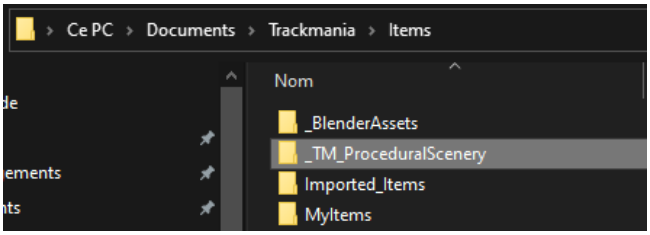
Discord : @Skyrow

User Manual
TM_Procedural_Scenery

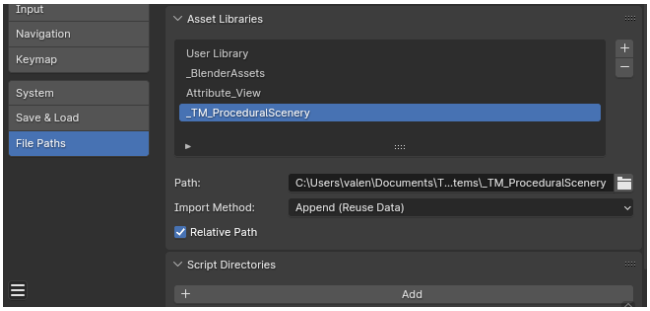
Version: 1.0.0

1. Installation

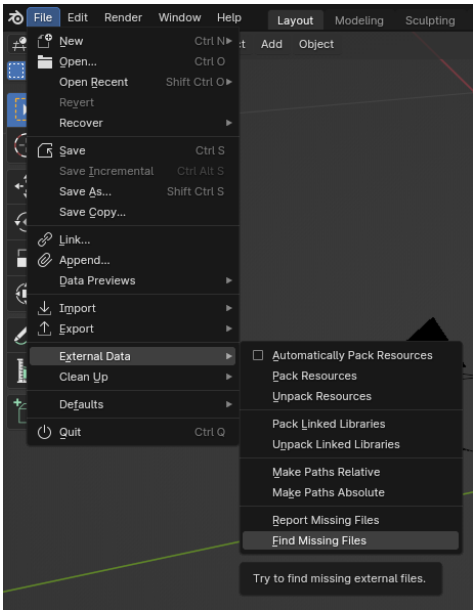
1. Extract the downloaded zip and drop the "_TM_ProceduralScenery" anywhere on your drive, but not inside an existing blender library folder. I.E you can drop it in the same root folder of the "_BlenderAssets" folder "%USERPROFILE%\Documents\Trackmania\Items\":

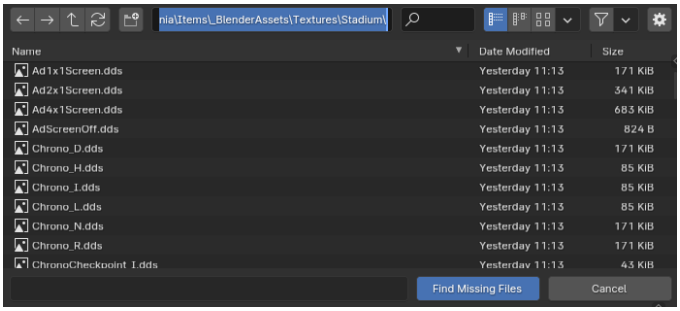


2. Open blender and setup the library folder (Edit -> Preferences -> File Paths -> Asset Libraries):



3. If you want to use the materials assets from this library, you need to fix the missing texture files: open the blender file (inside of the library folder) and go to File -> External Data -> Find Missing Files. On the prompt, go into "%USERPROFILE%\Documents\Trackmania\Items_BlenderAssets\Textures\Stadium\" and click Find Missing Files. Then save the blender file.





