Create terrain and photo realistic scenery for Condor 2.

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

CREDITS: Many thanks to Mr. Luis Briones (a member of a Flying Club in Argentina), and special thanks to Mr. Nick Bonniere, a long-time Condor scenery pro who created a Condor 2 scenery for Lake Placid. Nick developed the Condor_tiles program and a lot of notes/description used in the tutorial.

Updates and revisions to this document are welcome. Just send to the author and you'll be included in the Credits above.

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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. Large sceneries at high resolution take a lot of processing power and time. In this case we'll be creating a 57x57 mile landscape with the Harris Hill airfield (4NY8) at the center.

At the end of this tutorial we'll have flyable scenery with 3-D terrain which has been overlaid by photo scenery. For those of you who have used Condor, it will NOT have any actual 3-D objects like trees, hangars, runways. We will not do any special thermal modeling. Hopefully, those additions to this tutorial will come later (maybe from you!)…

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 only 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 tool set and documentation for landscapes from the condorsoaring.com site, unpack in a different directory from where Condor2 is installed

1a) Download a Legacy texture tool from Nvida 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.

2) Download and install the QGIS program version2.18.28, x64 from → https://www.soaringtools.org/downloads/QGIS-OSGeo4W-2.18.28-3-Setup-x86_64.exe . 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.

3) 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.

4) Download the Condor_tiles program and unpack. It can be found in the downloads section on the SoaringTools web site → http://www.SoaringTools.org/index.php/downloads/

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 1).

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 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 your UTM zone and then the latitude/longitude of the north west corner and south east corner of your landscape (also know as top left and bottom right). **NOTE**: *It can be OK if your scenery crosses into another UTM zone by a small amount. Just be sure to use the UTM zone # where the majority of the scenery is located in the steps below. There may be some minor distortion.*

Use this to find your Universal Transverse Mercator Zone (UTM) and measure distances → https://mangomap.com/robertyoung/maps/69585/what-utm-zone-am-i-in-

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 you center point and measure out 23 miles N,S,E,W (46 miles/side)

You can use the UTM lookup site above for that, also Google Earth is very handy. Here is what we have for Harris Hill and the yellow pins define the two corners. Take the time to make SURE you get the coordinates right. In this case we have the below. BE CAREFUL not to confused 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 late

Step Two: Convert to UTM coordinates, confirm proper size

With those corners defined, we now start to build the landscape. The Lat/Lon we have are approximate. We do not need to get exact numbers by converting to UTM and making sure we are on a boundary.

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).

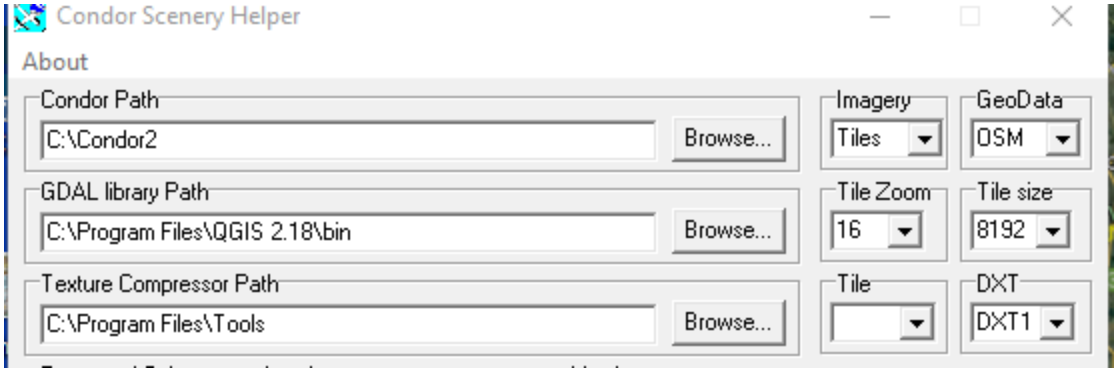
1) Start Condor_Tiles.

- 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 two paths. Using the 'Browse' buttons 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

Mine looks like this when done.



