



# Train Simulator Route Explorer

GokuMK

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## **Lettering**

This book is typeset using the Ubuntu TrueType font

## **Text Layout**

Ruby - With ASCIIDOCTOR, ASCIIDOCTOR-PDF, ASCIIDOCTOR-DIAGRAM

## **Cover Art**

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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 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.



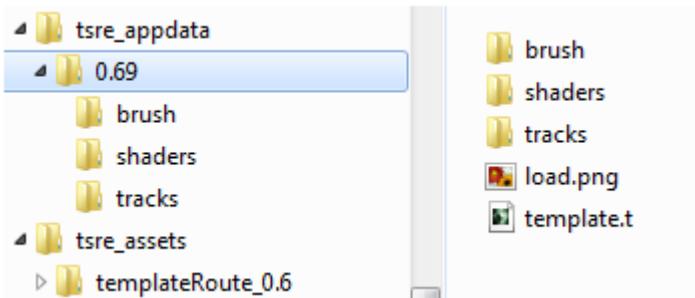
Please do not put the TSRE .exe file into C:\Program Files or C:\Program Files (x86). If you install your MSTS into \Program Files\ or \Program Files (x86)\ expect problems due to Microsoft Security controls. TSRE will not operate correctly in a **system** managed folder like these. You must place the **EXE** somewhere else, like maybe a new folder you 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
- 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?

Any line in the `Settings.txt` file that begins with `#` is *commented out* and is therefore **DISABLED**. So, to **enable** the AASAMPLES option in the first line, you would edit the `SETTINGS.TXT` file in the TSRE folder with the text editor of your choice and delete the `#` in front of AASAMPLES.

Below is a sample settings file. Some parts of it need to be modified with content that is related to you personally such as folder locations and online map tool keys.

### File

"`settings.txt`"

```
#AASamples
allowObjLag | 1000
#autoFix | true
#cameraFov | 20.0
cameraSpeedMax | 2
cameraSpeedMin | 20
cameraSpeedStd | 0.20
#cameraStickToTerrain | true
#ceWindowLayout | CU1
colorConView | #87ceeb
colorShapeView | #87ceeb
consoleOutput | false
#createNewIfNotExist | true
#defaultElevationBox | 0
#defaultMoveStep | 0.25
#deleteTrWatermarks | true
#deleteViewDbSpheres | true
fogColor | #D0D0FF
fogDensity | 0.55
#fpsLimit | 0
fullscreen | true
gameRoot | T:\0_NEKS
geoPath | H:/Hgt
#GoogleMapsKey |
#hudEnabled | true
#hudScale
ignoreMissingGlobalShapes | true
imageMapsUrl |
http://api.mapbox.com/v4/mapbox.satellite/{lon},{lat},{zoom}/{res}x{res}.png?access_to
```

```
ken|
leaveTrackShapeAfterDelete | false
loadAllWFiles | true
#mainwindowslayout| PWT
mapImageResolution | 1024
markerLines | true
maxObjLag | 10
mouseSpeed | 0.1
numRecentItems | 30
objectLod | 4000
#objectsToRemove
#oglDefaultLineWidth | 1
#ortsEngEnable | true
#playerMode | true
#proceduralTracks | true
#renderTrItems | true
#routeMergeString
#routeName | cmk
#season
#seasonalEditing | true
#serverLogin
#shadowMapSize
shadowsEnabled | 0
#skyColor
snapableOnlyRot | false
#sortTileObjects | true
soundEnabled | true
#startTilex | -5306
#startTiley | 14961
#systemTheme | true
tileLod | 2
#textureQuality
#toolsHidden | true
#trackElevationMaxPm
#useImperial | true
#useNetworkEng | true
usenNumPad | true
#useOnlyPositiveQuaternions | true
UseQuadTree | false
#useTdbEmptyItems | true
#UseWorkingDir | true
warningBox | false
writeEnabled | true
writeTDB | true
```

The list of items above includes items that were extracted from the TSRE5 Source Code.

The list below is an attempt to describe each option, where possible.

Entry	Value	Description
#	Comment	Any line that starts with a # character is a "Comment" line and its contents are ignored.
#AASamples		Anti-Alias
allowObjLag	1000	Lower value may be better for HDD. Higher value increases loading speed on startup but requires SSD.
#autoFix	true	
#cameraFov	20	Route Editor Camera field of view.
cameraSpeedMax	2	High Speed Preset
cameraSpeedMin	20	Slow Speed Preset
cameraSpeedStd	0.2	Normal Speed Preset
#cameraStickToTerrain	true	Camera will stick to ground level and follow terrain
#ceWindowLayout	CU1	Gui Setting
colorConView	#87ceeb	Consist Viewer custom background color.
colorShapeView	#87ceeb	Shape Viewer custom background color.
consoleOutput	false	Set this to true if you want log printed on console. It will output to a file named <b>log.txt</b> . <i>It seems to not be working in the current version</i>
#createNewIfNotExist	true	Set to true to auto create new route if routeName is set and route not exists. Not recommended
#defaultElevationBox	0	[values 0 - 3]
#defaultMoveStep	0.25	[default 0.25]
#deleteTrWatermarks	true	Set this to true if you want to delete "TrWatermarks" objects in .W files on save.
#deleteViewDbSpheres	true	Set this to true if you want to delete ViewDbSpheres objects in .W files on save.

<b>Entry</b>	<b>Value</b>	<b>Description</b>
fogColor	#D0D0FF	Ambient Fog settings - Color
fogDensity	0.55	Ambient Fog settings - Density
#fpsLimit	0	Set FPS limit. Default; 0 = no limit.
fullscreen	true	
gameRoot	T:\0_NEKS	Example: "F:/train simulator" 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.
geoPath	H:/Hgt	Enter the path to directory where you have .HGT files stored if you want to use the terrain height data import in Route Editor.
#GoogleMapsKey	API KEY	Enter your personal Google Maps API key here to use satellite Imagery
#hudEnabled	true	<b>new</b> True/False
#hudScale		<b>new</b> True/False
ignoreMissingGlobalShapes	true	True/False hide unavailable global shapes
imageMapsUrl	<a href="http://api.mapbox.com/v4/mapbox.satellite/{lon},{lat},{zoom}/{res}x{res}.png?access_token">http://api.mapbox.com/v4/mapbox.satellite/{lon},{lat},{zoom}/{res}x{res}.png?access_token</a>	There is a section on how to use this in the manual.
leaveTrackShapeAfterDelete	false	True/False Set to true if you want to manually fix broken TDB vectors in Route Editor. <i>Only for advanced users</i>
loadAllWFiles	true	<b>new</b> True/False
#mainwindowslayout	PWT	Default, Other options include "TWP", "PTW", "WTP" etc. Using just "W" will make all windows be separate.
mapImageResolution	1024	use multiples, IE; 2048,4096,8192 etc
markerLines	true	<b>new</b> True/False

<b>Entry</b>	<b>Value</b>	<b>Description</b>
maxObjLag	10	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.
mouseSpeed	0.1	Control mouse movement speed
numRecentItems	30	<b>new</b>
objectLod	4000	View distance in meters. <b>tileLod = objectLod/2000 required</b> . The default for the MSTS Route Editor is <b>tileLod = 1, objectLod = 2000</b>
#objectsToRemove		<b>new</b>
#oglDefaultLineWidth	1	Bounding Box Line Width Value Adjustment
#ortsEngEnable	true	<b>new</b>
#playerMode	true	<b>new</b>
#proceduralTracks	true	<b>new</b>
#renderTrItems	true	Ture/False Set to true if you want to see TDB items. <i>Only for advanced users</i>
#routeMergeString		<b>new</b>
#routeName	cmk	Place a route name here if you want to skip the Load Window and instead use this route on startup.
#season		<b>new</b>
#seasonalEditing	true	<b>new</b>
#serverLogin		<b>new</b>
#shadowMapSize		<b>new</b>
shadowsEnabled	0	<b>new</b>
#skyColor		#R #G #B RGB COLOR
snapableOnlyRot	false	True or False, Stick to track property
#sortTileObjects	true	<b>new</b>
soundEnabled	true	<b>new</b>

Entry	Value	Description
#startTilex	-5306	Optional Route Editor Start Tile X position. This overrides the route settings in the <a href="#">TRK</a> file
#startTiley	14961	Optional Route Editor Start Tile Y position.
#systemTheme	true	Set to true if you want to use a system theme instead of the default dark one.
tileLod	2	Tile view distance. 0 = 1x1 tiles, 1 = 3x3 tiles, 2 = 5x5 tiles etc. The default MSTS value is 1.
#textureQuality		<b>new</b>
#toolsHidden	true	Set to true if you want to hide all tools in the Route Editor.
#trackElevationMaxPm		<b>new</b>
#useImperial	true	Set to true if you want to use miles instead kilometers etc. <i>Not sure it works</i>
#useNetworkEng	true	<b>new</b>
usenNumPad	true	Set to false if you have keyboard with no numpad 0-9 keys.
#useOnlyPositiveQuaternions	true	<b>new</b>
UseQuadTree	false	true/false Disable or Enable the new renderer.
#useTdbEmptyItems	true	<b>new</b>
#UseWorkingDir	true	<b>new</b>
warningBox	false	true/false Set to false if you don't want warning window on startup.
writeEnabled	true	Set this to false if you want to disable all <a href="#">Save</a> functions.
writeTDB	true	Set this to false if you want to disable the <a href="#">Save Track Database</a> functions.



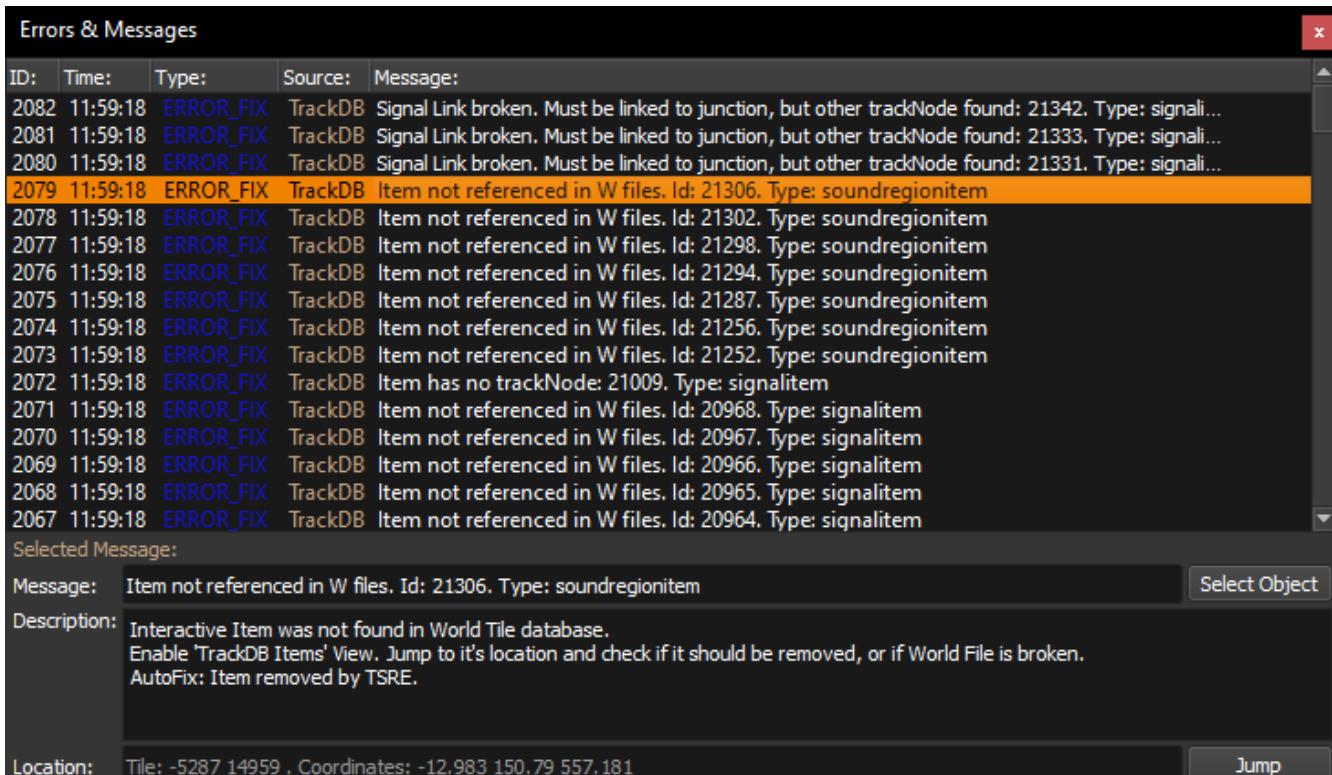
If the comment says **new** and nothing else... we still need a good explanation of what it's supposed to do.

# Changes

What's new:

0.7.001 - some dynamic track bug fixes - fixed bug when placing elevated complex tracks and shapes - fixed bug when signals face wrong direction after track vector editing - TSRE creates an empty graphic.ace file when making a new route, so MSTS won't crash on load - multiplayer editing demo

0.699 - autoFix function. TSRE will remove all broken objects if autoFix is set to true in settings.txt - new error detected by TSRE - signal linked to wrong trackNode



0.698 - introduction to error & messages. New window + route checks + new option: "loadAllWFiles = true" - randomized object placement - multiple ref files - shape viewer reload file - geo terrain editable offset - improved kml rendering - try "markerLines = true" - improved Image Maps download - seasonal editing - option to customize number of recent items list: "numRecentItems = X" - many fixes and features already forgotten XD

0.69752

- fixed RE shape preview window

0.69751

- fixed selection bug

0.6975

- shape viewer
- fixed shader shadow bug

- fixed bug when moved carspawner marker is not properly displayed in some tools

0.6974

- fixed bug when editing water on tile with water disabled

0.6973

- fixed Quad Tree bug (disappearing terrain)
- fixed bug when moved platform marker is not properly displayed in some tools

0.6972

- fixed bug with loading DDS textures defined directly in data files.
- fixed bug when train path stations were not in order while making services.

0.697

- new installation method. TSRE uses now Tar archiwes and own tar file extractor instead of windows .cab files. So, now automatic installation should work on all operating systems.

0.6963

- elevation info for dynamic tracks and rulers
- set position Y value for group of objects
- edit position of signal shape in properties window
- more actions available from the context menu
- pick elevation for placement → easy placement of elevated track using short segments
- new option "useTdbEmptyItems = false" may help editing broken routes?

# Route Editor

## Before Getting Started

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

To start working with the Route Editor you need to:

- Download and run the TSRE5 application
- Have at least one populated 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



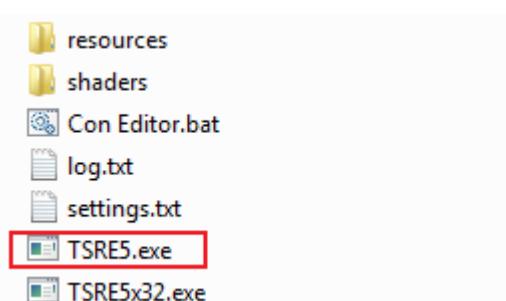
If you haven't done this by now, please make sure that you are running any instances of MSTS outside of system managed folders like `c:\program files(x86)`. This means that you didn't accept the default folder options when installing MSTS from CDROMS. It is recommended that a root directory for MSTS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



TSRE is much more stable than the MSTS route editor: you can place many more objects on the tile and do some things , which were previously impossible. It's not perfect though - so it's probably a good idea to back up your work from time to time.

## Overview

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



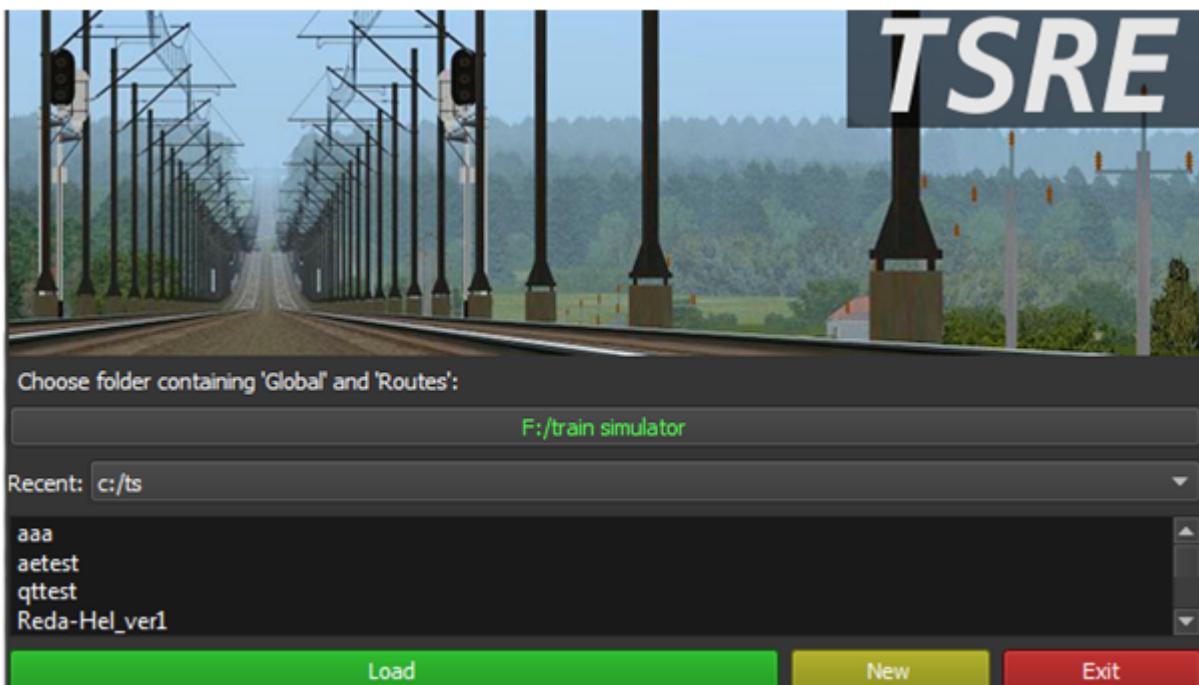
If you have properly set up the `gameRoot` settings then the Route Editor is ready to use.

# Starting a Session

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

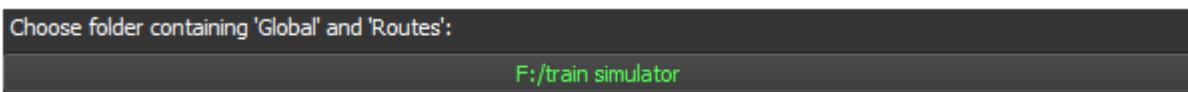


If you want to use **Consist Editor** however, you need to use the `ConsistEditor.bat` file to start a Consist Editing session.



## Loading a Route

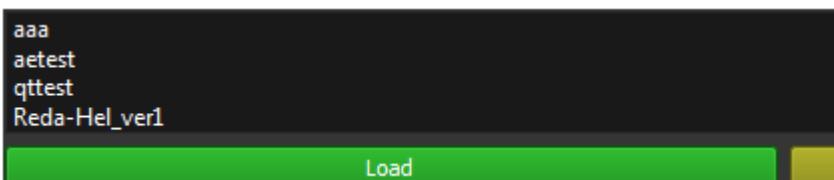
If you have not defined a default "gameRoot" setting, you will need to click the **browse** button and select your game directory every time that TSRE is loaded. It can be any directory that contains **Routes**, **Trains** and **Global** folders such as the standard MSTS installation folder, or a mini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



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

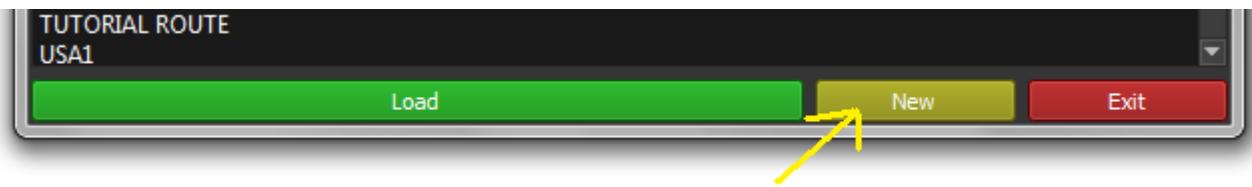


Select the route you want to edit and click **Load**



# Creating A New Route

Click the **New** button

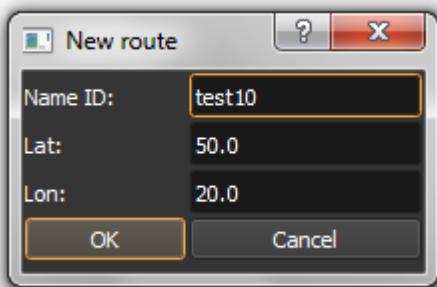


Enter the name to use as a **Route Name ID**. This will become the route's directory name and is used for the naming of key files. It is a good practice to enter a short, lowercase name with no spaces.

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.

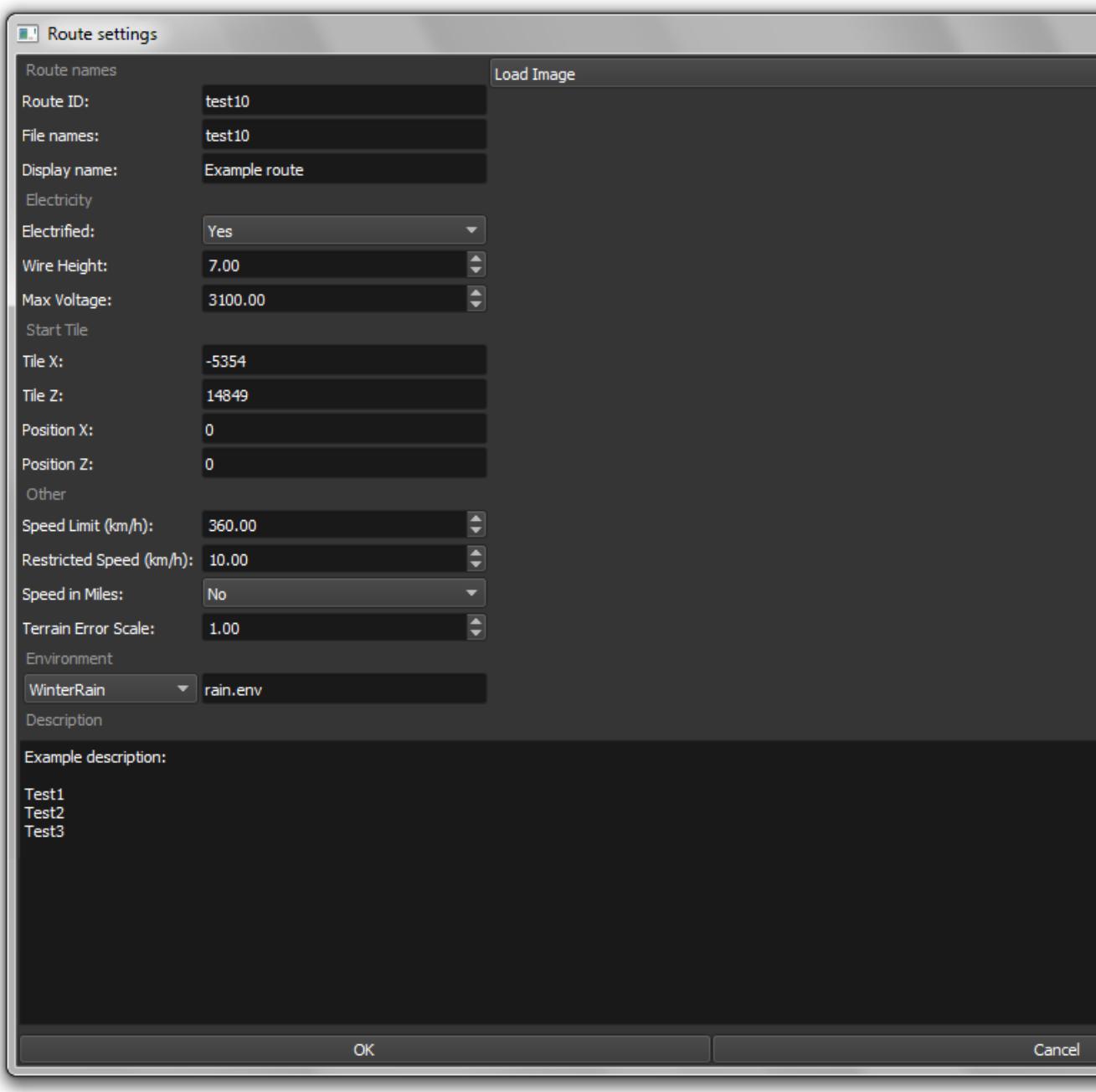


To find the Latitude and Longitude of the location you want to work in, you can use Google Maps.



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

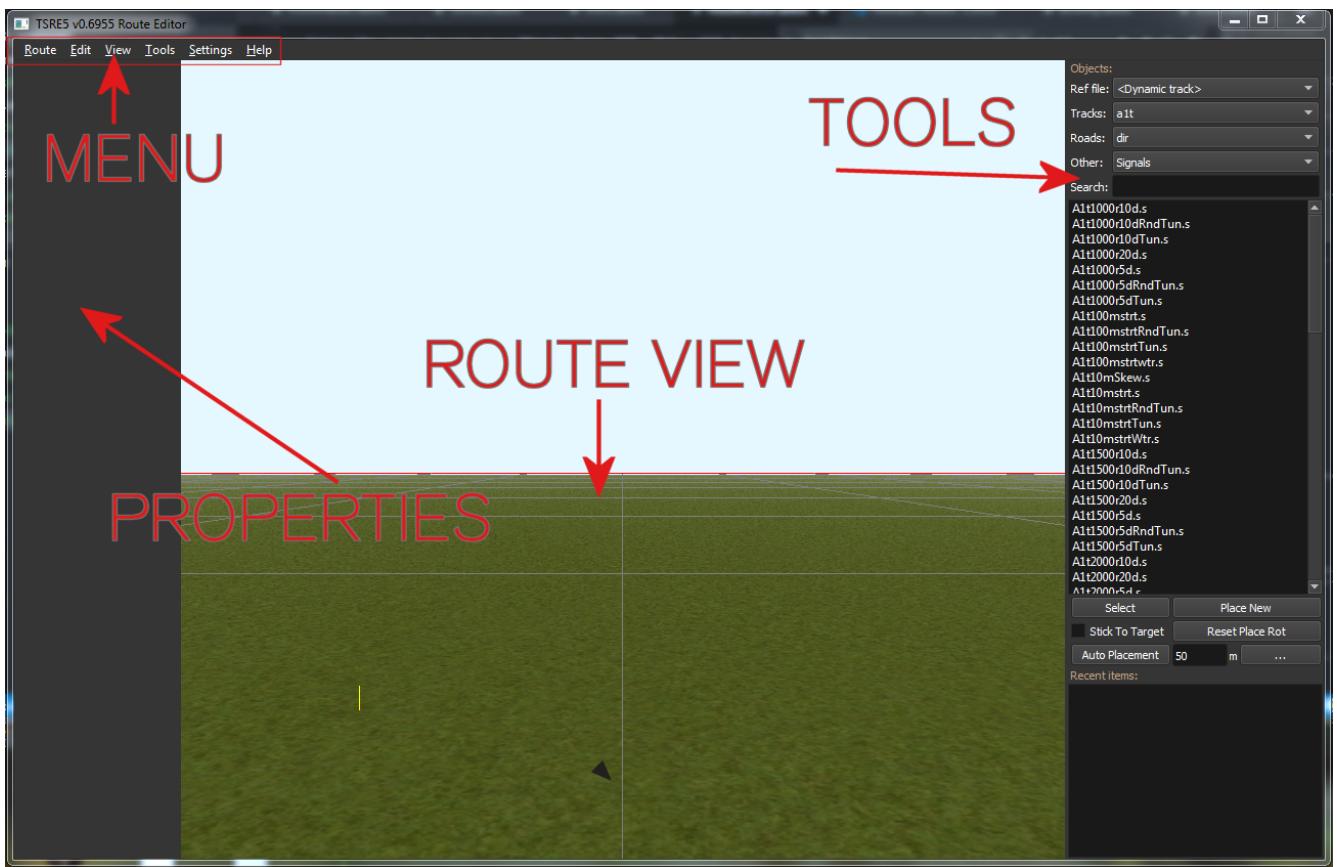
The Route Editor will start at this world position. Changing these values is not recommended while creating new route.



You can now begin editing your new route.

# Getting Around in the Route Editor

## Main Window



## Menu

### Route→Save

Save changes.

### Route→Create Debug 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→Undo

Undo last action **CTRL + Z**.

### Edit→Copy

Copy selected object **CTRL + C**.

## **Edit→Paste**

Paste selected object **CTRL + V**.

## **Edit→Select Tool**

Select object **E**.

## **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**

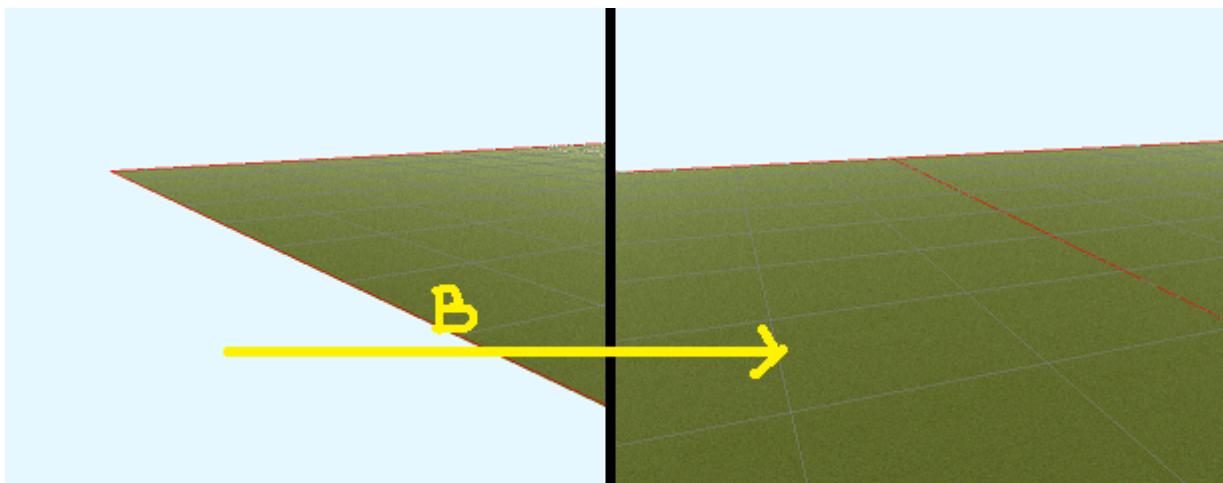
Choose a tool-set.

**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.

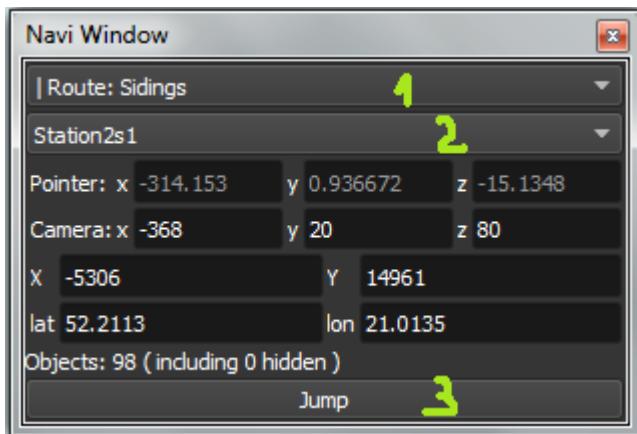
- Min Speed is keyboard arrow keys + **Ctrl** key.
- Std Speed is keyboard arrow keys.
- Max Speed is keyboard arrow keys + **Shift** key.
- Move up **W-Spacebar**, Move down **S-Spacebar**.

**.** (Period Key)

Top Down View. Press to toggle on/off

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

You can easily jump to many locations in your route using Navi Window.

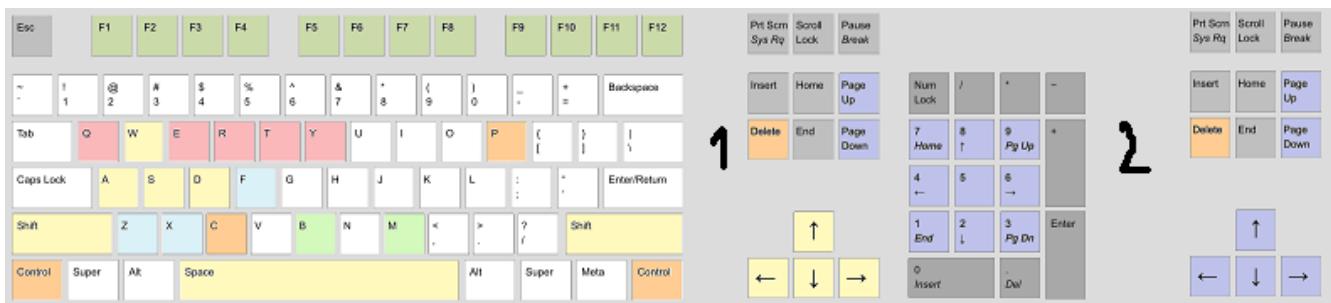


1. Select from one of the many categories, for example Route: Sidings.
2. Select siding.
3. Click Jump.



Press LMB 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. This is probably the most important tip you should remember.

# Navi Window

[TIP] Due to map projection issues, using actual LAT/LONG values may not be 100% accurate. It is recommended that MARKERS from Google Earth (saved as KML files) be used as jump references. Some people have found that determining the **offset** for the route area is handy. For example; adding approx 100 to the ingame compass latitude reading and subtracting approx 150 from the longitude and then inputting those figures into the navi window gets me near enough to work with. eg: a lat fig of 48.0785 up to 48.0883 and lon -82.1266 down to -82.1113.

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.



If your camera is looking down on terrain, you would also be flying down to terrain by using the arrow-key to move forward. If you press the period-key **.** (dot), you are flying horizontally, and the camera is looking down. By pressing dot **.** a second time, you will get the standard-function back.

# Working With Objects:

**Q**

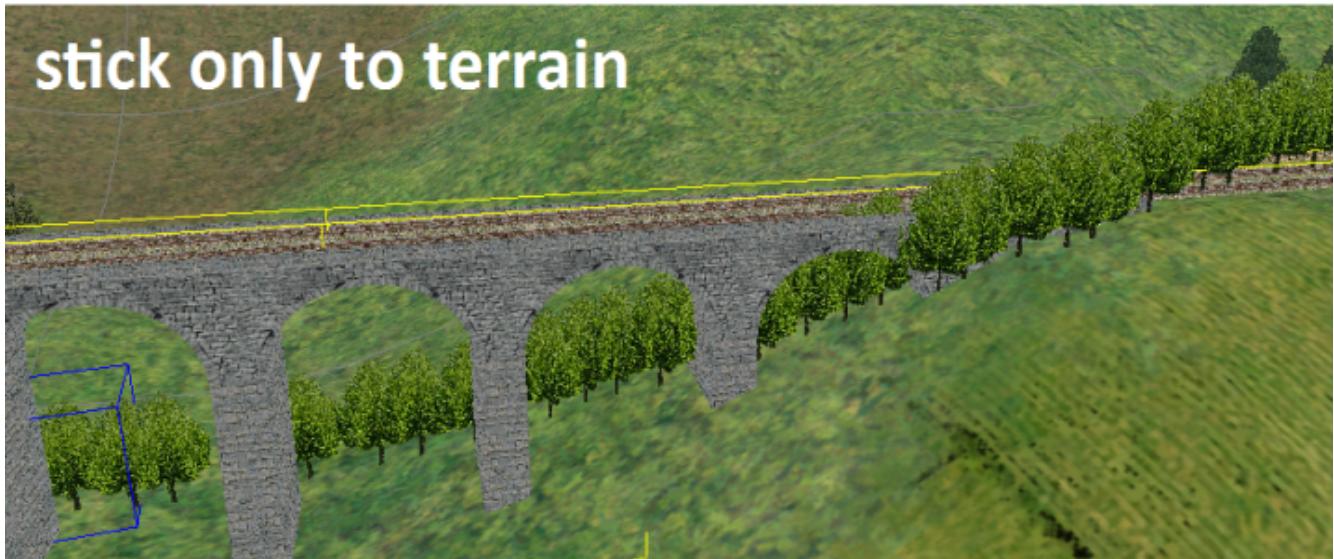
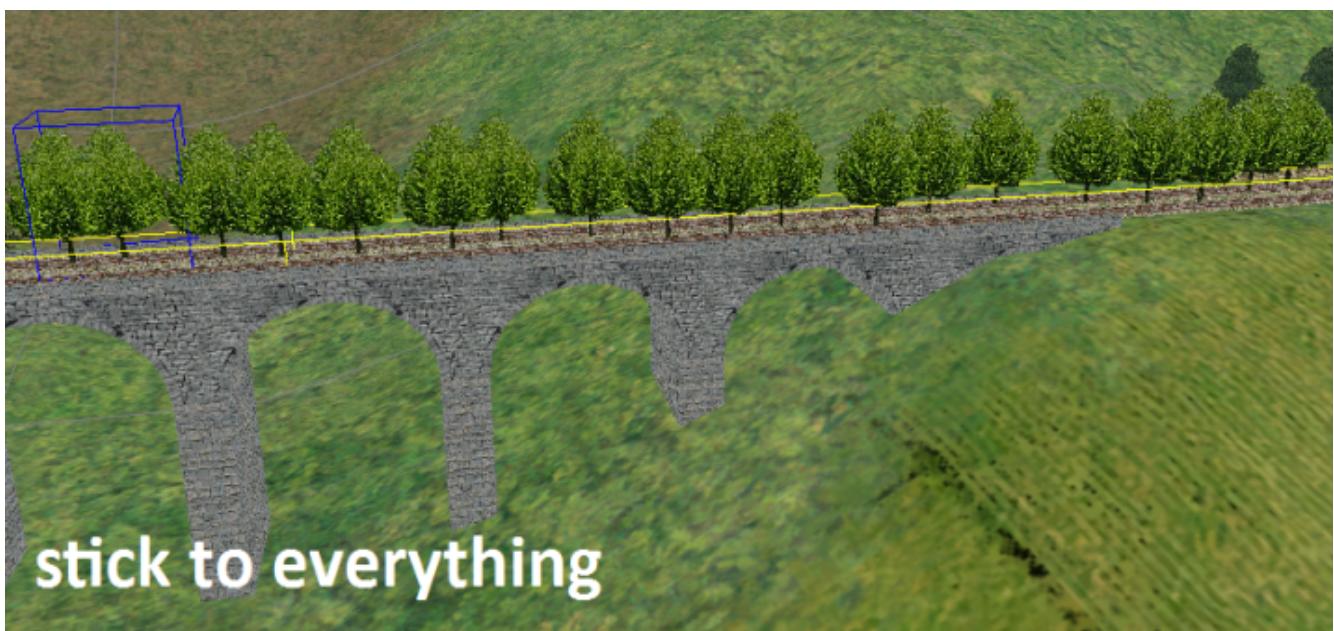
Place a new object.

**Ctrl + Q**

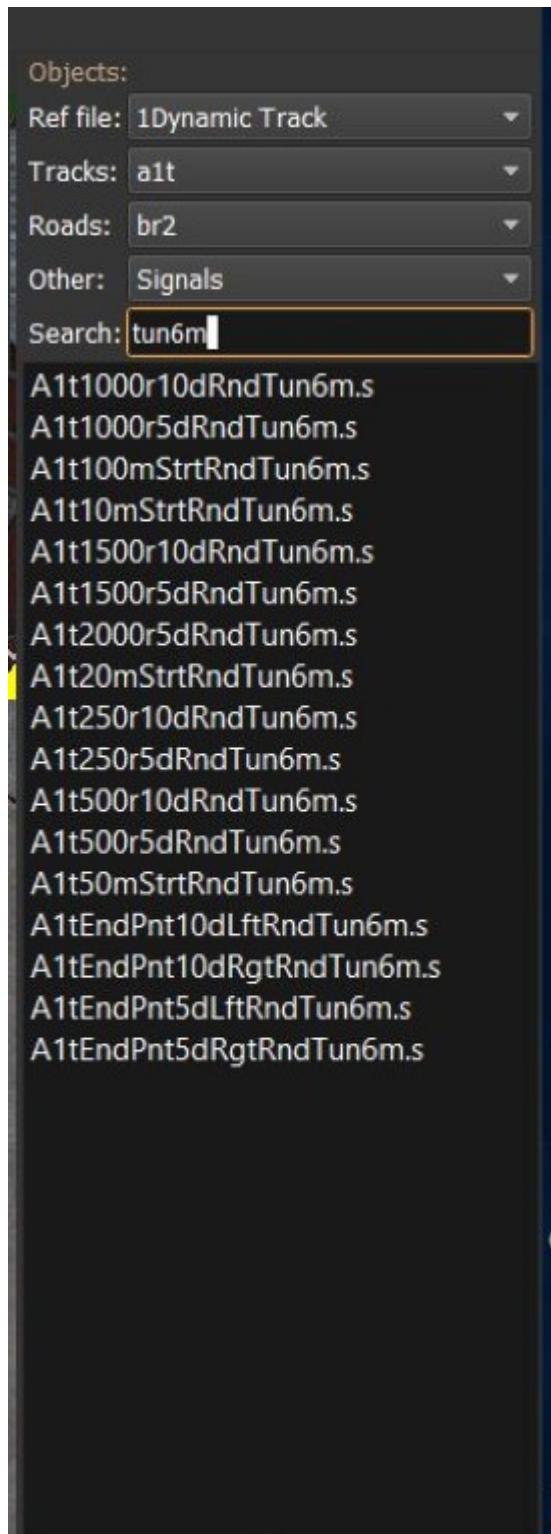
Toggle the "manual/auto" **add track to TDB** option (use **Z** key for manual).

**Shift + Q**

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



The TSRE5 Objects Panel has a search function. With it, you can search on any part of a shape's filename.



In TSRE, when laying track inside tunnels, use: **Shift + Q**. It will change the placement mode between "stick only to terrain" and "stick to everything". Then you will then be able to stick the new track to the existing track that is under the terrain.

## 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



In the TSRE **Tools** menu of the Objects window is a built-in ruler function. When measuring mileposts in Real-World routes, use the Geo length rather than game length. It's remarkably fast to measure out 1600 meters, place a milepost, and move on to the next. Make sure you delete the ruler objects when you're done. Open Rails won't necessarily choke on them, but they will create errors in the log file if left



Translate operation should be performed first, before Rotate, as a Translate really drops shape's position down again, as it was placed originally.

## 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

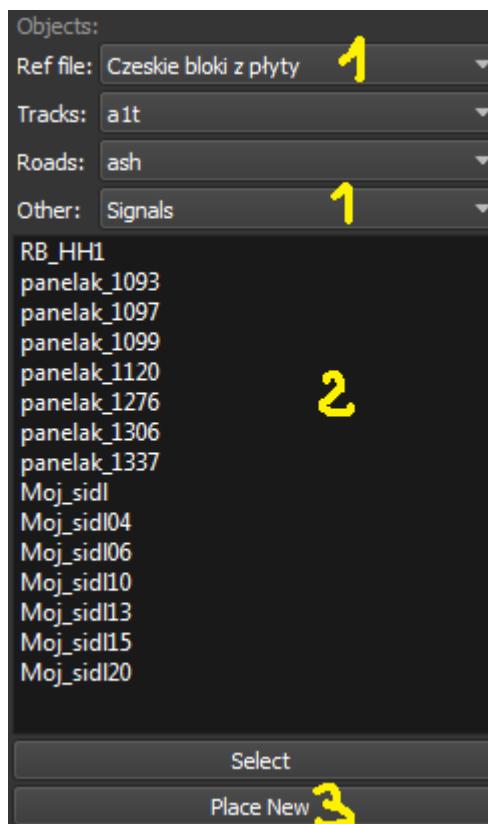
CTRL + V,H

Toggle "Hide Terrain"

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



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



Holding the **Shift** key while dragging with the mouse will cause an object to rotate

## 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
  1. You can select object and move it around using mouse. Use mouse wheel to raise or lower its position.
  2. 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.
  3. You can adjust object rotation by pressing **R** and using **4 + 6 + 8 + 2** keys.
  4. You can press **Ctrl** to change **R & T** step rate.



- 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

The general sequence of steps for adding tracks is as follows.

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



Having the Open Rails **Track Viewer** tool open when using TSRE is a useful assistant when editing a route. It works fine even with a one monitor setup. Navigation becomes easy and tracking down errant TDB items too!

