

Course: 3D Design
Title: Temple Of Kukulkan – Blender To Google Earth
Dropbox File: TempleOfKukulkan.zip
Blender: Version 2.46
Level: Intermediate
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The Mayan Temple of Kukulkan, Chichén Itzá, Mexico – Blender To Google Earth

In this tutorial we will examine the process of placing a Blender model into the Google Earth application. Google Earth provides satellite imagery depicting the entire earth and allows users to insert three-dimensional objects at specific latitudinal and longitudinal locations.

Blender Configuration Requirements:

Before starting this tutorial, download and read the “ConfiguringBlenderForGoogleEarth.pdf” file located in the Temple Of Kukulkan PDF tutorial area of this course site. This file contains important information about configuring Blender version 2.46 so that it will properly export .dae (Digital Asset Exchange) files to Google Earth along with UV mapped textures. If your model does not contain any UV mapped textures you can use the standard Blender 2.46 configuration.

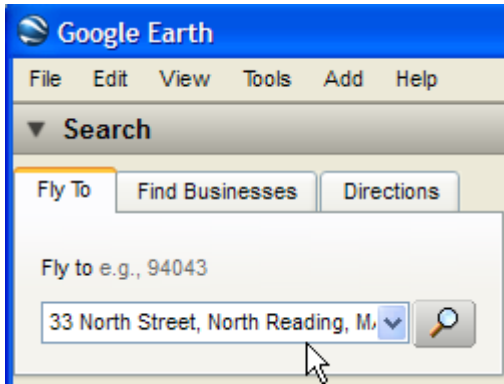
Tutorial Files:

All of the files needed for this tutorial are located in the TempleOfKukulkan.zip file. Create a new folder on your desktop named “Kukulkan”. Open the TempleOfKukulkan.zip file in WinZip or some other zip utility, select all, and unzip to the new Kukulkan folder on your desktop. **This is an important step** as all of the image files **must** be in the same directory as your .blend and exported .dae file.

Step #1 – Obtaining a Google Earth Footprint:

Before creating a model in Blender that is destined to be placed in Google Earth it is a good idea to first sample the position (latitude and longitude) in the Google Earth Environment.

Open Google Earth. In the “Fly To” box, type in your home address.



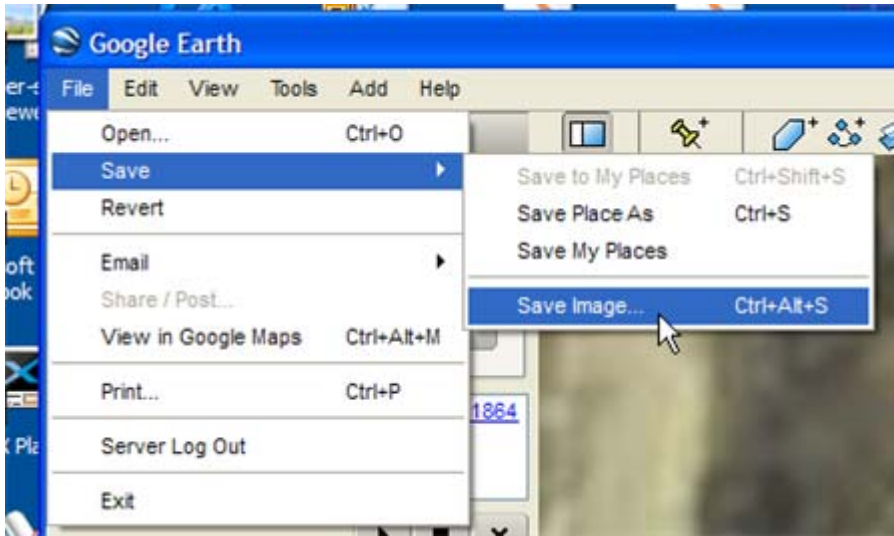
Click the ENTER key. Google Earth will fly to your home address. Zoom in to get a better view.

In the “Layers” panel make sure “terrain” is check marked. You can use the Rotate, Zoom and Tilt controls in the upper right hand corner to alter the view. Here is a satellite view of my house:



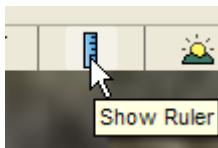
Adjust your view so that your house is in the center of the display looking straight down with the rotation pointing Due North.

Select File / Save Image.

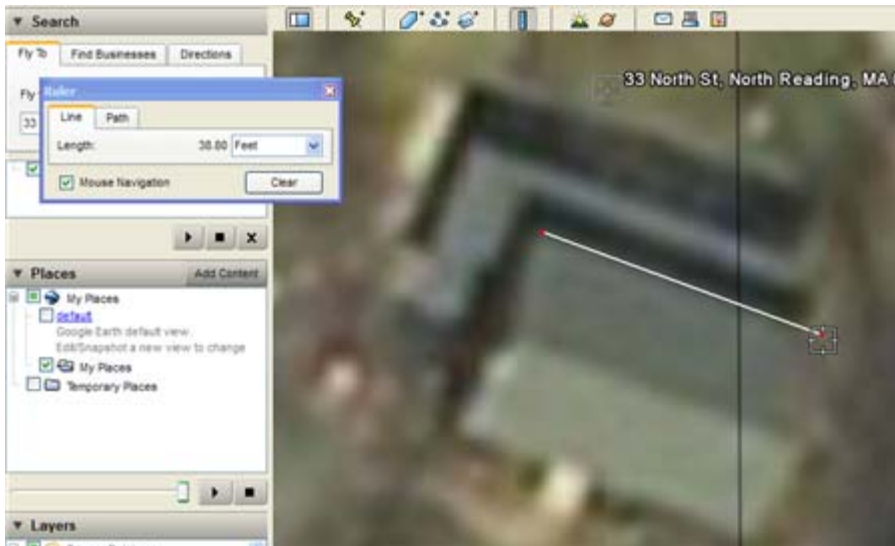


Save the image to your computer. If you were to model your house and place it into Google Earth, this image would serve as a footprint providing an aspect ratio of your house's length and width. It will also indicate the angle your house is set from due North. This is handy if you do not know the exact dimensions or angles of the object you are modeling.

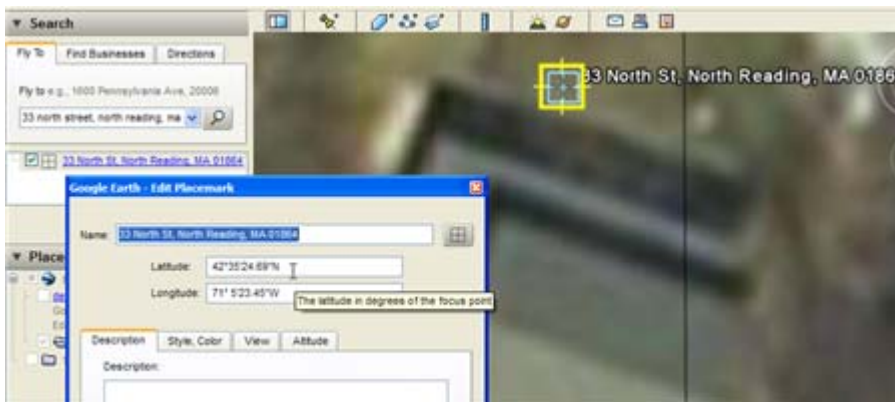
You can also use the Google Earth tape measure tool to measure objects depicted in the imagery. Go back to Google Earth and select the "ruler" tool:



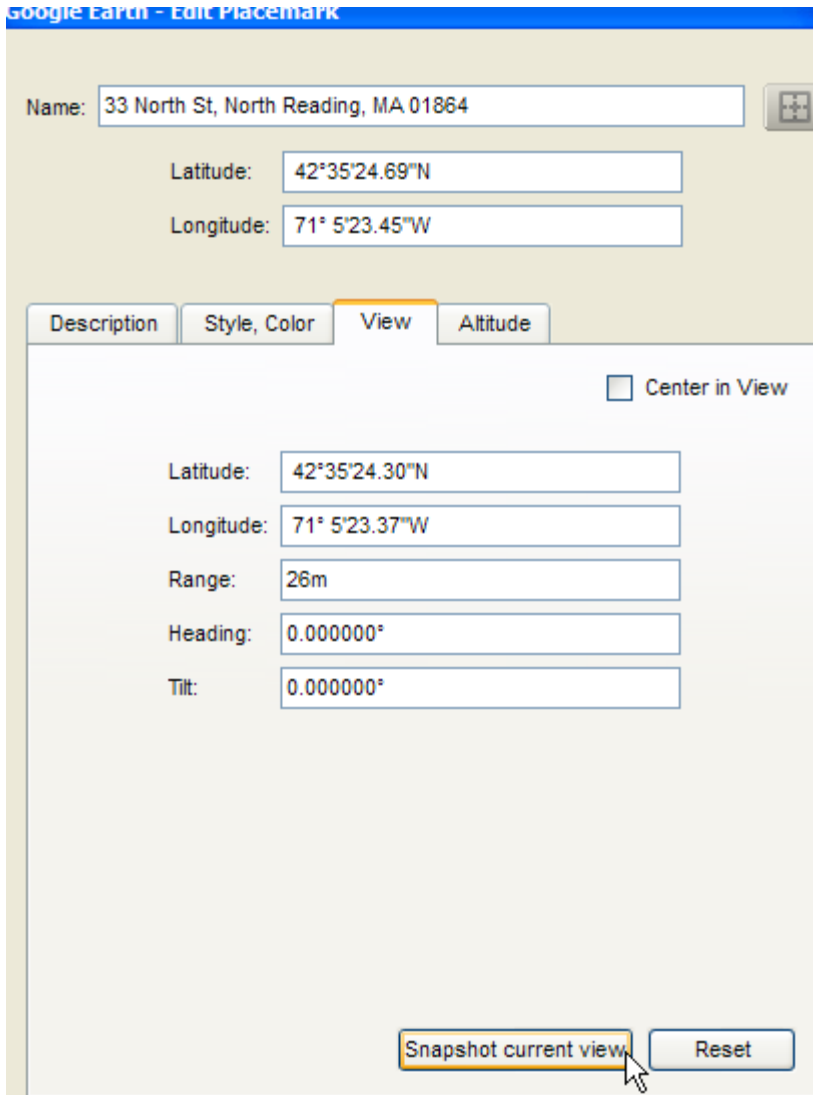
A dialogue box will open allowing you to set the measurement units. Click on one corner of your house and then another. The readout will give you a "rough" measurement. (you may want to zoom in).



Center your house again in the display. You can now obtain the Latitudinal and Longitudinal location of your house. In the current place panel you will see the address you typed in. Right-Click (CTRL-Click MAC) and choose “Properties” from the dropdown box.



This displays the display properties dialogue box. Select the “View” tab; then click on “Snapshot Current View”. This will display the coordinates of the current Google Earth view.



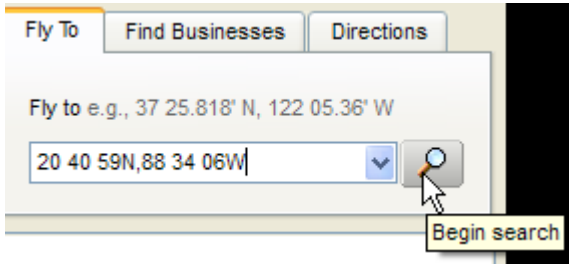
Close Google Earth. Do not save any locations to your Places Panel.

Google Earth provides fairly high resolution satellite imagery for most populated places on earth. However once you get into the countryside or less populated places the resolution degrades and it is hard to locate distinct structures. This is the case with the object we will use in this tutorial. The Mayan Temple of Kukulkan is located in the remote jungle of Yucatan peninsula in Mexico and the resolution for this area is very low. However many remote archeological areas have satellite imagery of their own and it is possible to “overlay” these images on Google Earth.

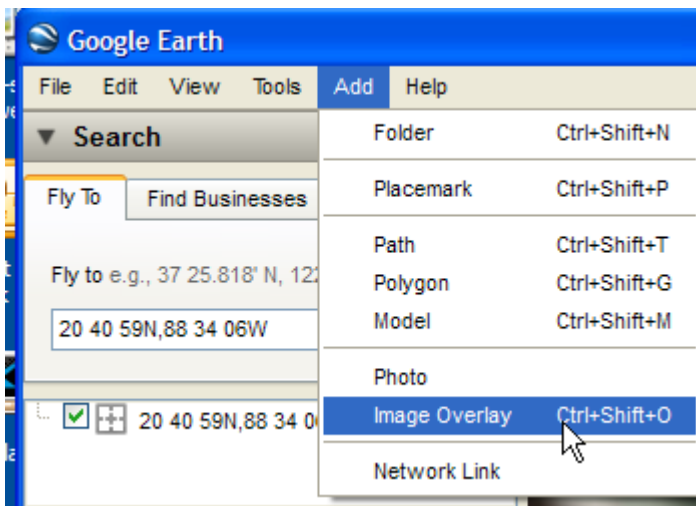
There is a satellite image overlay file in the TempleOfKukulkan.zip file named overlay.jpg. We will use this image to create an overly in Google Earth from which we can then extract a footprint of the site.