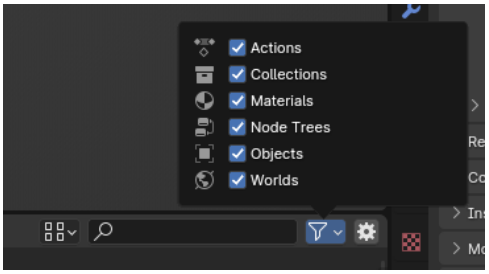
2. Content

The blend file contains different assets sorted in the asset catalog as following:

- ▼ TM Procedural Scenery
  - ▼ Demos
    - 3 demos of the geometry nodes in use
  - ▼ Landscape grids
    - Placeable grid generators
  - ▼ Materials
    - Decohill materials with the same render as in-game (alpha painting)
    - Road materials used in the demos
  - ▼ Modifiers
    - TM_Generate_Grid
    - TM_Procedural_Landscape
    - TM_Landscape_Flush_With_Route
    - TM_Road_From_Curve
    - ▼ Utils
      - TM_Show_Vertex_Alpha

2.1. How to use the modifiers

To use all the modifiers from the library, you can open a new blender file and go to the asset browser, if you don't see them, check if node trees are enabled in the filters (top right of the panel):



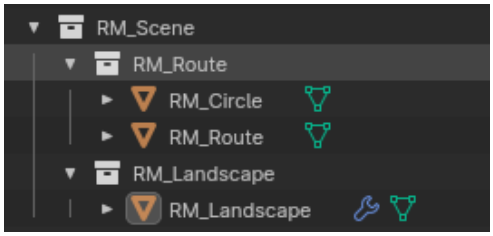
Then just drag & drop any modifier on an existing mesh in the viewport. See Workflow to have a better explanation for their application.

3. Workflow

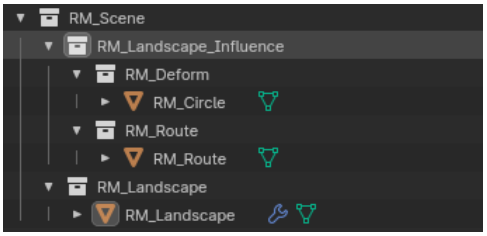
3.1. Scene

The base setup requires 2 collections, one with the landscape and one with the route and other meshes that can be used to deform the landscape, I call them influencers.

All the meshes in the same collections as the route will be used to cut the landscape and create connection with it. So, you can create a mother collection, in which there will be a collection with meshes that will deform AND cut the landscape, and another collection only for meshes used to deform the landscape:



RM_Circle and RM_Route will deform and cut the landscape.



RM_Circle and RM_Route will deform the landscape but only RM_Route will cut it.

N.B. All influencers must be one-sided non-manifold geometry, like a plane, a circle or a block surface.

3.2. Prerequisites

Ensure your route is perfectly cleaned, there should be only the surface, no micro faces left on the borders (if there are some, you'll be able to spot them by looking at the way the landscape is deformed)

3.3. Add a grid

Open the asset catalog, and under “landscape grids” you’ll find different grid generators, their named size corresponds to TM blocs.

You can drag & drop one of your choices in your scene, and to move it at the world origin you can press “shift+s -> selection to cursor” (ensure your 3d cursor is at the world origin).

By default, they are centered to the middle of the stadium that correspond to the grid size.

Now you can open the modifier panel of the placed grid, and edit the settings. You can extend the Size X & Size Y and it will stay centered at the Center location.

The Tile Size (8.0) should not need to be changed but it is available.

You can enable Triangulate to converts quads to tris on each diagonal. This doesn’t create new vertices, but it can make the landscape look better.

UVs correct aspect should always be enabled, unless you have a non-square grid and want to stretches the UVs to have a square ratio.

You can also apply the modifier to make the grid real (top right of the modifier panel: ▾).

3.4. Create a procedural landscape

On the previously created grid, you can now add TM_Procedural_Landscape modifier by drag & drop from the asset library (It should then be below the grid generator modifier).

By default, no preset is selected, but first, go setup the Landscape influence:

All the meshes in the Collection input will be used to deform the landscape (referring to Scene, it would be RM_Route on the left, and RM_Landscape_Influence on the right).

The Flat range is the range within the landscape will try to be on the same plan than the closest influencer, and the Falloff range is the range within the influence will fade to 0 (starting after flat range).

If your route is not correctly cleaned, you'll see that the landscape doesn't align correctly with the route tilt.

Now you can go and edit the landscape generation with Presets, Transform landscape and Additive filters.

Then setup Altitude based materials if needed (you could set materials manually if you have a real grid).

Finally, you can enable Distant LODs to reduce the number of polys the further from the influencers it is.

