Modeling a City

A Guide for Creating Your Google Earth Environment

Google

What is Google Earth Modeling?

Google Earth is an online environment, and performs best when models are created with this in mind. A well constructed model will load fast and allow Google Earth to perform to it's highest potential.

All geo-referenced models go through an internal review process before being included in the "Best of the 3D Warehouse" layer in Google Earth. Following this guide is best way to get your models included in the layer!

Keys to Success
- Maintain accuracy in scale and location
- Focus on the important and identifying details
- Show small, intricate details through photo textures
- Low polygon count
- Make it beautiful

Google

Useful Tools

Google SketchUp
www.sketchup.com
3D modeling tool

Google Earth
earth.google.com
3D interactive earth browser

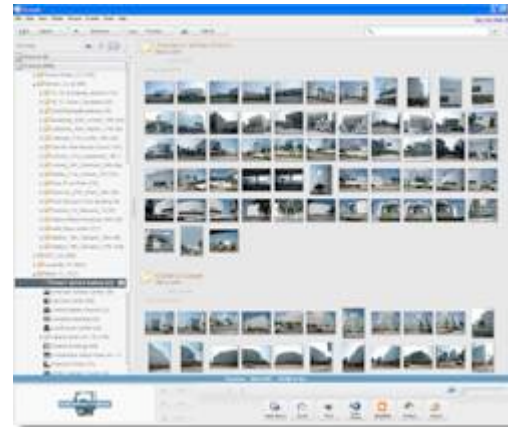### 3D Warehouse
sketchup.google.com/3dwarehouse
Online collection of 3D content

Adobe Photoshop
www.adobe.com
Advanced photo editing

Picasa
picasa.google.com
Photo editing and organization

Google

Useful Resources

Google Search
www.google.com
Many searchable categories

Emporis
www.emporis.com
Building heights and details

Archiplanet
www.archiplanet.org/
Building encyclopedia

Wikipedia
www.wikipedia.org
The free encyclopedia

Skyscraperpage
www.skyscraperpage.com
Building heights, diagrams and forums

Google

Terminology

Edge or Line
- Geometry that divides and borders faces.

Face or Polygon (Poly)
- A two-sided, flat surface bound by at least three lines.

Texture or Material
- Images or colors that are applied onto faces.

Tiled Texture
- An images that repeats across a face, "tiling" to create a texture.
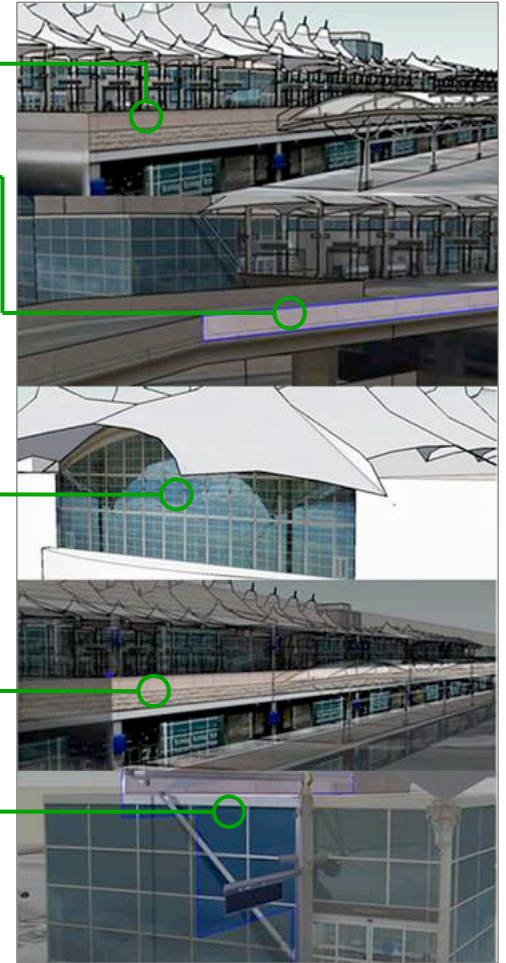
Alpha Transparency
- The use of transparency in an image.

Low Poly
- Using a minimal number of edges and faces to limit file size and increase computer performance.

File Size
- The amount of space your file uses on your computer. Models must be under 10MB to be uploaded to the 3D Warehouse.

Google

Taking Pictures

- Take LOTS of pictures! You will need every façade, including alleys and courtyards.

- Shoot around obstructions when you can like trees, people, cars, etc.

- Include the context. Show the building in its surrounding area.

- Include corner shots for use in matching a photo.
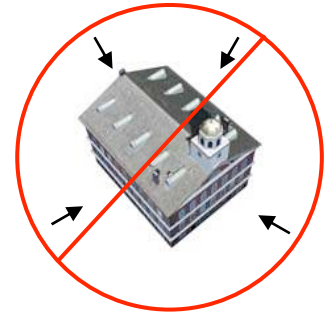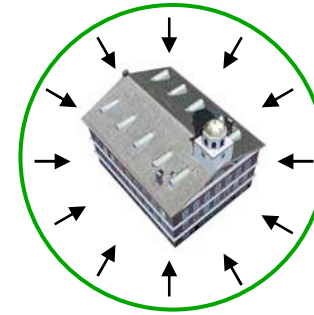
Get detail shots.