Open Google Earth. In the address line type in the following:
20 40 59N,88 34 06W

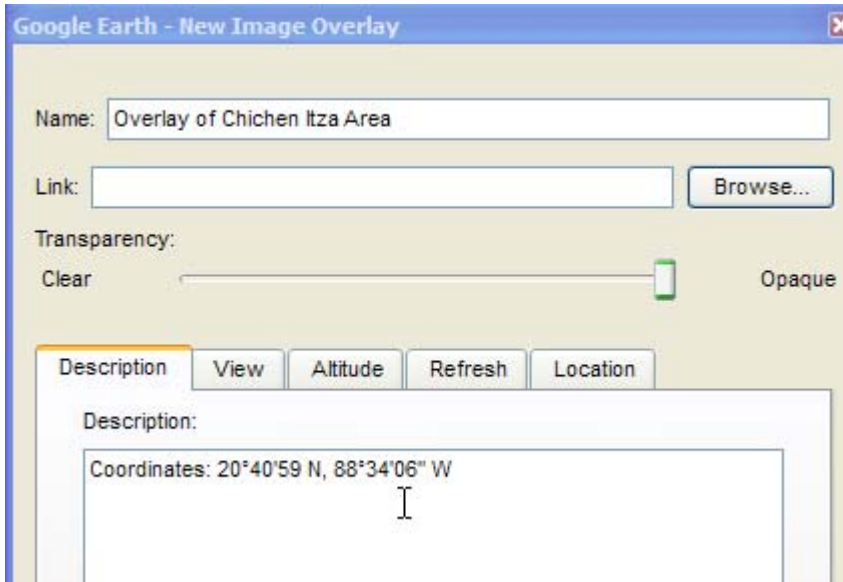
These are the coordinates for the Kukulkan Pyramid area.
Click on the Begin Search Button



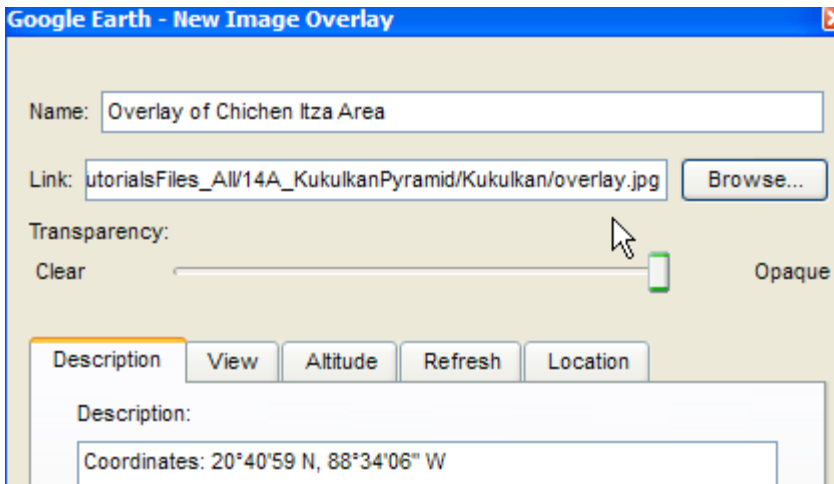
Google Earth will fly to those coordinates. From the main menu select Add / Image Overlay.



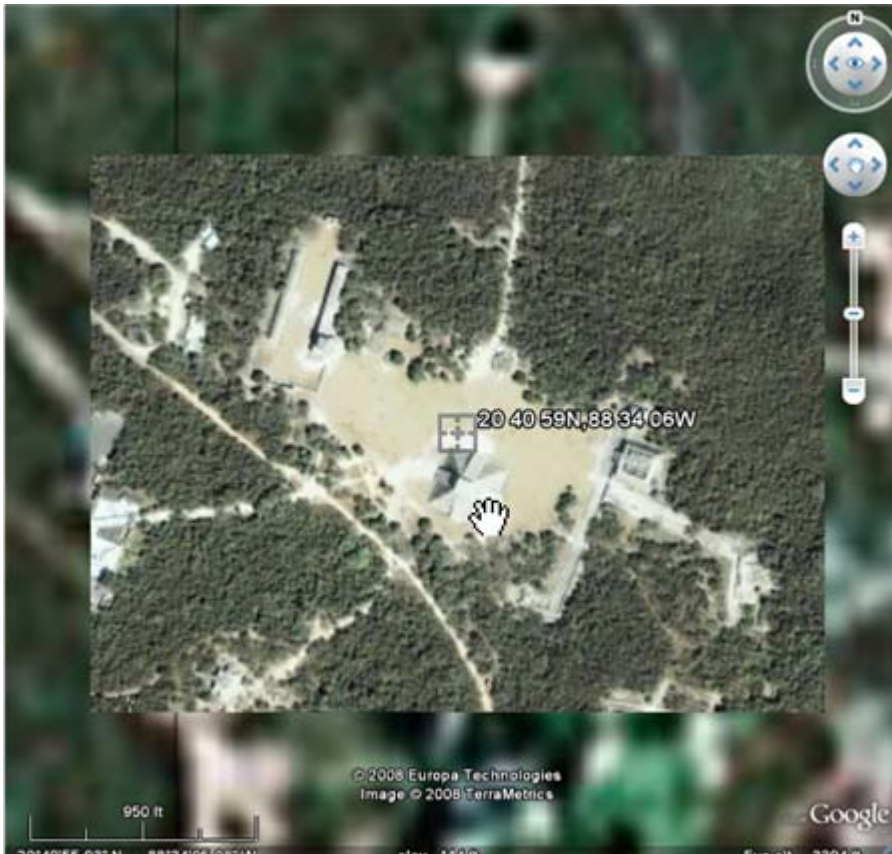
An Image Overlay dialogue box is displayed along with a yellow rectangle in the display. Name the Overlay “Overlay of Chichen Itza Area”. Place the following text in the description box: “Coordinates: 20°40'59 N, 88°34'06" W”.



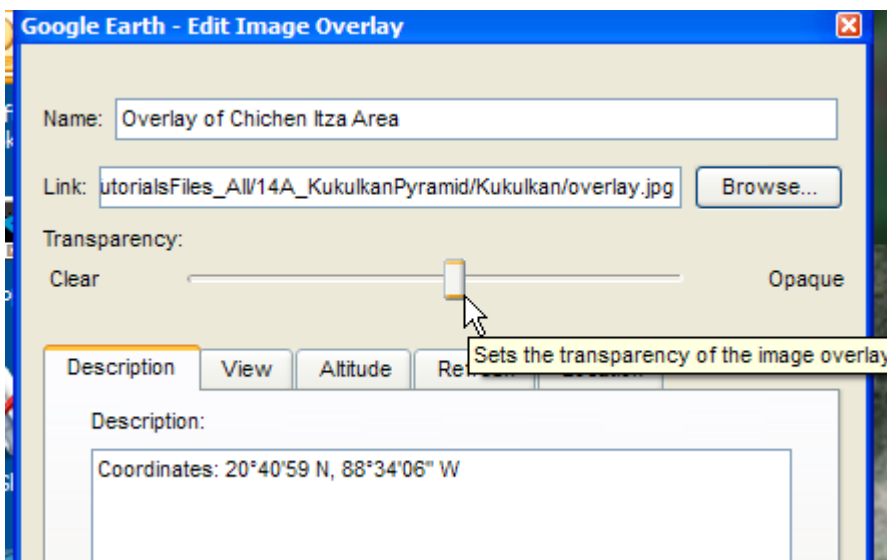
Click on the Browse button and select the overlay.jpg image from the KukulkanPyramid folder.



Click OK. This will place the overlay image on the display centered in the rectangle.



Right-Click on the Overlay of Chichen Itza Area link now listed in the Places panel on the left. Choose Properties. In the Properties dialogue box there is a slider that allows us to adjust the transparency of the overlay. Set it so it is about 65 percent opaque.



The overlay is a bit off its mark. Click and drag the center-point of the yellow rectangle and move it a bit to the left aligning the rod that runs north with the overlay and the GE

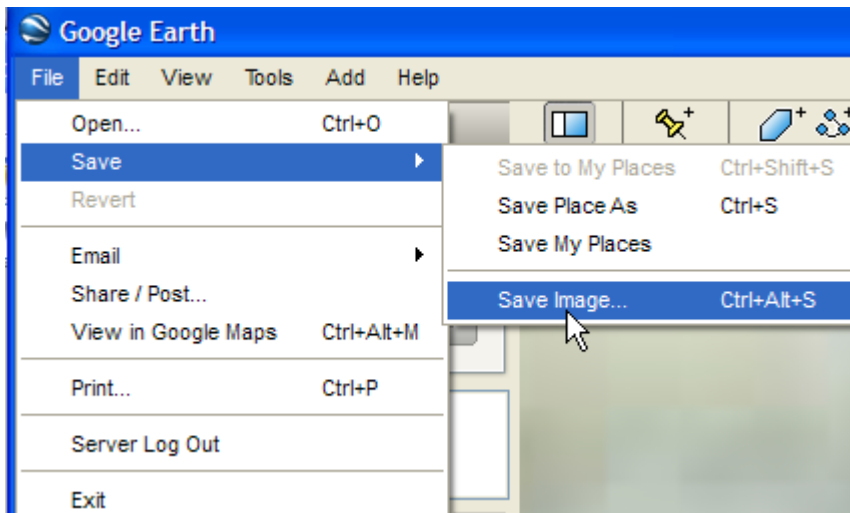
display. You may also have to enlarge the overlay by dragging on the corner mark as shown below:



When you are satisfied with the position, click OK. We now have an overlay of the pyramid area.
You should be able to zoom in and locate the stepped pyramid.



From the main menu select File / Save / Save Image. Save this file as KPOverlay.jpg to the Kululkan folder.



We now have a footprint image of the model area (KPOverlay.jpg) that we could use as a base for the Blender modeling.

If we were to now begin modeling the pyramid in Blender, we could use the KPOverlay.jpg image as a Top View background to get a very good understanding of the length, width and angle of the pyramid.

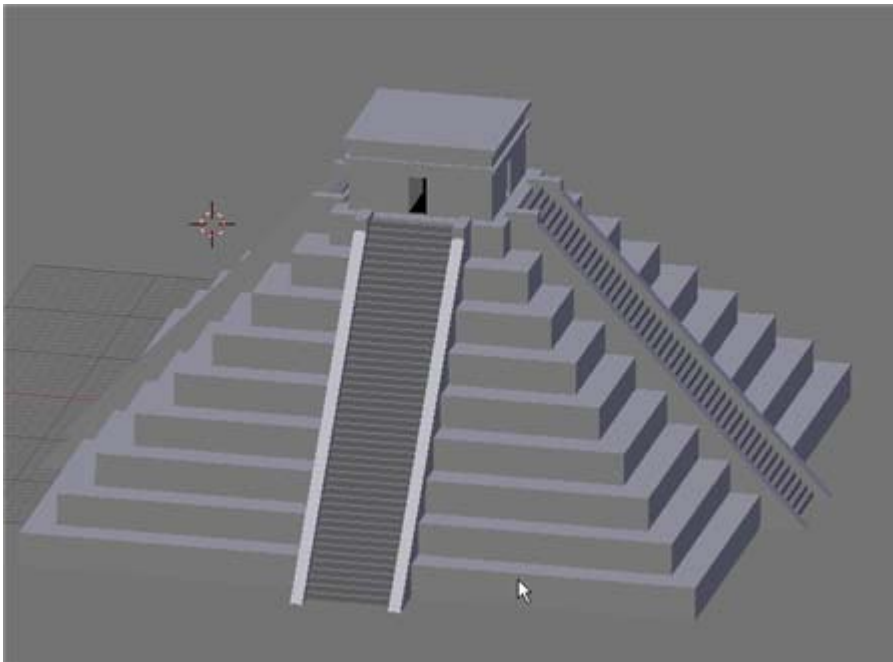
As this is a tutorial focuses on placing a Blender model into the Google Earth environment (and not a general Blender modeling tutorial), I have already created a simple base model of the Kukulcan Pyramid to use in this tutorial.

Note: In most instances you will not have to include an overlay image but rather take the information directly from Google Earth. It is only when the area resolution is too low that an overlay is needed.

You can now close Google Earth. Do not save any locations to your Places panel.

Step #2 – The Blender Model:

Open the KukulcanPyramid.blend file located in the Kukulcan folder.



Generally speaking, 3D models placed in Google Earth do not reveal a lot of detail.