You can also apply the modifier to make the changes real (previous modifiers must be applied before)

3.5. Connect the landscape with the route

On the previously generated landscape, you can now add TM_Landscape_Flush_With_Route modifier by drag & drop from the asset library (It should go below the previous modifiers in the modifiers panel).

First you can setup Route collection input (referring to Scene, it would be RM_Route on the left and RM_Route on the right).

Now toggle Enable and the landscapes is modified to flush with the route, it is quite fast compare to other methods, so if you have a good cpu (I believe Intel 11th gen +) you'll be able to edit the route in real time with a decent amount of fps.

Toggle Show only borders or Wireframe view to have a different visibility if needed.

You can also apply the modifier to make the changes real (previous modifiers must be applied before)

3.6. Exporting

You can export the landscape without applying the modifiers. To do that, you'll need to list all used materials in the material list panel of the object. So, if you have 3 different Altitude based materials, you must add them all (index 0 should be material 0, index 1 is material 1 and index 2 is material 2). If you have the same material in multiple input of the modifiers, you only need to add it once in the material list.

If you want to make the landscape real and go on with manual editing, instead of applying each modifier, you can just convert the object to mesh so you'll be able to keep the original:

1. Select one or multiple object(s)
2. Right-click -> Convert To -> Mesh
3. In the drop-down menu at the bottom left, check "Keep Original"
4. Hide the originals objects

4. Procedural Roads Creation

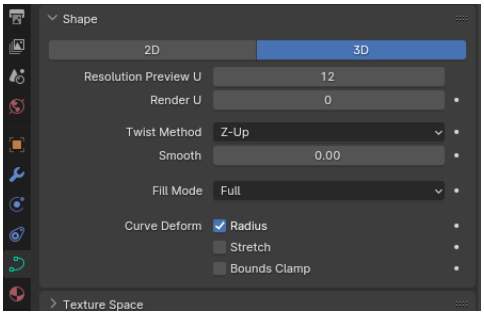
Creating roads with TM_Road_From_Curve modifier allows you to edit the curve whenever you want. You can use a Bezier curve or a Nurbs curve depending on your preferences, but if you use a Bezier curve, you won't be able to use the Round angles feature.

1. Add a curve object that will be the source curve.
2. Add a mesh object, on which you'll add the TM_Road_From_Curve modifier.
3. Setup materials and settings from the modifier.
4. Edit the curve as you want, cyclic is allowed.

That object can be exported at anytime if you list all materials used by the modifier in its material list (the path material and the border material).

Road tilt:

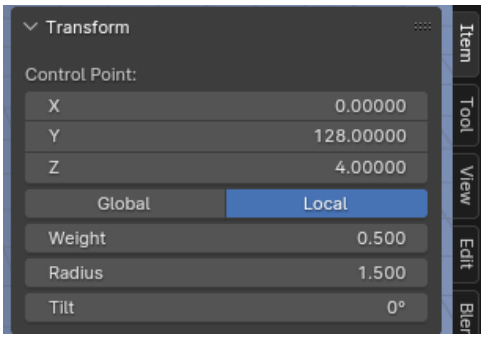
First you should set the "Twist Method" to Z-Up in the curve Shape properties:



Then you can edit curve tilt for each control point by opening the top right "Item" panel (press N)

Path bending:

You can bend the generated road using the "Radius" value of control points. Open the top right panel and select a control point in the curve:



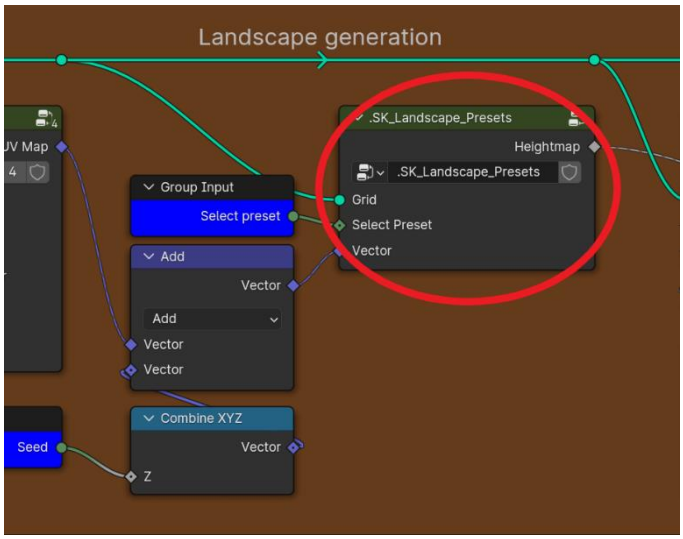
A value between 0 and 1 will make the road concave, at 1 the road is flat, and between 1 and 2 the road will be convex. Don't go over 2, it would raise the bending propagation.

