

# Create terrain and photo realistic scenery for Condor 2.

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*A step-by-step tutorial on how to create both 3D photo-realistic scenery for use in Condor 2.*

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## Table of Contents

Goal: Create a scenery for Harris Hill Soaring Corporation.....	2
Part One: Creation of 3-D terrain.....	2
Step Zero: Download the tools and guides needed.....	2
Step One: Determine the coordinates for the scenery.....	3
Step Two: Check layout and confirm proper size.....	4
Step Three: Download terrain data and create terrain files.....	7
Step Four: Use the Condor Landscape Scenery Editor.....	9
Step Five: Take a test flight in Condor 2.....	11
Part Two: Photo Scenery creation.....	12
Step Zero: Download extra needed tool.....	12
Step One: Create the commands necessary to download images.....	13
Step Two: Download the image data.....	13
Step Three: convert images to Condor tiles.....	15
Step Four: create the final scenery.....	16
Step Five: Splash Screen and Imagery Credits.....	16
OPTIONAL EXTRA PROCESSING.....	18
Easy Tool to Create Grass Runway.....	18
Higher resolution scenery for airport area tiles (¼ tiles).....	20
How to create a transparent runway surface.....	22
How to create a building/hangar for your airport.....	26
Creating custom thermal maps & forest maps.....	31
APPENDIX ONE – General notes on Scenery Creation.....	34
APPENDIX TWO – manual run of downloader/combiner.....	36
Downloading images manually.....	36
Combining images.....	37
APPENDIX THREE – Licensing, Google and Satellite Imagery.....	38
APPENDIX FOUR – Distortion: Flat map over round earth.....	39
APPENDIX FIVE – GNU Free Documentation License.....	40
APPENDIX SIX – Misc: Turnpoint files, splash images.....	48
APPENDIX SEVEN: Notes on object creation/placement.....	49
APPENDIX EIGHT: High Resolution – whole tiles.....	51
APPENDIX NINE: Adding/merging to an existing scenery.....	52

## Goal: Create a scenery for Harris Hill Soaring Corporation.

This tutorial will take you thru all the steps that were used to create a scenery for Harris Hill Soaring in Elmira, NY. The home of Soaring in the United States and the location of Schweizer Aircraft. In this case we'll be creating a 57x57 mile landscape with the Harris Hill airfield (4NY8) at the center.

*You don't have to be a graphics expert to create your own scenery. We're constantly updating this document with step-by-step instructions and also using better automation from some of the complex steps. If you have any problems, don't hesitate to [contact us](#). At the end of this tutorial we'll have flyable scenery with 3-D terrain which has been overlaid by photo scenery.*

### Part One: Creation of 3-D terrain

This part will first get your computer setup for landscape creation with the needed landscape creation tools and documentation. We'll then go thru the steps necessary to create a flyable 3-D terrain of the correct size

#### Step Zero: Download the tools and guides needed

If you're a Mac/Apple person, sorry, most of these tools run under Windows. Graphics processing is a difficult task for a PC. You should have a reasonably fast processor and at least 8 gigabytes of RAM and room on your hard drive. A completed scenery can easily use several gigabytes of disk space.

- 1) Download the Condor Landscape tool set (CLT 2.0) and documentation for landscapes from the [condorsoaring.com](http://condorsoaring.com) site, unpack in a different directory from where Condor2 is installed. We recommend you place it in a folder called 'condor' for ease of reference.
- 2) Download a legacy [texture tool from Nvidia](#) that will be needed. Unpack the zip in the same directory where you installed the landscape editor above. When you are done the LandscapeEditor.exe and nvdxt.exe should be in the same folder.
- 3) Download [wget.exe](#) and place it in a folder called C:\Programs\wget (*you will probably need to create the C:\Programs folder and the folder C:\Programs\wget*).
- 4) Download [7zip](#) and run the install program, accept the default location.
- 5) Download an additional compression tool, [Compressinator](#). Unzip the file to the same directory as the Landscape Editor.
- 6) Download and install the [QGIS program](#) version 2.18.28, We won't use most of it, but one of the utilities it contains will be used by Condor\_tiles later. Although there are newer versions of this software, make sure you get version specified.
- 7) Download and install Google Earth Pro for the desktop → <https://www.google.com/earth/versions/> Scroll down on the versions page and choose the desktop download. This is a great tool for visualizing/measuring your landscape.

8) Download the Condor\_tiles program. Unzip the file to the same directory as the Landscape Editor. It can be found in the downloads section on the SoaringTools web site → <http://www.SoaringTools.org/index.php/downloads/>

9) You can now download some updated files used in scenery creations. After download you want to unpack them in the same folder where you unpacked Condor\_tiles. In my case: \John\soaringtools\condor\Batch

NOTE: The “Batch” folder should already be present. It was created when you unpacked Condor\_tiles in the step above. *You may get a warning that the files already exist in the destination, go ahead and allow replacement.*

As an example, if you unpacked the Landscape Editor, Compressorator, and Condor\_tiles in a folder called “condor”. It should have at least the following contents:

```
Batch/                Help_Files/          SimpleObjects/  compressorcli-4.4.19-win64/
Condor_Tiles.exe  LandscapeEditor.exe  viewer/         nvdxt.exe
```

## Step One: Determine the coordinates for the scenery

Although we will be building the Harris Hill scenery, it’s likely you’re already thinking about making a small scenery for your local area. It’s relatively simple to use this tutorial as a model and substitute your own area. The steps are the same, just the naming is different. If you’re going to do this, it might be good to learn a bit more about the structure of Condor2 sceneries so that you understand what is happening at each step (see details in APPENDIX ONE – General notes on Scenery Creation).

Briefly, the unit of Condor2 scenery is the *tile*. Each tile is 23 km x 23 km (14.29 mi x 14.29 mi), and a scenery is a rectangle of row x col tiles. This is important because as you choose the size of your initial scenery you want the sides of your rectangle to be multiples of the tile size. Also be aware that the outer edge of this rectangle is not usable (approximately ¼ tile), so when you think about your coordinates, take into account this margin.

You can use any map, but Google Earth is very handy. Take the time to make SURE you get the coordinates right. Google Earth makes it easy giving you the decimal coordinates of the Southeast and Northwest corners.

You now have a potential area selected. Because the earth is round and our maps are flat, we need a way to project that curved surface onto a flat area. The first goal is to determine the latitude/longitude of the north west corner and south east corner of your landscape (also know as top left and bottom right).

For Harris Hill we want at least a 9 tile landscape (3 x 3). Each Condor landscape tile is 14.2915 miles/23 km square, so we want to have a square app. 42 miles on each side. Now remember, the Earth is not FLAT, so our square is approximate and the tools will compensate for that. Make sure you have a little extra. Start from your center point and measure out 23 miles N,S,E,W (46 miles/side)



If you use another tool, BE CAREFUL not to confuse Degrees/Decimal minutes/seconds below with other format which give individual degrees, minutes, seconds.

Some tools like a certain format – many are happy to take the wrong format and convert to a bad location..... beware! This web site is your FRIEND in conversions →

<https://www.pgc.umn.edu/apps/convert/>

**NW Pt: 42°25'26"N / 77°24'26"W or 42°25.438'N / 77°24.434'W or 42.423968 / -77.407247**

**SE Pt: 41°48'41"N / 76°25'32"W or 41°48.699'N / 76°25.545'W or 41.811661 / -76.425757**

WARNING: Don't skimp on this step, some bad numbers here will cost you later!

## Step Two: Check layout and confirm proper size

With those corners defined, we now start to build the landscape. The Lat/Lon we have are approximate. Create a folder in the Condor2\Landscapes directory to hold your scenery. In this case we call it hhsc1 (you can substitute your own scenery name in the examples).

1) Start Condor\_Tiles.

- In the "Landscape" box, choose the folder you just created above.
- Some settings: Imagery/Tiles, Tile Zoom/16, Tile size/8192, GeoData/OSM. DXT/DXT1
- On just the first run you need to define several paths. Using the '...' buttons to set:

Condor\_Path → Set it to the location of your Condor2 install, usually C:\Condor2

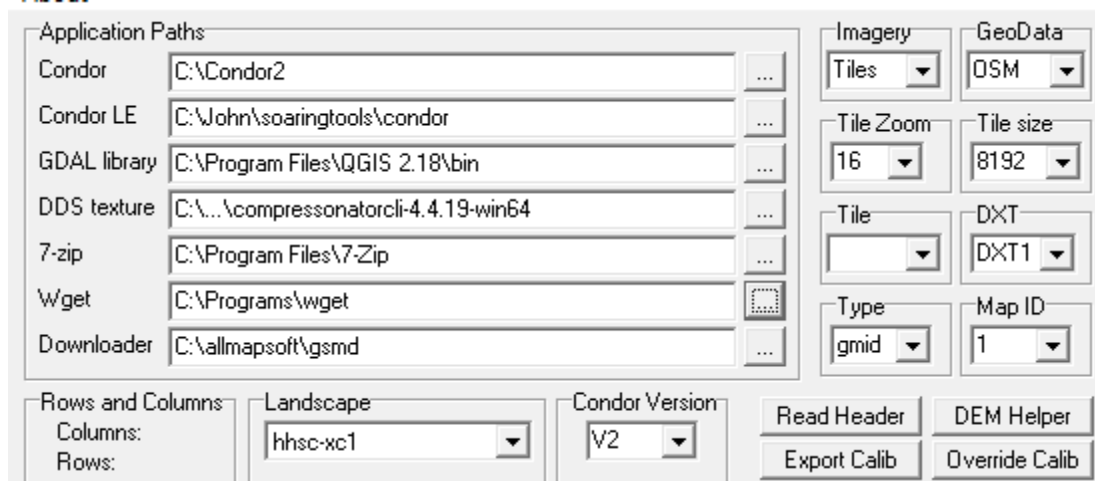
GDAL library Path → This is a geodata processing package that was installed as part of QGIS. If you've installed QGIS 2.18 you should find this path: C:\Program Files\QGIS 2.18\bin  
If you're having a hard time finding it, do a Windows search for gdalwarp.exe

Texture Compressor Path → This should point to the install directory for compressorator.

Download combiner path → This will become important later when we download satellite imagery. For now just type in the path: C:\allmapsoft\gsmd -- we'll install the software later

in the tutorial.

