



# TRAIN SIMULATOR ROUTE EXPLORER

GokuMK

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# Train Simulator Route Explorer

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# Preface

## General Information

- MSTS is the Microsoft Train Simulator
- Open Rails or ORTS is an open source train simulator that can utilize MSTS Assets
- While Open Rails is a new train simulator that can use MSTS assets, it does not come with additional utilities, such as a Route Editor, Activities Editor or Consist Editor

## What is TSRE5?

- TSRE5 is Game Engine that is compatible with MSTS and Open Rails
- TSRE stands for Train Sim Route Explorer, the name I gave my "university homework"
- 5 is 5th version of this engine

## Who is behind TSRE5?

The TSRE open source project is the creation of Piotr Gadecki who often goes by the nickname "GokuMK" or "Goku" on the train simulation related forums. The Source Code for TSRE5 is maintained by GokuMK on GITHUB at <https://github.com/GokuMK/TSRE5>

## What can the TSRE5 program do?

The functional components of TSRE5 are:

- Route Editor
- Track Viewer
- Activity Editor
- Consist Editor (Which is enabled using a command line option with TSRE)

## Why does TSRE5 exist?

Open Rails needs developer utilities. MSTS needs utilities that are not stuck in the 1990's. TSRE can solve these issues.

The utilities supplied with the Microsoft Train Simulator have always seemed a bit unpolished and in general have had to some unusual behaviors. These behaviors include crashing at various times while editing or the random corruption of data files that can possibly lose you hours of work.

The TSRE5 application attempts to resolve some of these *new needs* and *legacy issues* by creating a brand new Route, Activity and Consist editor from scratch. It is fully compatible with the files created and used by the original MSTS utilities.

The TSRE5 application is for content developers who wish to create or edit routes, consists and activities for Open Rails or MSTS.

# How to Download TSRE5

The latest version of TSRE5 is always available for download here: <http://koniec.org/tsre5/data/?C=M;O=D>

For example, you would download: [http://koniec.org/tsre5/data/TSRE5\\_v0.6955.exe](http://koniec.org/tsre5/data/TSRE5_v0.6955.exe) as of January 2018.



If you have 32 bit Windows (usually for use with an older computer), you would download: [http://koniec.org/tsre5/data/TSRE5x32\\_v0.6951.exe](http://koniec.org/tsre5/data/TSRE5x32_v0.6951.exe)

## Installing TSRE5



While the download file is an installer of sorts, it is not a "Windows" installer. The program will run from where ever you placed it so make sure you place the downloaded file where you want TSRE to permanently run from.



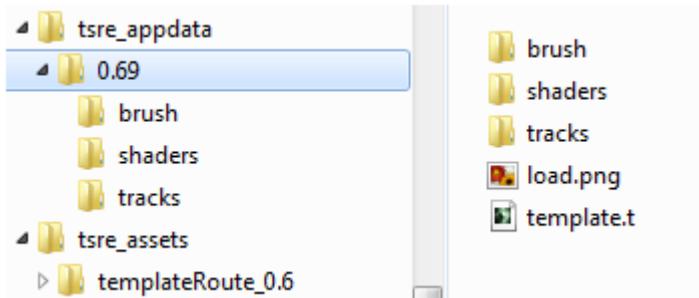
If you install your MSTS into \Program Files\ or \program Files (x86)\ expect problems due to Microsoft Security. TSRE will not operate correctly in a **system** managed folder like these. You must place the **EXE** somewhere else, like maybe a new folder you that you name **C:\Programs\TSRE\**.

Run the **EXE** file that was downloaded. The TSRE executable will download the additional application data from the server.

### Manually Installing the additional TSRE application data

If the automatic installation download doesn't work for you (for instance, if you have Windows XP or no internet connection), download latest ZIP version from here: <http://koniec.org/tsre5/data/appdata/> and then unzip into the desired directory location **tsre\_appdata**:

### What gets installed by the additional download?



Example Path to the shader directory: **./tsre\_appdata/0.69/shaders/**

If TSRE isn't working right, check to see that your installation folders look similar to this.

## Linking TSRE to Your Simulator Files

For TSRE to operate properly, you need to have some pre-existing simulator data folders on your computer. This is referred to as **gameRoot** in this document.

Possible **gameRoot** locations are:

- The MSTS root (Where **train.exe** is located)
- An Open Rails installation profile
- A Mini Route directory

## Preface

- Any other Directory that has "global", "routes" and "trains" directories inside.

## Linux

You can also download a Linux native version. The Linux release is only available as a 64 bit version.

The Linux version requires all of the files and directories that are located under the Root Directory, (gameRoot), to have lowercase names only. Windows is generally a case insensitive operating system when it comes to file names, so `texture.ACE` and `Texture.Ace` refer to the same file in Windows. This is not true with Linux.

For example, in an `.s` file there might be a reference to `TEXTURE.ACE`, but in the hard drive it is named `Texture.ACE`. Linux does not see these as the same file. To deal with this issue, the Linux TSRE program always looks for only lowercase file names.

An example script to change all the filenames lowercase on Linux would be:

```
rename 's!/([^\/*]*/?)$!\L/$1!' **/*
```

*(It might require running it several times).*

There are also Windows based tools like "Bulk Rename" [http://www.bulkrenameutility.co.uk/Main\\_Intro.php](http://www.bulkrenameutility.co.uk/Main_Intro.php) that can process the files before being moved to a Linux platform.

# How to Manually Configure TSRE5

Persistent Settings for TSRE can be managed using the `settings.txt` in the program folder where `tsre5.exe` is located.



Configuring the `settings.txt` file is optional but it can be very helpful. Since the program is still under development, this list of options can change.

## How does `settings.txt` work?

Setting	Function
#	Any line that starts with a <code>#</code> character is a "Comment" line and its contents are ignored.
<code>allowObjLag = 1000</code>	As above. Lower value may be better for HDD. Higher value increases loading speed on startup but requires SSD.
<code>cameraFov = 20.0</code>	Route Editor Camera field of view.
<code>cameraSpeedMax = 3</code>	High Speed Preset
<code>cameraSpeedMin = 15</code>	Slow Speed Preset
<code>cameraSpeedStd = 0.20</code>	Normal Speed Preset
<code>cameraStickToTerrain = true</code>	Camera will stick to ground level and follow terrain
<code>ceWindowLayout = CU1</code>	Gui Setting
<code>colorConView = #FF0000</code>	Consist Viewer custom background color.
<code>colorShapeView = #00FF00</code>	Shape Viewer custom background color.
<code>consoleOutput = false</code>	Set this to true if you want log printed on console. It will output to a file named <code>log.txt</code> . <i>It seems to not be working in the current version</i>
<code>defaultElevationBox = 0</code>	[values 0 - 3]
<code>defaultMoveStep = 0.25</code>	[default 0.25]
<code>deleteTrWatermarks = true</code>	Set this to true if you want to delete
<code>TrWatermarks</code>	objects in <code>.W</code> files on save.
<code>deleteViewDbSpheres = true</code>	Set this to true if you want to delete ViewDbSpheres objects in <code>.W</code> files on save.
<code>fogColor = #80C0FF</code>	Ambient Fog settings - Color
<code>fogDensity = 0.55</code>	Ambient Fog settings - Density
<code>fpsLimit = 0</code>	Set FPS limit. Default 0 = no limit.
<code>gameRoot = F:/train simulator</code>	If you don't want to specify a root directory each time you start the application, enter the path to your desired MSTS/Open Rails directory.
<code>geoPath = F:/hgst</code>	Enter the path to directory where you have <code>.HGT</code> files stored if you want to use the terrain height data import in Route Editor.
<code>GoogleMapsKey = AlzaSyB1whjhasdshkashdasdhaskdt1Et9g4</code>	Enter your Google Maps API key here to use satellite Imagery
<code>ignoreMissingGlobalShapes = true</code>	hide unavailable global shapes

<code>imageMapsUrl = http://maps.googleapis.com/maps/api/staticmap?center={lat},{lon}&amp;zoom={zoom}&amp;size={res}x{res}&amp;maptype=satellite&amp;key</code>	Universal URL setting for using google maps
<code>leaveTrackShapeAfterDelete = false</code>	Set to true if you want to manually fix broken TDB vectors in Route Editor. <i>Only for advanced users</i>
<code>mainwindowslayout= PWT</code>	Default, Other options include "TWP", "PTW", "WTP" etc. Using just "W" will make all windows be separate.
<code>mapImageResolution = 2048</code>	use multiples, IE; 2048,4096,8192 etc
<code>maxObjLag = 10</code>	Number of new loading threads/frame. IMO, for HDD best value is 2. Lower value for older HDD and CPU, higher for SSD and better CPU.
<code>mouseSpeed = 0.5</code>	Control mouse movement speed
<code>objectLod = 4000</code>	View distance in meters. <code>tileLod = objectLod/2000 required</code> . The default for the MSTS Route Editor is <code>tileLod = 1, objectLod = 2000</code>
<code>oglDefaultLineWidth = 1</code>	Bounding Box Line Width Value Adjustment
<code>renderTrlItems = true</code>	Set to true if you want to see TDB items. <i>Only for advanced users</i>
<code>routeName = cmk</code>	Place a route name here if you want to skip the Load Window and instead use this route on startup.
<code>snapableOnlyRot = [true or false]</code>	True or False, Stick to track property
<code>startTilex = -5306</code>	Optional Route Editor Start Tile X position. This overrides the route settings in the TRK file
<code>startTiley = 14961</code>	Optional Route Editor Start Tile Y position.
<code>systemTheme = true</code>	Set to true if you want to use a system theme instead of the default dark one.
<code>tileLod = 2</code>	Tile view distance. 0 = 1x1 tiles, 1 = 3x3 tiles, 2 = 5x5 tiles etc. The default MSTS value is 1.
<code>toolsHidden = true</code>	Set to true if you want to hide all tools in the Route Editor.
<code>useImperial = false</code>	Set to true if you want to use miles instead kilometers etc. <i>Does not work currently</i>
<code>useNumPad = true</code>	Set to false if you have keyboard with no numpad 0-9 keys.
<code>UseQuadTree = false</code>	= Disable or Enable the new renderer.
<code>warningBox = true</code>	Set to false if you don't want warning window on startup.
<code>writeEnabled = true</code>	Set this to false if you want to disable all Save functions.
<code>writeTDB = true</code>	Set this to false if you want to disable the Save Track Database functions.

# Route Editor

## Before Getting Started

*Some comments in case you just jumped right to this section*

To start working with the Route Editor you need to:

- Have downloaded and run the TSRE5 application
- Have at least one train simulator **gameRoot** or **Root Directory** to refer to



A **gameRoot** must be one of the following items:

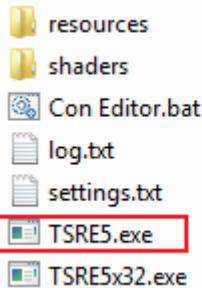
- An MSTS root directory
- An Open Rails installation profile
- A Mini Route directory
- Any other Directory that contains populated "global", "routes" and "trains" folders



If you haven't done this by now, please make sure that you are running any instances of MSTS outside of system managed folders like `c:\program files(x86)`. This means that you didn't accept the default folder options when installing MSTS from CDROMS. It is recommended that a root directory for MSTS be used, like `C:\MSTS`. This installation location would be one of your possible **gameRoot** locations.

## Overview

- (*Optional*) Set the **gameRoot** value in the application settings to your desired Root Directory. See: [How to Manually Configure TSRE5](#)
- Open `TSRE5.exe`, or `TSRE5x32.exe` if you are using a 32 bit version of Windows



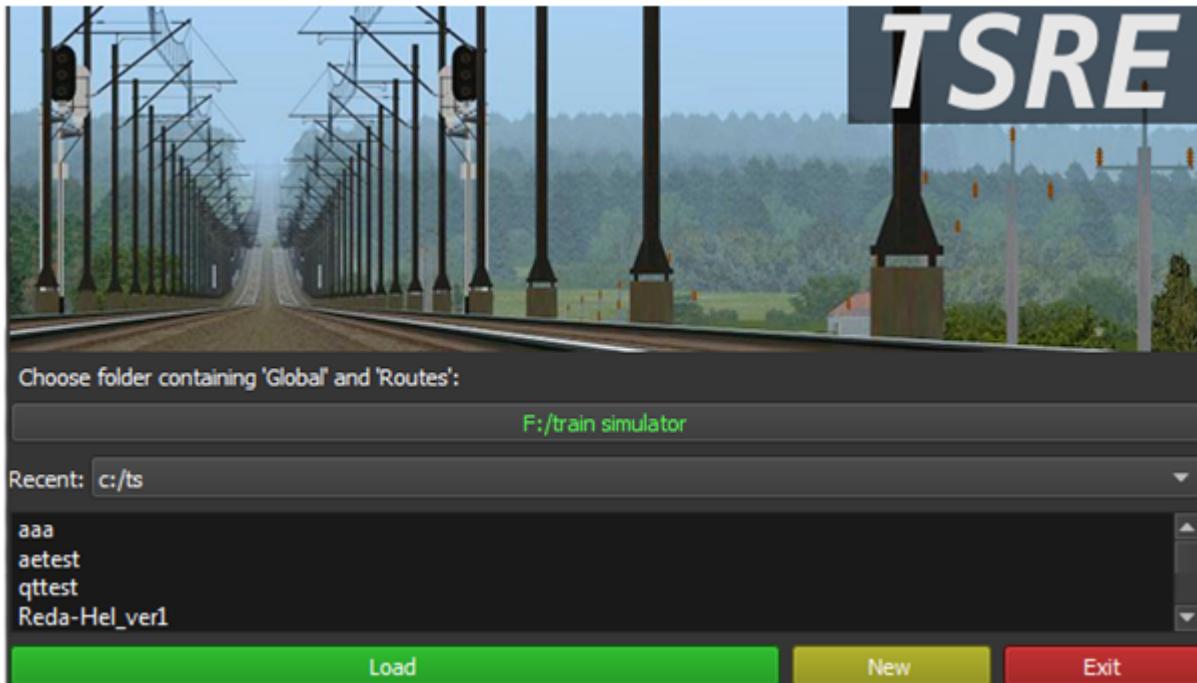
If you have properly set up the **gameRoot** settings then the Route Editor is ready to use.

# Starting a Session

If you want to use the Route Editor, simply open the TSRE5 application. By default, the **Route Editor** features will be available. The **Activity Editor** is also available from within the Route Editor.

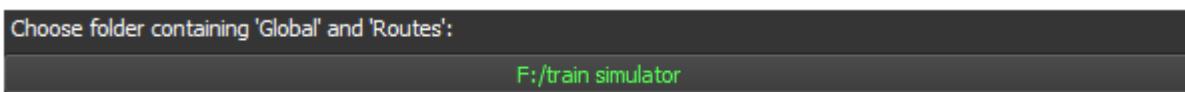


If you want to use **Consist Editor** however, you need to use the **ConsistEditor.bat** file to start a Consist Editing session.



## Loading a Route

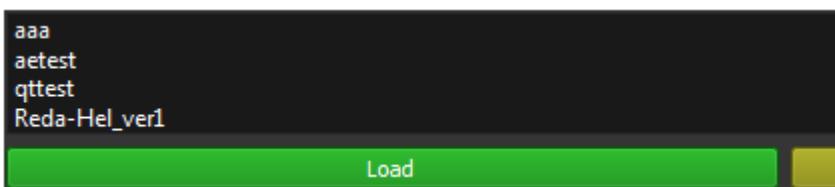
If you have not defined a default "gameRoot" setting, you will need to click the **browse** button and select your game directory every time that TSRE is loaded. It can be any directory that contains **Routes**, **Trains** and **Global** folders such as the standard MSTS installation folder, or a mini route folder.



You can also select from your "recently used" folders if you have had previous Route Editor sessions.

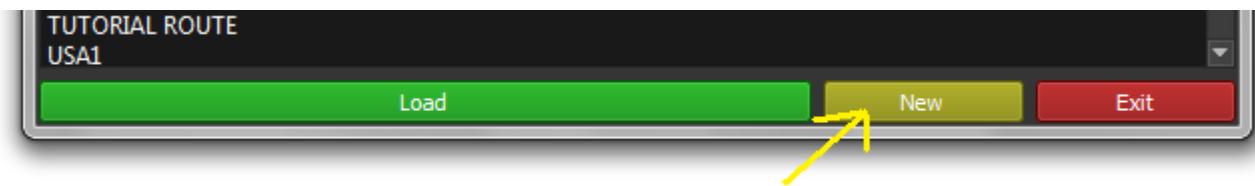


Select the route you want to edit and click **Load**



# Creating A New Route

Click the **New** button

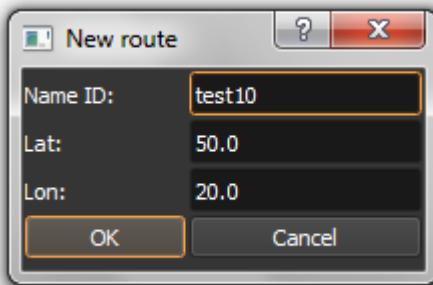


Enter the name to use as a **Route Name ID**. This will become the route's directory name and is used for the naming of key files. It is a good practice to enter a short, lowercase name with no spaces.

Enter the Latitude and Longitude of the World coordinates where you want to start the new Route. If it will be a fictional route, you can use default values.



The values entered need to be valid Latitude and Longitude coordinate values, otherwise Route Editor will crash.

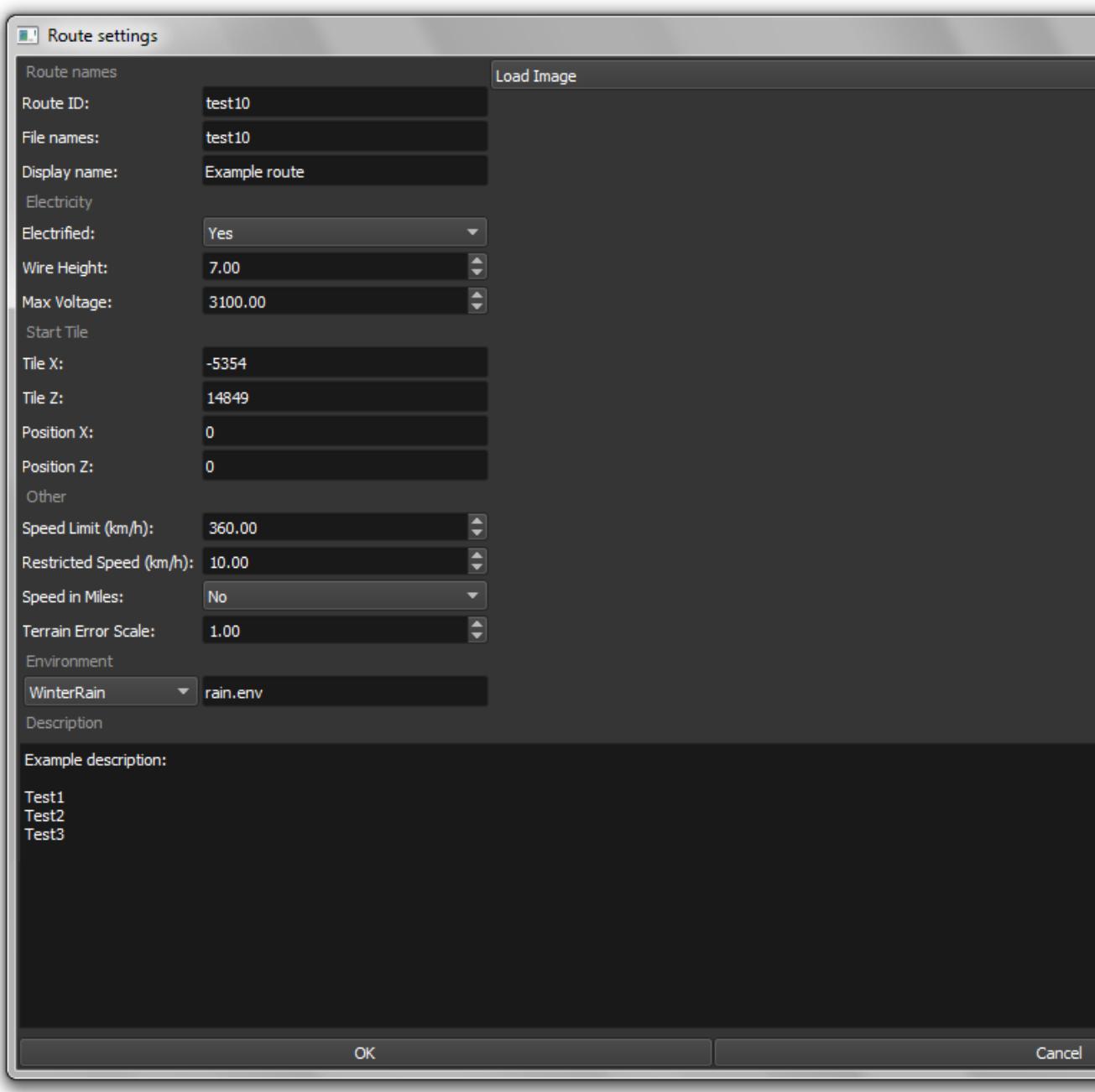


To find the Latitude and Longitude of the location you want to work in, you can use Google Maps.