Take context pictures to help place the building.

Take multiple pictures of each façade.

Take multiple photos of long façades if they are too difficult to get in one shot. You can use a photo editor to stitch them together later.

Google

Building a Model

Creating a successful model means creating one that accurately represents the building and also loads efficiently into Google Earth. Models with simple geometry and web ready textures will load quickly into an online environment such as Google Earth.

- Getting started
- Simple modeling
- Components
- Grounding your model
- Clean up

Google

Building a Model

Open Google Earth.

- Find your building in Google Earth. Press the "R" key to align North to the top of the screen and to get a direct overhead (plan) view.

    - Be sure the Elevation Exaggeration is set to 1 in the Tools -> Options menu.

    - Be sure your terrain layer is check-marked.

- Save the image for use as the roof texture without moving your position. File -> Save -> Save Image
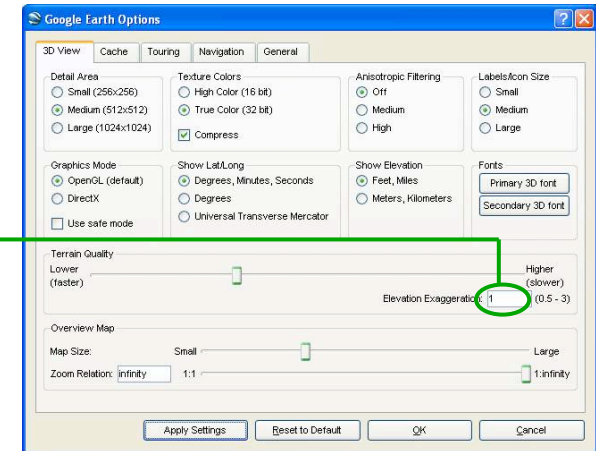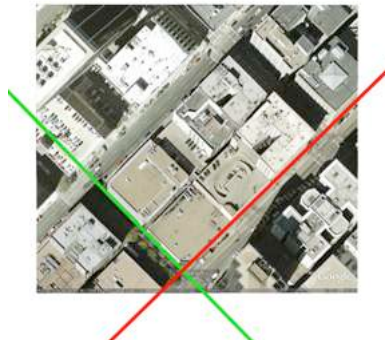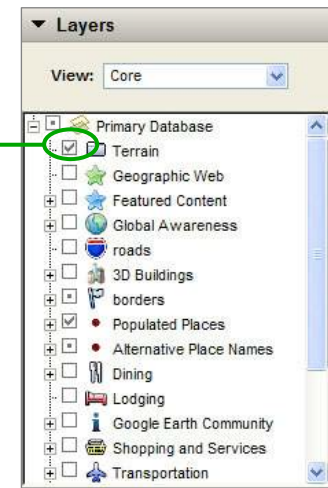
Open Google SketchUp

- Import terrain using Get Current View tool in SketchUp.

- Align your axis to match your building by using the Axis tool.
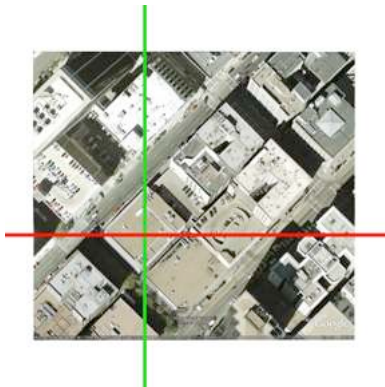
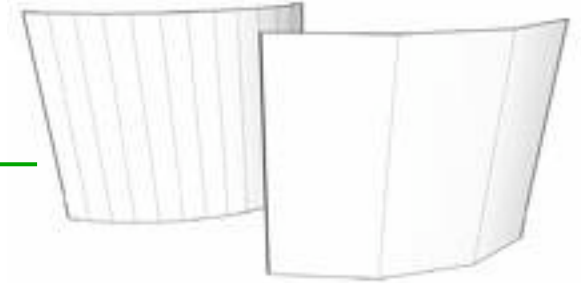Incorrectly aligned axis   Correctly aligned axis

Google

Building a Model

- Simplify the curves. Fewer faces means smaller file size and better performance.

Curves are made of line segments in SketchUp. To simplify while drawing an arc or a circle, just type a number and "S" then hit Enter.


- Many 3D building features can be portrayed in 2D.

This complex looking shape is actually composed solely of flat faces with no depth. This is a good technique for adding detail while keeping it simple.

- Proper face orientation.