Consideration should also be given to the following:

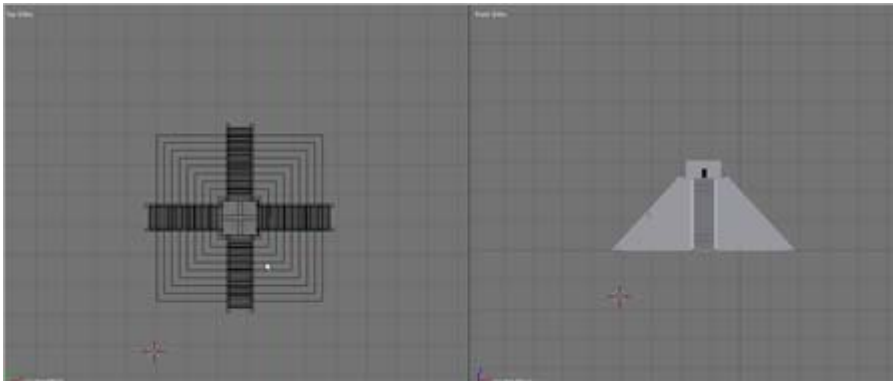
- **Mesh Objects** – Google Earth will import all Blender mesh objects. All mesh polygons are imported as triangles. All extrusions must be at least 0.1
- **Camera** – Google Earth does not make use of the Blender Camera object. You might as well delete it from your Blender model.
- **Lighting** – Google Earth does not import any Blender lighting. All Google Earth models are displayed in an even ambient light with no highlights or shadows. There is no need to place any lighting objects in your Blender model.
- **Animation** – Google Earth does not import any animation keyframes set in your Blender model.

- **Bezier, NURBS, Meta, Armature and Deformation** objects all need to be converted to Mesh Objects before exporting.
- **Materials/RGB Textures** – Google Earth will import simple RGB materials created in Blender. However, it will not import any textures applied to RGB materials. For instance, noise, procedural, environmental or **image mapping** will not be imported.
- **UV Mapped Textures** – Google Earth will import UV mapped textures. Any textures applied to your Blender model must be UV mapped. However, unlike the rendering inside of Blender the “TexFace” button in the Material Panel of the Material Buttons is **NOT** activated.

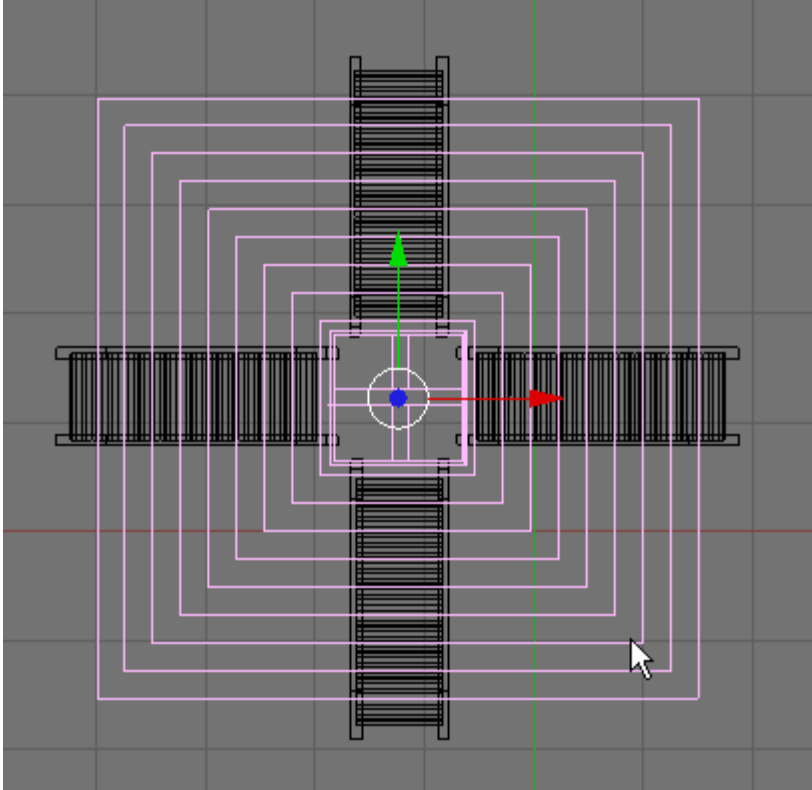
Step #3 – UV Texture Mapping:

Google Earth models created in Blender will display all regular RGB colors as well as any UV mapped textures. Since proper UV mapping is critical to viewing Blender created textures in Google Earth, we will apply some UV mapping to our KukulkanPyramid model.

Change the left 3D viewport to top view **NUM-7** and click on the **ZKEY** to switch out of shaded mode to wireframe mode.

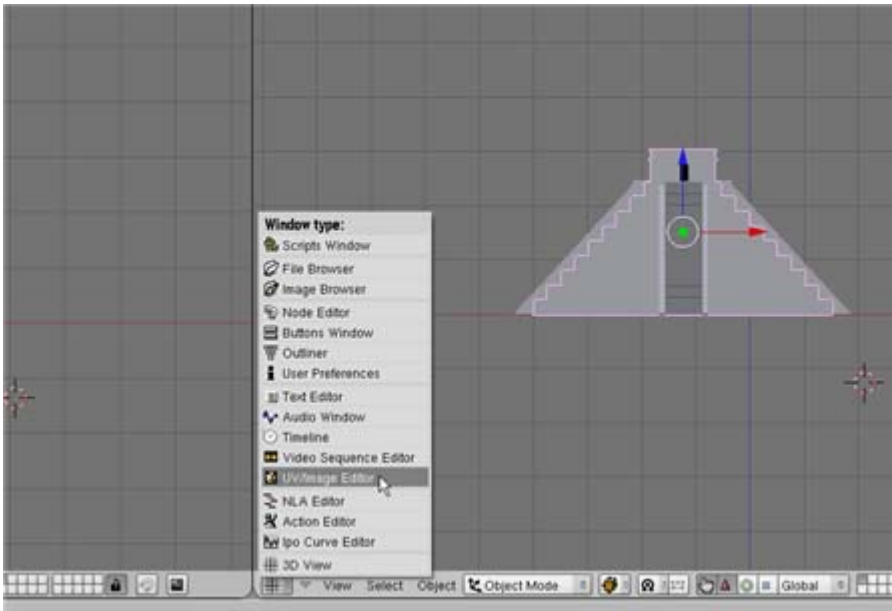


Select (right mouse button) the “base” object.

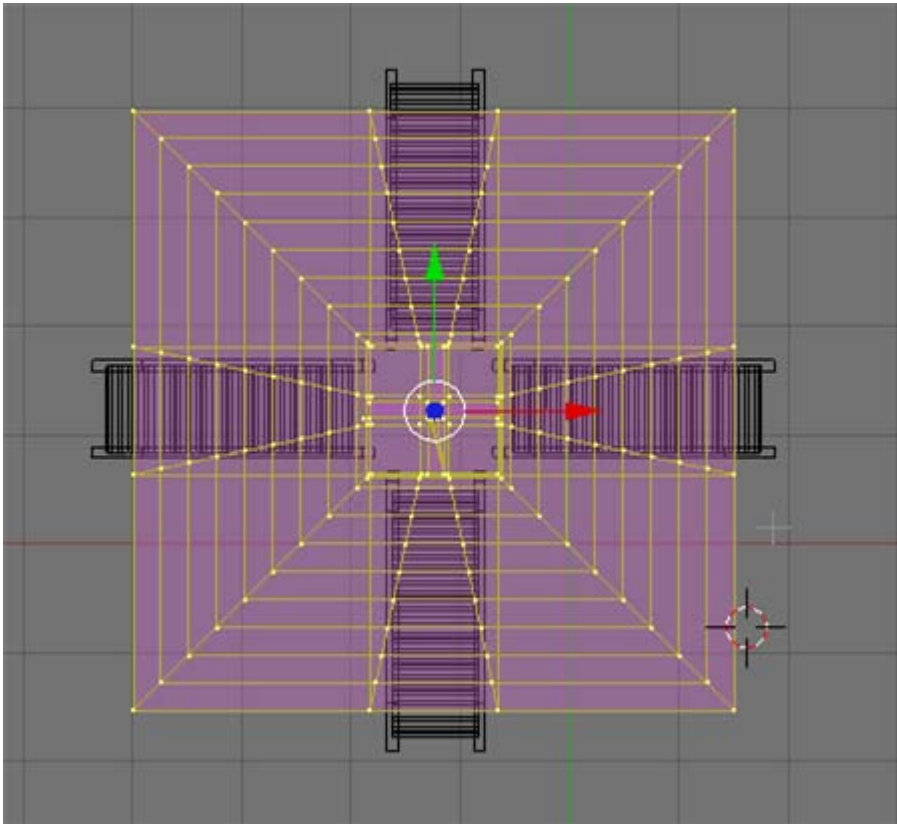


TAB into Edit mode.

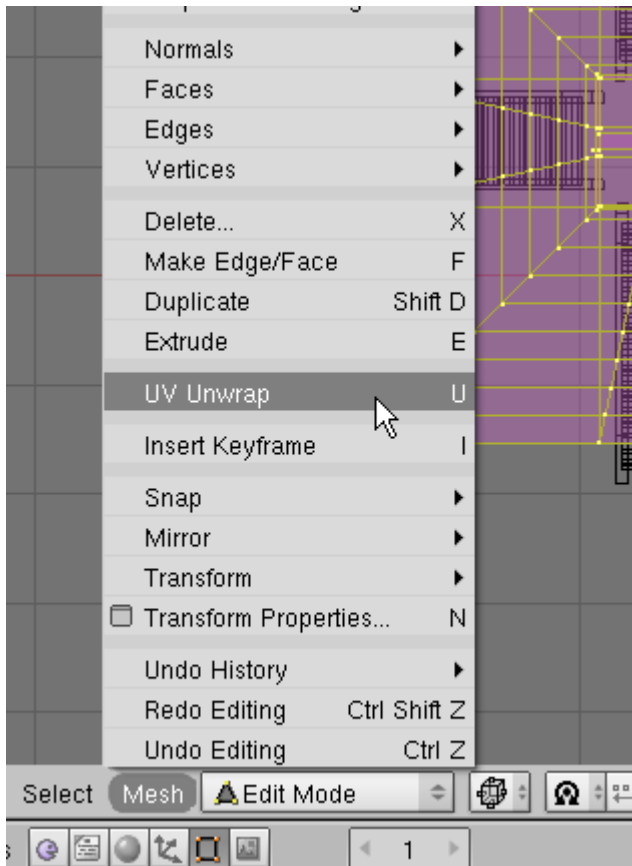
Change the right 3D Viewport from 3D View to UV /Image Editor.



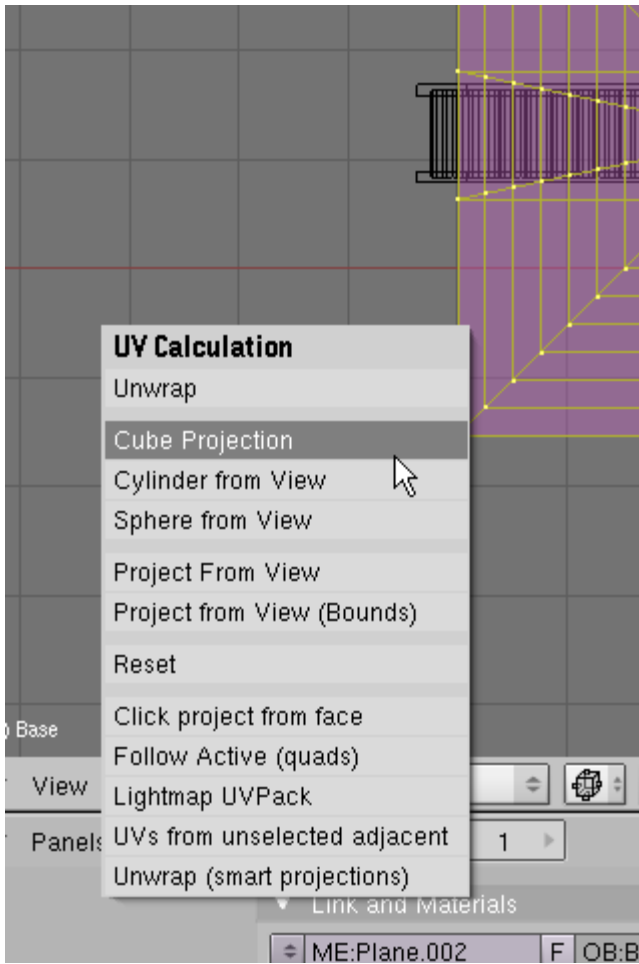
In the left 3D viewport press the AKEY to select all of the vertices from the selected base object.