2) In Condor_tiles click on the "DEM Helper" button (top of the 2nd 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 the degree/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 landscap

c) Then click the box 'To UTM', do not check the box "TL BR" – you will then see values fill in the upper right side in the box "Condor UTM Range". (TL – Top Left, BR – Bottom Right coordinates are used for extents instead of the overall largest extents)

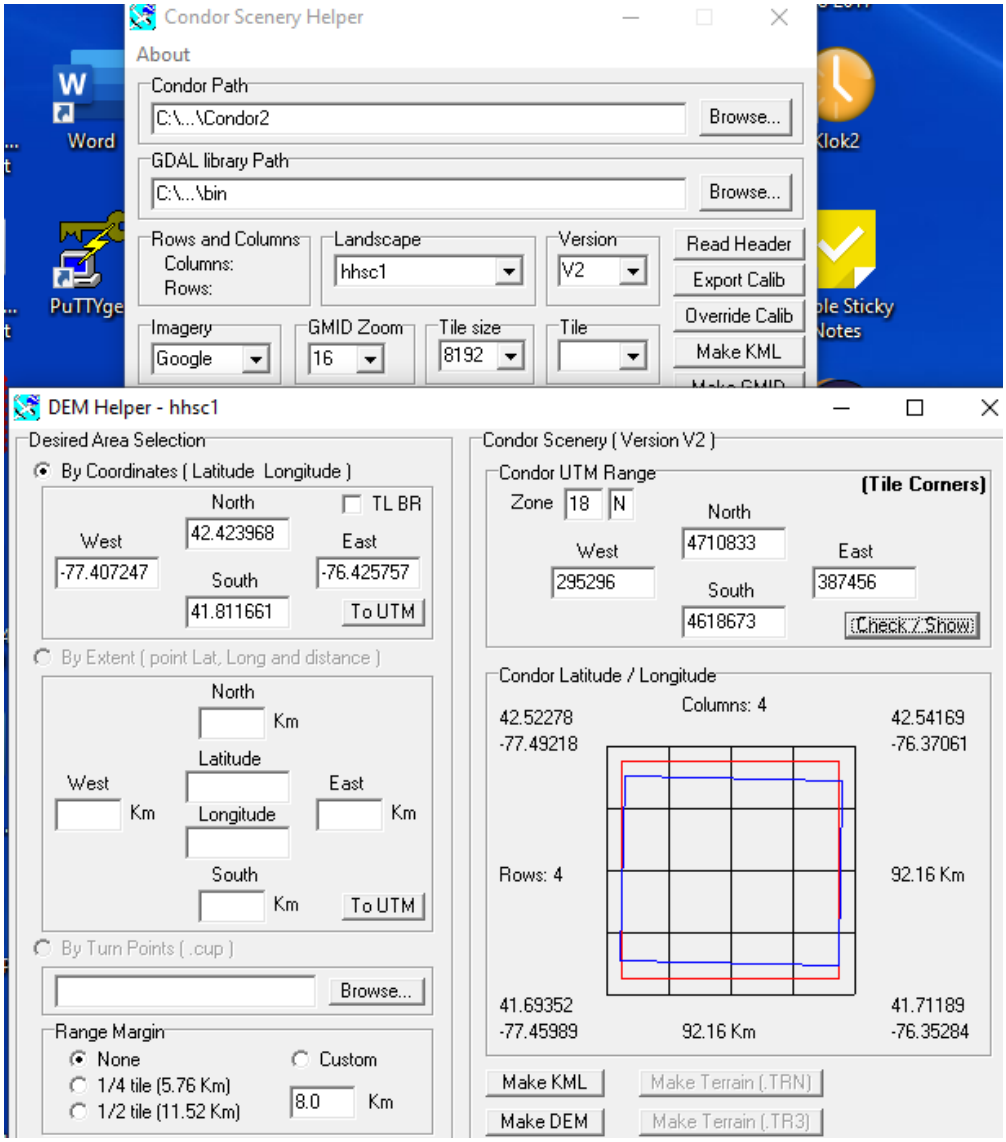
d) Then click "Check/Show" and you will see a grid pattern in the box labeled "Condor Latitude/Longitude". Explanation follows.

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.