**Advice from Vince:** A good rule to follow is NEVER move a track section if the 'Yellow TDB' line appears above the track section.

Vince also says that a good track addition sequence is:

1. Place the track
2. Adjust the elevation, and for Dynamic Track, make "all" curve adjustments
3. Bring terrain to the track
4. Press the Z key to finally add your changes to the TDB



It is recommended you turn OFF **auto add to TDB** while adding / adjusting track and so prevent TDB corruption.

Adding tracks to the TDB **manually** will prevent all sorts of problems that will arise if a track is physically moved after it is added to the TDB.

You must be in **Select Mode** to toggle **auto-add TDB** OFF and ON using the **Ctrl + Q** key combination. There is also an option you can set in the settings file.

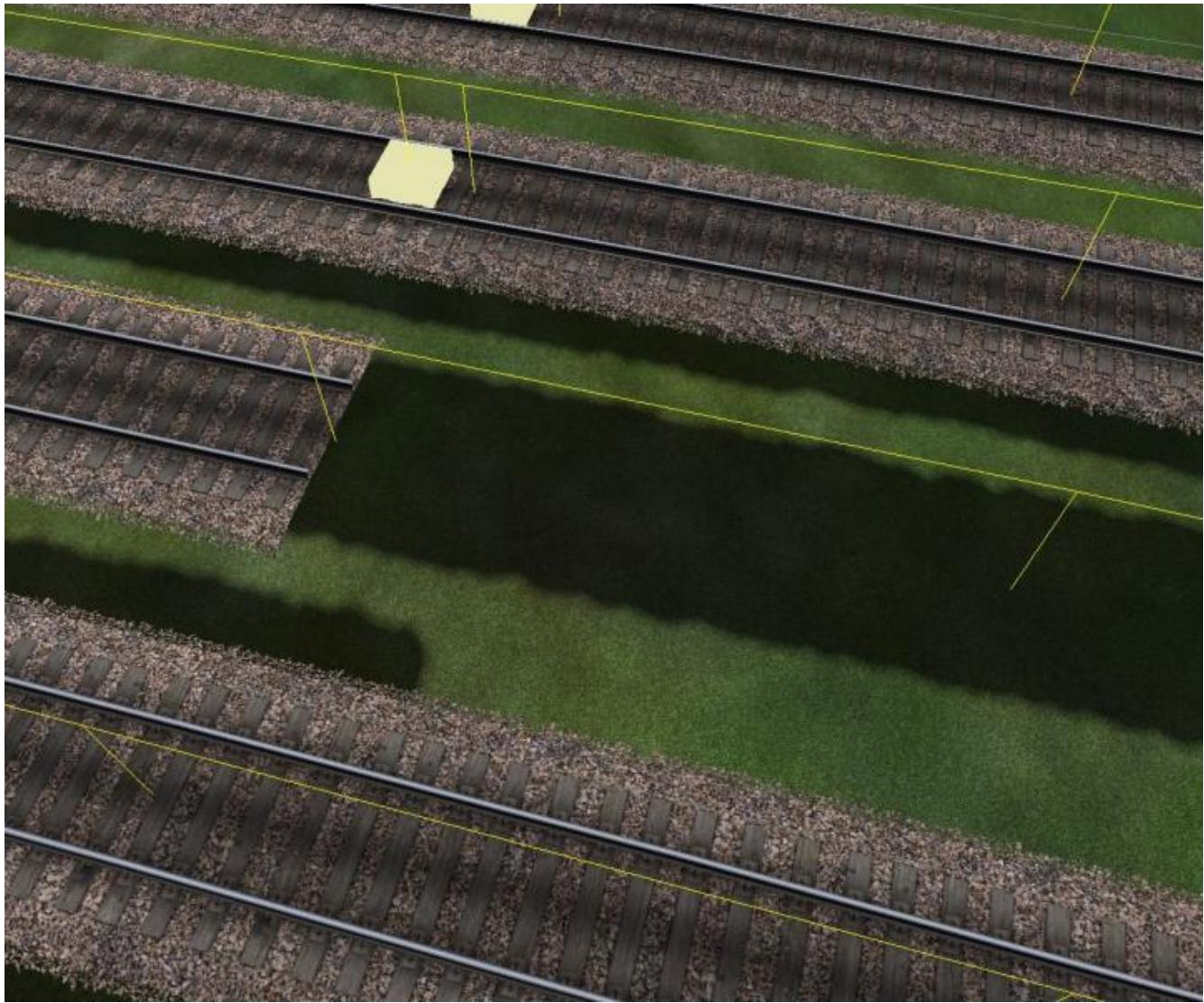


When making *micro adjustments* of the gradient are needed, remember the **STEP** value in the Left Side Panel when the track is selected. The Default setting is 25. This works out to around 2.5 cm. This value may be too large for any fine adjustments that are needed and you can set it to very small values. Good values for finer control over adjustments would be 0.01 for some 'really small' adjustments. The value can be reset in the **context menu** brought up by **right clicking** anywhere on the screen and selecting **Reset Move Step**. It will go back to the default value of 25.



If you are having problems with a section, there is always **CTRL-Z** to undo.

## Dealing with Shape issues



If you end up having issues with track section such as yellow TDB section but no track shape, there is hope.

Vince Says:

- Delete the track sections on either end of the missing shape then attach a small track section to one end of the missing section; you can use a 30d tram curve but any short section will do.
- Save.
- Select the short section you just attached. At the bottom of the left side panel select **Hacks**.
- A **TrackObj Hacks** window opens.
- Select **Remove TDB Vector**. The yellow database lines above the missing track and the just added short section will go away.
- Select the short track section you previously added and **Delete** the track.
- Save. Done!



When adding track I'd suggest keeping **auto-add to TDB** off. Press combo **Ctrl + Q** to toggle. *Sound familiar?*

## Dynamic Track Tips

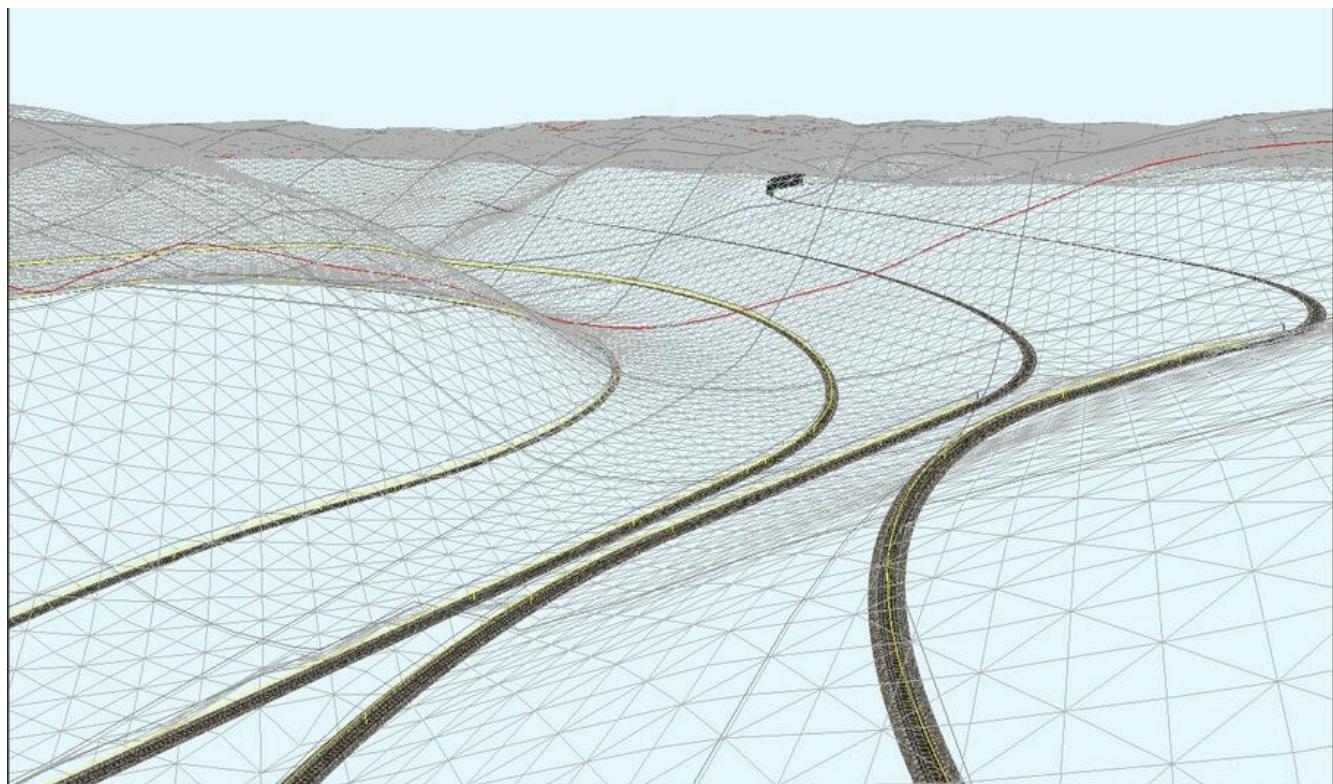
- TIPS From Jerry Sullivan \*

While it is probably preferable to not to use Dynamic Track, it is not difficult to set up in TSRE.

- First you need to know the degree of curve which will be indicated on a track chart if you are trying to duplicate the real world.
- Then you need to know the gradient.

Dynamic Track in TSRE is better than in MSTS in one respect. You can make it bend either direction, left or right, by using, or not using, a minus sign "-" in front of the angle.

- When you first select Dynamic Track the first tangent is already there, set at 10 Meters.
- Now select the first curve (I would recommend only using one curve per piece of Dynamic Track) and you will see a minimal radius & curve.
- On the track chart the curve was labeled either 4.25 degrees, or 4 degree 15 minutes.
- Using a constant that surveyors use up to about 10 degree curves divide 1746 meters/4.25 degree = 410.8 meters radius. (or you could divide 1746 by the radius to get degrees)..
- Now make the Dynamic Track bend one way or the other by inserting the minus sign. No plus sign needed. Now select the 2nd tangent & it will appear with a minimum length.
- Now adjust radius, degrees in the curve, and the tangent length to get a fit. Tricky at first but easy once you get the hang of it.



Using the mouse is nearly useless. Use the keyboard to enter the adjustments because you may get down to a hundredth of a meter or degree and the mouse key does not go that low. Sometimes there is no other way. If you have 3 curved tracks

and the only value that is close is 90 meters, then you can lay a 90 meter radius curve but then have to use dynamic track to get 95 & 100, or 90 & 85 meter curves.



Jerry Says: "I don't like it, I minimize use of it, but sometimes you have no choice.\*\*\*"

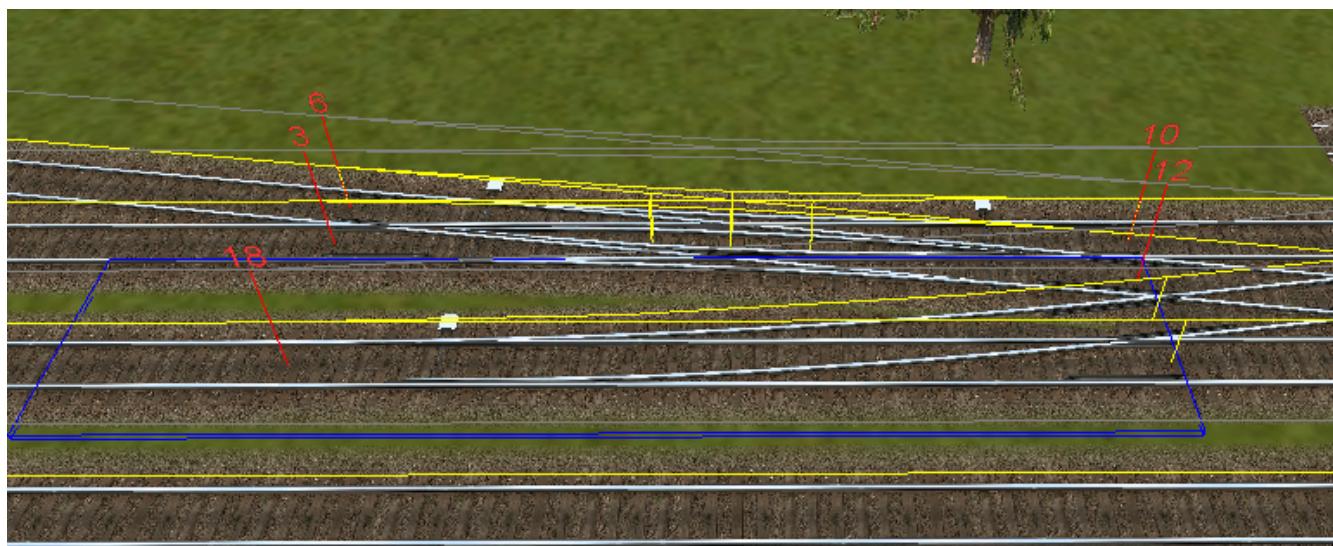
Attached is a image at the north (top) end of the tracks that go south from Beckley, WV area down Gulf creek. There are tunnels, at one point 4 layers of track, and Gulf Switch is actually a switchback. Two railroads are here. The lower one is the former C&O and other is the former Virginian, then NS, and now a shortline. The C&O part was abandoned about 1995 or so. And yes, there are some Dynamic Track pieces in this spaghetti bowl. Click image for larger version

## 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.

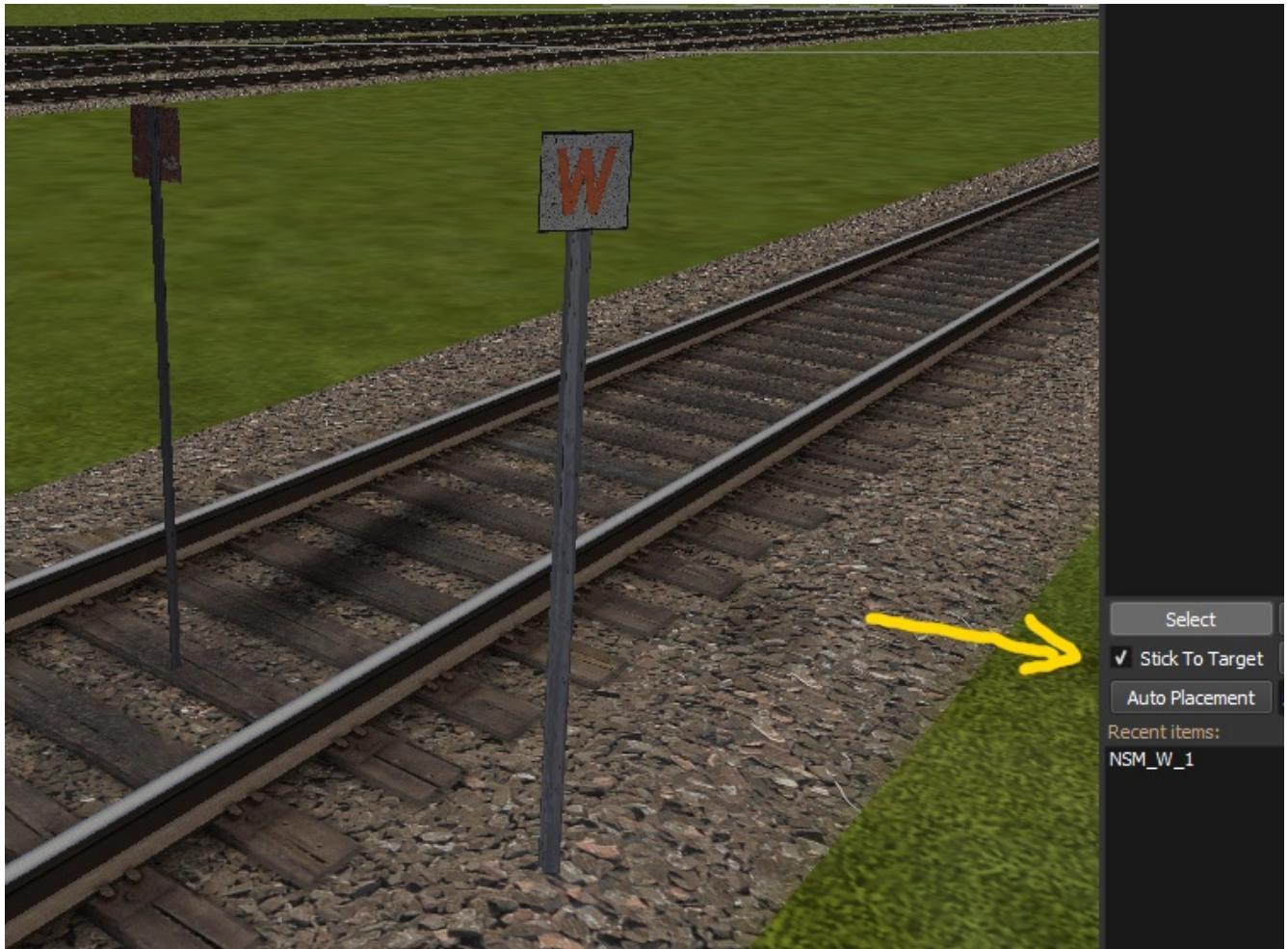
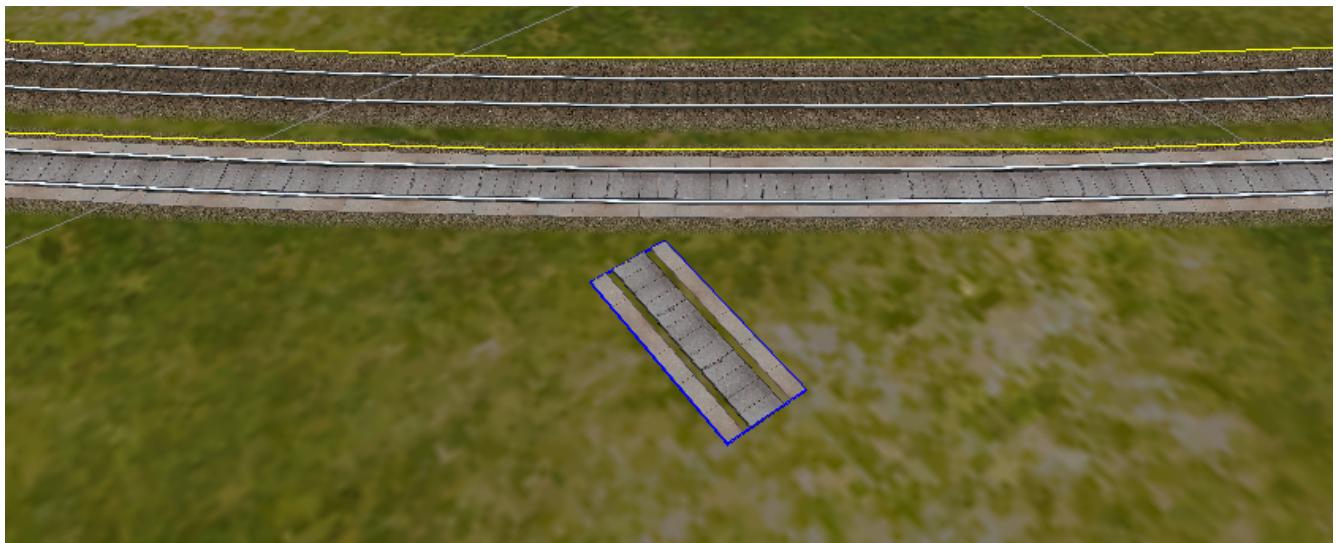
You can also select track and press **Ctrl + C** to copy it and then move to the location where you want add the new track and press **Ctrl + V** to paste it.



## How to align objects to track

### Stick to track method

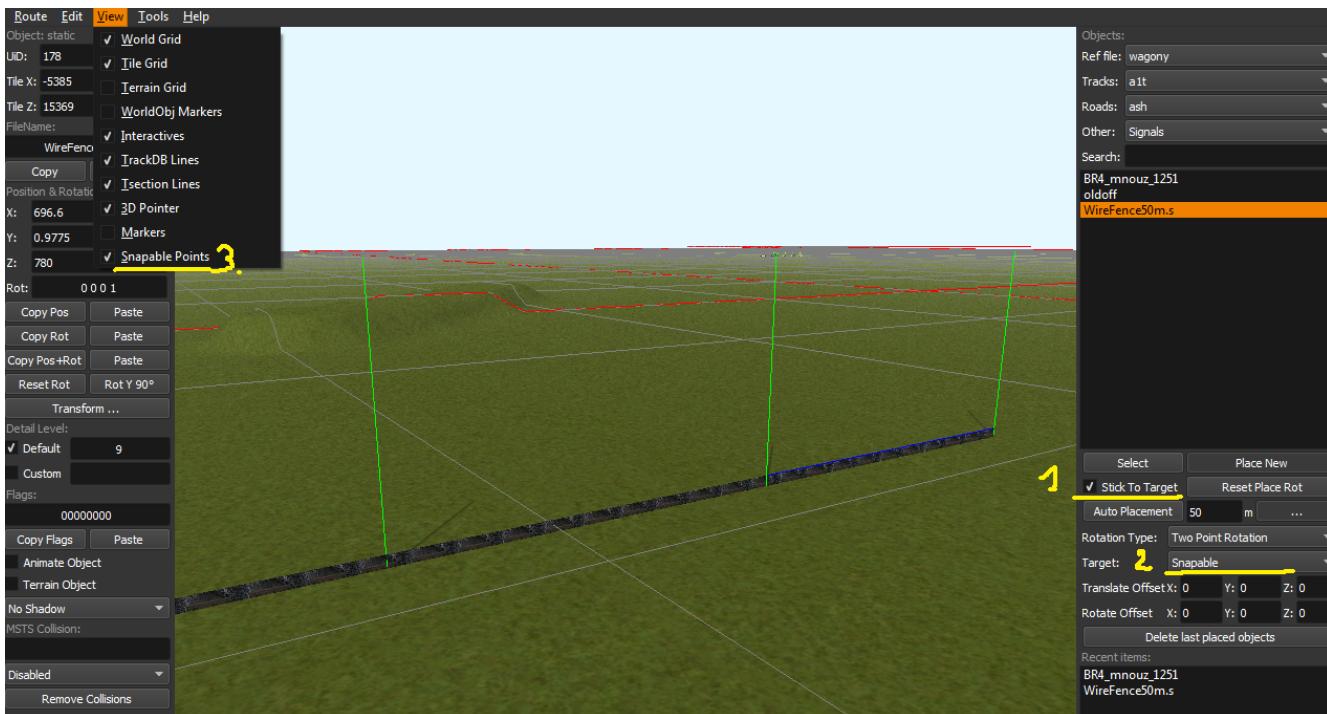
- Click **Stick to track** checkbox.
- Click **Place New** button and place object you want on a track you want to align.



### 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!

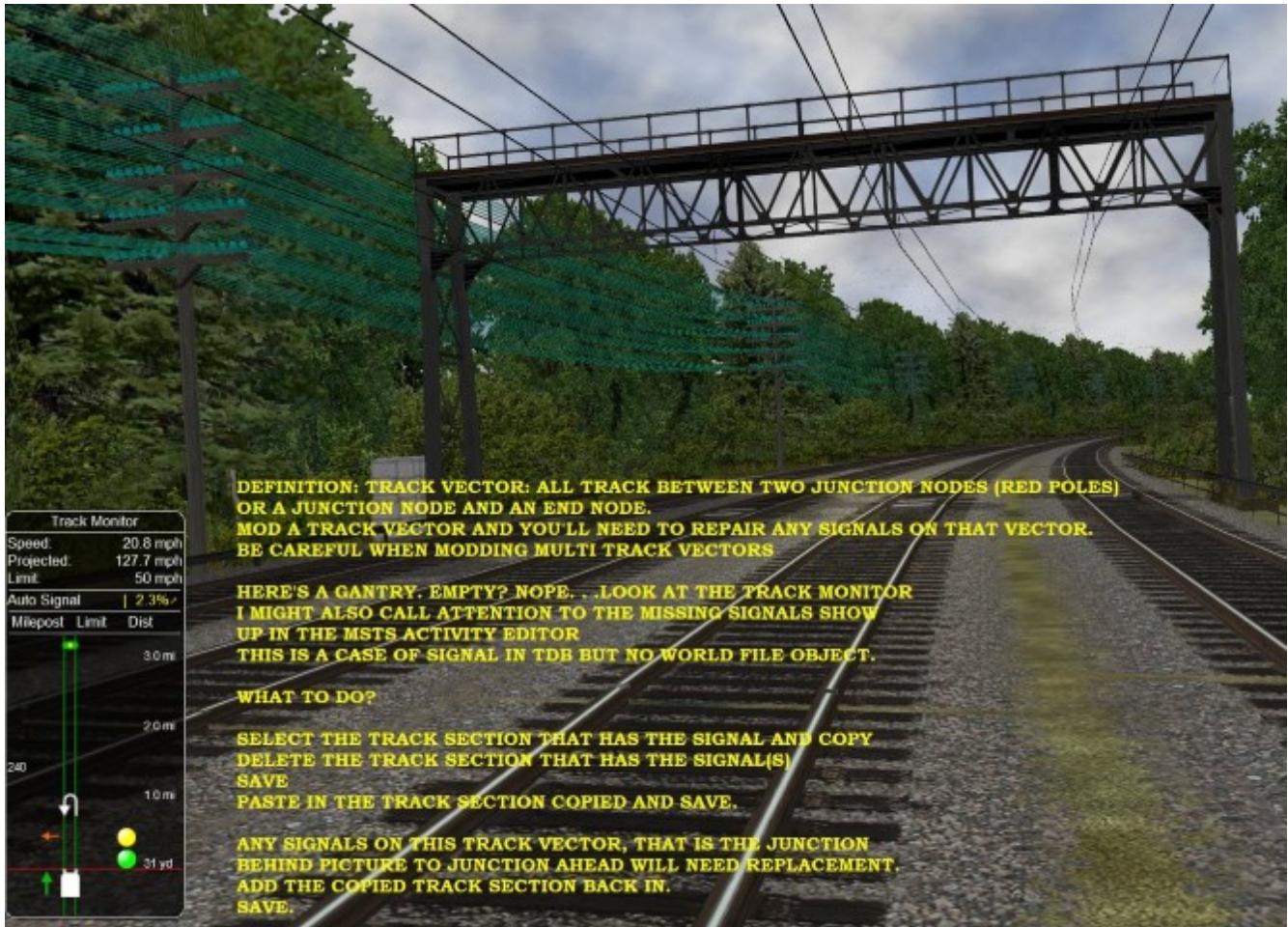


Signals will automatically align to the track when placed except for direction. Use **Flip** or **X** to change direction.

## Modifying Track After Signals are Present

Generally, you just don't want to do this as it si fraught with danger.

As you can see in the picture below, the gantry sites empty, however, in MSTS activity Editor there are signals here. You can also see them in the track monitor.



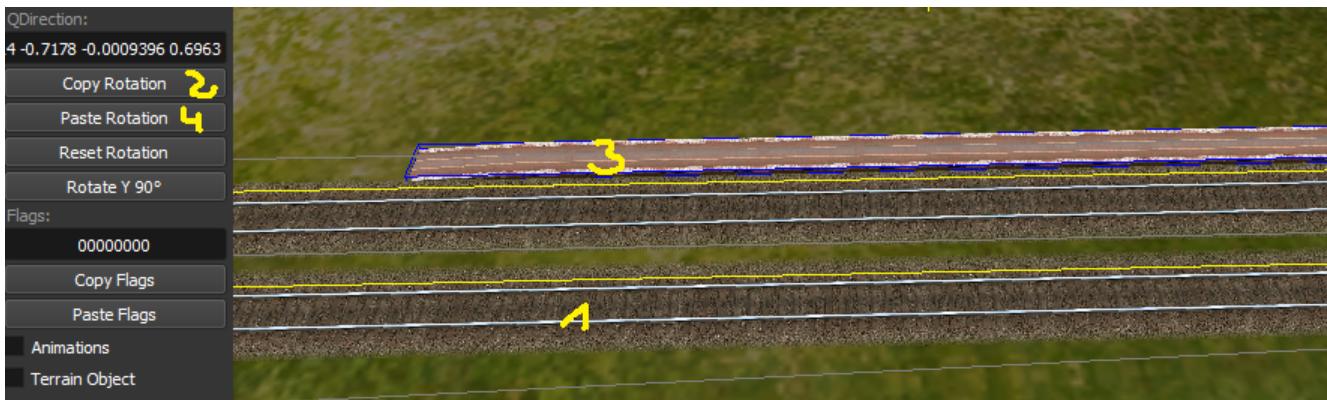
So AE & Sim agree, there is a signal here but not visible. It is a 'Phantom' signal.

Using TSRE, I've found an easy way to remove them. Only problem is that it also fouls up any other signals on the same Track Vector and they need to be either replaced or most often, just relinked.

Actually, the track section with the phantom on it does NOT need to be copy-delete-paste back-save. All you need do in TSRE with the track section selected is press **Z**, which removes track from the TDB, then save. Re-select the track and press **Z** again (yellow tdb lines appear) then save to add track back to the TDB.

## 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.



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 use of the 'E' key or Select Button. This is to allow you to regain fine movement control when the Ctrl Key is pressed and held with the movement keys.

## Object Panels

### Static Objects

#### Forests

#### Transfers

### Platforms and Sidings

Place a siding or platform marker and fill in the properties for each item.

On the TSRE Objects Panel you would enter 'platform' and find the Platform marker you want. Select it, place on track. Movement is about the same as MSTS. Use **2 + 4 + 6 + 8** keys to move them or you can drag w/mouse.

#### Roads

With the MSTS editor there was no choice when installing roads. If they were added to the route they got added into the Road Database file.

If you need short roads and some that would not be seen from a passing train having these roads without car spawners would result in taking up unnecessary space in the Road Database file and they serve no purpose other than to complicate the database file!

So why not just eliminate the database entry for these roads and leave them as static objects?

- METHOD \*

With TSRE5, select the road for which you want to eliminate its database entry. Press the **Z** key. The blue road database line vanishes. Save now and you're done.

The road section has been deleted from the routes RDB this leaving the road as a static object.

Note: To create roads without car spawners you can also use John Milligan's Dumb Roads. Just static scenery, no rdb entries.

## Carspawners

To create a car spawner, you need an entry in the route's **REF** file like this.

```
CarSpawner (
    Class (Vehicles)
    Description ("Car Spawner")
    StoreMatrix ()
)
```



The class can be anything, I put mine in the "vehicles" class.

To add a car spawner, select it from the **REF** file list and then select **place new** as you would for any object. When you place it on the road section, you will see 2 purple squares ("handles"). Pull them apart and take note which direction the traffic is flowing. If it is going in the wrong direction, pull one handle past the other to reverse them.

When you select a handle, it changes to a lighter shade of purple and data for the spawner will display on the left side pane.

You may move the handles by either dragging with the mouse or by using the arrow keys. Selecting the **Expand** button on the left side pane expands the spawner to the extent of the road.



It is not recommended to have a car spawner longer than approximately 2 km.

The values for "car number" and "car speed" affect the speed and density of traffic. The car number refers to the average number of seconds between spawning a car so higher numbers mean less traffic such as for a rural road. A car number of 1 tends to produce vehicles so fast that they are sometimes bumper to bumper or worse.



The spawning mechanism randomizes vehicle appearance so this is just an average number.

Car speed is in meters per second. 60 mph is approximately 27 meters/sec. There is a conversion table at the back of the TSRE manual. Basically multiply mph by 0.447 to get meters per second. For kilometers per hour to meters per second multiply by 0.278.

If the car spawner handle refuses to cross a road joint it means that you do not have a good joint at that location and you will need to remove the road sections and rebuild them. Road sections can be finicky to join especially multi lane highways that sometimes will want to join misaligned. Roads on a grade or over a bridge can be difficult. Try using shorter road sections and turning off "stick to terrain" (Shift-Q).

The cars spawned by the car spawner are defined by the **carspawn.dat** file in the root directory of your route. For MSTS there is only one car list. For Open Rails you can define multiple car lists. This

is useful when you want to have different cars for different roads or lanes of a road. For example on my 6 lane freeway I have cars and trucks in the right 2 lanes but cars only in the left lane, which is common in many US Interstates and freeways. To set up multiple car lists see **section 15.5** of the Open Rails Manual.



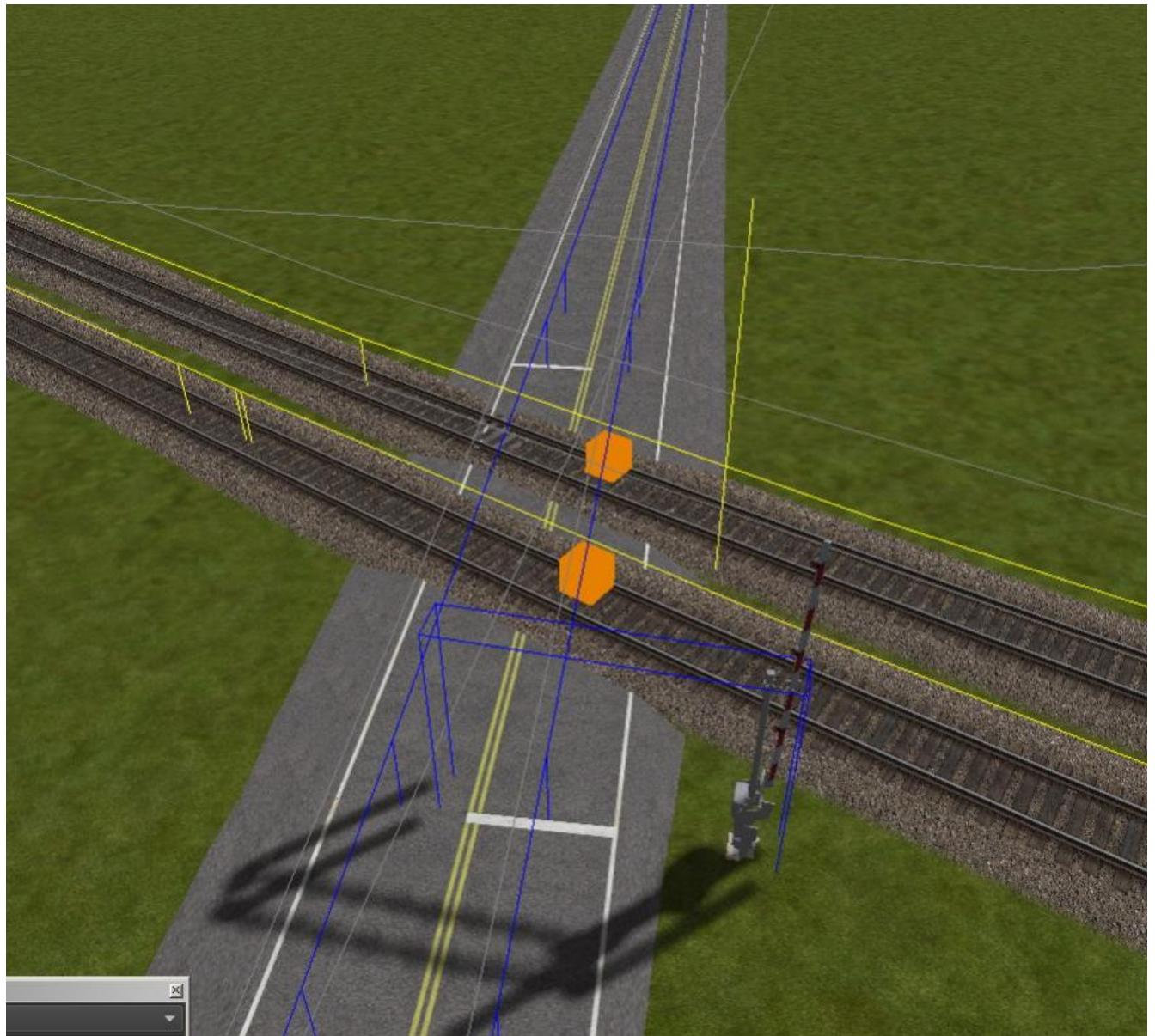
Car spawners can also be used for walking people. Refer to **section 15.6** of the Open Rails manual for more details.

# Level Crossings

## Simplifying Placement

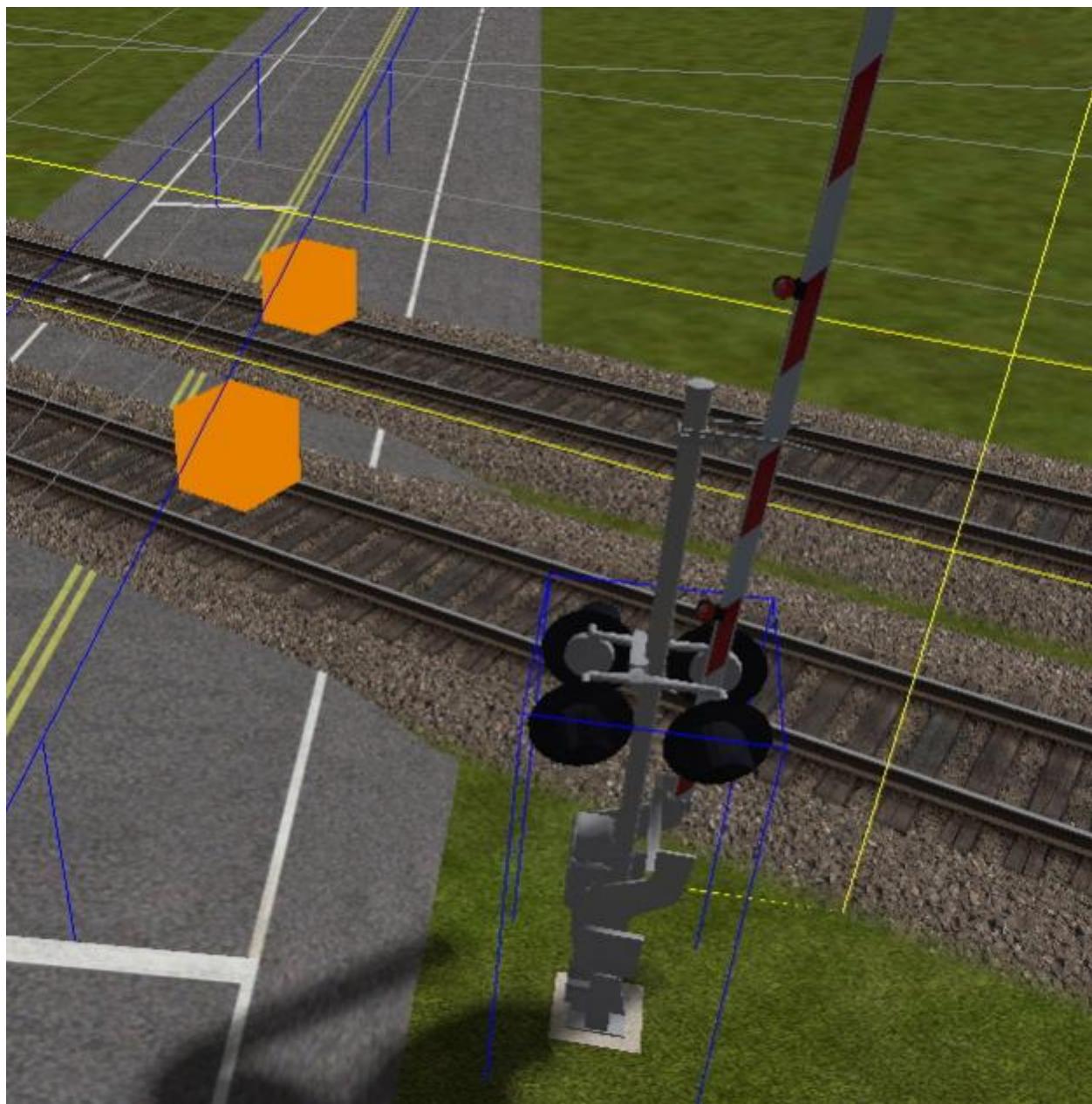
### Step 1

Place your first interactive. Start with the gate shape. Use the NumPad arrow keys to move your shape generally close the desired position. During this process you may move the camera laterally, but you should not rotate the camera at all! The grid that TSRE uses while moving an object using the NumPad arrows is based on camera angle, so rotating it after placing an object will throw off subsequent objects, and they will not line up perfectly. At this point, this is what we should have:



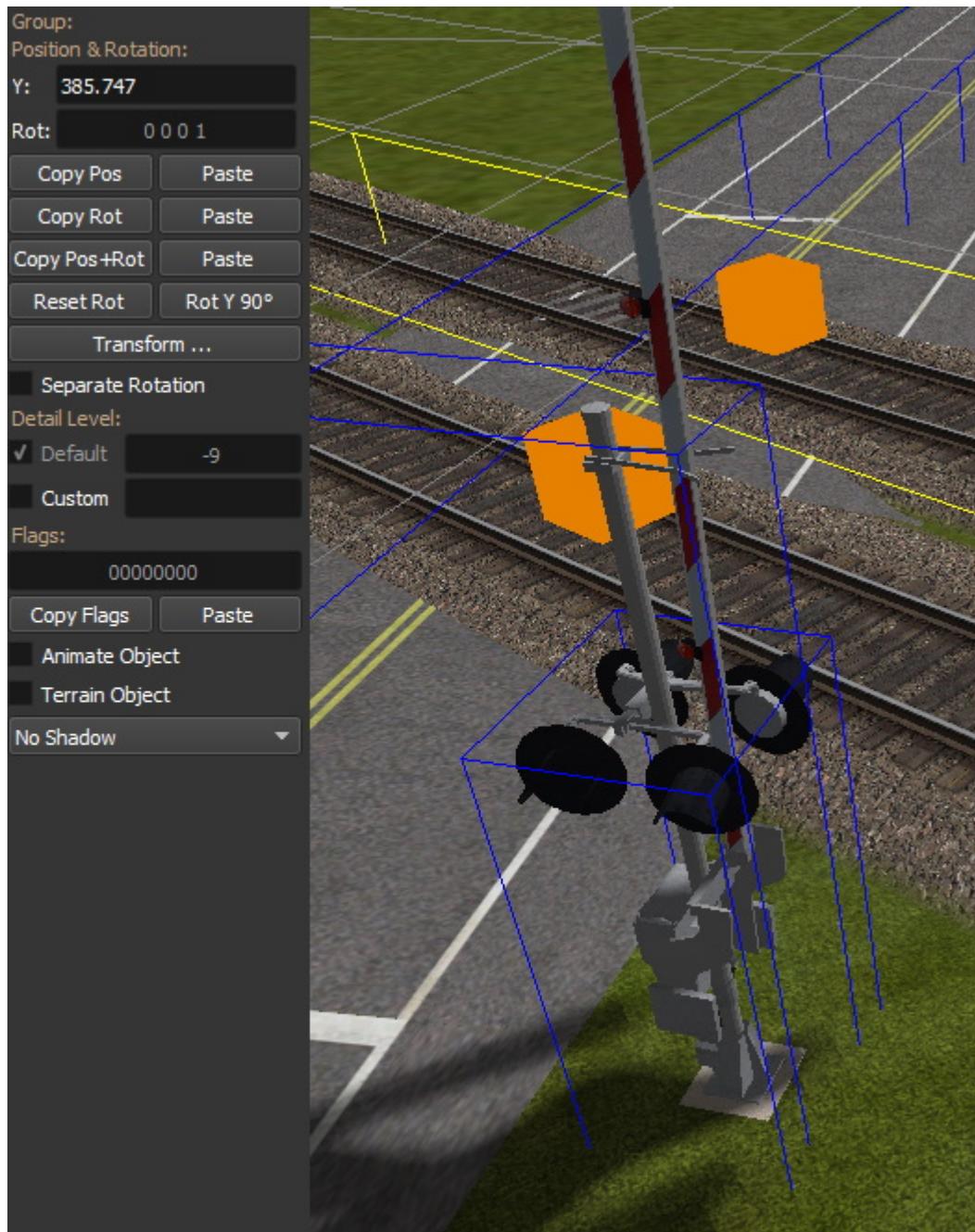
## Step 2

Place the second interactive - in this case, the flashers. Use the same method for moving the object as the first one. Once the flasher is in place, if there are no more **interactives** to be placed, you may move and rotate the camera freely. Another progress shot:



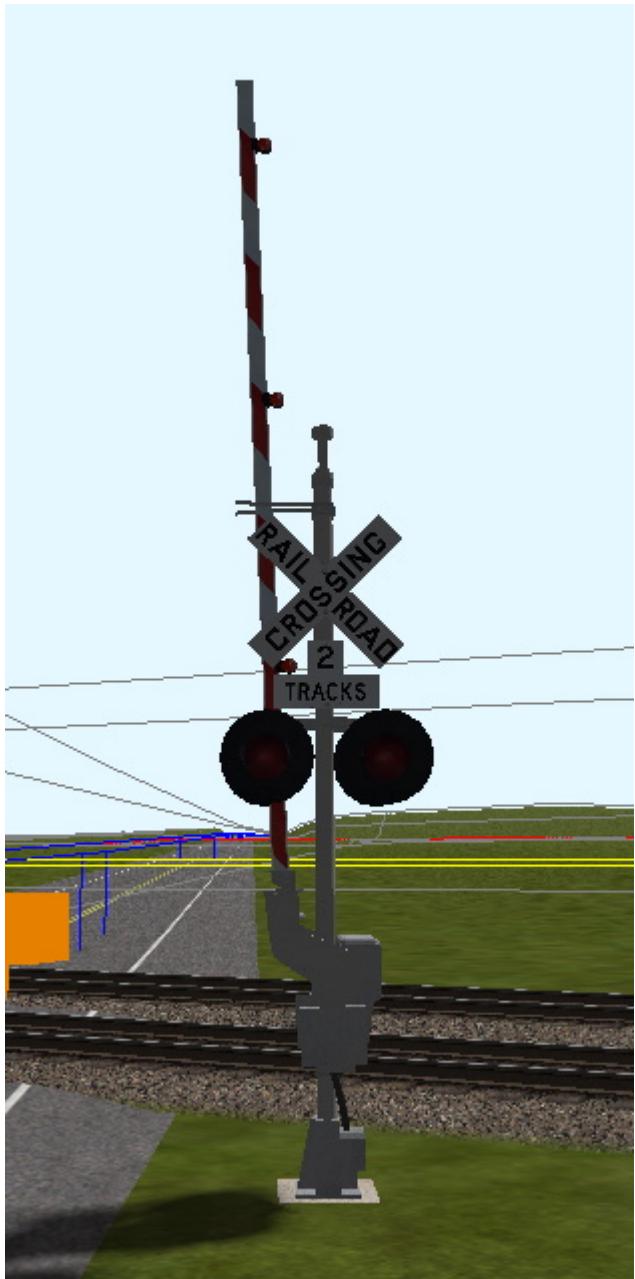
## Step 3

Now you can select both gate and flasher, or more if needed, as a group (Ctrl-Click each part) and move them into their final position. Typically you would set the rotation by copying rotational data from a road piece. Be sure to pick a level road piece, or your signal will be leaning. While you can't copy or paste rotational data from individual crossing objects, you can do this with groups of crossing objects. Once you do this you can use the **Copy Pos/Rot bottom** and instantly align any static parts that remain to be placed.