Click **OK** button.

You can now edit the Route Settings. You can also click **OK** here and come back to update these values later.

**Display name**

The Route name.

**Description**

The Route description.

**Electrified**

Yes/No option to choose if tracks have electricity.

**Wire Height**

The overhead line height.



The default MSTS/Open Rails wire is visually unpleasing and many route builders ignore this value.

**Max Voltage**

The overhead line voltage.

*Start Tile*

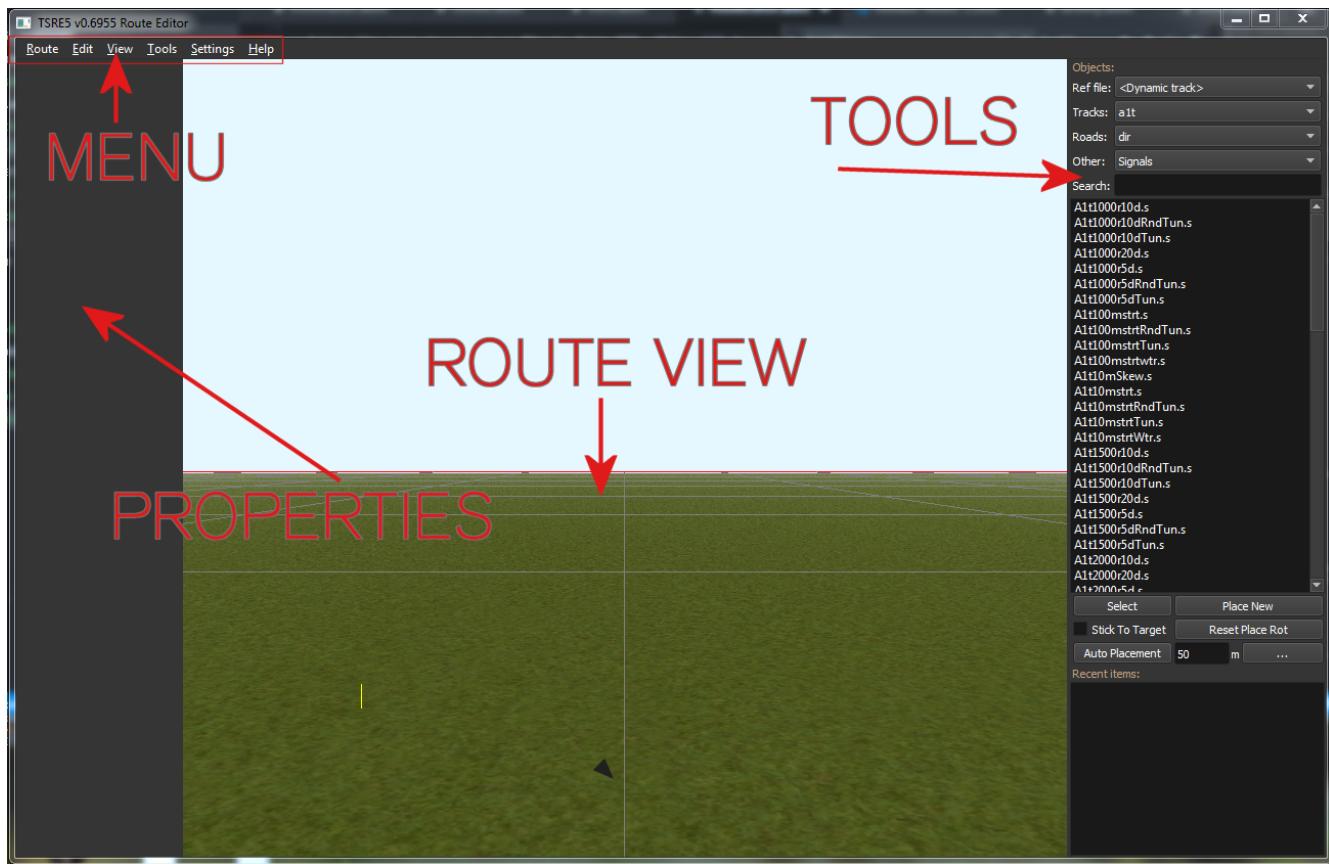
The Route Editor will start at this world position. Changing these values is not recommended while creating new route.

[IMAGE]how to use image::images/ren4.png[]

You can now begin editing your new route.

# Getting Around in the Route Editor

## Main Window



## Menu

**Route → Save**

Save changes.

**Route → Create Paths**

Delete all existing paths and create new simple paths for each track end node. You can use it to test route in OR without manually creating paths. If route has custom paths - make backup first!

**Route → Edit Route settings**

edit route settings (TRK file) in new window.

**Route → Exit**

Close the route editor.

**Edit → Copy**

copy selected object (ctrl+c).

**Edit → Paste**

paste selected object (ctrl+v).

**View**

show/hide route objects.

**Tools → Properties**

show/hide properties tab.

**Tools→NaviWindow**

show/hide navigation window.

**Tools→F1 - Tools→F12**

choose a tool-set to work with.

**Help→About**

show app info.

## Properties

Shows the selected object's properties.

## Tools

Tools you can use to edit your route. The list adjusts to context.

## Route View

Shows the route visuals.

# Using the Editor

F1 … F12

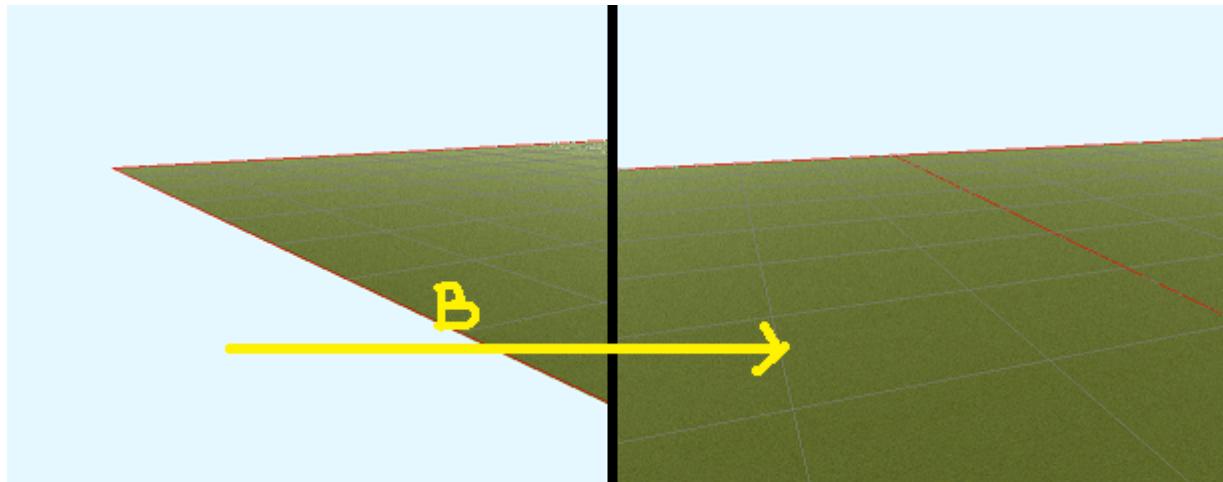
Choose a tool-set.

Ctrl-Shift-S

Save the route

B

Create new Tile at current position



## General Navigation

### Navigating Keys

AWSD (*and Arrows if UseNumPad=False in 'settings.txt'*)

Move left, right, front, back.

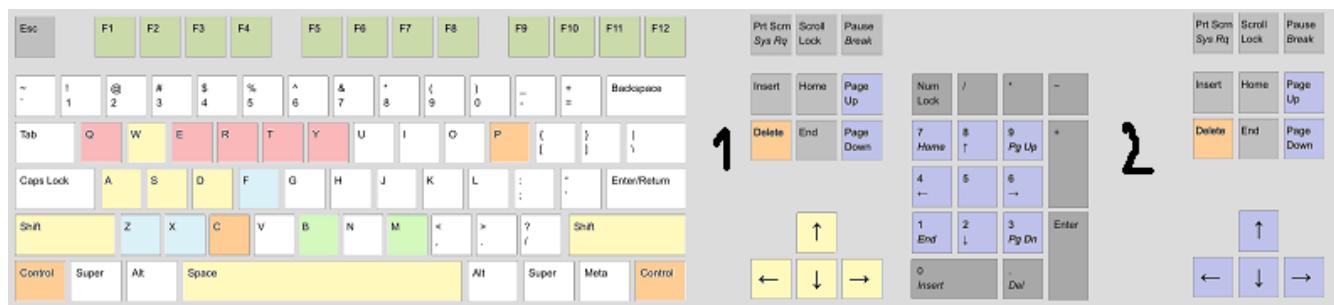
- Min Speed is keyboard arrow keys + SHIFT key.
- Std Speed is keyboard arrow keys.
- Max Speed is keyboard arrow keys + CTRL key.

See Camera Speed Presets in [How to Manually Configure TSRE5](#)



Press left mouse button and move mouse to look around.

## Keyboard



Keyboard has two layouts depending on the setting in the `settings.txt` file.

1. If `useNumPad = true` TSRE assumes you have a number pad
2. If `useNumPad = false` TSRE assumes you will use the Arrow Keys



Remember: `Ctrl + Z` will **Undo** the last operation

## Navi Window

The Navi Window is a separate movable window that allows coarse adjustments of position with the Route Editor. It can take input from Traditional Marker Files (MKR), Google Earth Keyhole Markup Language (KML) files and Open Street Map (GPX) files.

If desired, it will accept Latitude and Longitude values or any existing Route entities that have been defined.



### Using Lat/Long, Marker files, GPS position files, or object placements in the Navi Window

#### Example 1

Select a file from the pull down list in the navi windows (You can use MKR, KML, GPX) and select item from the file for a location to go to. See [Making Realistic Routes Using GEO Data](#)

#### Example 2

The Navi Window will show the current world Lat/Long position. You can enter a specific Lat/Long position you want to go to

#### Example 3

Select a category from the categories list, like **Route: Sidings**. Select a **siding**.

When you have entered the desired position you wish to be moved to, Select **Jump** to go there.



The Navi Window will also show the current tile object count and removed object count.

# Working With Objects:

**Q**

Place a new object.

**Ctrl + Q**

Toggle the "manual/auto" **add track to TDB** option (use Z key for manual).

**Shift + Q**

Change the placement mode: stick only to terrain / stick to everything.



## Object Placement Keys

**E**

Select

**R**

Rotate

**T**

Translate / Transform

**Y**

Scale. Use for example with transfers, dynamic tracks

Numpad keys + pgup / pgdown

Use for **R/T/Y** if in keyboard layout 1 mode.

Arrows and pgup / pgdown

Use **R/T/Y** if layout 2.

**X**

Flip

**Ctrl**

Change **R/T/Y** step slower.

**Alt**

Change **R/T/Y** step faster.

**H**

Adjust object position to terrain.

**N**

Adjust object rotation to terrain.

**P**

Pick object. You can pick existing object and place it in different place

**CTRL**

Holding **CTRL** while "picking" will allow selection of multiple items

**C**

Clone object. Creates object duplicate at the same position.

**Delete**

Delete selected object.

**Mouse Scroll Wheel**

Raise/Lower object after placing

## Track Keys

**Z**

add selected track to TDB.

**X**

change new track position. Use before Z.

**F**

adjust terrain to track. Use after Z. See more: Editing terrain.

## Terrain Keys

**Z**

change the terrain 'height-map' painting direction: + or -

/

Toggle Terrain Collision mode.

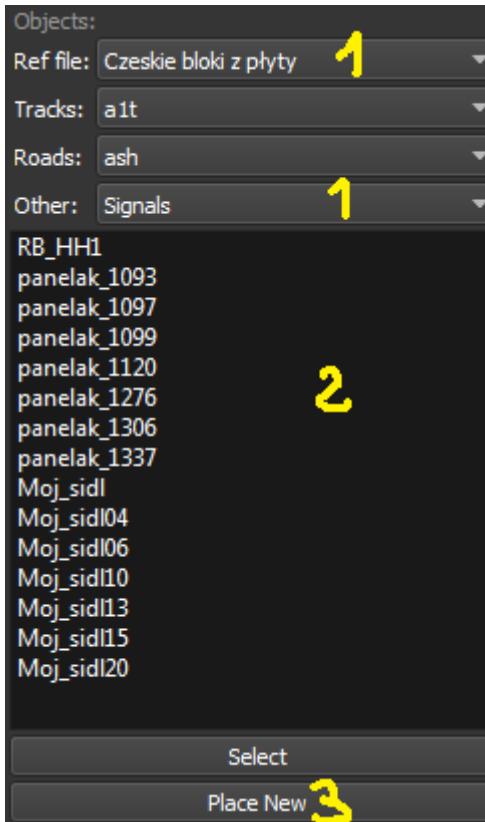
CTRL

Auto-Paint Mode

# Placing Objects

How to place objects?

1. Select object type you want.
2. Select shape you want.
3. Click **Place New** button or **Q**



Click on the ground where you want new object.

You can use the Mouse Scroll wheel to Raise or Lower object after placing



Remember that using **Shift+Q** you can change placement mode between **stick only to terrain** or **stick to everything**.

## Selecting Objects

You can select all objects using Select Tool. Enable it using:

- **E** key
- Right click → **Select**
- Edit Menu → **Select**
- Select button in **F1 Object Tools**

Press and hold **CTRL** while selecting to select multiple items

## Manipulating Objects

- **E** key
- Right click → **Select**

- Edit Menu → **Select**
- Use the **R** key to Rotate, **T** key to Transform, **Y** key to Scale
  - a. You can select object and move it around using mouse. Use mouse wheel to raise or lower its position.
  - b. You can perform advanced translation by pressing **T** and using **4,6,8,2** keys• to move in X and Z Axis, and **9,3** keys to move in Y axis.
  - c. You can adjust object rotation by pressing **R** and using **4,6,8,2** keys•.
  - d. You can press **Ctrl** to change RT step.



- Depending on your keyboard layout, you can use other keys. See: [Using the Editor](#)



When you rotate an object by use of the Copy/Paste or Transform button, be sure to re-select the object (even though it appears to be selected (blue outline)) by using the 'E' key or the **Select** Button. This is to allow you to regain fine movement control when the **Ctrl** Key is pressed and held with the movement keys.

## How to duplicate objects

There are multiple options for object duplication

- Select object and press **Ctrl+C**, find place you want new object and press **Ctrl+V**
- Press **C** to clone object and make duplicate at the same position.
- Press **P** to pick object. Now you can click **Place New** button and place this object in a new location.

## How to delete objects

- Select the object and press **Delete**.

## Working with Track sections

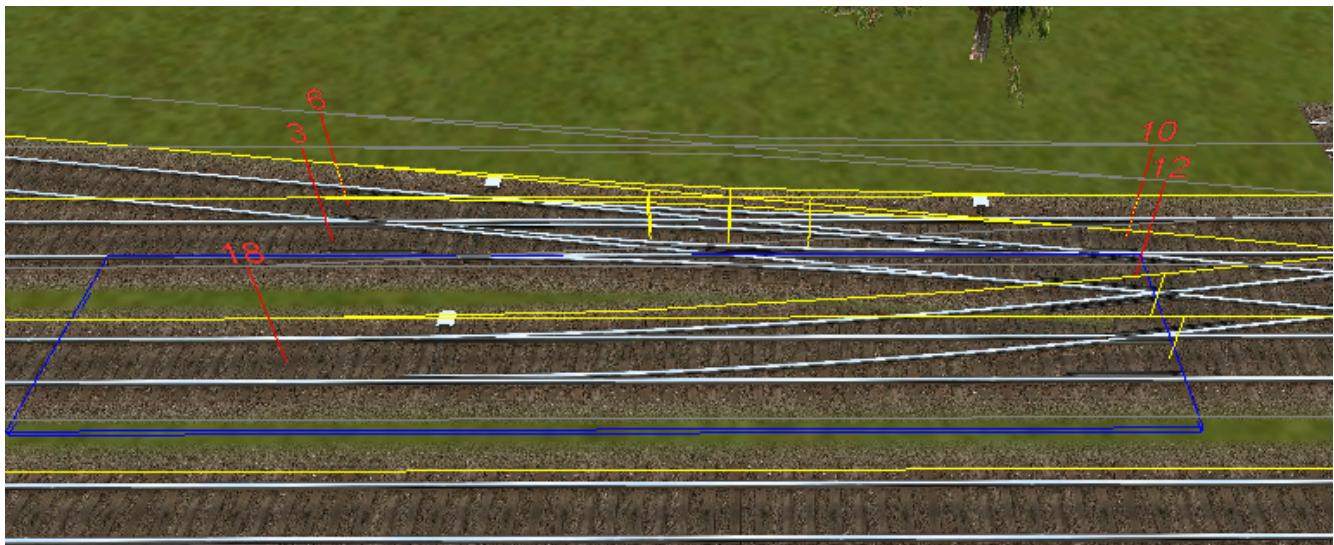
1. Place track
2. Adjust dynamic track properties
3. Save w/no TDB lines
4. Re-select track
5. Press **Z** for TDB
6. Save

## Copying Tracks

You can duplicate an existing track by find the one you want, selecting it and then pressing **P**.

Now you can click **Place New** and place this track at another location.