Mine looks like this when done. **Don't accept the default values!**



2) In Condor\_tiles click on the “DEM Helper” button (top of the 2<sup>nd</sup> column on the right side). This will bring up a new screen. Make the following entries:

a) In the upper left “Desired Area Selection” choose “By Coordinates” and enter the values just as we recorded earlier. Use decimal values, latitude for North/South, longitude for West/East.

b) In the bottom left “Range Margin” choose “None” (we should have already compensated that the last 5.76Km or 3.6 miles will be unflyable around the border of your landscape. Do not check the box “TL BR”

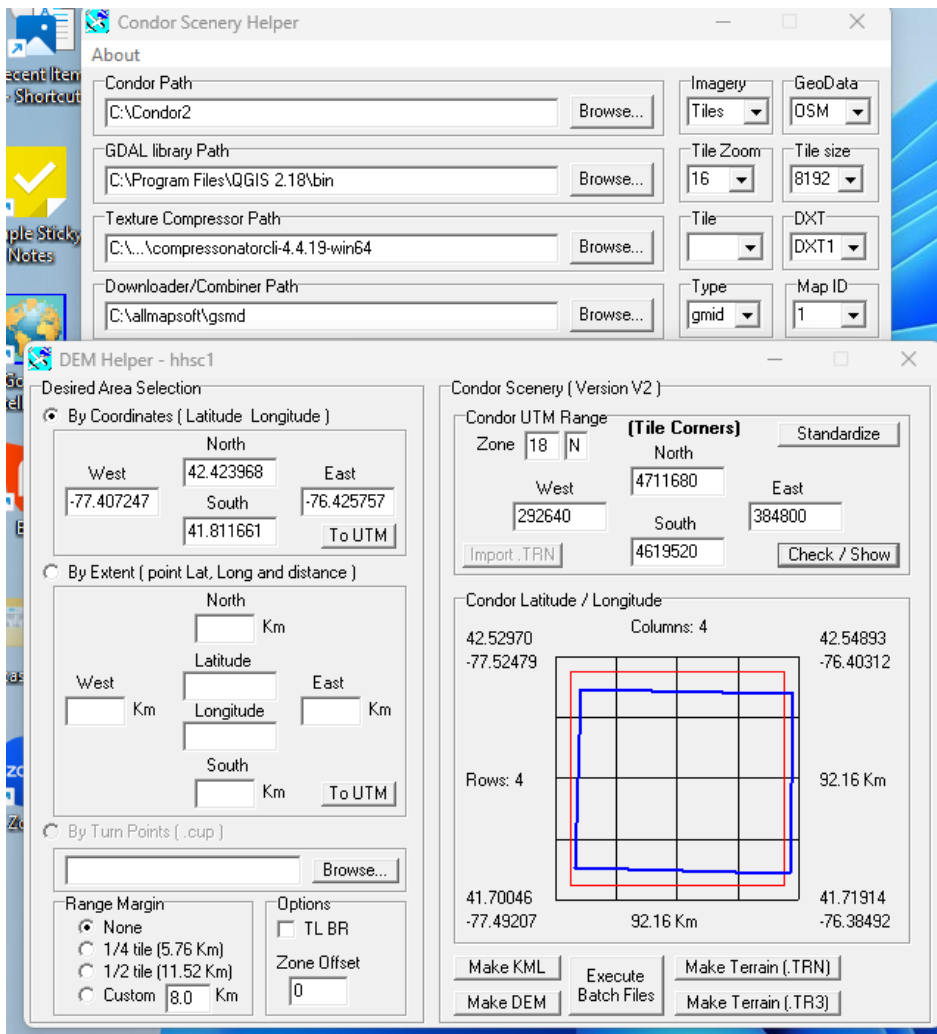
c) Then click the box ‘To UTM’. You will see values fill in the upper right side in the box “Condor UTM Range”.

d) In the upper right click on “Standardize” and then click “Check/Show” and you will see a grid pattern in the box labeled “Condor Latitude/Longitude”. Explanation follows.

The numbers in the upper right box are called Easting/Northing values. The earth is divided into 60 UTM zones, HHSC is in 18N, and your exact location in the zone is defined by the Easting(X Coord) and Northing(Y Coord). So the values above express the exact coordinates of the corners and for our Condor landscape they need to be on whole numbers.

The bottom right box shows the rounding that occurred. Our original values (the Blue Box) put us closer to a 4x4 terrain. The outer black grid shows the landscape has been expanded to 4x4. The red box shows the actual flyable area (remember, you can't reach the edge of a landscape). We could try to shrink it in Latitude and Longitude for a 3x3, but we'll accept the 4x4.

GOOD IDEA to take a screen snapshot to you have all the values, including lat/lon of the corners.



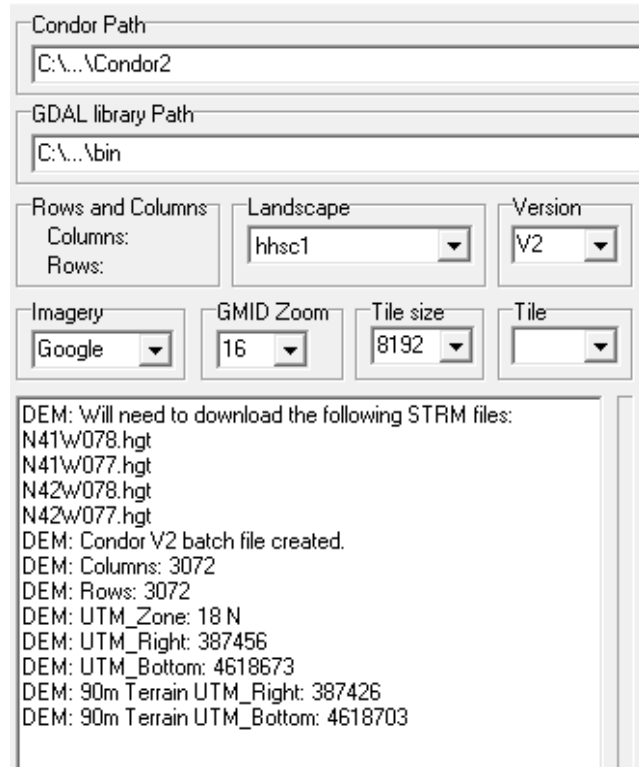
NOTE: Your screen layout may look a little different than above, depending on your version of Condor\_tiles – but the info should be the same.

3) In the lower right click on “Make KML” to make a Google-earth map file. It will be stored in Landscapes/hhsc1/working/DEM/OverAllMap/OverAll.kml  
 You’ll need Google Earth to open and see the file. It should agree with what you expect.

### Step Three: Download terrain data and create terrain files

1) Click on “Make DEM” (lower left part of the window) while in the “DEM Helper” window to create a batch file to run the GDAL library routines. Check the message box in the main Condor\_tiles window for files you need to download. What’s DEM? → Digital Elevation Model

DEM: Will need to download the following STRM files:  
 N41W078.hgt  
 N41W077.hgt  
 N42W078.hgt  
 N42W077.hgt  
 DEM: Condor V2 batch file created.  
 DEM: Columns: 3072  
 DEM: Rows: 3072  
 DEM: UTM\_Zone: 18 N  
 DEM: UTM\_Right: 387456  
 DEM: UTM\_Bottom: 4618673  
 DEM: 90m Terrain UTM\_Right: 387426  
 DEM: 90m Terrain UTM\_Bottom: 4618703



2)

At this point some files have been created for your new scenery. Check the ../Working/DEM folder and you see several batch files: DEM\_WGET.bat, DEM\_Extract.bat, and DEM.bat. They contain the commands necessary to download the actual 3-D terrain data for the area you specified.

```
C:\Users\jmurtari>cd \Condor2\Landscapes\<1landscape_name>\working\DEM
C:\Condor2\Landscapes\hhsc1\working\DEM>dir /w
```

```
[.]                [..]              DEM.bat           DEM_Extract.bat   DEM_WGET.bat
[KML]              LatLong.txt       scenery.hdr       URLs.txt
```

3) The scripts will download data from a USGS/NASA website. It uses Space Shuttle Radar Topography Mission data. Go to → [asa.gov/home](http://asa.gov/home) to register and create a login account with NASA.

*NOTE: They require a strong password that includes a ‘special’ character, please use the ‘@’ character and not an exclamation point or dollar sign. At times downloads from the USGS servers may fail. They do offer pretty responsive tech support. If you have a problem, let them know here → <https://ers.cr.usgs.gov/feedback/>*

4) In the DEM Helper window press the button labeled “Execute Batch Files”. You will see a command window opened and you will be prompted to enter your username and password for the NASA website.

NOTE: You may get a warning about an unknown program that wants to execute, allow it.

5) Start a “Command Prompt” window. After download you should now have this additional contents:

```
c:\Condor2\Landscape\hhsc1\working\DEM>dir (your dir display may have different columns)
12/18/2023 12:42 PM          10,602,217 N41w077.SRTMGL1.hgt.zip
12/18/2023 12:42 PM          11,545,464 N41w078.SRTMGL1.hgt.zip
12/18/2023 12:42 PM           9,441,928 N42w077.SRTMGL1.hgt.zip
12/18/2023 12:42 PM           9,575,162 N42w078.SRTMGL1.hgt.zip
12/18/2023 12:43 PM              679 UTM_cropped.hdr
12/18/2023 12:43 PM         18,874,368 UTM_cropped.raw
12/18/2023 12:43 PM              604 UTM_cropped.raw.aux.xml
12/18/2023 12:43 PM              683 UTM_cropped_90m.hdr
12/18/2023 12:43 PM         2,097,152 UTM_cropped_90m.raw
12/18/2023 12:43 PM              604 UTM_cropped_90m.raw.aux.xml
12/18/2023 12:43 PM         2,099,695 UTM_cropped_90m.tif
12/18/2023 12:42 PM              34 wget.log
12/18/2023 12:42 PM              104 ZIPS.txt
```

6) Now you can use the two other buttons at the bottom of the DEM helper page. Click on “Make Terrain (.TRN)” to generate a Terrain file. *You will see a blue progress bar in the main Condor\_tiles window.*

When that is complete click on “Make Terrain (.TR3)” to generate the heightmaps files that Condor2 uses for elevation. Depending on the size of the terrain, this may take a few minutes. *Again, the progress bar will appear in the main Condor\_tiles window.* The following files and folders were created within [c:/Condor2/Landscape/hhsc1](#)

hhsc1.trn

HeightMaps/ – a folder containing series of files starting with h0000.tr3 – h1515.tr3

These contain the terrain data for each tile. You should be asking if our terrain is 4x4, that should only be 16 files, why are there 256!!!!? Because.... Condor2 subdivides each of the larger tiles into 4x4 subtiles. So  $16 * 16 = 256$ .

How do you relate the numbers to the actual terrain location, check Appendix ONE for a complete explanation. Real quick → The bottom right tile is “0000”, the first two digits are the row, the second two are the column. The tile to the left of the bottom right tile is “0001” and the tile above the bottom right is “0100”. The tile in the upper right corner is “1515” (remember, total of 16 subtiles numbered 0-15).

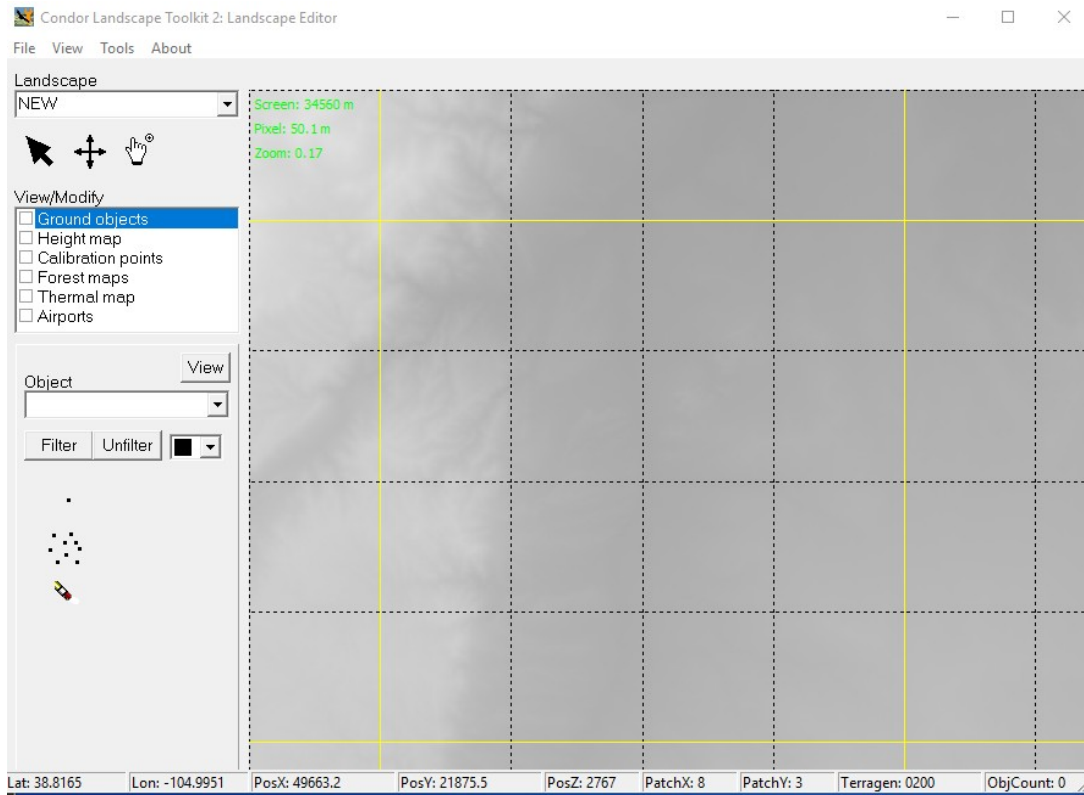
**NICE JOB!** – you can close Condor\_tiles for now.



