Introduction

Many new assets for Trainz now use 'groundplane' objects to add some shading below the traincar, to give the impression of deep shadows that aren't generated by Trainz. Although TANE now has world shadowing, and SSAO shading, this effect is still useful to give some depth and 'shadow' below the traincars. Many modern games use this technique, in some form or another, to give this effect in addition to regular directional lighting.

For Trainz, there are several methods used to create groundplanes. I have personally found that using 'baked' Ambient Occlusion shading for the groundplane works best, as you then only end up with truly dark areas in areas that 'ambient' light will not reach. Hence the name, ambient occlusion.

Before completing this tutorial, you should already be proficient with creating and texture mapping objects.

The Groundplane Mesh

To start with, make a groundplane that overhangs the a.limfront and a.limback attachments, or that overhangs any parts that protude beyond these that are close to the ground (cow catchers, low couplers, or similar). Map this to fit a 128 pixel wide by 512 pixel high texture without stretching (for short vehicles, you could reduce the height to either 256 or 128 pixels). The texture you use here is simply a placeholder till we bake and edit the groundplane texture.

Baking

Preheat your oven to 200 degrees celcius… oh, sorry, not that sort of baking.

If you already know how to do a standard AO bake, then you can skip this section. Although it means a little bit of photoshop work, I prefer to start with just a regular AO bake. These particular steps provided are for 3DSMax 2008 and newer, if a Blender user can assist with steps for Blender then I am happy to add these in!

1) Select your mesh in 3DSMax.
2) Press '0' on your keyboard, or click on 'Rendering' at the top of the screen then click on 'Render to Texture'.
3) Select a location for your Output Path
4) In the Render Settings, select 'mental.ray.daylighting.high'
5) Ensure that all settings up to 'Output' are set as per Fig 1.

6) In 'Output', click on 'Add…'
7) Select 'Ambient Occlusion (MR)' from the list
8) If necessary use the '...' button next to 'File Name and Type' and change it to '.tga'
9) Set the width to '128' and the height to '512' (or other desired)
10) Set the samples to '64', I have found that this gives relatively soft/smooth shading, lower values will render quicker but will have a grainier look.
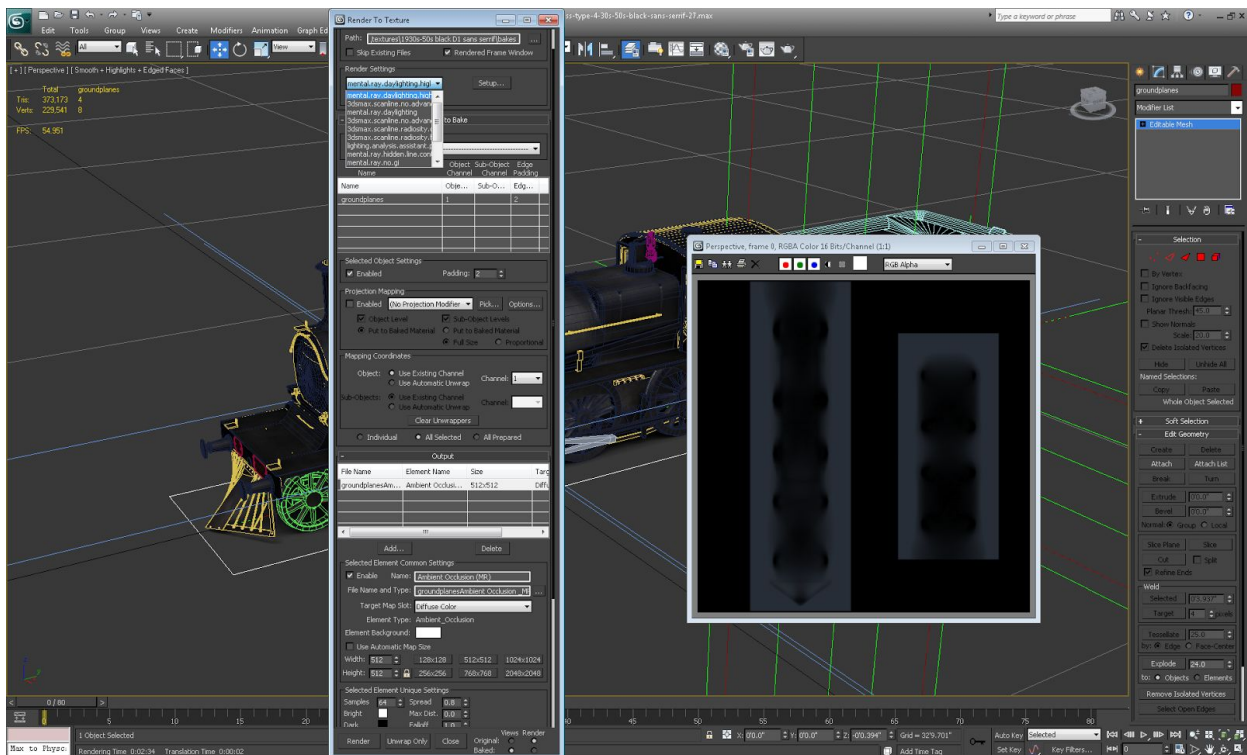11) Tick the option for 'Render to Files Only' in 'Baked Material'
12) Click on 'Render'