If a crossing is on a track piece that extends from another tile, copying position won't work (copying rotation will still work). Attempting to use position copying will result in the static part disappearing (actually it teleports a mile or two away). The way to tell if this is a problem is to select one of the **interactives**. If one of the x- or z- coordinates is larger than 1024, it is on a track piece extending over a tile boundary. Up until now, we haven't had any problems with a crossing that is physically in one tile, but in another's .w file. However, when this is the case, we have to eyeball the static object placement. You can place objects with the crosshair on top of the mast, copy the y- coordinate from the mast shape, and then copy rotation data from the interactive shapes so it lines up (that still works on out-of-tile shapes).



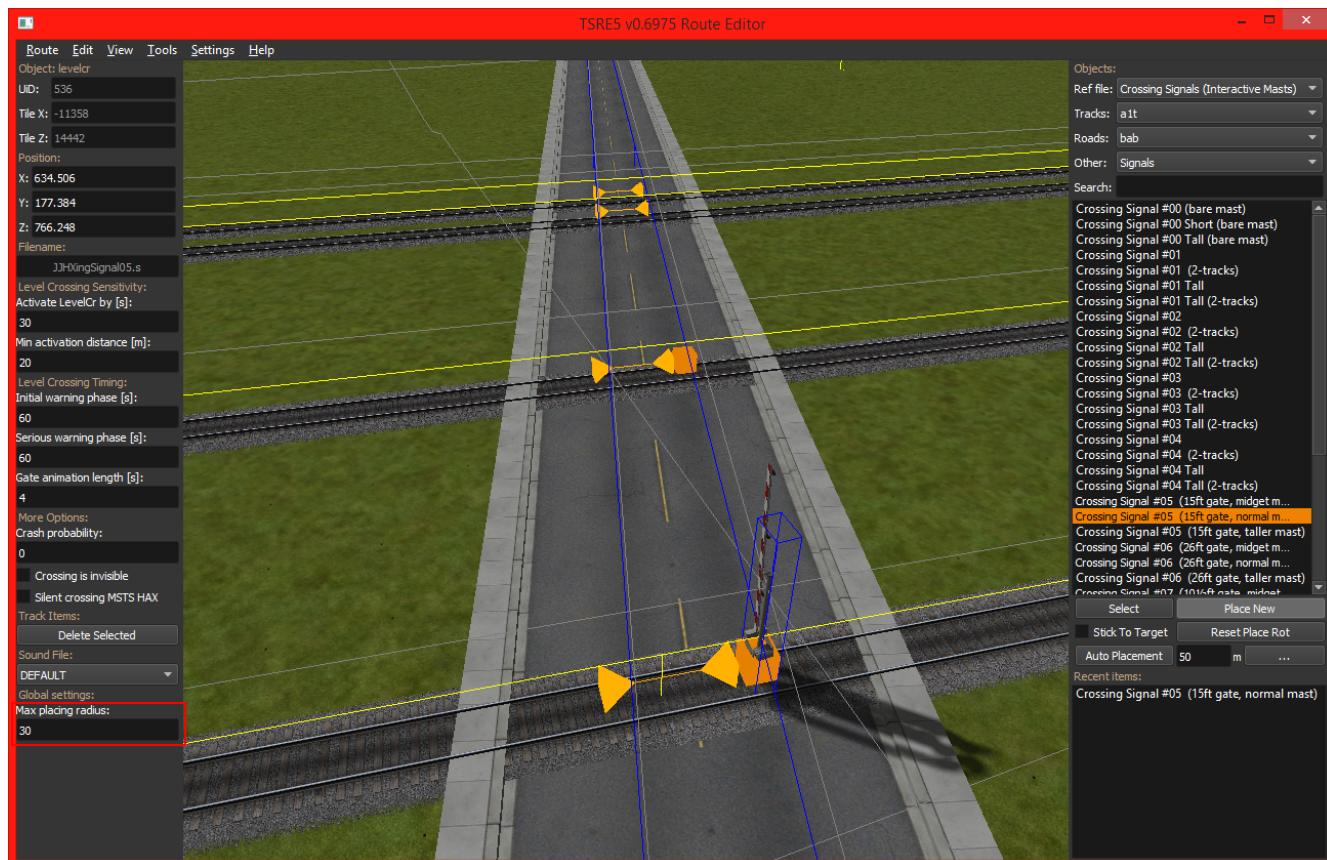


## Max Placing Radius

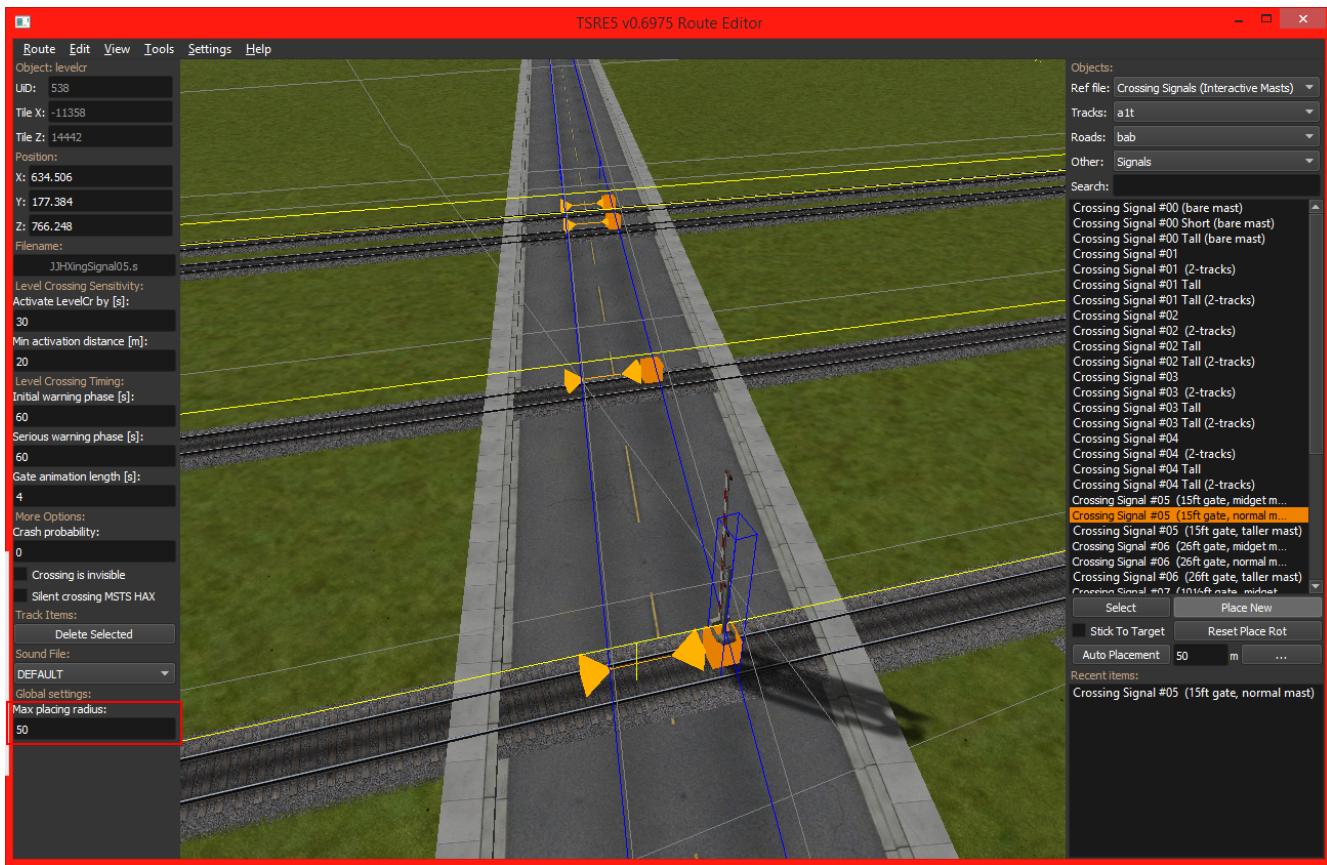
Did you plan on having your railroad grade crossing span every track in a wide area, but the orange cubes don't cover all of them? Do you want to make sure one railroad line's mileposts doesn't cover a parallel line that uses a different milepost measurement?

This is where the Max Placing Radius box comes into function. By default, it's set at 30. For the purpose of this tip, the Max Placing Radius function and its text box are highlighted in red.

Here, we are attempting to place a railroad crossing gate at a wide multi-track crossing. Notice that the two furthest tracks aren't covered.



Click on the text box below the Max Placing Radius text and change the value to an appropriate number. For this example we've changed the Max Placing Radius to 50 and this allows each track served by the crossing to be covered by the orange box.

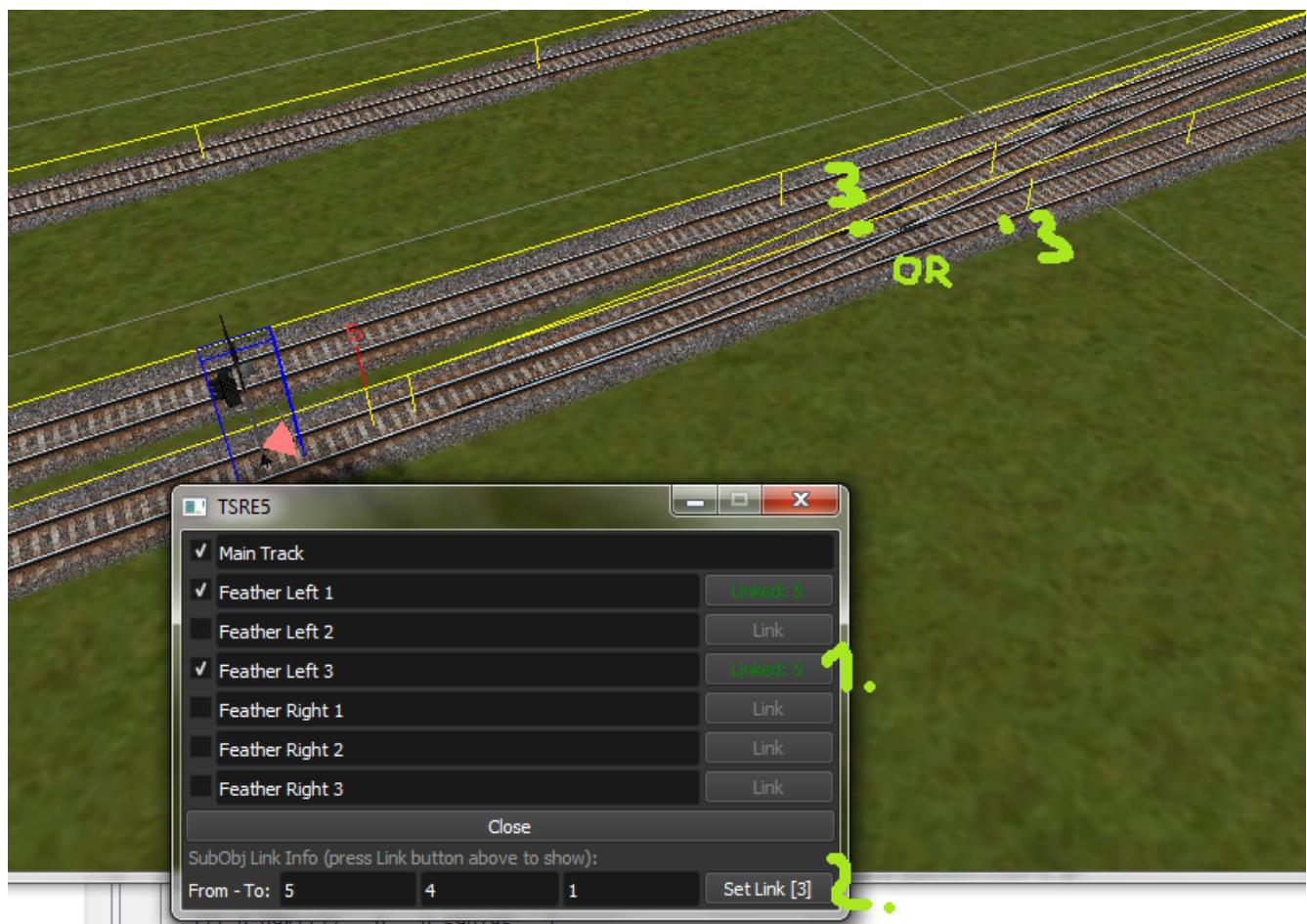


This little function should allow you to have proper massive-sized crossings and limited-track-reach mileposts, among other things.

# Signals

## Linking Signals

1. Click 'Link' button.
2. Click 'Link Set' button.
3. Click on track



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.

## Linking Signals for the Deviating Path

1. Click 'Link' button.
2. Click 'Link Set'
3. Click between the straight and the deviating rail close to the root of the switch.

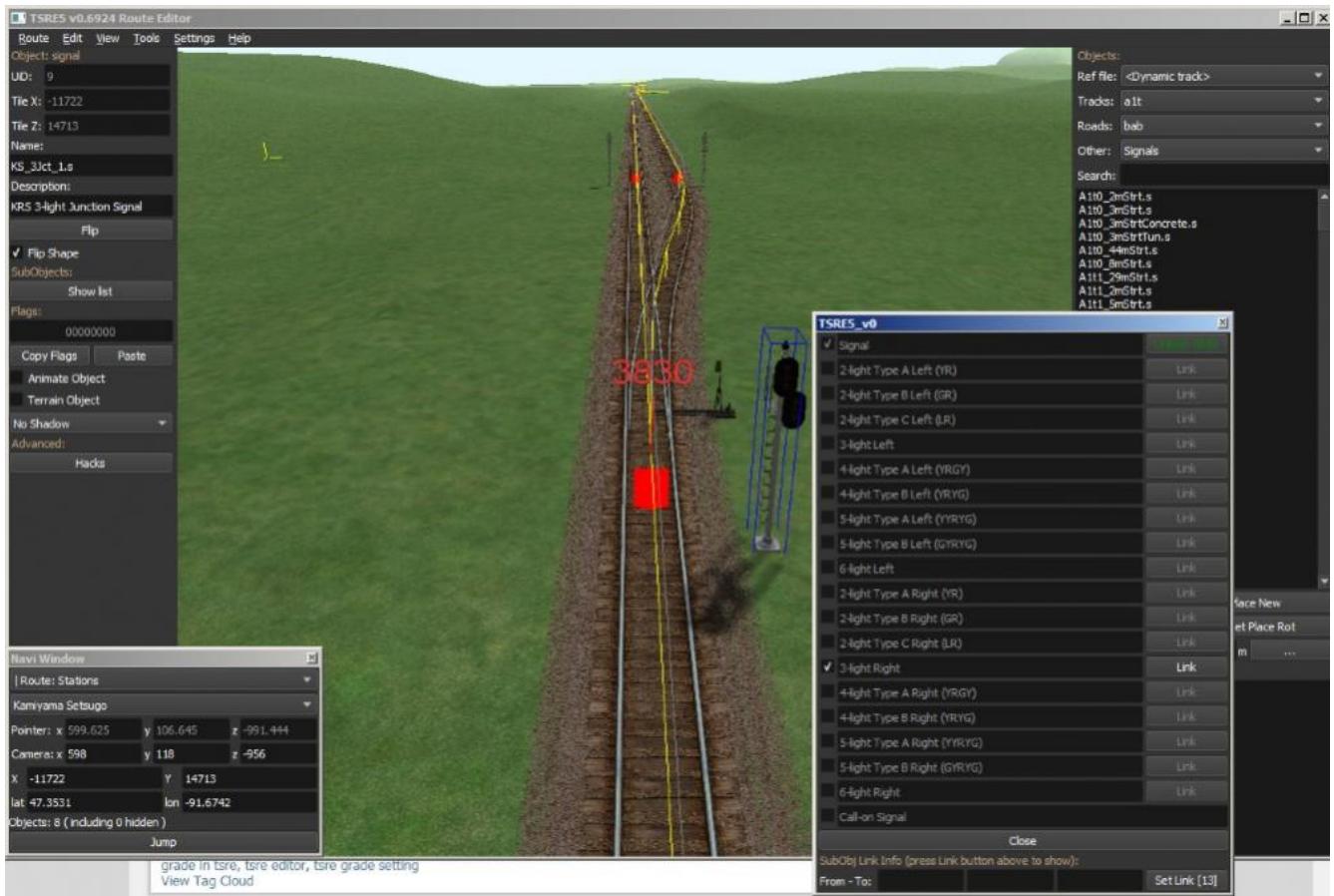
If the Link is set, the **text** in the button 'Link' will be written in **green** and the Fields near "From To" you will see numbers.



You will have only one try to set this. If the 'Link' does not get set, you will need to

start steps 1-3 over again. Also, avoid moving the camera while doing these steps as this will also force you to start over.

## Easy Junction

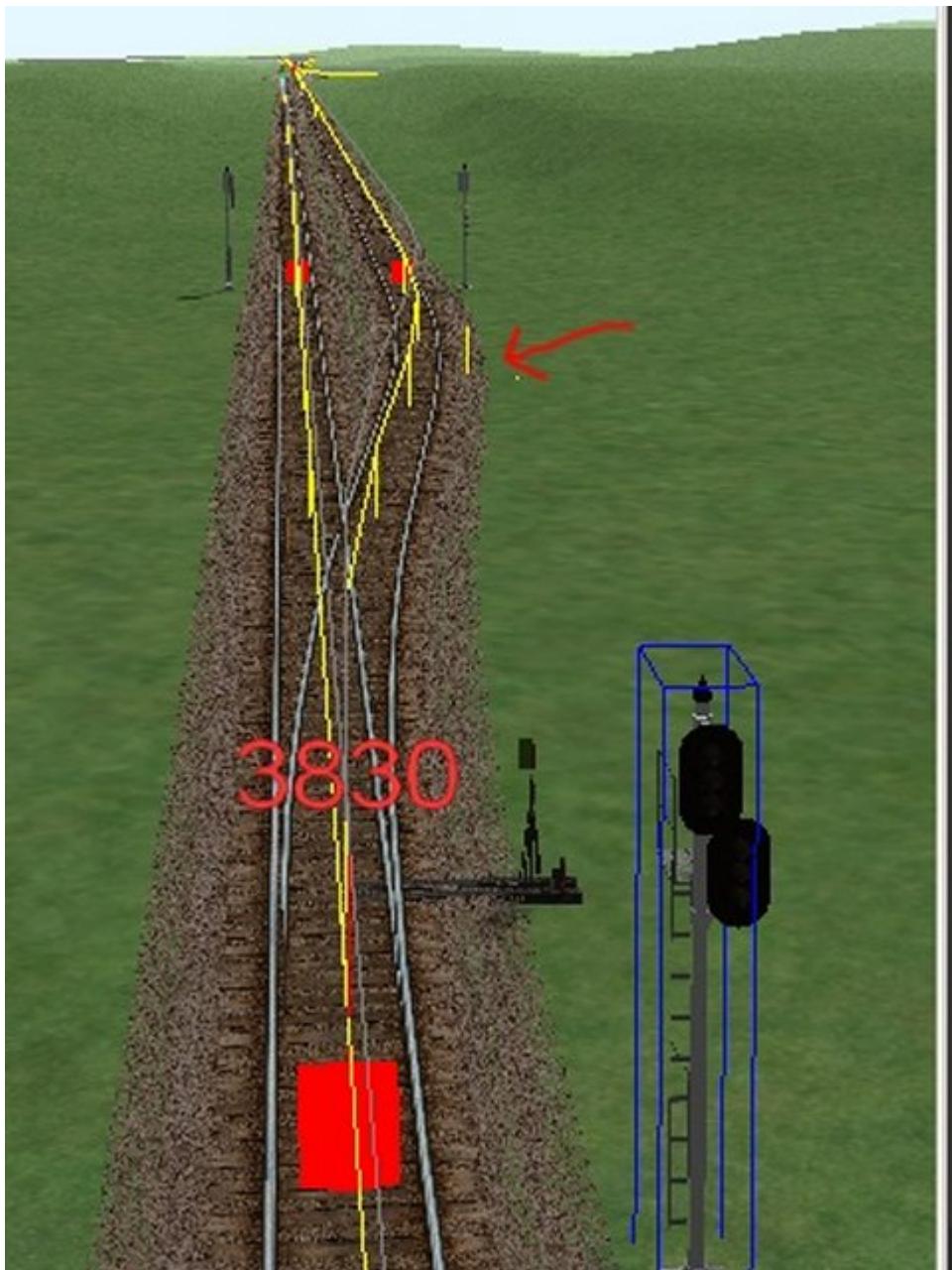


1. Locate pointer on the track and place the signal. A **red** marker and signal object appear. Flip with **X** if necessary.
2. Click the **Show list** button.
3. Click the **Link Top Head** checkbox. A check in the box appears and the **Link** button enables.
4. Click the **Link** button. The **Set 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

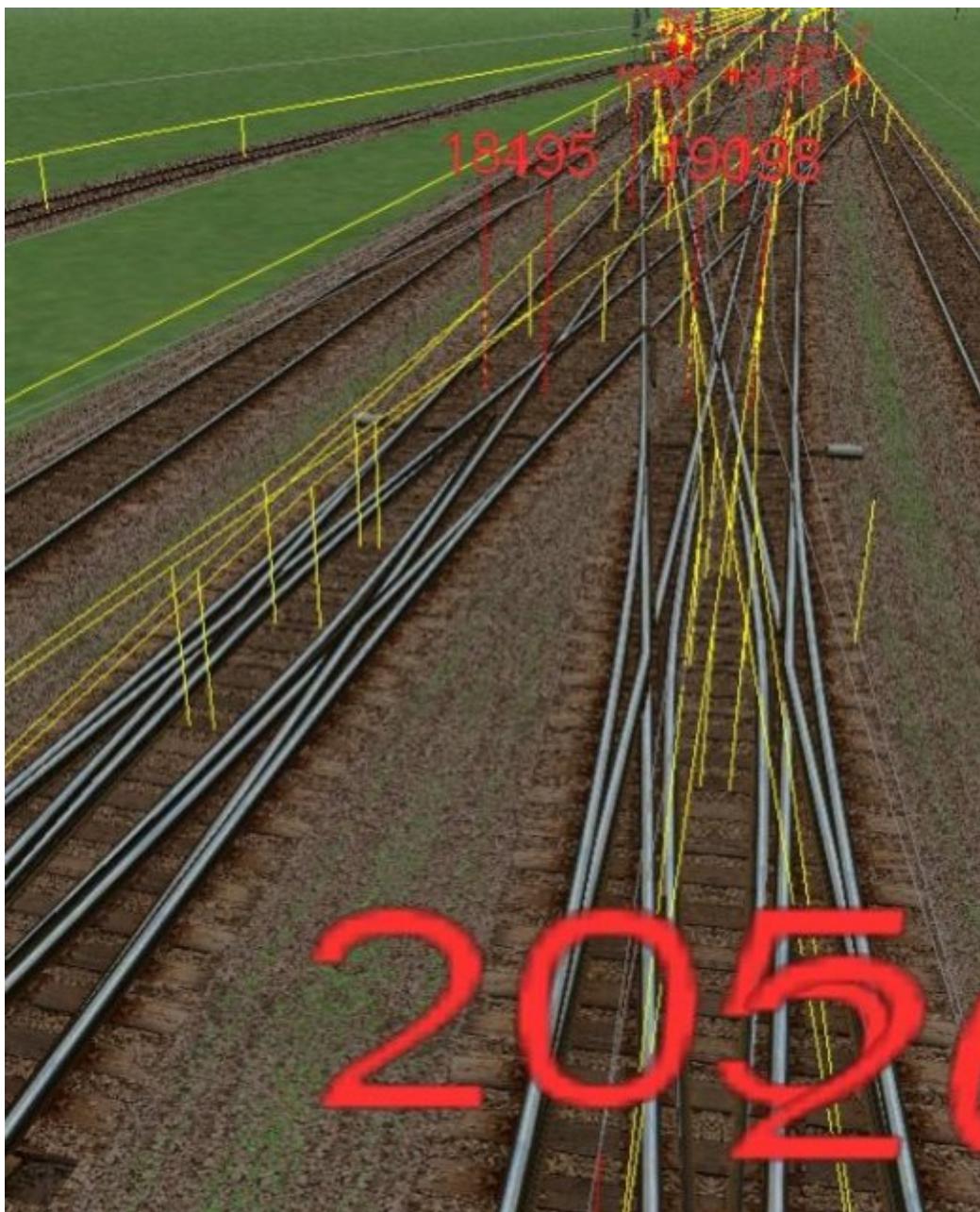
### Explanation

- 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]**.

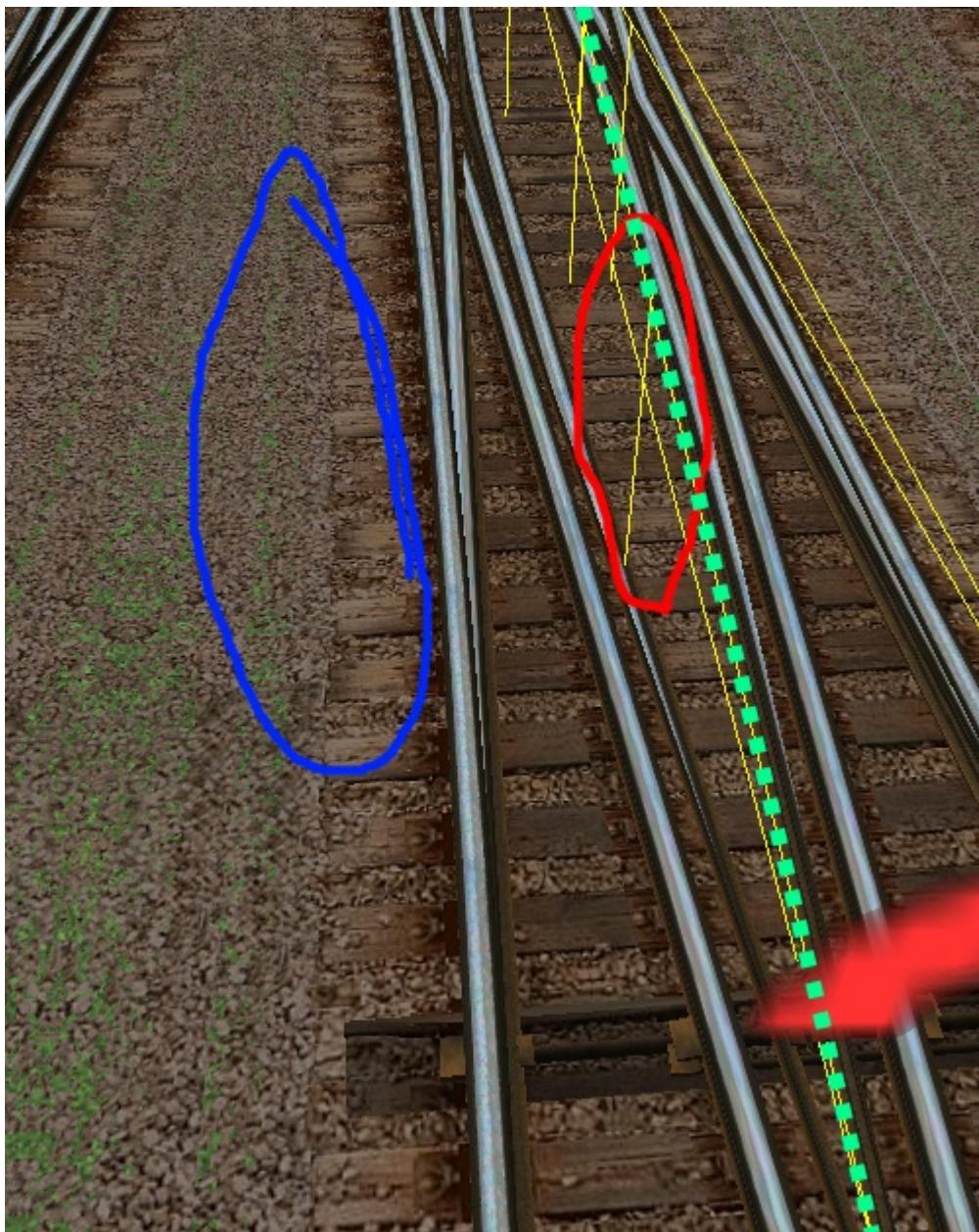
- When you have done this, click on the track where you want the link set. In my case it will be the diverging route. In the image below, a red arrow indicates where I clicked to set the link. If done right, a set of numbers will appear in the blanks in the SubObjLink info section next to the Set Link 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

To add sounds in TSRE, go to "Object View" then in the right hand window under "Other" you will find "Sound Regions".

Additionally, you can review the Open Rails Manual in section 13.3. This can automatically add sounds to curves and points. There is a link to download a set of sound files.

Note: It was noticed that one of the sounds called for was not in the download. If you copy one of the files to be the missing file that was referenced, you can get it working.

# Editing Terrain

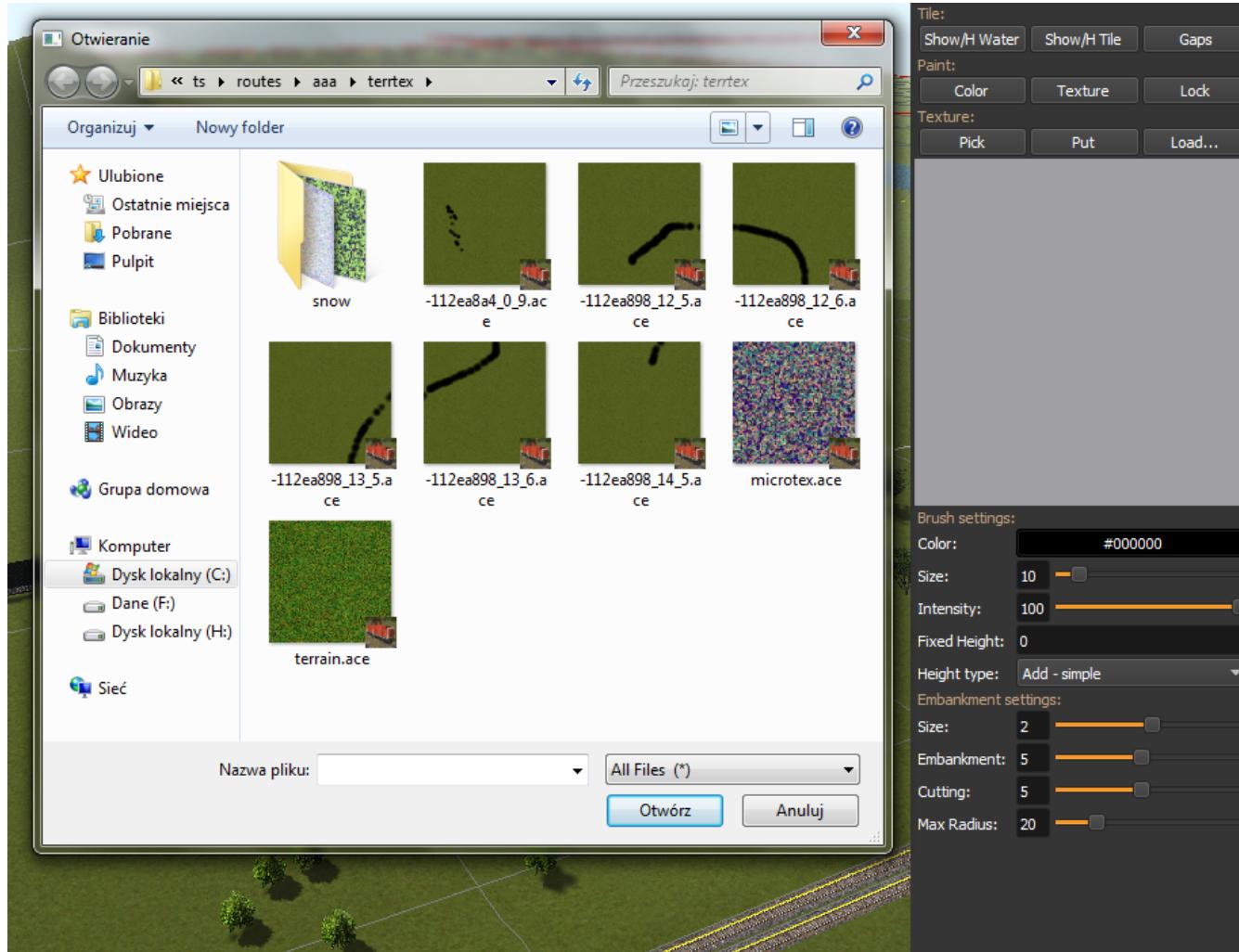


**Alt + V, H** will Toggle terrain view on and off. Handy for finding out what you might have "lost" below ground level.

## Ace File Thumbnails

There is a 64bit ACE file viewer add-on available at:

[http://koniec.org/MstsAceThumbnails\\_v1.zip](http://koniec.org/MstsAceThumbnails_v1.zip)



On Windows 7, UAC must be disabled.

1. Download and extract the files somewhere. Pick something that makes sense, like where you installed TSRE or something you can remember, like `c:\bin`.
2. Open a command prompt and make sure you open it "as Administrator".
3. Go to the directory where the unzipped files are
4. Register the library using the command:

`Regsvr32.exe CppShellExtThumbnailHandler.dll`

Now all .ace files will have thumbnails like other images.

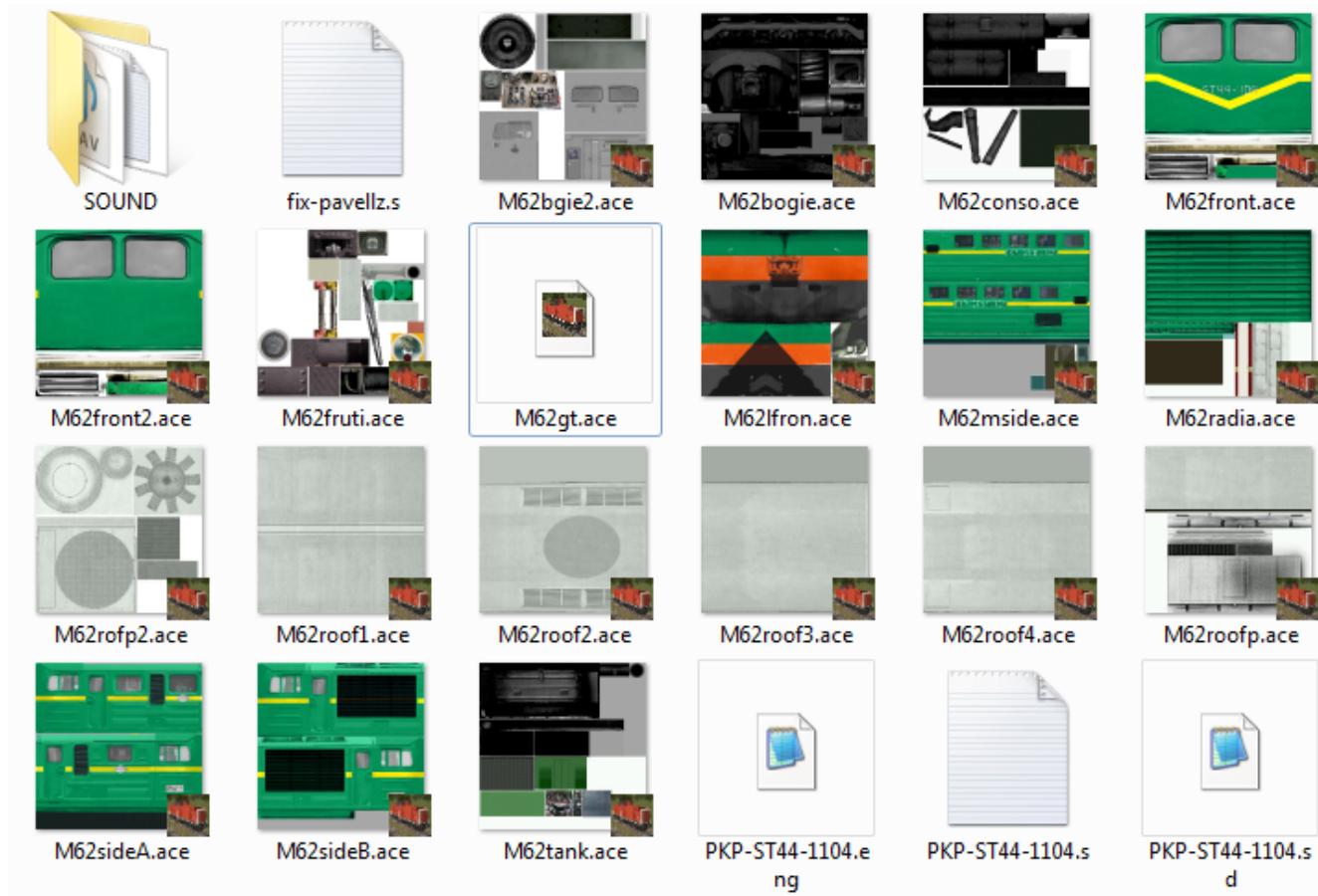
**REMOVAL** If you want to remove it, unregister the library using the command:

Regsvr32.exe /u CppShellExtThumbnailHandler.dll

Once the removal step is performed, you can then delete the files.



This thumbnail library is only for 64 bit only



## 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.



In TSRE, when laying track inside tunnels, use: **Shift + Q**. It will change the placement mode between "stick only to terrain" and "stick to everything". Then you will then be able to stick the new track to the existing track that is under the

terrain.



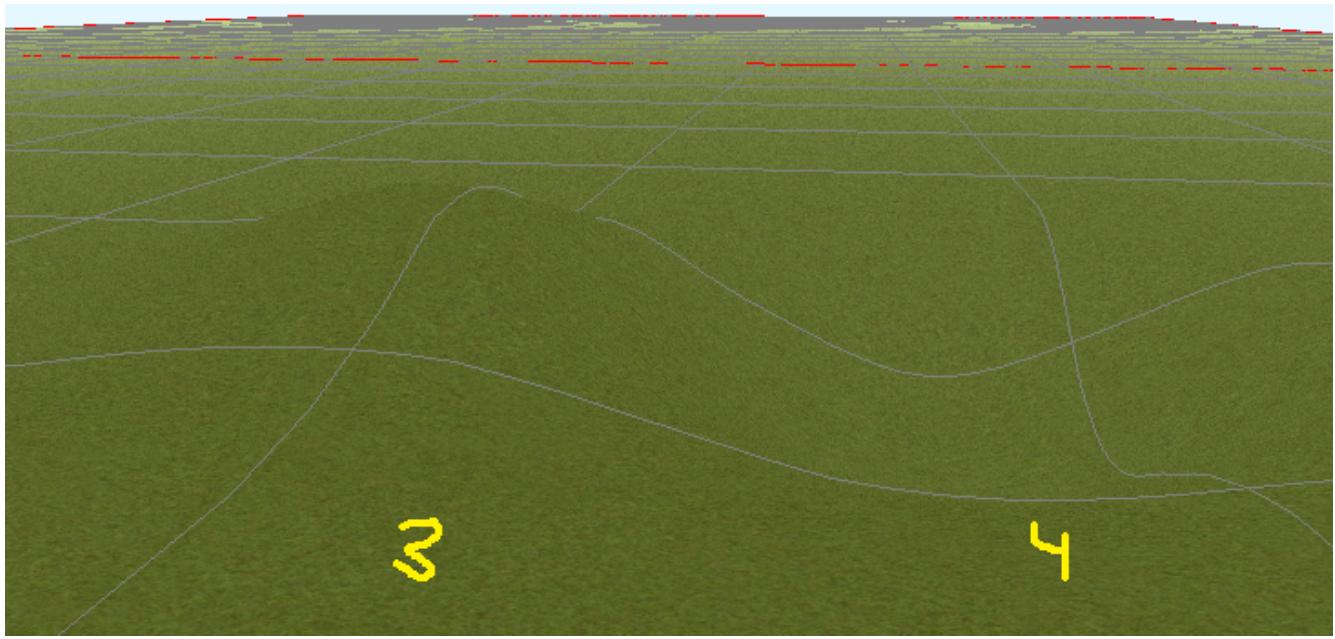
Tunneling: ( Garry's method) My tunneling method is a bit unique, but easy. I make a copy of the tiles folder. Then each piece of track I lay I press F to mould the terrain to the track, turning the tunnel into a cutting. I can follow the track path on a map overlay, and when I get to the far end of the tunnel I can check the height, then go back and change the gradient until the track emerges at the correct height. Finally I replace the Tiles folder with the one I saved earlier.



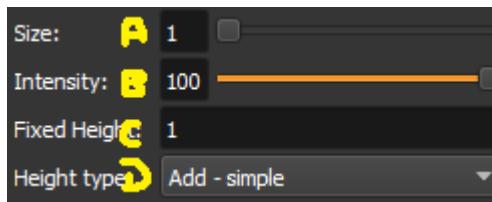
## Painting the Terrain Heightmap.