## Step Four: Use the Condor Landscape Scenery Editor

In our last step we'll actually finish creating a flyable terrain. It won't have any real scenery, but you'll be able to see 3-D terrain and fly it in Condor2.

1) Start the Landscape Editor, and from the Landscape popdown in the upper right, you should see your new Landscape, hhsc1, as an option. You should see something like below. *It doesn't look like much, but it's actually showing elevation features in the terrain.*



How to maneuver. As you move the mouse around, you are presented with a lot of useful location information in the bottom bar. The latitude and longitude values should agree with what you're expecting. By default, the editor puts you near the middle of the terrain. To move around select the "FINGER" and you can drag the terrain. Notice the yellow lines delimit the larger 4x4 tiles, and the dashed lines show the 4x4 subtiles.

Click the left mouse button to zoom in, middle/right to zoom out.

3) A landscape must have at least one Airport defined to be flyable in Condor 2. Using another tool like Google Earth you need to find the exact LAT/LON in decimal degrees for the middle of your runway, also the elevation (in meters). Google Earth does give you the option of seeing decimal degrees and meters.

For hhsc1 I used the name 4NY8: 42.119522 / -76.900490 (THIS SHOULD BE THE MIDDLE/CENTER of the runway), elevation: 523 meters(1715'), length: 500 meters (1640'), direction: 331 True (340-9W variation), width: 36 m.

4) In the Landscape Editor, in the "View/Modify" box, check "Airports". Then put your mouse in the blank area beneath and click right. A menu should appear, select 'Add'. Then fill in the values and select OK. It should appear on the map.

4a) OPTIONAL – you may want to flatten the runway terrain. Choose "Height Map" and the map will show you elevation, zoom into the runway, it should be outlined. Then click on the "FLATTEN" icon and set the radius slightly wider than the runway, and set the altitude to elevation (in meters) and a slope ratio (1:3 is good). As you sweep your mouse you'll see two concentric circles: the inner one is the flattening area and the ring between the inner and outer one is the graduated slope. It's helpful to get the immediate runway area flat for placement of objects and ease of towing.

5) Now just complete the steps in the "Condor Landscape Guide". Make sure to follow the order below:

- a) File → Export flightplanner map
- b) File → Export forest map.
- c) File → Export thermal map.
- d) File → Export textures to DDS (As the guide says, you'll need the Nvidia legacy texture tools placed in the same directory with the LandscapeEditor.exe for this to work. Say 'No' to export only nonexisting, we want everything recreated.
- e) File → Export terrain hash
- f) File → Export forest hash (NOTE: These steps are important as an anti-cheat mechanism. ALSO, if you ever try to fly Condor2 and your elevator doesn't work, make sure you have exported these recently).
- g) File → Save Landscape

## Step Five: Take a test flight in Condor 2

Just a little more to do.

1) You still need two more files in the main landscape directory. Condor\_Tiles will automatically create two dummy files you can edit as needed. You just need to start Condor\_Tiles and then choose the 'Read Header' button on the upper right side. You should then see some messages and the files will be created if they are absent.

```
Reading Terrain header...
```

```
UTM Zone: 18 N
UTM Bottom: 4618673
UTM Right: 387456
Height: 1024
width: 1024
Resolution: 90
Delta X: -90
Delta Y: 90
```

```
42 dummy centre tile airports \dhsc1.apr created
```

- hhsc1.ini – Edit the text file and change Version to be something meaningful, e.g. version=1.0
- hhsc1.cup – This is another text file, which contains waypoint/turnpoint definitions. By default, a dummy waypoint is placed in the center of the scenery. See the appendix for the format of this file.

2) Start Condor2 and select "FREE FLIGHT". In the upper right "Landscape" box you should now be able to select your scenery.

3) TASK tab: You must define a simple task. Click on "New" and then Click on your airport, move the mouse and it will create a line, Click again to create a turnpoint. Just make a box, but end it by going to your airport and clicking again – you should get "Finish"

4) NOTAM tab: You can try an "Aerotow", recommend change rope length to 200'. We have not yet created a real airport, so the terrain and tow planes may not line up. If it doesn't work, choose Airborne.

5) "SAVE" the flightplan and then click "Start flight"

**NOTE:** *When the flight starts, check your flight controls. If you cannot move the stick forward/aft please re-export the terrain and forest hash shown earlier in the landscape editor, then save again. The lack of stick control is a security feature against 'tampered' sceneries...*

## Part Two: Photo Scenery creation

### Step Zero: Download extra needed tool.

There is probably a way to do this for FREE and we're happy to update the tutorial. For now you'll need to spend a little money for a tools that makes downloading satellite imagery easier.

Go to <http://AllMapSoft.com/> and download the "Google Satellite Maps Downloader." To create HI-RES scenery as we will in this case, you'll need the paid version.

**Your version should be at least 8.368**

Let it install to the default location, usually: C:\allmapsoft\gsmd

After it installs you'll need to create a symbolic link to make it usable by other tools. To do that you need to run a Command Prompt window as the Administrator.

*NOTE: Use "Command Prompt" and not "Power Shell".* Then give these commands:

```
C:\WINDOWS\system32>cd \allmapsoft
C:\allmapsoft> dir
Directory of C:\allmapsoft
05/11/2020 01:31 PM <DIR>      .
05/11/2020 01:31 PM <DIR>      ..
05/11/2020 01:22 PM <DIR>      gsmd
C:\allmapsoft> mklink /D gmid gsmd
symbolic link created for gmid <<====>> gsmd
```

Confirm with a 'dir' command. Depending on your version of Windows, you'll see something that matches the below

<pre>C:\allmapsoft&gt; dir 05/11/2020 01:32 PM &lt;DIR&gt;      . 05/11/2020 01:32 PM &lt;DIR&gt;      .. 05/11/2020 01:32 PM &lt;SYMLINKD&gt;  gmid [gsmd] 05/11/2020 01:22 PM &lt;DIR&gt;      gsmd</pre>	<pre>C:\allmapsoft&gt;dir 03/31/2023 11:36 AM &lt;DIR&gt;      . 03/31/2023 11:36 AM &lt;DIR&gt;      .. 04/03/2023 04:37 PM &lt;DIR&gt;      gsmd 1 File(s) 847 bytes</pre>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

For Condor scenery generation, the concept is to get a set of these imagery tiles at a desired resolution for a given area to fit into Condor tiles of a desired resolution. Review APPENDIX ONE – General notes on Scenery Creation for more info and a table of zoom/resolution in meters.

## Step One: Create the commands necessary to download images

1) Start Condor\_Tiles (**IMPORTANT: click right and choose "Run as Administrator"**) To minimize the download data size, Condor\_Tiles creates 'symbolic-links' for the imagery folders and needs administrator level for this step.

Pick the landscape name and Version should stay at V2 (this is for Condor2, not version 2 of your scenery).

Pick the type of data imagery (we'll be using Tiles).

Pick the desired Tile zoom level (we'll use 16 for high resolution)

Pick the desired tile size for Condor, which should match closely to the zoom level (8192)

NOTE: High resolution uses a lot of disk space. Use zoom level 15 for large Landscapes, with a tile size of 4096.

2) Click on 'Read Header' button to load the UTM data of the scenery extents

You should see something like this in the message area:

```
Reading Terrain header...
UTM Zone: 18 N
UTM Bottom: 4618673
UTM Right: 387456
Height: 1024
Width: 1024
Resolution: 90
Delta X: -90
Delta Y: 90
```

3) Click on the 'Make GMID' button to generate initial coordinate extent files for each tile. These files will be used by the Maps Downloader. Again, you can see the numbering coordinate system used for the files. These are text files. You will find them in the ./Working/SourceTiles

NOTE: Look at the contents, the Lat/Lon coordinates should be as you expected.

## Step Two: Download the image data.

NOTE: The latest version of GoogleSatelliteMapsDownloader and Condor\_Tiles allows us to automate much of this process. To see details on the manual method, reference Appendix Two.

1) Condor\_tiles has created a couple of batch files to automate the process in the :

GM c:\Condor2\Landscapes\hhsc1\working\sourceTiles folder:

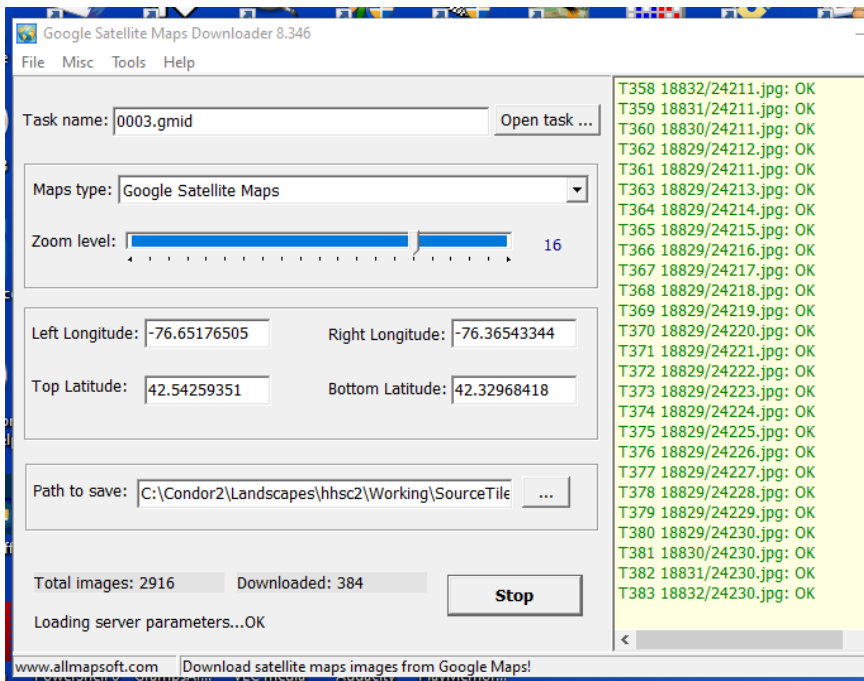
```
-rwxrwxr-x jmurtari None 1250 May 11 11:56 ./working/SourceTiles/GMID_ALL.bat
-rwxrwxr-x jmurtari None 690 May 11 11:56 ./working/SourceTiles/GMID_ALL_Combine.bat
```

Again, in a Command Prompt window, change to the tiles directory and run GMID\_ALL:

```
> cd \Condor2\Landscapes\hhsc1\working\sourceTiles
> GMID_ALL
```

Note that some of the batch files call other batch files, so you may not run all the batch files listed.

This takes about 30 minutes on a 4x4, 16 tile scenery. You will see new windows open and close for downloading and combining files as it works it's way thru the process, e.g.



NOTE: If the scenery has more than 55 tiles, it is possible the process will be interrupted as Google sets limits for downloads. In that case you will have to wait 24 hours to resume. You can just give the GMID\_ALL command again, the tools will skip images that have already been downloaded.