Fig 1 (AO Bake Settings)

Creating the Texture

After baking, you will need to use photoshop to alter the resulting image.

1) Open the image that you baked
2) You first need to 'invert' the image, by clicking on 'Image' on the top toolbar then go to 'Adjustments' then click on 'Invert'. Or you can press CTRL + I on your keyboard. See fig 2.
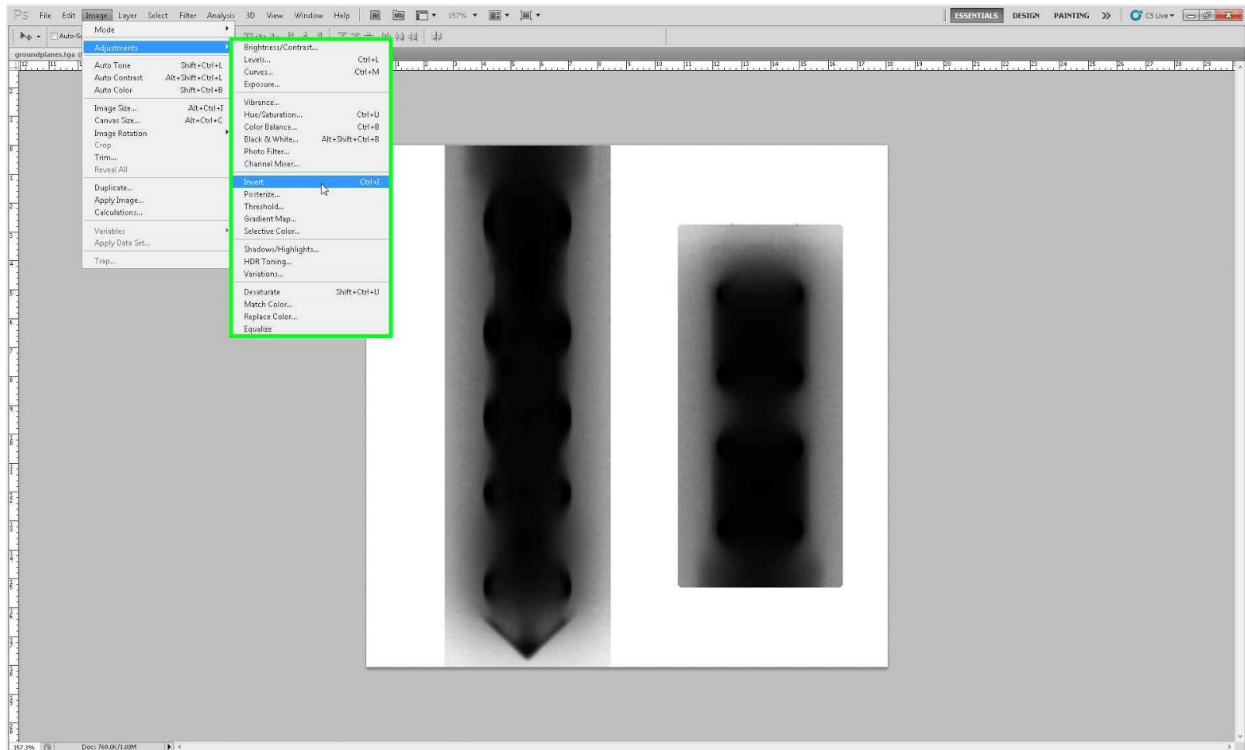
Fig 2 (Invert image)

