How to use Google Earth and TransDEM to create routes for Trainz.

NOTE: It is assumed you have already followed the TransDEM Trainz Edition PDF instructions under section "*Installing the TransDEM Ground Textures*" (Page 14) and the instruction under section "*Downloading and Installing the Trainz Mesh Importer*" (Page 16). Both procedures are necessary for creating routes. You may optionally install the "*Wireframe Replacement Texture for Trainz Surveyor*" by following the procedure on Page 16.

This tutorial will detail the procedures I used to create maps for T:ANE using Google Earth images. The process looks a bit complicated, and, I suppose it might be, but actually it isn't. Most of what you do right at first is repetitive but necessary to gather the images for your route.

1. Open Google Earth (known as GE from now on) and set it up for taking snapshots by:

   Going to the **Tools** menu and choose **Options**.

   On the **3D View** tab

   Click **Restore Defaults**.
   Set **Labels/Icon Size** to Small
   Set **Show Lat/Long** to Decimal Degrees
   Set **Units of Measurement** to Meters, Kilometers
   Click **OK**

   On the **View** menu:

   Enable **Toolbar**
   Enable **Sidebar** are enabled
   Set **Show Navigation** to Automatically
   Disable **Overview Map**
   Enable **Statusbar**
   Disable **Atmosphere**

   NOTE: If you wish to have the rail line highlighted by GE, you can expand the **Layers** at the left and move to **Primary Database** --> **More** --> **Transportation** and check the box for **Rail**. This will put a thin, black line on the GE image approximately where the rail lines run. It will also put a square blue marker for each station (which is handy for physically placing them later on your route).

2. Click the arrow to expand **My Places**:

   RIGHT-click on **My Places**, Choose **Add** and click **New Folder**

   In the pop-up that appears, change the default name to something meaningful for your

purposes, like the name of your route. Ensure that "**Allow the folder to be expanded**" is checked. You can also enter text in the **Description** area if you desire. Click **OK**

3. Now you are ready to navigate to the area you are interested in. You can either drag the globe around with the mouse pointer by holding down the left mouse button (LMB) to find your spot, or enter the name in the **Search** field above **My Places**. GE will rotate the globe and zoom in on the named place. You can use the mouse wheel to zoom in or out for height adjustment. The keypad **Plus** and **Minus** keys can also be used.

A bit of explanation about what you are about to do.

In order for TransDEM (referred to as TD from now on) to convert all the images to usable UTM tiles, you should make sure that you encompass all of your chosen geographic area as well as a margin surrounding the area. If you make the margin large, say 2 or 3 kilometers away from the furthest points of your route, you can always trim the baseboards created to make your route smaller. But, if you miscalculate and do not include enough of a border, it is hard to impossible to add them later with any accuracy.

In my case, the area surrounding the Kishigawa Line, which runs from Wakayama Station east to Kishi Station, I set up a square of images 18Km wide and 9Km deep. There is no reason you have to include images in the entire square, but if you don't, there will be large black areas on your final route in Trainz. I have also found that at extreme viewing distances from ground level in T:ANE that the GE images will look like real flora and habitation.

Each image (and I ended up with 110 images) is created using a GE feature called Add Placemark. This is an icon near the far left of the top toolbar and pictures a yellow pushpin. It is these pushpins that are used to create the images and make them usable to TD.

I recommend that you start at the northwest corner of your target area and work south and to the east in vertical rows using the steps that follow.

Preliminary:

Open a Windows Explorer window and create a place on your hard drive to save all the images you will be generating.

Next, pan/zoom the GE window to the initial point you wish to use as Image one. For best results, zoom until you are at a viewing height of 2.5Km. You can do that using the vertical bar on the right of the GE main window, moving the tiny slider up or down slowly by dragging the mouse with the LMB pressed and watching the numbers of "eye alt" at the lower right. It is tricky to hit 2.5Km exactly, but be patient. Once you reach the desired height, do NOT use the mouse wheel in the Main Window again or the height will change. Changing the height will change the visual coverage of your tiles and they will not register properly on the terrain of your route. To move the map, use the Up,

Down, Right, and Left keys on the keyboard, or use the LMB carefully to drag the GE image around. Always reverify the height is still at 2.5Km.

Also, click the name you have given this route in the My Places area once, turning it blue. This will ensure that all placemarks in the next steps will be ordered under that folder. If they somehow get outside that folder, they can be dragged back into the folder using the mouse.