2) At the end of the automatic process, you've created 16 .bmp files, one for each tile:  
/cygdrive/c/Condor2/Landscapes/hhsc1>find ./working/SourceTiles -name "\*.bmp" -print

```
./working/SourceTiles/0000/0000_combined/0000.bmp
./working/SourceTiles/0001/0001_combined/0001.bmp
./working/SourceTiles/0002/0002_combined/0002.bmp
./working/SourceTiles/0003/0003_combined/0003.bmp
./working/SourceTiles/0100/0100_combined/0100.bmp
./working/SourceTiles/0101/0101_combined/0101.bmp
./working/SourceTiles/0102/0102_combined/0102.bmp
./working/SourceTiles/0103/0103_combined/0103.bmp
./working/SourceTiles/0200/0200_combined/0200.bmp
./working/SourceTiles/0201/0201_combined/0201.bmp
./working/SourceTiles/0202/0202_combined/0202.bmp
./working/SourceTiles/0203/0203_combined/0203.bmp
./working/SourceTiles/0300/0300_combined/0300.bmp
./working/SourceTiles/0301/0301_combined/0301.bmp
./working/SourceTiles/0302/0302_combined/0302.bmp
./working/SourceTiles/0303/0303_combined/0303.bmp
```

## Step Three: convert images to Condor tiles

Now each image is converted into a Condor tile, by 'warping' to UTM and 'cropping' to the desired size.

*NOTE: If you took a break in the process and just re-started Condor\_tiles, make sure to select the proper landscape and click on the “Read Header” box.*

This process is automated below, for information on the manual process see Appendix Two. Also, note that these batch files sometimes create messages such as “Cannot find file xxxx.xxx” or assorted

Error messages. Not all of these messages are indicating failure of the programs. It's best to run each step to completion and then check to see if the indicated output has occurred before deciding there is an execution error.

With Condor\_Tiles, click on Make GDAL but do not select a tile, i.e. leave the tile selector blank.

Condor\_tiles creates a batch file 'GDAL\_XXXX\_TIF.bat' in each tile folder

..\Working\SourceTiles\XXXX and an overall batch file 'GDAL\_ALL.bat' in the  
..\Working\SourceTiles folder.

Again, in a Command Prompt window, run GDAL\_ALL to start the process. For a scenery with a total of 16 tiles (4x4), it can take about 15 minutes.

When you're done, again 16 files created in a new directory, these will be large files, >200 Meg each.

```
jmurtari@anvil:/cygdrive/c/condor2/Landscapes/hhsc1>
./working/Terragen/Textures/0000.bmp
./working/Terragen/Textures/0001.bmp
./working/Terragen/Textures/0002.bmp
./working/Terragen/Textures/0003.bmp
./working/Terragen/Textures/0100.bmp
./working/Terragen/Textures/0101.bmp
./working/Terragen/Textures/0102.bmp
./working/Terragen/Textures/0103.bmp
./working/Terragen/Textures/0200.bmp
./working/Terragen/Textures/0201.bmp
./working/Terragen/Textures/0202.bmp
./working/Terragen/Textures/0203.bmp
./working/Terragen/Textures/0300.bmp
./working/Terragen/Textures/0301.bmp
./working/Terragen/Textures/0302.bmp
./working/Terragen/Textures/0303.bmp
```

## Step Four: create the final scenery

1) Run the Landscape editor, and pick the landscape, and then in Tools, 'Import tile sized textures'  
- the images in `working/Terragen/Textures` will be loaded as the imagery.  
- this will replace the initial black-and-white terrain based imagery.

2) You can check your airport placement with the imagery, and carefully adjust the lat/lon for the proper position.

3) In the Landscape editor the run the same export commands as before.

a) File → Export flightplanner map

b) File → Export forest map

c) File → Export thermal map

d) File → Export textures to DDS (As the guide says, you'll need the Nvidia legacy texture tools placed in the same directory with the LandscapeEditor.exe for this to work. Say 'No' to export only nonexisting, we want everything recreated. This will take about 40 minutes for a 16 tile scenery.

*NOTE: When this is done you can also use Condor\_tiles to tune the runway position. Start the program, pick the landscape, click on 'Read Header' and then 'Airport Place'. A separate window will appear that allows you to make fine position adjustment using the arrow keys. You will see a blue line also, that is the tow plane track. Make sure to save your changes!*

e) File → Export terrain hash

f) File → Export forest hash (These steps are important as an anti-cheat mechanism.

ALSO, if you ever try to fly Condor2 and your elevator doesn't work, make sure you have exported these recently).

g) File → Save Landscape

## Step Five: Splash Screen and Imagery Credits

When Condor loads you see some large images displayed as the scenery is being loaded, in the default Slovenia 2 landscape, 'Two burly guys in a glider!'

It's easy to create your own. We'd recommend at least 1920x1080 in size (HDTV/16:9 ratio) and JPG format. Your landscape has an Images subfolder. It will be empty, but you can copy the files and they are used in random order. As you see below, just use a number as the name, starting at 0 (zero).

Directory of `C:\Condor2\Landscapes\hhsc1\Images`

05/12/2020	08:12 AM	1,714,475	0.jpg
05/12/2020	08:12 AM	1,528,563	1.jpg
05/12/2020	08:12 AM	2,053,719	2.jpg



**See APPENDIX THREE about imagery usage.** Not real practical to put tags in the landscape that will never be seen. We'd suggest adding some text somewhere on your Splash Screens to credit Google. ALSO, don't forget to give us a LITTLE LOVE! We'd be happy if you'd share the source of help, e.g.

Satellite imagery: Google Earth  
Help from: SoaringTools.Org

*CONGRATULATIONS – you should have a flyable landscape! If you'd like to share it, let us know and we'd be happy to offer a download from our site.*

*Now you just need to create a nice airport/runways and potentially user higher resolution in the immediate airport area. See the **OPTIONAL EXTRA PROCESSING** section that follow*

*You can find some excellent tutorials on using the other Landscape utilities and how to create a detailed airport with buildings in their "Downloads" area ->  
<https://www.condorsoaring.com/downloads-2/>*

*Be prepared for some reading, the English version of the Airport Creation tutorial has over 130 pages!*

## OPTIONAL EXTRA PROCESSING

None of these items are required, but they can enhance your scenery. We especially recommend adding a smooth runway and also using a higher tile resolution in the immediate airport area.



### Easy Tool to Create Grass Runway

This can be a lot of work. But if you need just a grass strip you can [download Airport Maker](#) (by Jiří Brožek) from our site. Just unpack to your desktop and you'll see the Icon.

In this example will assume the name of the Airport in your landscape is "Lawrence." Then follow these steps.

1. Start Airport Maker
2. In the Runway parameters box, enter the width and length (IN METERS!).
  1. Side marker count: 1
  2. Corner makers: Outer
  3. Marking style: Painted Grass
3. In the Grass surface, enter the size of any grassy area that surrounds the runway (experiment). Use the "Offset" values to move the grass.
4. Windsock – change the offset values to move it's position.
5. Generate OBJ Files - A "Save as" dialog pops up. You want to pick the Airports folder for your landscape (it should be empty if you've never created an airport). Then enter the "File name" as "Lawrence", do not choose anything for "Save as type". Press the "Save" button.
6. You should see these files in the Airports folder and can close Airport Maker;

LawrenceG.mtl\* LawrenceG.obj\* LawrenceO.mtl\* LawrenceO.obj\*

7. You can close Airport Maker.
8. Convert the files to Condor format – As part of the "Condor Landscape Toolkit" you downloaded earlier in the tutorial, you will find the "Object Editor". Double-click and start the application.
9. Choose "File" → "Open Obj"
  1. Open the LawrenceG.obj, you'll see some info appear.

2. Select “File” → “Save to C3D” and the Airports folder should already be selected with the proper file name. Just press the “Save” button.
  3. Repeat the steps above for the LawrenceO.obj file.
10. You should now see two additional files in the Airports folder and can close Object Editor.

LawrenceG.c3d\* LawrenceO.c3d\*

11. Those are the only two files required in the Airports folder, you can delete the others.
12. Congratulation! You should now see a real surface in Condor 2. If you do not, or see blotches, check the ‘flattening’ of your airport area. A bumpy surface will project above the runway.

## Higher resolution scenery for airport area tiles ( $\frac{1}{4}$ tiles)

From: Nick Bonniere

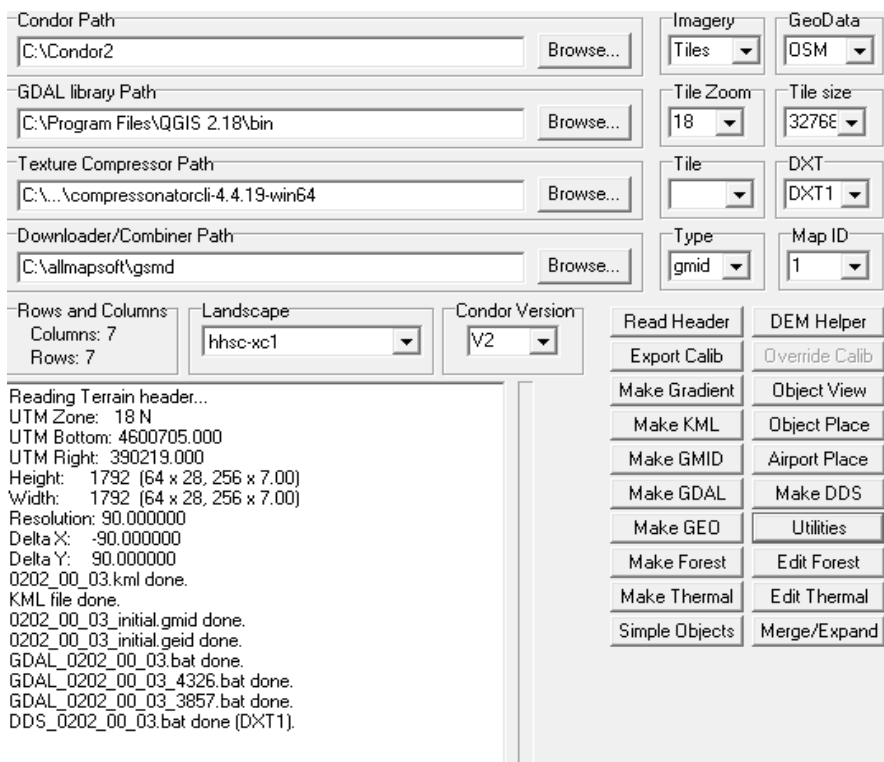
For this procedure we assume you have already completed the entire landscape and imagery is present following the earlier steps in this tutorial. At this point we may want to use higher resolution in the immediate airport area.

NOTE: You may wonder why we limit ourselves to  $\frac{1}{4}$  of a full tile when going to higher resolution. The additional imagery detail has quite a cost in disk space:

- Zoom level 16, tile size: 8092 (our default)– resolution of 2.8 meters/pixel, file size: 2.8 Meg
- Zoom level 18, tile size: 32768 – resolution of .7 meters/pixel, file size: 44 Meg
- Zoom level 19, tile size: 65536 – resolution of .35 meters/pixel, file size: 178 Meg

The quarter-tile number is used instead of the tile number, because the tiles are further sub-divided into 4x4, Tile 0202, becomes 16 tiles, 0808, 0809, 0810, 0810, 0811 ... 1111 and you have to pick the right one(s). You can use the Landscape Editor. The Patch X/Y values are at the bottom of the screen, e.g. PatchX: 8, PatchY:11 is converted to quarter tile 0811.

1. Start condor\_tiles (run as admin), select the landscape, read the header.
2. In the selection boxes manually type 32768 in the “Tile Size” box. Manually type 18 in the “Tile Zoom.” Make sure GeoData is set to “OSM”.
3. Click on the “Utilities” button.
4. Next to the “Quarter Tile KML GDAL DDS” button, enter one quarter tile number (0811) and then press that same button. You’ll see a message about created files, the names will have a reference to the full tile position, e.g. 0202 in our case.