5. Create landscape preset

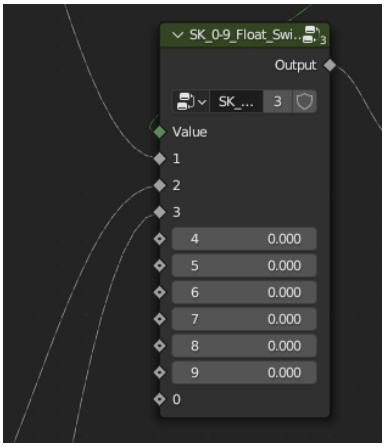
Making procedural landscape preset is like material creation, it relies on a lot of abstract stuff that is really close to sound physic, or electronic signals, so if you're already used to waves and related maths, you'll dive into it really fast.

If you'd like to create new presets, here's where you can do it:

1. Open the geometry node editor and access to the TM_Procedural_Landscape node.
2. Find the brown frame named "Landscape generation", click on the "SK_Landscape_Presets" node group and hit TAB to enter:



3. There is a Float switch node with inputs 4 to 9 available to add any presets you want.



You can look at existing ones and try anything, it really has no limits of combining maths and textures in any possible way.

Here's a good source for anyone who'd like to learn and understand what's behind:

https://www.redblobgames.com/maps/terrain-from-noise/

6. Reference Manual

6.1. TM_Generate_Grid

6.1.1. Settings

- Size X

The number of tiles along X axis.

- Size Y

The number of tiles along Y axis.

- Tile Size

The size of one tile for the generated grid.

- Triangulate

This will triangulate quads alternatively on each diagonal (doesn't add new vertices).

- UVs correct aspect

For a non-square grid, UV's must most of time not be scaled to the bounds, this will preserve the aspect ratio of the UVs.

- Align to center

Will center the grid at the center location, if you set the center location at the half of your map size, you can then extend the grid size and it will stay centered.

- Center location

Grid's center location.

6.2.TM_Procedural_Landscape

6.2.1. Presets

- Select preset

Allow choosing a landscape design preset, currently 3 are available. See Create landscape preset for more information.

- Seed

This is an input for procedural generation, each different value set to this input will generate a different infinite amount of landscape.

- Show heightmap

Display the current heightmap of the landscape (doesn't consider Landscape influence), only visible in "Viewport Shading: Material Preview mode".

6.2.2. Transform landscape

- Weight

Can be used to set the landscape generation factor (0 = no generation). Can be weight painted if the original grid is real and you link this attribute to a vertex group.

- Delta height

The Z range of the landscape.

- Smooth

A smooth factor to make the landscape smoother.

- MidLevel

This offsets the Z zero point for the generation, when this value is changed, landscape part that goes above or below height range will be clamped.

- UV Scale

Scale the landscape generation, higher values will result in more density.

- U Offset (X)

Move the landscape generation on the X axis.

- V Offset (Y)

Move the landscape generation on the Y axis.

- UV Rotation

Rotates the landscape generation.

6.2.3. Additive filters

These filters allow making quick desired shape to the landscape. They are additive so you can make ratios i.e., Line Y 1:2 Line X.

- Exponent

The filter value is raised to this exponent. The higher the exponent is above 1, the closer to 0 the landscape will be, and the lower the exponent is below 1, the closer to 1 the landscape will be.

6.2.4. Landscape influence

This allow using a collection of meshes to modify the landscape shape using geometry proximity. The proximity is evaluated on geometry faces on the XY axis, but it detects the closest influencer in the 3D space.

- Collection

The source collection (child collections allowed). Only

- Flat range

The distance below which the landscape will be moved the closest to the influencer Z position.

- Falloff range

The distance below which the influence will fall off until 0.

Setting both *Flat range* and *Falloff range* to zero will make an infinite influence result, useful if you only want the landscape to be elevated to the nearest route but without landscape generation.