3) Now you need to adjust the brightness and contrast to tweak the 'intensity' of the shading. To do this, click on 'Image' again, then go to adjustments and click on 'Brightness/Contrast'
4) Enable 'Preview' and 'Use Legacy'
5) Set the 'Brightness' to a negative number, around -70
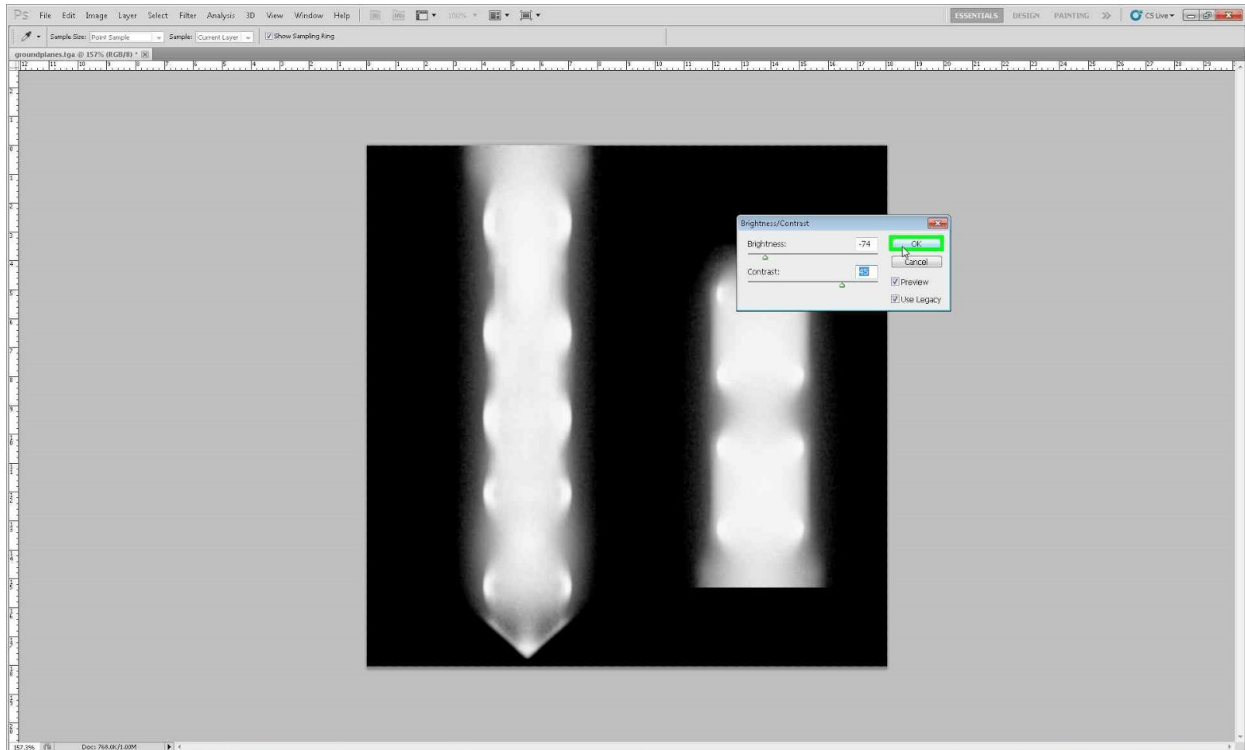6) Set the Contrast to positive value, around 45.
7) Click ok.