5. Go to the folder Working\SourceTile\0202\QuarterTiles
6. Make sure Texture Compressor Path is correct, you should use Compressorator.
7. In the QuarterTiles folder, in a command prompt window, run the MAKE\_ALL\_xxx.bat file (the one without the \_4326). It will take care of downloading the tiles, combining them, and producing the final .dds texture files with the increased resolutions
8. It does download a lot, it may be disconnected early. You should run it again to double-check. It will only download anything missed. No harm in the process.
9. Finally run the bat file beginning with “DDS” to create the final texture. The file will be in the same directory, e.g. t0811.dds (app. 44 megabytes in size).
10. You will need to copy that file to the <landscape>\Textures folder, it will replace the existing t0811.dds (2.7 megabytes in size).  
*NOTE: Before doing this copy, make a backup version of the files you’ll be replacing. The original resolution version are necessary if you wish to create a forest map later.*
11. You’re ready to fly the landscape!

NOTE: If you wish you can try zoom level 19 and tile size 65536. When running the ‘downloader’ in step 7 above, it may terminate with an error about licensing, just start it again and it will pickup where it left off.

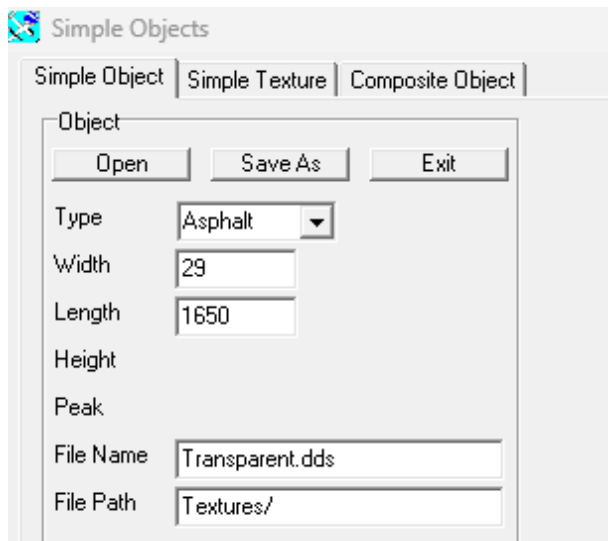
## How to create a transparent runway surface.

For airports using concrete/asphalt pavement, the easiest method to get a realistic runway is to use high resolution in the just the airport area (as describe previously), and then create a transparent surface to deliver a smooth takeoff.

**Overview:** A condor airport consists of a ‘G’ file and an ‘O’ file. Another runway is another airport. The G file is runways, natively condor understands only grass and asphalt. The glider sits on top smoothly. The O file contains objects like windsocks, buildings, or other objects. Contact with one of those breaks the glider. The windsock is special since condor changes the orientation depending on winds you select. The pole is stationary, the windsock sits on stop, as two separate objects.

The steps are as follows, using an example landscape called: ‘cap-ner’

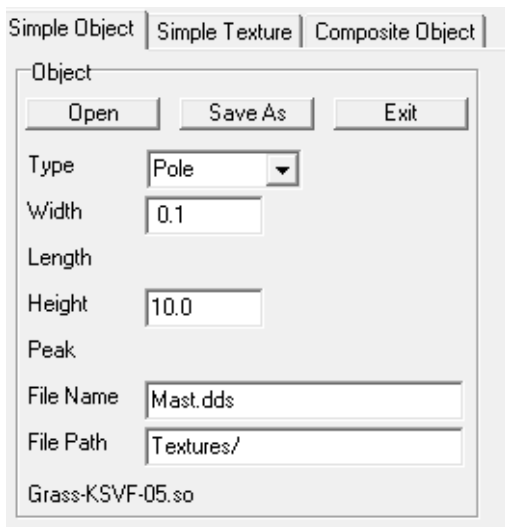
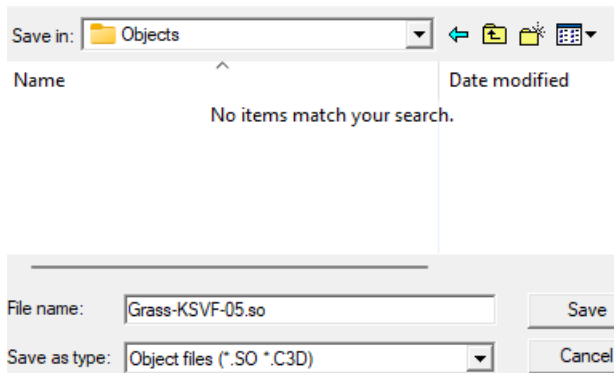
1. Create the folder cap-ner\Working\Objects – this will hold some temporary files used to create the objects.
2. Create the folder cap-ner\Airports\Textures – this will hold 3 d objects.
3. In the folder where you installed Condor\_tiles you will see a folder named “Simple Objects\Textures.” You should copy two of those files, Mast.dds and Transparent.dds, to the cap-ner\Airports\Textures folder you created above.
4. Start condor\_tiles, select the landscape, and click on “Read Header.” The select “Simple Objects.”
5. When the Simple Object window appears, make sure the “Simple Objects” tab is selected, and



in the “Type” pull down menu select Asphalt, fill in the other boxes as shown (with the correct runway length/width).

6. Select “Save As” and use a meaningful name. The file will be stored in the Working\Objects folder you created. Two files will be created with a .so and .c3d extension. The files will have different contents.

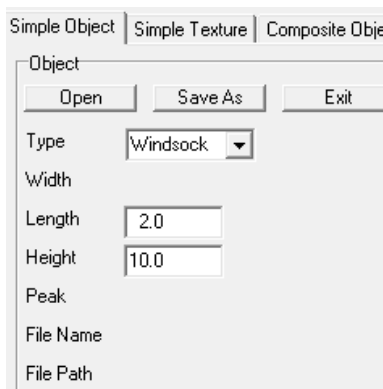
It is recommended you use the runway name to avoid confusion if the scenery could contain more than one airport/runway.



7. Next we will create the windsock and its pole. Return to “Simple Objects” and choose “Pole.” Then select the correct width and height (in meters). The File Name and Path should fill in automatically. Make sure you save.

8.

9. Then choose “Windsock” (you are allowed up to three for one airport). You can set the length as desired, but the height must match what you selected for the pole. They are actually two separate objects within Condor.



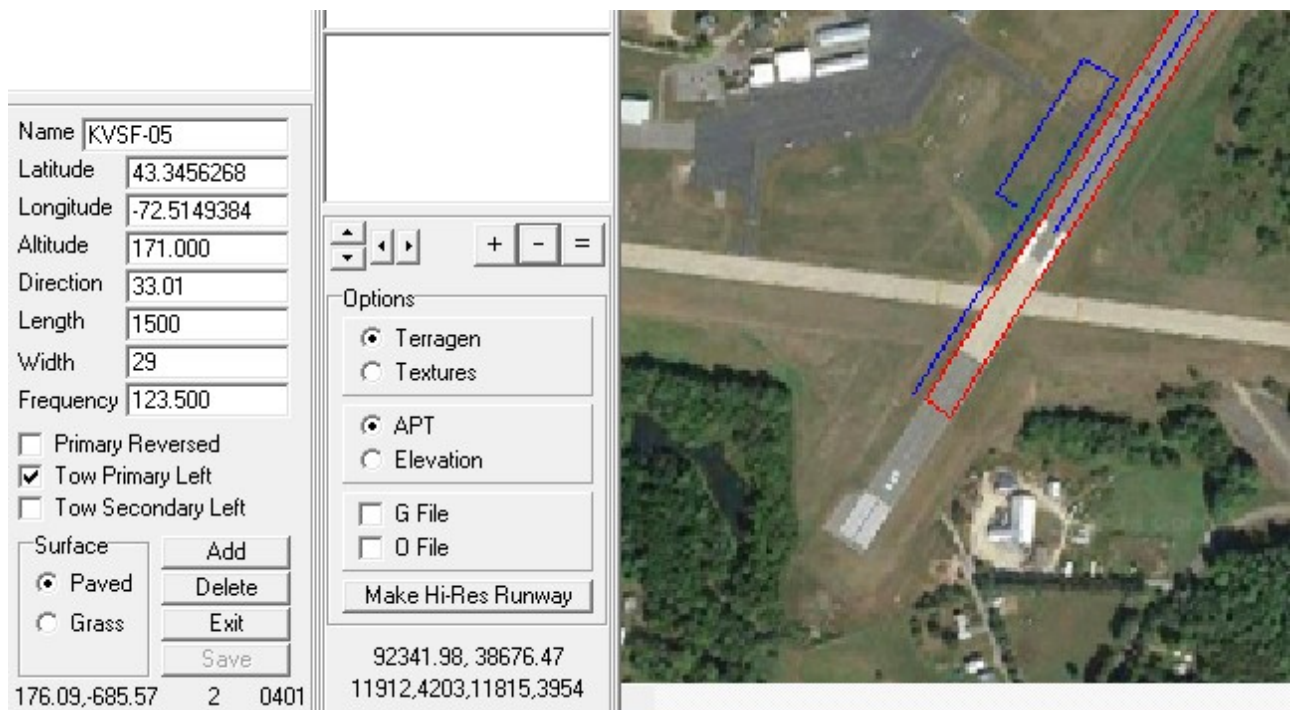
10. Again, repeat the “Save As” operation and start the name with the word “windsock.”

At this point you've created all the basic objects, you should have directory contents similar to the below:

```
c:\Condor2\Landscapes\cap-ner\Working\Objects>dir

02/18/2024  02:45 PM                256 Grass-KSVF-05.c3d
02/18/2024  02:38 PM                 52 Grass-KSVF-05.so
02/18/2024  02:49 PM               510 pole-KSVF-05.c3d
02/18/2024  02:49 PM                 45 pole-KSVF-05.so
02/18/2024  02:55 PM               190 windsock-KSVF-05.c3d
02/18/2024  02:55 PM                 32 windsock-KSVF-05.so
```

11. We are now ready to position our windsock in the airport area, but we must first get the exact position. Again, we'll use "Airport Place" to get a view of the field. Before you select the airport make sure you choose "Terragen" in the Options area.



12. As you move the mouse over the images, you'll see two numbers changing in the lower left corner. When you reach the position desired, write down the values. In this example: 176 "Easting" and -685 "Northing". These are the meter distances from the airport center as you defined in the landscape editor.



13. We are now ready to group these to make a Composite Object. Select the “Composite Object” tab and press “Add”. It will add a placeholder object with xxx as a name

File	Easting	Northing	Angle
Working\Objects\pole-KSVF-05.c3d	176	-685	0
Working\Objects\windsock-KSVF-05.c3d	176	-685	0

14. Double click in the File box and you will be able to choose another object you created. We’ll be picking the pole and the windsock.

15. We must now position each object using the “Easting” and “Northing” values (units of meters), we recorded earlier. The image shows the complete entries.

16. As before, we’ll use “Save As”. The file name is very important, it will be the name of the airport with the letter “O” added. KSVF-05O.co

17. The next is to create the runway surface, the ‘G’ file. Delete the existing two lines in the composite object window, press Add, and add the file name “Grass” which actual is transparent.

File	Easting	Northing	Angle
Grass-KSVF-05.c3d	0	0	0

You do not make any entry in the Easting/Northing values. That is already the center of the runway.

18. As before, we’ll use “Save As”. The file name is very important, it will be the name of the airport with the letter “G” added, use KSVF-05G.co

19. The final step is to copy the “O” and “G” files to your Airports folder.

## How to create a building/hangar for your airport.

Having structures near the runway can be helpful in creating a realistic environment for takeoffs and landings; however, they can be difficult to create for ‘non-graphics wizards’ – which is most of us!

Condor\_tiles supports the creation and positioning of simple structures. Its repertoire of structures is limited, but will hopefully grow in the future. In the following we take you through the steps used to create a structure near Runway 18 at the Oskosh Airport (KOSH).