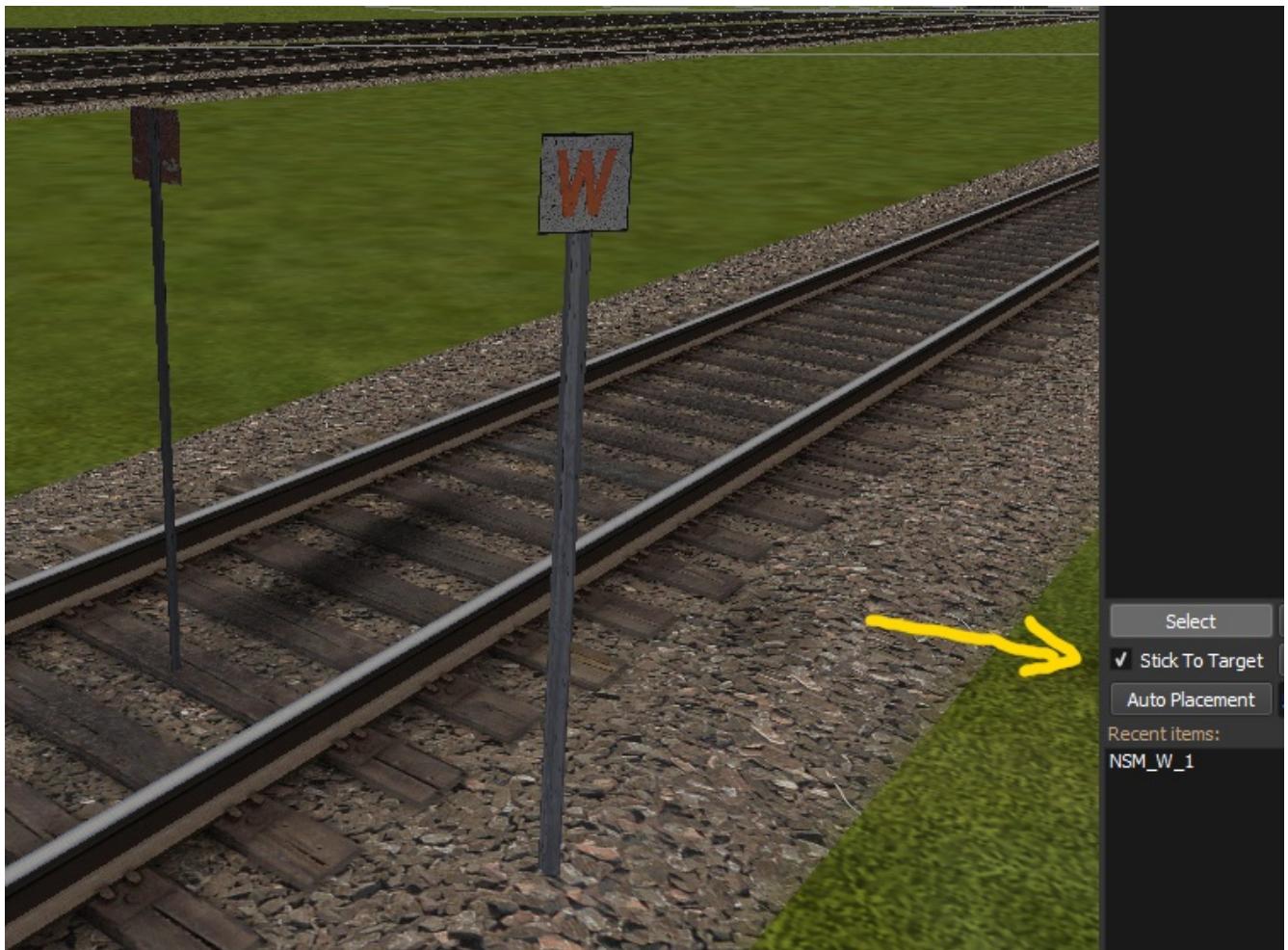
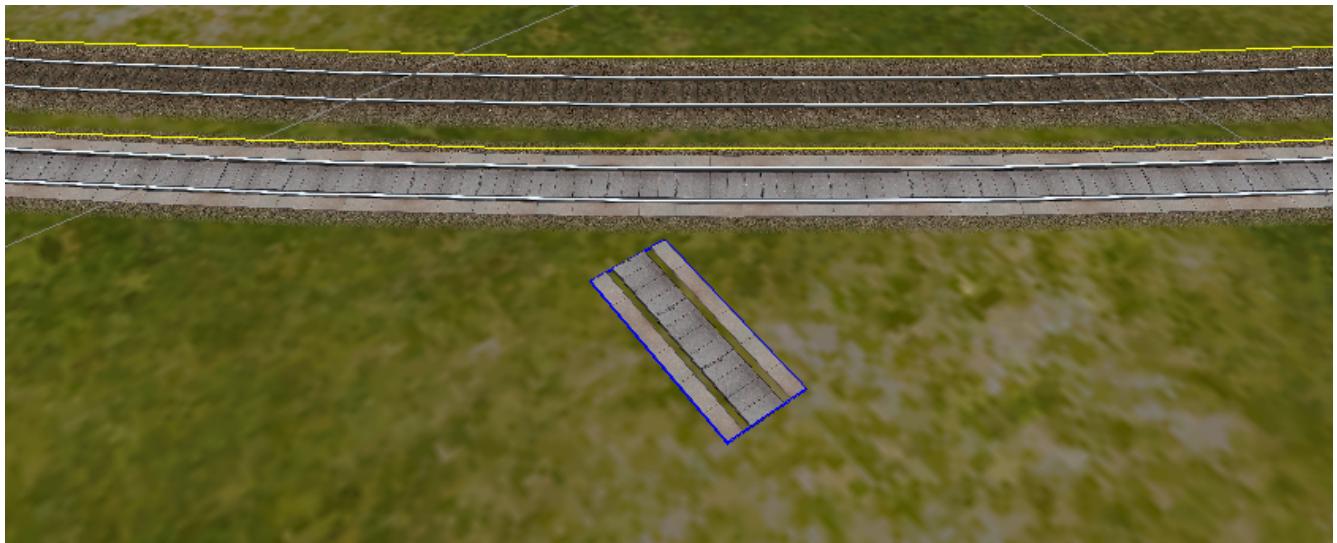
You can also select track and press **Ctrl+C** to copy it and then move to the location where you want add the new track and press **Ctrl+V** to paste it.



## How to align objects to track

### Stick to track method

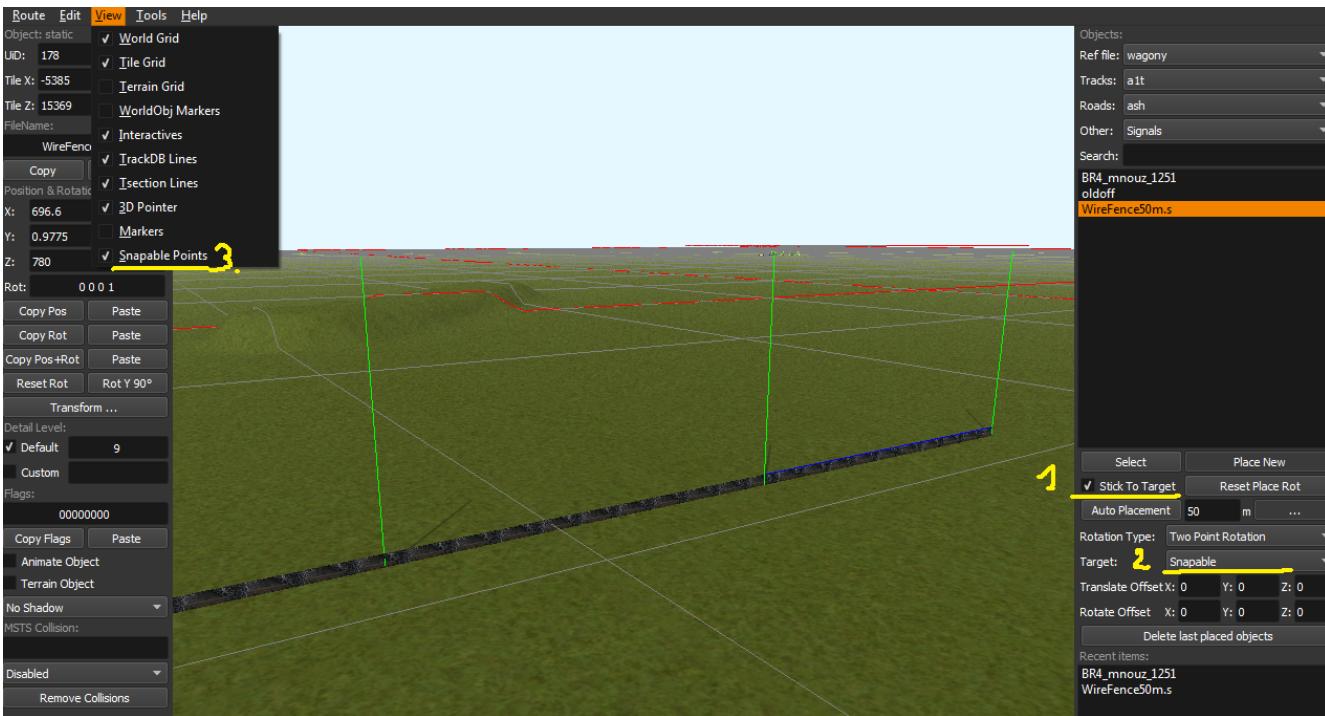
- Click **Stick to track** checkbox.
- Click **Place New** button and place object you want on a track you want to align.



### Stick to Target

1. Enable **Stick To Target**
2. Select "Snapable" target

3. If you want to see snapable points, you can enable **View→Snapable Points**
4. Place new object near snapable point. It will be adjusted to adjacent shape



For use when you need to align ANYTHING to track.

- Place a Check in the **Stick to Target** box.
- Any object placed within the distance specified in the **Snappable max radius field** •, will align to the track.
- Set the size radius smaller to align objects in crowded areas.
- *This is set in the Target Field Default setting is Tracks*



This sure makes placing track-side equipment, bridges, platforms, gantries easy, even on curve!. Placed items will follow (align to) the track grade. If the alignment is off by 90 degrees, use the **Rot Y 90** button. The correct gradient will follow the rotation!



Signals will automatically align to the track when placed except for direction. Use **Flip** or **X** to change direction.

## Copy Rotation

- Select track you want to get the rotation from.
- Click **Copy Rotation** button.
- Select object you want to set the rotation.
- Click **Paste Rotation** button.



## Object Panels

### Static Objects

#### Forests

#### Transfers

#### Platforms and Sidings

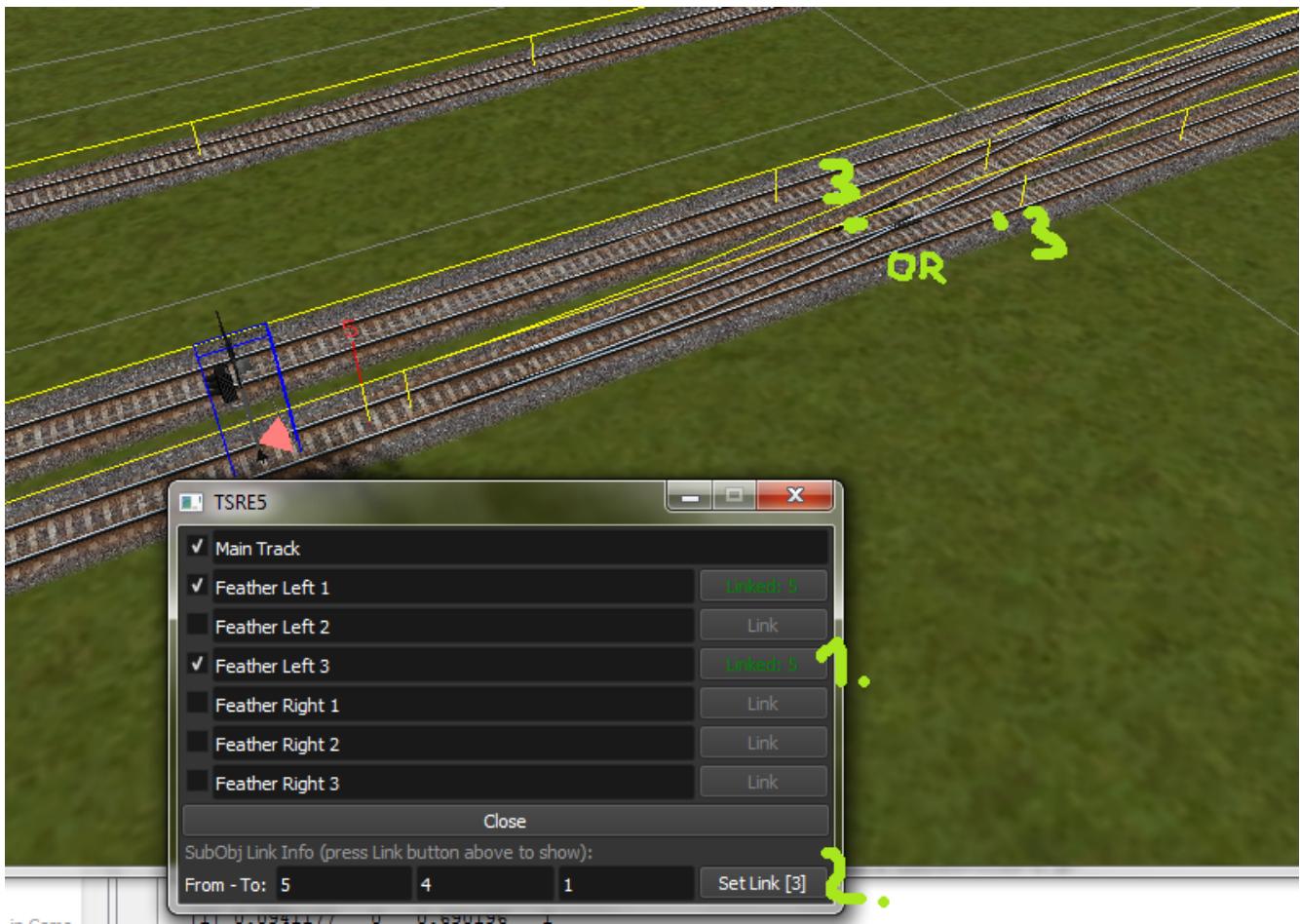
#### Carspawners

#### Level Crossings

#### Signals

##### Linking Signals

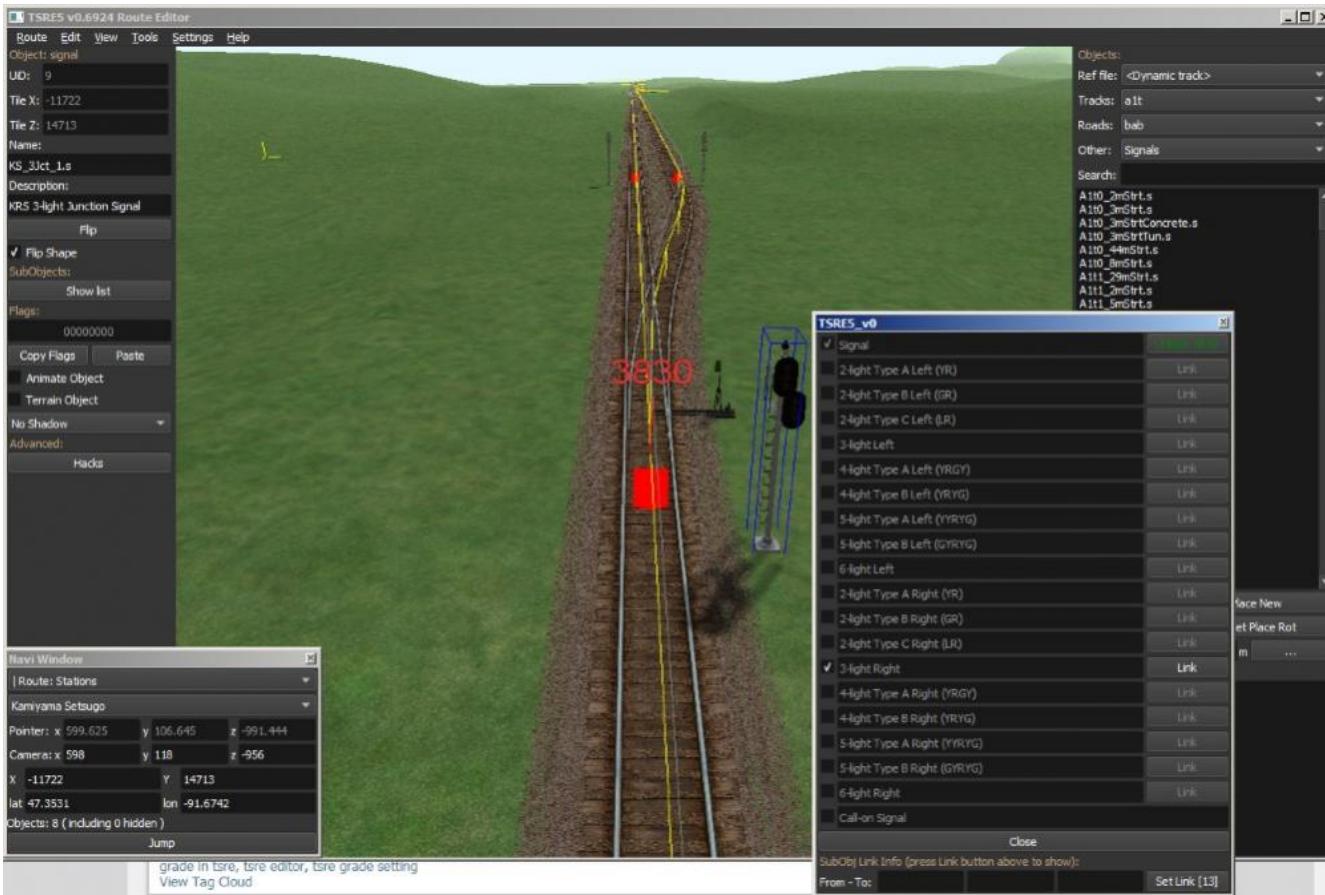
1. Click 'link' button.
2. Click 'set link' button.
3. Click on track (siding for example) you waypoints



Be sure the pointer (cursor) is set to **Stick to Anything mode**. **Shift+Q** toggles the selection.

TSRE's method of linking signals is quite intuitive, but can be daunting for the uninitiated. Here are some lessons learned.

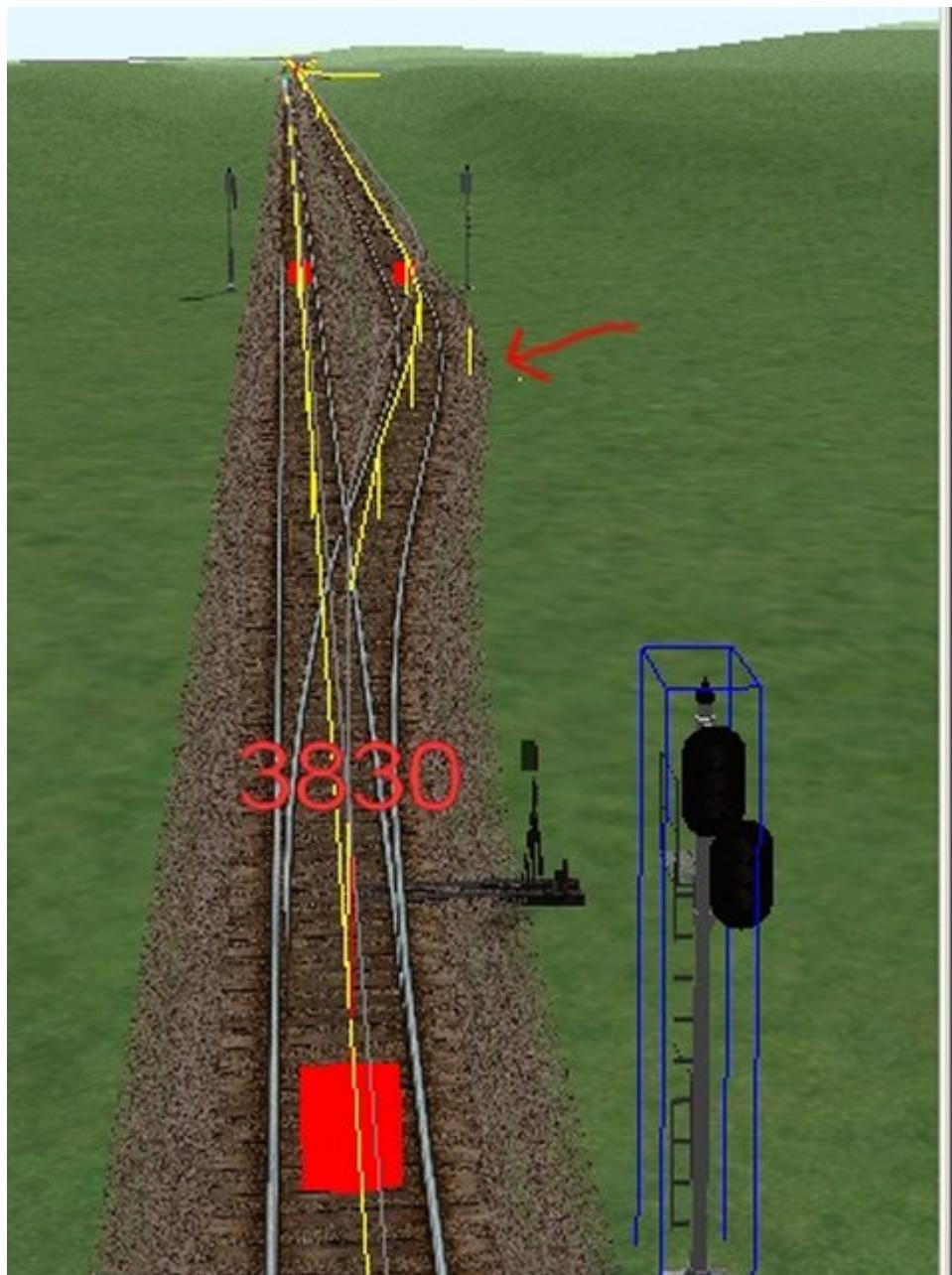
### Easy Junction



1. Locate pointer on the track and place the signal. A red marker and signal object appear. Flip with X if necessary.
2. Click the Show list button.
3. Click the Link Top Head checkbox. A check in the box appears and the Link button enables.
4. Click the Link button. The Set link button enables. The fields are blank.
5. Click on the Set link button.
6. Click the switch exit track you want linked. Junction data appears in the Set Link fields.
7. Save