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

NW Corner: 295296 (Easting) <the West value>, 4710833(Northing) < the North value>
SW Corner: 387456 (Easting) <the East value>, 4618673 (Northing) <the South value>



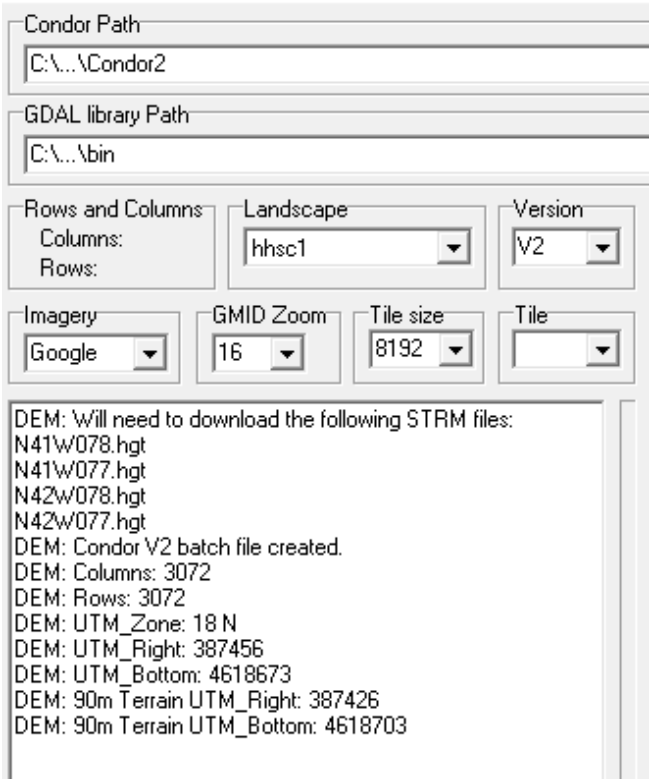
NOTE: Your screen layout may a look a little different than above, depending on your version of Condor_tile – but the info should be the same.

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 right 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.

```
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
```



DEM → Digital Elevation Model

At this point some files have been created for your new scenery. Check the ../Working/DEM folders and you see the batch file (DEM.bat). It contains the commands necessary to created the actual 3-D terrain for the area you specified.

2) You next need to download this data from a NASA website. We'll be use Space Shuttle Radar Topography Mission data (SRTM).

a) First go to → https://dwtkns.com/srtm30m/

You can zoom in to your location and then click to see the tile name, we need four tiles as shown in the message above:
N41W078.hgt, N41W077.hgt, N42W078.hgt, N42W077.hgt

b) When you click to download, you'll first need to create a login account with NASA. Save the files (.zip) in the DEM directory where the .bat file is located.

NOTE: 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/

Start a "Command Prompt" window. After download you should now have this directory contents:

```
C:\Users\jm>cd c:\Condor2\Landscapes\hhsc1\Working\DEM

c:\Condor2\Landscapes\hhsc1\Working\DEM>dir (your dir display may have different columns)



-rwxrwxr-x+ 1 jmurtari None     2188 May 11 10:58 DEM.bat
drwxrwxr-x+ 1 jmurtari None        0 May 11 10:52 KML
-rwxrwxr-x+ 1 jmurtari None       87 May 11 10:50 LatLong.txt
                  -rwxrwxr-x+ 1 jmurtari None 10602217 May 11 11:03 N41W077.SRTMGL1.hgt.zip
-rwxrwxr-x+ 1 jmurtari None 11545464 May 11 11:03 N41W078.SRTMGL1.hgt.zip
-rwxrwxr-x+ 1 jmurtari None  9441928 May 11 11:03 N42W077.SRTMGL1.hgt.zip
-rwxrwxr-x+ 1 jmurtari None  9575162 May 11 11:02 N42W078.SRTMGL1.hgt.zip
-rwxrwxr-x+ 1 jmurtari None      264 May 11 10:58 scenery.hdr
```