NOTE: At the lower right of the GE main window, there is a small blue circle. When moving the displayed image around, this circle will rotate, turning white in the process. When it returns to solid blue, it is safe to place the Placemark or use the "N" and "U" keys as described below.

Perform these steps repetitively until you have all your images:

1. Hit the "**N**" and "**U**" keys once. This will ensure your image is oriented North and Vertical (no tilt).

2. Click the **Add a Placemark** button.

3. A square yellow placemark with a pushpin will appear in the center of the map. Leave it where it is placed by default, as moving it will make the geo-coordinates wrong.

4. In the pop-up that appears, give the placemark a name. Make it a short name as you will be doing this many times. I suggest "P" and a serial numbering system. Click the **OK** button.

5. Move to the GE **File** menu and **Save** --> **Save Place as**... In the Windows dialogue that pops up, save the place in the folder you have prepared. It will be named the same name as given in the placemark pop-up and under the route name folder in **My Places.**

6. Immediately use the **File** menu and **Save** --> **Save Image** in the same folder used in step 5. You will have to type the file name, but not the "jpg" extension as that will be done automatically when you hit Enter.

7. Use the Down arrow to move the GE image south until the placemark is just below the top left of the main window, almost, but not quite, out of sight.

NOTE: If you have moved as far South as you desire, use the UP arrow to move back North until you see your top placemark. Place the mouse pointer at the lower right of the main window at approximately the same level as the placemark on the left. Press and hold the LMB, then drag the image to the left until the map is where you wish to add the next Placemark.

Repeat steps 1 through 7, marching south and east, storing .kmz and .jpg files

until you have completed your desired area. If the placemarks have moved from under the route name in **My Places**, you can drag/drop them back under the route folder name.

If you do not want to do the entire route at one sitting (and that can be horribly boring and repetitious) take a break. To reset for the next image in line, double-click the last marker you made (under the route name in **My Places**) and you will be moved to the exact spot to continue making placemarks. Remember to move the main image to the position for the next placemark in the series first.

When you are finished with your images, you can zoom out until all placemarks become visible. This will tell you if you have missed any in the group. If so, double-click the placemark in the Route folder in the **My Places** list to the left (west) of the one you missed, move the GE map to the missed area and follow steps 1 through 7.

Finally, ensure you have two files in your disk folder for each image taken in GE. There will be a file named "<placename>.jpg" and "<placename>.kmz" for each image taken. These files will be used in the next major step in route creation. If you are missing these two files, you may have forgotten to Save the placemark .kmz and Save the image .jpg file.

You can close GE now if you desire.

Use TransDEM to convert the created images into Georeferenced Raster Maps

Everything we do now is done within TransDEM. This part is also tedious, so take your time. Note that every menu item mentioned below has a shortcut key sequence and, if you are adept at shortcut keys (I am not) by all means use them.

Preliminary:

Open TransDEM and prepare to execute these steps repeatedly to convert your images into images that TD can use for your route.

1. Use the **Raster Map** menu and **Open Raster Map**. Select <placename>.jpg from your disk folder. If this is a subsequent file, you will see a popup asking if it is OK to close the current map. Click **OK**. TD will load the map (accessing the <placename>.kmz file automatically) and display the image for that file. A red grid will appear on the image, showing Latitude and Longitude.

2. Using the **Raster Map** menu, move down to **Convert to UTM** and click it. The red grid will shift and change the geographic references from lat/long to UTM.

3. Using the **Raster Map** menu, move to **Save georeferenced Raster Map** and save the image into the same folder as the jpg files. This will save as "<placename>_georef.png" and "<placename>_georef.trf".

Repeat steps 1 through 3 for as many jpg images as you have for your route.

Once you complete converting all the images, open the first image with Raster Map --> Open georef Raster Map and select the first "<placename>_georef.trf" file. Continue loading the georeferenced .trf files in order. As they are loaded, they will begin to form a larger and larger image in the TD window. If you have a lot of files, I suggest you save the current larger image in an interim file using a temporary filename. Save georef Raster Map as "<temporaryname>.lgb" (the .lgb is added automatically). Continue opening georef files, saving by overwriting the temporary file occasionally, until all files are loaded and you have a complete image of your entire route. If there are "black holes", you have skipped one or more files. Go back and gather them, or open them.

With the entire route image file open, make a final save as "<routename>_master" the .lgb will be appended when you save it.