## Explanation

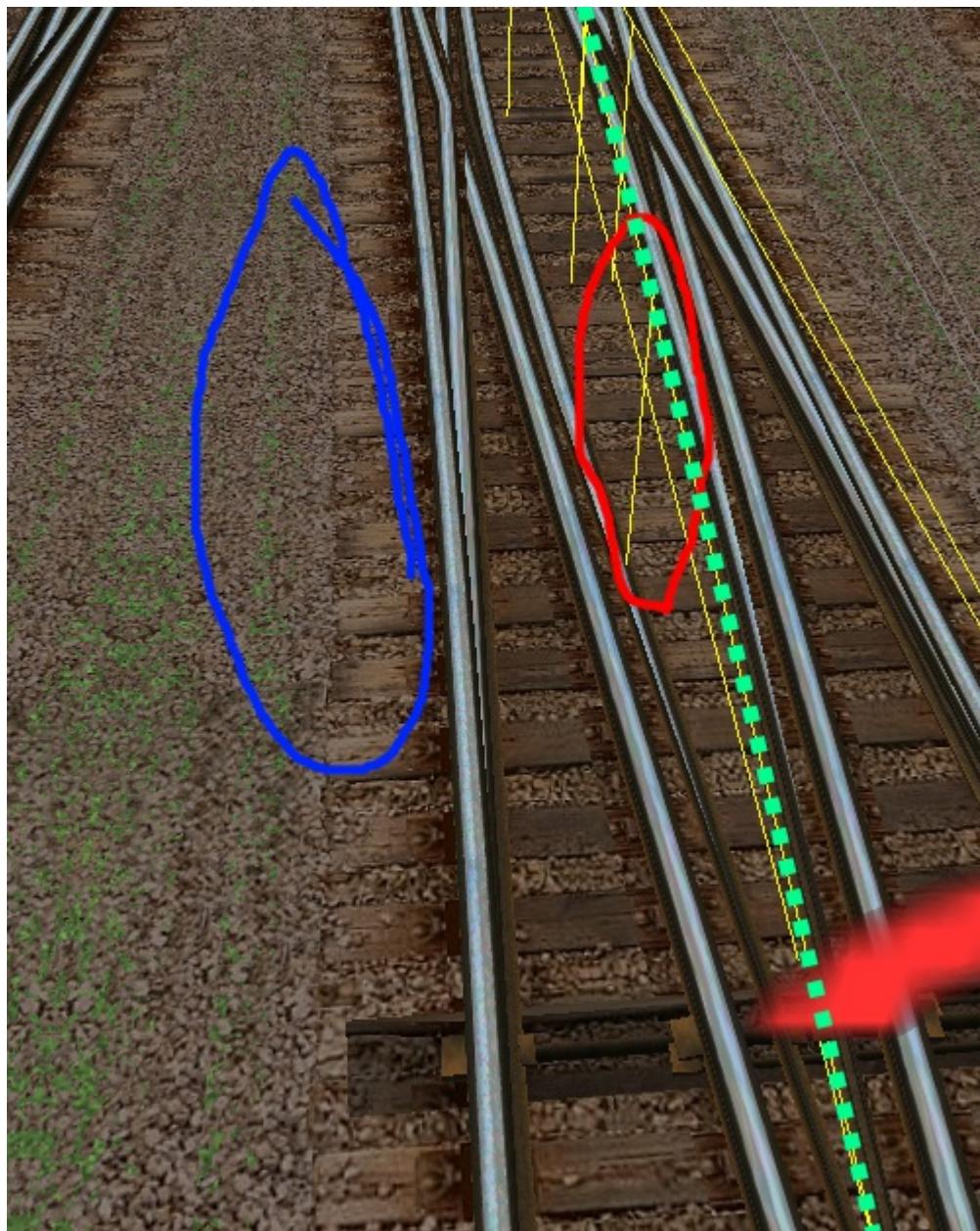
- Assuming you've placed your signal and know what you want linked, click on the button Show List on the left-hand side of the screen. A menu will pop up with all the signal's sub-objects on it. Select what you need. Note that unlike MSTS, you must actually click on the checkbox, rather than either the text or checkbox.
- When you're ready to link a route, click the Link button for that sub-object, which should no longer be greyed-out now that that sub-object has been selected. When you press the Link button, the Set Link button should now read Set Link [x], with x being the sub-object number assigned to it in the sigcfg file. That number is not otherwise indicated in the menu, but can be determined by counting from the top starting at 0 for the topmost one. In my case, it reads Set Link [13].
- When you have done this, click on the track where you want the link set. In my case it will be the diverging route. In the image below, a red arrow indicates where I clicked to set the link. If done right, a set of numbers will appear in the blanks in the SubObjLink info section next to the Set Link button. The two outside numbers will be switch or end-of-track nodes which will be visible in TSRE. These can be used, especially in tight quarters, to make sure you got the right track linked.



**Complex Junction**



Use above steps, but when clicking on links, especially for double slips, these are best practices. The red circle shows where I would link the through route on this switch. The **green** dotted line shows the **TSection** line for the through route, which will be a good guide to where to link that route. The blue circle shows where a diverging route can be selected on this switch. It works almost without fail, even in very tight spaces.



These guides will work on any switch, not just double slips.

## Speedposts

## Pickups

## Hazard Objects

## Soundsources

## Soundregions

# Editing Terrain

## How to edit terrain settings

Go to **Terrain Tools**. Menu Tools→Terrain or F2.

- Use **Fixed Height** button and click on tile if you want to reset its height map to fixed value.
- Use **Water level** button and click on tile if you want to set water level for tile.
- Use **Show/H Water** button and click on small tile if you want to show/hide water.
- Use **Show/H Tile** button and click on small tile if you want to show/hide it.



If you want to show a hidden tile - click on its "line".

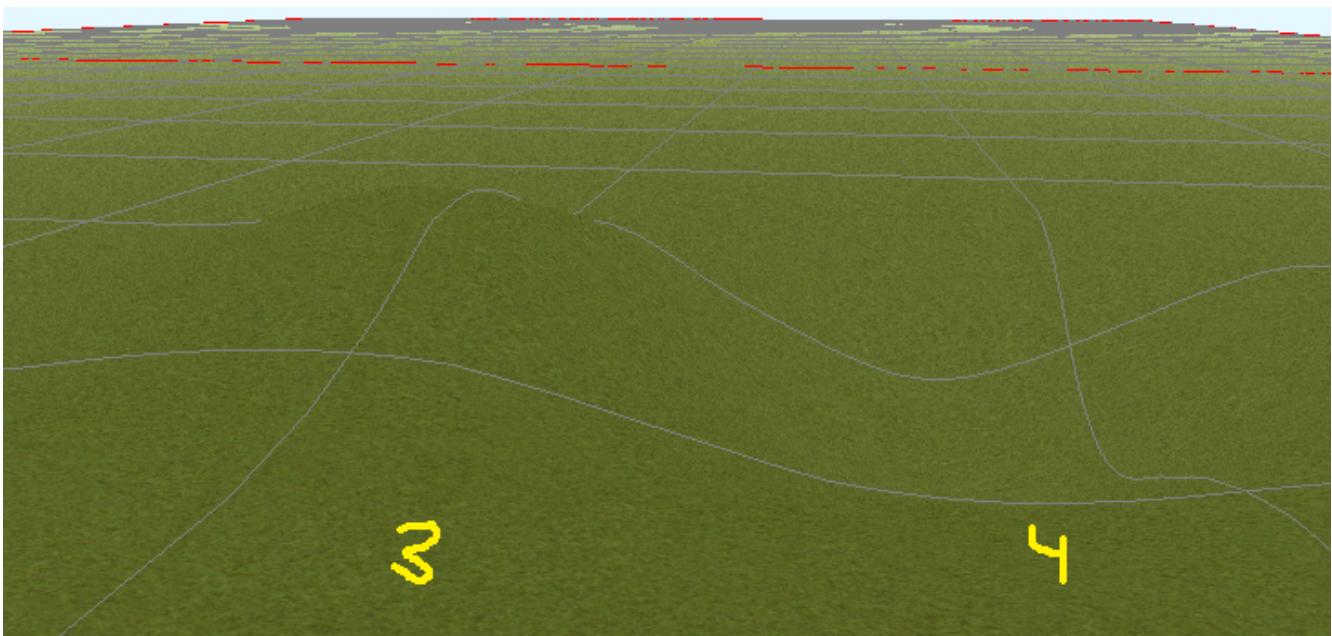
- If you want to make holes in terrain, use the **Gaps** button and click where you want it. You can use holes for tunnel entrances. If you want to fill the holes, show water first.



## Painting the Terrain Heightmap.

- Go to **Terrain Tools**. Menu Tools→Terrain or F2.
- Click **HeightMap** button.
- Click on terrain and paint using mouse.

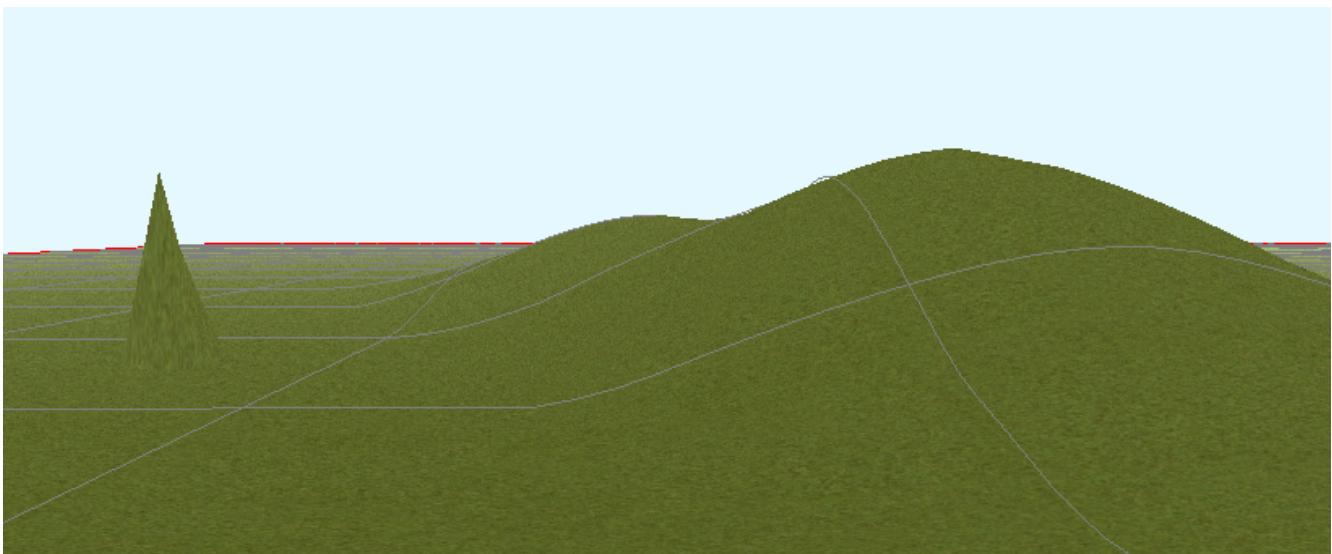
If you want to switch between making mountains and valleys, press Z



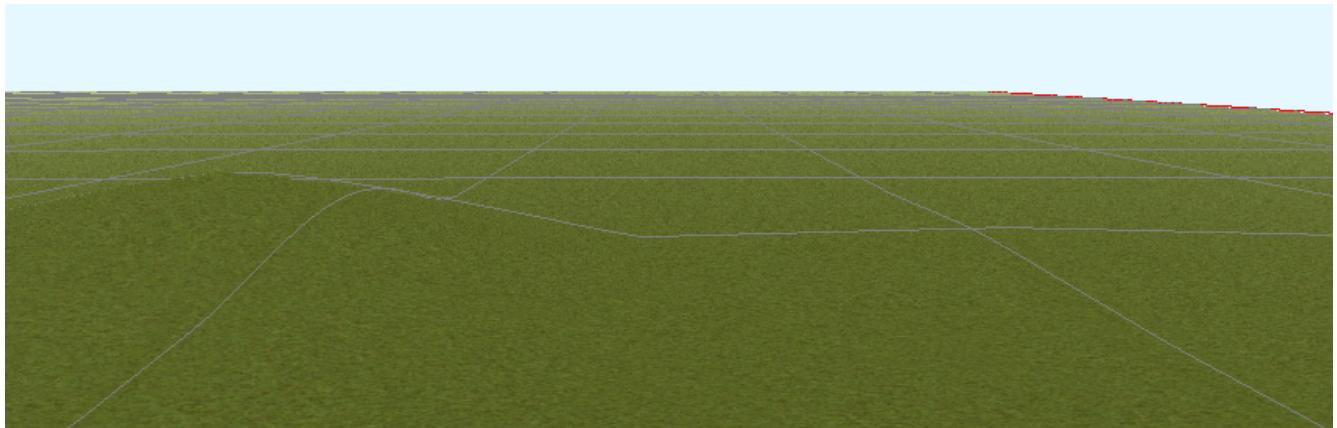
You can adjust settings:

Size:	1	<input type="checkbox"/>
Intensity:	100	<input type="range"/>
Fixed Height:	1	<input type="checkbox"/>
Height type:	Add - simple	<input type="button" value="▼"/>

#### A: Brush Size



#### B: Brush Intensity



**C: Brush fixed height** - it is used if Brush type = Fixed Height.

#### D: Brush type

- Add simple: current height += brush size × brush intensity
- Add if inside size radius: current height += brush size × brush intensity, but max value is brush size × brush intensity
- Fixed height: set fixed height
- Flatten: make current height closer to average value

#### For Fine Adjustments to terrain

- **F2** then Click on **HeightMap+** → **Brush settings:** **Size=1, Intensity=1**(this is fine setting)
- In the View Menu, Check **Terrain Grid** (it's easy when you can see the vertex's to position the cursor.)
- The **Z** key toggles terrain vertex up/down. It make it VERY handy when sliding cursor around with mouse and left finger on **Z** key.

Tapping left mouse does it. Sliding and painting with the cursor is really a nice feature, especially with larger brush (cursor) sizes.



Beware of terrain gaps . . . you can loose stuff, it falls though the hole if you dragging... bye bye... it's a long way down.



For a very fine adjustment of terrain you can use a track or a road section or just about any object to adjust and/or flatten terrain. However some objects/shapes produce some very strange terrain sculpting. The **Ctrl+Z** key comes in handy here.

## Painting Terrain Texture.

Go to **Terrain Tools**. **Menu Tools→Terrain** or **F2**.

### Putting textures on terrain:

1. Find some textures and place them in **routeDirectory/terrtex**.
2. Click **Load** button and select your texture from terrtex directory.
3. Click **Put** and click on small tile you want place this texture.
4. If you want to rotate the texture, click on small tile again.

You can use **Pick** button and pick a texture from the existing small tile instead of loading it from disk.

### Painting terrain textures:

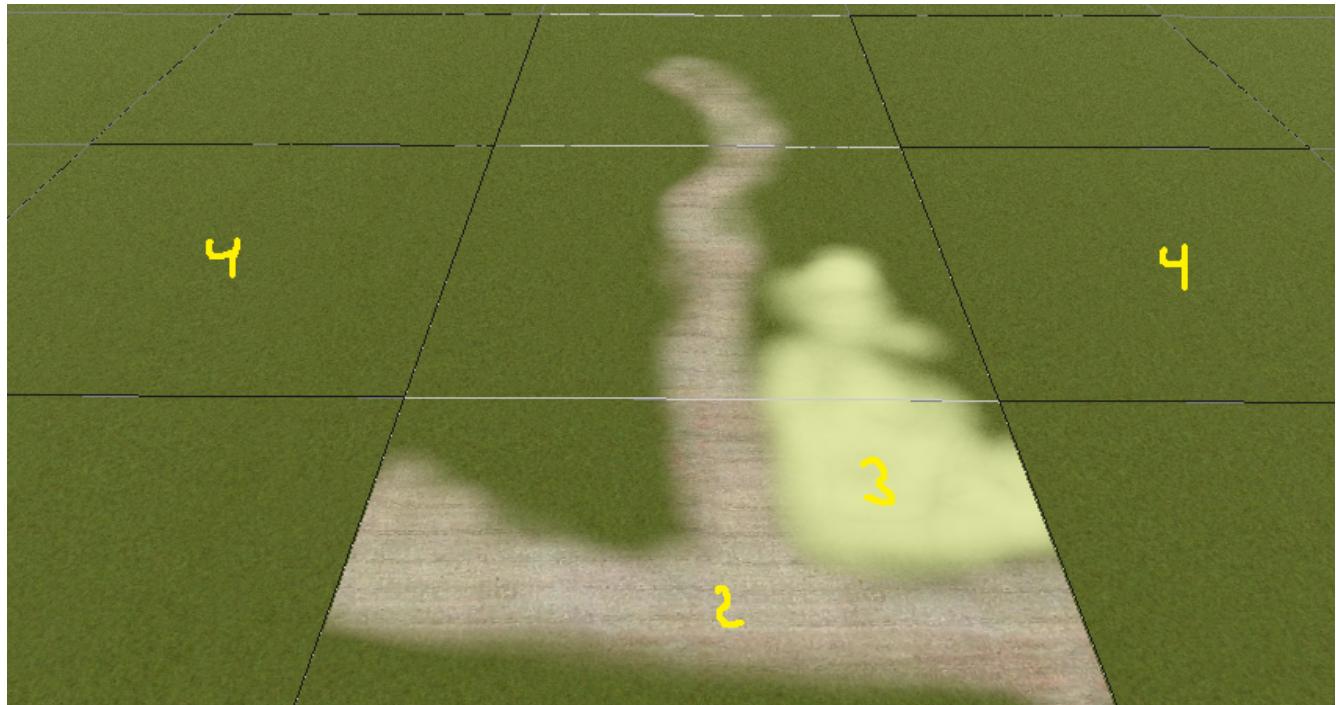
1. Pick or load texture you want to use as paint, or choose color from color window.
2. Click **Texture** button if you want to paint using texture.
3. Click **Color** button if you want to paint using color.



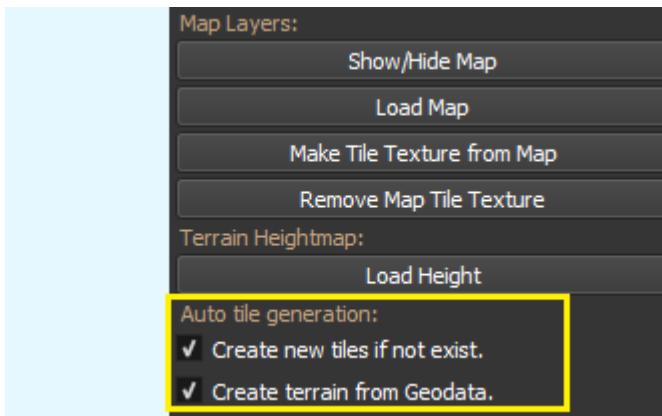
You can't lock small tile to avoid painting it by mistake.



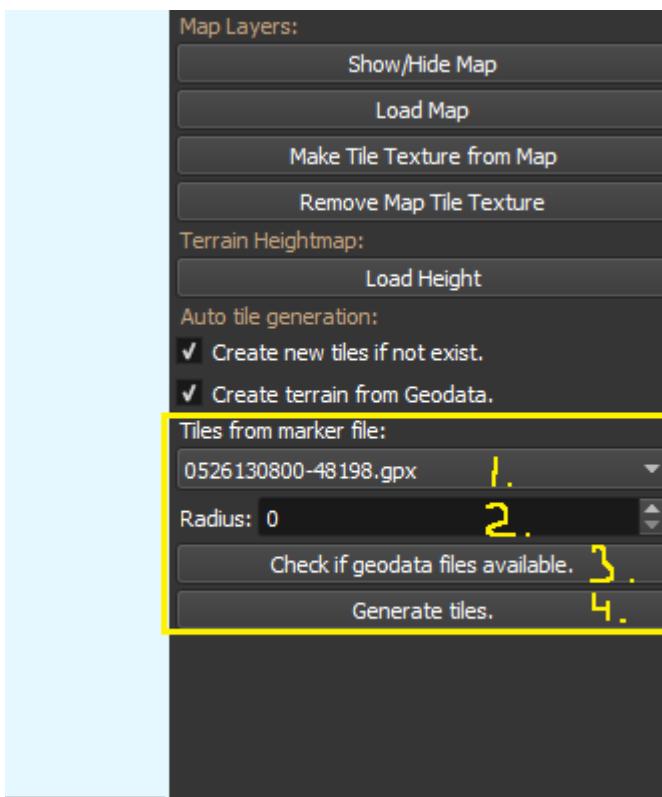
Remember that painted textures need a lot of memory and disk space. Use them in important locations only.