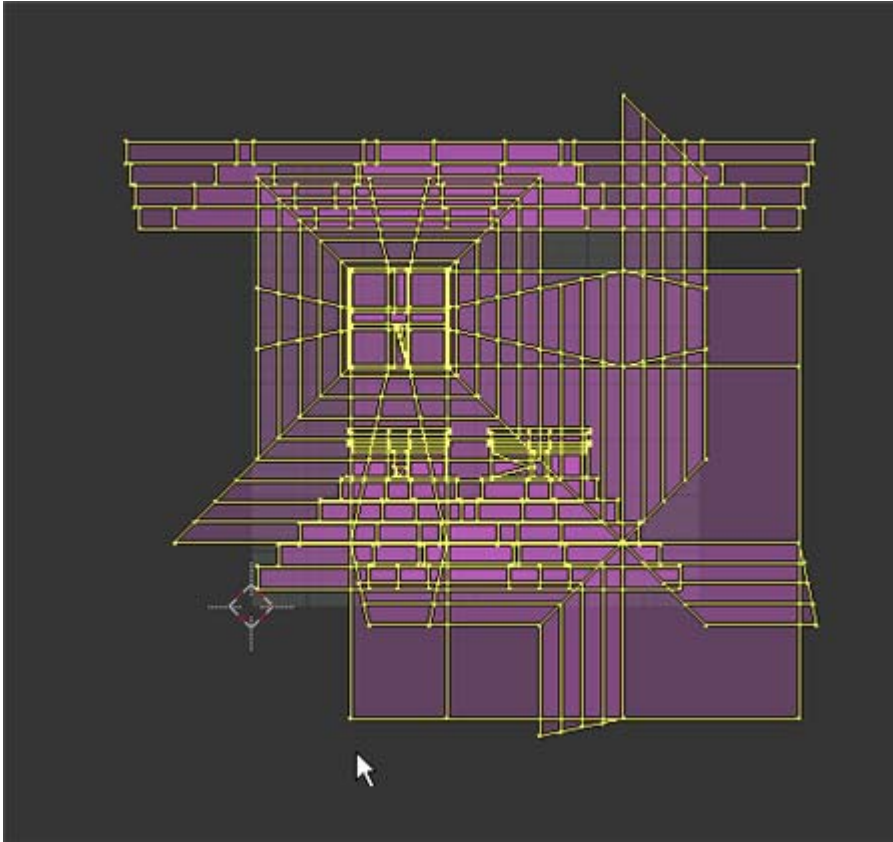
From the Mesh menu choose UV Unwrap (or press the UKEY)



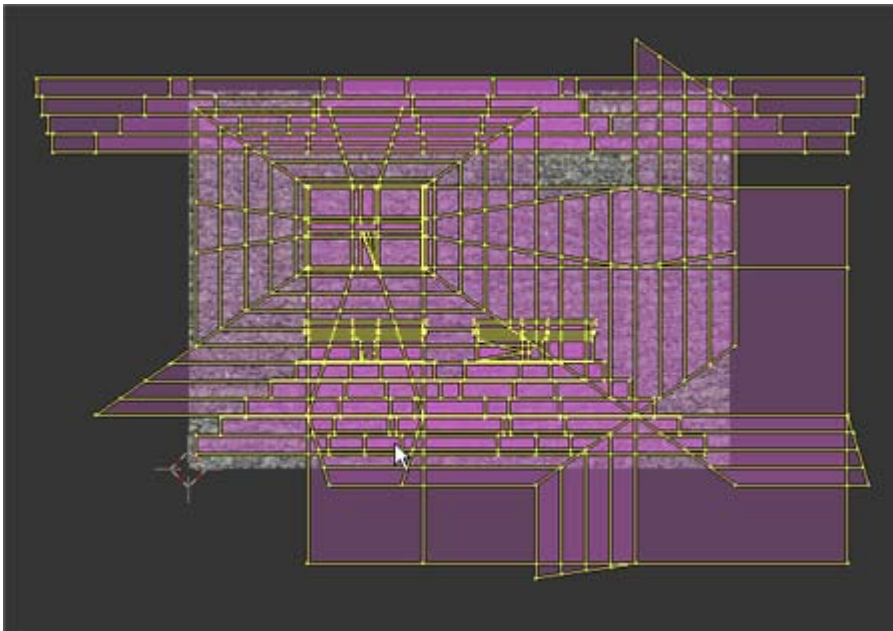
This displays the UV Calculation dialogue box. Select Cube Projection



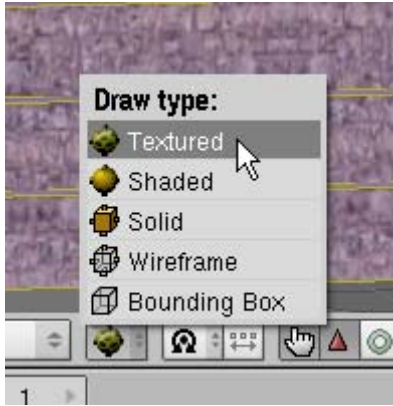
This unwraps all of the faces in the base object and places them in a “cube” unwrap position in the UV Image Editor. (You may have to use your scroll wheel to zoom in or out in the UV Image Editor)



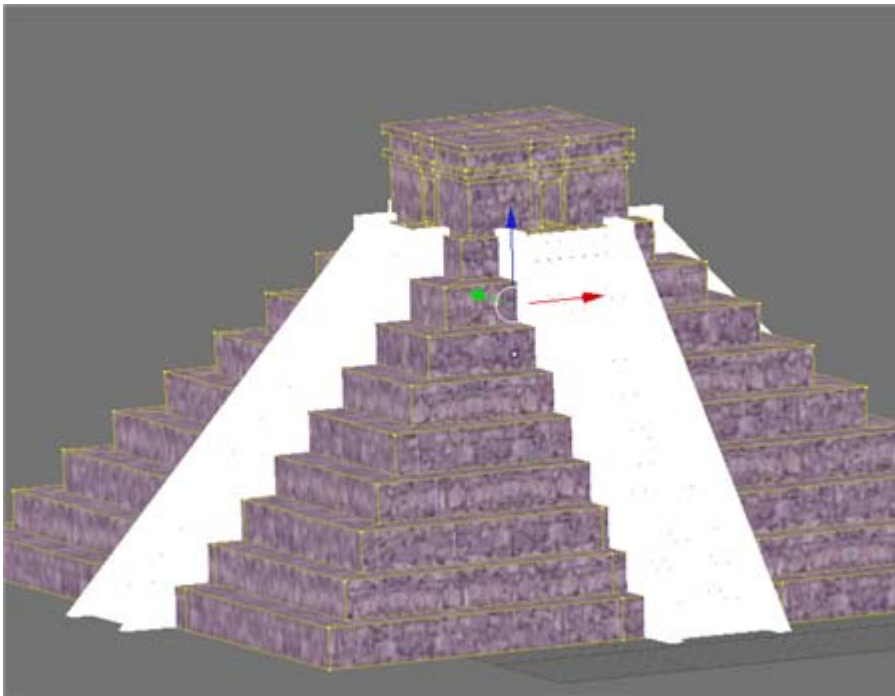
In the UV Image Editor window, click on the Image button then Open. Select the stone.jpg image from the Kukulkan folder. This places the stone.jpg image on the faces of the base object.



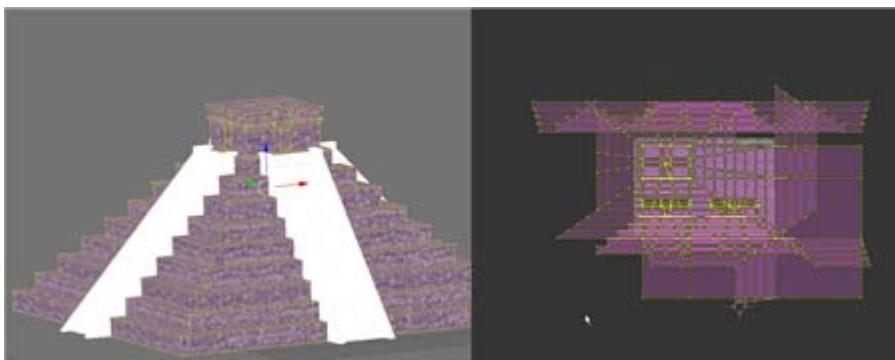
Change the display mode in the left 3D viewport from wireframe to textured.



You can see the results in the left viewport by rotating the view.



In the right UV Image Editor window, scale (SKEY) the vertices up until the size of the stone texture as seen in the left viewport is to your liking.



Note: If we wanted to remove this UV mapping we would have to:

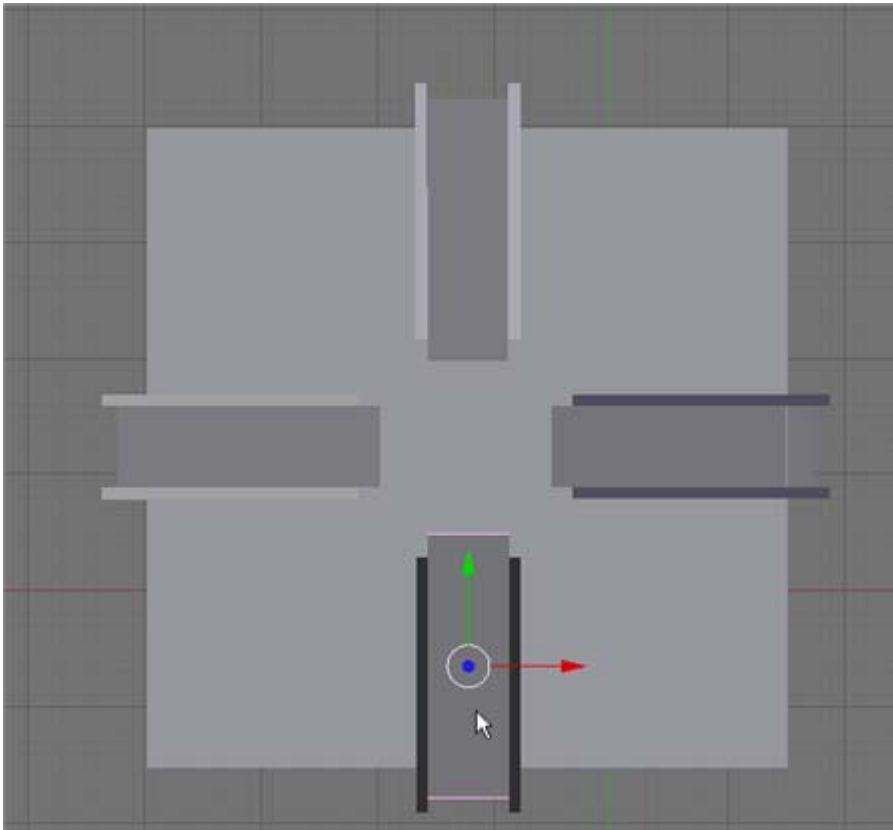
1) Click on the “X” in the UV Mapping Editor

And

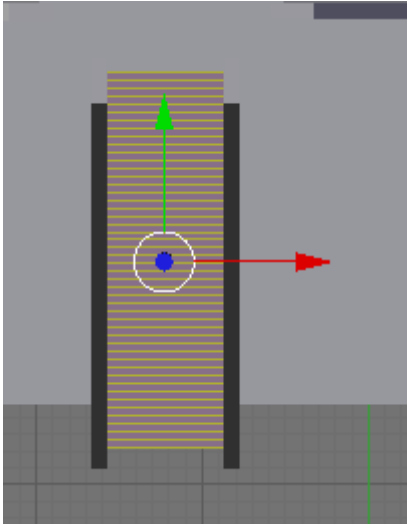
2.) Click on the “Delete” (TexFace) button in the Mesh Panel of the **F9** Editing Buttons

Set the left 3D viewport back to top view (NUM7). TAB back to object mode. ZKEY back into solid shading view.

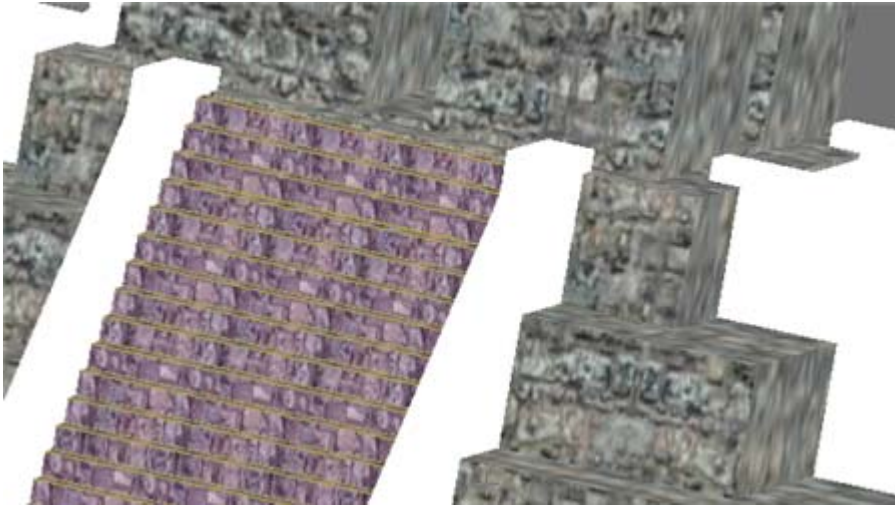
(RMB) Select the lower stair object (do not include the railing objects).