At this point, while you have your entire route showing in the main TD window, Use the Route --> Simple Route Editor. Note that the small icon on the lower toolbar is now depressed. Immediately to the right of that icon is an icon for creating a polyline. Click this icon and move the mouse to one end of your route. Each time you click the mouse, a segment of route will show as a blue line. Exact alignment is not required, just an indication of where the tracks will go on your route. To stop creating the route, double-click the mouse or hit the Esc key. You may create as many route segments as you desire, but create the "main line" first and then create any branching lines later.

When finished marking your route, go to the Route --> Save Route and save the route. Give it the name of your route. A <routename>.str file will be created when saved. The .str will be appended automatically.

Skip the next section if you have already set up the Map Tile Services.

Setup for Map Tile Services

This procedure is detailed in the **TransDEM Program PDF file** copyright by Roland Zieglar. Locate **Tutorial 7: Map Tile Services**, and follow step **A. One-Time setup** which is used to import and store a ZIP file containing two XML files. Once selected, you may skip this step in subsequent route creation.

Creating the route DEM file

1. Either start or continue with TD. If you do not have the large route image .lgb file in the TD window, open it.

2. Use the TD **File/DEM** menu and click **File name into SRTM .hgt**

3. In the dialog box that opens, write down the DEM info file name(s) that appear inside

the box.

4. Open your browser and go to this URL: http://dds.cr.usgs.gov/srtm/

   a. Navigate to *Version2_1* and then to *SRTM3*.

   b. Pick your continent or area. A long list of geographical ZIP files will be presented.

   c. Using the web page search function (usually Ctrl-F) and enter the file name you wrote down in step 3.

   d. When found, click the link and a download dialog box will show. Save the file into the same folder you have been saving all information for your route. If more than one xxxxxxx.hgt file is given in step 3, locate those files also and save them. They will save as .zip files.

   e. Using the TD menu **File/ DEM** click **Open DEM... .** Find the folder where you just saved the zip file(s) and double-click the file, or one of the files. No need to unzip the file. A large, color-tinted area will show in the TD main window. Use the TD File/DEM and click Save DEM using the default name offered. It will save as a .dem file. If more than one file is needed, repeat step e until you have loaded and saved each DEM file.

When the last DEM file is saved, but still present in the TD window, and you have more than one DEM file to use, go to File/DEM --> **Add DEM...** and load DEM files until all DEM files are present in the window. For each file you load, a **Parameter & Info** dialog will appear. Accept the suggested values.

   f. Save the joined (or single) DEM file using the TD **File/DEM** --> **Save DEM**, giving it the name of the route with a new name or a suffix like "_finalDEM". It will be saved as a .dem file.

   NOTE: You may use the mouse to draw a box around the portion of the DEM file in which your route lies. This box size may be adjusted using the small black dots on the perimeter of the box until satisfied. Then, go to the top tool bar, choose the scissor icon and click OUTSIDE the bounding box you just created. In the dialog that opens, make sure the bottom radio button is active, which will remove all outside the box, turning the background black. Click **OK.**

Ready to create the route and export the UTM tiles

For this portion of the tutorial, ensure that you have loaded both the master .dem file, the master .lgb file, and the route .trf files for the chosen route. In order to do this, use the **File/DEM** --> **Open DEM** and select the route's .dem file and the **Raster Map** --> **Open georef Raster Map** and select the route's master .lgb file. Use the **Route --> Open Route** menu and load the route .trf file.

You will now have the DEM map overlaying the master georeferenced image file and the route file showing the route as a blue line or lines.

1. In the TD **View** menu

   a. Set the coordinate system to **UTM**

   b. Select **Fixed 1000m grid width**

2. In the TD **Trainz** menu

   a. Select **Show baseboard grid**

NOTE: If you used the scissors to reduce the size of the DEM originally or not, you may use the magnifying tool on the toolbar (the magnifying glass icon) and zoom in on your route by using the mouse LMB to zoom in and the mouse RMB to zoom out. It is easier to zoom in until the 1000M grid and the baseboard grid shows. Move the map to the upper left area of your route.

3. Activate the Select Tool in the top toolbar (the white arrow icon) and draw a boundary box that surrounds all baseboards that are entirely covered by both the DEM and the image map. You can adjust the boundaries of the box by moving the line using the black points on the perimeter of the box. While the box is being drawn, use the right, left, up and down keys to move the map. Drag the corners of the box as desired until the whole route is enclosed.

4. Using the **Trainz** menu, click "**Export and create DEM & ground textures...**".

   A dialog box will open containing fields for entry. Utilize the **Reset** button first for default settings.