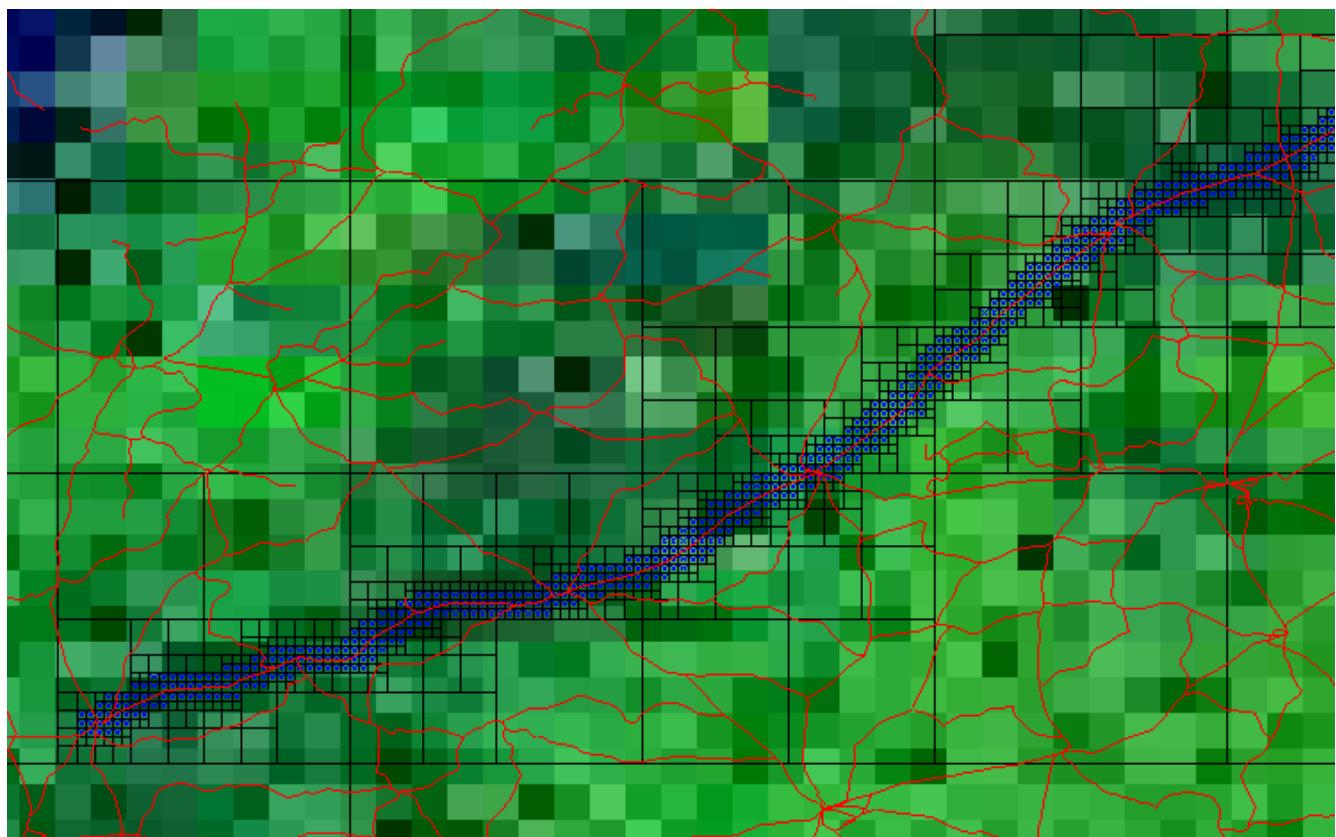


## Auto Tile Generation



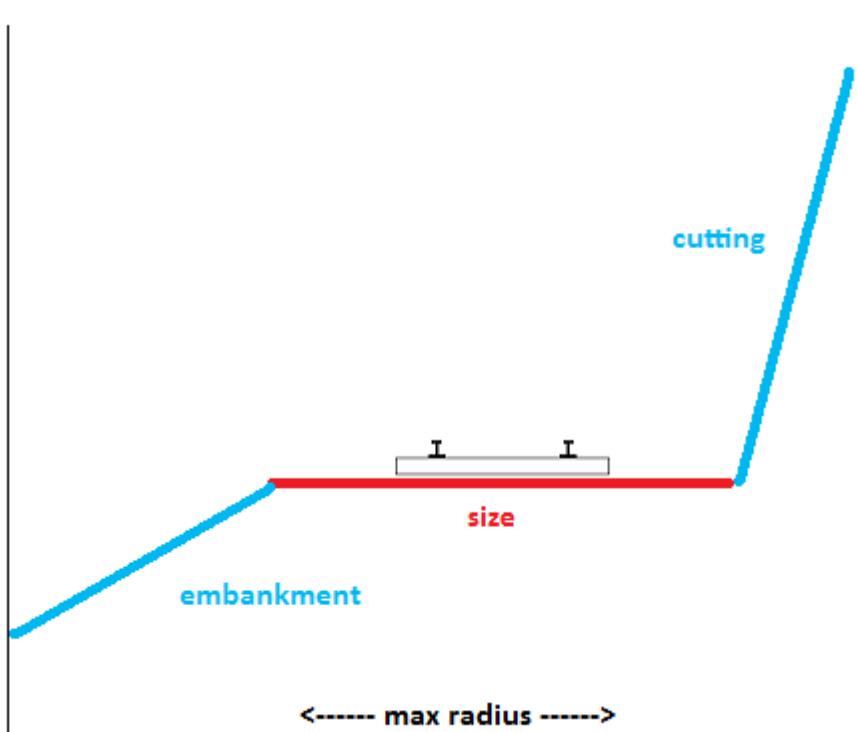
1. Select marker file.
2. Select radius in tiles from marker file line.
3. Check if all heightmap files are available.
4. Create whole terrain in one click.





## Embankments and Cuttings

Here you can adjust embankment settings. Look at this image:



If you want to create embankment or cutting, select the track or road (it must be in TDB) and press F.

# Making Realistic Routes Using GEO Data

The Route Editor supports using several methods for making realistic routes easier. You can use:

- Marker Files
- Map Layers
- HGT terrain data import



If you are making an imaginary route, you can also skip this section.

## Marker Files

Current version of Route Editor supports three different types of marker files formats. It can take input from Traditional Marker Files (MKR), Google Earth Keyhole Markup Language (KML) files and Open Street Map (GPX) files.

1. MKR MSTS file [http://msts.steam4me.net/tutorials/mkr\\_Googlemaps.html](http://msts.steam4me.net/tutorials/mkr_Googlemaps.html)
2. KML file [https://en.wikipedia.org/wiki/Keyhole\\_Markup\\_Language](https://en.wikipedia.org/wiki/Keyhole_Markup_Language)
3. GPX file [https://en.wikipedia.org/wiki/GPS\\_Exchange\\_Format](https://en.wikipedia.org/wiki/GPS_Exchange_Format)



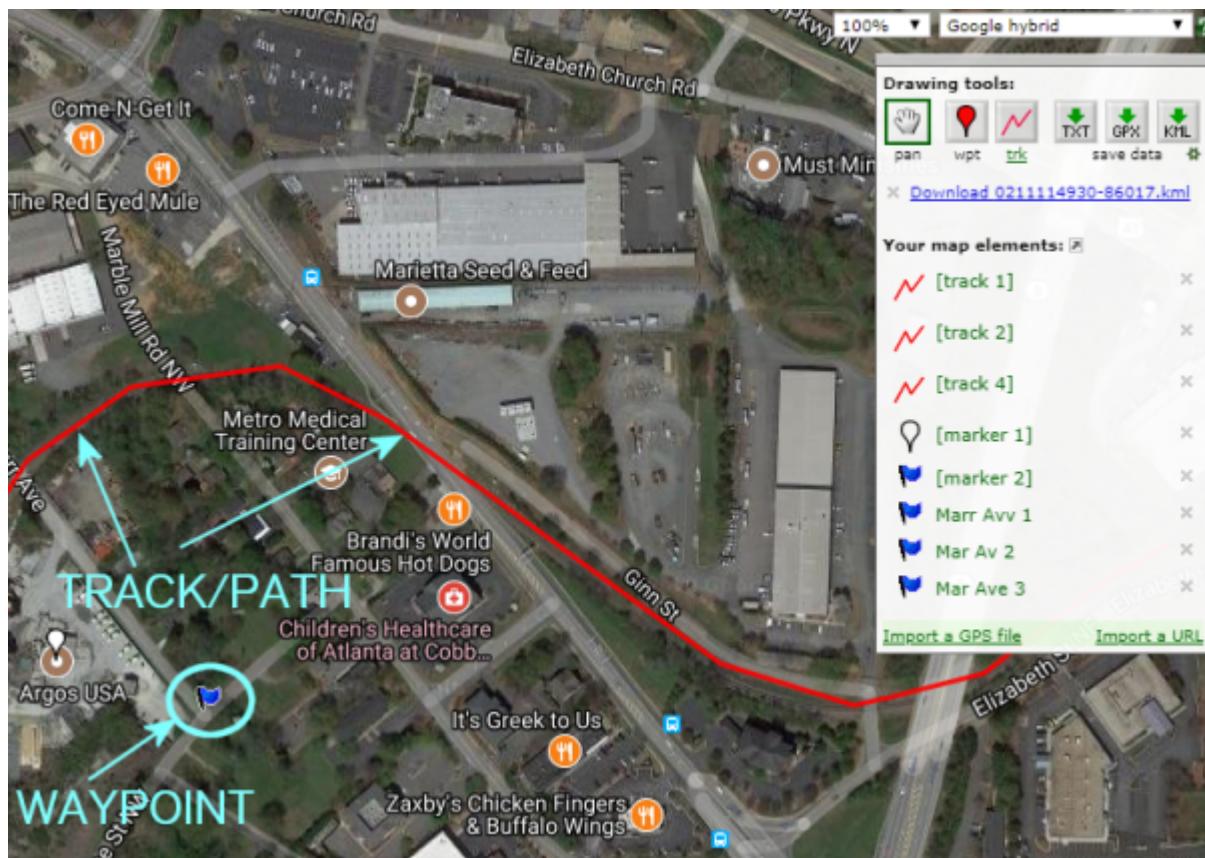
The original MKR files are the legacy method of placement references used with the MSTS Route Editor. This is by far the most common method used when creating MSTS routes, however, with TSRE5 everyone should use **KML** or **GPX** methods instead.

## How to create KML/GPX format files

You can use <http://www.gpsvisualizer.com/draw/> This site allows you to draw points and paths on a large number of map layers, including the Google Maps Satellite images.

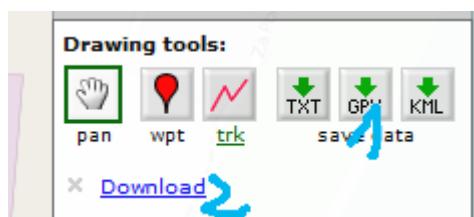
Using the **GPS Visualizer** website is very simple.

Use the Button labeled WPT draw individual waypoints used to define specific locations Use the Button labeled TRK to draw long segmented paths for roads or tracks.



Draw some way-points and continuos paths

Click on the appropriate button to choose a file type (GPX or KML). Selecting the button will change the file type to be downloaded. A download link will appear and clicking it will allow you to download the generated file to your computer.



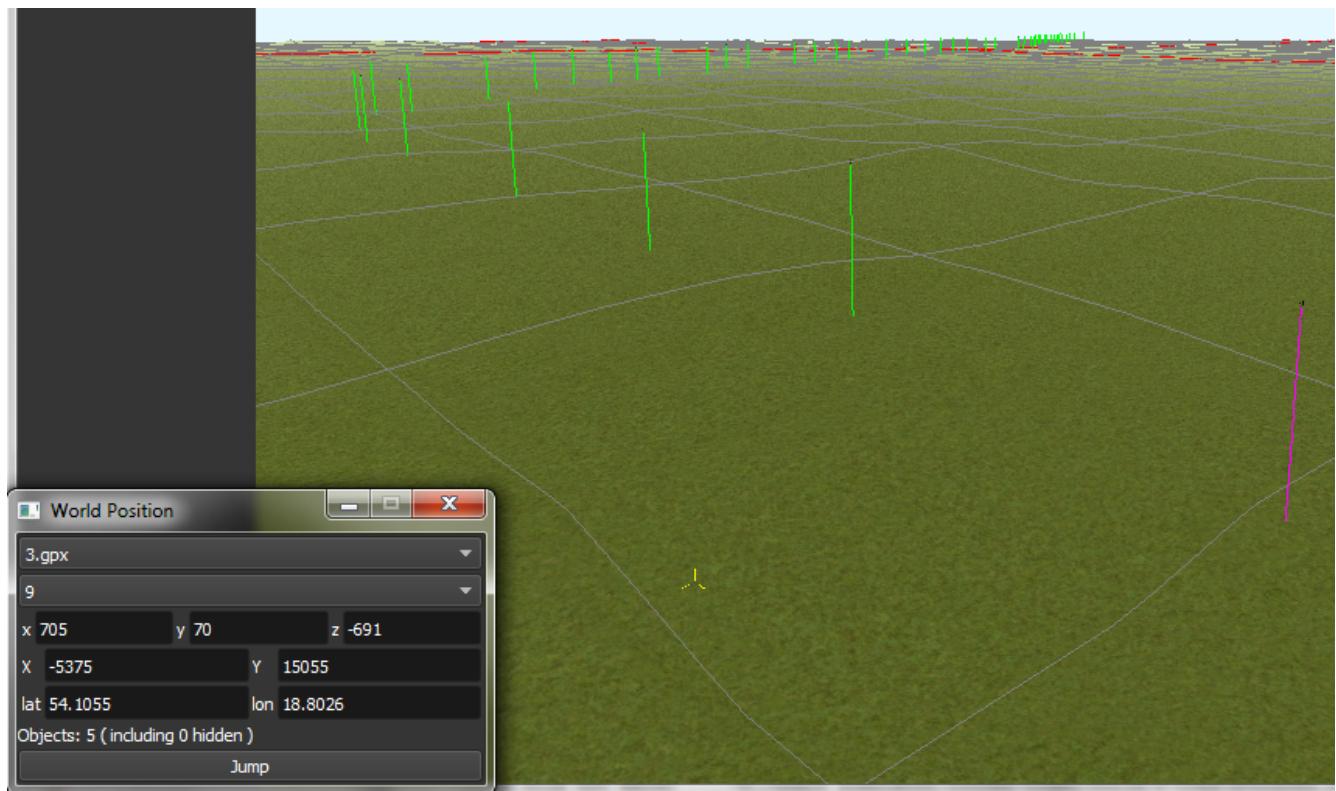
Place the downloaded file into the working directory of the route being worked on.

2.kml	2016-06-18 02:33	Plik KML
3.gpx	2016-06-18 16:01	Plik GPX
3.kml	2016-06-18 16:01	Plik KML
0617154020-89218.kml	2016-06-18 00:41	Plik KML
0617154049-89218.gpx	2016-06-18 00:41	Plik GPX
carspawn.dat	2001-05-08 03:52	Plik DAT
deer.haz	2001-05-08 03:52	Plik HAZ
forests.dat	2001-05-08 03:52	Plik DAT
sigcfg.dat	2001-05-08 03:52	Plik DAT
speedpost.dat	2001-05-08 03:52	Plik DAT
spotter.haz	2001-05-08 03:52	Plik HAZ
ssource.dat	2001-05-08 03:52	Plik DAT

- In the **Navi Window**, use the pulldown bar to select your file.
- You can select a file item and then select the **Jump** button to go to desired position.

## Train Simulator Route Explorer

- Click menu **View→Markers** to show selected file items.

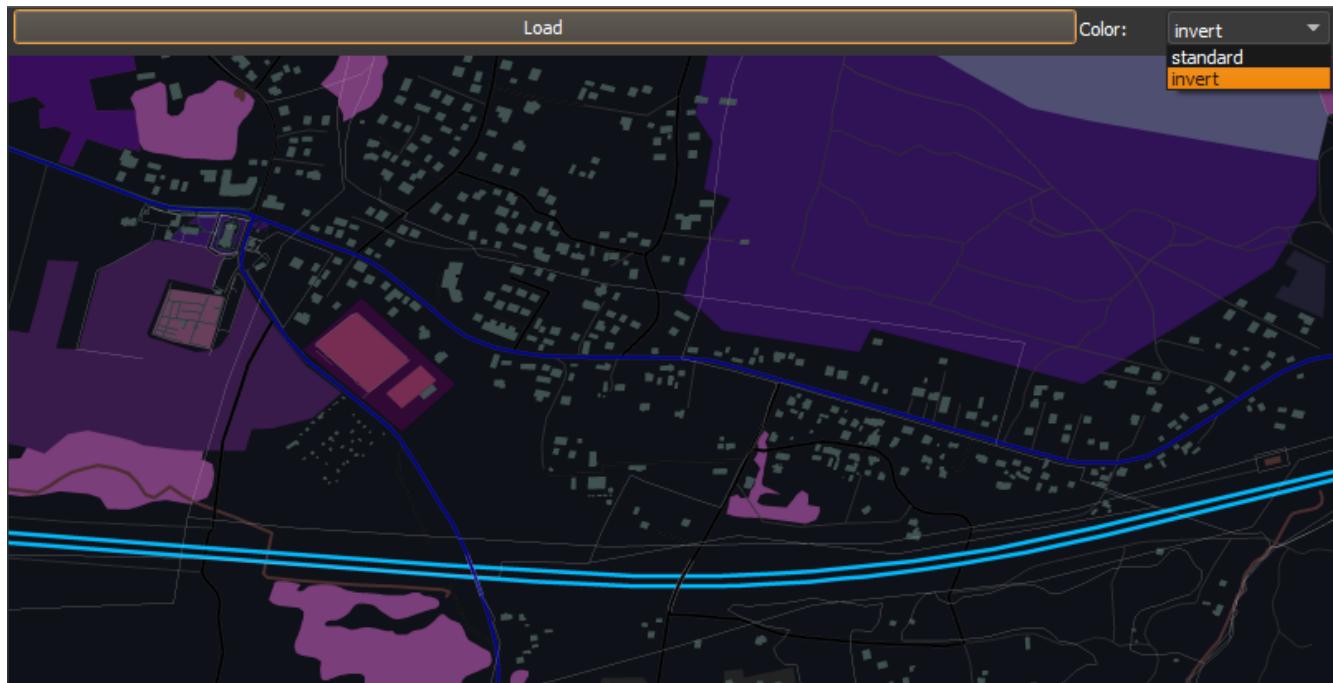


## Map Layers

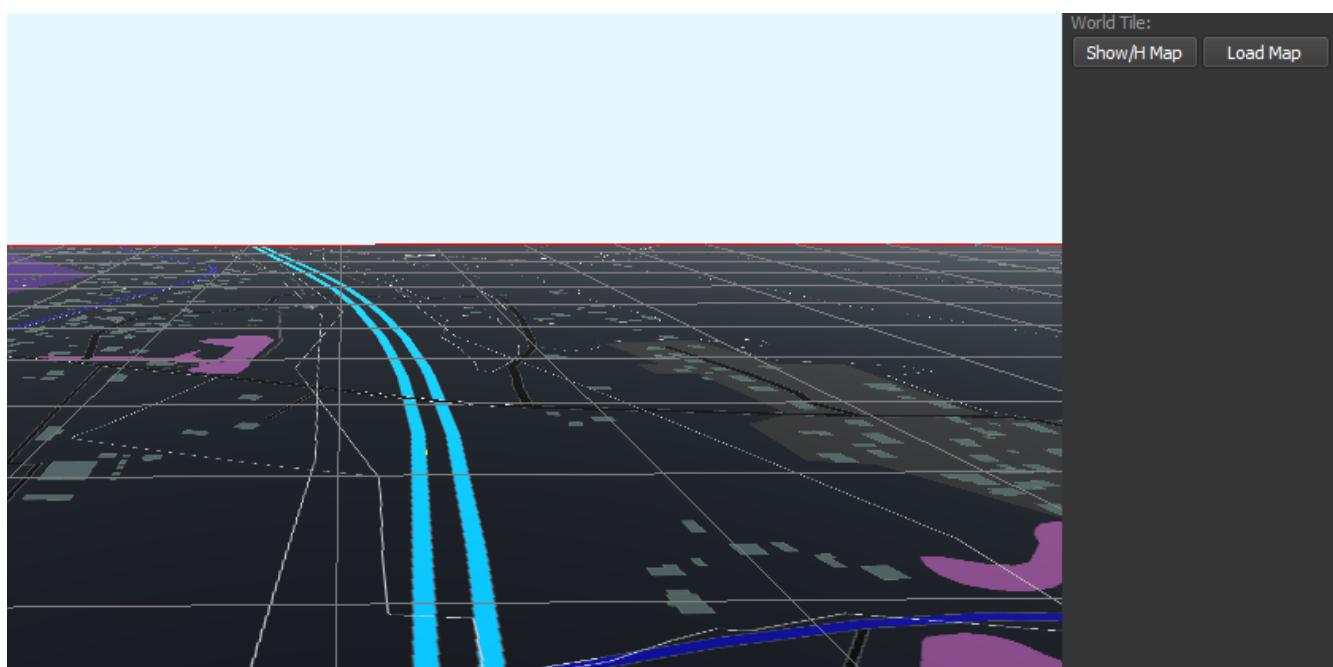
Using a *Map layer* is a better and faster solution than using marker files if you want to create realistic route.

- Go to **Geo Tools**. Menu **Tools→Geo** or press **F3**.
- Click **Load Map** button.
- Find Tile you want to load map layer and click on it.
- In new window click **Load** and wait until map layer download is complete.

You can choose between bright and dark colors.



- Close the window.
- Click **Show/H Map** button.
- Find Tile you want to show map layer and click on it.





Don't load too many Tile maps at once.