c) Next unzip the files and you should have four .hgt files. You may need to rename these files to match what is expected, e.g. `N41W078.SRTMGL1.hgt → N41W078.hgt` When done you should have 4 new files in the same directory as above:

```
-rw-r--r--+ 1 jmurtari None 25934402 Oct  8  2012 N41W077.hgt
-rw-r--r--+ 1 jmurtari None 25934402 Oct  8  2012 N41W078.hgt
-rw-r--r--+ 1 jmurtari None 25934402 Oct  8  2012 N42W078.hgt
-rw-r--r--+ 1 jmurtari None 25934402 Oct  8  2012 N42W077.hgt
```

d) Then run the DEM.bat file in a command prompt window (NOT power shell)– you should see quite a bit of output . Just showing sample output from the start of execution:

```
c: \Condor2\Landscapes\hhsc1\Working\DEM>DEM

C:\Condor2\Landscapes\hhsc1\Working\DEM>setlocal

C:\Condor2\Landscapes\hhsc1\Working\DEM>set PATH=C:\Program Files (x86)\Common Files\
Oracle\Java\javapath;C:\ProgramData\Oracle\Java\javapath;C:\WINDOWS\system32;C:\WINDOWS;C:\
WINDOWS\System32\Wbem;C:\WINDOWS\System32\WindowsPowerShell\v1.0\;C:\Program Files (x86)\
Common Files\Intuit\QBPOSSDKRuntime;C:\WINDOWS\System32\OpenSSH\;C:\Program Files\Git\
cmd;C:\John\emacs\emacs\bin;C:\Program Files (x86)\Intel\Intel(R) Management Engine
Components\DAL;C:\Program Files\Intel\Intel(R) Management Engine Components\DAL;C:\Program
Files\PuTTY\;C:\Users\jmurtari\AppData\Local\Microsoft\WindowsApps;;"C:\Program Files\QGIS
2.18\bin"

C:\Condor2\Landscapes\hhsc1\Working\DEM>set GDAL_DATA=C:\Program Files\QGIS 2.18\bin\..\
share\epsg_csv

C:\Condor2\Landscapes\hhsc1\Working\DEM>rem convert HGT file to GeoTiff

C:\Condor2\Landscapes\hhsc1\Working\DEM>set sourceHGT=N41W078.hgt

C:\Condor2\Landscapes\hhsc1\Working\DEM>set destinationTIFF=T0.tif

C:\Condor2\Landscapes\hhsc1\Working\DEM>gdal_translate -of GTiff N41W078.hgt T0.tif
Input file size is 3601, 3601
0...10...20...30...40...50...60...70...80...90...100 - done.
```

<<< much more follows, should be no errors>>

The following new files should be created:

```
-rwxrwxr-x+ 1 jmurtari None  2099695 May 11 11:10 UTM_cropped_90m.tif
-rwxrwxr-x+ 1 jmurtari None      604 May 11 11:10 UTM_cropped.raw.aux.xml
-rwxrwxr-x+ 1 jmurtari None 18874368 May 11 11:10 UTM_cropped.raw
-rwxrwxr-x+ 1 jmurtari None      679 May 11 11:10 UTM_cropped.hdr
-rwxrwxr-x+ 1 jmurtari None  2097152 May 11 11:10 UTM_cropped_90m.raw
-rwxrwxr-x+ 1 jmurtari None      604 May 11 11:10 UTM_cropped_90m.raw.aux.xml
-rwxrwxr-x+ 1 jmurtari None      683 May 11 11:10 UTM_cropped_90m.hdr
```

3) 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.