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

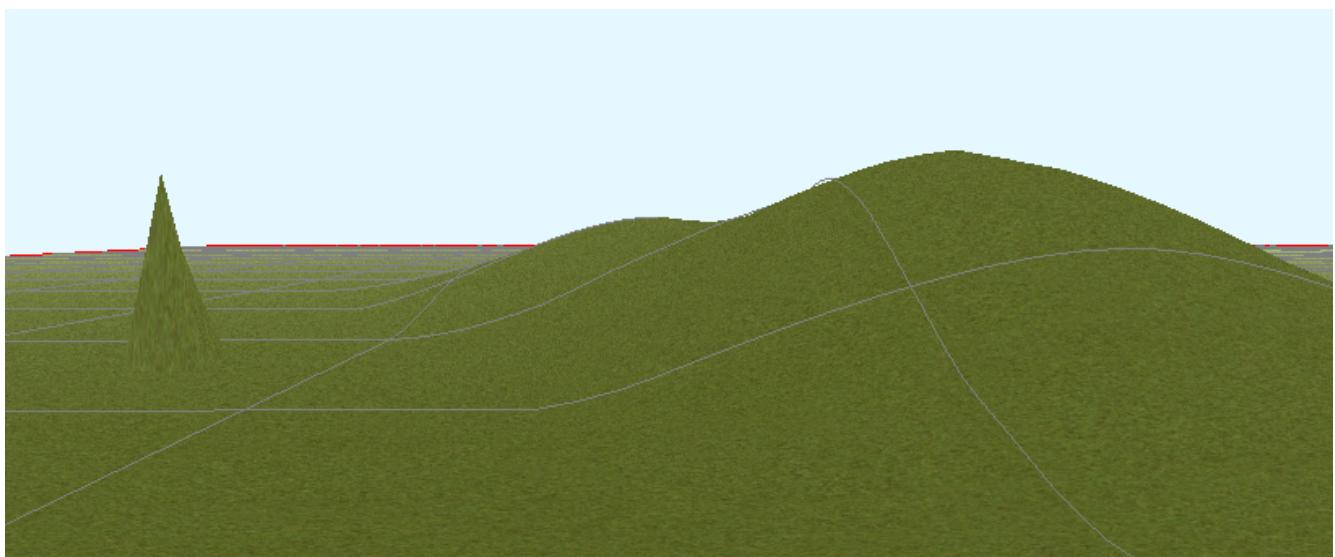
If you want to switch between making mountains and valleys, press **Z**



You can adjust settings:



**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.

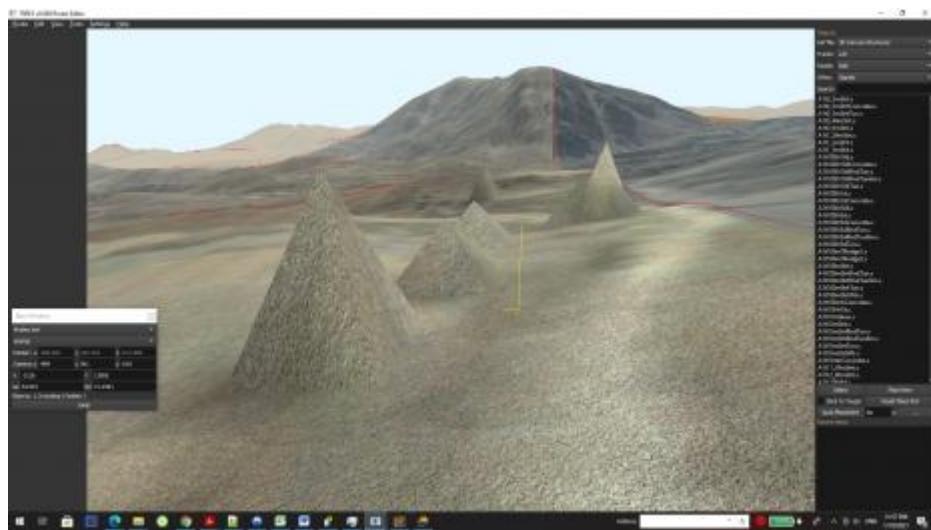


For a very fine adjustment of terrain you can use a track or a road section or just about any object to adjust and/or flatten terrain. However some objects/shapes produce some very strange terrain sculpting. The **Ctrl + Z** key comes in handy here.

Be careful when "painting" terrain. I am not sure how, but it appears brushing the tile to increase height might affect other tiles as well. Case in point, these spikes below which always appear after I have done terrain editing on adjacent tiles.

Perhaps using the "add if in radius" setting would avoid any unwanted artifacts like these being generated.

The example below is definitely not DEM artifacts



Latest TSRE version should have resolved issues with these random spikes.

## **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:**

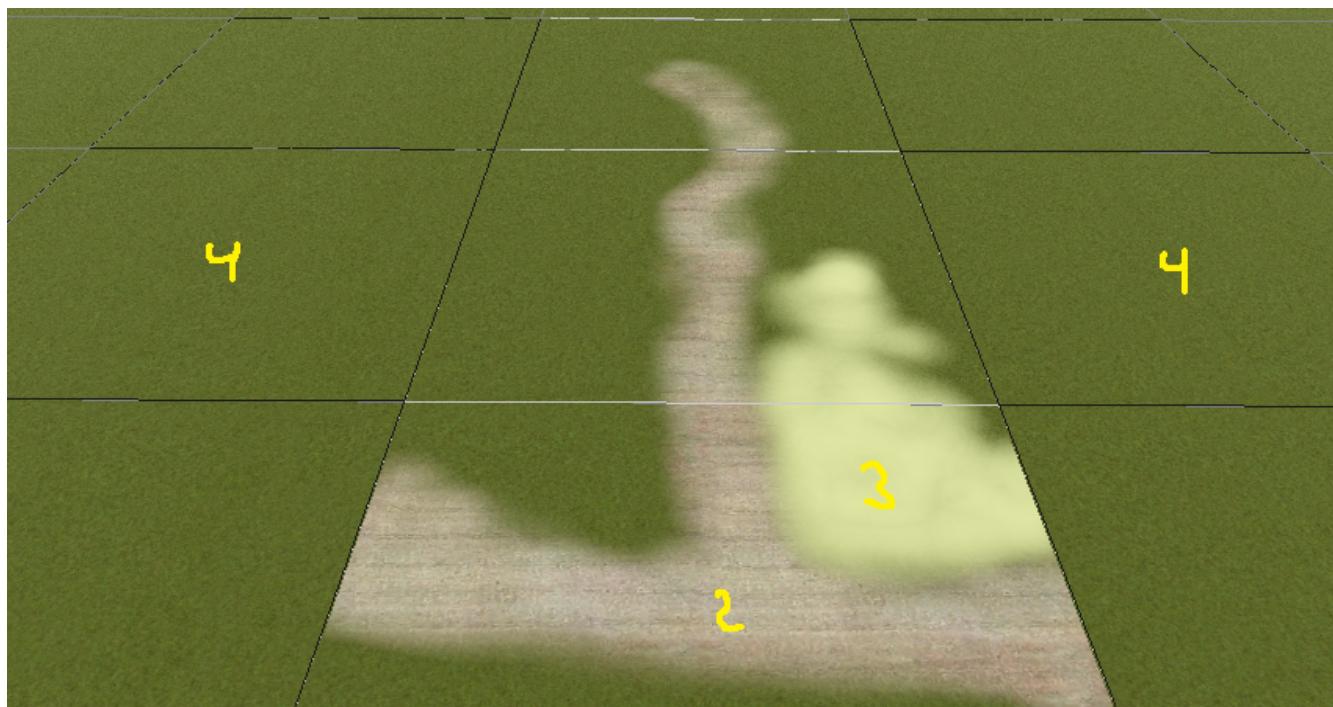
1. Pick or load texture you want to use as paint, or choose color from color window.
2. Click **Texture** button if you want to paint using texture.
3. Click **Color** button if you want to paint using color.



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. For ground texture don't forget to eventually compress with DXT1. It won't lose quality and will save space



This below is after spending 10 to 15 minutes work painting the Right of Way .



## AutoPaint

F2 → LOAD → TEXTURE - Select Brush and Size

Use **CTRL** **LMB** on individual tracks to place Ballast under that selected piece or use mouse **RMB** and you will get the **AUTO PAINT** option and you can find a lit of items including the "Track Nodes" which will have the texture be applied under all track nodes that apply.

## Some Painting Tips - Compression

Each painted texture is almost 1MB, because these textures are not compressed. The DXT compression method reduces the size of these to approx 1/8th of the original size. Compressing them individually isn't a solution if you extensively use this feature. Thousands of files are difficult to manage if you have to compress each of them one at a time.

**Route Riter** won't compress them to DXT, because it uses the **AceIt** tool, and the **AceIt** tool doesn't like the "-" prefix that these files have. You can make **AceIt** work for you though since it only has a problem if the output files have the "-" prefix. To get this to work, the output files need to be created without prefix and then you need to rename them afterward.

## One way to do it

It can be done with a text editor or Excel and the creation of some batch files. An example for a batch file:

```
aceit.exe -01a769f8_0_1.ace 01a769f8_0_1.ace /dxt /q  
aceit.exe -01a769fc_0_4.ace 01a769fc_0_4.ace /dxt /q  
aceit.exe -01a769fc_0_5.ace 01a769fc_0_5.ace /dxt /q
```

Notice the missing prefix at the output files.

After that, with another batch file You can rename them back to originals:

```
ren 01a769f8_0_1.ace -01a769f8_0_1.ace  
ren 01a769fc_0_4.ace -01a769fc_0_4.ace  
ren 01a769fc_0_5.ace -01a769fc_0_5.ace
```

You need something like Excel or a text editing program to create list of the commands.

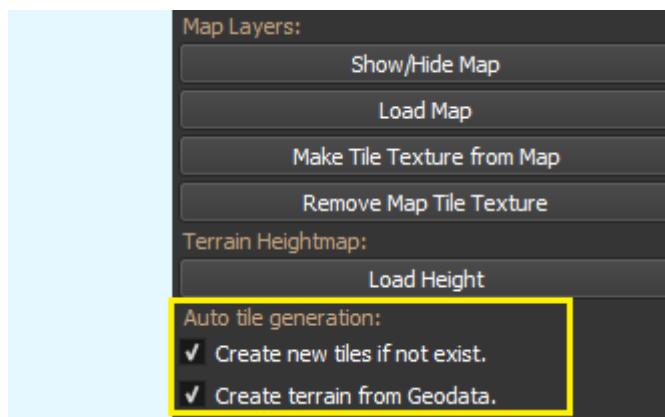
You will also need a copy of **AceIt.exe** placed in the same folder, for simplicity sake.

#### Additional tip:

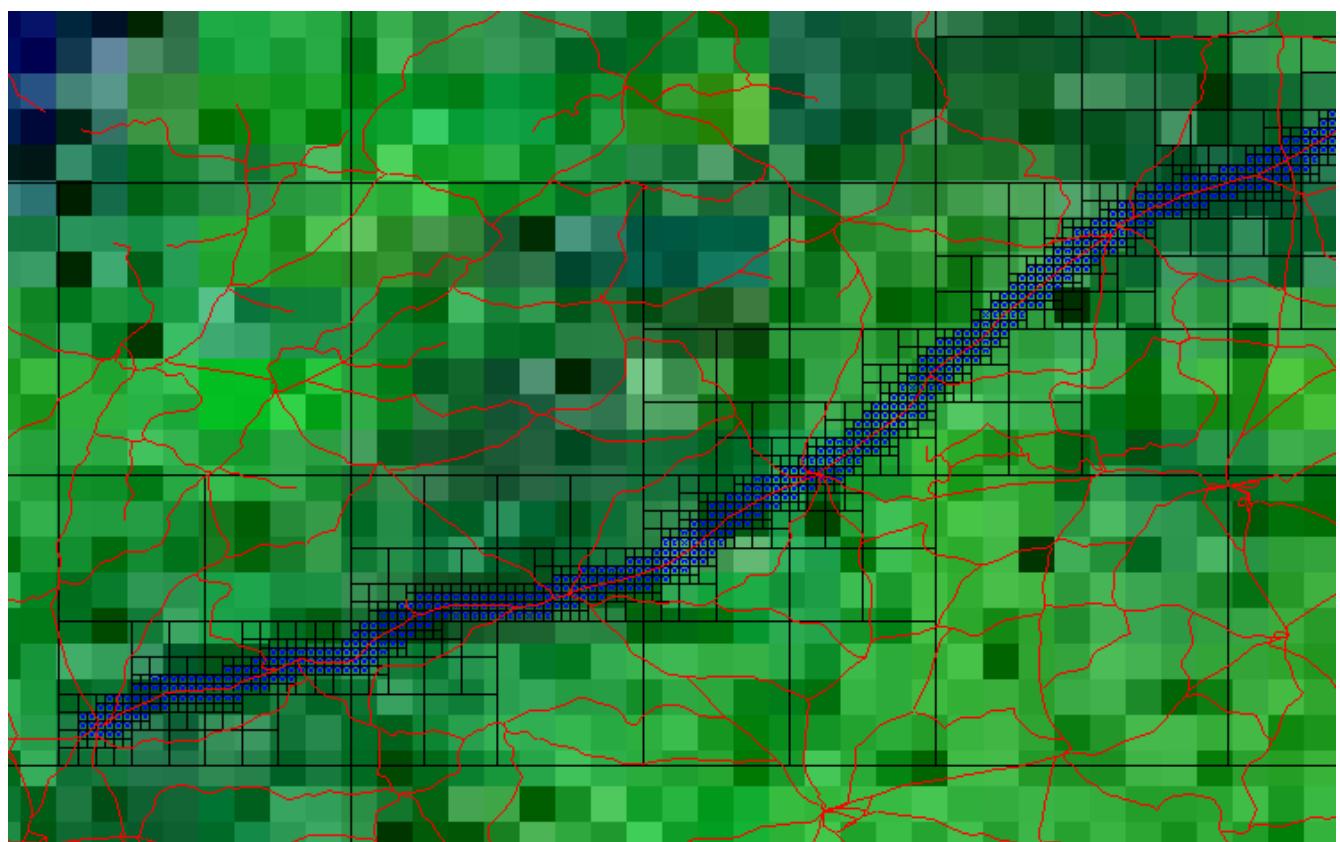
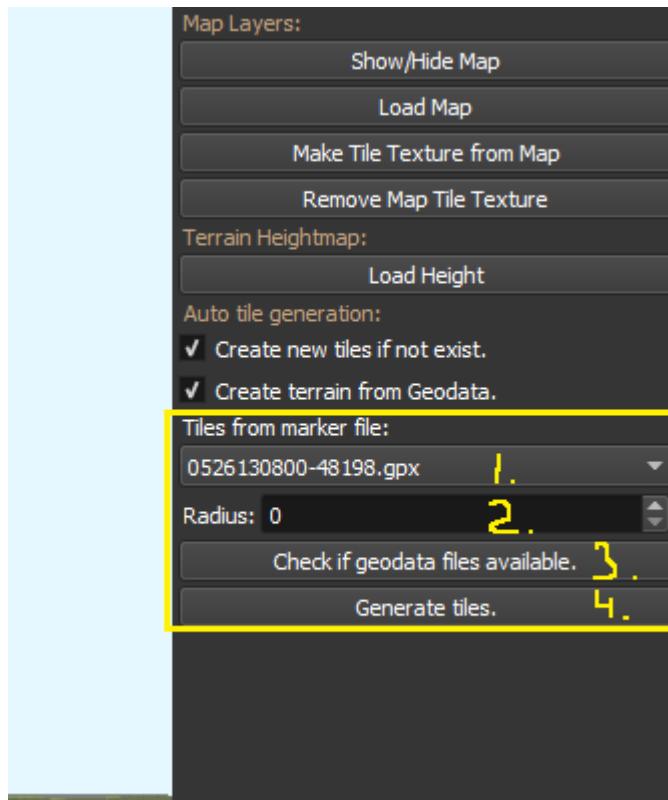
To generate a list of matching files from the command prompt:

```
DIR /S /B /A:-D -*.ACE > myfiles.txt
```

## Auto Tile Generation

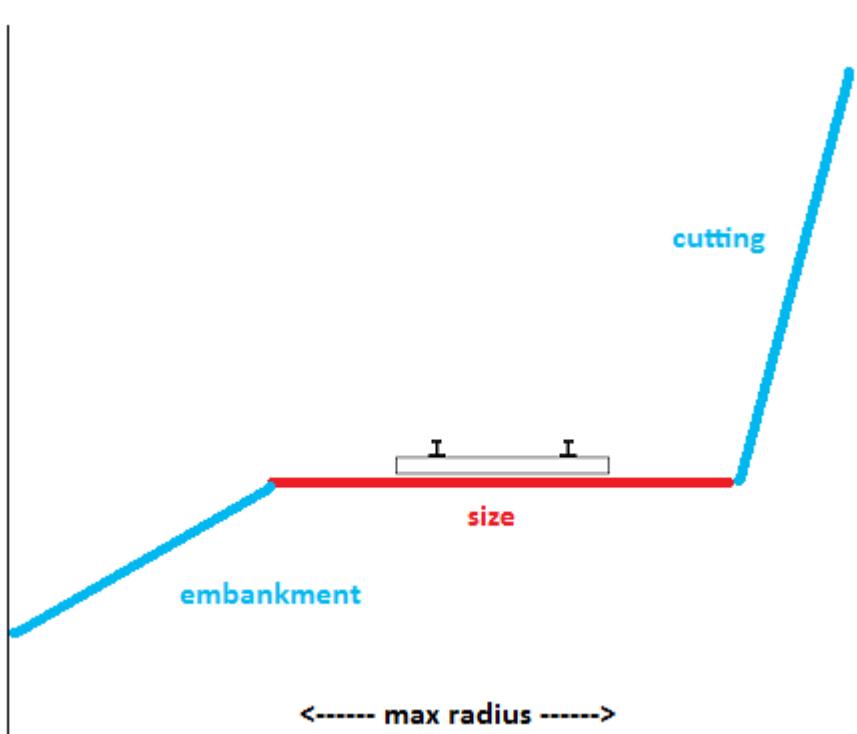


1. Select marker file.
2. Select radius in tiles from marker file line.
3. Check if all height-map files are available.
4. Create whole terrain in one click.



## Embankments, Cuttings and Road Height

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**.

### Road/Terrain Adjustment

To adjust terrain under the road:

1. Click "View" at the top of the screen, and tick "Terrain Grid"
2. Press **F2** to get the terrain window on the right. Set "Size" and "Intensity" to **1**, "Height Type" to **Add-Simple**
3. Select the "HeightMap" button at the top (it turns light grey)
4. Mouse click repeatedly on the terrain junctions to adjust the terrain height. The keyboard **Z** key adjusts between up/down.

If the road piece is already in the rdb (or you just placed it without deselecting), just press the **F** key. This will raise the terrain under your road piece, but doesn't raise it everywhere else.

# 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.



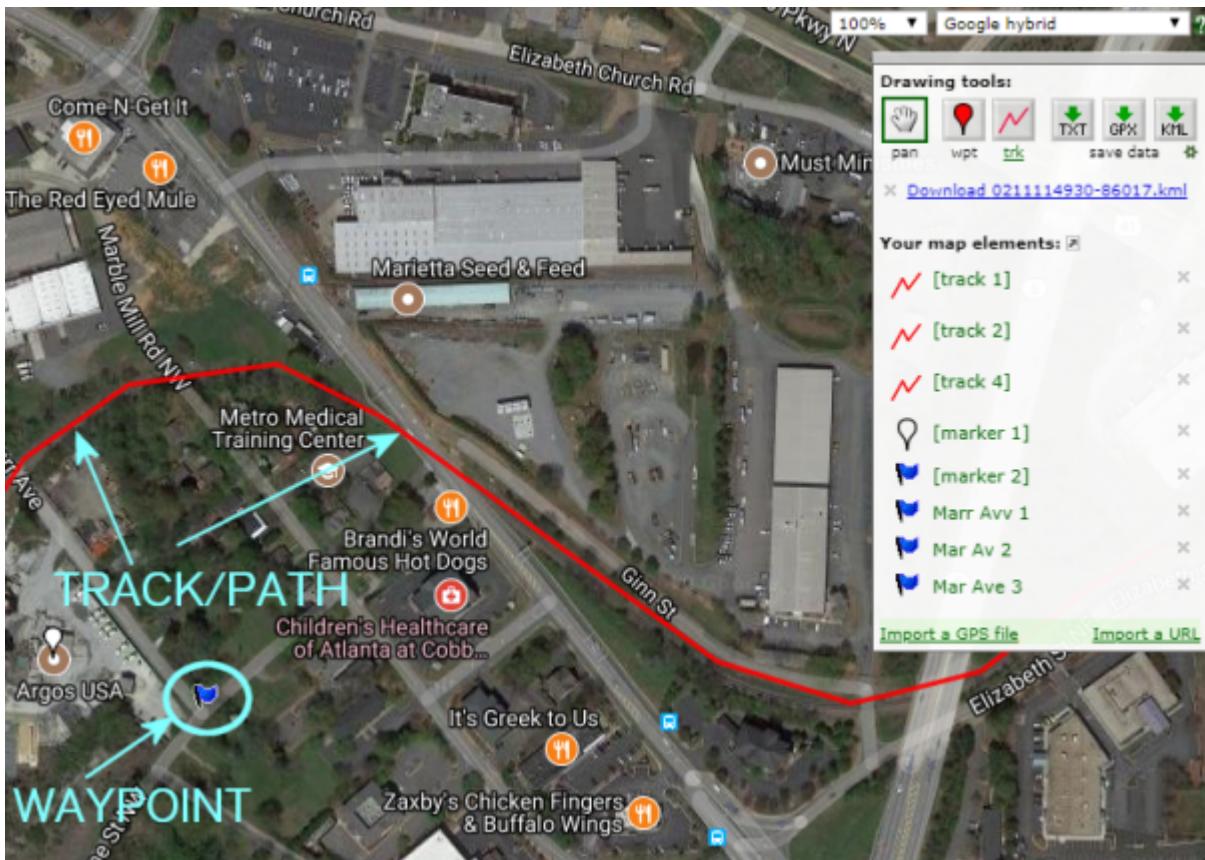
Another handy tool when routebuilding is GPS visualizer: <https://www.gpsvisualizer.com/>

## 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.

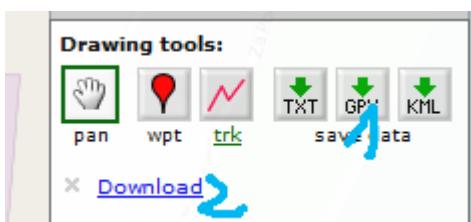
Using the **GPS Visualizer** website is very simple.

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.

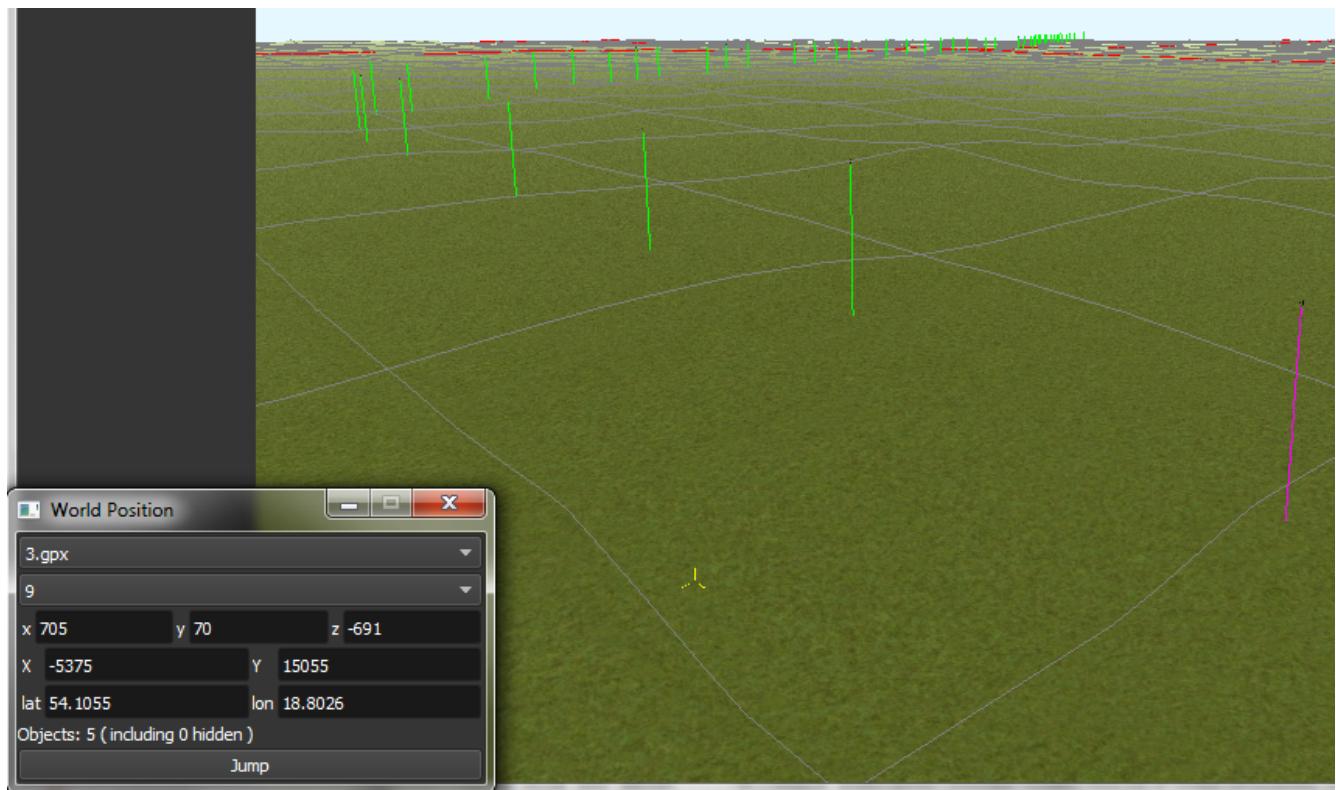


Place the downloaded file into the working directory of the route being worked on.

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

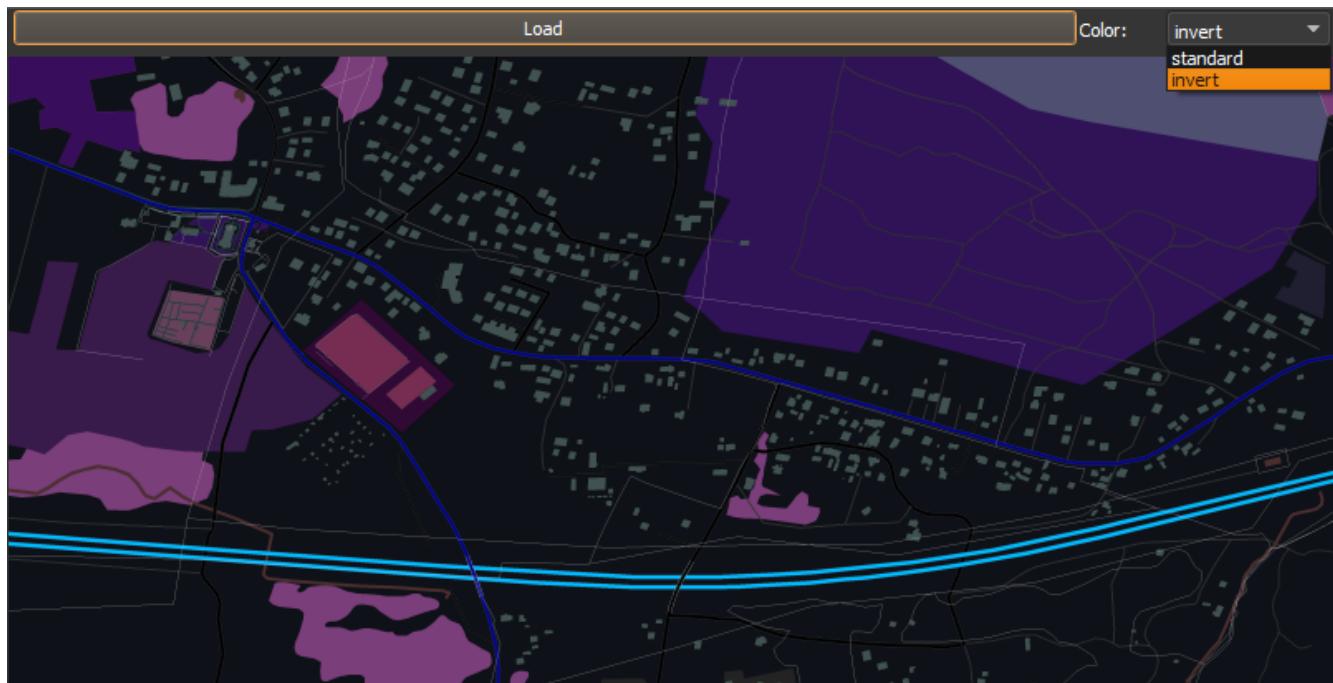


## Map Layers

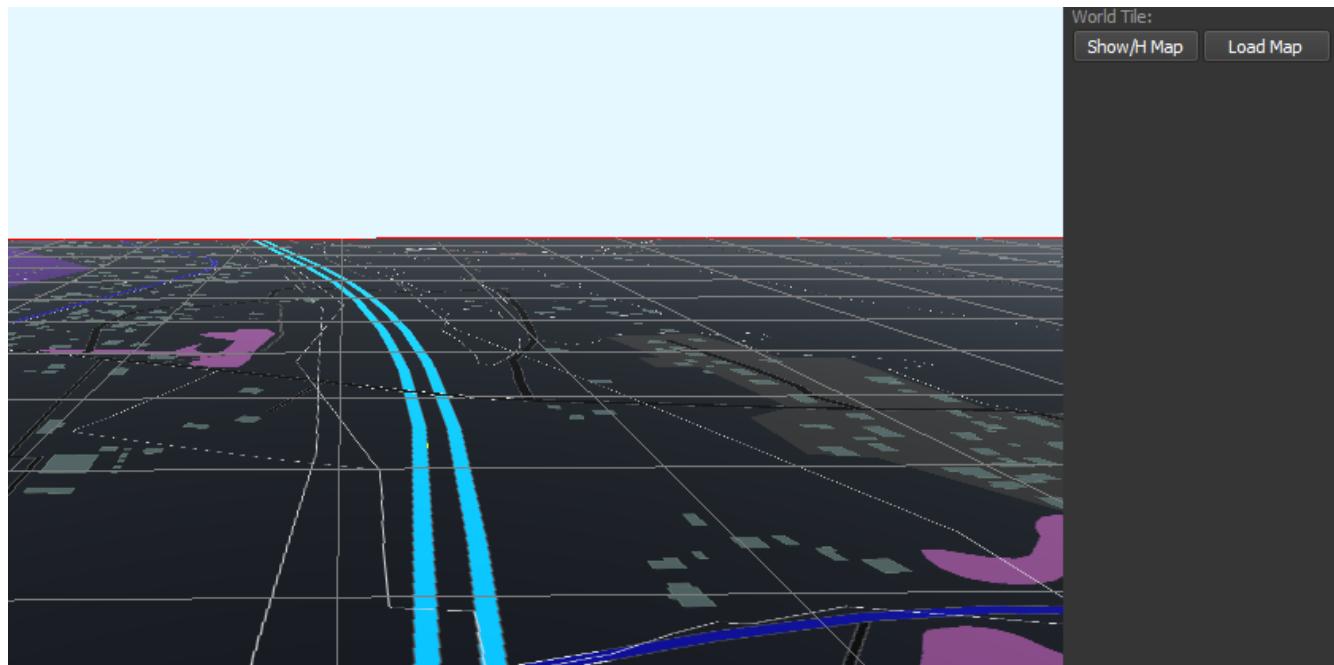
Using a *Map layer* is a better and faster solution than using marker files if you want to create realistic route.

- 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 **find** the HGT data files is below.

<http://dwtkns.com/srtm30m/>



While this web page will let you **find** the DEM (Height) data that you want... and allow you to have the DOWNLOAD link for this data, you still need to have a (free) account with <HTTP://urs.earthdata.nasa.gov> to actually download them. So... first things first... get your free account at <https://urs.earthdata.nasa.gov/users/new> Registration Page. Any web based instructions older than 2016 might not tell you need to also have a free account to use these sites.

The downloaded data will be in inside ZIP files.

Nasa also has a web page: <https://earthexplorer.usgs.gov/> but my opinion is that it is less user-friendly to use as the first link above. I'm not even going to explain how to get DEM data from this site... I leave that up to the reader.



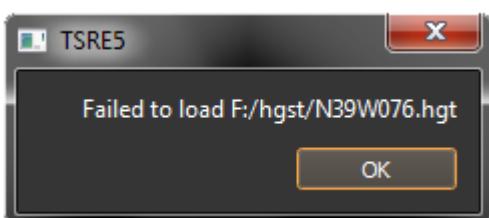
With Earth Explorer, I believe that you want to locate the results that contain the NASA LPDAAC Collections → NASA SRTM → SRTM → NASA SRTMGL30 database. (I have not done this personally)



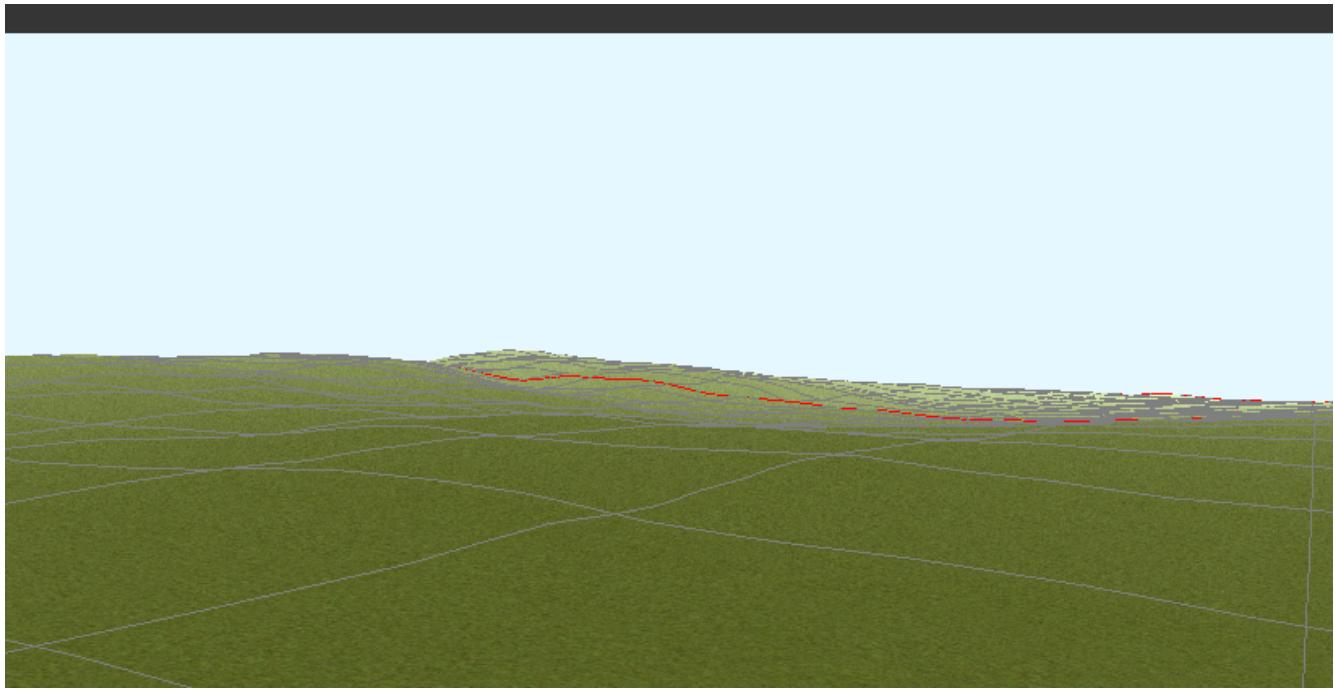
The link provided in the Official TSRE5 website no longer works.

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.

### **Some Additional Internet Links for .hgt Files.**

These are subject to change and may stop working...

[http://viewfinderpanoramas.org/Coverage%20map%20viewfinderpanoramas\\_org3.htm](http://viewfinderpanoramas.org/Coverage%20map%20viewfinderpanoramas_org3.htm)

[https://dds.cr.usgs.gov/srtm/version2\\_1/SRTM3/](https://dds.cr.usgs.gov/srtm/version2_1/SRTM3/)

[https://search.earthdata.nasa.gov/search/granules/collection-details?p=C1000000240-LPDAAC\\_ECS&m=18.984375!-10.40625!2!1!0!&tl=1098377168!6!!](https://search.earthdata.nasa.gov/search/granules/collection-details?p=C1000000240-LPDAAC_ECS&m=18.984375!-10.40625!2!1!0!&tl=1098377168!6!!)

# Using Satellite Images

## Google Maps

Using this feature requires Google maps api key. Without it sooner or later you will see gray 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>

 Google Maps changed how API keys are administered and are "technically" no longer free since you need to provide a way for them to bill you in case you exceed their usage guidelines for each service. *An alternative to Google Maps API has also been implemented.*

## Mapbox

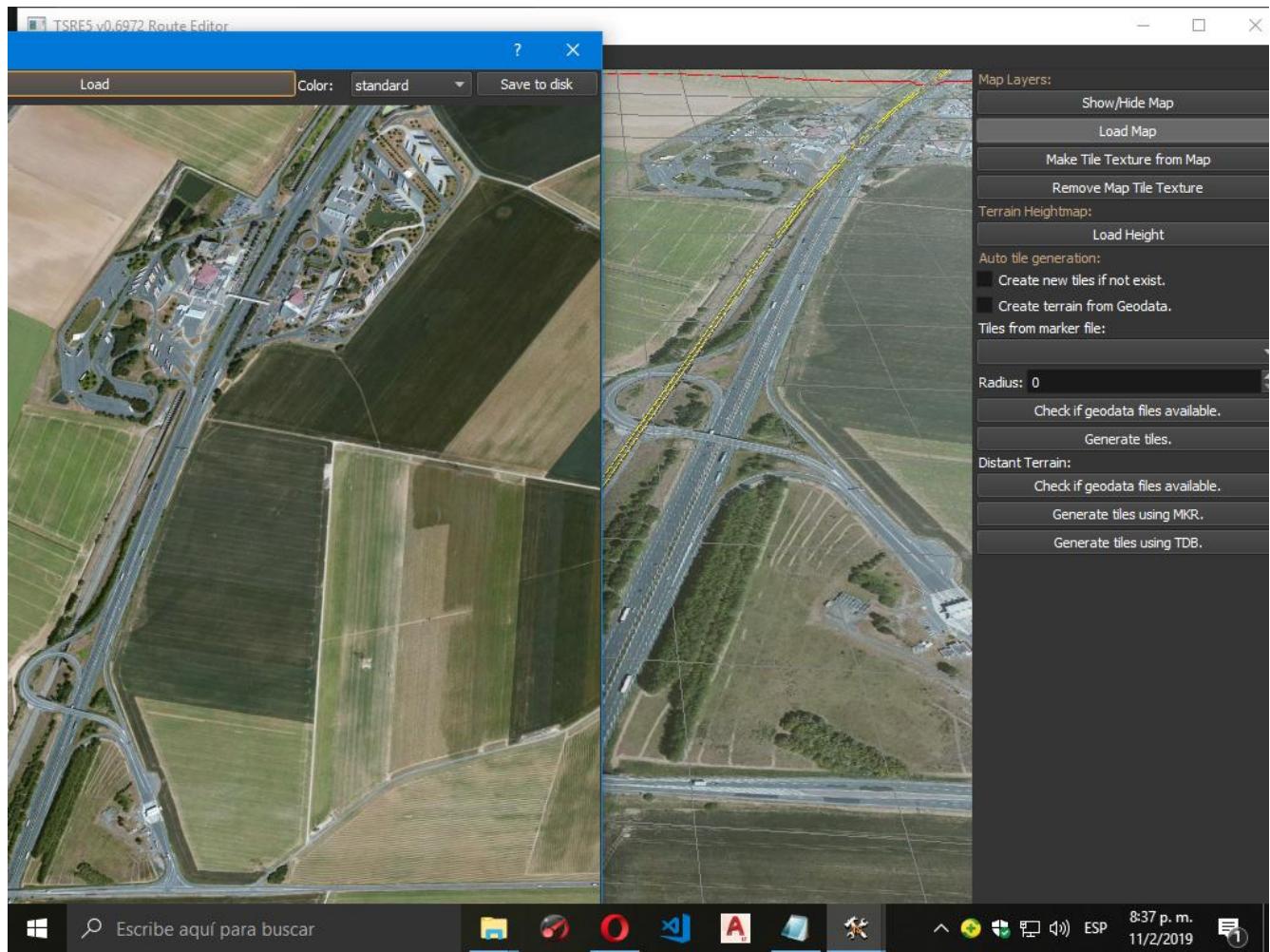
Mapbox provide not just a vector street map also an satellite images.

<http://www.Mapbox.com>

1. Register and obtain your API KEY.
2. Once you obtain your API KEY, open the **TSRE settings.txt** file and alter **imageMapsURL** line with the following code:

```
imageMapsUrl =
http://api.mapbox.com/v4/mapbox.satellite/{lon},{lat},{zoom}/{res}x{res}.png?access_to
ken=INSERT_YOUR_API_KEY_HERE
```

Example:



You might find that using these map projections for Japan are problematic, however for Europe and America it works well...

# Distant Mountains

(Supplied by Renzo Grassi & Giuseppe Ptrains)

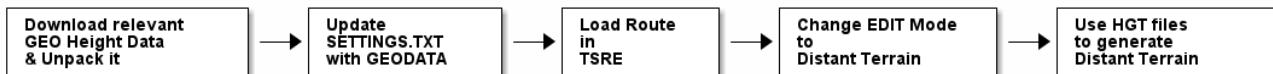


This section is related to TSRE5 from version 0.698 onwards.



This Distant Mountains solution is only compatible with Open Rails and will not work in Microsoft Train Simulator routes.

## General Workflow



As a first step, it is necessary to download the geographical data of the area to be produced. There are several websites that allow you to download **geodata**.

Examples were downloaded from: <http://www.viewfinderpanoramas.org/dem3.html>, a site which contains geodata from different parts of the world at a resolution of 3" (almost) all over the world. They are files in **.hgt** format.



To locate alternate **geodata** sources, you only need to do a Google search and enter "geodata hgt" as the search criteria.

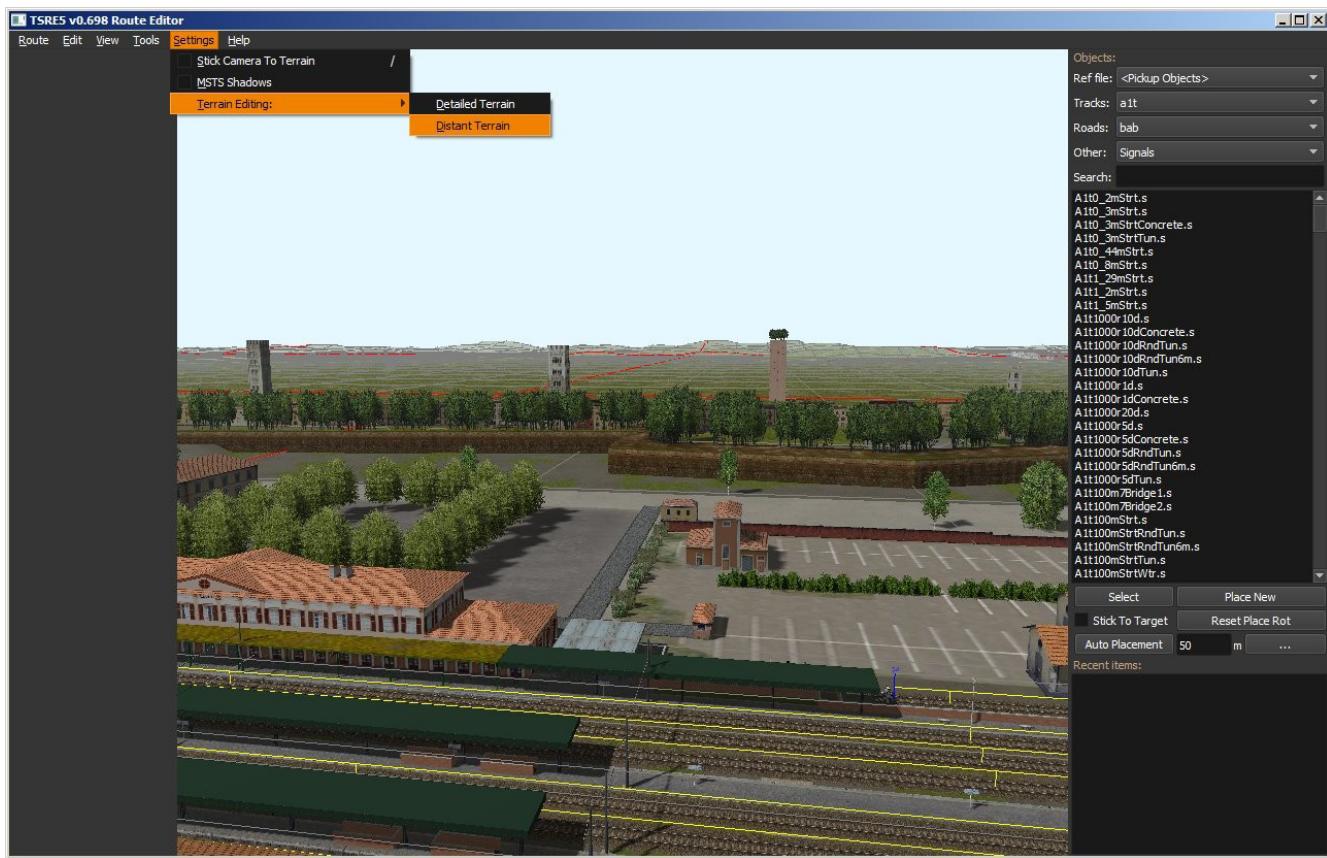
## Setup

Once the **geodata** you require has been downloaded to your PC, you need to edit the **settings.txt** file in the **TSRE5** folder and search for the **geoPath** entry. This entry defines the "path" to the folder containing the downloaded **geodata**, for example: **geoPath = c:\train\MSTS\DEM\dem90m\SRTM**

For more information, refer to the **HGT terrain data import** section of this document.