## HGT terrain data import

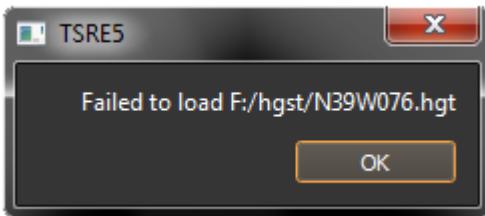
HGT terrain data import allows you to easily create realistic terrain. The easiest to use place I have found to get HGT files is below.

<http://www.viewfinderpanoramas.org/dem3.html>

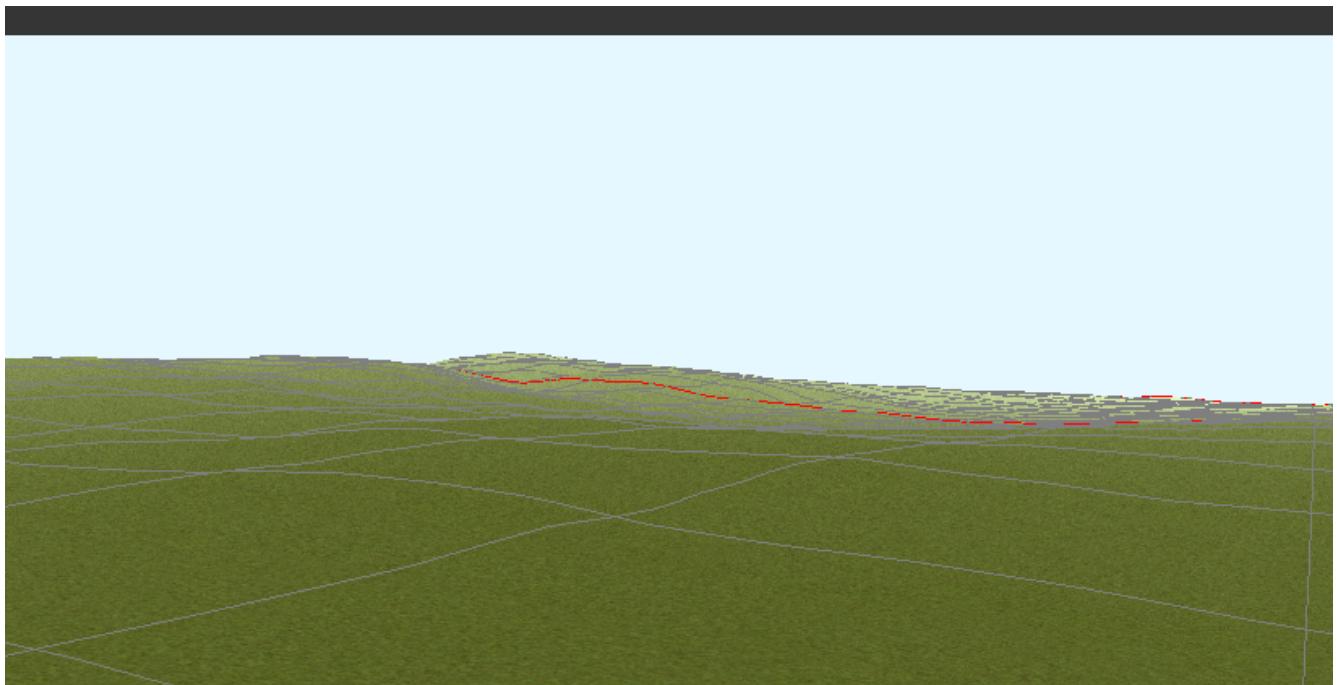
SRTM HGT data is available from other official sources, such as NASA.gov and the USGS.gov websites. Example: <https://dds.cr.usgs.gov/srtm/version1/>

1. Set **geoPath** in settings to directory where you have your HGT files. See: [How to Manually Configure TSRE5](#)
2. Go to **Geo Tools**. Menu **Tools→Geo** or F3.
3. Click **Load Height** button.
4. Find Tile you want to load terrain data and click on it.
5. In new window click **Load** button.

If a proper HGT file doesn't exist, a message box will tell you name of the file you need to download. Close Route Editor and download the missing files.



- Close the window.
- Enjoy realistic terrain.



### Example session - Adding a tile with terrain:

Add a tile to existing route by jumping to the location of where you want to add a tile.

- Push the **B** key. Tile is created and the quad tree updated.
- Push **F2** to load Terrain tools menu.
- Push **Height** button and push **LOAD** button in the window. The "Hgt" data for that tile is located and loaded, provided that the hgt files are downloaded and saved in the location pointed to by what is in **settings.txt**.
- Save.

There is now a new tile with terrain in the route.

## Using Satellite Images

Using this feature requires Google maps api key. Without it sooner or later you will see grey image instead of satellite view

1. Create Google maps api key.
2. Enable static maps for your key.
3. Place key in `settings.txt`. Example below:

```
GoogleMapsKey = Key Goes Here
```

To get your own Google Maps API Key, use this link: <https://developers.google.com/maps/documentation/javascript/get-api-key>

# Route Building - By Example

## Route Building Tools

## Route Building Tips

## Route Planning

## Laying Track with gradients

### Tips for Placing and Rotating Tracks for Gradients

From Vince Cockeram



When Elevating track, remember the 'snap' elevation settings to get a smooth gradient transition. 0.150, 0.300, 0.450, 0.600 and so on.

### Rotating Tracks for Gradient

1. Place a track section in TSRE
2. Press keyboard **R**. This puts just installed track section in ROTATE Mode.
3. Holding the keyboard **CTRL** key down, tap either **NumPad 8** for up or **NumPad 2** for down.
4. The track will elevate or descend in **0.1 per-cent steps** with each key tap of **8** or **2**.
5. The **0.1 grade per-cent** is equal to **1.0 per-mille** which is equal to **0.058 degrees** (MSTS measurement) steps.
6. **All three of these gradient values are displayed on the TSRE panel, left side.**
7. If you want a very smooth a gradient transition, use 1.5 meter track sections with each sections elevation greater or less than the previous track section by 0.1 per-cent or 1.0 per-mille or 0.058 degrees. It will look less smooth but will still look good when you elevate / descend in 0.2 percent steps.

When manually entering the numbers into the gradient section of the panel you must use a two place decimal, where 1 percent (per hundred) is entered as 1.00 and is equal to 10 permille (per thousand) which must be entered as 10.00 in the permille field and 0.1 percent is entered as 0.10 or 1.00 permille.



TSRE will strip off leading and trailing zeros when saved but this does NOT change the gradient values.

### Keyword: Practice!



There is a general consensus that using PerMille is easier than working grade percentage.

### WHAT YOU ENTER IN THE GRADE FIELDS

//// Generic Table layout Example

PERMILLE	PERCENT
1.00	0.100

2.00	0.200
3.00	0.300
4.00	0.400
5.00	0.500
6.00	0.600
7.00	0.700
8.00	0.800
9.00	0.900
10.00	1.00



For whatever reason if you enter, lets say, 6 permille or .6 percent when you select the track/road the 6 permille changes to 5.9996 permille or 0.59996 percent.

## USE TWO PLACE DECIMALS IN EITHER FIELD AND IT WILL SAVE EXACTLY AS ENTERED. IF YOU FAIL TO USE 2 PLACE DECIMAL PLACES, TSRE WILL ROUND OFF NUMBERS

### Some General thoughts from Vince about working with gradients

Until you get used to working with gradients get down close and personal as you adjust track grade. Entering (typing) into the gradient dialog panel sometimes produces unwanted results.

Example: I'll set (type in ) a grade of 20 in the permille field ( 2.0 percent ) and then when I have to select the already selected track section ( why do I have to re-select) in order to use the 'Z' key to add track section to the TDB. (yellow lines)The gradient field 20 permille becomes 19.9998. It seems to have a arithmetic error. I want 20 permille and I get 19.99989 something? It's required to have the editor hold the grade a designer wants.

Additionally I can't figure why if I select a track section (Blue Outlined) why do I have to select ('E' key or Select Button) it again ...and again, the need to select just about any object multiple times to perform multiple concurrent operations.

1. select and use the Transform feature.
2. now select the already selected (blue outlined) object if you need to move the object into a final position.

Seems a bit silly but this editor is a work-in-progress so I have gotten used to having to select over and over again as just a very small nit. Annoying but not a show stopper.

### Tips for Using the TRANSFORM panel

This is very very helpful. A great feature only lacking a detailed method of Operation.

How many times have you wanted to align a platform, bridge, berm, to track on a grade? Me? A LOT! Once I figured out (sort of) how Transform worked it is a super tool! I urge and recommend experimentation. Post results here. One day we can put all these 'found-out-about-features' in a FAQ. Note that the Transform Panel has **OK** --- **Cancel** buttons. You enter your numbers and **OK** does the job. How about the same thing for the Track Grade Panel? That would eliminate the track or road moving until you are ready.

One last nit to pick: **Dynamic Track** .... I don't see how (other than tapping the keys I use for grade) to set a gradient for DT? I do know that holding the **Ctrl** key down as I tap the **NumPad 2** or **8** keys for down / up slope of 1 permille (0.1 percent) grade changes so I just count off key taps. A display of grade as is done for 'normal' track is preferred. Now add a Grade Panel **OK** button to set the typed in grade and we'll be cooking.

## Some thoughts on Laying Track

When swapping track sections in and out it's better to set TSRE to NOT automatically add track into the database. The yellow lines over the track are a graphic representation of the TDB.

To toggle **Auto-Add TDB ON/OFF** With nothing selected press **Ctrl + Q**

This prevents the auto-add to TDB when a track is de-selected.

This is good practice because if you move a track section without first removing the yellow TDB lines will create a MIS-MATCH between the TDB and the WORLD file. This is a well known 'Out of Sync' condition and it's a real pain to repair. At this time there is no indication of **Ctrl + Q** being on or off. Before beginning editing you should test to see if Auto-TDB add is on or off. How?

When a **Auto-Add TDB is ON**, the Yellow TDB indicator lines will come ON when the track is deselected. There is no indication of Auto-TDB at this editor release level other than the above procedure. Goku is aware of the no indication.

Another use for the **Q** key: Allowing easy installing underground or on up-in-the-sky bridges. \*With nothing selected press 'SHIFT + Q'"

This allows you to place the cursor ( pointer ) on any object for the purpose of placing a track or road section. The cursor normally 'sticks' to the terrain. **Shift + Q** allows the cursor to **Stick to Anything**. This IS covered in the Manual. - There is an error in the Manual for the entry on this in section /rewobj.html page 1 of 4 Item 5. **Shift +** is missing. - There is no indication of Shift + Q being on or off however the behavior of the cursor provides a positive indication.

- When placing track underground as for a tunnel, first check 'Hide Terrain Shape' in the View Menu
- Now, position the cursor very close to the end on the previously installed track section to place the next track section.
- For new track to SNAP to previously installed track, the previous track section MUST have the Yellow TDB lines present.
- To add a newly placed track section to the TDB when in manual (**Ctrl + Q**) mode:

1.Select the track. Blue outline appears. 2. press the **Z** key. Yellow line appears & track is added to the TDB. Save to make final.

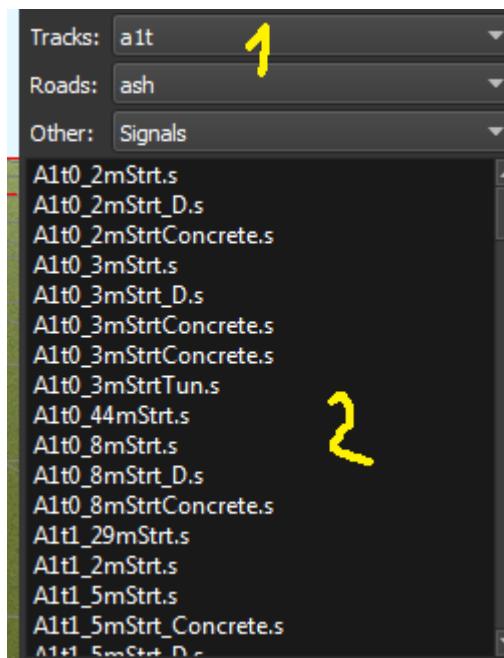
Do NOT move the track if TDB lines are present

- Dragging track underground? *Don't try it!*
- Misplace or lose a track underground? (which dragging is sure to do) Press **DELETE** and do over!

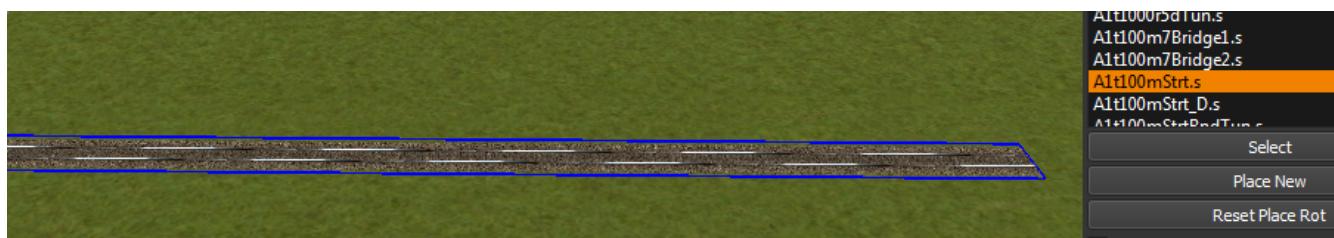
## Placing New Tracks

How to place tracks or roads?

- Select track or road type you want.
- Select shape you want.



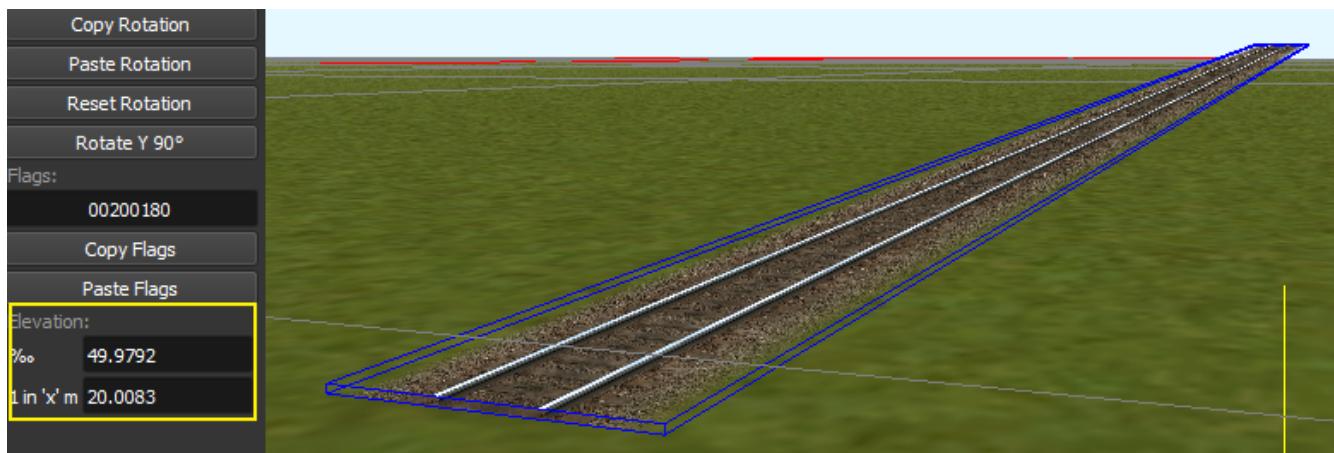
- Click **Place New** button.
- Click on the ground where you want new track.



- You can adjust track position by pressing **T** and using **4,6,8,2** keys (move XZ axis), **9,3** keys (move Y axis).
- You can adjust track rotation by pressing **R** and using **4,6** keys.
- You can adjust track elevation by pressing **R** and using **8,2** keys. The Properties window will show you elevation value.
- You can hold **Ctrl** with **R & T** mode to change the step rate (0.10%).



Depending on your keyboard layout, you can also use other keys. See [Using the Editor](#).



- Press **Z** to add track to the TDB (Track DataBase). If you want to remove track from the TDB and keep the shape - press **Z** again.

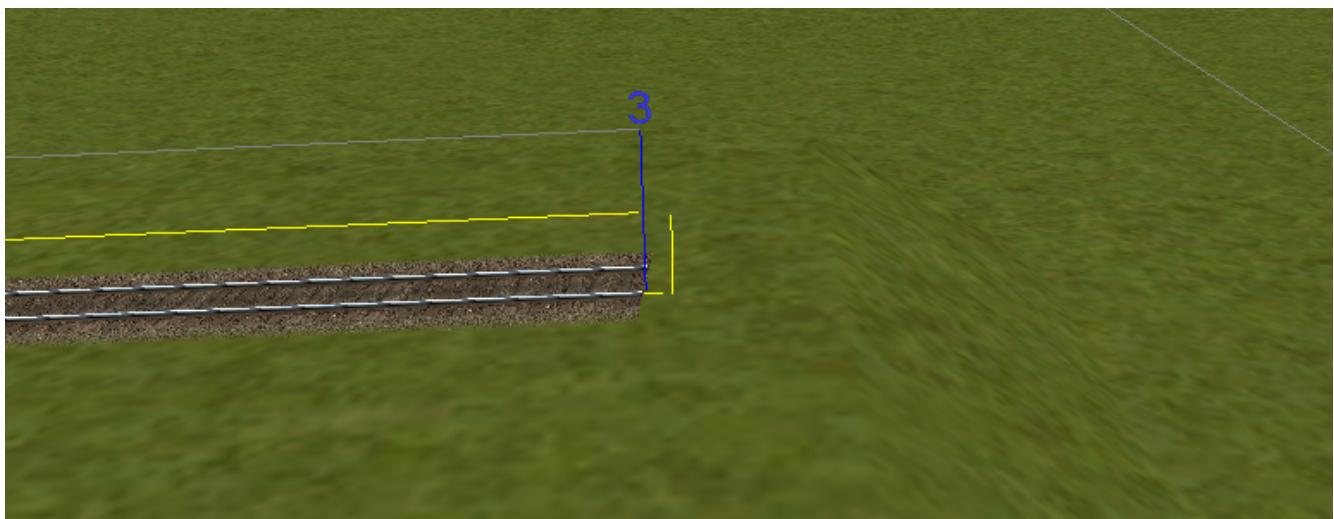


Never translate or rotate track when it is in the TDB (when it has a yellow line) !!! If you do, you will need to delete this track and place new one.

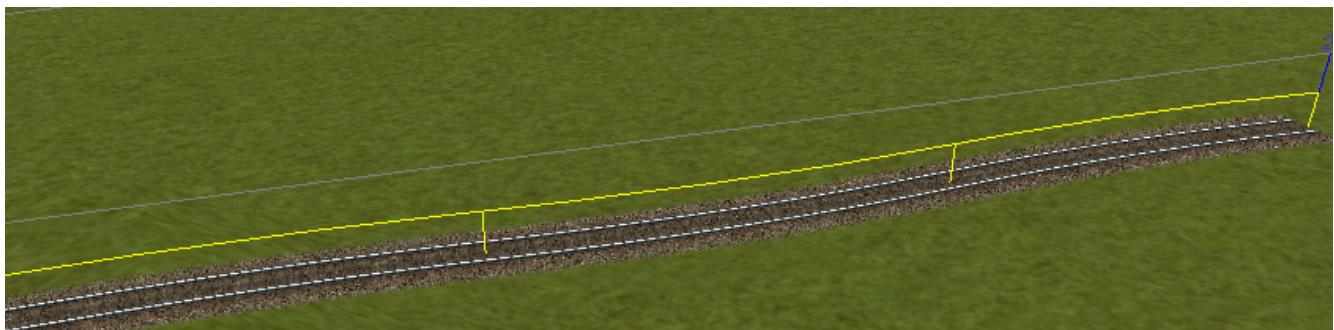
- When track is in TDB, you can press **F** to adjust terrain to the track. You can also do it later by selecting the track you want to adjust and press **F**. See more: [\[Editing\\_terrain\]](#).