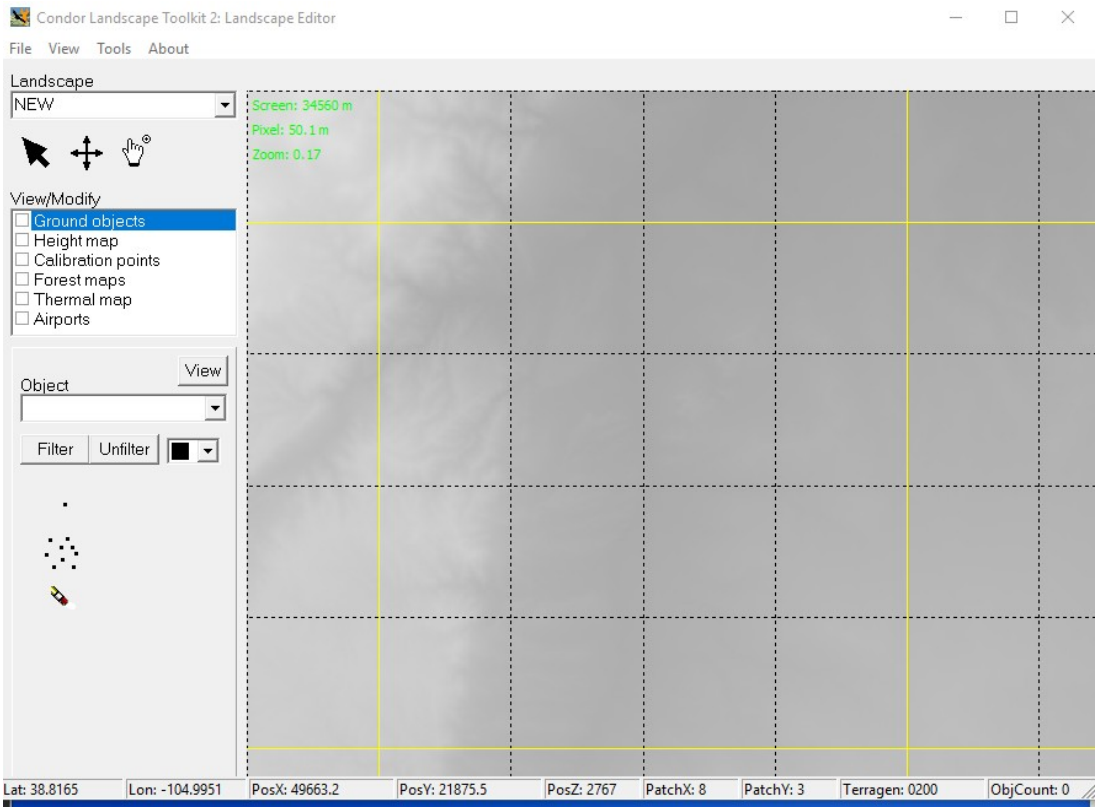
How do you relate the numbers to the actual terrain location, check Appendix ONE for a complete explanation. Real quick → The bottom right tile is “0000”, the first two digits are the row, the second two are the column. The tile to the left of the bottom right tile is “0001” and the tile above the bottom 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 no wider than the runway, and set the altitude to elevation (in meters) and a slope ratio (1:4 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 \dhhsc1.apt 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 all the items shown earlier in the landscape editor. 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 I'm 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