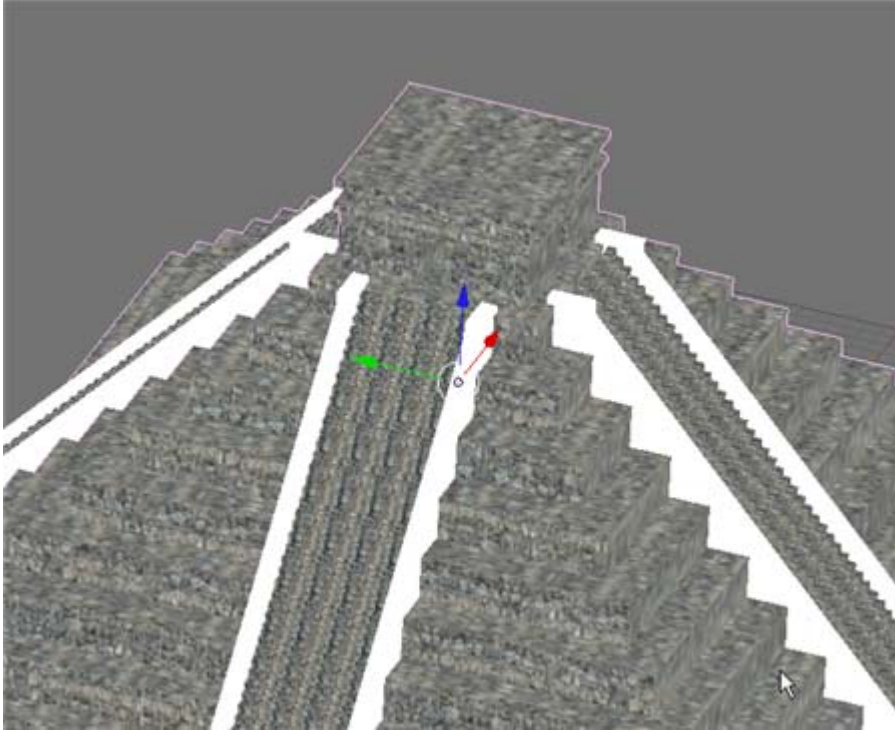
TAB into Edit mode. Press the AKEY to select all of the vertices.



From the Mesh Menu, select Unwrap UVs then Cube Projection. In the UV Image Editor click on the Image Button then Open and load the romanwall.jpg image from the KukulkanPyramid folder. This applies the image to the faces of the lower stairs.

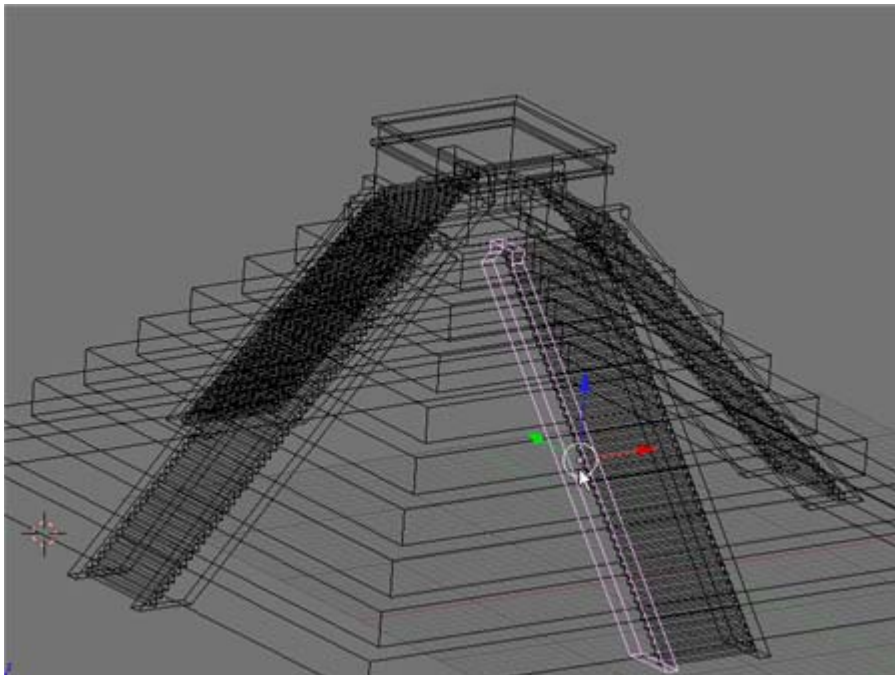


Switch back to Object Mode. Repeat the UV mapping process on the other 3 stair objects.

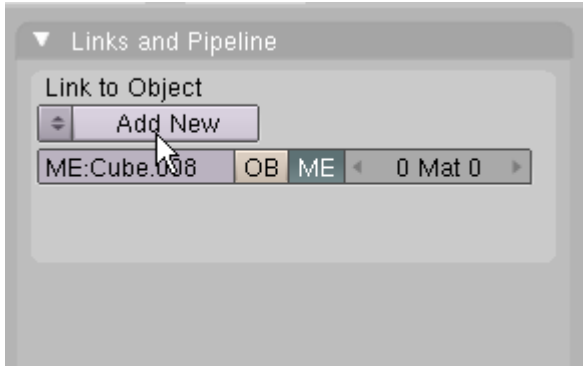


When you are finished UV mapping the stair objects switch back to Object Mode. Switch the right Viewport back to 3D view and switch the Draw mode back to wireframe.

We will now create a simple material to use on the stair rail objects. Select one of the stair rail objects.



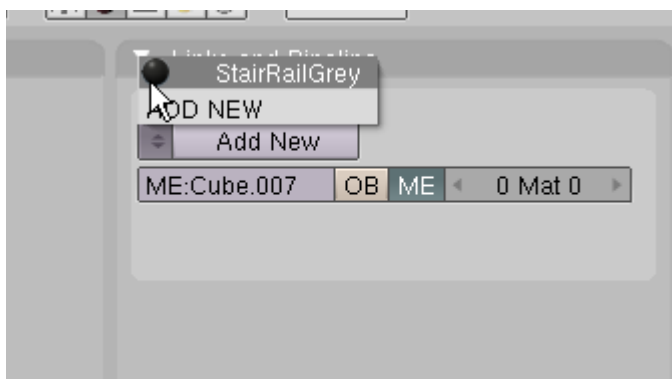
Go to **F5** Shading. In the Links and Pipeline panel, click on Add New material button.



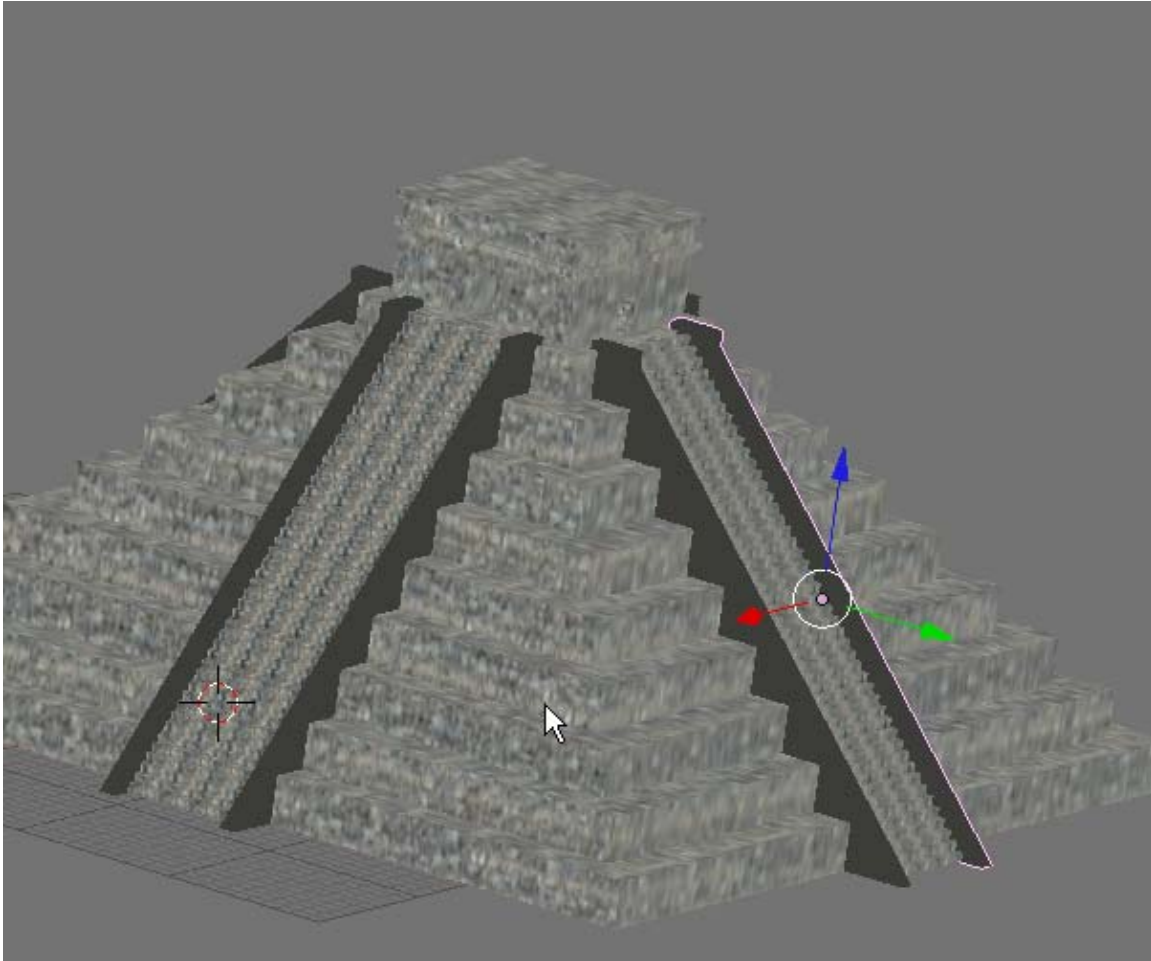
Set the RGB sliders in the Material Panel to a dark grey and name the material StairRailGrey in the Links and Pipeline Panel.



Select each of the other rails in turn and apply this same material to the objects.



Switch to textured view. The materials are now applied to the Blender model.



Note: As with many instances of UV mapping of textures it is sometimes important before applying the UV mapping to:

1.) Select each object and turn off “Double Sided” in the Mesh Panel of the **F9** Editing buttons.

And

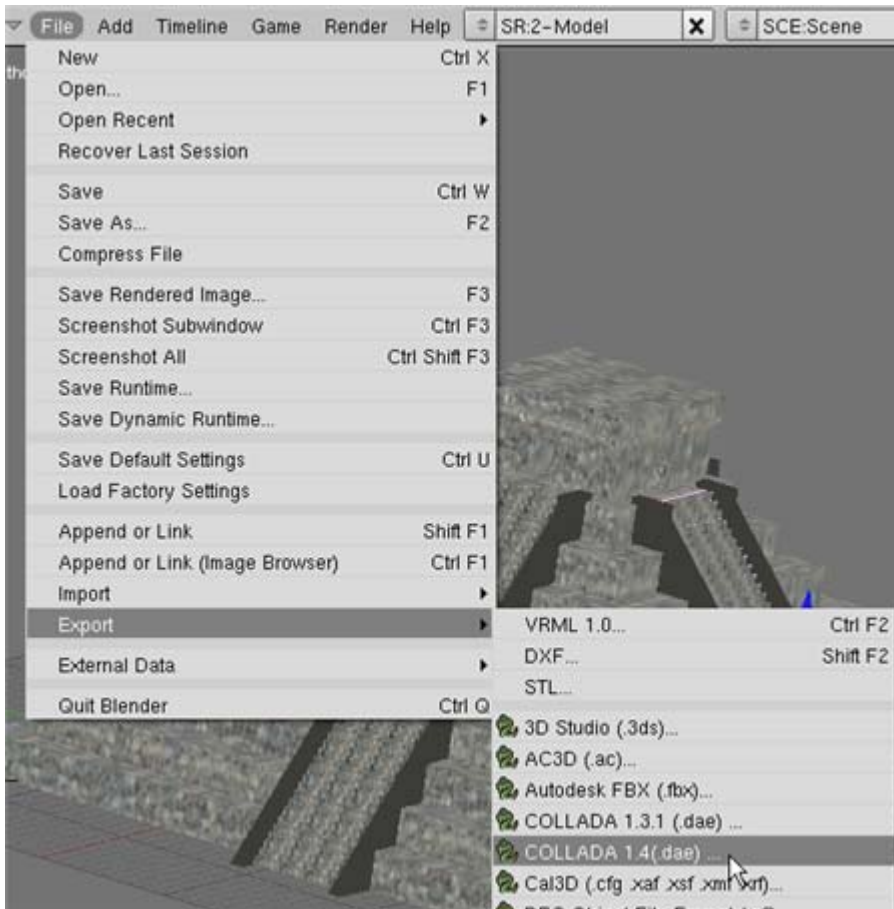
2.) Select each object, TAB to Edit Mode, AKEY select all vertices and CTRL-N Recalculate Normals Outside.