### Background on how Condor handles “objects”

We’ll provide step-by-step instructions, but to feel comfortable, it helps to understand some basic concepts on the various files involved. Here is a some of what you’ll encounter and a simple explanation of each. You can also reference [APPENDIX SEVEN: Notes on object creation/placement](#) which has additional info.

We start from the top folder in your landscape:

**Airports/** - When you first create a simple airport(runway) and give it a position/size, this folder is empty. Condor starts your aircraft at an offset from the runway end and heading into the wind. Even if you’ve flattened the terrain, it can be a bumpy takeoff.

*Once you create a runway surface and windsock in our tutorial, you’ll see the following:*

**Airports/KOSHG.c3d** – This has the name of the airport followed by the letter “G” for Ground objects. This is normally just the runway surface. Condor puts you on top of the smooth surface. Ground objects can’t hurt the glider. This file is not viewable as text and contains references to .dds files located in the “Textures” subfolder. These are created with other tools, but can be viewed with an image editor.

**Airports/KOSHO.c3d** - The letter “O” is for surface Objects, a windsock, hangars, etc... Hit these and the wings come off! This contains the contents of other .c3d files which contain the detail of individuals structures. It has their location info as offsets from the lat/lon you previously defined as the airport location. *Change the airport lat/lon and all the objects move with it.*

This file is not viewable as text. It contains geometric point positions, a wire frame, that describes each object. Not very pretty to look at. It has references to the files which contain the “Texture” used to wrap the frame. Those files are usually in a subfolder called “Textures.” The texture is an image in .bmp format. Think of it as specially patterned wrapping paper. You can view/change the texture in any image editor.

*NOTE: Condor requires both the “G” and “O” files to exist! You might think all I want is the runway and I don’t need an “O” file. It is required, just add any tiny object and Condor is happy.*

**Airports/Textures/Transparent.dds** – As ‘built ins’ Condor understands two types of runway surfaces, Asphalt and Grass, and it knows how to show an image. The default can usually work for grass, it’s just green, but rarely works for a real runway since there are no markings. Condor does support a user defined texture, and in our tutorial we use transparent. This allows the original surface to be displayed.

**Airports/Textures/H\_PK\_Blue.bmp** – This is an example of an image file that contains what is visible for a surface object like a hangar. Again, you can give the file in an image editor. You’ll notice the file has a grid pattern which covers each surface of the hangar, front, sides, back, and top.

This can be created from actual photographs using different perspectives, or more slowly with an image editor like GIMP or Photoshop. You can also take an existing image and change the colors.

### Step by Step Instructions



1. The first step is getting accurate size information. You can try either Bing or Google to get the best satellite imagery (they use different sources).

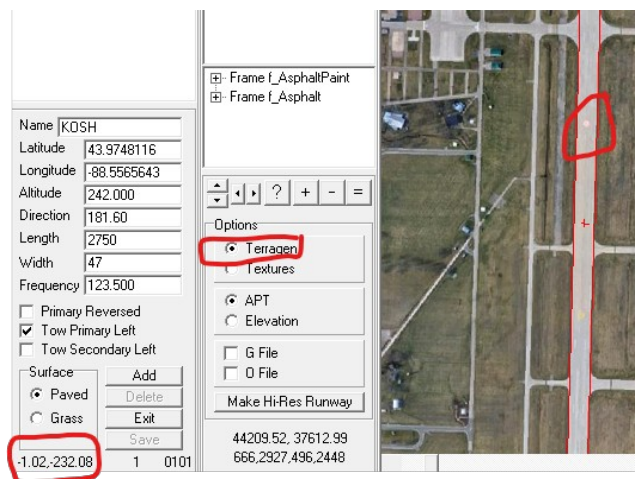
2. Using Condor\_tiles → Airport Place: We’ll make the simple structure identified by the circle.

*NOTE: If you’ve created a hi-resolution tile for the airport area, when running “Airport Place” select the “Terragen” radio button in the “Options” section.*

3. A very import item in Condor\_tile (Airport Place) is the position info it supplies in the lower left part of the main window. As you move the mouse, you’ll note those numbers are changing.

The units used are “meters”, as are most units in object creation. The values are “Easting, Northing” as used by cartographers. The zero point is the position of the runway center. Marked in Airport Place by a red cross.

For example, in the diagram to the right. If I position the mouse over the circled orange dot, I see the values are -1.02 (Easting), -232.08 (Northing). I’m very close to runway centerline, but I’m a couple of hundred meters north of the center point.



- We use Condor\_tiles to zoom in on the structure. We can get it's center position coordinates, and by pointing the mouse at the corners and noting the change in meters, you can determine the size. In our case we get the following:

**Center:** -286.8 / -879.3 m, **width:** 37.5 m, **length:** 53.3 m

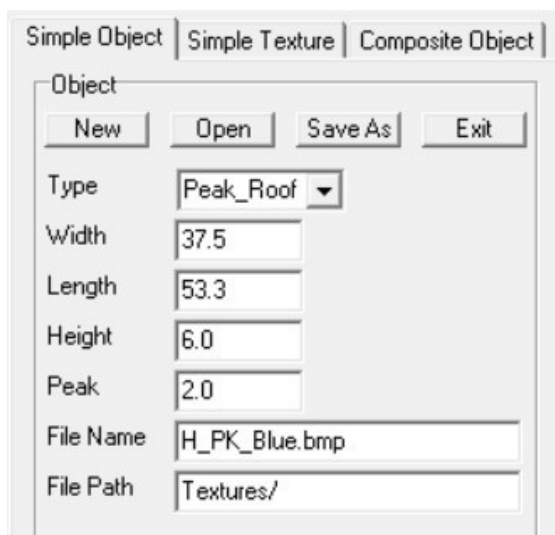


But what about the height, roof type – you can use Google or Bing street view to get some perspective.

It's a peaked roof, white building, people about 6' high, top of roof, maybe 12' (4 m), peak size of 6' (2 m).

We're now ready to create the structure!

- Start condor\_tiles, read header, and go “Simple Objects”



- You can then pick a Type: Flat\_roof, Peak\_roof, Dome (Quonset hut) – we'll choose Peak\_roof.

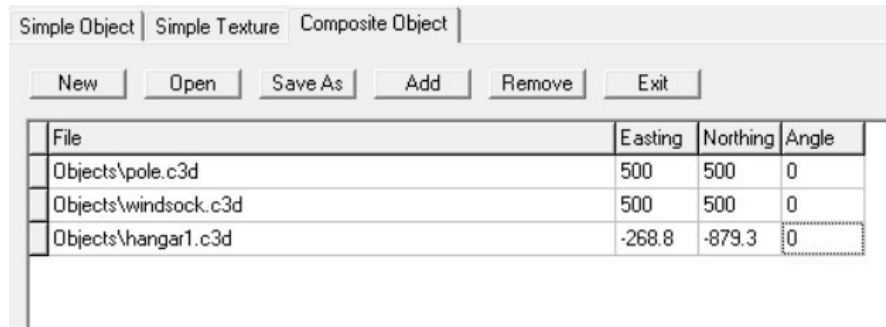
NOTE: The names correspond to file where Condor\_tiles was installed, SimpleObjects/textures

- Pick your dimensions (in meters)
- Pick “Save As”, give it a good name, e.g. hangar1.so and place in your <landscape\_name>/Working/Objects folder. NOTE: You may need to create the folder if it doesn't exist.

- Next, we will choose the “Composite Object” tab to create what will become the KOSHO.c3d It allows us to add each structure to the airport area and define its exact location and orientation.

- To position it, select “Composite Object” / “Open” – and pick your Airport File Object file “O file”, e.g. KOSHO.co, you should see the pole and windsock, now we choose the “Add” button and select the structure. Set the position.

*NOTE: Once you create a structure, you can use it multiple times in different positions.*



- Do a “Save As” to the airport “O” file name you used before.
- You need to copy the .c3d files to your “Airports” folder.
- Any textures you used in Step #2 above, need to be copied from the SimpleObjects/textures folder to your landscape Airport/Textures
- As a check, you can start Condor\_tiles, read the header, choose “Airport Place” again and make sure that “Terragen” is selected in “Options”. Then you can select “O File” to see your structure using a black outline.
- Fly condor.
- If the structure is not facing the correct direction, you can set the rotation angle also in the Composite Objects, the rotation is clockwise.

*NOTE: The next section shows you a method to change the surface appearance of your structure.*

## ADVANCED STRUCTURE MANIPULATION

Let's now assume we don't like the color of our hangar, we'd like it to be a white exterior.

Currently, from the cockpit, this is what we see (on the left). On the right is the texture file that supplies the imagery used (SimpleObjects/H\_PK\_blue.bmp). The imagery is a simple Window Bit Map file and can be edited with many tools



Type	Peak_Roof
Width	37.5
Length	53.3
Height	6.0
Peak	2.0
File Name	H_PK_White.bmp
File Path	Textures/

We'll edit this file with GIMP (being sure to save it with an alternate name): H\_PK\_white.bmp

We create a new object, same size, but with a different file name for the texture.

We add the object at a slightly different position, below is the cockpit view and the .bmp file used.



## Creating custom thermal maps & forest maps

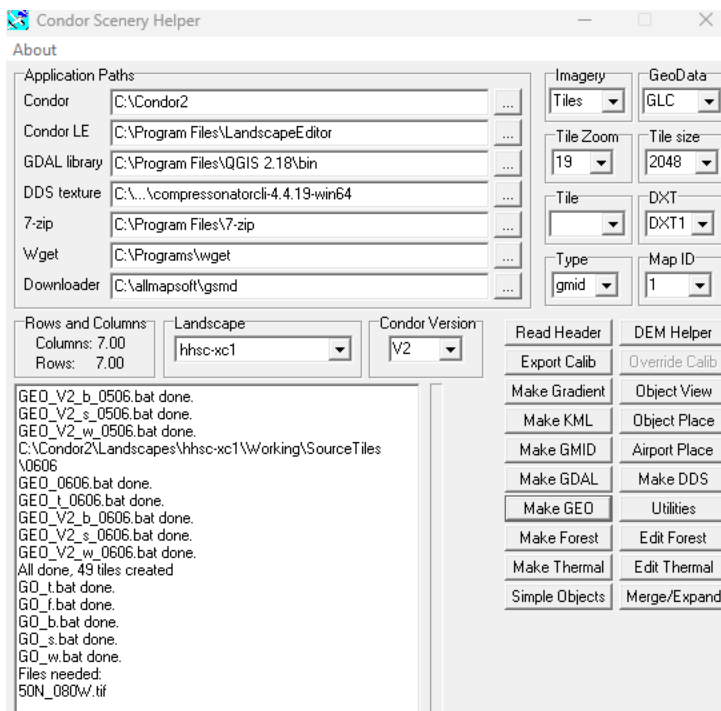
You can create custom thermal/forest maps for Condor. It can be a lot of work. Condor\_Tiles has some support for using publicly available data to automate the process. Below are some background notes and then an example. *Background By Nick Bonniere*

For thermal and tree maps, it can be done by hand, basically ‘painting’ forests, roads, fields, etc.. onto a background of each tile. This takes way too long, but will match the textures very closely. For a landscape in Canada, the Geogratis website can be used, but it only covers the Canadian landmass.

### Creating a Forest Map for your entire landscape

In this example we’ll be creating a map for a Harris Hill landscape. Will be using free public data collected by the University of Maryland.

We’ll start Condor\_tiles as usual and make a few changes in the top settings:



- For GeoData (upper right), choose Global Land Cover (GLC).
- Click on “Read Header”
- Set the tile size to “2048”, the GeoData is at a lower resolution than imagery.
- You can ignore the “Tile Zoom” setting, it is not used for this operation.
- Then press “Make GEO” and you will see output similar to what’s shown.