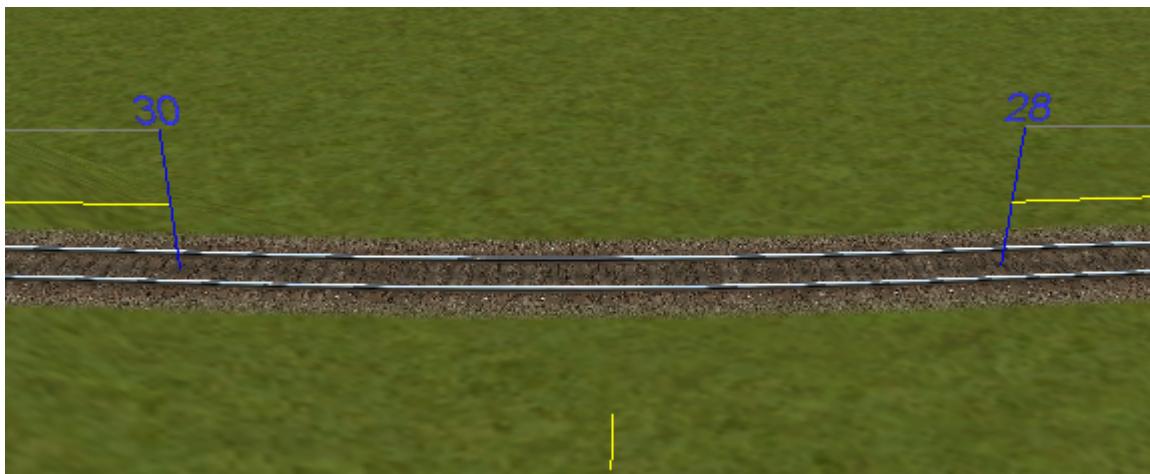
- If you want to place the next track, click around the endpoint (the blue pole) where you want to add next track.
- If you have difficulty placing a track above or below ground, press **Q** to change placement mode to **stick to all**.



- If you want to change direction of track or joining point, press **X**. **Do it before pressing Z!**



- If you want to delete track from TDB, but keep the shape placed, press **Z**



If you want to delete track completely, press **Delete**. In this case, you don't need to press **Z**.

## Placing objects - A guide

### Car Spawning Tips

Car Spawner Speeds Table

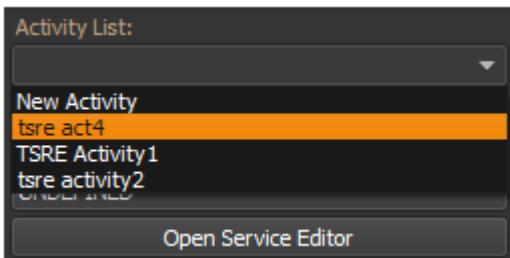
<b>meter/s</b>	<b>km/h</b>	<b>mph</b>
10	36	22.4
12	43.2	26.8
13	46.8	29.1
15	54	33.6
16	57.6	35.8
17	61.2	38
18	64.8	40.3
19	68.4	42.5
20	72	44.7
21	75.6	47
22	79.2	49.2
25	90	55.9
27	97.2	60.4
28	100.8	62.6
29	104.4	64.9
30	108	67.1
35	126	78.3

# Working with activities

Press **F4** or select **Tools→Activity**.

## Selecting an Activity

Select an activity from the Activity List.

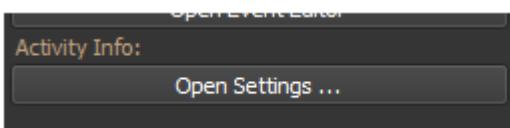


## Creating new Activity

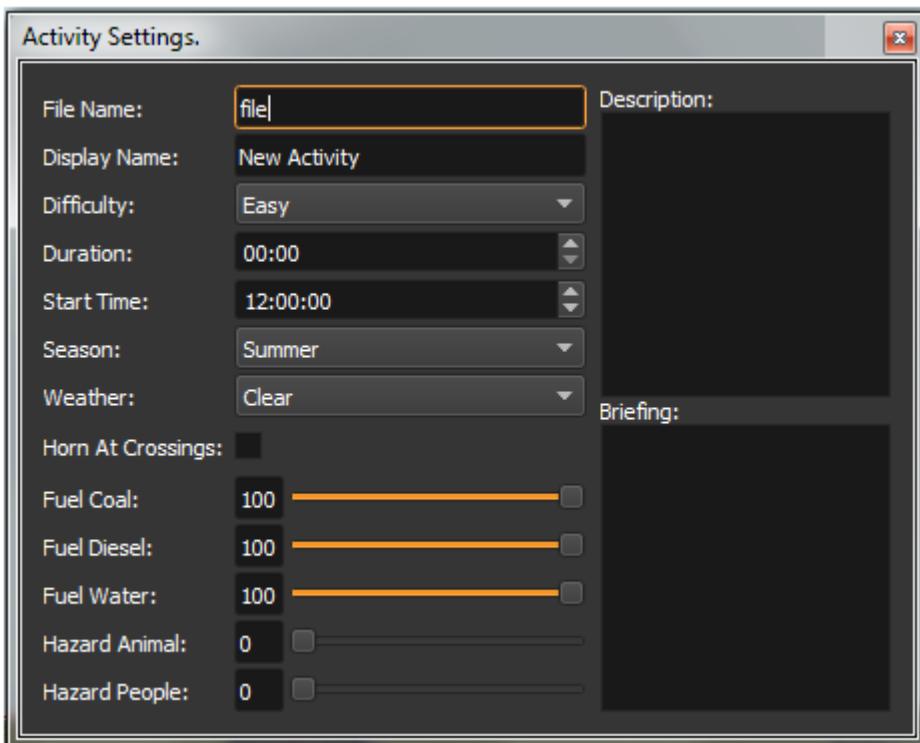
Click **New Activity** button below the Activity List. A new activity will be created and selected.

## Editing Activity Settings

Click Open Settings ... button.



New window will appear.



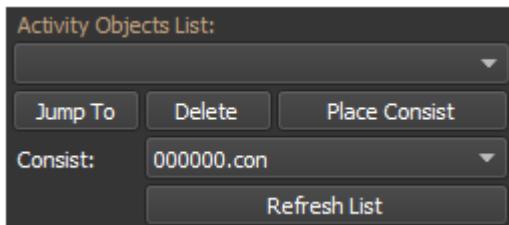
### *File Name*

You can edit it only for new activity before first activity save.

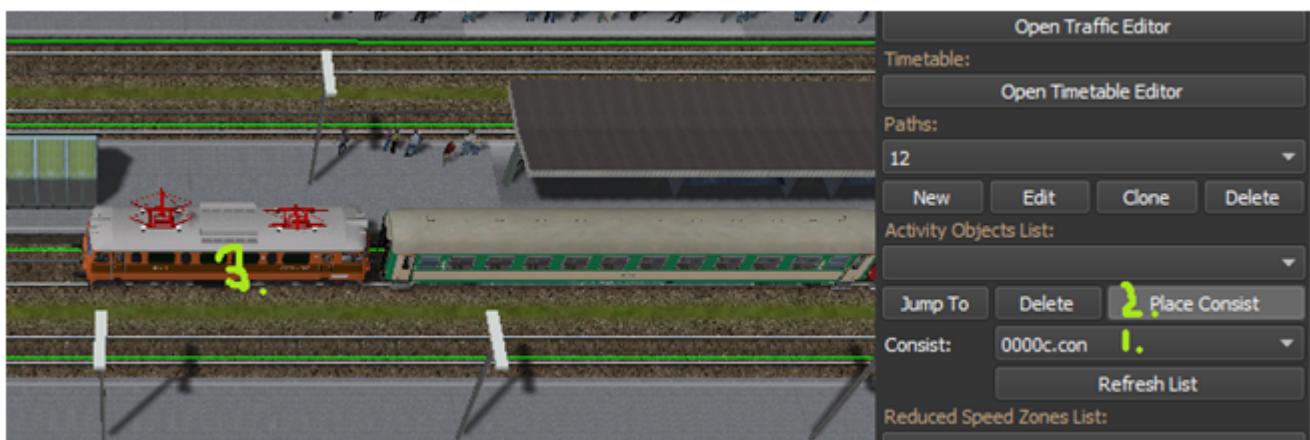
**Display Name**

The name of the activity. The name will be updated on the activity list after TSRE is restarted.

## Placing Loose consists



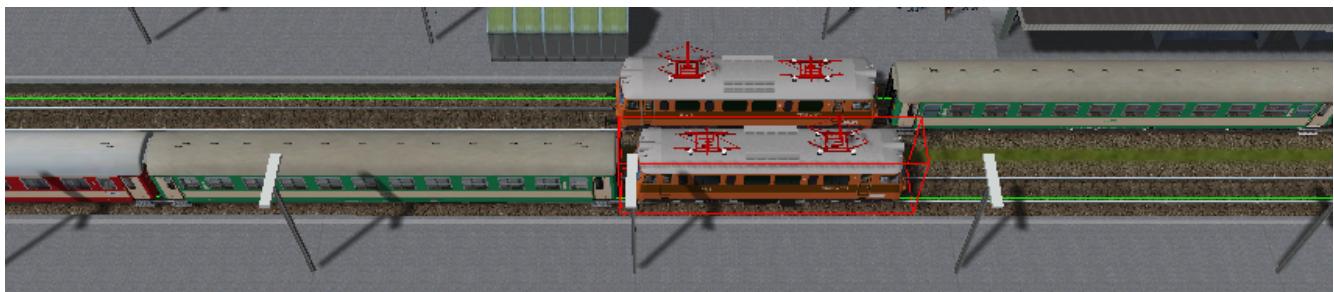
1. Select consist from Consist list.
2. Click **Place Consist**.
3. Click on the track where you want to place the consist.



If you want to change consist direction, **select** the consist, right click for the context menu and then choose **Toggle Direction**



It will end up like this:

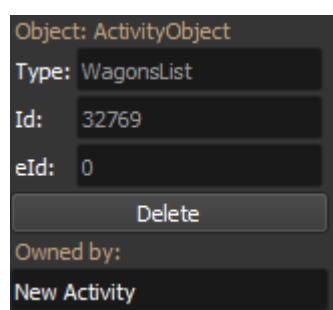


## Moving loose consists

Select consist, and drag it using mouse.

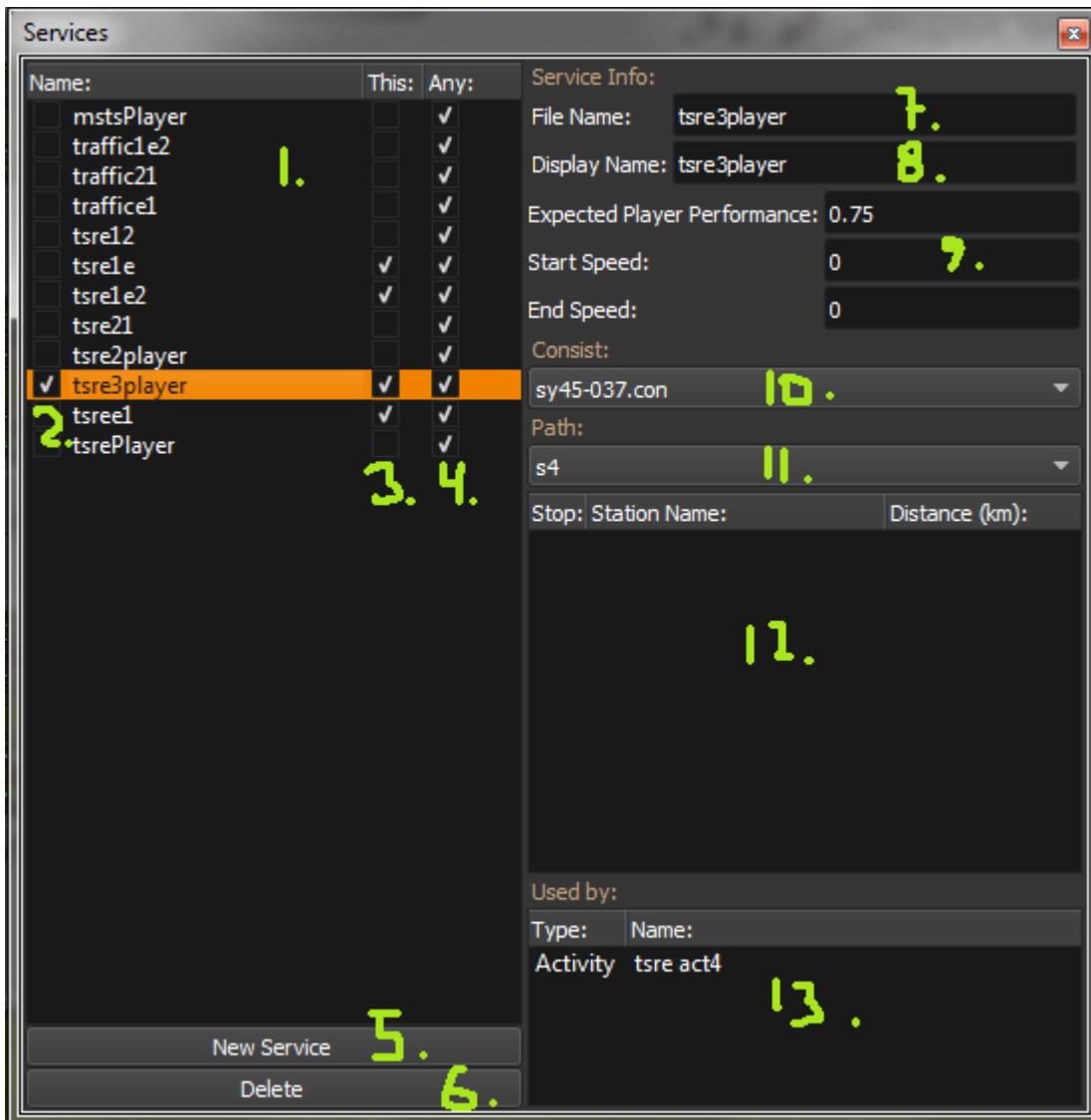
## Removing loose consists

Select the consist you want to remove and then click the **Delete** button in properties window.

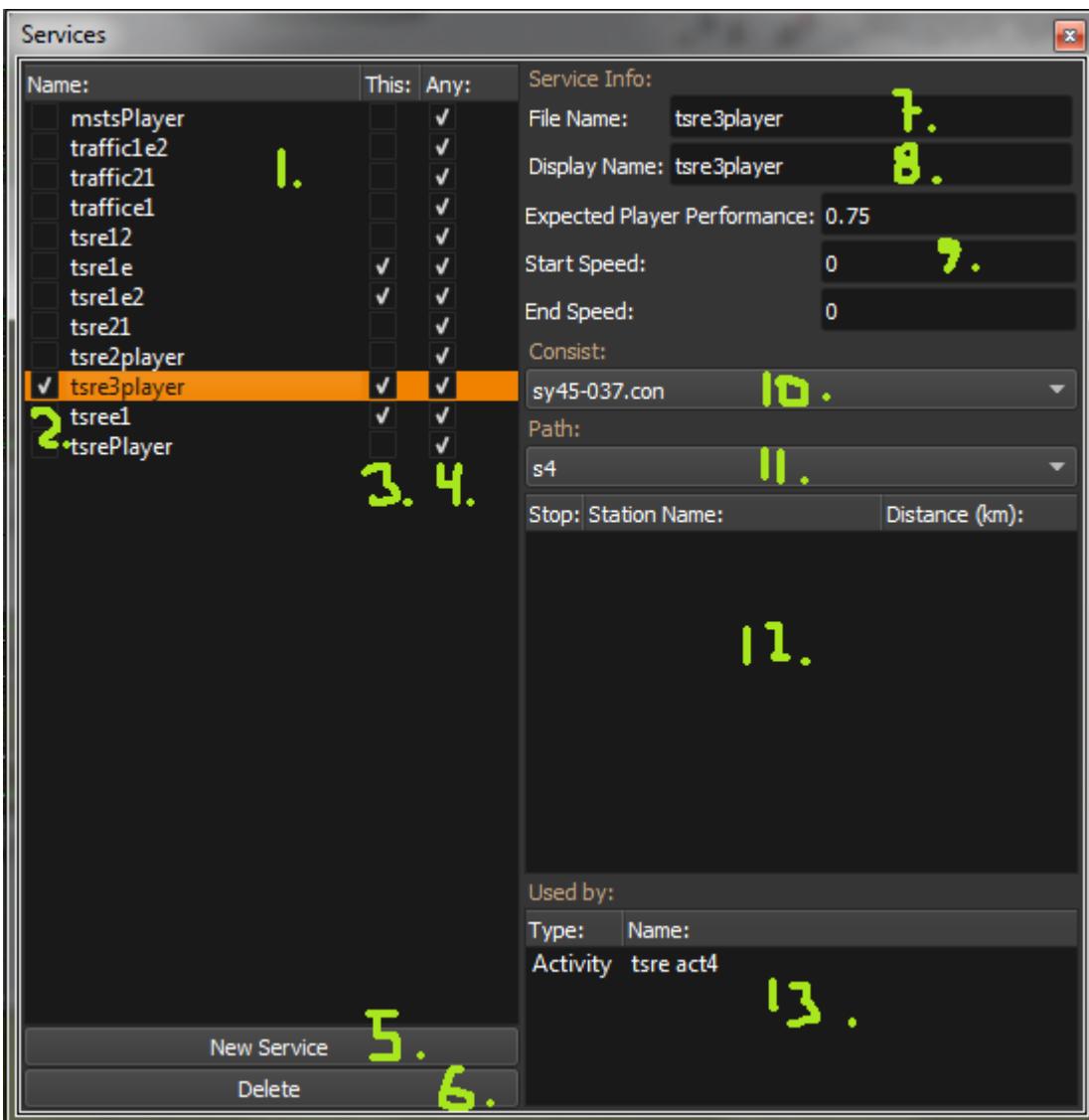


## Working With Services

Click **Open Service Editor**.

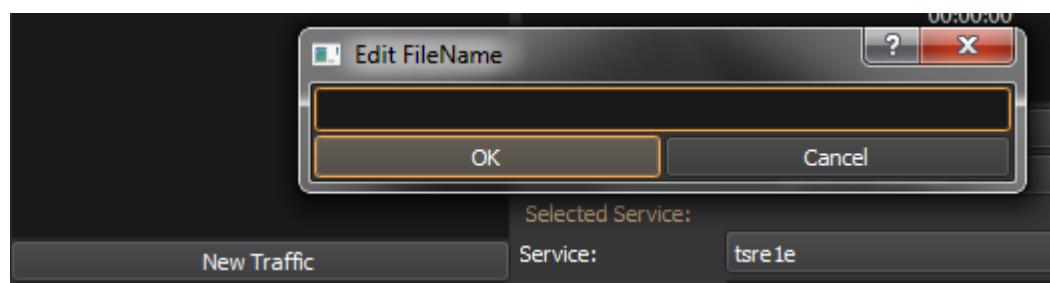


1. Service list.
2. Checked if service is set as player service in current activity.
3. Checked if service is used in current activity.
4. Checked if service is used by any activity.
5. Click this button to create new service.
6. Click this button to delete this service. *Doesn't work currently.*
7. File name of the service file - *not editable*.
8. Display name of the service - *editable*.
9. Service properties - *editable*.
10. Consist used by this activity.
11. Path used by this activity. *Changing path will reset service timetable.*
12. Station list. Check station if train must stop: *See the Image Below*
13. List of files that use this service.



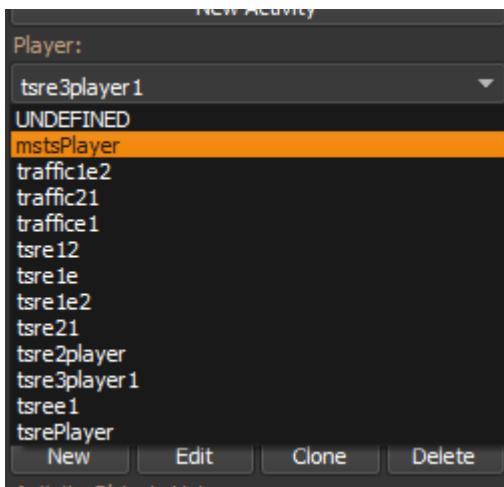
## Creating a new Service

Click **New Service** button and enter service file name in new window.



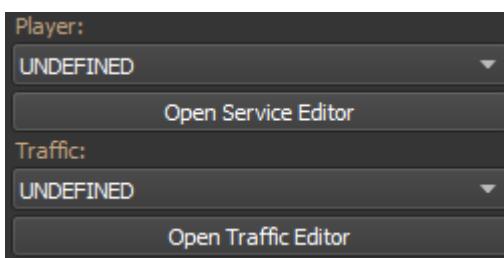
## Selecting activity player service:

Just select service from the list.