I already did this on the Kukulkan.blend file model.

Step #4 – Exporting the Blender Model:

Save your model and rename it KukulkanPyramidCompleted.blend. Save it in the same directory as the KukulkanPyramid.blend file. This is **VERY IMPORTANT!** The .blend and the image files and the exported file for Google Earth **MUST** be in the same directory.

We will now export the geometry to a .dae file that can be interpreted by Google Earth. Select File / Export / Collada 1.4 (.dae)



Set the file name as Pyramid.dae.

Set the file path so that the Pyramid.dae file is exported to the KukulkanPyramid folder.

Select Triangles (Google Earth will only import triangles via the Collada Export)

Select Disable Physics (Google Earth will import it anyway)

Select Use Relative Paths (This will help Google Earth to find the texture files)

Click on “Export and Close”.



An “Export Successful” note will appear on the screen. You can now close Blender.

Step #5 – Creating the KMZ File:

The process of placing the Blender model into Google Earth and creating a KMZ file that can be shared with others is fairly easy. Open Google Earth. In the address line type in the following:

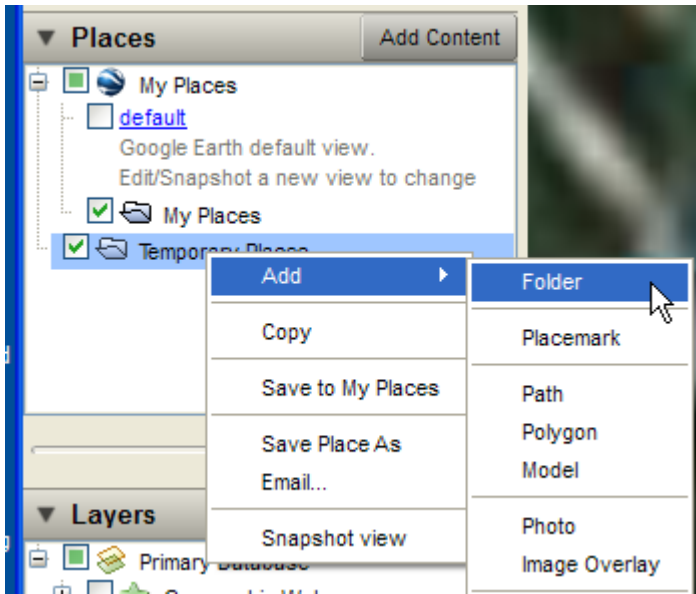
20 40 59N,88 34 06W

These are the coordinates for the Kukulcan Pyramid area.

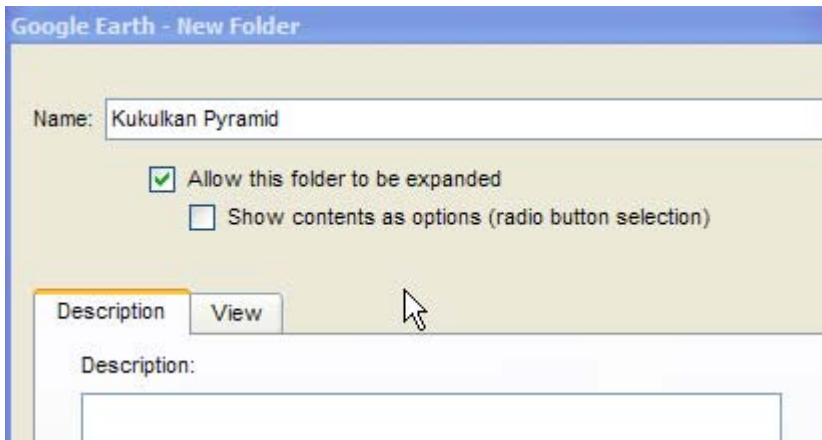
Click on the Begin Search Button

Note: your Overlay of Chichen Itza Area may still be displayed if it is listed under “My Places” (and checked). If the old overlay is still displayed u can right-click the listing in the Places panel and delete it (we will add a new one)

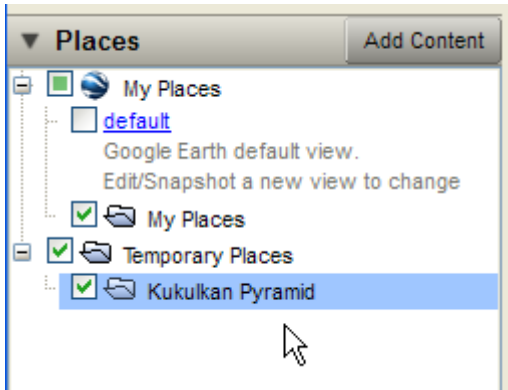
First we need to create a folder. Select the Temporary Places in the Places Panel and Right-Click. Select Add / Folder



Name this folder “Kukulkan Pyramid”. Leave the description box blank. Do **NOT** checkmark Show contents as options (we want all of the folder elements displayed by default).

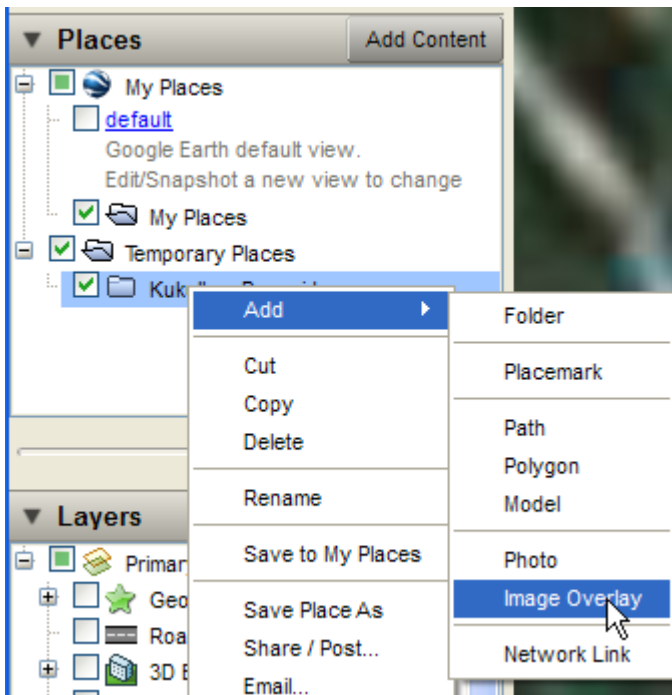


Click OK. This creates a folder in the Places Panel.



We have created a folder because we have a number of elements to add to the KMZ file (an overlay, a model and a placemark). To keep this in one file we needed to create a folder and make sure we put all of our elements in that folder.

We will now add the overlay image. Select the Kukulcan Folder in the Temporary Places Panel. Right-Click and select Add / Image Overlay.



An Image Overlay dialogue box is displayed along with a yellow rectangle in the display. Name the Overlay “Overlay of Chichen Itza Area”. Place the following text in the description box: “Coordinates: 20°40'59 N, 88°34'06" W”. Click on the Browse button and select the overlay.jpg image (**NOT** the KPOverlay.jpg) from the KukulcanPyramid folder.

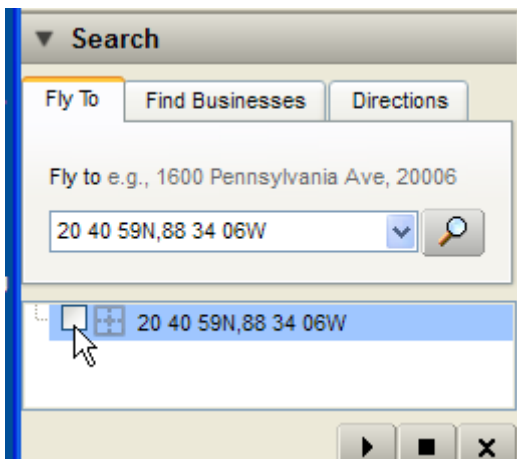
Click OK. This places the overlay image on the display centered in the rectangle. Right-Click on the “Overlay of Chichen Itza Area” link now listed in the Places panel on the

left. Choose Properties. In the Properties dialogue box there is a slider that allows us to adjust the transparency of the overlay. Set it so it is about 65 percent opaque. The overlay is a bit off its mark. Click and drag the centerpoint of the yellow rectangle and move it a bit to the left aligning the road that runs north with the overlay and the GE display and scale it up a bit by dragging on a corner handle as shown below:

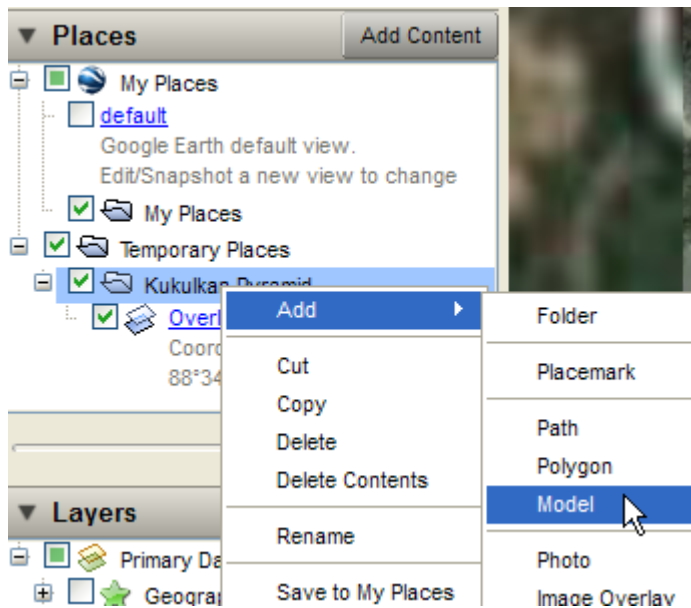
When you are satisfied with the position, click OK. We now have an overlay of the pyramid area.



We will next add the model. Before we add the model **uncheck** the “20 40 59N,88 34 06W” link in the Fly To /Search Panel. This placemark will get in the way and is not needed.

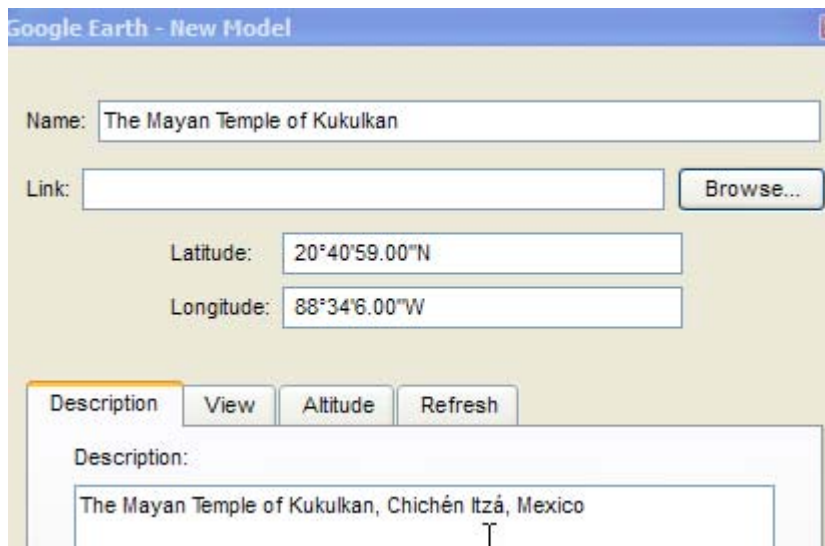


Select the Kukulkan Pyramid Folder in the Places Panel. Right-Click and select Add / Model. (Make sure you right-click on the folder and not the overlay)



It is important that the model be added to the Folder and not the overlay.