C:\allmapsoft> dir

05/11/2020  01:32 PM    <DIR>          .
05/11/2020  01:32 PM    <DIR>          ..
05/11/2020  01:32 PM    <SYMLINKD>     gmid [gsmd]
05/11/2020  01:22 PM    <DIR>          gsmd
```

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 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 of 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

IMPORTANT NOTE:

CONFIRMATION CHECK: Look at the contents of a file, 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:

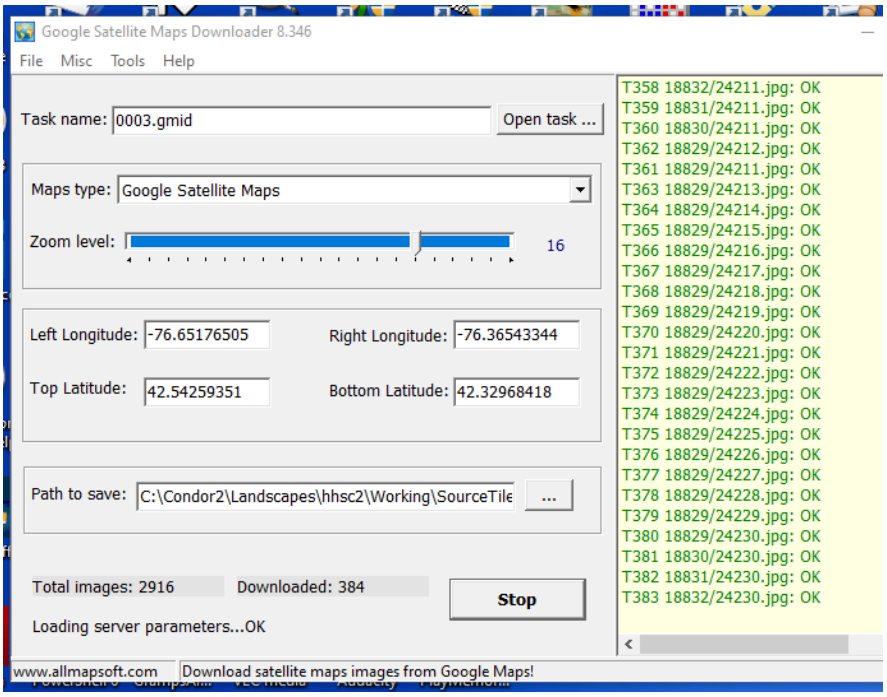
```
-rwxrwxr-x jmurtari    None  1250 May 11 11:56 ./Working/SourceTiles/GMID_ALL.bat
-rwxrwxr-x jmurtari    None  690 May 11 11:56  ./Working/SourceTiles/GMID_ALL_Combine.bat
```

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 30 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 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 images: Google Maps
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. You can find some excellent tutorials on using the different Landscape utilities and how to create a detailed airport 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:

Easy Tool to Create Grass RunwayAdding a real 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.

Correcting artifacts in the imagery

NOTE: The Landscape Editor uses the nVidia nvdxt program to export DDS tiles. nvdxt has two bugs which can result in ‘water puddles’ on the landscape in dark spots, with 3 color compression instead of 4. A workaround is to use nvdxt with a different output (dxt5 instead of dxt1a).

Condor_Tiles generates a batch file ‘`DDS_xxxx.bat`’ in each tile folder `..\Working\SourceTiles\xxxx` and an overall batch file ‘`DDS_ALL.bat`’ in the `..\Working\SourceTiles` folder. You can click on `DDS_ALL` as a work-around.

NOTE: dxt5 DDS files are twice as large as dxt1 DDS files. Condor_Tiles provides a Utility to convert dxt5 DDS tiles to dxt1 DDS tiles which effectively reduces the file size by 50% and still maintain 4 color compression.

Click on the Utilities button and click the dxt Convert button and select all (ctrl-A) the tiles in the Textures folder.

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 notes. As of this tutorial version, we have not tried it!

Helper_OSM_GEO.txt 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.

An alternate way is to use the database from Open-Street-Maps which has shape files for roads, lakes, rivers, forests, etc... The database is not complete, but for some areas it is quite good. Whatever is missing can then be filled in manually.

In Condor-V1 the various maps had this resolution:

Terrain-map – 90m
Thermal-map – 90 m
Combined forest map with
- Deciduous Forest-map – 45m
- Coniferous Forest-map – 45m
Textures maps – variable resolution in Textures folder

In Condor-V2 the various maps have this resolution:

Terrain-map – 90m and .tr3 maps at 30m in HeightMaps folder
Thermal-map – 90 m
Combined forest maps in .for ForestMaps folder with
- Deciduous Forest-map – 11.25m
- Coniferous Forest-map – 11.25m
Textures maps – variable resolution in Textures folder

OSM ESRI shape files are available in a reasonable format from GeoFabrick. You can use OpenOffice database to look into the .dbf files to look for items of interest such as roads and rivers.The OSM shape files can be downloaded from GeoFabrik:

https://download.geofabrik.de/index.html

For the Pennsylvania Landscape Ridge-North-2 recently created, a downloaded of the .shp.zip is needed for the Pennsylvania state from North-America. Because the scenery extends around and south of Pennsylvania, the states of Maryland, Virginia and West-Virginia are also needed. Use Google-Earth for example to find all the states/regions that is needed.

It is possible to download a whole region or by state. It depends on what you want and how big it is.
The .shp.zip file type is what is needed.

https://download.geofabrik.de/north-america.html

pennsylvania-latest-free.shp.zip
maryland-latest-free.shp.zip
virginia-latest-free.shp.zip
west-virginia-latest-free.shp.zip

There is a button on Condor-Tiles ‘Make-Geo’, that creates a GeoDatabase folder and creates batch files for each condor tile. You then unzip the shape files into the geodatabase folder and for each, change the name, if desired, such as Pennsylvania.shp for example. It is actually a folder that contains all the shape files.

In each sourceTile, there will be 3 batch files. One for thermal, GEO_t_0000.bat, one for deciduous forest GEO_V2_b_0000.bat, and one for coniferous forest GEO_V2_s_0000.bat. You can run these batch files individually or use the 3 batch files, GO_b.bat, GO_s.bat, GO_t.bat, in the GeoDatabase folder that call all the

individual batch files, one at a time. It is best to start by doing one tile individually, and if it looks good, then run the overall batch file and go away for a few hours, as all the tiles get generated.

Note that OSM has only a ‘forest’ definition, not a deciduous nor a coniferous distinction. A blank coniferous map will be generated as it is needed for the Landscape Editor.

You can view and modify the resulting tiles with Condor_Tiles with the ‘Edit Forest’ and ‘Edit thermal’. The background textures tile is shown and is overlaid with the thermal or forest. Press the ‘v’ key to toggle the overlay.

Because the shape lines are narrow, it is best to usually 'shrink' the forest which provides more margin around lakes, rivers, roads, so that no tree ends up on roads or lakes, etc...

Forest maps end up in Working/Terragen/Forest folder, and with the landscape editor, you can import them, and then export the forests and export the forest-hash.

Thermal maps stay in each SourceTile folder. There is a button on Condor_Tiles ‘Make thermal’ that will generate the thermal map. Each type of geographic structure is assigned a thermal value 0 to 255, basically a heat index for thermal generation. You can edit the default values if you want.

Details about OSM data:

Open Office can be used to open the database file to have a look at details.