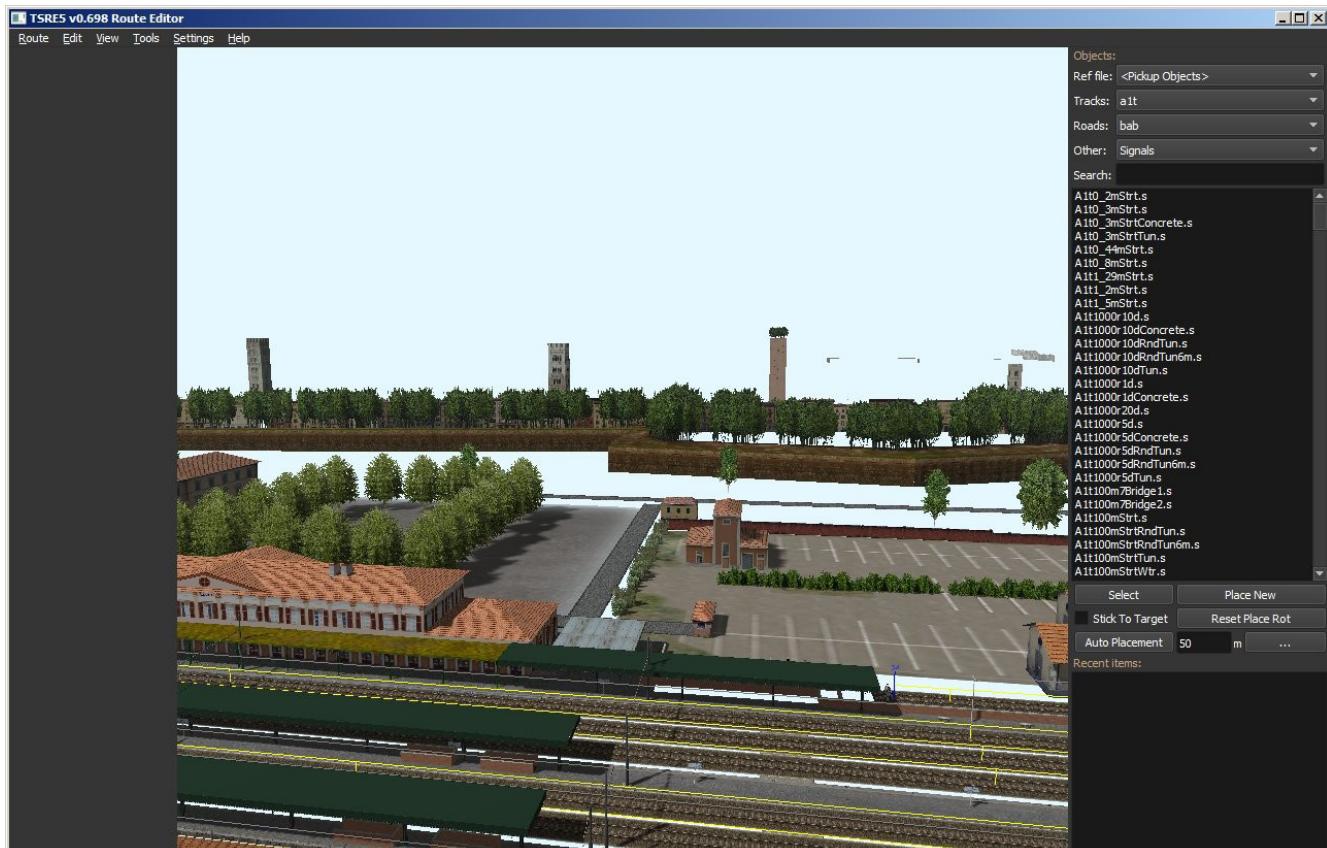
## Editing

At this point, the preparations are complete and we can start **TSRE5** and open the route in which we want to add the distant mountains. Once it is loaded in the main window, choose **Settings → Terrain Editing: → Distant Terrain** from the top menu.



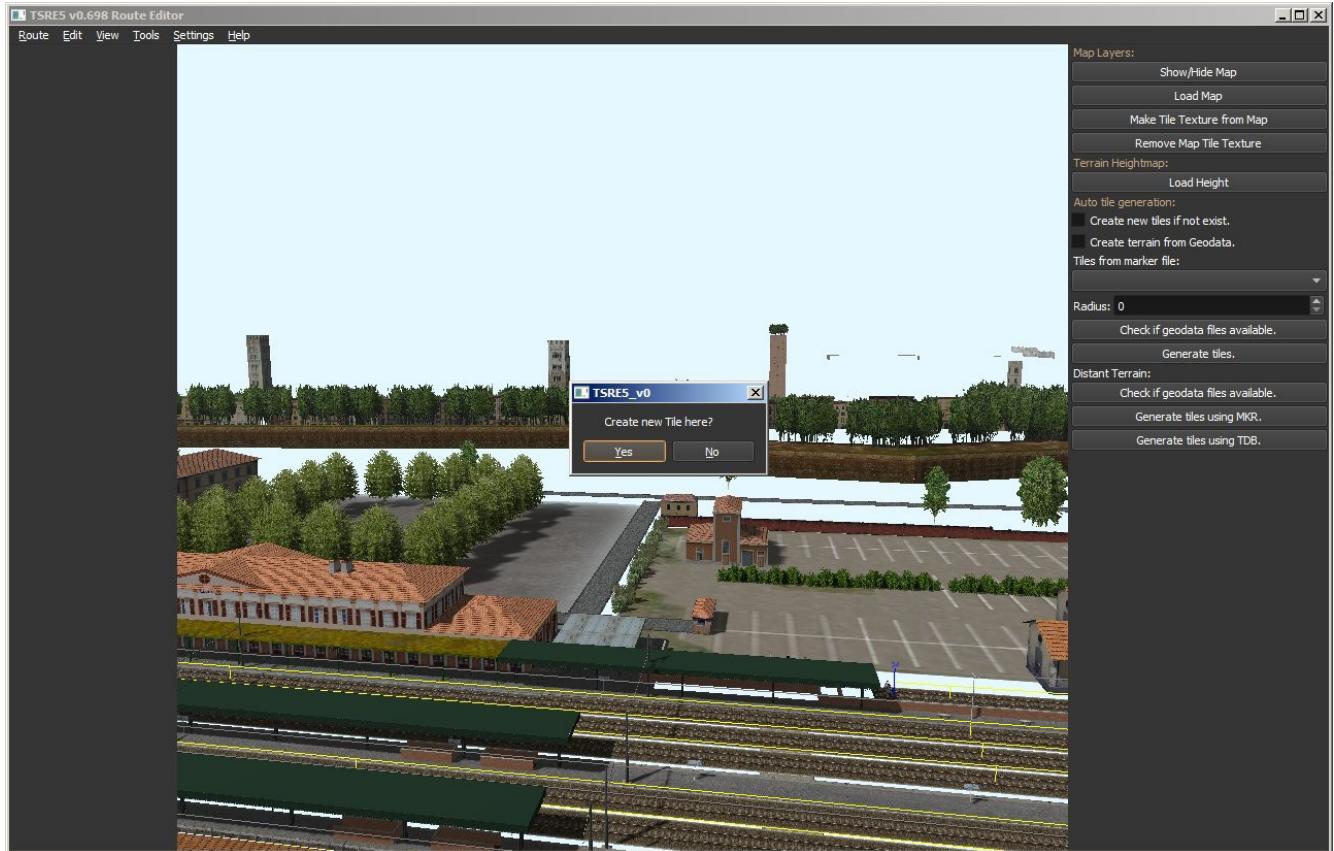
To return to normal terrain editing so you once again see the terrain of the route, simply select the item **Settings** → **Terrain Editing:** → **Detailed Terrain**.

Once the **Distant Terrain** option is selected, the standard terrain will disappear and TSRE will display the current Distant Mountain settings, and these don't exist yet.



The right side **Tools** options menu normally contains the objects we must select. We need the **Geo** window tools options and we reach it by either opening the menu at the top under **Tools** or by pressing the **F3** key.

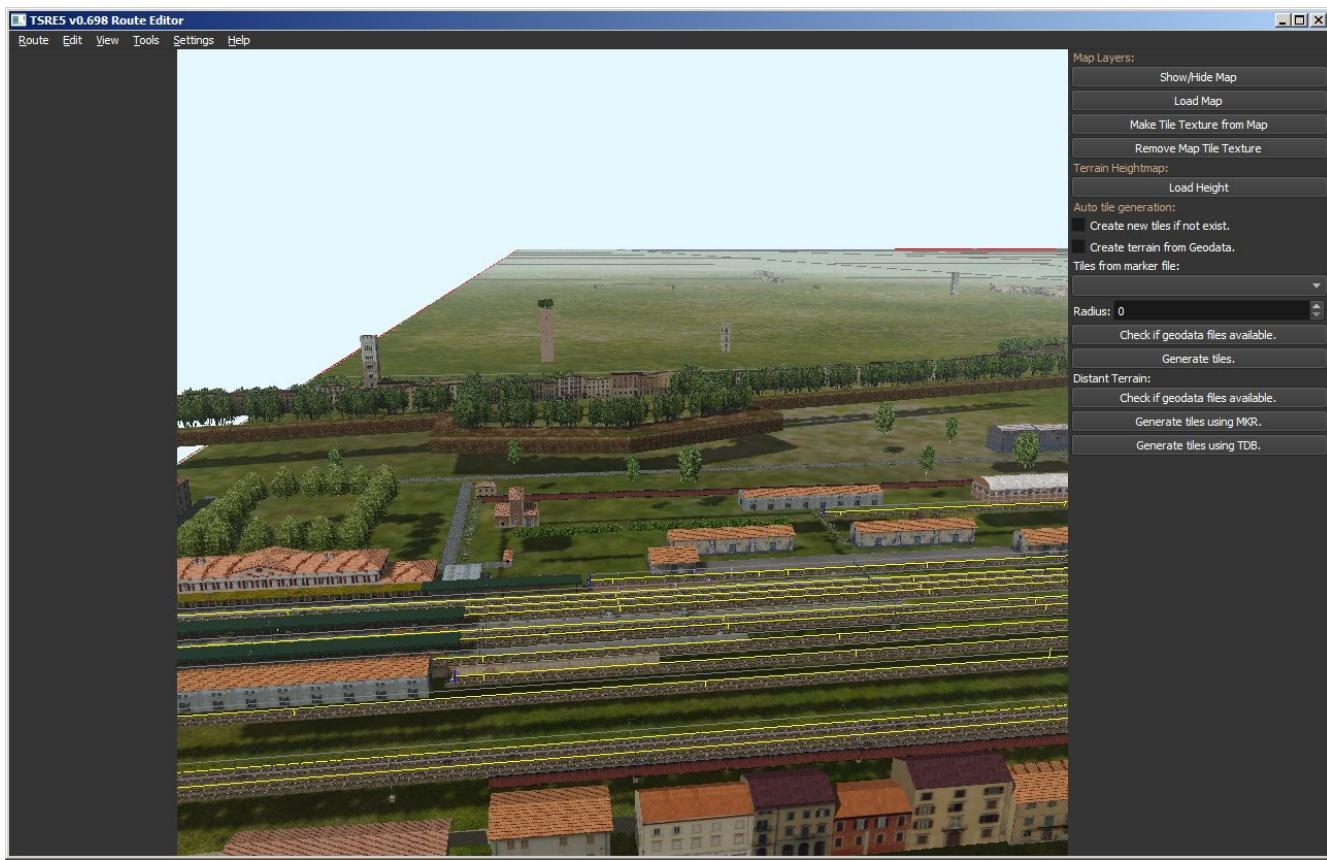
To create a new tile, press the **B** key and a window will open asking whether or not to create a new tile. Answer: "Yes".



It will say that the tile exists and if we want to overwrite it, again Answer: "YES".

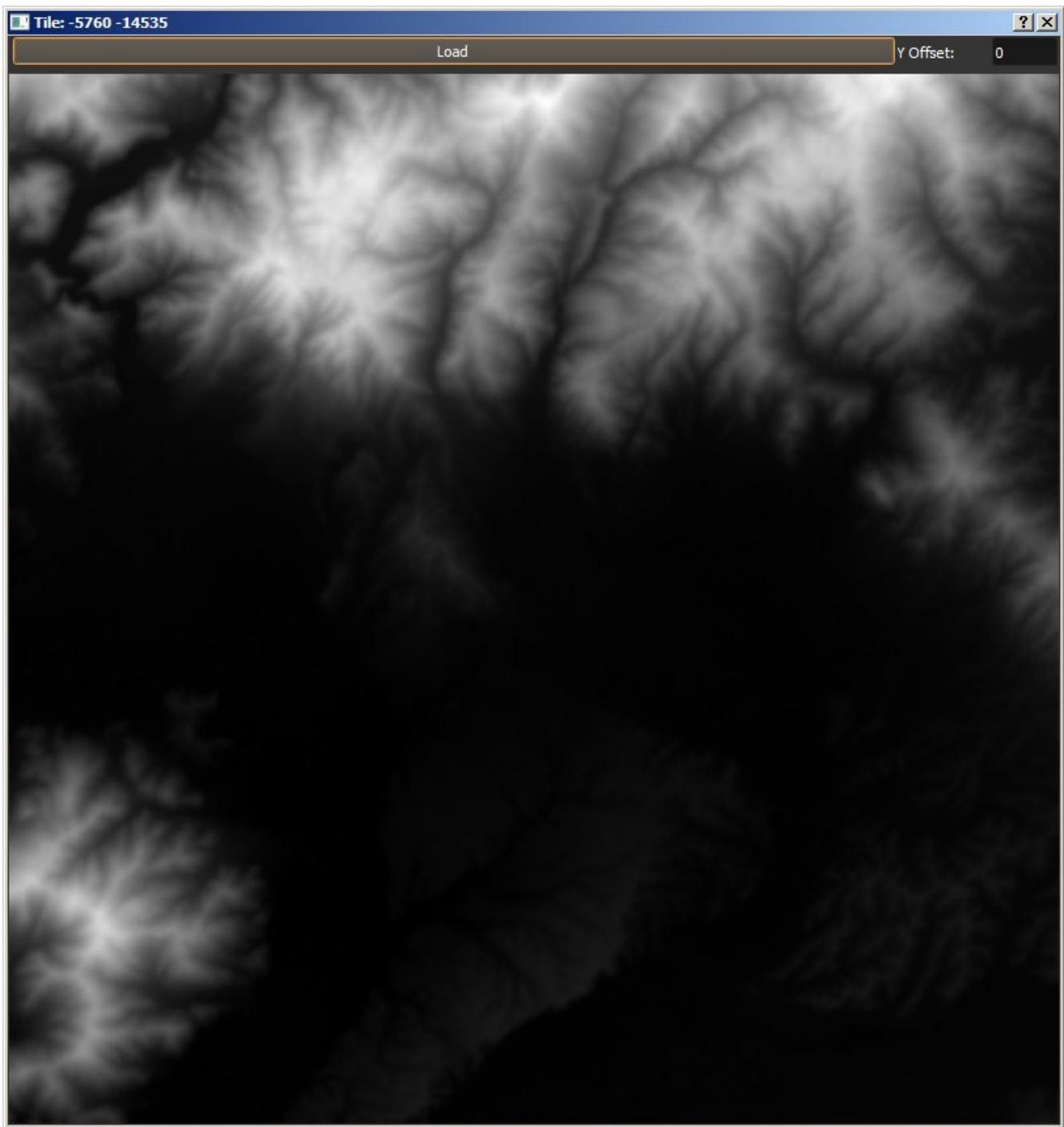
*next section of text needs some clarification*

The new tile just created is much larger than those of the normal terrain (which have the side of 2 km) and if, as in the figure below, we are close to the edge of the tile, once you have finished fixing this, it is sufficient to move to the area white and repeat the creation procedure from button B onwards.

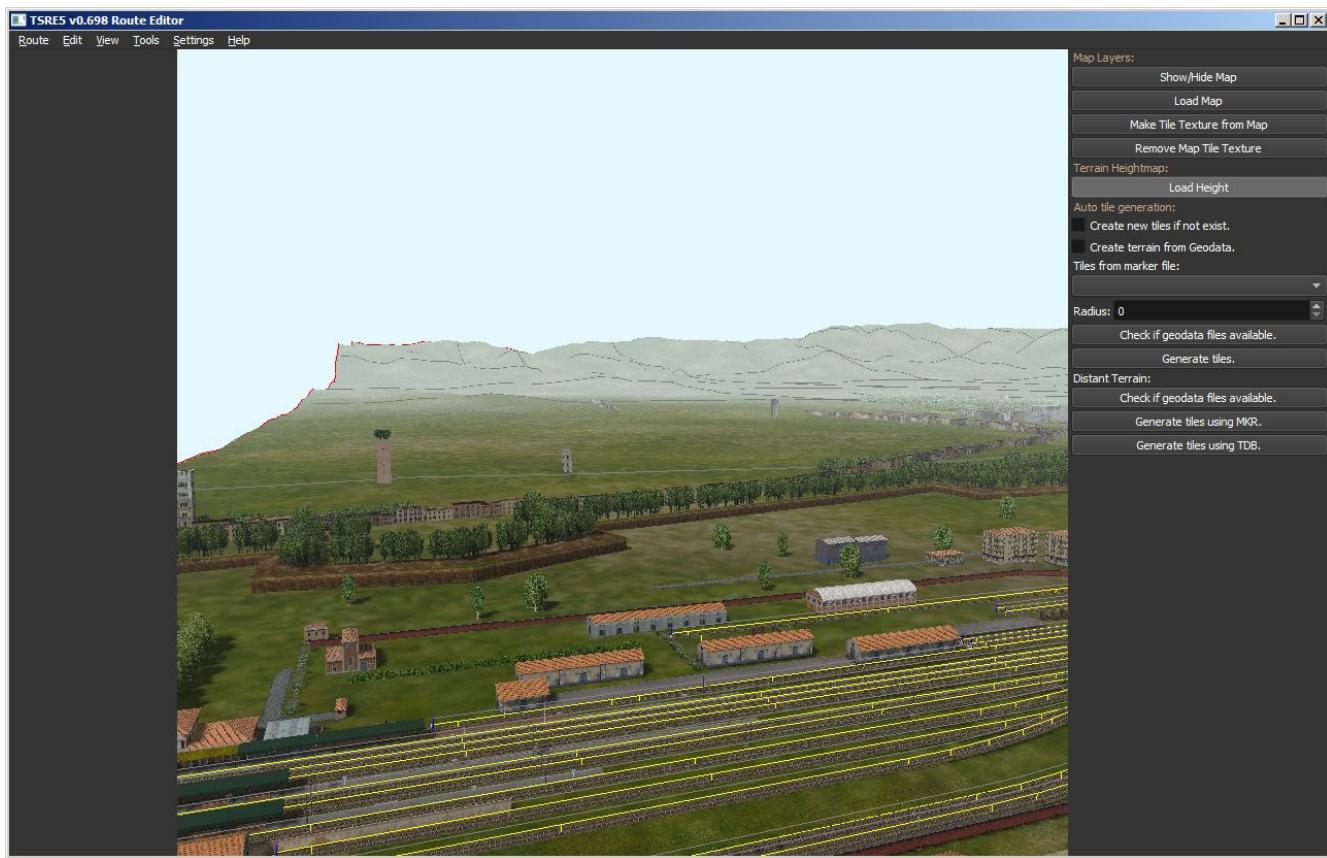


In the **Geo** window, which we opened by pressing **F3**, we must now press the **Load Height** button and with the left mouse button click on a portion of the created tile to select it.

A new black window opens, press the big **Load** button at the top and an image of the mountainous reliefs of the area will appear.



If this does not happen, check that you have correctly entered the path to the **geodata** folder and that the **hgt** file covering that part of the territory is present. Once this is done you can close the window and the new tile will show the view of the area.



Before leaving the editor, remember to save your work.

# Route Building - Step By Step

## Route Building

Creating a railway route requires a variety of components. These components should mostly be prepared in advance as they will be the items you will rely on to create your unique route. This list is not intended to be daunting to the route builder, rather it is meant to give an understanding of what is involved in a "complete" route, such as the 6 default Open Rails routes.

To create a complete Open Rails route, the items included would be:

1. custom terrain shapes and textures
2. tracks
3. rail yards
4. bridges
5. tunnels and other underground structures
6. water
7. stations
8. platforms
9. overhead electric wires and gantries
10. signals
11. speed limits
12. mileposts
13. roads with traffic definitions
14. controlled level crossings
15. refueling equipment
16. static and dynamic trains
17. textured houses and other buildings
18. various visual objects (such as rocks, fences, junk piles, and railroad equipment)
19. city objects
20. industrial complexes
21. people and animals
22. train and environmental sounds
23. and at least one defined activity.

Constructing a thorough itinerary from the bottom up is a complicated task, even for a small route. It is essential to plan such a route systematically. This guide is designed to meet this requirement.

I was not informed at the beginning of my route-building journey about the amount of research

and knowledge that would be needed to create a high-quality route. For example, I was unaware of the resources such as track profiles, Sanborn or topo maps, and hundreds of photographs that I would need to be familiar with.

Building custom models and researching the route are both very laborious tasks, taking up at least 90% of the total effort. Installing the tracks and roads is minimal in comparison, provided you understand where to put them. Static models, although requiring knowledge of modeling, are even more straightforward. Although custom models require a significant amount of work, this is mostly due to the need for correct pictures to create the art that covers them. Making Terrtex images, however, is much harder; it needs to be a consistent tile so that there is no visible pattern, and there is currently no online resource to obtain samples of Terrtex files.



Some available tools do make creating seamless tiles somewhat easier. These tools include Gimp, Krita, Affinity Designer and Photoshop.

## Route Building Tips

The best way to start is to build a small route. With a maximum of 5 to 10 miles in size, you won't get overwhelmed when trying to figure out the route building tools. Make something you can get operational in a short time. You will sometimes encounter errors or design problems that would force you to backup several steps, and that is much less traumatic with a small route.

When laying tracks, the process typically involves attaching one track section at a time to the previous one. Start with the first track section and build out from there, either in one or two directions or even more if you include switches. Track laying should be done in a systematic fashion, one small section at a time. As for adding other elements, it's not as strict, but it's important to follow a certain sequence to avoid potential problems down the line.

It is essential to understand that track and terrain (mountains, valleys, etc.) are interconnected during the construction process. Usually, one shapes the landscape while laying the track. Unless one imports the terrain and track layout from an outside source (which requires more skills, software, and techniques that are not provided by Open Rails), it is necessary to link the terrain shaping together with the track laying, since they are inseparable unless the ground is completely flat.

Once tracks have been laid, particularly over hills and mountains, it can be difficult to alter them. Even though the existing track can be removed, it is arduous to fill in the space left with new track. This is because it is challenging to join two tracks together within a few centimeters, especially when the ground is uneven.

Backups, backups, backups. It is important to save "extra copies" of your work in progress as well as saving often during a session to avoid catastrophic loss of effort should the route editor crash.

Studying existing routes within the Route Editor can provide a wealth of ideas and techniques for creating your own route. Whether it be original default routes or add-on routes, you are sure to find something useful to apply to your own route.

Historically, routes in legacy MSTS had some difficulties with the use of dynamic track. It does seem that Open Rails has much less difficulty with dynamic track so using them is now much less risky.

Some people are saying that using dynamic tracks is safe for Open Rails and looks and feels great since it reduces rough transitions. These days, some people are saying that they always use dynamic tracks and just use the available curve shapes for actual curve transitions.

There are many authors who have created track and road sections with textures, and these can be found online. A regularly extended database, known as the [Tsection.dat](#) file, contains all available track section-specific vector components. Trains and cars traverse invisible vectors, while textures are merely attached to these vectors to make them visible and more varied. Ultimately, it is up to the route author to decide which track and road sections to use in the route, taking into account the specific variables such as broad, middle, or narrow gauge, etc.



Routes can be expanded later if that is desirable.

## Route Planning

What kind of route do you want?

- Will it use real terrain elevations, or will it be fictional?
- Will it consist of one or more mainline(s), dual-tracked or otherwise, yards, sidings, spurs, loops, wyes, bridges, tunnels, overpasses, grades, switchbacks?
- What kind of terrain will you need to make?
- Where will be the stations, towns, hills, mountains, valleys, rivers, lakes be?
- How much detail do you want to include.

Planning ahead is essential for building a successful model railroad. Begin by sketching out a rough map of the desired route, allowing room for potential improvisation during the actual construction. Be aware that the geographic area of the layout may be subject to expansion as you build, so a flexible plan is key.

Having a plan for your route is essential for any modeler. This is because you need to first choose a set of square tiles for your route to be situated on. Furthermore, it is important to have an understanding of where to place the bigger elements such as curves, loops, wyes, valleys, and mountains, as each tile is only about 2km by 2km square (1.24mi by 1.24mi).



You can make a "marker" file for guidance in laying track (this will place markers on the terrain, so you can lay your track from marker to marker). But this requires that you know the GPS coordinates of each marker: these are not so easy to generate, especially for free-style routes.



Peter at "Coals to Newcastle" website has also created a resource page dedicated to a "getting started with route building" tutorial and is well worth the visit.

## 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 **NumPad 8** or **NumPad 2**.
5. The **0.1 grade per-cent** is equal to **1.0 per-mille** which is equal to **0.058 degrees** (Open Rails 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 19.9998 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.

When typing grade in on the TSRE Elevation Panel there is a problem if the tracksection is 'flipped'.

When you place a curve it normally curves to the left. All works well when entering grade values in the elevation panel.

Not so if track is 'flipped' i.e. curves to the right and it's impossible to manually enter into any field in the elevation panel.

If I'm setting grade on multiple curve-to-the-right (flipped) sections it's convenient to paste a grade entry copied from text.

In the editor there is a 'Search' field on the Objects Panel a few lines from the top. If I'm setting grade to lets say 2.5% I type 2.50 into the percent field ( or 25.00 into the permille field).

As long as you don't type into these fields it's ok and copy / paste from the Search

is an easy spot to put you grade data.

## 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 **NumPad 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.

- Transform Panel - ROTATE \*

(See the lower part of the panel)

Rotate will revolve or translate an object reference based on the objects PIVOT point. This pivot point is also known as the ORIGIN that was set by the creator of that object. It can be seen as the point where the Red, Green and Blue axis lines join.

 Different objects might have requirements on where this **origin** is located, for example rail cars place a pivot point in the center of the shape, Road and Track shapes place the pivot at an extreme end of the shape while most scenery can have the pivot point anywhere. Hopefully the modeler chose a reasonable location.

- So, rotation (transforms) will always occur based on the origin point.
- When an object is ROTATED or SLOPED up / down grade, the grade angle and rotation is specified in DEGREES. In the Grade Panel this angle is referred in several different ways all meaning the same thing.
- When a TRACK is initially placed it's pointing NORTH, 0 degrees
- If you rotate it +90 degrees the track is now pointing EAST.
- If you rotate it -90 degrees the track is now pointing WEST.
- If you rotate it +270 degrees the track also ends up pointing WEST.

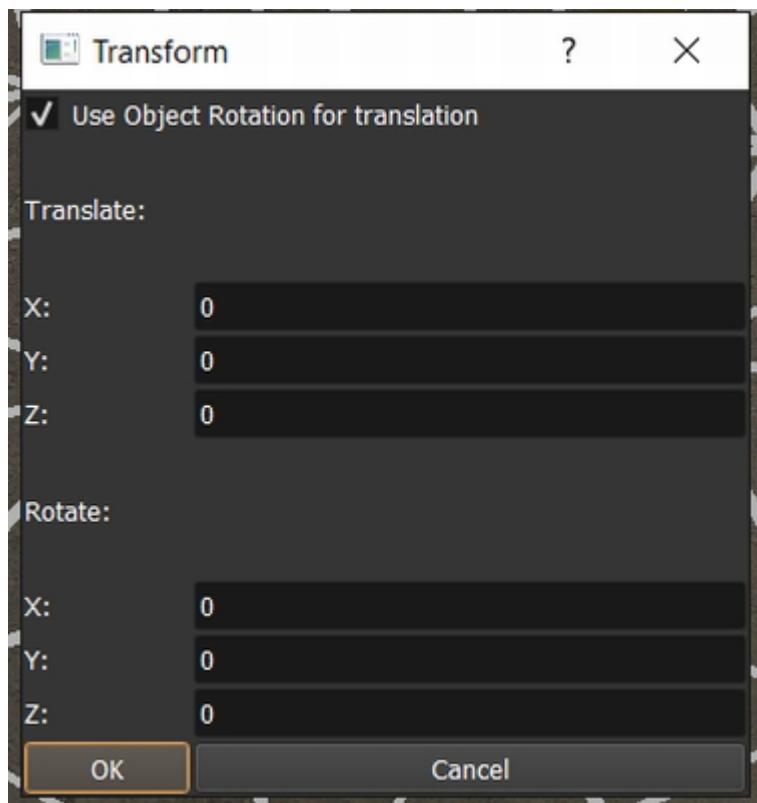
ALL the above examples start with the track in it's initially placed position pointing NORTH. BUT...

- You may enter a value in the **Transform Panel** AT ANY TIME you need to 'nudge' it just a bit to

achieve the alignment you want.

- If the track is say pointing SOUTH and you need to rotate it just a few degrees, that's what you would enter into the 'Y' axis field

Now the Transform Panel Examine the lower half of the panel, the ROTATE Section. Three Fields: 'X' 'Y' 'Z'



- **X** is along the LENGTH of the Track Section. Enter a 1 here and the track rotates (slopes) up by 1 degree.
- **Y** is the vertical axis. The track rotates about (around) this axis.
- **Z** is across the track . . . Not exactly sure what this might do as I have not used this field. Maybe TILT the track from side to side? Experiment! Let us know what YOU find!

### Practical Uses for Transform

Have you ever had to join track sections on a grade? Tough, especially if you're joining to an already installed section. Getting that gradient *exactly* right can be a pain. You've been using the grade adjust panel but exact joining just won't work. Let's say you need to raise one end of the track by less than a centimeter (about 3/8ths of an inch). This is when you use Transform!

Conditions: 1. Track section selected, press **Z** key so you see no yellow **TDB** lines showing for the track section 2. On the Transform Panel enter 0.01 (1 centimeter) in the **X** field and press kdb:[OK]

Result: The track end opposite the pivot end will elevate by 1 centimeter.

So, lets say that 0.01 was too much so you need to slope it down just a bit, by half the amount you raised it. Enter -0.005 in the **X** field. This lowers the track by half the amount you raised it in step 2 above.

## Some thoughts on Laying Track

Rule #1 of editing track is that there must be no interactive objects on the node being edited - a node being the section of track between two red and/or blue poles. If track is edited while interactives are present, those interactives will now be corrupted.

Also, Attaching two switch points (marked by red poles in editor) directly to each other will cause train crash in game and will be noted in LOG-file. Instead, we should always insert at least one track section between two switches.

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.

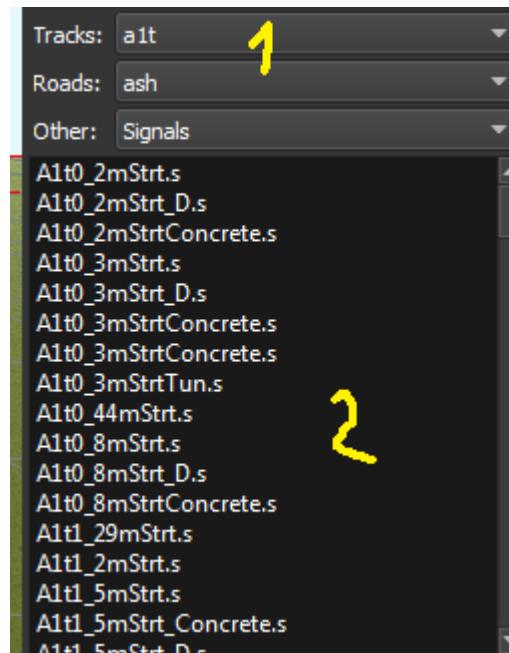
Do NOT move the track if TDB lines are present

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

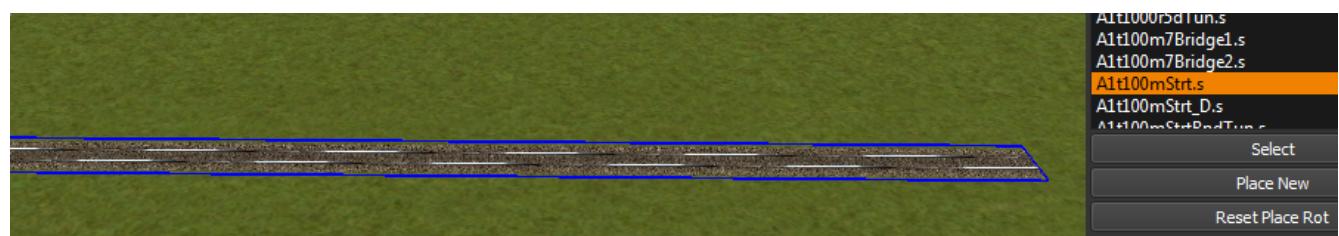
## Placing New Tracks

How to place tracks or roads?

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



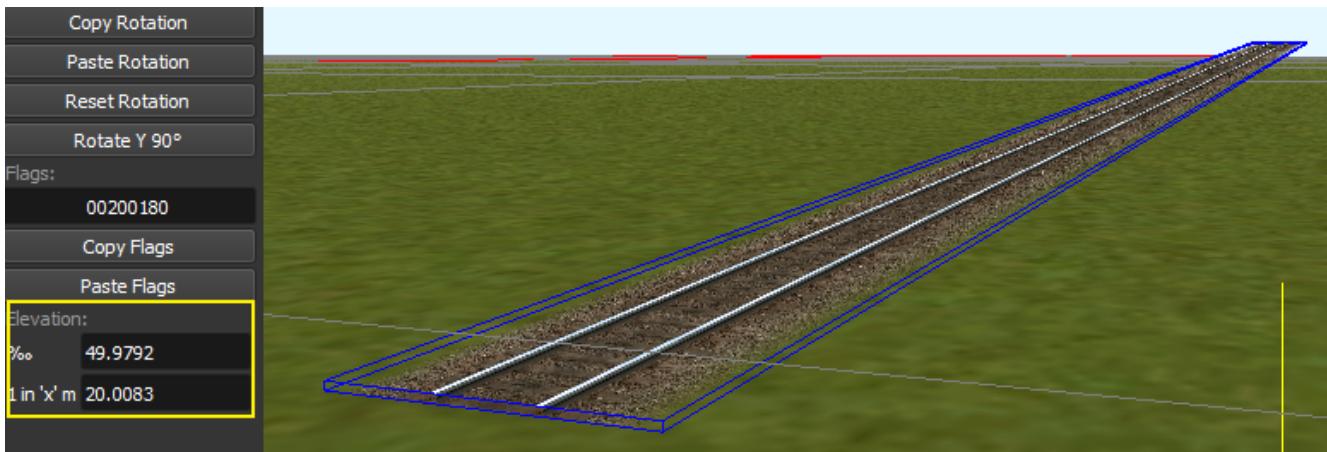
- Click **Place New** button.
- Click on the ground where you want new track.



- 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](#).

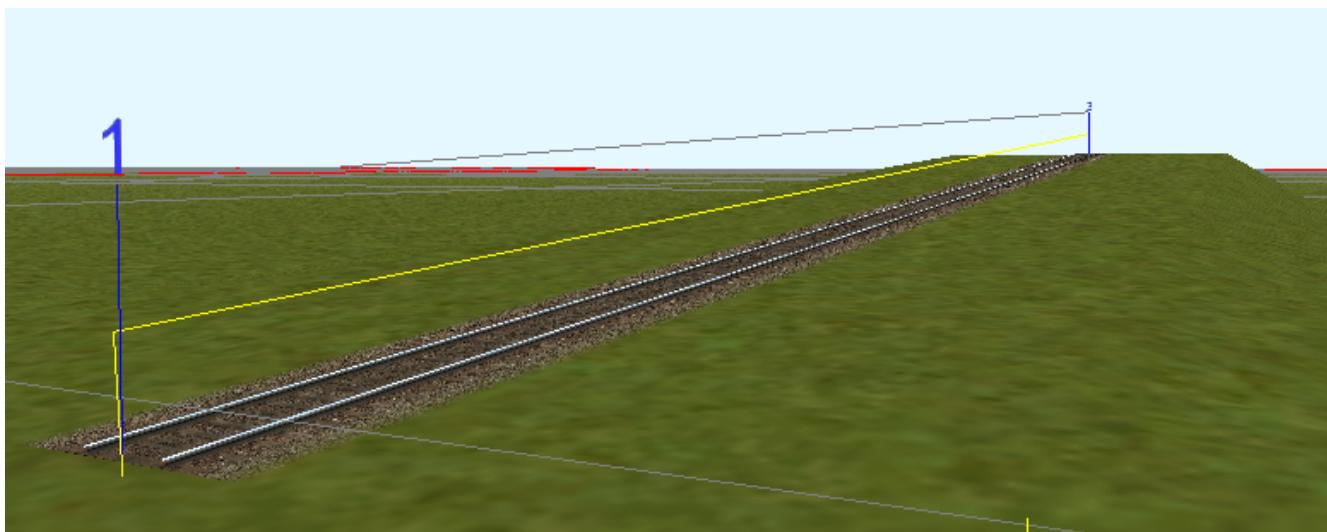


- Press **Z** to add track to the TDB (Track DataBase). If you want to remove track from the TDB and keep the shape - press **Z** again.

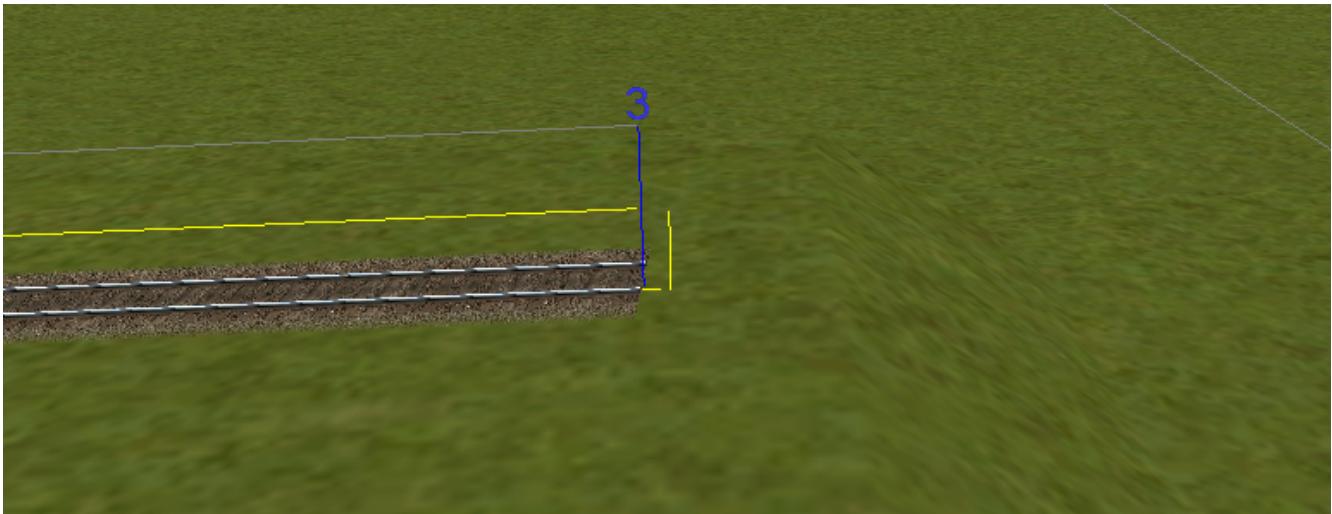


Never translate or rotate track when it is in the TDB (when it has a yellow line) !!!  
If you do, you will need to delete this track and place new one.

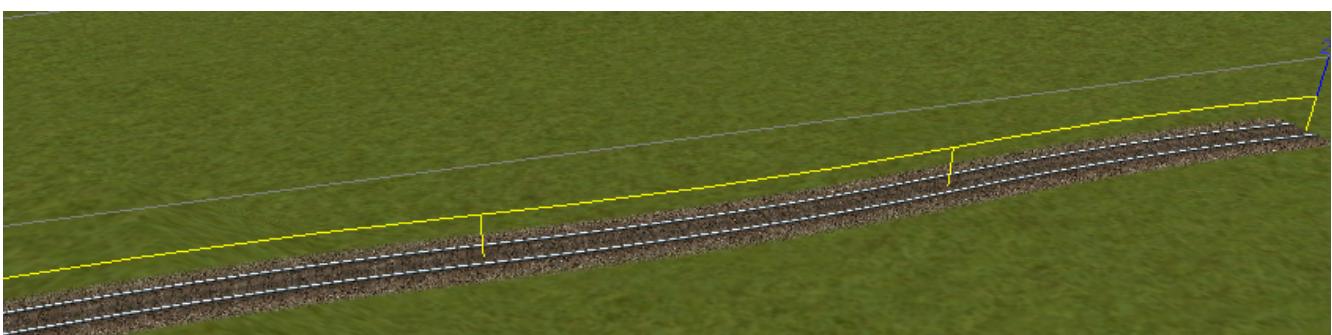
- When track is in TDB, you can press **F** to adjust terrain to the track. You can also do it later by selecting the track you want to adjust and press **F**. See more: [\[Editing\\_terrain\]](#).



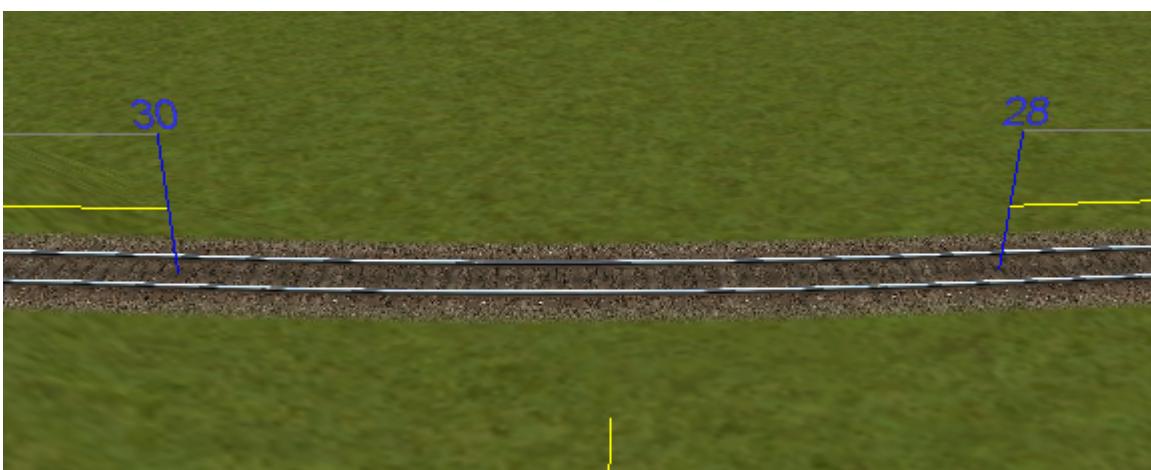
- If you want to place the next track, click around the endpoint (the blue pole) where you want to add next track.
- If you have difficulty placing a track above or below ground, press **Q** to change placement mode to **stick to all**.



- 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`.



To adjust a road piece, Press `Z`. This should remove the Blue Line above the selected road. Select the road again and attempt to drag it to where you want it connected. It *should drag along the terrain!* If it doesn't then toggle the Cursor Mode using `Shift + Q` Key. You might need to try using a different road section to get it to snap correctly.