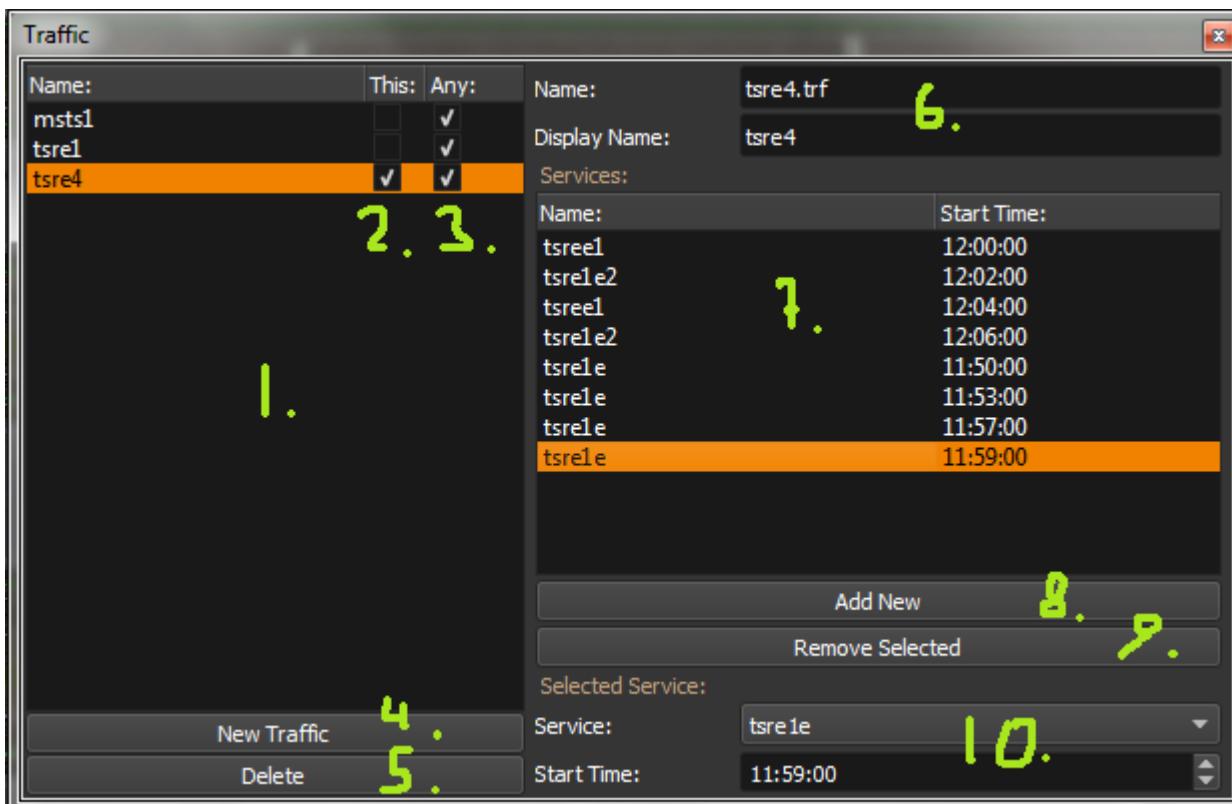


## Working with Traffic

Click on Open Traffic Editor



A new window will appear:

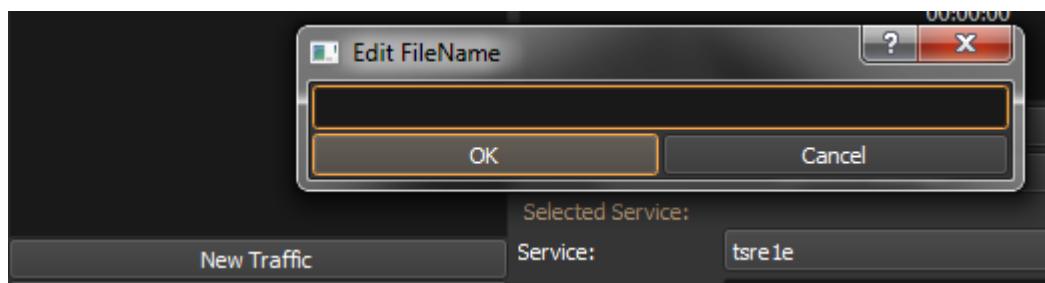


1. Traffic list.
2. Checked if traffic is used in current activity.
3. Checked if traffic is used by any activity.

4. Click this button to create new traffic.
5. Click this button to delete this traffic. *Doesn't work currently.*
6. File name of the traffic file - *not editable*.
7. Service list. *Click service to edit it's preferences.*
8. Add new Service.
9. Delete Service. *Doesn't work currently.*
10. Edit service preferences: service file used by this entry and start time.

## Creating new Traffic

Click **New Traffic** button and enter traffic file name in new window.



## Selecting activity traffic:

Just select traffic from the list.



# Consist Editor

The Consist Editor is a built-in part of the TSRE5 application. It is enabled by supplying a command line option to TSRE5 when the program is started. This option contains the value of "--conedit". This is step that is accomplished by the supplied **ConsistEditor.bat** file.

- To use the Consist Editor you must have a version of TSRE5 that is V0.6124 or higher.
- You need to edit the **settings.txt** file and set the path to your MST/OS routes/trains directory, Example: **gameRoot = F:/train simulator**
- You run the **ConsistEditor.bat** file from the command line or you can use Windows Explorer to copy the **ConsistEditor.bat** file and then use "Paste Shortcut" to save it to your desktop. You can then use the new desktop icon to start the Consist Editor.

## How to use the Consist Editor

### The File Menu

**File→New**

Start a new consist

**File→Save**

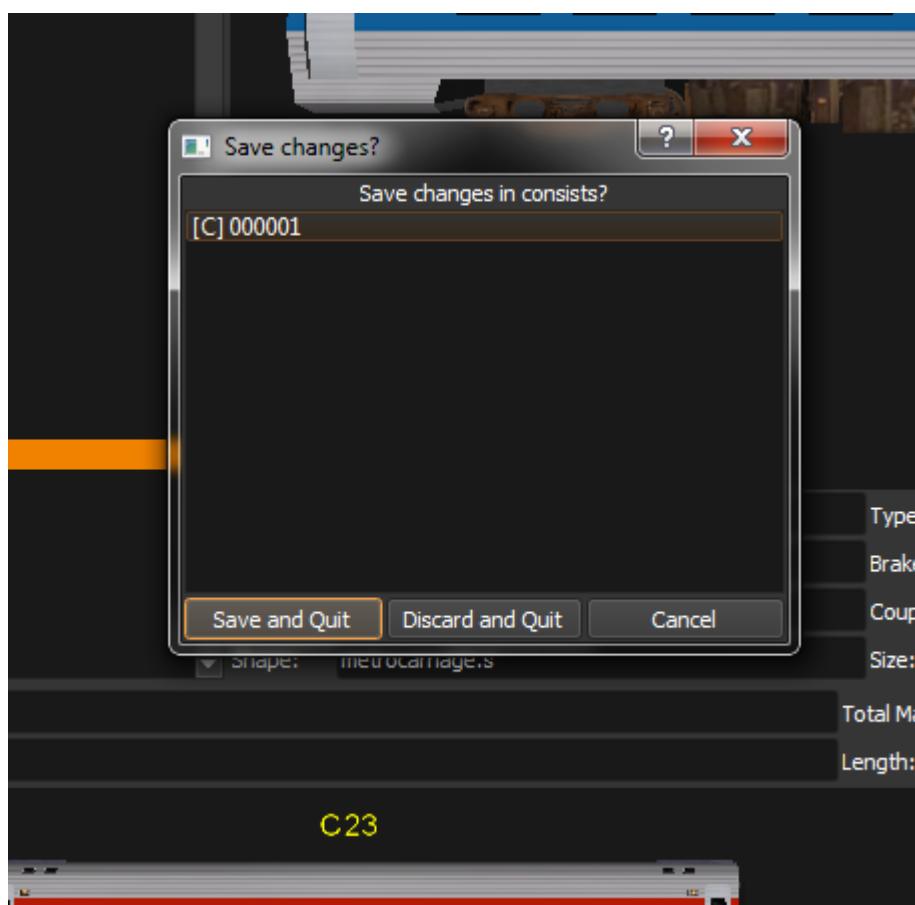
Save the current consist

**File→Exit**

Exit the program



If you have made changes and they are unsaved when you attempt to exit, you will see the "save changes" pop-up menu.



## Starting a new Consist or open an existing one:

- Select an existing consist from the list or click **File→New** to begin a new one
- Find a desired train item in the asset list and double click it to add it to the consist
- You can also click the desired item once to highlight it and then use one of the following buttons at the top of the list:

### Add Beg

Add the selected item to the beginning of the consist

### Add Cur

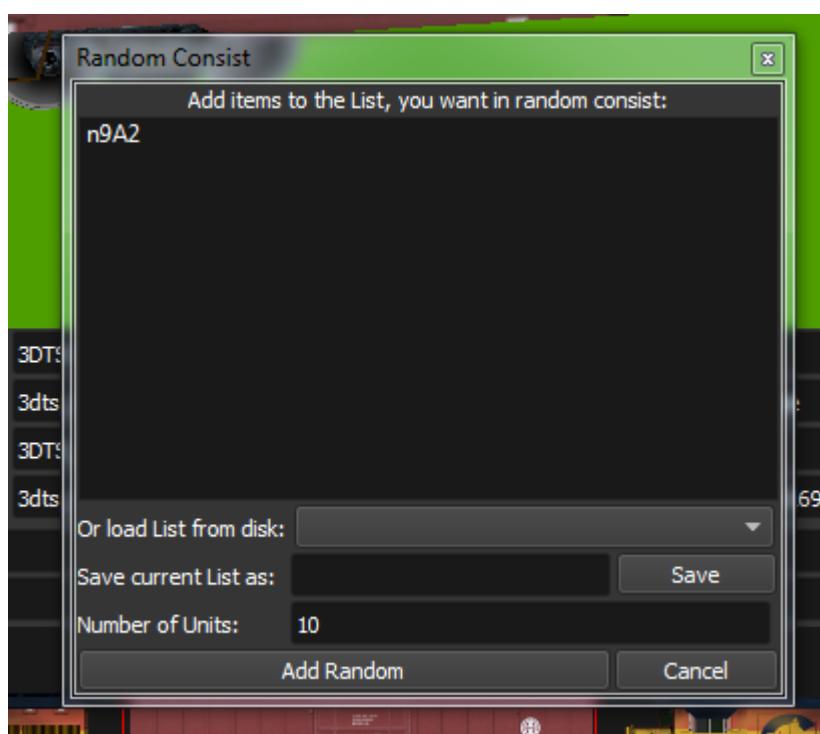
Add the selected item to the currently selected consist position

### Add End

Add the selected item to the end of the consist

### Add Rand

Add items to a list that you want in a random consist. This is a separate list. You can also save and load random consist lists within the "**Random Consist**" pop-up dialog box.



**Add Rand** is part of a Random Consist generation tool. It is designed to replace the current consist entirely when the **Add Random** button is pressed inside the "**Random Consist**" pop-up dialog box. You won't lose the changes to a consist you might have been working on as you do get the option to save all pending changes upon exiting the program.

## To Save the Current Consist

- Enter the **File Name** and **Display Name** of the current consist, if these fields are empty.
- **File→Save** - Will save the consist file to disk

## Consist Tools

### Consist→Reverse

Reverse the order of the whole consist

### Consist→Clone

This is the "Save As" feature, allowing you to save the current consist under a new name.

### Consist→Delete

Will delete the current consist from the disk

### Consist→Open in External Editor

*Untested* it does nothing for me at the moment

### Consist→Save as Eng Set

This option is used to combine multiple items into a set. See: [Engine Sets](#)

## Eng Tools

### Eng→Find Consists

Perform a filtered search, using the filter pulldown options

### Eng→Open In External Editor

Open the ENG or WAG file of the currently selected item in the associated editor (ORTS Compliant)

### Eng→Open Legacy ENG In External Editor

Open the ENG or WAG file of the currently selected item (MSTS Specific)

### Eng→Refresh Shape

Will refresh the displayed item from disk

## The Replace Menu

Now you can replace units in consists easily.

- Select a consist unit
- Find new unit in ENG list and select it, making sure it is displayed in the ENG View window. (Don't double click)
- Use one of the Replace Menu functions

### Replace→Only Selected Unit

Swap the consist item with a selected item from the asset list

### Replace→Replace All units in selected consist

Replace Unit consist-wide

### Replace→All units in all consists

Replace the unit in **all** consists

## The View Menu

The view menu provides a selection of panels that can be toggled on or off to customize the way components of the Consist Editor are displayed.

For example, if all of the view options are toggled off, you will only have a blank screen.

The most useful layout will have **Consist List**, **Eng List 1**, **Eng View** and **Con View** enabled.

As an example, you can use the **View Menu** options to have **ENG LIST 1** and **ENG LIST 2** enabled to use them to display Diesels in one panel and Freight cars in another panel based on the filter selections.

## Graphical Consist 3D Model View

Select Items using the mouse. A selected item will have a red highlight around it.



### Available Actions using the Keyboard

**F**

Flip, This will reverse the current consist item

**Delete**

This will delete the current consist item

**Left or Right**

This will move a consist item left or right



You can also use the slider bar at the bottom of the window to slide the windows left and right if the consist is larger than the width of a screen

### The Context Menu Options

When you **"Right-Click"** with the mouse above an item in the consist, that device becomes the selected item and a context menu appears with available actions.

### Available Actions using the "Right-Click" Context Menu

**Flip**

This will reverse the current consist item

**Move Left**

Move the selected item one position to the left in the consist

**Move Right**

Move the selected item one position to the right in the consist

**Delete**

Remove the current item from the consist

**Copy**

Copy the selected item so it can be pasted into the same or different consist

**Paste Right**

Paste the copied item into the consist to the right of the currently selected item

- To copy an item from current consist and paste it into another, do the following steps:

- From the context menu, **Copy** an item from the current consist
- Select a consist name from the consist file list

3. The consist editor will open the selected consist file and it will be displayed.
4. Using the context menu again, you may **Paste Right** to insert the item to the right of the selected item in the consist.
5. You can then use the context menu or keyboard keys to shift the position of the newly pasted item, if needed

## 3D View Menu - ENG View

These menu items refer to the larger 3D Model image in the upper right of the consist editor.



This section can have its visibility toggled by selecting the **View→EngView** item

### **Shape View→Reset**

Reset viewing angle to default (Side View)

### **Shape View→Copy Image**

Copy the current 3D View to the ClipBoard

### **Shape View→Save**

Save a copy of the 3D View image to disk

### **Shape View→Set Color**

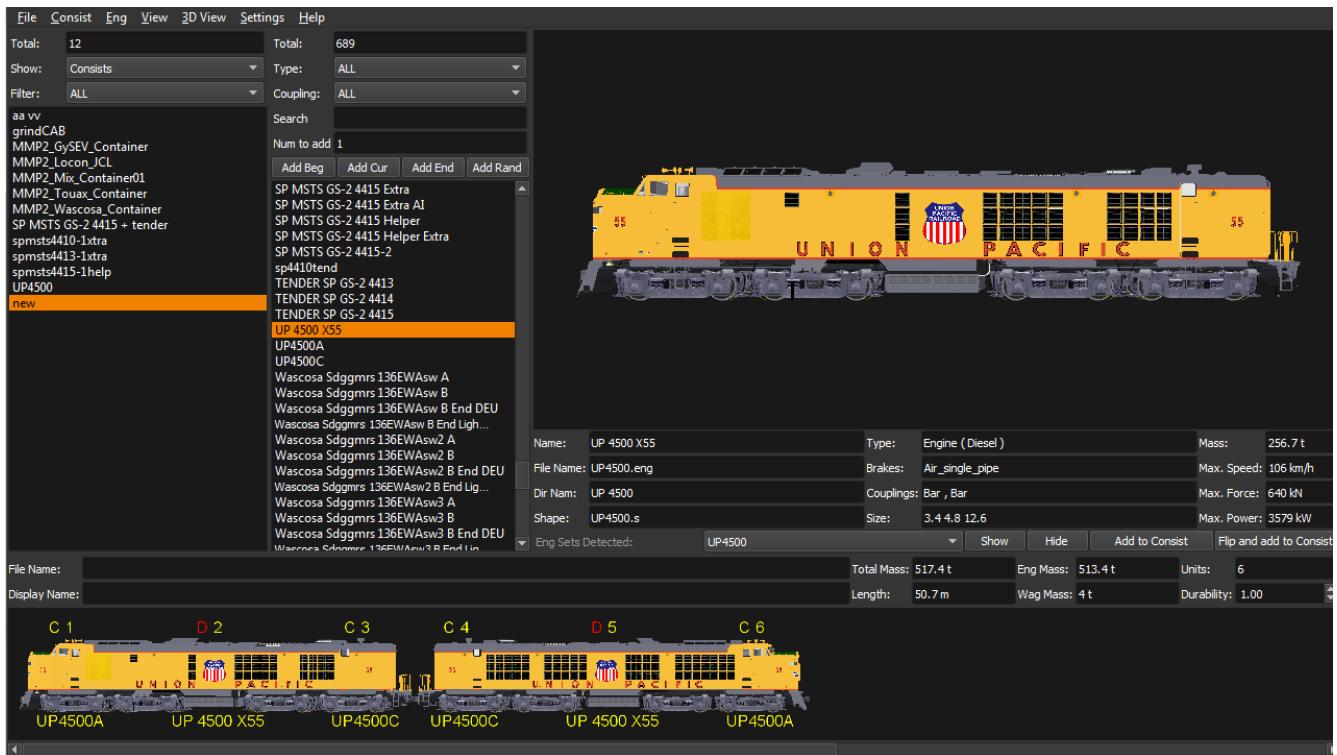
Set the background color for the 3D Model View from an available color palette

- There is currently no context menu for the Model details portion of the editor

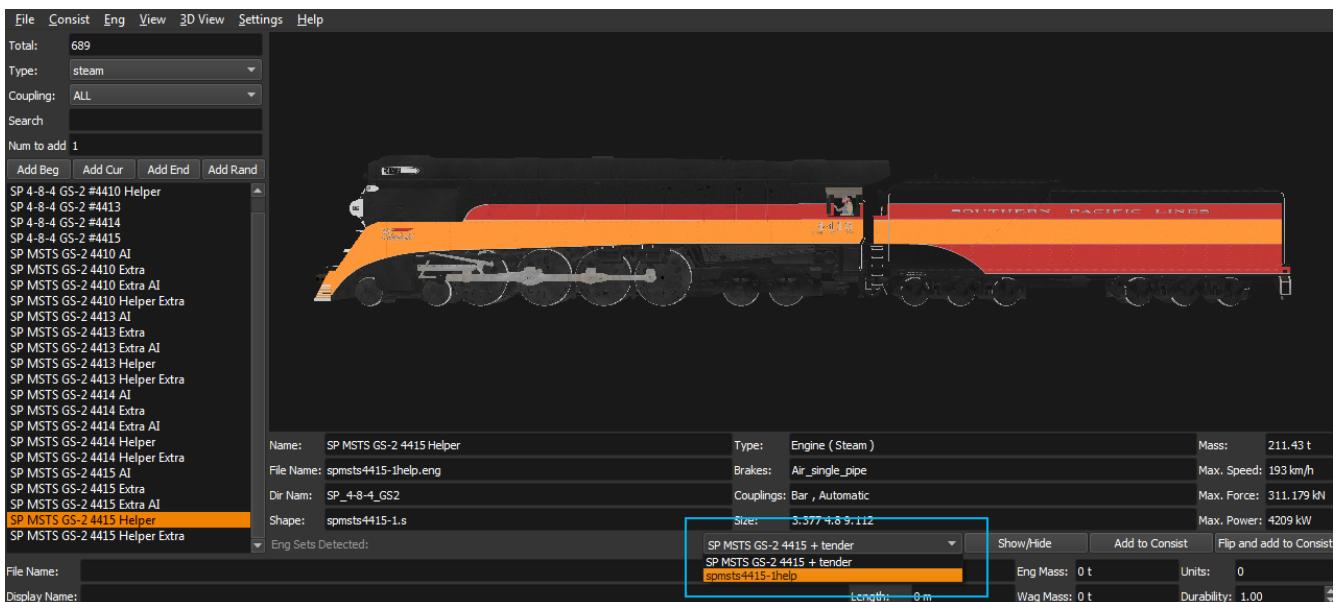
# Engine Sets

## What are "eng sets"?

Engine sets are dedicated collections of items for a better experience with multi-mesh/multi-eng locomotives, steam locomotives etc.



For example, now you can add to consist steam loco and tender in one click. It's possible to have many eng sets for one locomotive:



## How the "eng sets" feature works?

### Options:

1. Consist with name = eng\_name → eng set • See Note Below
2. Consist with name = eng\_name#something → eng set

Eng must be included in it's eng set consist.



- Developers Comment: I think it's worth ignoring option #1 in this case because lots of default consists have names that match its eng. Looking for feedback. For some trains it just works, for others you must create your own sets.

### How create new eng set?

- Create new consist
- Add the items you want in new eng set
- Enter in the "File Name" that you want based on the eng name or leave it empty.
- Click **Consist → Save as eng set**



You can also use this method to create Wagon Sets by omitting an engine. The set will be linked to the first item in the list.