Some batch files have been created in Working\GeoDatabase:

GLC\_WGET.bat GO\_b.bat GO\_f.bat  
GO\_s.bat GO\_t.bat GO\_w.bat

In a command prompt window, you’ll first run the `GLC_WGET` to retrieve the raw data, then run:

`Go_b` (deciduous trees), `Go_s` (conifer trees), and `Go_t` (terrain data used for thermal map)

The last steps are easy:

- In the Landscape Editor, load the landscape and then choose Tools → “Import tile size forest maps”
- NOTE: If you previously created a hi-res quarter or full tile, you must temporarily restore the

original tiles (.dds) before performing the next step. After the export is complete, you can restore the hi-res versions.

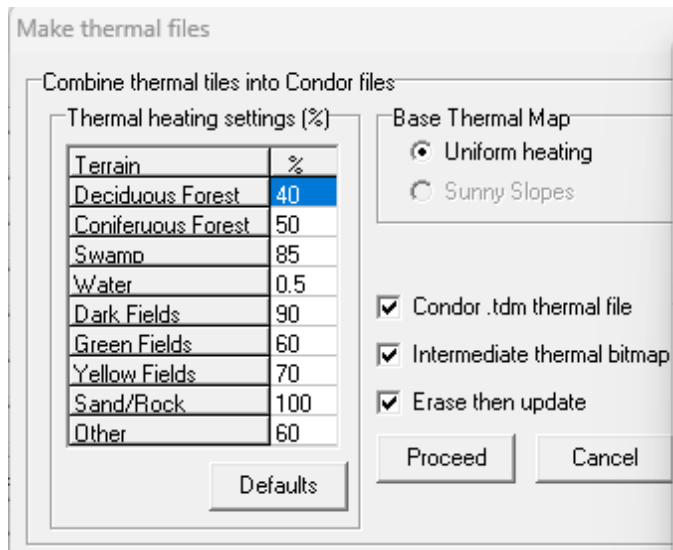
- Make sure you redo all the save steps for a landscape, including export forest maps.



## Creating a Thermal Map for your Landscape

By default, Condor creates an 'equal' thermal map for your landscape. There are no good or bad regions. The step above in loading forest Geo data also has a step to collect ground characteristics for thermal maps, e.g. is it a forest, farm land, barren, desert, city, water.

Assuming you've done the earlier forest map steps. Start Condor\_tiles, leave the GeoData at GLC and the Tile Size at 2048. Read the landscape header.



- In Windows, create a folder called “Thermalmap” in your landscape “Working” directory.
- Choose “Make Thermal”, accept the default for heat settings and check all three boxes as you see on the left.
- The press “Proceed”
- Your new thermal map is in your top landscape folder, it is called <landscape>.tdm
- Exit from Condor\_tiles or you may see an

access violation error later in the Landscape Editor.

- You can then start the Landscape Editor, load the landscape, and click on “Thermalmap” to see a grey scale version. The lighter the color, the stronger the thermal area. Water will be black.
- Make sure you redo all the save steps for a landscape, including export thermal map.

# APPENDIX ONE – General notes on Scenery Creation

by Nick Bonniere

1) A scenery is made up of a group of tiles

2) Each tile is 23 km x 23 km (14.29 mi x 14.29 mi), which is actually a resolution of 90 meters times 256 = 23.040 km

If you pick 4 tiles, I would suggest you offset the airport from the center a bit so it falls fully into one of the 4 tiles, otherwise it will be cut-up into 4 pieces. Not absolutely necessary, just a suggestion so you can view the airport in one tile only.

3) The original resolution of 90 m is based on Space Shuttle elevation data (STRM)

4) Condor 2 uses a resolution of 30 meters, which is 3 times the resolution of Condor 1, and 30m STRM data is available

5) The last 1/4 tile edge of a scenery is not flyable. So if you have one tile, only the centre 1/2 or 11.5 km x 11.5 km is flyable, If you use 2 x 2 tiles, i.e 4 tiles, 46 km x 46 km, only the centre 34 km x 34 km is flyable, etc...

6) The projection used is UTM, (Universal Transverse Mercator), This means that all elevation data and photographic data needs to be converted to UTM coordinates.

7) Tiles are in a grid of rows and columns starting at the bottom right corner (South East), which is tile 0000. The first two digits are the column number and the second two digits are the row number. Above tile 0000.bmp is tile 0001.bmp. The tile to the left is tile 0100.bmp

8) You can use multiple resolutions. For LakePlacid, the centre tile is hi-res 8192x8192, while all the other tiles are 4096x4096. The file size increases by a factor of 4, 48MB file (at 4096) instead of 192MB (at 8192).

## 9) Notes on Tile system zoom level and Condor resolution

You have to match the zoom level with the tile-size. I have not gone beyond zoom 18. The imagery is 'warped' when projected to UTM coordinates, so I use a zoom level that provides just above resolution than needed. For example, for a Condor resolution of 16384 (1.4m), a zoom level of 17 (1.2-0.85m) is good.

I do 4096 for general tiles and 16384 around airports. Sometimes I do Quarter-Tiles around airports at 32768, not full 4x4 tiles. With Condor, It is OK to do various tiles are different sizes. Area over forest do not need high-resolution, but for areas around airports when you fly at a low altitudes, a higher resolution is good.

- Tile system zoom level (approximately)
- zoom level 1 - each pixel is 78184 m (equator), 55284 m (45 deg latitude)
- zoom level 2 - each pixel is 39092 m (equator), 27642 m (45 deg latitude)
- .....
- zoom level 10 - each pixel is 152.7 m (equator), 108.0 m (45 deg latitude)
- zoom level 11 - each pixel is 76.3 m (equator), 54.0 m (45 deg latitude)
- zoom level 12 - each pixel is 38.1 m (equator), 27.0 m (45 deg latitude)
- zoom level 13 - each pixel is 19.1 m (equator), 13.5 m (45 deg latitude)
- zoom level 14 - each pixel is 9.5 m (equator), 6.7 m (45 deg latitude)
- zoom level 15 - each pixel is 4.8 m (equator), 3.4 m (45 deg latitude)
- zoom level 16 - each pixel is 2.4 m (equator), 1.7 m (45 deg latitude)
- zoom level 17 - each pixel is 1.2 m (equator), 0.85 m (45 deg latitude)
- zoom level 18 - each pixel is 0.6 m (equator), 0.43 m (45 deg latitude)
- zoom level 19 - each pixel is 0.3 m (equator), 0.22 m (45 deg latitude)
  
- Condor resolution
- tile size 256 - 23040 m, each pixel is  $23040/256 = 90$  m
- tile size 512 - 23040 m, each pixel is  $23040/512 = 45$  m
- tile size 1024 - 23040 m, each pixel is  $23040/1024 = 22.5$  m
- tile size 2048 - 23040 m, each pixel is  $23040/2048 = 11.25$  m
- tile size 4096 - 23040 m, each pixel is  $23040/4966 = 5.625$  m
- tile size 8192 - 23040 m, each pixel is  $23040/8192 = 2.8125$  m
- tile size 16384 - 23040 m, each pixel is  $23040/16384 = 1.4$  m
- tile size 32768 - 23040 m, each pixel is  $23040/32768 = 0.7$  m
- tile size 65536 - 23040 m, each pixel is  $23040/65536 = 0.35$  m

## APPENDIX TWO – manual run of downloader/combiner

In Part Two of this document (Photo Scenery Creation), Steps Two and Three cover the downloading of image data and how it is combined into tiles usable for Condor. This is now an automated process, but below is more detail to cover the old manual method.

### Downloading images manually

1) Run the GoogleSatelliteMapsDownloader downloader.exe.

a) Click on "Open Task" and select the Initial\_0000.gmid file. Make sure "Zoom level" is set to 16 (or whatever was selected earlier) and "Maps type" is Tiles.

b) After it opens change the "Task name;" box to keep the original since the file will be overwritten:

Initial\_0000.gmid to 0000.gmid (*YOU ARE NOT changing the actual file name, just the Task name.*)

c) You should see LAT/LON values fill in (taken from the file), and they should make sense with your scenery location.

d) Click on "Start" to begin the download process.

You should see a "Downloaded" count in the lower left, it should eventually reach the "Total images" number. If it seems to get stuck, or no progress, make sure you can reach the google site.

e) What's actually happening:

- a folder 0000 will be created and a set files will be downloaded into that folder
- these files are 256x256 images that cover the desired area, but actually cover more area than needed
- at the end, the file 0000.gmid will contain the actual coordinate extent of the downloaded tiles

f) REPEAT the above steps for all 16 tiles – don't make any typos! *Yes, this is a bit time consuming. We're trying to convince them to create a command line version of the tool that could be used as part of a larger script.*

2) Still in the downloader. Select "Tools -> Map Combiner", that will take care of merging all the individual 256x256 files.

a) Select the "0000.gmid" file (NOT the one prefixed with "Initial\_") and untick all image types except bitmap. For Automatic generation of Condor Tiles, also select TIFF image type.

b) REPEAT for all 16 tiles.

## Combining images

1) Start Condor\_tiles. To create the batch file that will do this, on Condor\_tiles, pick the desired tile in the "Tile" section, 0000 in this case, and click Make GDAL

- a batch file `./Working/SourceTiles/000/GDAL_0000.bat` will be created.
- double-click on the batch file and it will process the data
- a new image `0000.bmp` will be placed into the `Working/Terragen/Textures` folder

REPEAT for each tile, 0001, 0002, etc...

You can do these simultaneously if your PC has the memory. Each is independent.

ALTERNATE: If you have a unix shell available, a command similar to the below will process all.

```
jmurtari@anvil:/cygdrive/c/condor2/Landscapes/hhsc1/working/SourceTiles> for dir in `ls -d
0*`; do echo "#### Processing $dir"; cd
/cygdrive/c/condor2/Landscapes/hhsc1/working/SourceTiles/$dir; ./GDAL_$dir.bat; done
#### Processing 0000
....
```

## **APPENDIX THREE – Licensing, Google and Satellite Imagery**

This tutorial uses imagery data collected by various satellite sources and compiled by Google and made available for download. We're happy to acknowledge the great help that is. Licensing can always be an issue (see link below for more info and references).

We certainly feel we are making 'FAIR USE' of their imagery and transforming it into a new product. That all being said we strongly advise NO COMMERCIAL use, e.g. You shouldn't setup a website where people give you coordinates and you spit out a scenery they can download for a fee. It might be OK, but it might not under FAIR USE.

More on FAIR USE → <https://FreeGeographyTools.com/2007/fair-use-and-google-earth-imagery>

You can certainly acknowledge Google. We'd suggest adding some text somewhere on your Splash Screens, some have used: "Satellite Imagery – Google Maps"

## APPENDIX FOUR – Distortion: Flat map over round earth

Some of you interested in enigmas and brain-teasers may be asking, “How can satellite photos of a ROUND Earth be flattened?” Well just think back to older flat maps you’ve seen... mercator projections, etc....

by Nick Bonniere

When you fly in real-life, you are flying over a sphere. When you fly in Condor, you are flying over flat terrain which is a projection of a sphere onto a flat surface. For Condor this projection is UTM (Universal Transverse Mercator). Just like for any flat map such as a paper map, the projection results in distortion. The further away from the centre point of the projection, the more the distortion and that is why you need to pick the closest UTM zone.

When images are downloaded, they have already been flattened based on a tile projection system. For use with Condor, they have to be re-projected to UTM. This is where epsg:3857 and epsg:4326 come in. They refer to the projections and coordinates. If you use the right one, you minimize distortions, but if you use the wrong one, you introduce more distortion. Over small distances, the distortion is small and in a Condor tile (23040 metres wide), the difference between epsg:3857 and epsg:4326 is about 10 to 15 metres.