```
gis_osm_buildings_a_free_1 - (big file - OpenOffice  may crash)
gis_osm_landuse_a_free_1   - forest, orchard,
                           - allotments, cemetery, commercial, farm, grass,
industrial, meadow,
                           - nature_reserve, park, quarry,
                           - recreation_Ground, residential, retail, scrub,
vineyard
gis_osm_natural_a_free_1   - beach, clifs, etc. Nothing useful
gis_osm_natural_free_1     - peaks, springs, trees, etc. Nothing useful
gis_osm_places_a_free_1    - village, town, locality, island, etc
gis_osm_places_free_1      - village, town, locality, hamlet, etc
gis_osm_pofw_a_free_1      - churches
gis_osm_pofw_free_1        - churches
gis_osm_pois_a_free_1      - park, golf course, graveyard, etc
gis_osm_pois_free_1        - restaurant, pub, hotel, university, etc
gis_osm_railways_free_1    - rail lines
gis_osm_roads_free_1       - (big file - OpenOffice crashes)
gis_osm_traffic_a_free_1   - parking
gis_osm_traffic_free_1     - crossings, junctions, turning circles, etc
gis_osm_transport_a_free_1 - railway stations, bus stations, etc
gis_osm_transport_free_1   - bus stop, railway stations
gis_osm_water_a_free_1     - river, lake, reservoir, bog, etc
gis_osm_waterways_free_1   - canal, river, stream, etc
```

APPENDIX ONE – General notes on Scenery Creation

by Nick Bonniere

1) A scenery is a 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

- 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)

- 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

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 folde
- 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 espg: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 espg: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*(5x23040)^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. Theses 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: New 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 (winsack 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.

"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: Higher resolution scenery.

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.

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.

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.

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.

I have been experimenting with an alternate to nvdxt. It is called Compressonator and it works quite well and does not have the issues nvdxt has. My new version of Condor_Tiles allows for the selection of either nvdxt or Compressonator. I have changed the interface of Condor_Tiles to account for all the

new features I have added, so your tutorial would have to change.

https://gpuopen.com/compressonator/

I use the CLI version for use in batch files for Condor_Tiles, and I use the GUI version when I want to convert a BMP for an object to a DDS file with mipmaps.

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.

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.