Fig 3 (Brightness Settings)

8) Select the entire image by pressing CTRL + A
9) Copy the image by pressing CTRL + C
10) Now open the 'channels' window by clicking on 'Window', then click on 'Channels'. If it's already part of a toolbar window, it will be select (it is often grouped with the 'layers' and 'paths' panels)
11) Select 'Alpha 1'. If this isn't present, click on the 'Create New Channel' button below the channels list to create the 'Alpha 1' channel
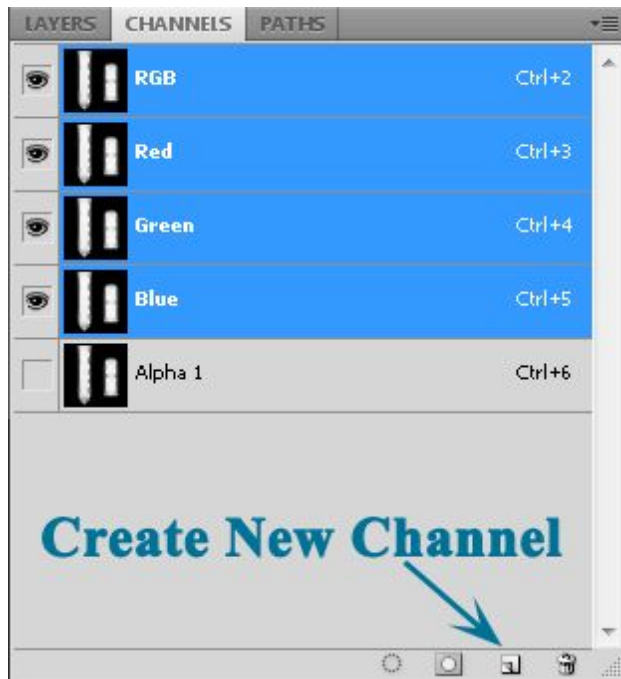
Fig 4 - the Channels Panel.

12) Press CTRL + V to paste the image into the alpha channel.
13) Now click on the channel named 'RGB', and you should see the 'alpha 1' channel become hidden and the RGB channels become visible again.
14) Go back to the 'Layers' panel
15) Click on 'Create New Layer' (same location as the Create New Channel button)
16) Select the 'fill' (paint bucket) tool
17) Change the primary colour in the colour selectors to pure black (RGB=0,0,0).
18) Fill the entire image with pure black.
19) Change the primary colour to RGB=5,5,5
20) Use the paintbrush or pencil tool to add a single different colour pixel in one corner (this will prevent errors, but won't be seen).
21) Click 'File', then 'Save As'
22) Now select a location, and save the file as a 'tga' and call it 'groundplane' (or similar)
23) When saving, you will be given the option "Targa Options", select '32bit/pixel' and ensure 'Compress (RLE)' is *NOT* ticked.

Now you simply need to apply this texture to your groundplane in 3DSMax as you would any other texture.

You may need to change the 'Alpha Source' setting in the material. This is done by clicking on the filename in the 'diffuse' slot, and then select 'Image Alpha' in the Alpha Source section of the 'Bitman Parameters'.
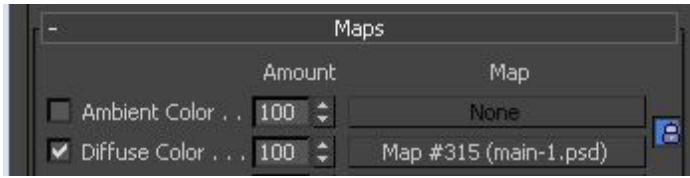
The Diffuse Slot

Alpha Source setting.

Now export your model with the groundplane in it. Your groundplane should be part of the main model, and should be present in all but the last 1 or 2 levels of LOD, so you don't see any obvious 'popping'.