For your 5x5 scenery, you can determine the overall effect of the UTM projection. You take the lat-long coordinates of opposite corners and do a great-circle calculation, and for condor you do an arithmetic distance calculation.

For 5x5, Condor opposite corner distance is  $(2*(5*23040)^2)^{0.5} = 162.92$  Km

Great-circle calculations for one diagonal is: 162.85 km, the other diagonal is: 162.84 km

As you fly in Condor, you are totally un-aware of any distortion. Reaching a turn-point is simply a few more metres away than in real-life, and for a 5x5 about 250 feet over 100 mi.

# APPENDIX FIVE – GNU Free Documentation License

Reference: <https://www.gnu.org/licenses/fdl-1.3.en.html>

Version 1.3, 3 November 2008

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## APPENDIX SIX – Misc: Turnpoint files, splash images

**Turnpoints** - If you look in the top folder of your landscape, you will find a <landscape>.cup (just put your turnpoints in that file).

Splash Screen Images – These are displayed while Condor2 is loading your landscape. These are stored in the <landscape>\Images folder (just check Slovenia), they are .jpg, 1920x1080, and use a number for the name. It will cycle thru them.

Below are some other notes on turnpoint usage and formatting:

- \* On your first use of a landscape the turnpoints are loaded from a file in the landscape directory with the name <landscape>.cup
- \* After first use Condor stores a copy of the turnpoints in a file located in Documents\Condor\Turnpoints\<landscape>.cup It then uses that file exclusively and ignores any changes you might make to the turnpoint file in the landscapes directory.
- \* If changes are made to the turnpoints file in the landscape directory with a new release of the landscape, you must delete the turnpoint file in the Documents\Condor\Turnpoints folder first before starting Condor. It will then use the new file.
- \* Visibility of turnpoints depends on the "Style" field being a '1' in the turnpoints file followed by no other data. If something is not showing up, try changing the value, perform the steps above, stop/start Condor, and it should appear. Example:

Before:

```
"Yadkinville", "YADKNVLL", US, 3608.550N, 08043.083W, 1050ft, 3, , 1200ft, , "Turn Point, Landable, Land to the East, RW width: 50"
```

After:

```
"Yadkinville", "YADKNVLL", US, 3608.550N, 08043.083W, 1050ft, 1, , , ,
```

- \* You can create your own turnpoints in the Flight Planner by clicking right and selecting "New" -> "Turnpoint". Those will be stored in your Documents directory copy only.



## APPENDIX SEVEN: Notes on object creation/placement

From: Nick Bonniere:

***“They wanted two windsocks. I used the Airport Maker tool to create the simple grass runway and one windsock. I then made some edits to the NorthPlains.obj file (in the Airports folder) and thought it would be easy to add another windsock -- it wasn't! “***

Although it sounds simple to generate two files from the Airport Maker, one with each windsock at its desired location, and merge the two files, it is actually complicated because the .obj format uses absolute indexes instead of relative indexes to each object (windsack and pole), and you'd have to 'add' offsets to all vectors. It is not really feasible.

I suggest you use the .px format and use Condor\_Tiles to convert it to c3d. It is easy to merge two or more .px files.

---

If you want multiple objects in an object file xxxO.px, or for that matter multiple grass and asphalt runways in a xxxG.px file, you simply create each object.px and then simply copy/paste the whole text (except 'xof 0303txt 0032') and append it to other objects.

Each object (frame) should have its own name. You can do a global search-and-replace to change names before concatenating objects.

There should only be one 'xof 0303txt 0032' at the beginning of the file containing all the objects.

You can have up to 3 wind socks in a landscape and the names MUST be Windsack1, Windsack2, Windsack3. Each would be at a different location and can have different pole size, and windsock size. With each wind-sock, there is a mast. The name of each mast is not critical, but usually Mast1, Mast2, Mast3.

I believe you can add a comment with // on a line by itself, but not the very first line which must start with 'xof'.

You then convert the .px file to .c3d with Condor\_Tiles.

The simple objects are all at the centre of the runway to start with. You can move each one to the desired location with Condor\_Tiles. In Object View, when you expand each frame and click on the mesh, it activates the edit buttons 'Centre', 'Rotate', and 'Move'. The 'Centre' button moves the mesh back to the centre of the runway. The 'Rotate' button rotates the object a number of degrees (relative to its current rotation) as specified in the box next to the button. The 'Move' button moves the object (relative to its current location) in X (left/right, left is a positive number), Y(up/down, up is a positive number), and Z (elevation), with the three input boxes below the button. This is a tricky operation.

In the new Condor\_Tiles version, it is also possible to move an object by adding a 'Frame-Transform-Matrix' to each object defined in a .px file format.

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***“They takeoff on a paved runway, but land in the desert. Joes been working on trying to put a real runway down that matches the desert. It looks good from high, but when you get close to landing, it turns green. “***

Yes, that's the way the 'grass' feature works, the detailed grass texture only showing when getting quite close to the runway. At altitude, there is no point as you can't see individual grass blades anyway.

If the runway is not grass and/or not green, and you don't want grass details, just don't put it in the file, i.e. remove the mesh named 'grass'. You can still have a mesh 'asphaltpaint' which looks like crackled paint to show an outline and marks on the dirt runway.

Condor treats objects with the mesh names 'grass', 'asphalt', 'grasspaint', 'asphaltpaint' with a special meaning and are treated differently. These meshes are painted over with a 'tiled' texture, and the 'grass' details only shows at low altitude.

If instead of a mesh called 'grass', you name it 'dirt\_runway', the special 'grass' texture is not used and instead, the object's RGBA 'color' is used and painted over the runway. If you specify a filename for this mesh, such as 'dirt\_runway.tga', this file will be used instead of the object's color, and the area specified by the texture coordinates will be stretched over the runway. This is the same as for any other object.

If you use the mesh name 'grass', and also specify a filename for this mesh, such as 'rnwy-09-27.tga', this texture file will be stretched over the runway, and the 'grass' will also appear as you get close to the runway.

If you've read Xavier's Airport write-up, you may have seen the mention of a 'muck' file, i.e. a texture file with the suffix '\_muck'. I am not entirely clear if this is treated any differently than a regular file without the suffix. It seems that this file can be applied to the 'grass', 'asphalt', 'grasspaint', 'asphaltpaint' areas and modify the tint and brightness, and it may be possible to get yellowish grass for example, and yellow paint markings instead of white.

It is also possible to create a runway texture file, that was created by close-in screen-captures of the runway from hi-res imagery. That is another way to enhance the runway details, by basically using higher resolution imagery for the runway.

## APPENDIX EIGHT: High Resolution – whole tiles

From: Nick Bonniere

It is possible to improve a scenery with higher resolution for some tiles, i.e. 16384 instead of 8192. In Condor\_Tiles, you can try if you want, just type in 17 for zoom level, and 16384 for tile size. (You can't select it, you have to type it in). You can select just one tile or do the whole scenery. You can also just do one-quarter tile too. Each tile is sub-divided into 4x4 sections for a total of 16 small tiles which I call 'quarter-tiles'.

The landscape editor cannot be used for exporting DDS tiles, you have to use the DDS batch file instead. It is because the program nvdxt does not work properly with defaults and needs a parameter change for 16384. nvdxt also has issues with 'water puddles' in dxt1.

Zomm level 19, size 32768, is the limit when using the Nvidia tools, for more Compressorator is necessary.

If you want to change one of the tiles in a landscape to a higher (or lower resolution), you have to create new GMID and GDAL and DDS batch files for this tile.

First you select the landscape and read the header as usual. Then you pick the tile you want to update in the tile pull-down box, such as 0000 for example. You select the zoom level in its pull-down box, and if you want zoom that is not showing, you type it in such as 17 for example. You also need to select the tile size in its pull-down box, and if you want a size that is not showing you type it in, such 16384 for example. You then click on the Make GMID and Make GDAL buttons to generate the batch files.

You then go to the tile folder, such as SourceFiles/0000 and click on the 'Batch\_Download\_0000.bat' file, and it will trigger the downloading and combining as before, but

it will take longer for higher-resolution.

NOTE: the Batch\_Download only does the download. You need to do the Batch\_Combine before you can run the GDAL\_0302.bat

Once the download/combine is done, you click on the GDAL\_0000\_3857.bat file to convert the tile to UTM. Then use the "Make DDS" button to create a DDS bat file used to make the final textures.

Once the UTM conversion is done, you need to generate the DDS textures. Instead of using the landscape editor and exporting the textures, You click on the DDS\_0000.bat file. The 16 Texture files will then be automatically generated, and when done you can fly the landscape. No need to do anything with the landscape editor.

I have limited the range of zoom and tile size on purpose as going beyond the ranges shown takes a lot of resources, but for those who know what they are doing, the zoom level and tile size can be set beyond the limits.

## APPENDIX NINE: Adding/merging to an existing scenery

From: Nick Bonniere

“How to grow an existing scenery without re-doing already created tiles”

To maintain the same bottom right hand corner UTM coordinates, you do NOT change the lat and long, but adjust the UTM coordinates instead in the DEM helper panel.

For one tile west, you subtract 23040 from the UTM west. for one tile north, You add 23040 to the UTM north coordinate, and then click on check/show to see the result.

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To be able to merge two landscapes, the UTM zone number must match and the UTM coordinates must be on the same Condor tile grid, i.e. offsets must be multiples of 23040, i.e. the same as if 'growing' an existing landscape.

To join landscapes, the numbering is quite simple. Each Condor tile has been split into 16 patches, i.e. 4x4. tile 0000 has been split into 0000 0100 0200 0300 horizontally and 0000 0001 0002 0003 vertically, with 0303 as the opposite corner. The first two digits are column numbers and the second two, are row numbers starting at the bottom right. So all you have to do is re-number according to a new 0000 reference you chose.

You can have a zigzag border. Missing tiles are filled in by Condor with a default tile. In Condor V1 there was a dds tile called empty.dds that was used for missing tiles. I believe this can still be used if you want to add a generic empty.dds tile. I have not checked in V2. You can try removing a tile and see how Condor deals with the missing tile, and you can add an empty.dds tile and see if Condor uses it to fill the missing tile.

Although the re-numbering of the tiles can be done simply, and tiles combined into one folder, there is more to it than that. All other files have to be merged too. Some like the .CUP file can be done easily, the .APT file too, but others are more difficult to merge, such as the thermal map .TDM, the object file .OBJ, the terrain file .TRN, the AIRPORT folder, etc...

For now, there is a way to merge two sceneries that use the same UTM zone and same grid reference (multiples of 23040).

To avoid downloading, combining and converting to UTM and exporting to DDS, the same tiles can be re-numbered with a script and this avoids a lot of time.

For the rest, you can create a 'new' scenery with a new name from scratch that encompasses the area of both sceneries by selecting appropriate UTM extents, doing a 'check/show' and doing a 'make DEM'.

Then after getting the elevation data do a 'make terrain .trn' and 'make terrain .tr3' as for a new scenery. Now, however, you just use the re-numbered tiles in the Landscapes\NewName\Textures folder. You still have to 'flatten' the airports, etc... but you avoid re-downloading and processing all the tiles.

There is also another way that uses the Landscapes\NewName\Working\Terragen\Textures files. You can re-number these tiles with a script. It is simpler since there are 16 times fewer tiles. You then need to use the Landscape Editor to import these textures, and export them to DDS.

There is yet another way. Create a new scenery as above, and merge the 'Tile' folder from both landscapes (Landscapes\Name\_2\Working\SourceTiles\Tiles, Landscapes\Name\_2\Working\SourceTiles\Tiles) into the Landscapes\NewName\Working\SourceTiles\Tiles folder. These are the raw downloaded files. This only avoids re-downloading all the tiles. You still have to combine them and process them, and the rest.