## Dynamic Track

```
{dot} Place track  
{dot} Adjust Dynamic Track Properties  
{dot} Save w/no TDB lines  
{dot} Re-Select track  
{dot} Press 'Z' to update TDB  
{dot} Save
```

## Placing objects - A guide

### Car Spawning Tips

#### Creating a Car Spawner

In order to create a car spawner you need an entry in the route's REF file like this. The class can be anything, I put mine in the "vehicles" class:

```
CarSpawner (  
    Class (Vehicles)  
    Description ("Car Spawner")  
    StoreMatrix ()  
)
```

To add a car spawner select it from the ref file list and select place new as you would for any object. When you place it on the road section you will see 2 purple squares ("handles"). Pull them apart and note which direction the traffic is flowing. If it is going in the wrong direction, pull one handle past the other to reverse them.

When you select a handle it turns a lighter shade of purple and data for the spawner will display on the left side pane.

You may move the handles either by dragging with the mouse or using the arrow keys. I am told that Selecting the "Expand" button expands the spawner to the extent of the road, but I have not tried that myself. Note that it is not recommended to have a car spawner longer than 2 km.

Note: There is no need to drag handles over long distances. Move more than a couple of tiles away from the origin of the spawner and it will stop displaying. If you lose the handles, you can lose the ability to delete it so would need to fix it in the 'w' file (which nobody wants to do). In this case you can increase tile rendering radius "tileLod" in settings.txt and wait until cars reach location of car spawner placement and you can select car spawner by selecting a car. But that's the reason why it isn't recommended. What to keep in mind: in Open Rails car spawners longer than 2 km may cause issues, in TSRE longer than 6 km.

The values "car number" and "car speed" affect the speed and density of traffic. The car number refers to the average number of seconds between spawning a car so higher numbers mean less traffic such as for a rural road. I have found that a car number of 1 tends to produce vehicles so fast that they are sometimes bumper to bumper or worse. Note that the spawning mechanism randomizes vehicle appearance so this is just an average number.

Car speed is in meters per second. 60 mph is approximately 27 meters/sec. I have seen a table somewhere that converts m/sec to mph but I don't recall where it was. Basically multiply mph by 0.447 to get meters per second. For kilometers per hour to meters per second multiply by 0.278.

If the car spawner handle refuses to cross a road joint it means you do not have a good joint there and you need to remove the road sections and rebuild them. Road sections can be finicky to join especially multi lane highways that sometimes will join misaligned. Roads on a grade or over a bridge can be difficult. Try using shorter road sections and turning off "stick to terrain" `Shift-Q`.



Bad road joints can be identified by a longer blue pole at the bad joint than a standard "good" joint. Anyway as you say, the car spawner will not move past it, so that's a good enough indicator something is wrong. Try to lay roads end to end rather than trying to join them up, as the precision pieces are somewhat limited when using default shapes.

The cars spawned by the car spawner are defined by the "carspawn.dat" file in the root directory of your route. For Open Rails there is only one car list. For Open Rails you can define multiple car lists. This is useful when you want to have different cars for different roads or lanes of a road. For example on my 6 lane freeway I have cars and trucks in the right 2 lanes but cars only in the left lane, which is common in many US Interstates and freeways. To set up multiple car lists see section 15.5 of the Open Rails Manual.

#### 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

<b>meter/s</b>	<b>km/h</b>	<b>mph</b>
35	126	78.3

## Markers



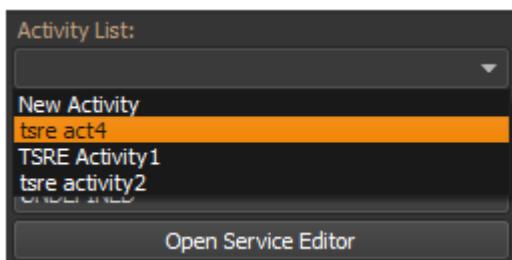
Well, with TSRE, once You've modified a track, platform marker won't disappear immediately, but if You'll try to move it then - it will. I also have seen, it's only one end disappeared first. But anyway, the only sense of them is to see their names for copy and paste to new ones, and, as You've said - the reminder. Once You've touch them - it already will be too late, so we should care to delete them first, As Travis suggests.

# Working with activities

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

## Selecting an Activity

Select an activity from the Activity List.

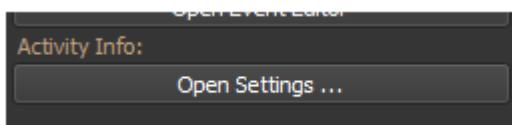


## Creating new Activity

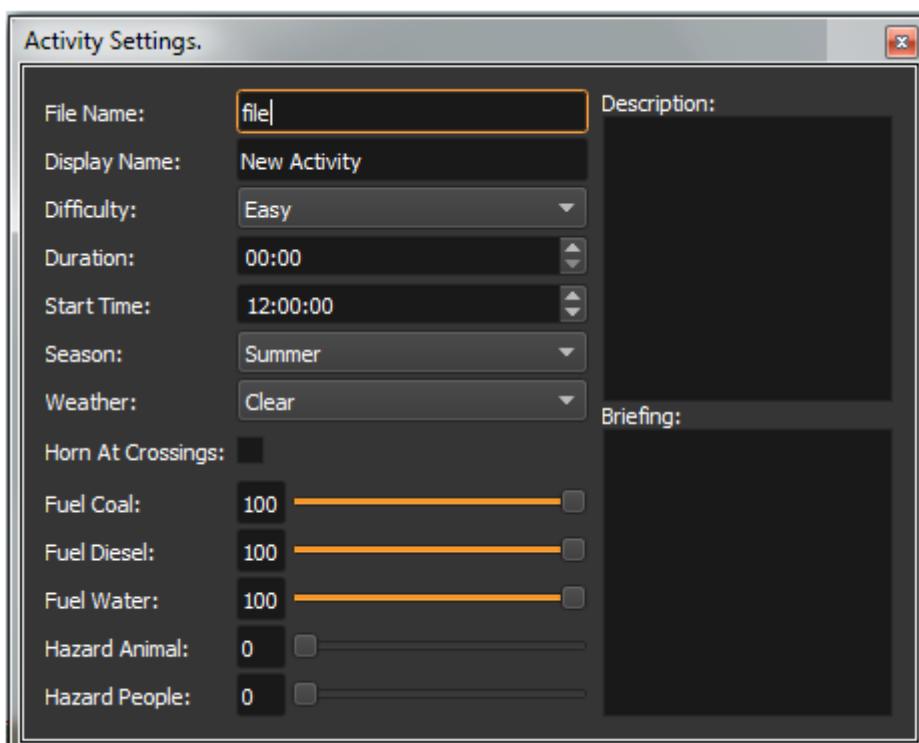
Click **New Activity** button below the Activity List. A new activity will be created and selected.

## Editing Activity Settings

Click Open Settings ... button.



New window will appear.



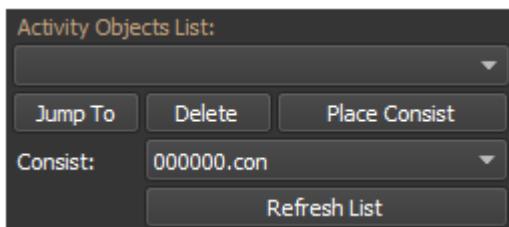
## File Name

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

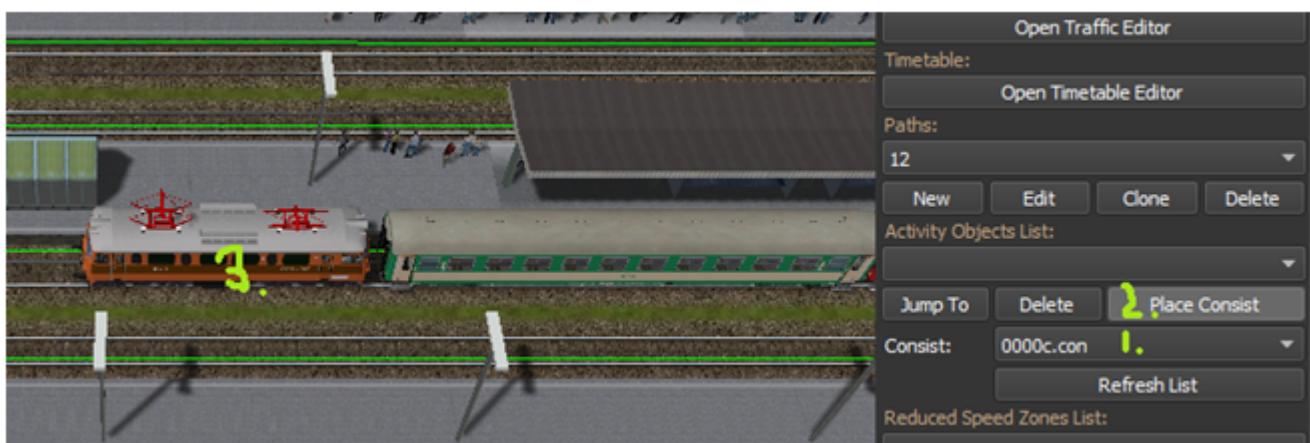
## Display Name

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

# Placing Loose consists



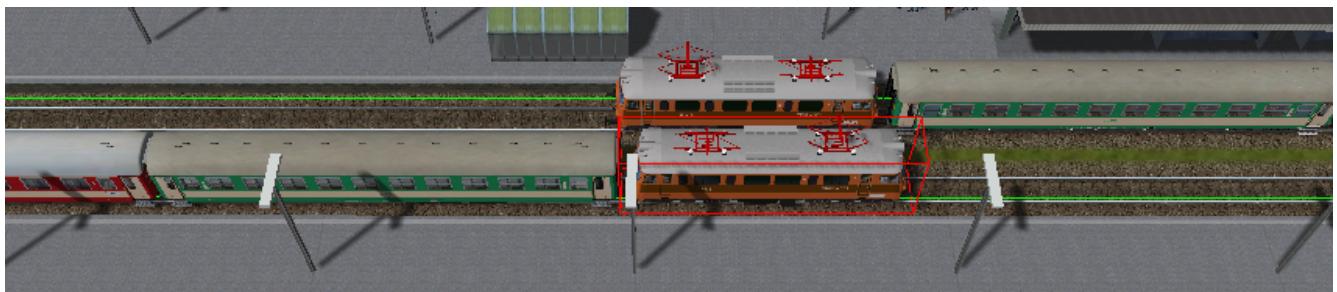
1. Select consist from Consist list.
2. Click **Place Consist**.
3. Click on the track where you want to place the consist.



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:

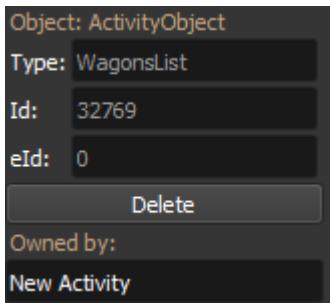


## Moving loose consists

Select consist, and drag it using mouse.

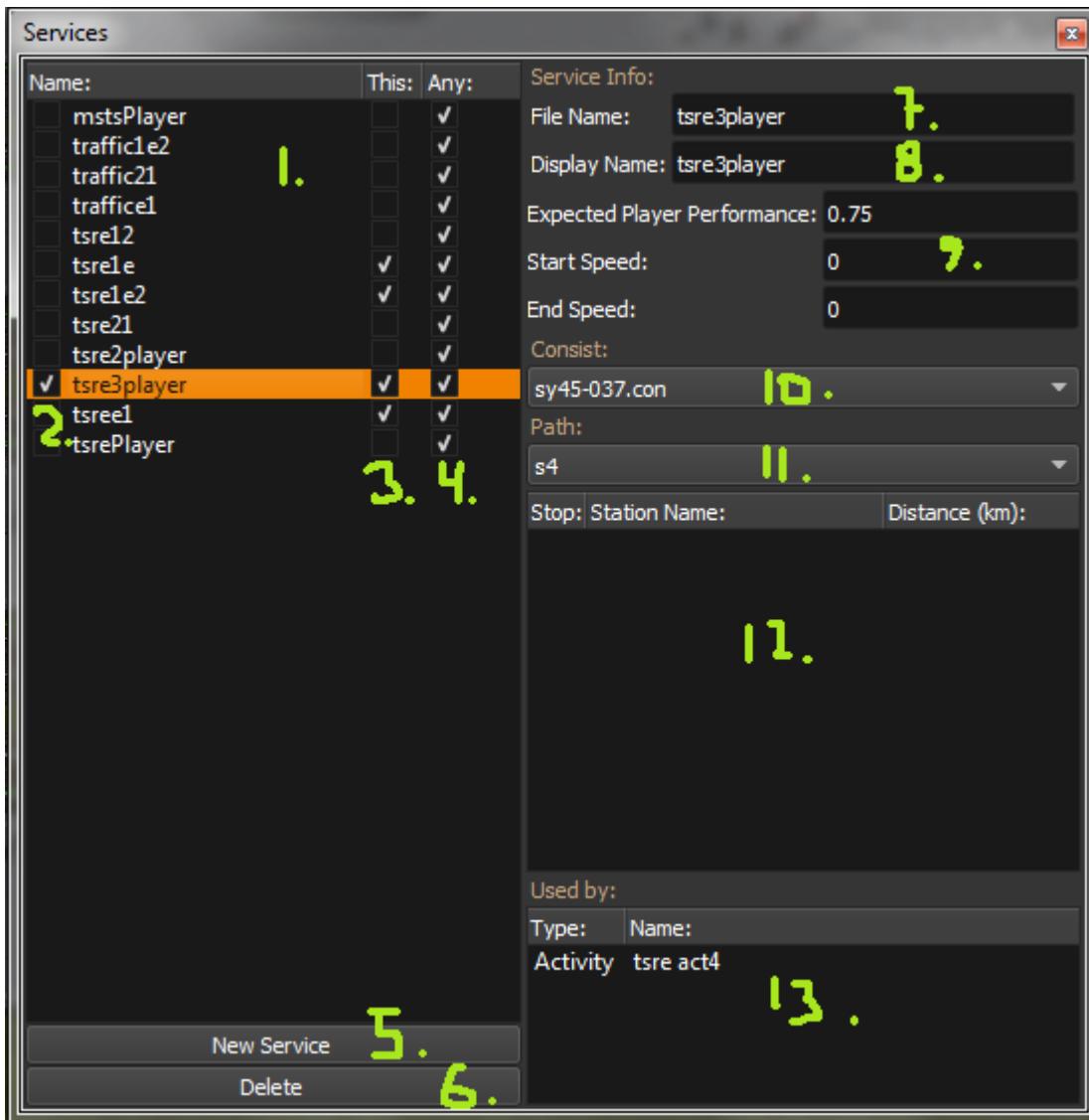
## Removing loose consists

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

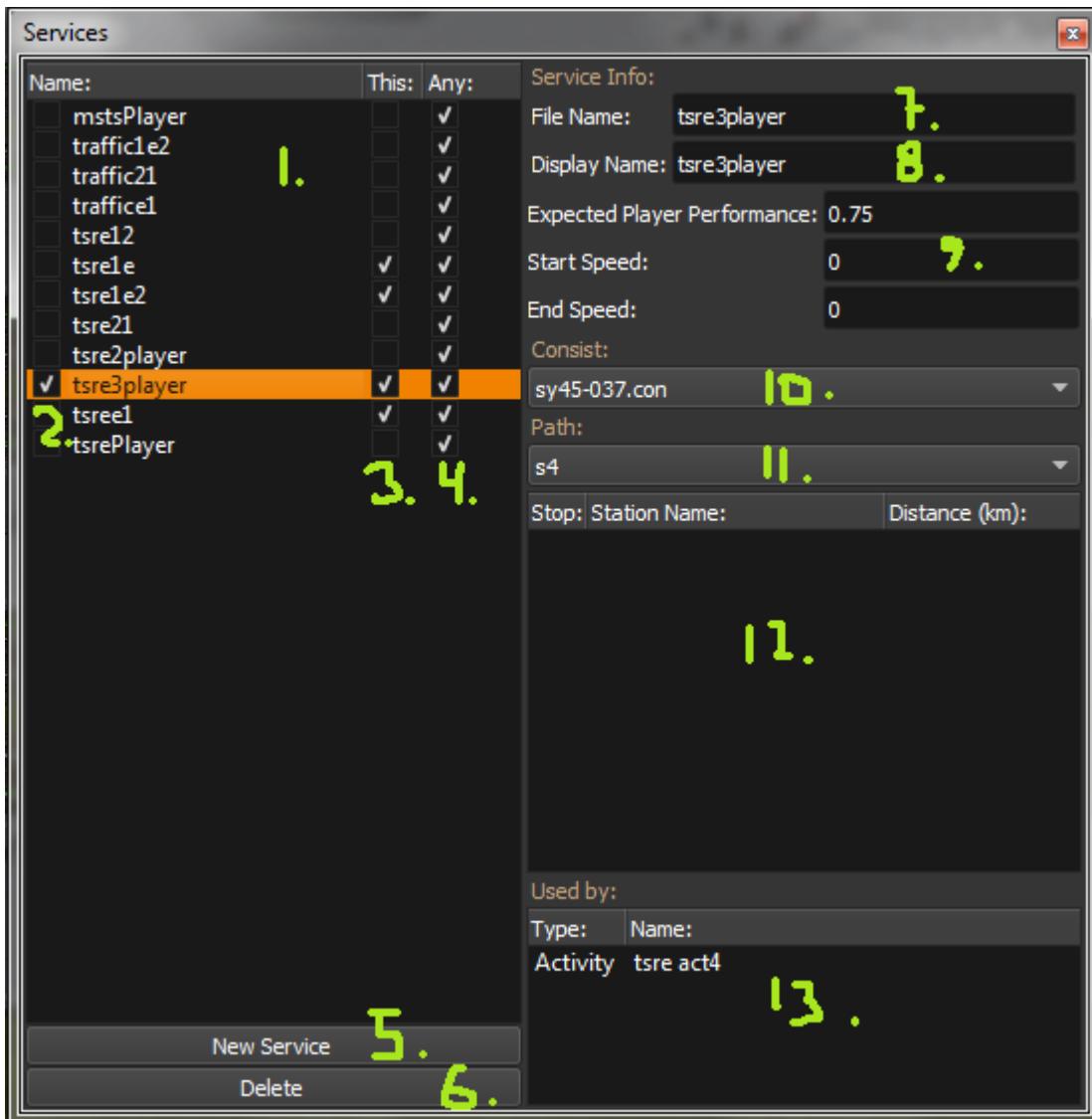


## Working With Services

Click **Open Service Editor**.

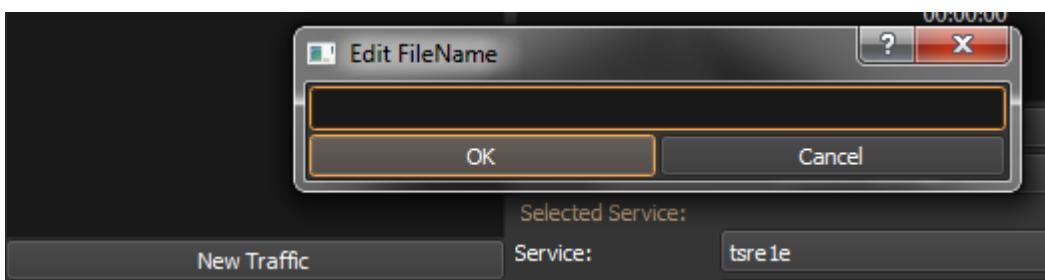


1. Service list.
2. Checked if service is set as player service in current activity.
3. Checked if service is used in current activity.
4. Checked if service is used by any activity.
5. Click this button to create new service.
6. Click this button to delete this service. *Doesn't work currently.*
7. 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.



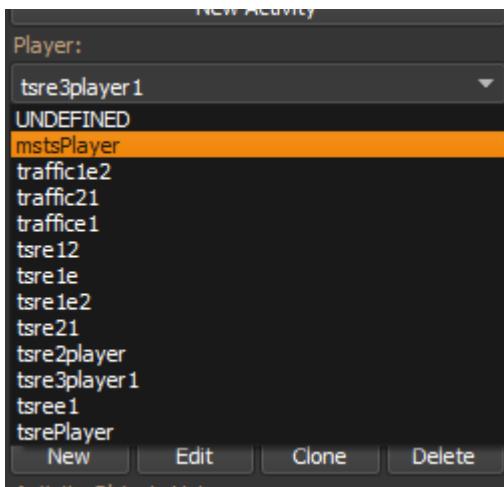
## Creating a new Service

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



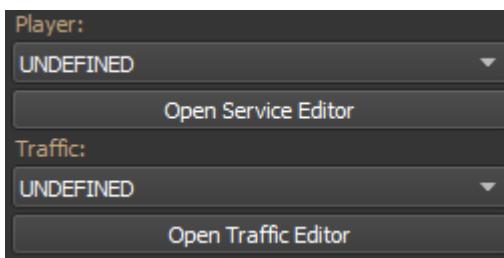
## Selecting activity player service:

Just select service from the list.

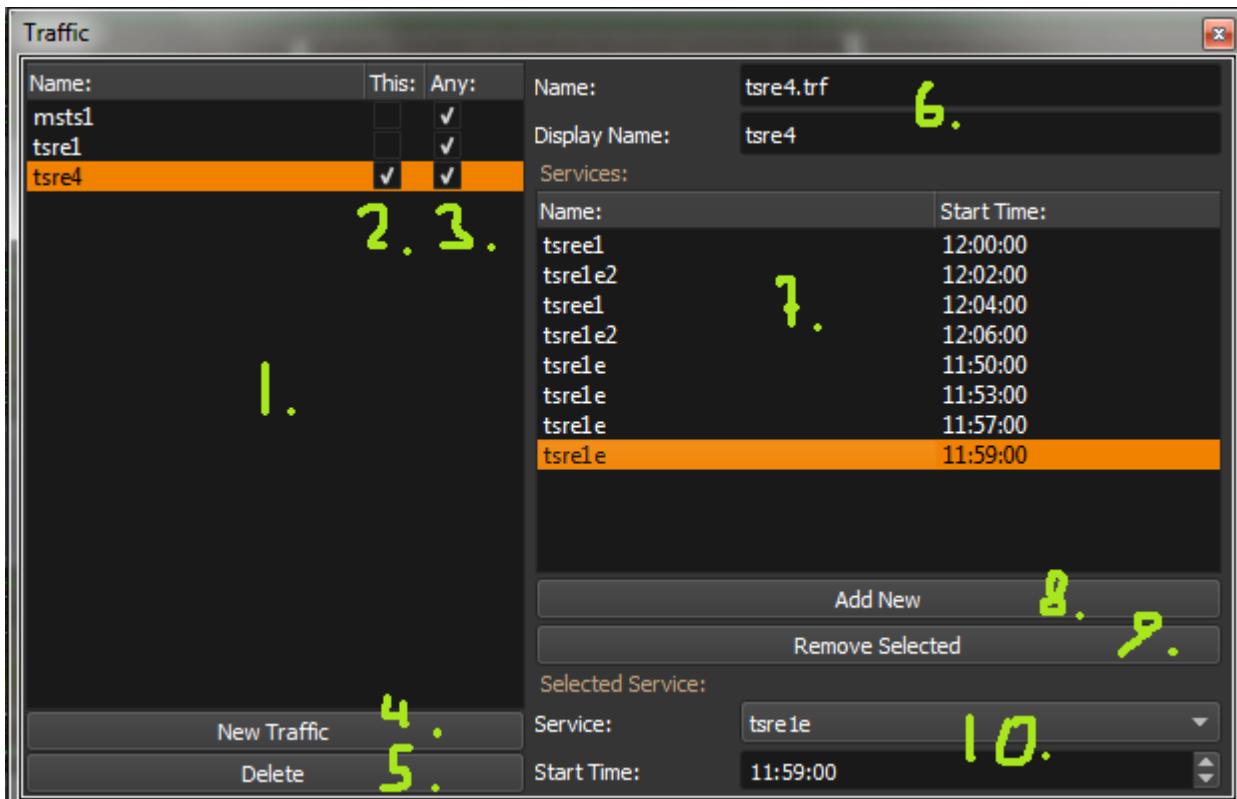


## Working with Traffic

Click on **Open Traffic Editor**



A new window will appear:

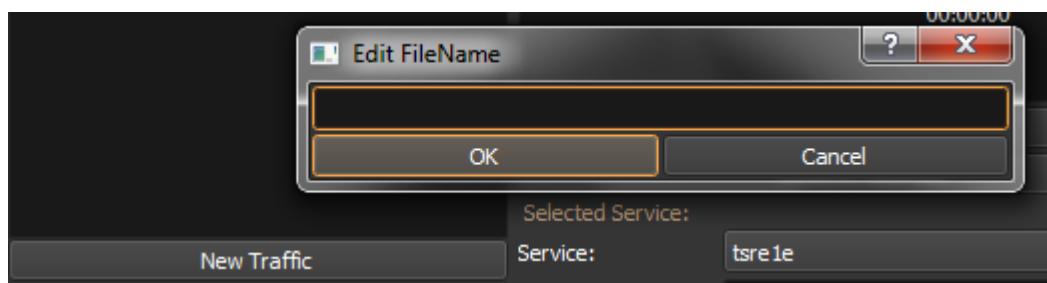


1. Traffic list.
2. Checked if traffic is used in current activity.

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 its 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:

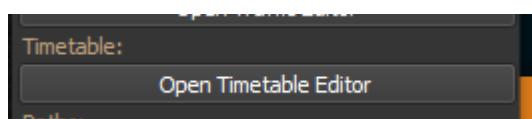
Just select traffic from the list.



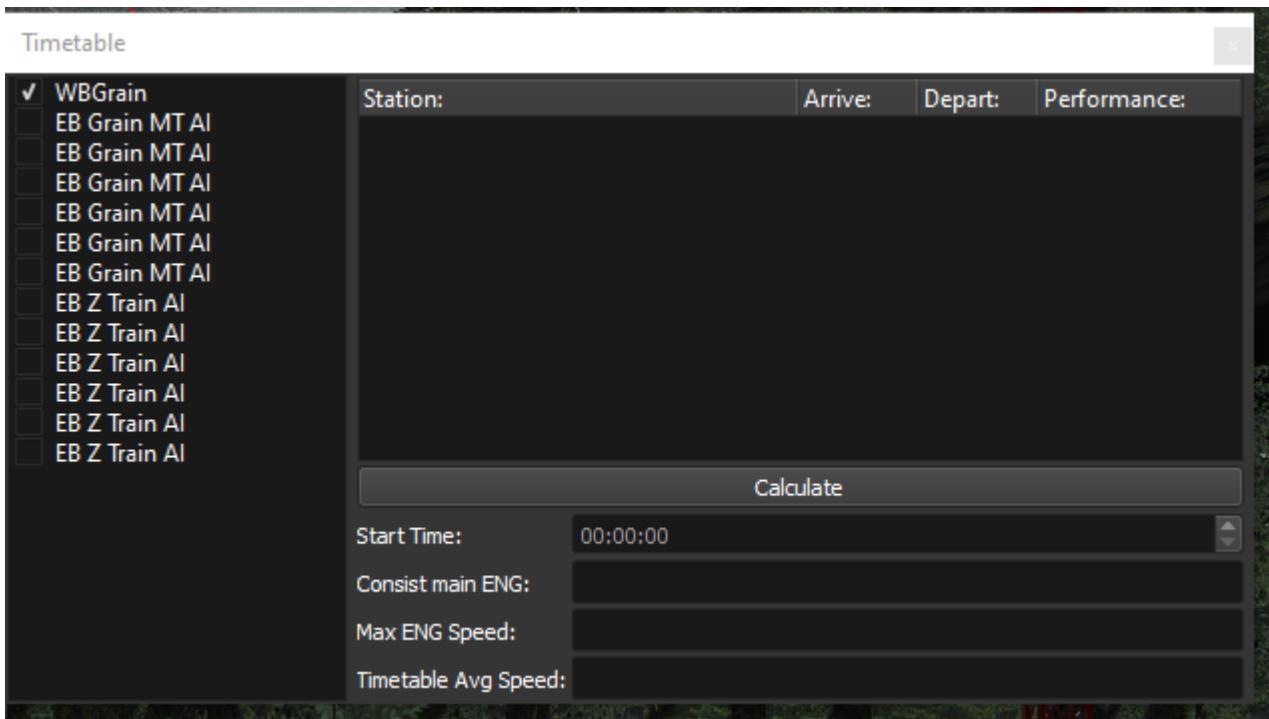
## Time Table

Editing Timetable should be done after player service and traffic is selected. Selecting new player service or traffic will reset Timetable values.

Click **Open Timetable Editor**.



A new window will appear:



Traffic trains can run with default timetable so there is no need for editing.

#### Manual Edit:

Select the service that you want to edit on the left and edit timetable values (double click on table cell).

#### Automatic Calculation:

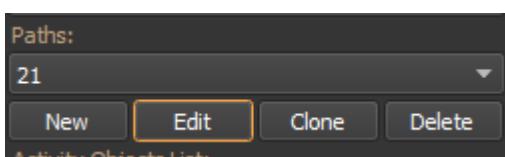
Click **Calculate** button. If you want to set later station arrival or depart time, enter new time and click **Calculate** again. If you want to remove longer station stops, remove all timetable vales and click **Calculate**.



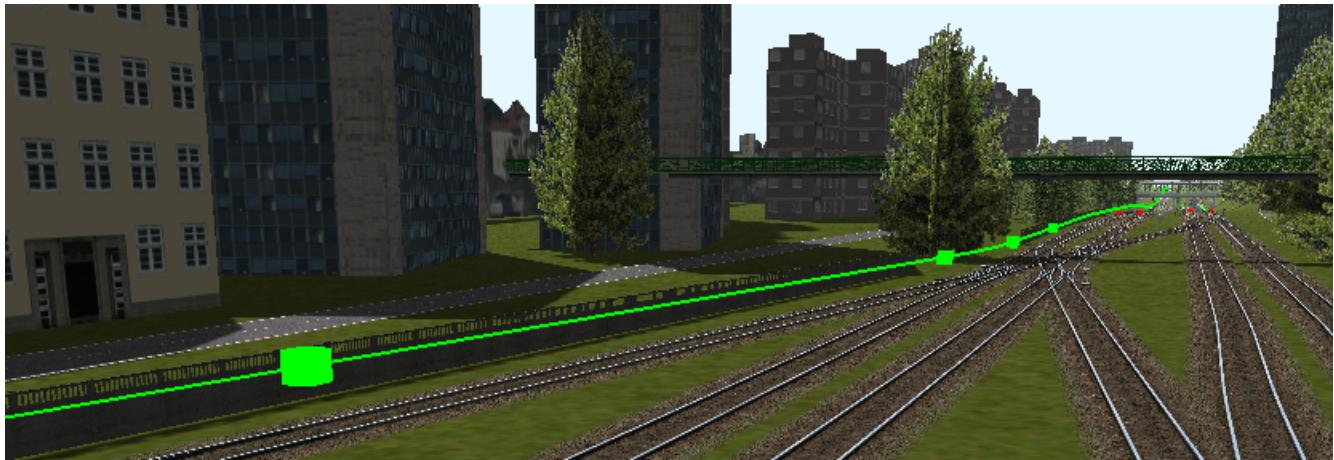
The timetable calculation is based on max speed and max acceleration values from consist file. You can modify consist acceleration by editing performance column

## Working with Paths

TSRE path editor is still under development. Now TSRE can't edit paths, but you can choose path from the list and use Edit button to see it.



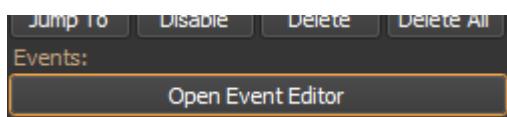
Current version of TSRE will crash if selected path is broken.



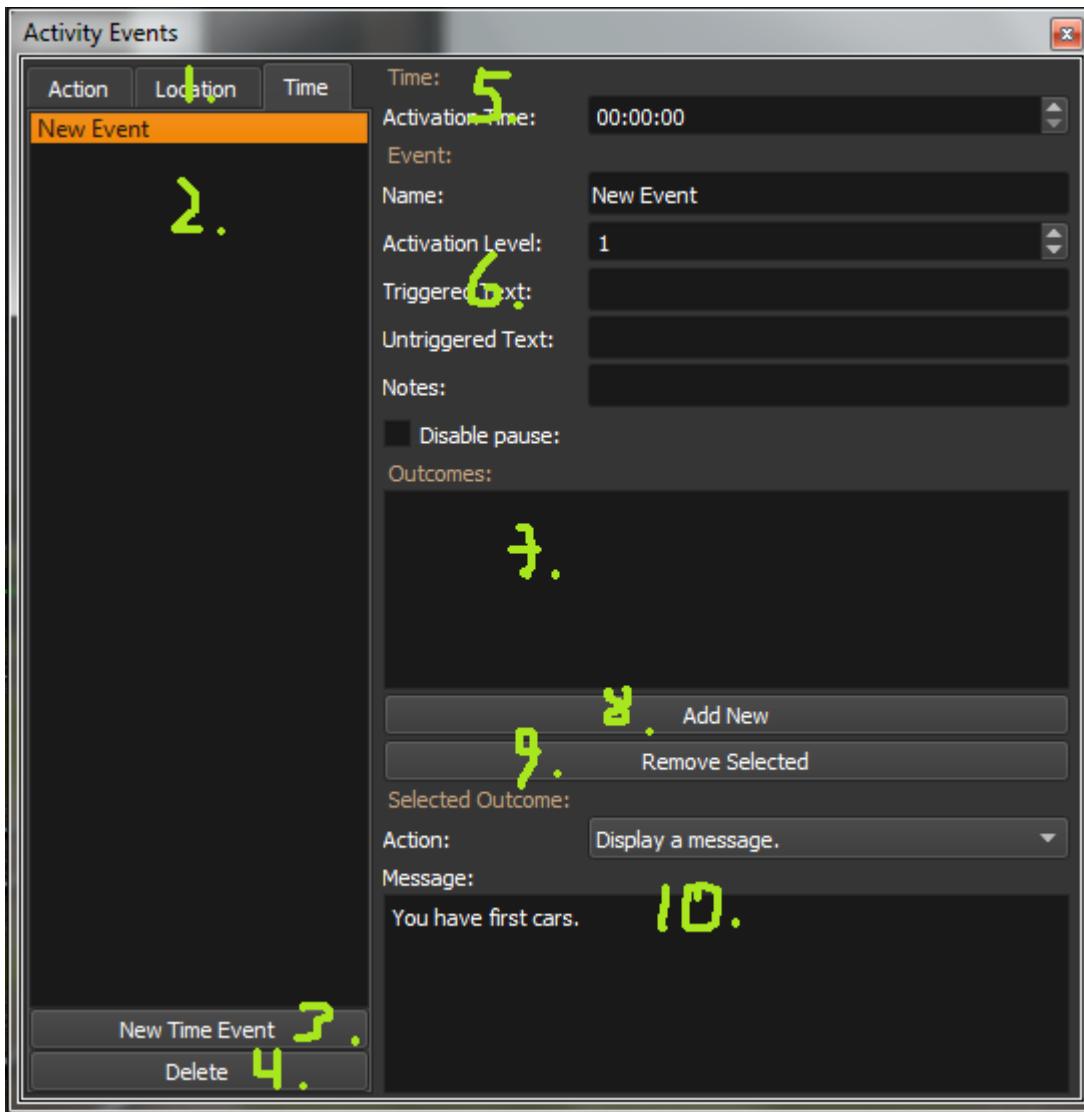
Now, for creating new paths you can use Track Viewer from Open Rails directory.

## Events

Click [Open Event Editor](#).

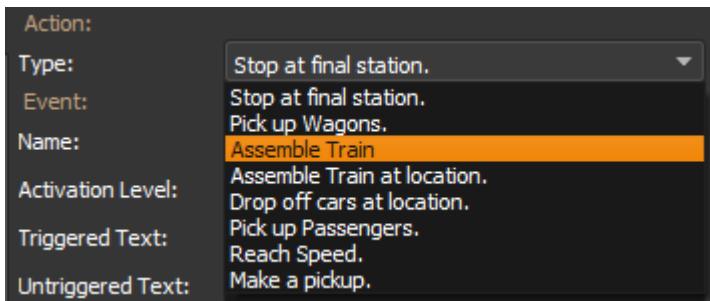


A new window will appear:



1. Event type list.
2. Event list.
3. Click this button to create new event.
4. Click this button to delete selected event.
5. Event type specific properties.
6. Event properties.
7. Outcome list.
8. Click this button to add new outcome.
9. Click this button to remove selected outcome.
10. Outcome settings.

#### Action event:



### Step 1

Stop at final station. No specific properties.

### Step 2

Pick up Wagons. Add cars to the wagon list.

### Step 3

Assemble Train. Add cars to the wagon list.

### Step 4

Assemble Train at location. Add cars to the wagon list. Select location.

### Step 5

Drop off cars at location. Add cars to the wagon list. Select location.

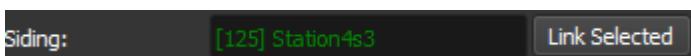
### Wagon List:

To add new item to wagon list, select loose consist car and click Pick Selected. To jump to wagon location, select item on the list and click Jump To Selected. To remove wagon from the list, select item on the list and click Remove Selected. To edit wagon description, select item on the list and click Edit Description.

Wagon List:	ID:	Description:
<input type="button" value="Pick Selected"/>	32768-0	
<input type="button" value="Jump To Selected"/>	32768-1	
<input type="button" value="Remove Selected"/>	32768-2	
<input type="button" value="Edit description"/>	32769-2	
	32769-1	
	32769-0	
	32770-0	

### Location

Select **siding** and click **Link Selected**.



### Step 6

Pick Up Passengers

Select station stop from player service station stops list.

Action:	Pick up Passengers.
Type:	Pick up Passengers.
Station:	Station1Ap1

## Step7

Reach Speed

Set Speed Value

Action:	Reach Speed.
Type:	Reach Speed.
Speed:	10

## Step 8

Make a pickup (This feature is not complete)

## Location Event

To set new location, click Pick new location button and click on the track you want the event. To jump to event location, click Jump to location button. You can set event radius.

## Radius

This parameter should define the "tolerance" of the location event; in other words, when the front of the train is at a distance of the location event which is less than Range (in meters), the location event is considered as hit. It is reasonable that, if such parameter is set at 0, the location event will never be hit, because the distance check is not continuous.

Location:	-5308 14963 482.826 315.318
Position:	<input type="button" value="Jump to location"/> <input type="button" value="Pick new location"/>
Radius:	10

## Time Event

Enter activation time of the event relative from activity beginning.

Time:	00:00:00
Activation Time:	00:00:00

## Outcomes

### Item 1

None.

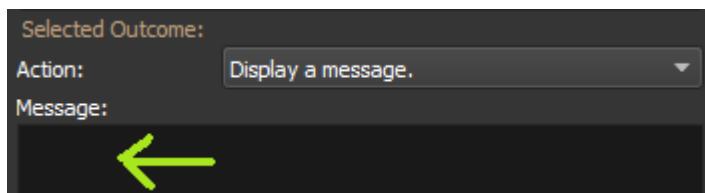
Empty outcome. Removed on route save.

### Item 2

Display a message.

Enter message in the text box below. Message window will be shown during simulation when event

is activated.



### Item 3

Complete Activity successfully.

### Item 4

End Activity without success.

End activity with or without success.

### Item 5

Increases an event's activation level

### Item 6

Decreases an event's activation level

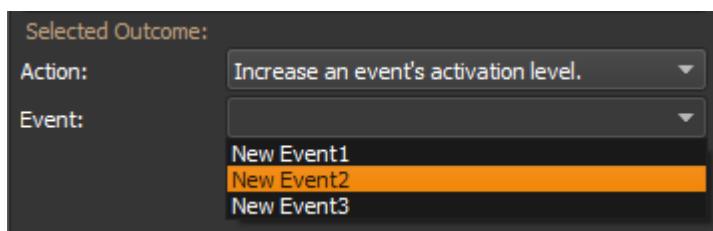
### Item 7

Restore an event's activation level

### Item 8

Activate an event

Choose an event from the list below:



### Item 9

Start ignoring speed limit

### Item 10

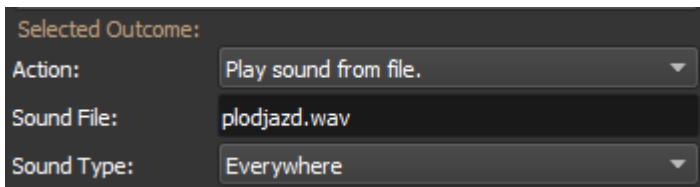
Stop ignoring speed limit

Start / stop ignoring speed limits.

### Item 11

Play sound from a file

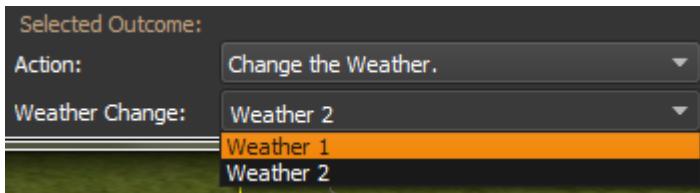
Enter sound file name from “sound” route directory and choose sound type. Read more about it in Open Rails Manual: [10.16.4 LocationEventandTimeEventSoundFile](#)



## Item 12

Change the weather

Choose weather change from Weather Change List.



TSRE requires new file in route directory: `weathertransitions.dat` This file contains list of `ORTSWeatherChanges` that can be chosen in `Outcome` properties. Editing this file using TSRE is not yet possible. You need to use a text editor.

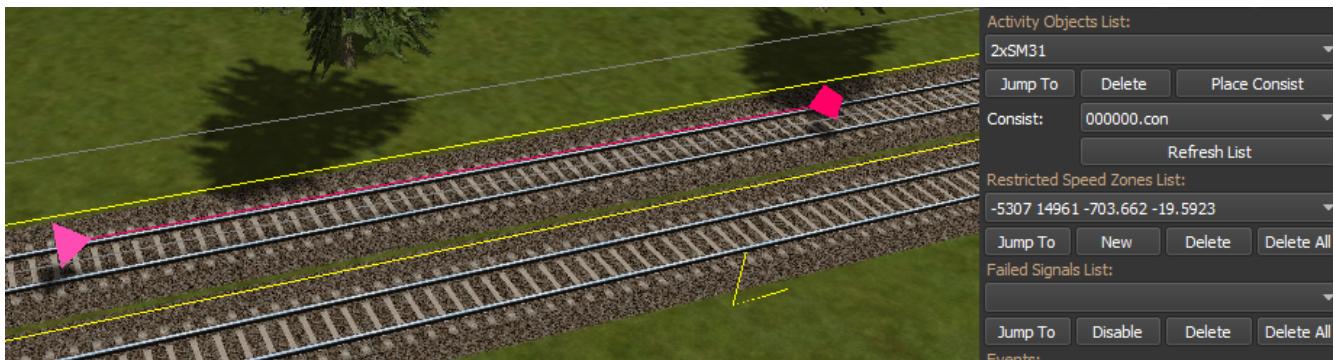
Read more about `ORTSWeatherChange` in Open Rails Manual: [10.16.5 WeatherChangeActivityEvent](#)

A screenshot of a Windows-style text editor titled 'weathertransitions.dat - Notepad2'. The menu bar includes 'File', 'Edit', 'View', 'Settings', and '?'. The toolbar below has icons for file operations like Open, Save, Find, and Print. The code in the editor is:

```
1
2 OrtsWeatherChangeList (
3     ORTSWeatherchange (
4         Name ( "weather 1" )
5         ORTSDaylight ( 0.3 4 )
6         ORTSFog ( 10 5 )
7         ORTSPrecipitationIntensity ( 0.01 0 )
8         ORTSPrecipitationLiquidity ( 0.5 5 )
9     )
10    ORTSWeatherchange (
11        Name ( "weather 2" )
12        ORTSDaylight ( 0.7 4 )
13        ORTSFog ( 1000 5 )
14        ORTSPrecipitationIntensity ( 0 0 )
15        ORTSPrecipitationLiquidity ( 0 4 )
16    )
17 )
18
19
```

`ORTSWeatherChanges` added to activity file by hand using Open Rails guide are not visible in TSRE outcome list, but are properly loaded and saved. If you want to change the event WeatherChange using TSRE, just add new Weather Outcome and the weather definition will be replaced.