   Move to the lower portion of the dialog (**Map KUID**). Your User-ID should already be entered followed by a unique value for the second field. Ensure both boxes in the Map KUID frame are checked.

   You may adjust the amount of baseboards away from the route line by viewing the frame labeled "Route filter", put a check in the Apply box, then enter the number of baseboards away. If this frame is "grayed out" the route .trf file isn't loaded.

   Move to the **Trainz Version** frame. In the dropdown I select T:ANE, but you should use the version you wish. If you wish to have 5m grids, select the appropriate radio button. If you wish to have default fog, check that box.

   Move to the last group, **Export Destination**. The custom content field should already be filled and "grayed out". In the **Map Name** field, enter the name you chose for your

route. This is a 15-character field. Use the **Region** drop-down list to choose a **Region**. Whatever you choose may be altered in Surveyor to a different region. This setting is used mainly for which side of the road traffic drives.

Fill in the target location by clicking the **Folder** button and navigating to the same folder you have saved all the other files for this route.

Close the dialog by clicking the **OK** button. This starts the route creation process.

A new folder within the target folder will be created with the name you entered in the Export Destination dialog. It will contain all the files necessary to import the route into your chosen Trainz version. For most versions, you simply drag/drop this folder into Content Manager for the route to be installed.

Create the route UTM Tiles

As soon as the route is created in the previous section, go to the TD **View** menu and ensure that the coordinate system has been set to **UTM grid / WGS84** and the **fixed 1000 m grid width** is selected.

Using the mouse with the **Select** arrowhead active on the upper toolbar, create a box around your route, making sure to encompass your entire route and all UTM grids the route covers. You may use the black dots around the box to adjust its size.

Move to the **Trainz** menu and select **Export & Create UTM Tiles**.

In the dialog box that appears, ensure that the radio button for "complete 'UTM' objects" is enabled.

Ensure that your personal User-ID is entered in the Initial KUID field, followed by a unique identifier that will be used as a base for the UTM tile(s).

Both the "Source Folder for Template 'UTM02' Object" and "Destination Folder 'Scenery' Objects" should be filled in automatically and "grayed out". If the destination folder is not filled in, use the **Folder** button to the right and locate the disk folder you created for your new route and click Select Folder. This is where a new folder entitled "Scenery" will be created when you click the **OK** button.

The OK button should now be activated. Click it and UTM tile creation will begin. This takes time, so be patient and wait until all tile generation is complete. When done, there may be a pop-up dialogue that tells you that certain UTM objects could not be found and the corresponding tile generation was "skipped". This is usually due to the bounding box around your route not being exactly right. However, if you made the bounding box cover all the tiles you wanted to generate, the skipped tiles may not impact on your route in any case. (I normally ignore any such "errors" and continue.)

At this point, you can close TD and open your desired Trainz program, starting up Content Manager to be used for route and UTM tile import.

Open Windows Explorer and locate the folder you created for your new route. Within that folder is a folder with the name of your new route.

Drag that folder and drop it into the primary Content Manager frame. The route will be imported into Trainz.

Double-click the Scenery folder to open it. Inside you will see one or more folders with a name beginning with "UTM". With a large route, this could be a great deal of folders.

Highlight all of the UTM folders and drag them to the main window of the Content Manager. They will be imported into Trainz to be used as 3D tiles on your new route.

Close the Trainz Content Manager and start the Trainz simulator. Navigate to the route selection page and select your new route for editing in Surveyor. If all went well, you should see your route with Google Earth images overlaying the entire route.

Final Notes:

If the images do not cover your entire route, you will have to repeat Route Creation and UTM Tile Generation once more, but make the bounding box for the route and the bounding box for UTM tile generation larger. You might also check to see if the route extends everywhere you want it.

As a preliminary step in route regeneration, I normally delete the just-created route and associated UTM tiles, allowing TD to overwrite both route and Scenery folders on your hard drive (which TD will do if you do not change the Destination Folders in both the route and UTM Tile generation stages. If you want to keep the previous route and UTM tiles, simply change the route generation name to a different name. The UTM Tiles generation will overwrite (and possibly add more) folders in the Scenery folder for later import into Trainz.

Need Help?

I can be reached on the Trainz Forum as "Hiballer". I will publish this PDF file in a new thread in the General Trainz panel where you can reach me with your question(s). Please let me know of any omissions you spot or clarifications you need.