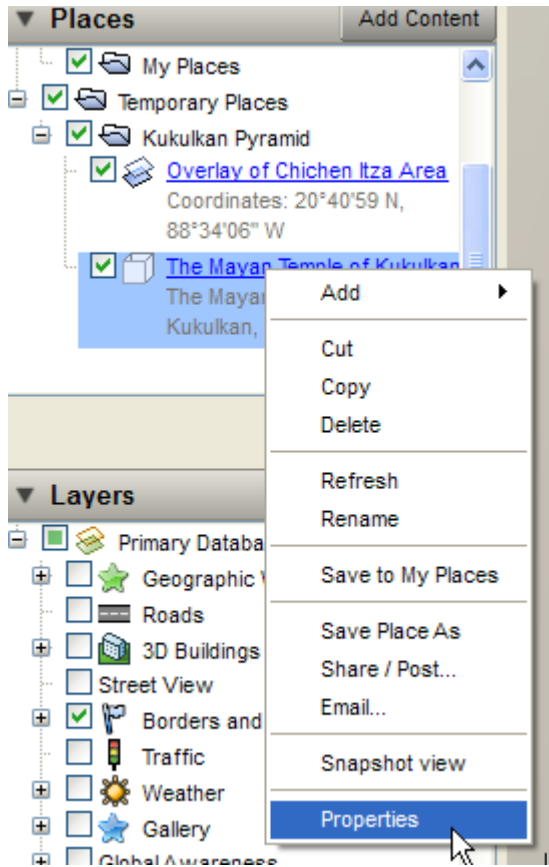
This displays the new model dialogue box. Name the model “The Mayan Temple of Kukulkan” and type in the following description: “The Mayan Temple of Kukulkan, Chichén Itzá, Mexico”.



Click on the Browse button and select the Pyramid.dae file that we exported from Blender which should be located in the KukulkanPyramid folder.

Click OK. This imports the Blender model into the Google Earth environment. However the scale of the Blender model is considerably smaller than the Google Earth scale. Zoom out and you will see that the model is but a small speck on the landscape.

Zoom in so that you can clearly see the Blender model. Right-Click the “The Mayan Temple” link located in the Places Panel **and select Properties**.



Notice that the Blender model is now enclosed by a yellow box.



Move your cursor to the bottom right corner of the box until the cursor changes to a double arrow. Click and drag the corner of the box and the model will scale up while dragging.

Continue to zoom out a bit and drag the corner of the box out scaling the model until it is close to the proper size. (Note: you may have to drag out (scale) the model many times, zooming out after each scale up.)

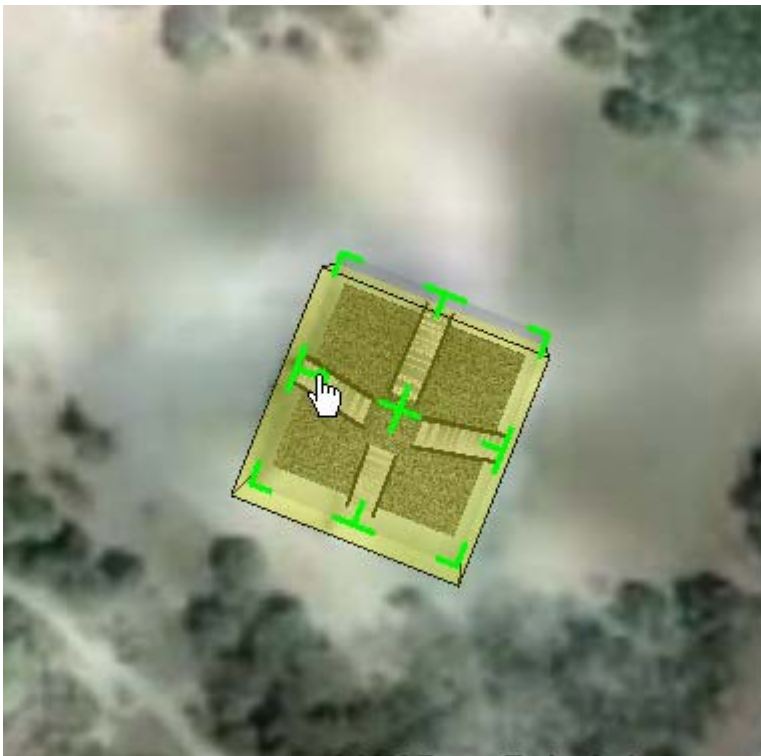


Move your cursor to the center of the box until a finger appears then click and drag the box. This allows you to “grab” it and move it.

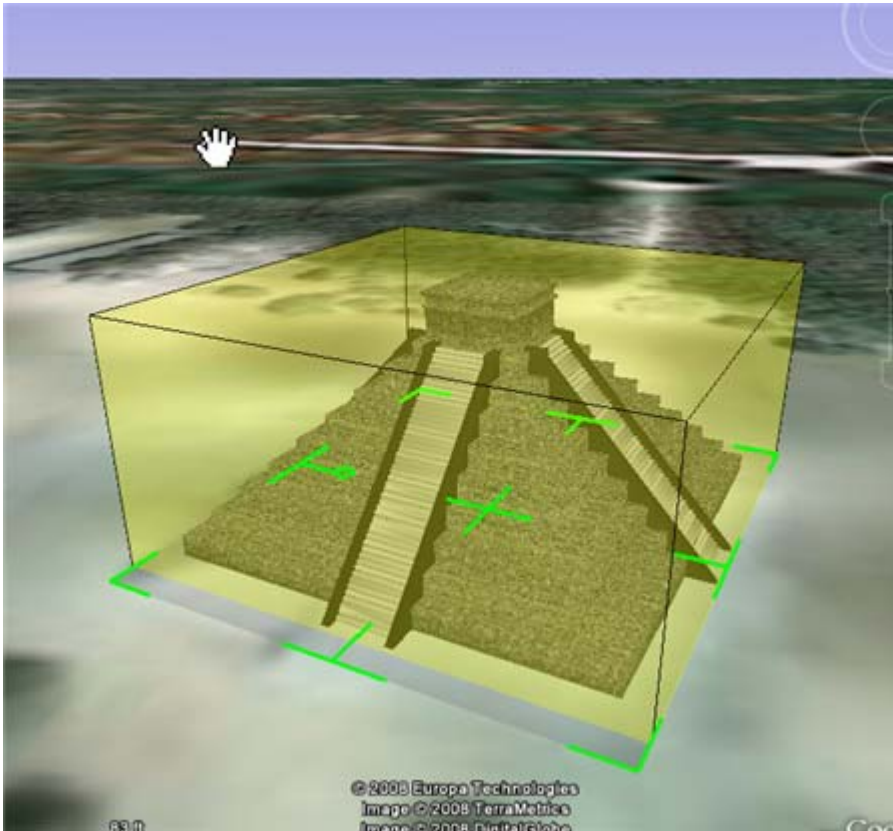
Move and scale the box so that it is located over the overlay image of the pyramid.



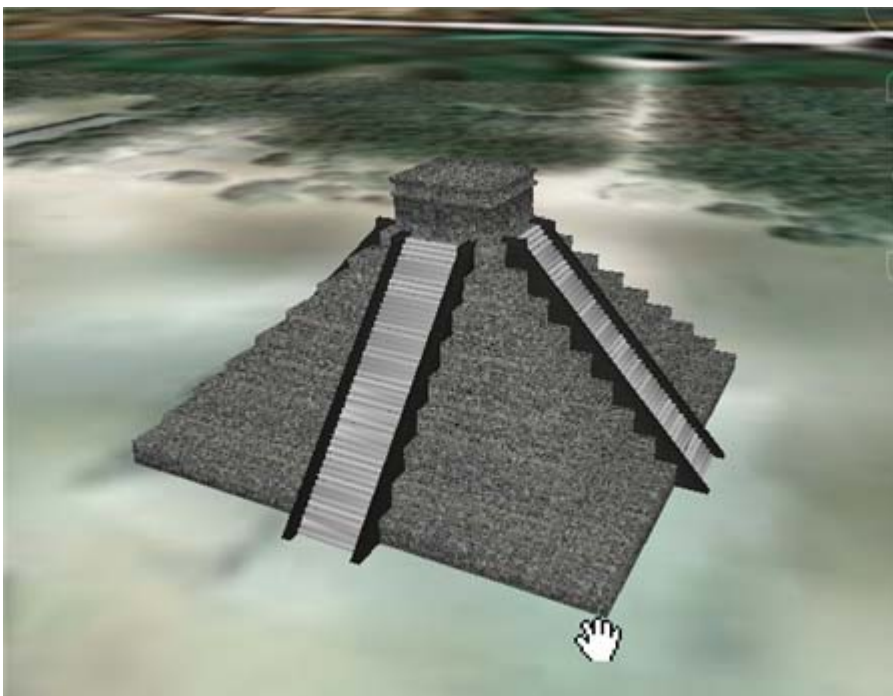
Move your cursor to the little yellow circle on the left or right side of the box. Your cursor will again turn into a pointed finger. Click and drag your cursor. This allows you to rotate the model.



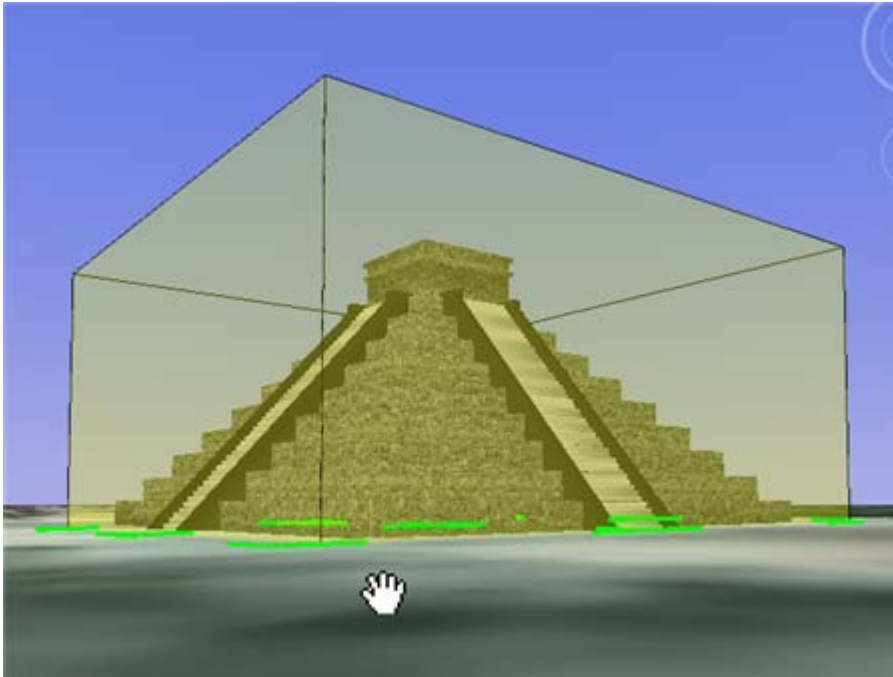
Move, scale and rotate the model until it appears to fill the area of the overlay pyramid image. You may have to rotate your Google Earth view to get a good look at it.



When you are satisfied with the scale, rotation and position, click the OK button in the dialogue box. Rotate the display view to see the model.

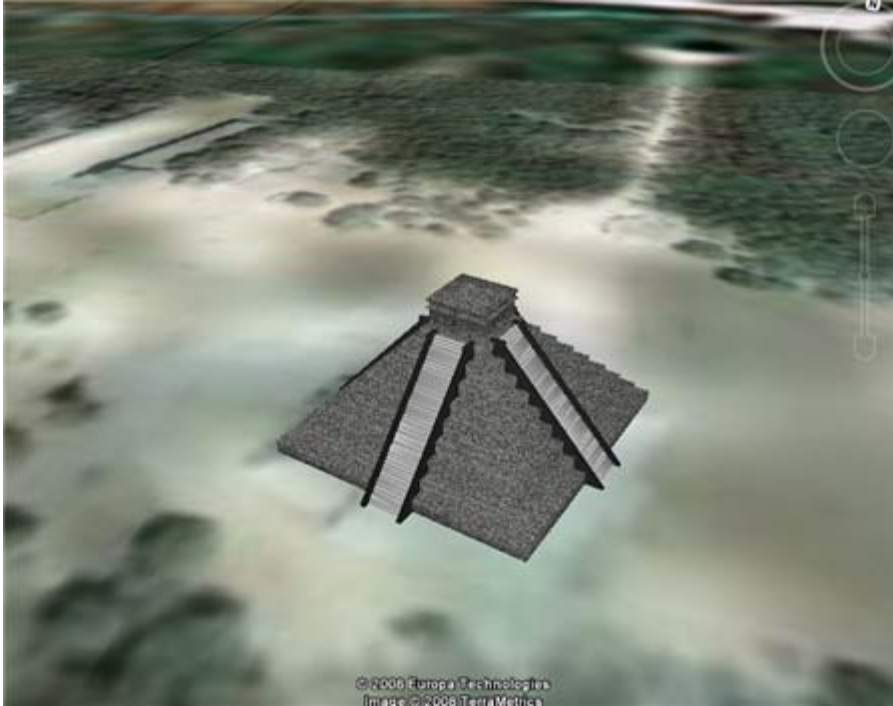


Select the model again in the folder, right-click and choose properties. Rotate the display view so you are looking at the model from about eye level.