## Restricted speed zones and Failed signals



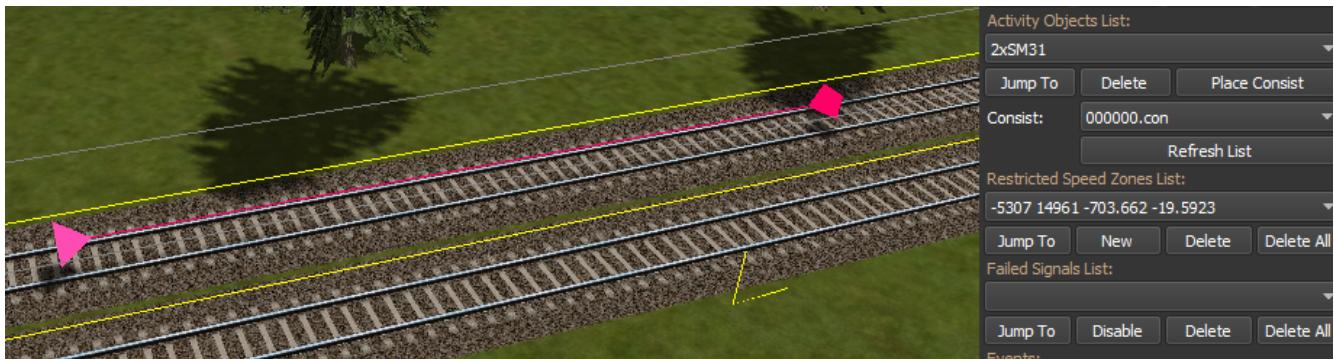
Creating new restricted speed zone:

1. Click New button under speed zone list.
2. Click on track you want new restricted speed zone.
3. Select one of the zone pointers and move it to desired position.

#### Removing speed zone

Select speed zone and press **Delete** key, or **Delete** button under speed zone list.

#### Failed Signals



Creating new restricted speed zone:

#### Step 1

Select signal you want to disable.

#### Step 2

Press Disable button under failed signal list.

#### Removing speed zone

Select signal on failed signals list and press Delete button under failed signal list.

# Consist Editor



Unlike MSTS Route Editor, there is no built in TrackViewer. There is, however, an ORTS TrackViewer utility that can be downloaded from the ORTS Website. [http://openrails.org/files/ORTS\\_Trackviewer\\_manual.pdf](http://openrails.org/files/ORTS_Trackviewer_manual.pdf) It can be used to edit paths. --Baldwin

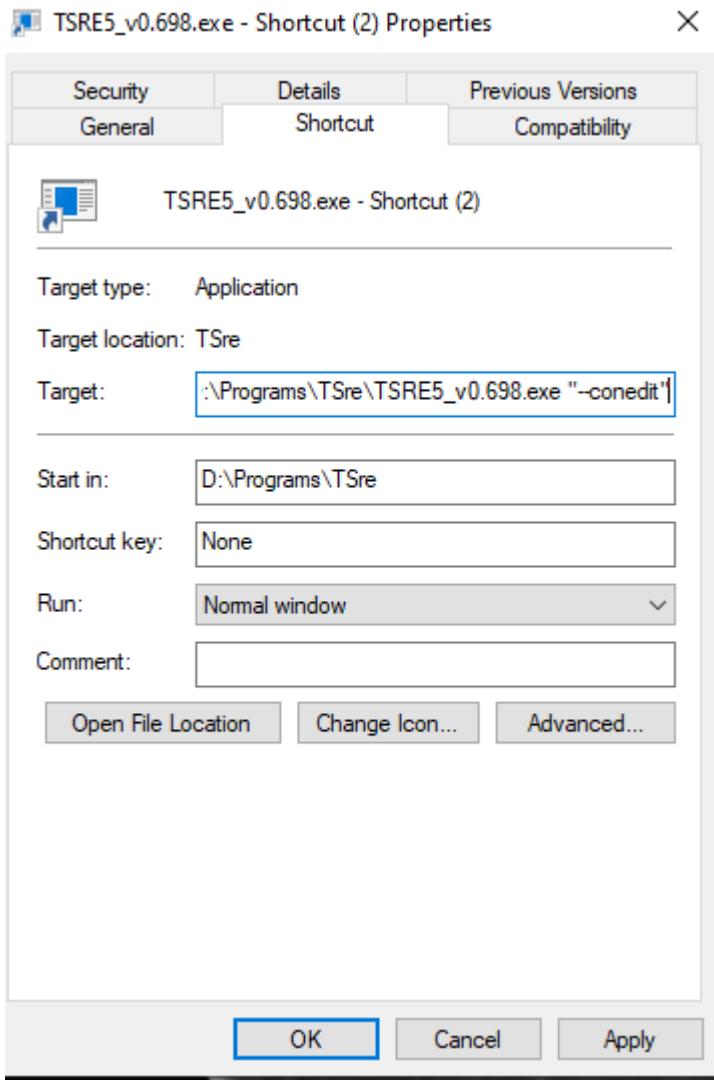


You don't place LC's via the map like the old AE, you can now place them by selecting the spur name from the pull down menu and zooming the camera around the route to that exact spot. Then you watch via the camera as the consist gets placed. See it as you flip its direction or slide adjust the starting point. --Geepster

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 MSTS/OR routes/trains directory, Example: **gameRoot = F:/train simulator**
- You must 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.

To use the consist editor, the TSRE program needs to be given a "command line option" that tells it to operate in a CONSIST mode versus ROUTE EDITOR mode. This is what the **ConsistEditor.bat** file accomplishes. If you wish, you can also create a new desktop shortcut to TSRE and name it **Consist Editor** and then edit the properties of the shortcut to also include "--conedit".



The contents of the **BAT** file is simply "TSRE5\_v0.698.1.exe --conedit"



All TSRE executables are **numbered** releases, so if you have a newer or older version, the numbers after **TSRE5\_v** would be different.

## How to use the Consist Editor

### The File Menu

#### File→New

Start a new consist

#### File→Save

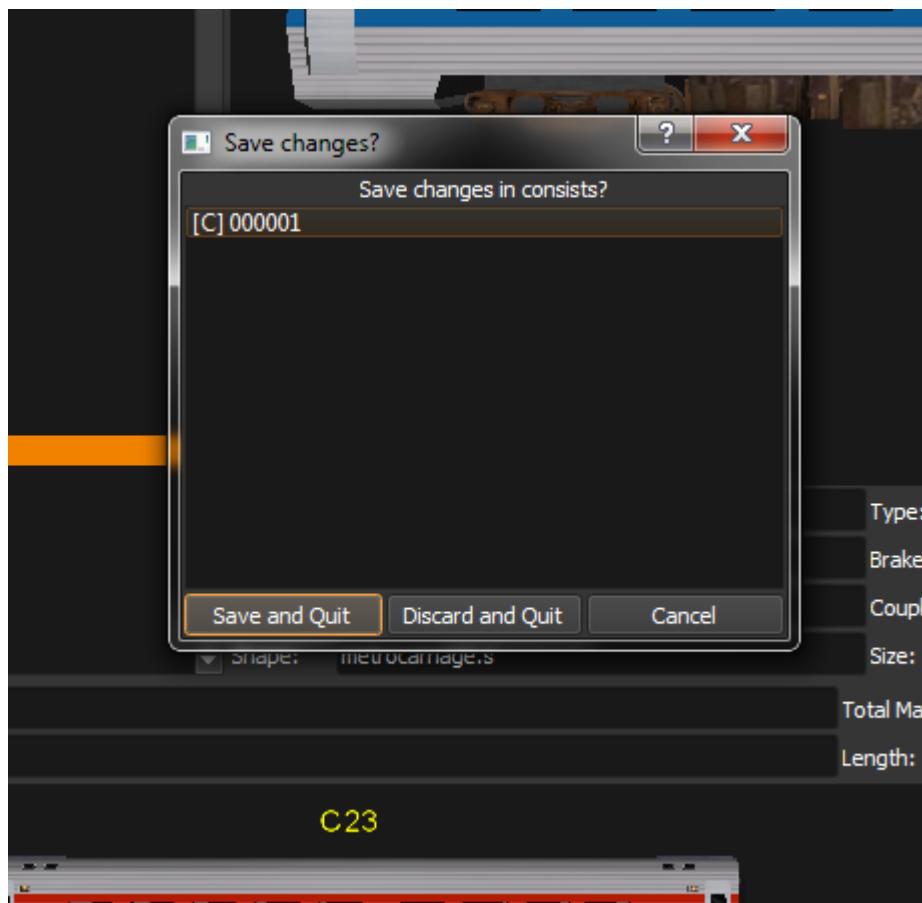
Save the current consist

#### 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

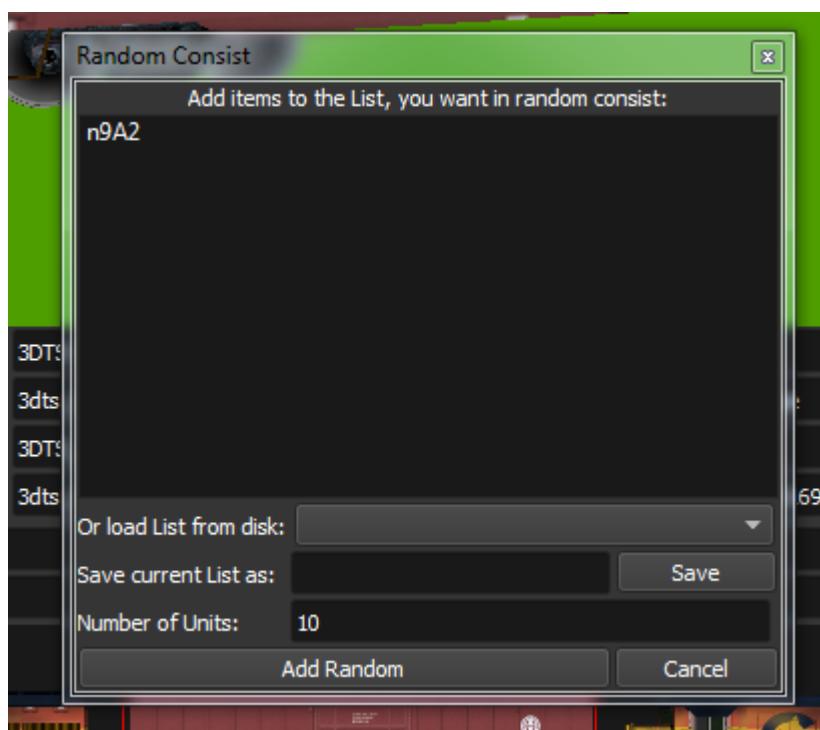
Add the selected item to the currently selected consist position

### 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 Arrow** or **Right Arrow**

This will move a consist item left or right



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

## The Context Menu Options

When you **RMB** "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:
  1. From the context menu, **Copy** an item from the current consist
  2. 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**

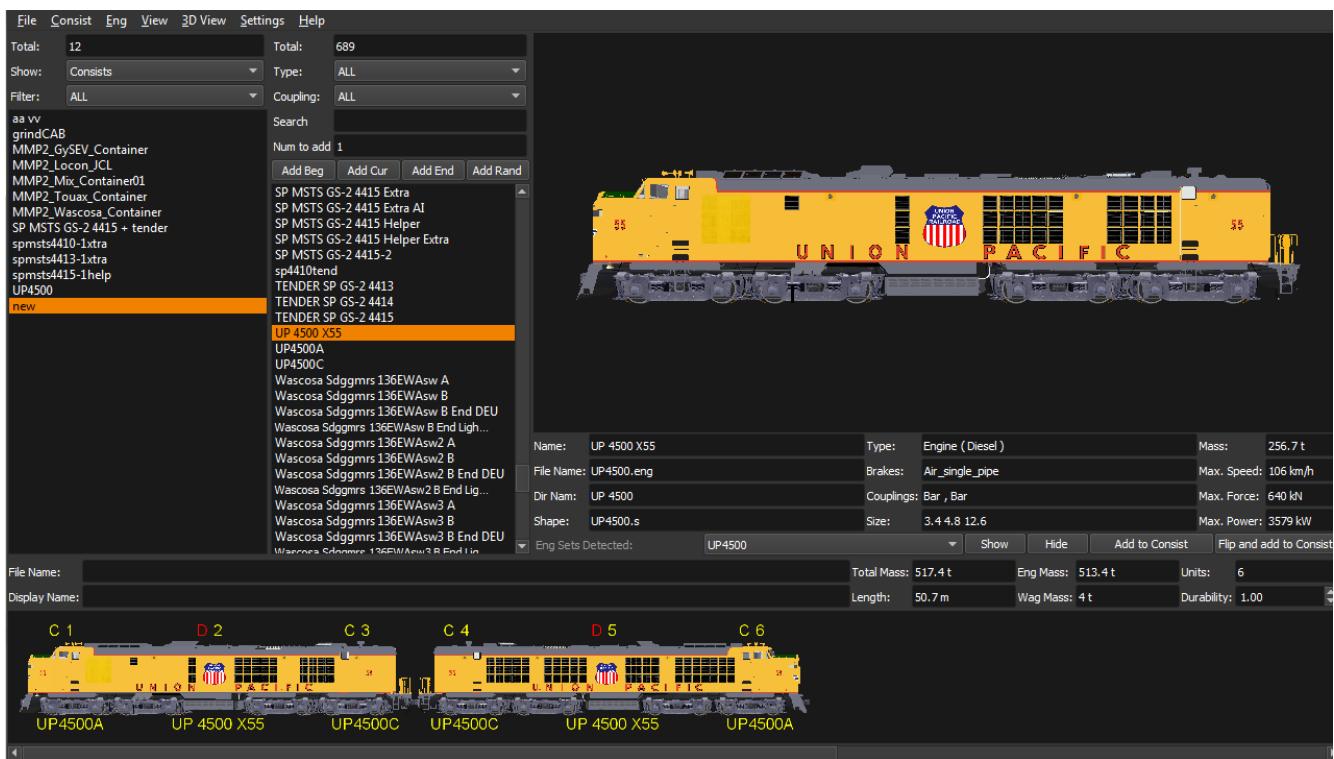
Set the background color for the 3D Model View from an available color palette

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

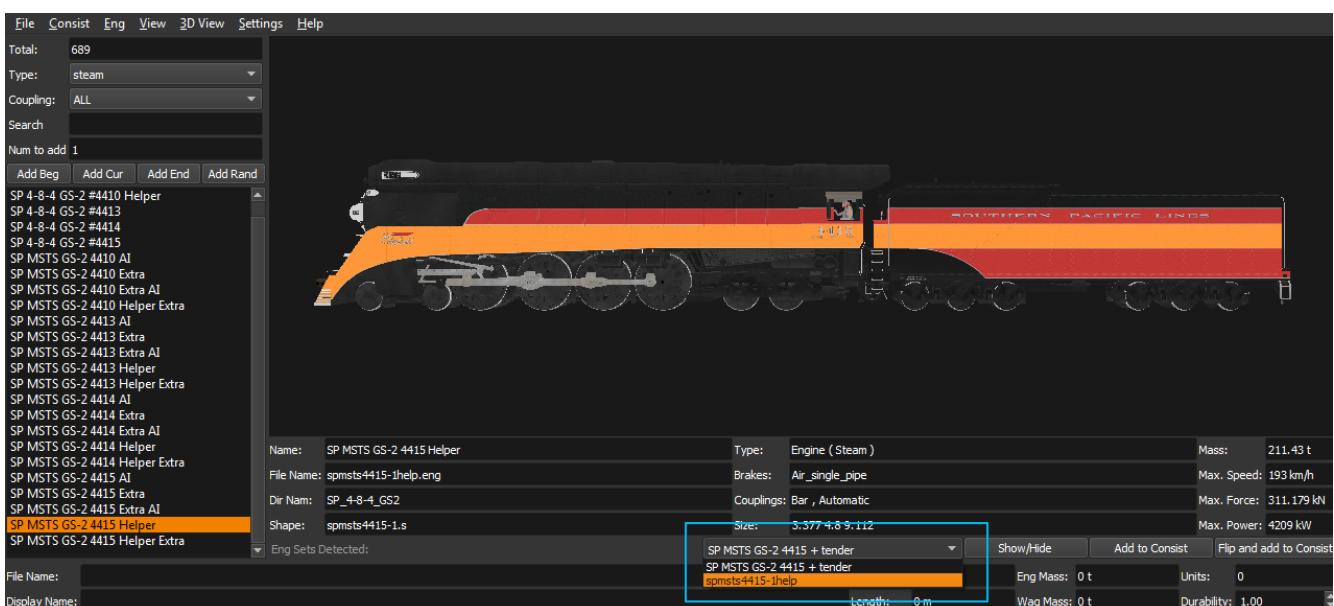
# Engine Sets

## 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.



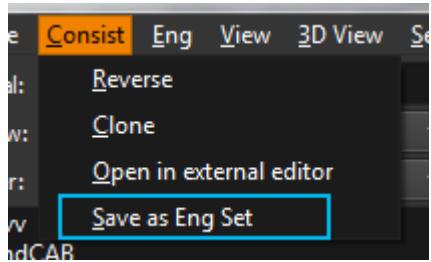
- Developers Comment: I think it's worth ignoring option #1 in this case because lots of default consists have names that match its eng. Looking for feedback. For some trains it just works, for others you must create your own sets.

### 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.



# Appendix A: Compiling Your Own Copy of TSRE

The installation process may vary based on your operating system and environment. This section provides a step-by-step guide to establishing a local development environment for the TSRE project. It's crucial to follow these steps sequentially, as they are interdependent. The objective is to replicate the development environment used by GOKU, which, as of 2024, is somewhat outdated. Consequently, incorporating newer versions of tools and libraries would require extensive modifications, a topic not covered here.

The installation instructions, beginning on the next page, are tailored for Windows 10 or Windows 11. If you are using slightly older versions of Windows, the process should be similar. However, if you opt to build the environment on a different operating system, be prepared to make adjustments to the instructions.



It is believed that GOKU did his TSRE development on a LINUX Operating System, so it should be possible to follow the same basic steps on LINUX, though it is not tested.

# Establishing a Local Development Environment for TSRE

## Step 1: Setting Up the Java Development Environment

To successfully build the TSRE project, it is essential to have the Java Development Kit (JDK) installed, with a version no later than 13.0.2. It is crucial to stick to this specific version, as a file required for the C++ / NetBeans installation is not present in JDK versions newer than 13.0.2. The JDK is a pre-requisite for the installation of NetBeans.



Visit <https://jdk.java.net/archive/> to obtain the JDK installation software. [https://download.java.net/java/GA/jdk13.0.2/d4173c853231432d94f001e99d882ca7/8/GPL/openjdk-13.0.2\\_windows-x64\\_bin.zip](https://download.java.net/java/GA/jdk13.0.2/d4173c853231432d94f001e99d882ca7/8/GPL/openjdk-13.0.2_windows-x64_bin.zip) is the file that you want.

The Java download listed above is just a zip file with folders, so you will need to extract it somewhere. Once that's done you'll need to set two Environment Variables: **JAVA\_HOME** and **PATH**.

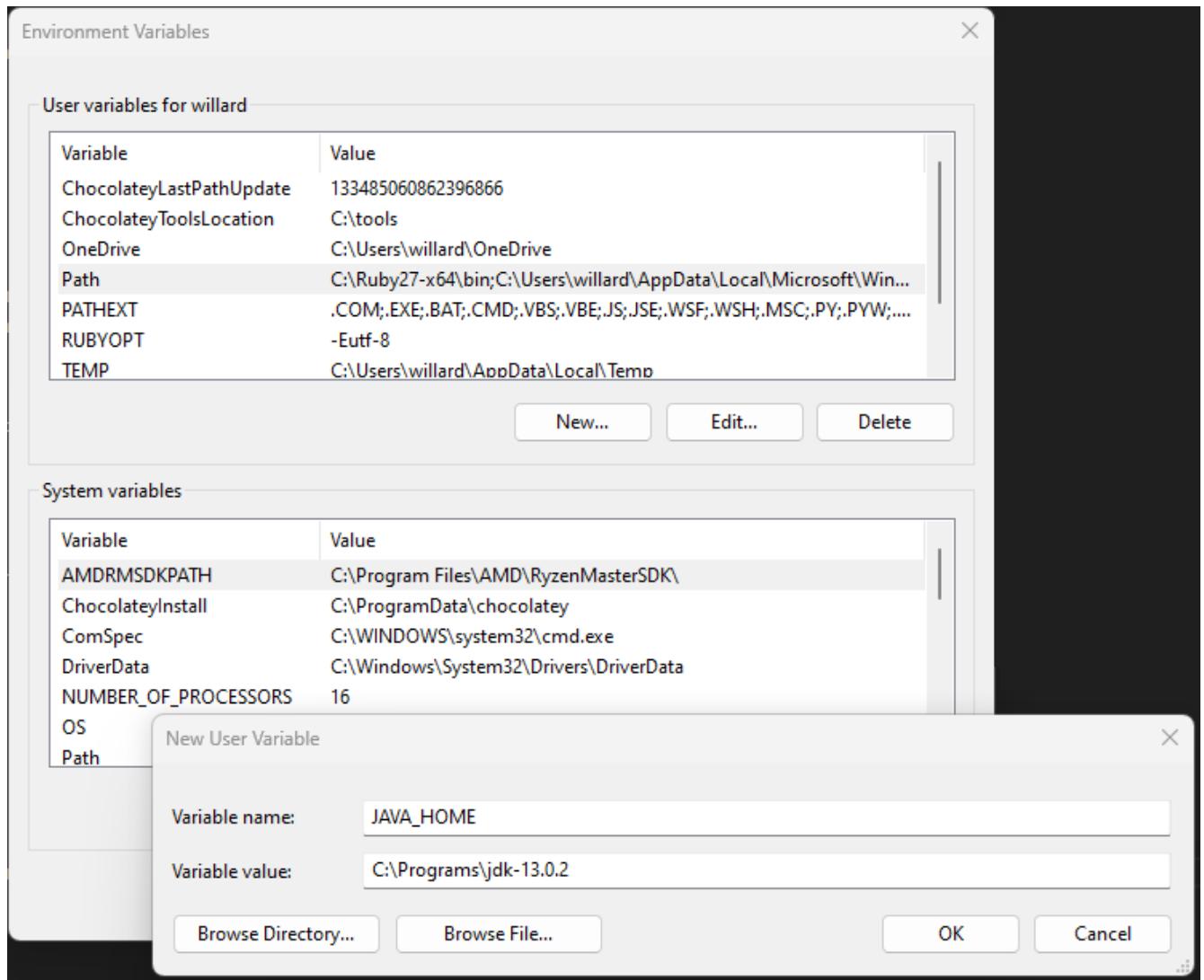
The **JAVA\_HOME** environment variable will be the path to the folder where it's installed and the **PATH** entry will qdded to your existing path statements with the same value you used for **JAVA\_HOME** above.

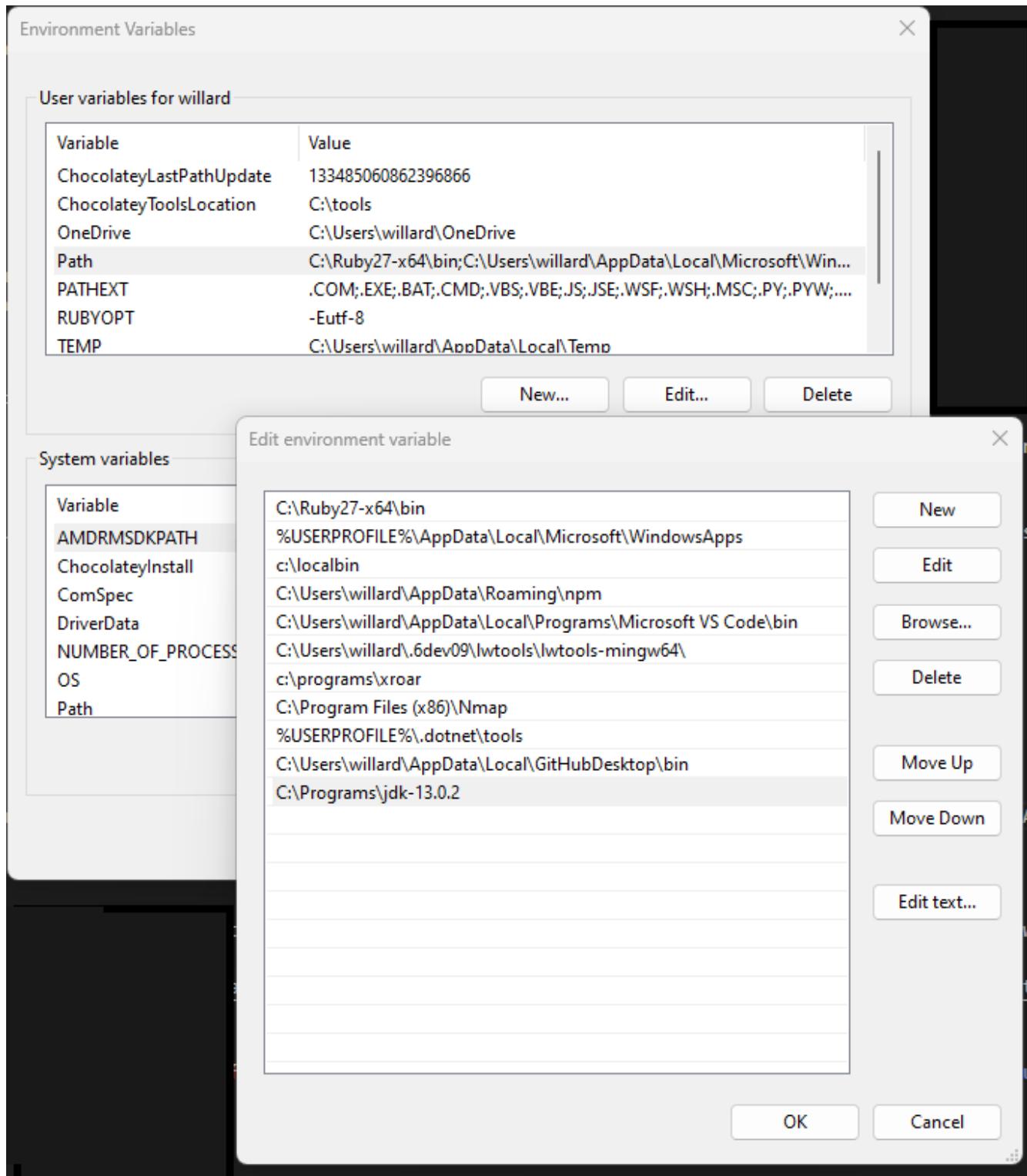


Setting environment values in Windows 10 and 11 require you to use the Control Panel SYSTEM section (Control Panel → System and Security → System → Advanced System Settings → Environment Variables).

A recommendation is to unzip the JAVA kit (\Downloads\openjdk-13.0.2\_windows-x64\_bin) in your downloads directory and then COPY the **JDK-12.2** folder inside of it to **C:\Programs\jdk-13.0.2**.

See the screenshots below:





For reference, this is what that folder looks like:

Name	Date modified	Type	Size
bin	12/11/2019 4:26 AM	File folder	
conf	12/11/2019 4:26 AM	File folder	
include	12/11/2019 4:26 AM	File folder	
jmods	12/11/2019 4:26 AM	File folder	
legal	12/11/2019 4:26 AM	File folder	
lib	12/11/2019 4:26 AM	File folder	
release	12/11/2019 4:26 AM	File	2 KB

After the steps above, you should be able to install NetBeans.

## Step 2: Installation of NetBeans

You will need to install Apache NetBeans 20. You can download it from here: <https://NetBeans.apache.org/front/main/download/nb20/> The download that you want is specifically the **Apache-NetBeans-20r1-bin-windows-x64.exe** from that page.

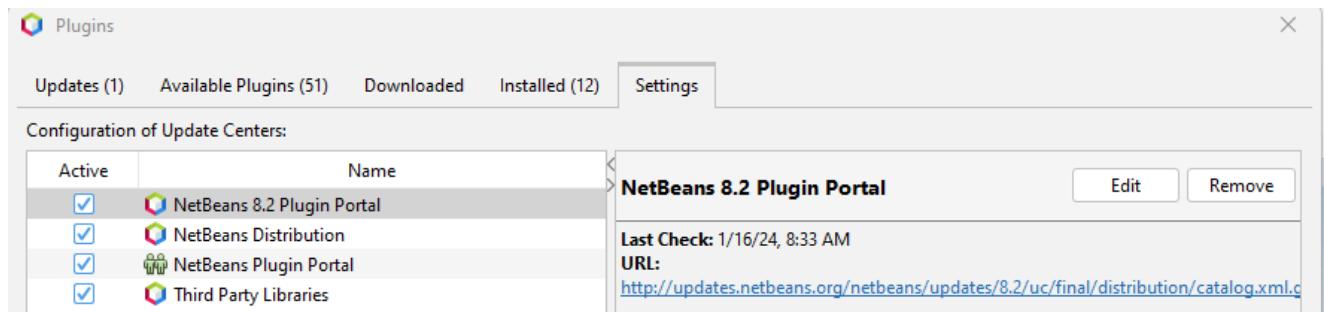
Specifically, the file you want is: <https://dlcdn.apache.org/netbeans/netbeans-installers/20/Apache-NetBeans-20r1-bin-windows-x64.exe>



NetBeans may complain about the JDK if one has not been installed correctly. If this happens, you should redo the JAVA JDK steps above.

## Step 3: Installation of C/C++ plugin for NetBeans}

You will need to install the proper C/C++ plugin for NetBeans. You can do this by going to **Tools > Plugins > Settings** and choose **NetBeans 8.2 Plugin Portal**. You will want to make sure it installs by using the update button. Exit and restart NetBeans



In the **Tools > Plugins > Available Plugins** tab, you should now be able to find the plugin called C/C++ (From the NETBEANS 8.2 Plugin Portal). Click install. Once the installation is complete, you should again restart NetBeans to be sure everything is setup correctly.

## My NetBeans

## Recent Projects

Install Plugins

Activate Features

Add support for other languages and NetBeans turns on functionality as you use.

Plugins

Updates (1) Available Plugins (52) Downloaded Installed (11) Settings

Check for Newest

Install	Name	Category	Source
<input type="checkbox"/>	Backlog Support	Base IDE	
<input type="checkbox"/>	GitHub Issues Support	Base IDE	
<input checked="" type="checkbox"/>	C/C++	C/C++	
<input type="checkbox"/>	jVi Update Center JDK-11	com.raelity.jvi	
<input type="checkbox"/>	Netbeans Markdown	Editing	
<input type="checkbox"/>	Color Codes Preview	Editing	
<input type="checkbox"/>	nb-noext-mime-resolver	Editing	
<input type="checkbox"/>	Change Line Endings on Save	Editing	
<input type="checkbox"/>	NB MindMap Editor	Editing	
<input type="checkbox"/>	Close Editor Tabs Left and Right	Editing	
<input type="checkbox"/>	NB CSV Editor	Editing	
<input type="checkbox"/>	Rainbow Braces	Editing	
<input type="checkbox"/>	BinEd - Binary/Hex Editor	Editing	
<input type="checkbox"/>	No Newline Resolver	Editing	
<input type="checkbox"/>	X3D-Edit 4.0 Module	Editing	
<input type="checkbox"/>	External Code Formatters	Editing	
<input type="checkbox"/>	asciidoc4netbeans	Editing	

Install 1 plugin selected, 19MB

C/C++

Certified Plugin

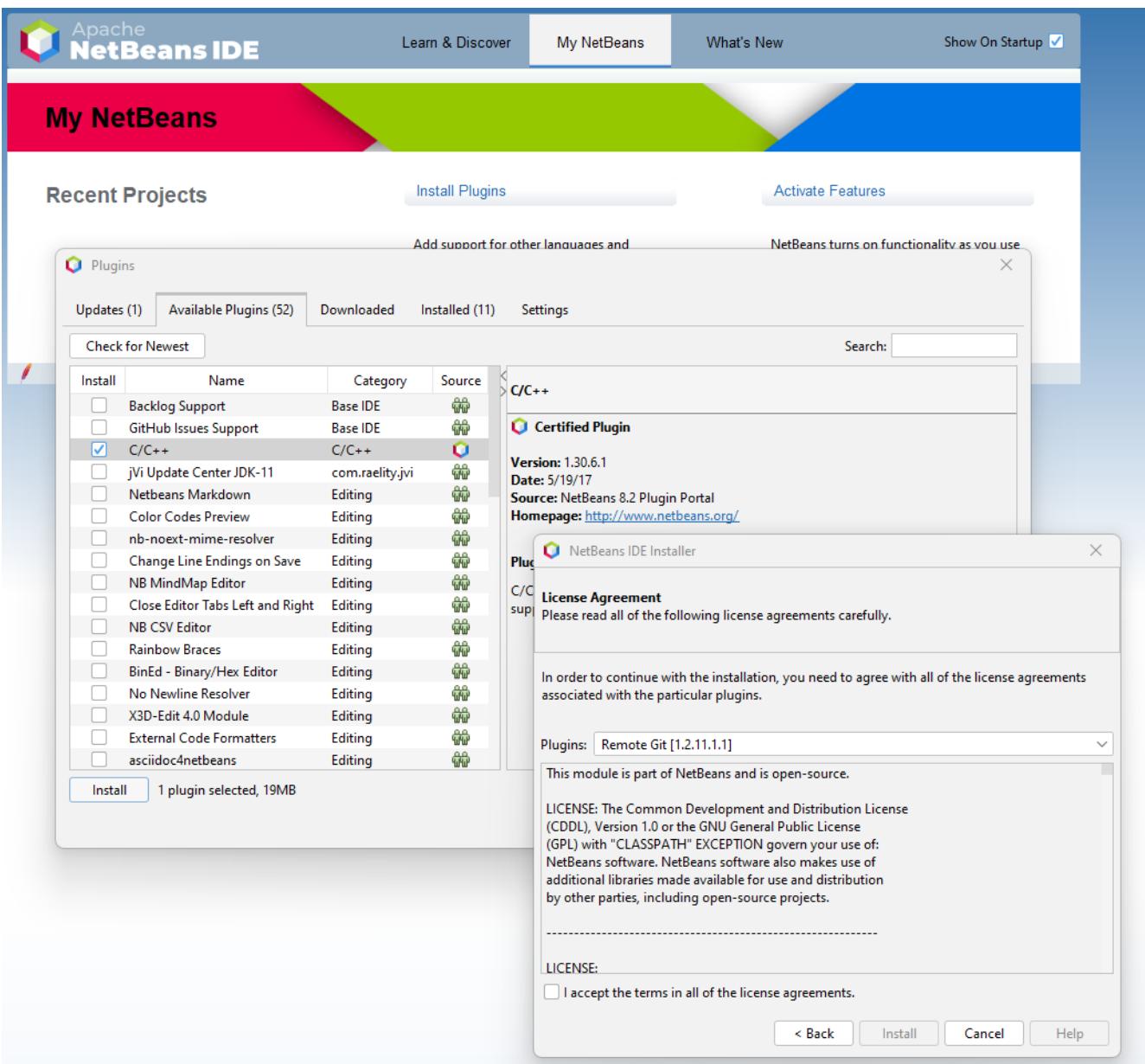
Version: 1.30.6.1  
Date: 5/19/17  
Source: NetBeans 8.2 Plugin Portal  
Homepage: <http://www.netbeans.org/>

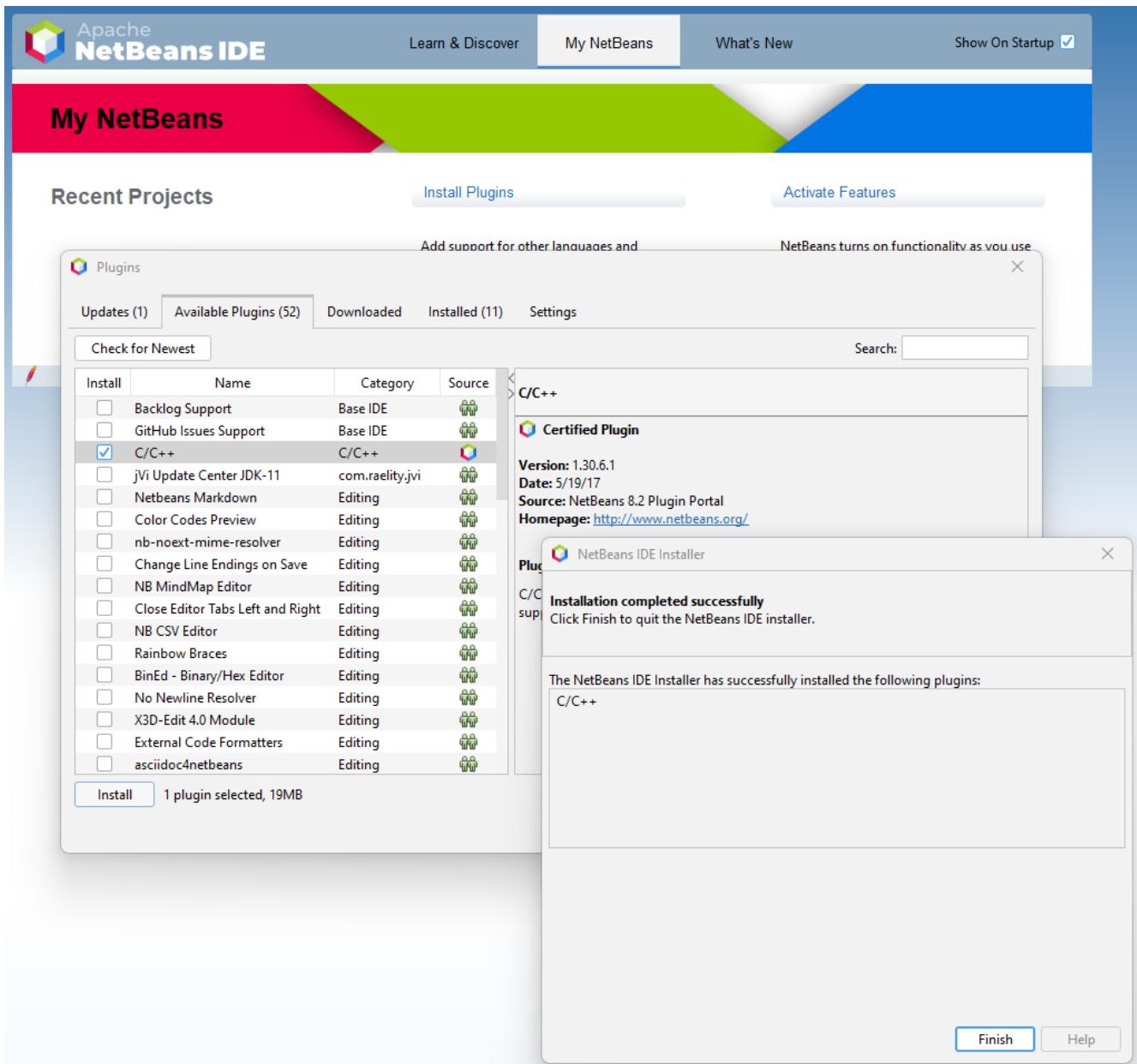
NetBeans IDE Installer

Welcome to the NetBeans IDE Plugin Installer  
The installer will download, verify and then install the selected plugins.

The following plugins will be installed:  
C/C++ [1.30.6.1]

< Back Next > Cancel Help





During the installation of the NetBeans C/C++ plugin, the installer may complain that it needs a file names `unpack200.exe`. If it does, you can direct the installer to choose the file within the **JDK 13.0.2** that you just installed previously. If you have setup the JDK correctly, the installer should be able to find the file and you won't see the message.



By default, the file is located at: `C:\Program Files\Java\jdk-13.0.2\bin\unpack200.exe` if you had used an installer, but remember that we downloaded the JDK **files** and possibly placed them in a different folder. For Example: `C:\Programs\jdk-13.0.2`, so it would be `C:\Programs\jdk-13.0.2\bin\unpack200.exe`



#### Step 4: Installing Qt 5.7

You will need to install Qt 5.7. since this is the version that GOKU was using. You can download it from here: [https://download.qt.io/new\\_archive/qt/5.7/5.7.0/](https://download.qt.io/new_archive/qt/5.7/5.7.0/) You will be specifically selecting the file `qt-opensource-windows-x86-mingw530-5.7.0.exe` to download



You can skip over the screens that talk about setting up an account, as you will not be needing that. You will also be using only the default settings, so you will press **NEXT** a few times. The default installation path is fine. `C:\Qt\Qt5.7.0`



The QT installer is quite large, so it will take a while to download.

## Step 5: Installing MinGW

You will need to install MinGW. You can download it from here: <https://sourceforge.net/projects/mingw/> - you will be selecting the file `mingw-get-setup.exe` to download if you are using Windows 10 or 11.



There have been some questions about **what to install** with the MinGW installer as there are many options. It should be apparent, but remember that we are installing the tools to have a "Basic Setup" for the C/C++ compiler suite (AKA G++). The installation choices here would be to mark the `mingw-developer-toolkit` and `mingw32-gcc-g++` packages for installation. There is a lot going on while the installer is running, so it may take a while.

## Step 6: Installing OpenAL Soft Binaries

You need to download the OpenAL Soft binaries. You will specifically need version **1.18.2** from this page: <https://www.openal-soft.org/openal-binaries/>



As of this writing, January 2024, the **openal-soft.org** URL is non-responsive, and that was not the case two weeks ago when this was initially downloaded.

You can try getting it from here instead if the other does not work for you: <https://web.archive.org/web/20230805164149/https://openal-soft.org/openal-binaries/openal-soft-1.18.2-bin.zip>

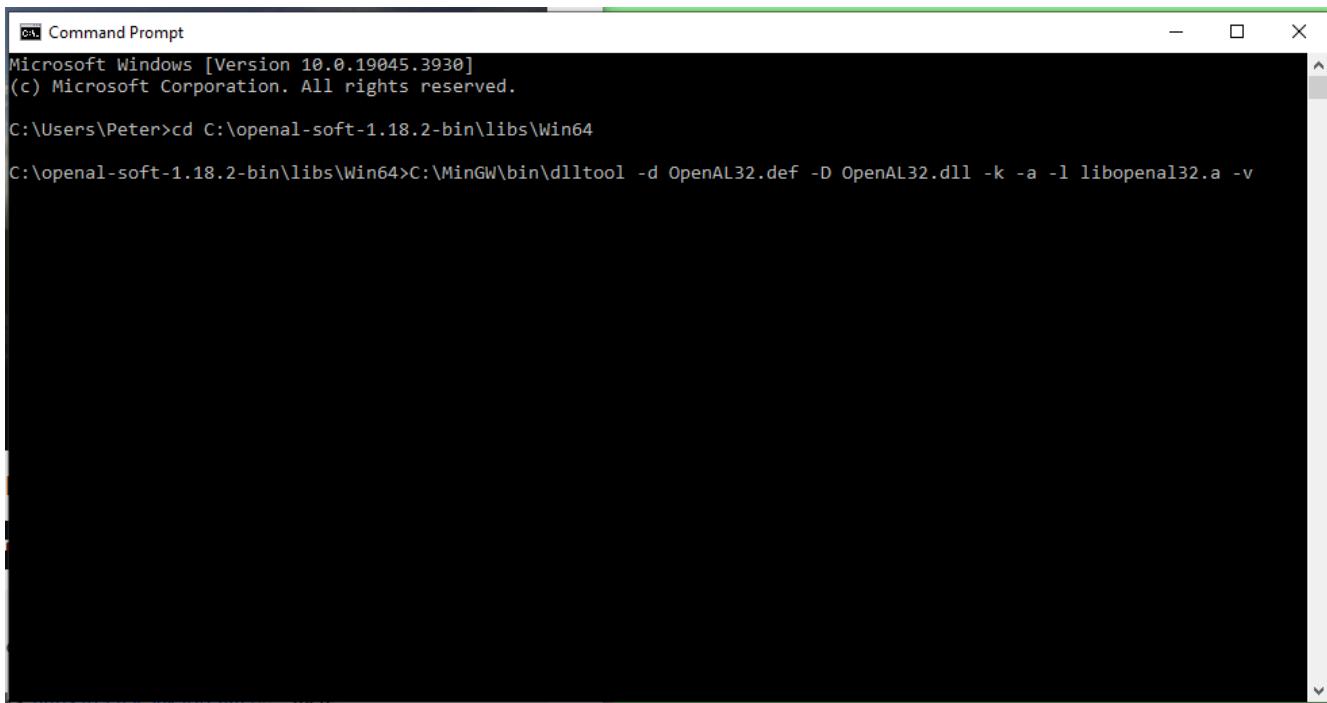
As with the JDK files, the ZIP file for the OpenAL Soft binaries unzips into a set of folders. A simple solution is to also locate the extracted files in `C:\programs\` so you end up with: `c:\programs\openal-soft-1.18.2-bin`.