6.2.5. Distant LODs

This is used to decimate the landscape the further from Landscape influence it is. Resulting in a great reduction of the polygons amount. There are 3 Levels of Detail, plus the level 0 that isn't altered.

- LOD N Start

The distance between the previous LOD and the current one.

- LOD N

The detail attenuation base, higher value means less detail.

6.2.6. Altitude based materials

Allow selecting 3 different materials that will be assigned to the landscape depending on the Z position of faces. Starting from the lowest altitude, "Material N Altitude" value determine the lowest point for the N material.

Don't let one input empty, if you need only 1 or 2 materials, you can set it on multiple inputs.

6.3. TM_Landscape_Flush_With_Route

6.3.1. Settings

- Show only borders

Allow viewing only the borders created between landscape and route. You could leave it enabled if you want to manually do a landscape from that.

- Wireframe view

View the landscape as wireframe.

- Route

Collection containing the route meshe(s).

- Range

The maximum distance between the route and the landscape where it will create the connection between them.

- Enable

Enable cutting the landscape and move vertices to flush with the route.

6.3.2. UV Lightmap

- Top project LightMap

Automatically generate a top projected UV lightmap.

- Correct aspect

Preserve the aspect ratio of the geometry (from above). Disabling this means it will stretch the UVs to make a square.

6.4.TM_Road_From_Curve

- Low Poly (only for editing)

Setup a low poly road (segment length = 32.0 with 2 subdivision).

- Show Curve

Let the curve outputs of the geometry node.

6.4.1. Settings

- Curve Resolution

Number of computed points between each control point, high values = smooth curve.

- Borders Alpha blend

Enable alpha blending on the border's vertices (used to make decohill texture from UV to Projected).

6.4.2. Round angles

- Round angles

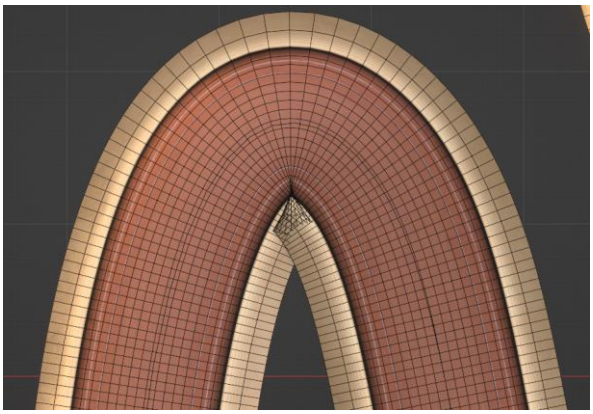
Enable corners rounding. Not for Bezier curves, but for Nurbs or Poly.

- Interpolate Tilt and Radius

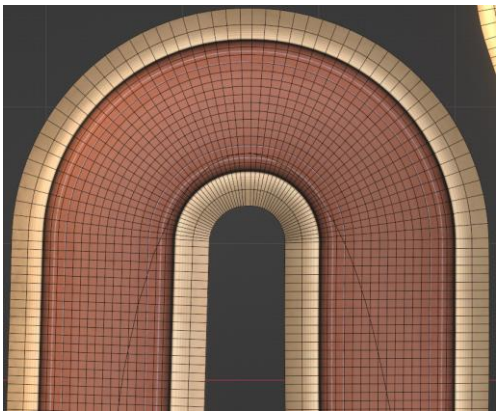
The round method applies the same tilt and radius along the rounded corner, so toggle this if you want to interpolate these attributes from the original curve.

- Max round radius

The maximum curve radius at which the curve will be rounded, use high values to have tight turns rounded and wide turns smooth.



Not rounded



Rounded with max radius = 32.0

6.4.3. Path bending

- Path bending

Enable path bending. It reads curve's radius attribute from 0 (hollow) to 1 (flat) to 2 (bump).

- Path bending Factor

The amplitude of the bending, it's scaled 1:1 so a value of 4.0 ≙ 4 meters amplitude.

6.4.4. Path & Borders properties

Allow modifying the road size and resolution (subdivisions).

6.4.5. Path & Borders UVs

Allow modifying the texture UVs.

6.5. TM_Show_Vertex_Alpha

- Enable

Allow you to see the Alpha values that are stored on the Color attribute (domain: points), will work in Material Preview Mode.