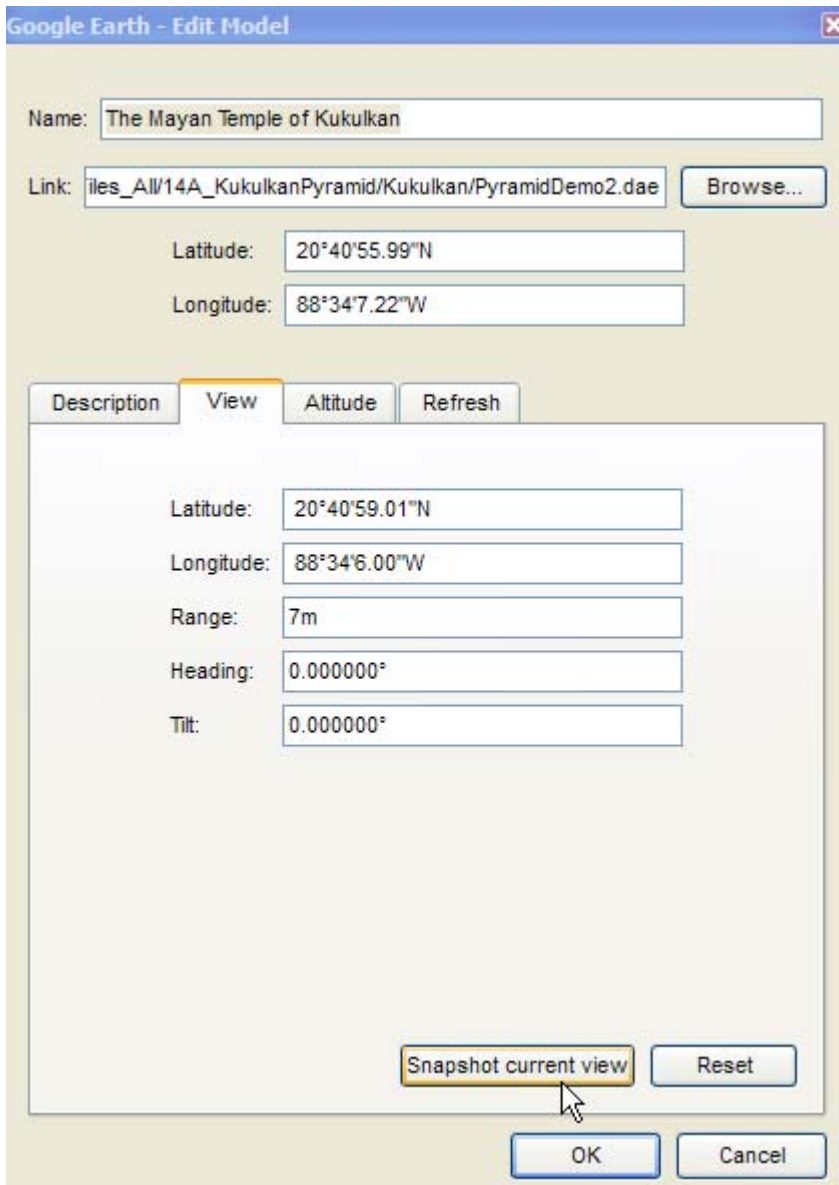
Note that the model is enclosed by a yellow cube. Select the Altitude tab from the dialogue box. Note that by default the model is “clamped to the ground”. You can adjust the vertical placement of the model by clicking on the dropdown box and choosing “relative to ground”.

You can now adjust the vertical position of the model by using the slider or entering a value in meters (m). In our case we do not have to make an adjustment. However, depending on the ruggedness of the terrain some models will need a vertical adjustment. Make scale, position, rotation or vertical position adjustment to fit the model to the overlay as desired. When you are satisfied with the final positioning, click on the OK button on the dialogue box Rotate the zoom the view until you find one you like (like below).

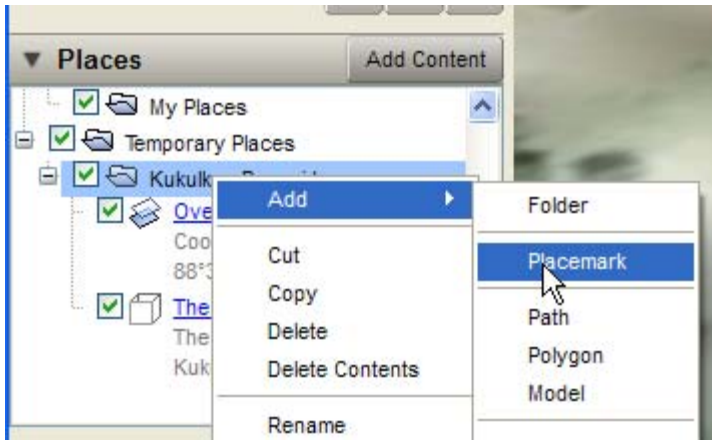


Right-Click “The Mayan Temple of Kukulcan” link in the Places panel and select Properties.

Select the View Tab and then click on “Snapshot current View”. This will record the current view in the properties for this element. Click OK when done.



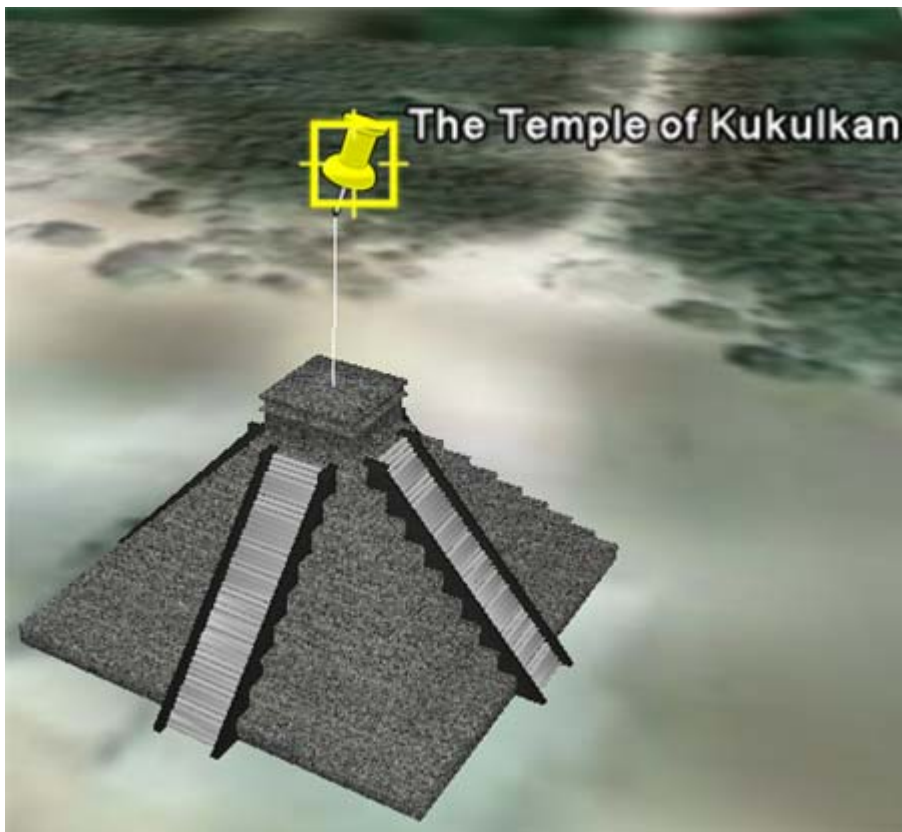
We will now add a Placemark. Select the Kukulkan Folder in the Places panel and Right-Click it and select Add / Placemark.



Note that we added the Placemark to the Folder, not the model or the overlay.
We now have a Placemark in the Display View.

Click on the Altitude Tab of the New Placemark dialogue box. Move the slider to the right a bit until the Altitude for the Placemark is about 70 meters. Checkmark the Extend to Ground box.

The Placemark is now above the pyramid in the display view with a line extending to the ground. Grab the Placemark with your cursor and position it directly above the pyramid. Name the Placemark in the dialogue box “The Temple of Kukulkan”



Click on the description tab. Add the following to the description box:

```
  
<br /><br />
```

El Castillo - the great temple-pyramid of Kukulkan (Feathered Serpent), Chichen Itza, Yucatan, Mexico built by the Toltecs whose arts and Mexican architectural style influenced the ancient Maya


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<a href="http://www.isourcecom.com/maya/cities/chichenitza/il.htm">More  
Information</a>
```

Note the description contains text, an HREF link and an img src image.

Click on the Icon Style button in the upper right-hand corner of the dialogue box. This displays an icon selection chart.

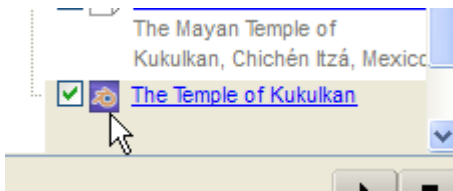


Select “Add Custom Icon” in the lower left corner. This displays a dialogue box which allows us to add a custom icon. Click on the Browse button and select the blendericon.png file from the KukulkanPyramid folder.

Click OK to the Icon selection dialog box and click OK on the Placemark dialogue box. The Blender icon is now above the model.



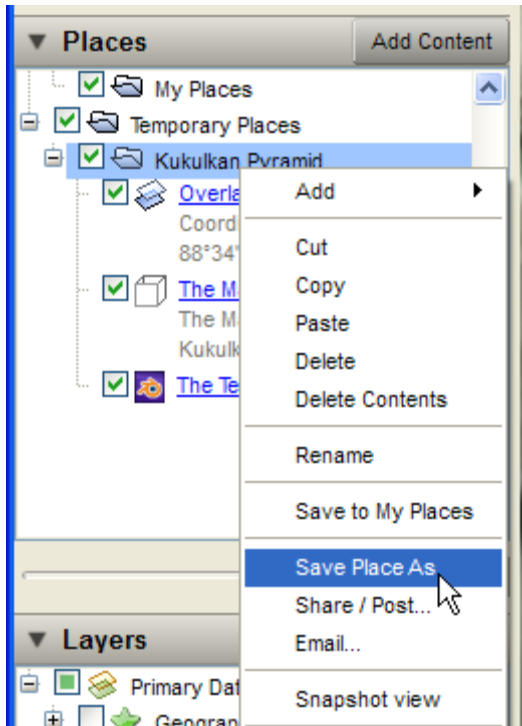
Note also that the Blender icon is now listed in the Places panel.



The final procedure we need to do is to make sure all of the View Tab properties for each element and for the folder are the same. First set the view in the display to how you want the users to view the model. Next, open the Properties dialogue box for the Overlay element. Select the "View" Tab then "Snapshot Current View". **Click OK. Do the same to the model element properties box and the placemark element properties box. Finally (and it is important to do this last), open the properties box for the folder, select the View Tab then Snapshot Current View. Click OK.**

We can now make the KMZ file.

Select the Kukulcan Folder listing in the Places Panel and right-Click. Select Save Place As. (Make sure you do this to the folder and not one of the elements).



Name the file KukulkanPyramid (.kmz) and save it to the Kukulkan Folder. After the file is saved, check your directory to make sure it is there.

You can now close Google Earth. Do not save any locations to your Places panel.

Reopen Google Earth. Go to File / Open and open the newly created KukulkanPyramid.kmz file. Google Earth will fly to the location and view and display the model, overlay and placemark.



Note that you can click on the + icon in the Places panel to open up the folder and reveal each element. Click on the Blender icon in the display. This displays a balloon pop-up that contains the Text / HREF / Image code we added to the Placemark description.

You can, at any time, open the KMZ file in Google Earth, make edits (even add more elements). When you are done editing, Snapshot all of the element views, select the folder and right-click Save As.

Step #6 – Distributing the KMZ File:

The KukulkanPyramid.kmz file contains all of the information needed by Google Earth to display the model and associated overlay and placemark. The KMZ file is actually a type of ZIP file which contains all of the image files, the DAE file we exported from Blender, a TXT file associating the textures and a KML file that calls the rest of the files. It is even possible to unzip the KMZ file using a Zip utility program like WinZip.

One way to distribute your Blender models is to simply distribute the KMZ file. Models created in Blender / Google Earth cannot be stored in Google's 3D Model Warehouse. Perhaps someone will create a Blender 3D model warehouse to share Blender / Google Earth models.

Copies of all of the files used in this tutorial are located in the TempleOfKukulkan.zip file located on our course site.