The plot thickens at this point, however, as an issue arises with the downloaded binaries since they don't seamlessly integrate with **MinGW** and **g++**. Attempting to use the libraries directly from the zip file inevitably leads to linking errors. The solution lies in generating the necessary `.a` library file, which is a straightforward process. You'll utilize the `dlltool` application file for this task, and it is conveniently included in the **MinGW** installation and accessible in the **MinGW bin** folder.

You'll need to open up a `cmd.exe` terminal and type in the following commands (You can press the Windows Key and type "command" in the search bar and then Choose "Command Prompt"):

```
cd C:\openal-soft-1.18.2-bin\libs\Win64  
C:\MinGW\bin\ dlltool -d OpenAL32.def -D OpenAL32.dll -k -a -l libopenal32.a -v
```

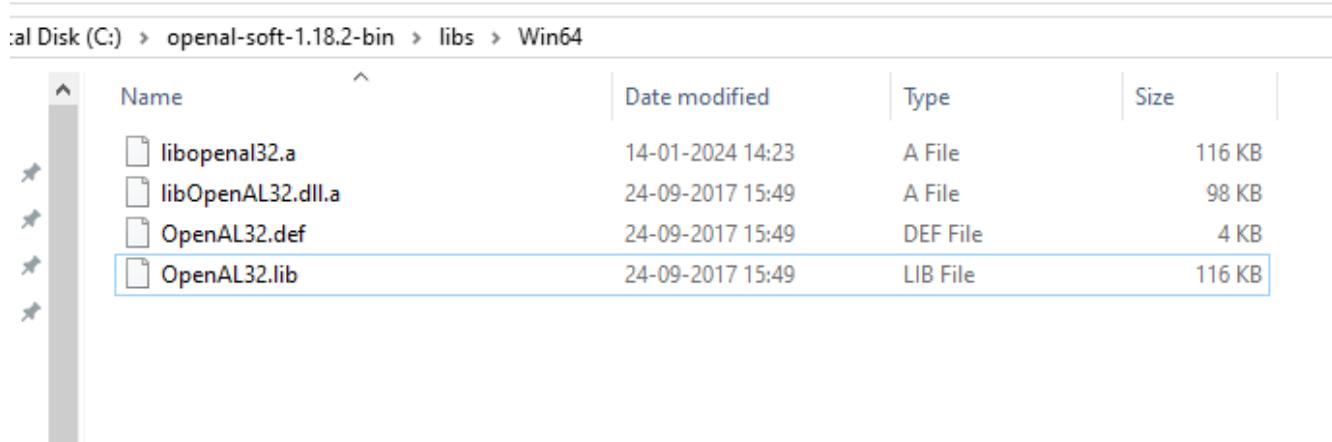
Example:



```
Microsoft Windows [Version 10.0.19045.3930]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Peter>cd C:\openal-soft-1.18.2-bin\libs\Win64
C:\openal-soft-1.18.2-bin\libs\Win64>C:\MinGW\bin\ dlltool -d OpenAL32.def -D OpenAL32.dll -k -a -l libopenal32.a -v
```

This will create a MinGW compatible library that links successfully when building TSRE5. Of course, the paths in the above commands might be different depending on where you have put things in the previous steps. Now you should have a file named `libopenal32.a`, and we will need this in the next step.

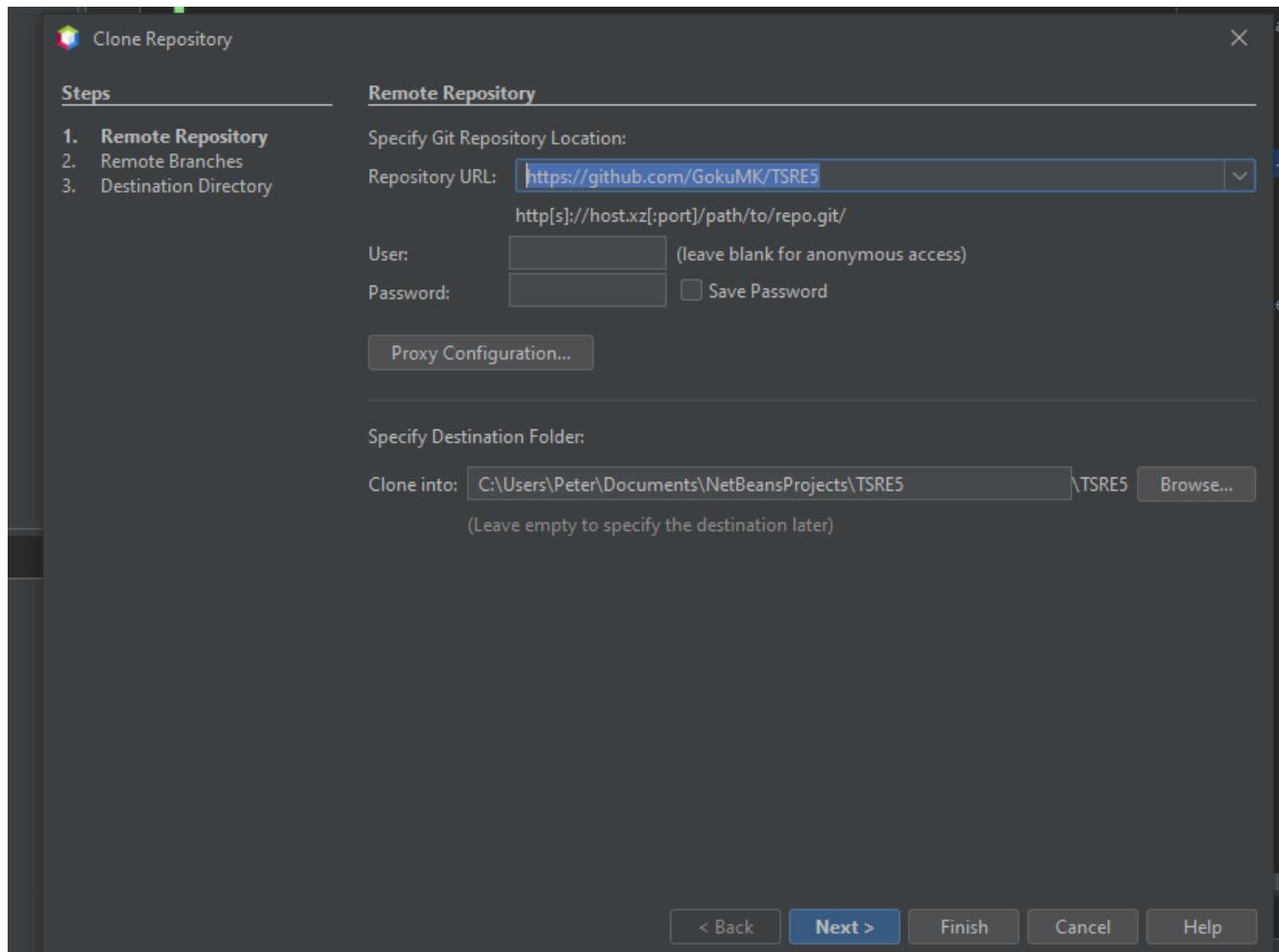


Name	Date modified	Type	Size
libopenal32.a	14-01-2024 14:23	A File	116 KB
libOpenAL32.dll.a	24-09-2017 15:49	A File	98 KB
OpenAL32.def	24-09-2017 15:49	DEF File	4 KB
OpenAL32.lib	24-09-2017 15:49	LIB File	116 KB

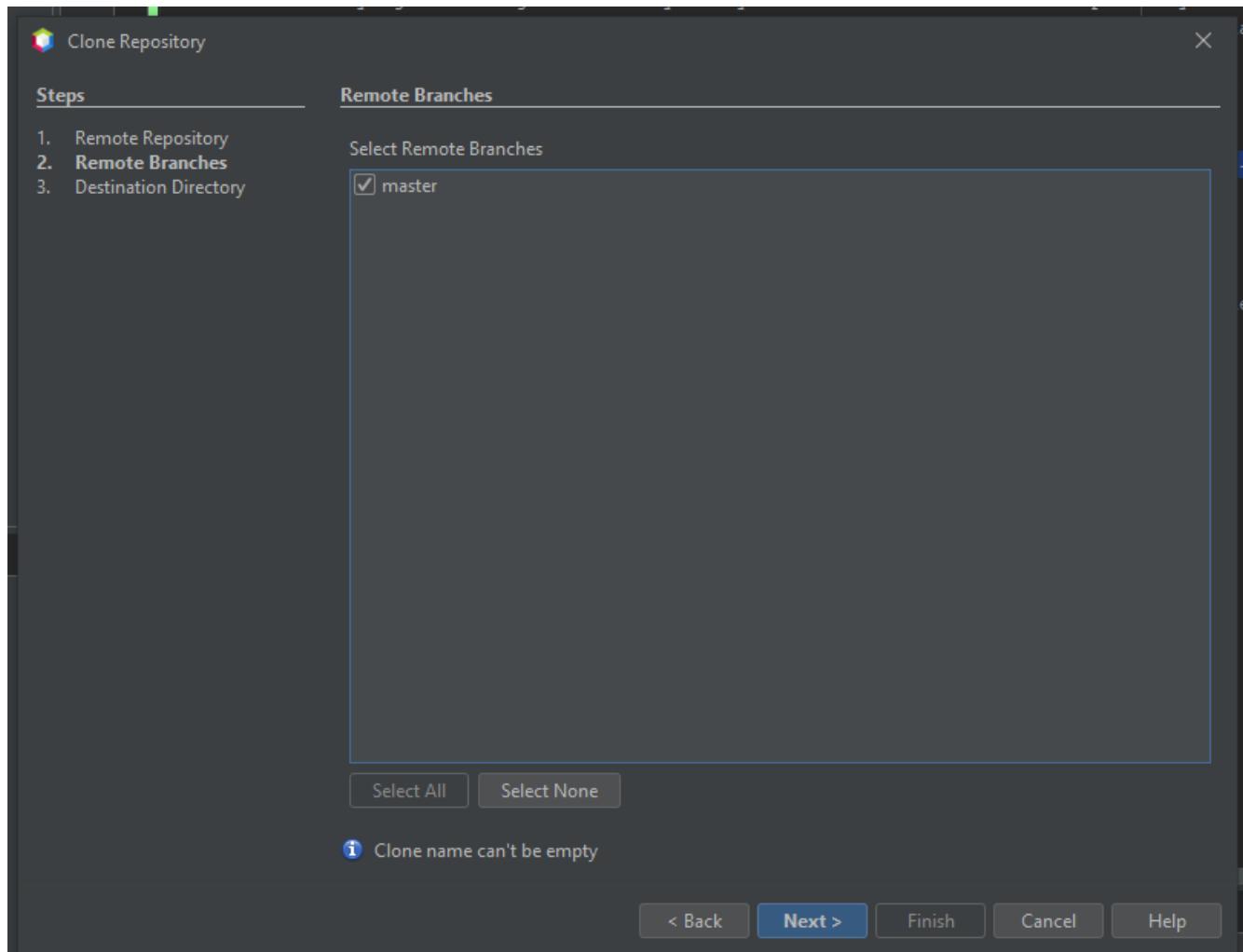
## Step 7: Configuring the NetBeans build

If you haven't done so already, it's time to clone the TSRE5 repository from GitHub.

In the top menu bar go to **Team** ⇒ **Remote** ⇒ **Clone...**, that will bring up the following dialog:

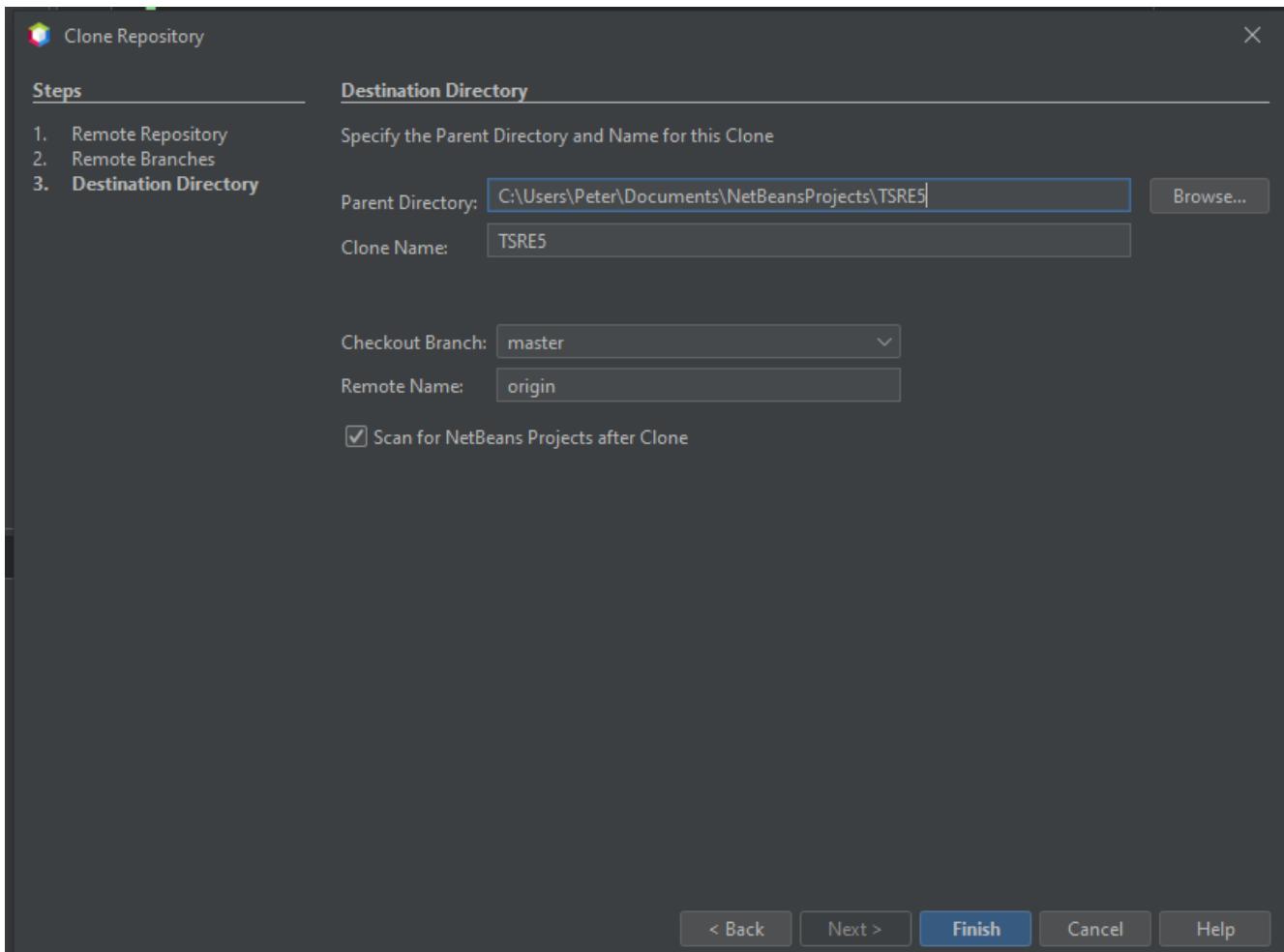


- Specify the repository URL as "https://github.com/GokuMK/TSRE5", and then the local directory you want to clone the repo to.
- Next specify the remote branch.
- Check "master" if it isn't already.

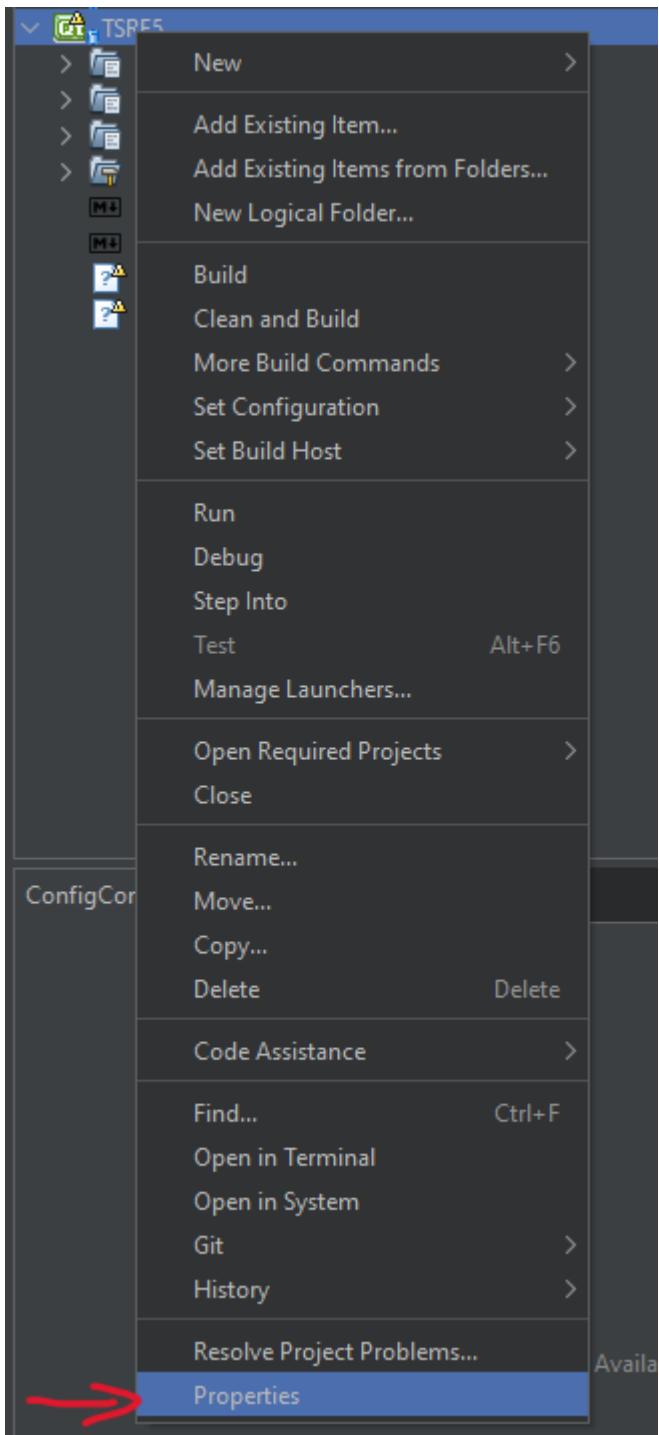


Click next.

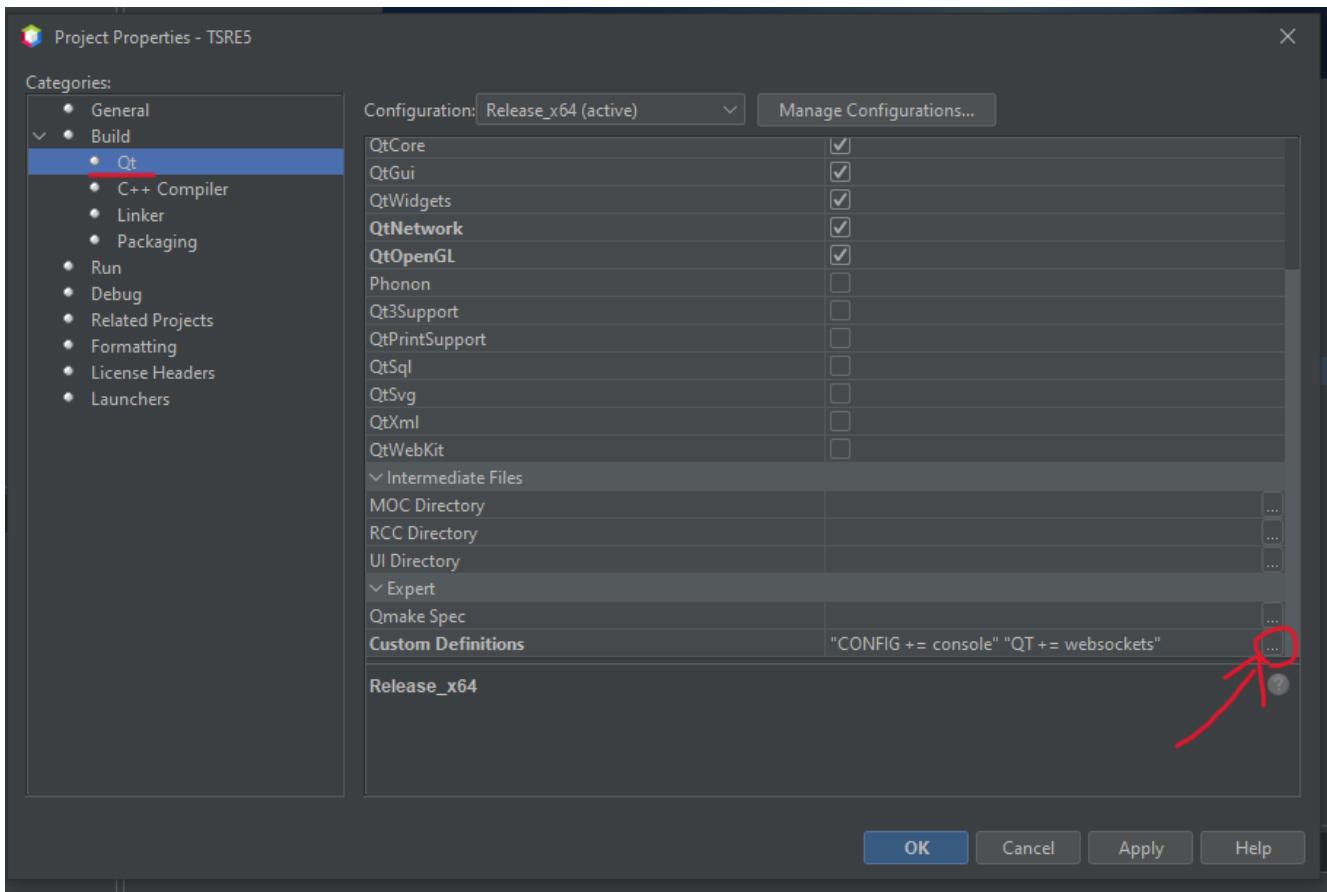
The final step should look like something this:



- Then click Finish. NetBeans will now clone the repo and open the project for you.
- When the project has loaded you'll want to right click it, and select Properties:



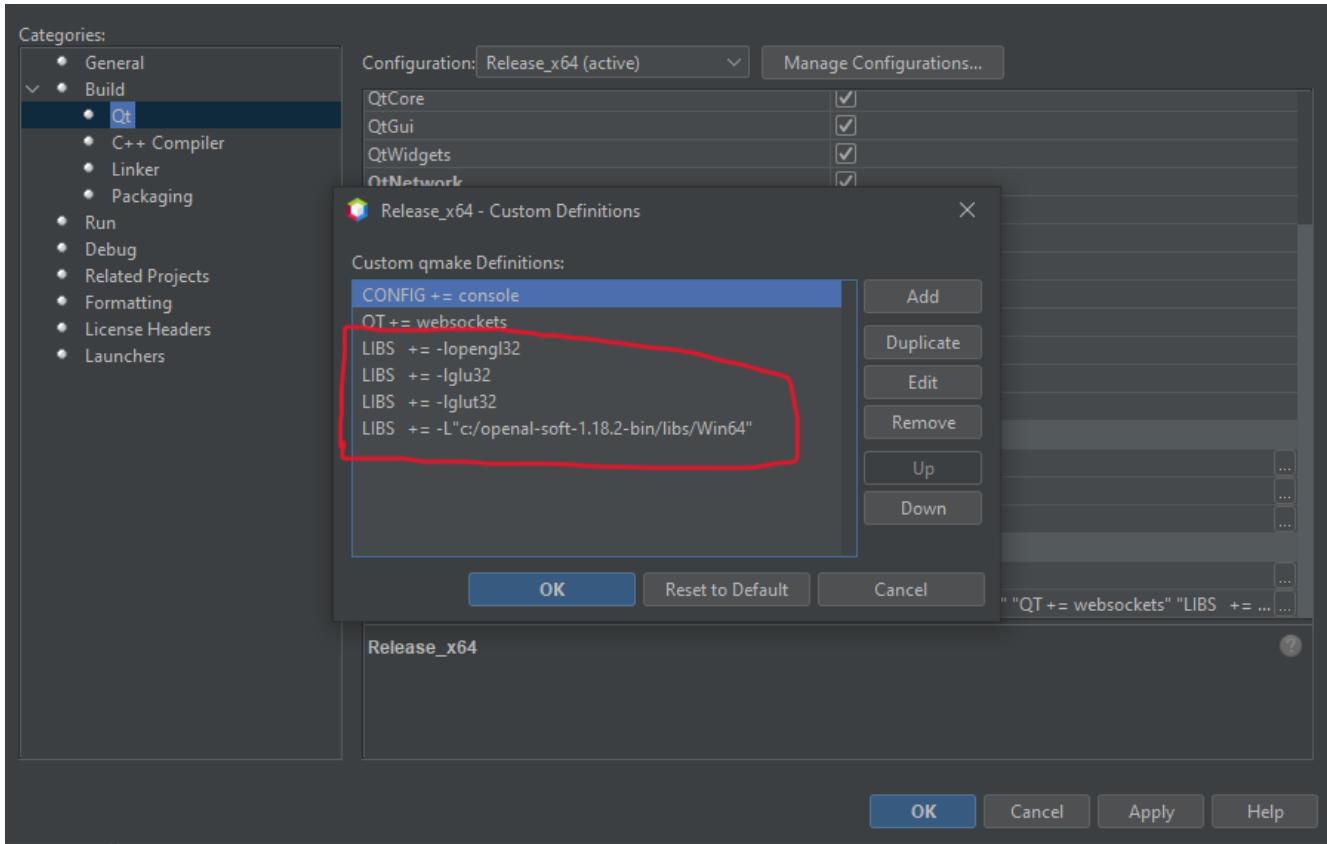
- We will need to add some extra Qt linking settings. Select **Qt** under categories.
- Then scroll all the way down to the bottom and find "Custom Definitions".
- Next, click on the small button with "..."



You will see another dialog where you need to add the following lines:

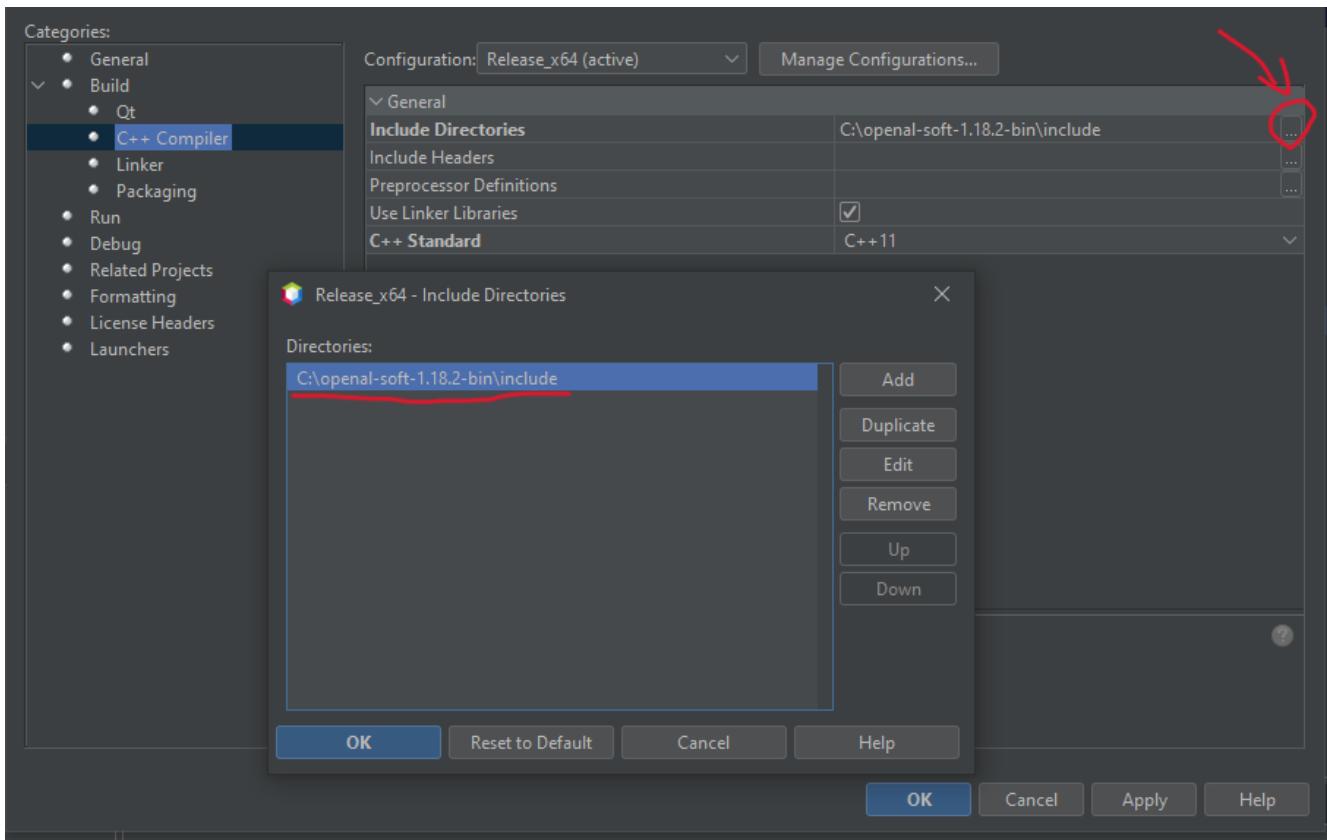
```
LIBS += -lopengl32  
LIBS += -lglu32  
LIBS += -lglut32  
LIBS += -L"C:\openal-soft-1.18.2-bin\libs\Win64"
```

Again change the path if necessary, it should look like this when you're done:

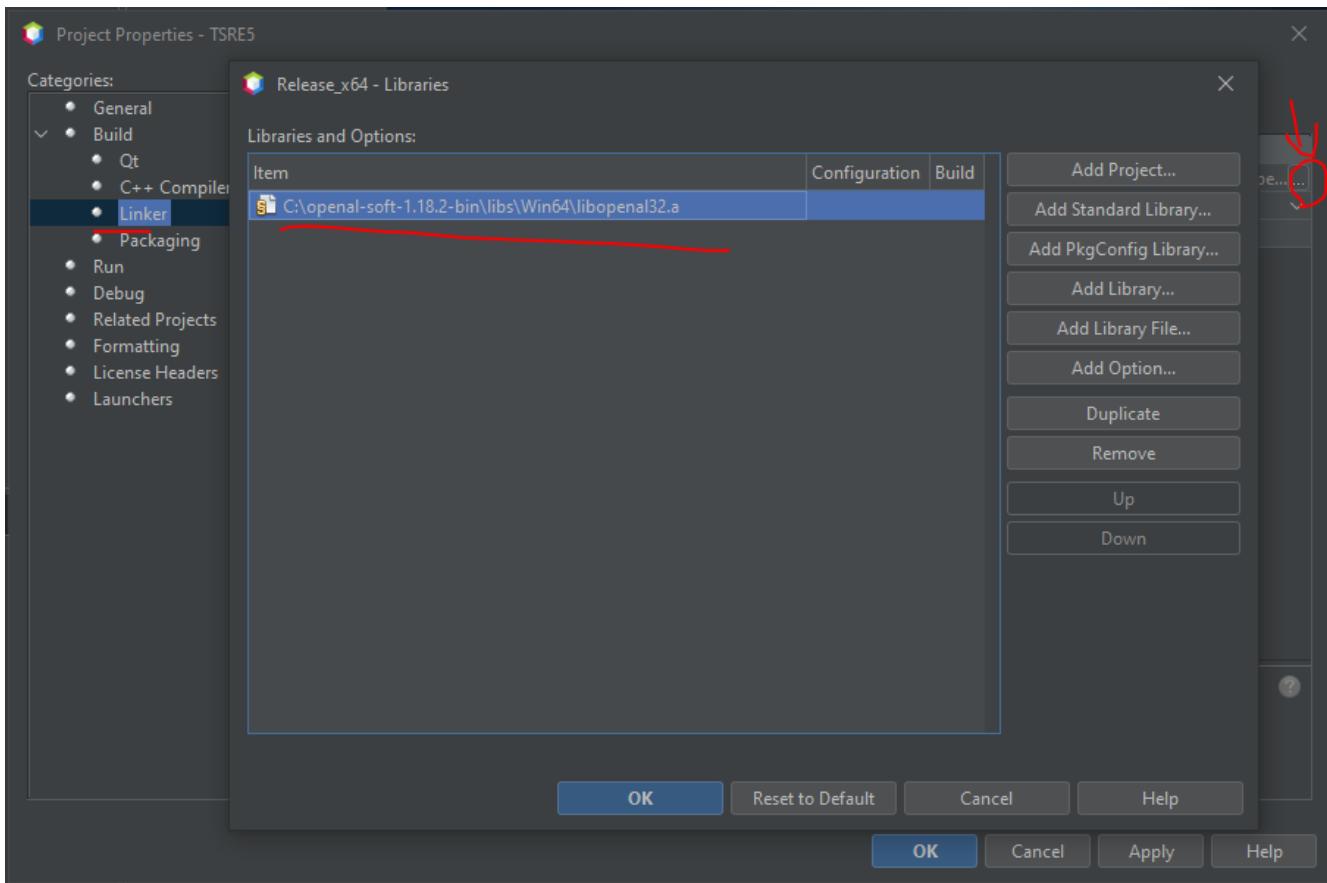


- Click OK.
- Next we'll need to change the path for the OpenAL Soft binaries
- Now select "C++ Compiler" under Categories.
- Click the small button with "..." in the "Include Directories" line.
- Then edit the path to where you put the OpenAL Soft binaries, with the ".\include" subdirectory appended to it.

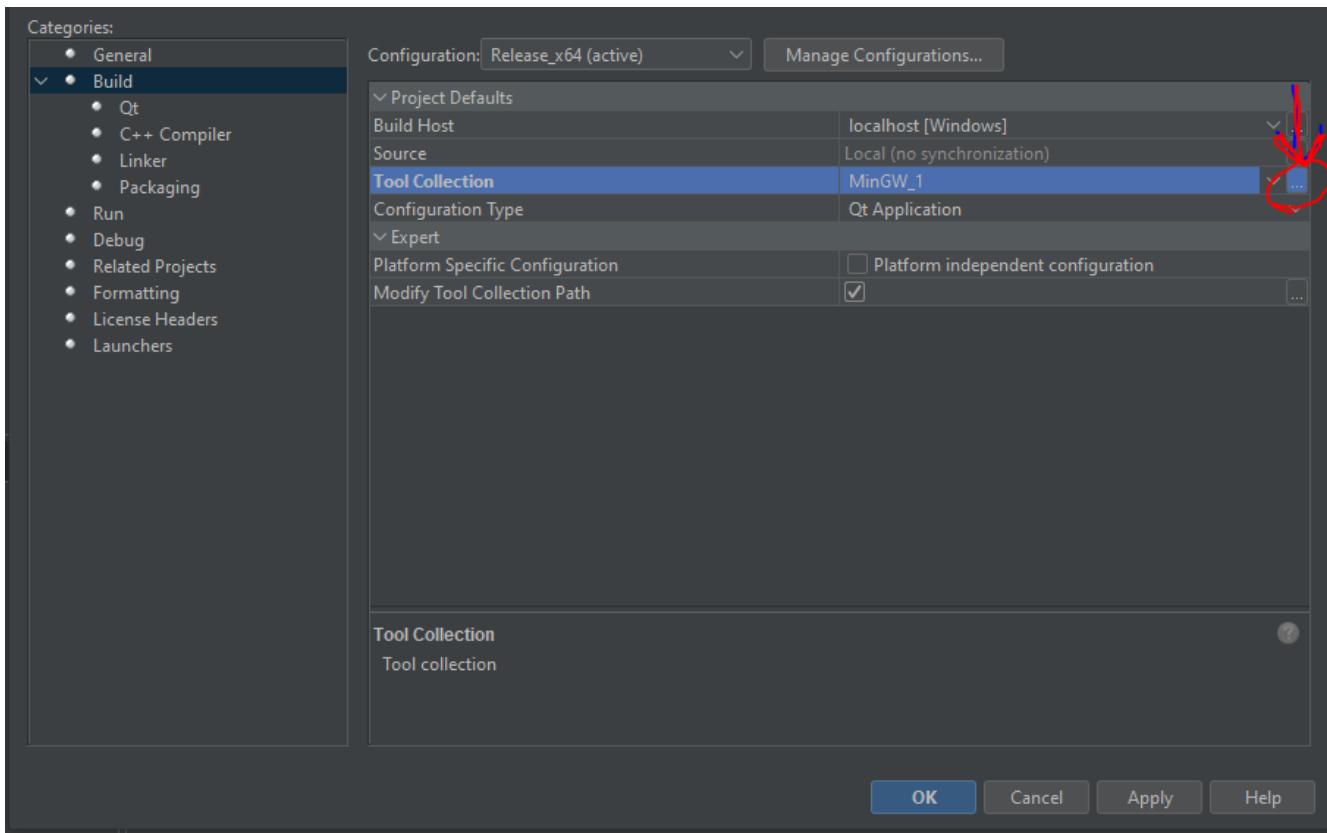
For Example: "C:\openal-soft-1.18.2-bin\include":



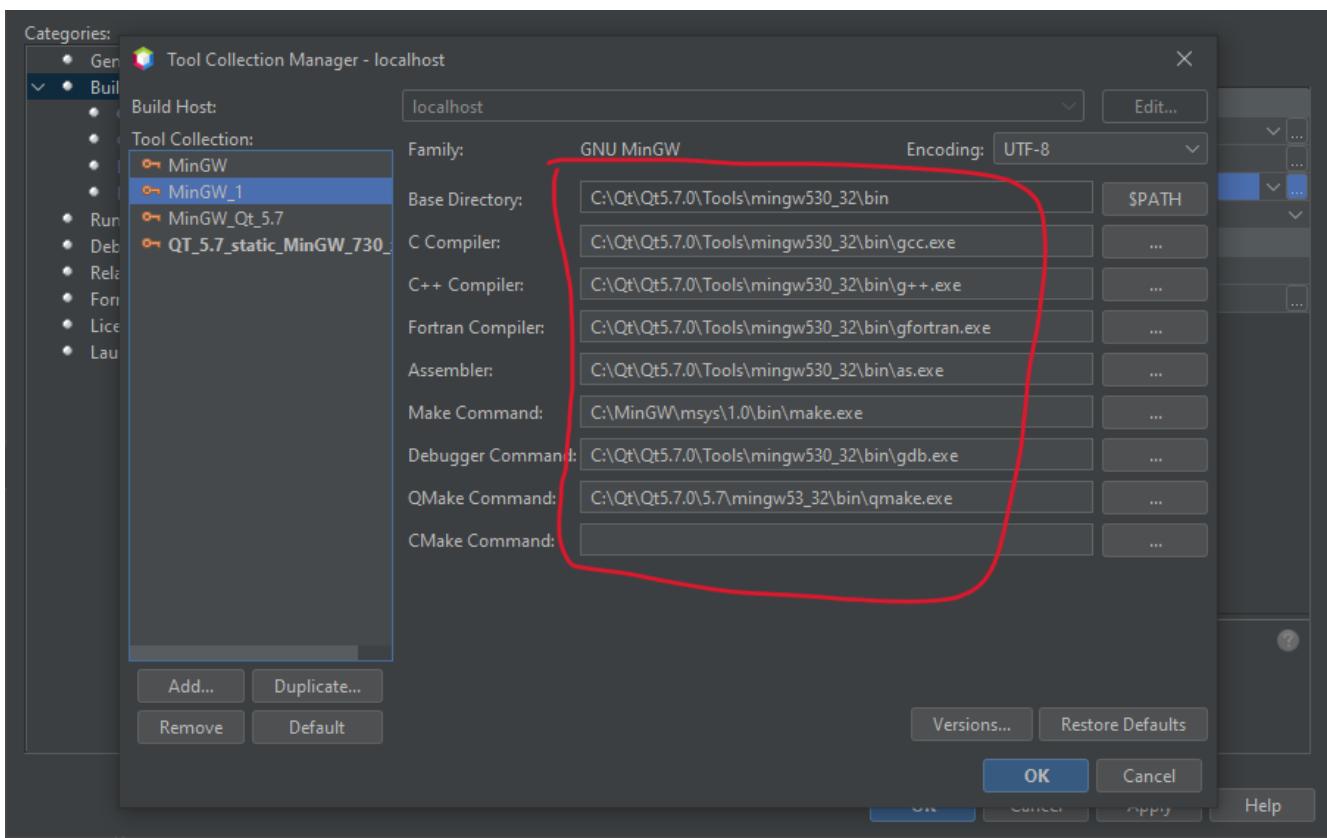
- Click OK.
- Then go to **Linker** under Categories and specify the path to the `libopenal32.a` file we created earlier.
- In my case this is `C:\openal-soft-1.18.2-bin\libs\Win64\libopenal32.a`
- You can edit the string directly or use the "Add Library File..." button.



- Click OK.
- The final thing we need to do before we can build TSRE5 is to tell NetBeans where Qt and the compiler tools are located.
- Go to "Build" under categories.
- Click the small "..." button in the "Tool collection" line.



It will bring up the following dialog:



All the fields here will be blank when you open it.

- Here you need fill out all the the fields like above.
- It does not matter whether you create a new Tool Collection or modify an existing one. And you can name it whatever you want.

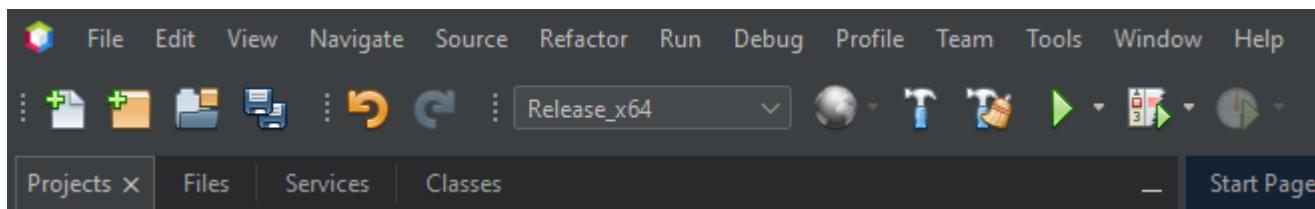
- When you have filled out the fields click "OK".
- And make sure the Tool Collection that you filled out the fields for is selected like this:



You should now be able to compile TSRE5.

### Step 8: Compile the project

It's now time to build. You can do this by clicking the hammer in the toolbar or you can press F11.



Sometimes the build fails with messages like this:

```
mv: cannot move qttmp-Release_x64.mk to nbproject/qt-Release_x64.mk: Permission denied
```

And that's just something you can disregard and try again until it works. I don't know why NetBeans does this occasionally.

### Step 9: Making the compiled .exe able to start outside of NetBeans

When it's been built you can start it within NetBeans with the play button in the toolbar or by pressing F6. The built TSRE5.exe is put inside the "./dist" folder of the same directory that you cloned the repository to.

For Example: "C:\Users\Peter\Documents\NetBeansProjects\TSR SRE5\dist\Release\_x64\MinGW\_1-Windows".

- To run TSRE5.exe outside of NetBeans, there's one more thing we have to do.
- And that is to move a couple of dll's into the directory with the TSRE5.exe file.
- Copy the following dll's from [C:\Qt\Qt5.7.0\5.7\mingw53\\_32\bin](C:\Qt\Qt5.7.0\5.7\mingw53_32\bin):

```
libstdc++-6.dll
libgcc_s_dw2-1.dll
libwinpthread-1.dll
Qt5Core.dll
Qt5Gui.dll
Qt5Network.dll
Qt5WebSockets.dll
Qt5Widgets.dll
```

So that the folder looks like this:

nGW_1-Windows			
Share	View		
<< NetBeansProjects > TSRE5 > TSRE5 > dist > Release_x64 > MinGW_1-Windows		Date modified	Type
tutorial	Name		
	libgcc_s_dw2-1.dll	28-12-2015 23:25	Application e
	libstdc++-6.dll	28-12-2015 23:25	Application e
	libwinpthread-1.dll	28-12-2015 23:25	Application e
	Qt5Core.dll	26-12-2023 18:07	Application e
	Qt5Gui.dll	10-06-2016 09:23	Application e
	Qt5Network.dll	10-06-2016 09:17	Application e
	Qt5WebSockets.dll	12-06-2016 21:27	Application e
	Qt5Widgets.dll	10-06-2016 09:29	Application e
	TSRE5	14-01-2024 16:02	Application

 The reason why these are not present with the TSRE5.exe built by Goku is that they are somehow included in the executable when he builds it and that doesn't happen here for some reason.



When TSRE starts for the first time it downloads the **appdata** folders it needs from Goku's webserver and creates the **settings.txt** file.