Each Face has two sides. Make sure the front (light) side of the face is outward. To view face orientation, View -> Face Style -> Monochrome

To reverse a face, Right click -> Reverse Faces

Google
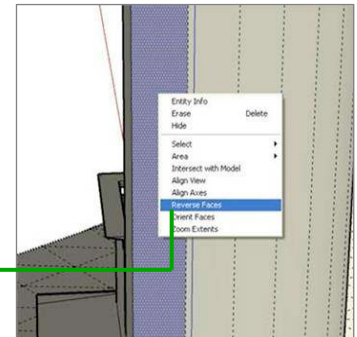
Building a Model

Components

Use components for repetitive building features. SketchUp treats components as instanced entities, thus they load faster and help make files smaller.
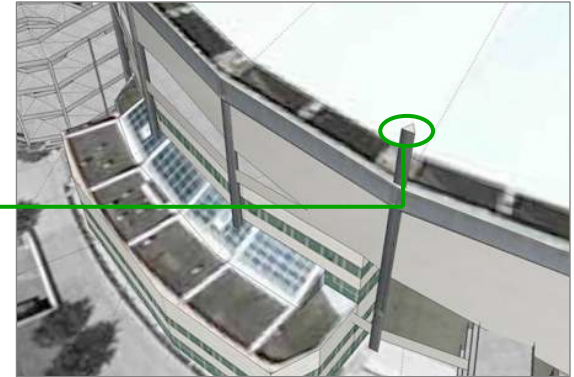
- Select geometry

- Edit -> Make Component

Remember to keep these low poly as well.

This column only has three sides. The top and bottom faces have also been deleted.

Remember that if you add a texture to a component or a group that you must double click to edit the object before you can apply your texture.
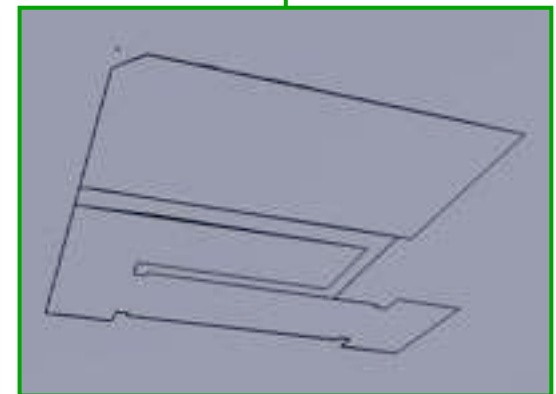
Google

Building a Model

- Make sure your model is sunk into the Google Earth terrain. Toggle the terrain on and off with the "Toggle Terrain" icon (See Advanced User Tips for more terrain tips).

Toggle the terrain on and off with the "Toggle Terrain" icon and move your building vertically so that it sits in the ground.
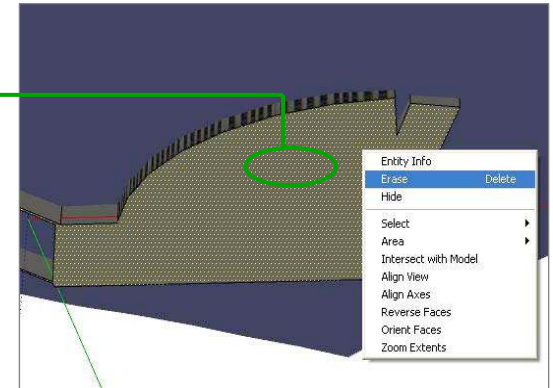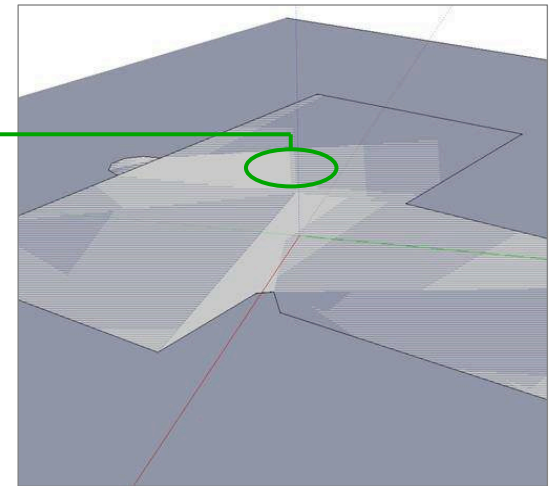

Google

Building a Model

- While modeling, delete non-visible faces and erase extra lines.

Try to create models which are a hollow shell, without any internal lines or faces.

- If you see flickering faces in your model, you are experiencing Z-Fighting.

Z-Fighting is a sign of excess geometry and should be eliminated by deleting the excess faces.

- PURGE! Purge your model to cleanse it of unused textures and components. Window -> Model Info -> Statistics -> Purge Unused
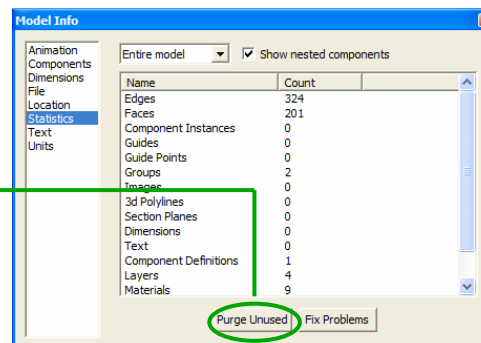
Photo Texturing

Photo texturing allows you to apply photographs onto your model. This will improve your model by making it realistic while keeping the polygon count low. One photograph may yield several unique textures, while others may be used only to aid in the creation of your model.

- Applying a texture

- Position texture

- Matching the best photo
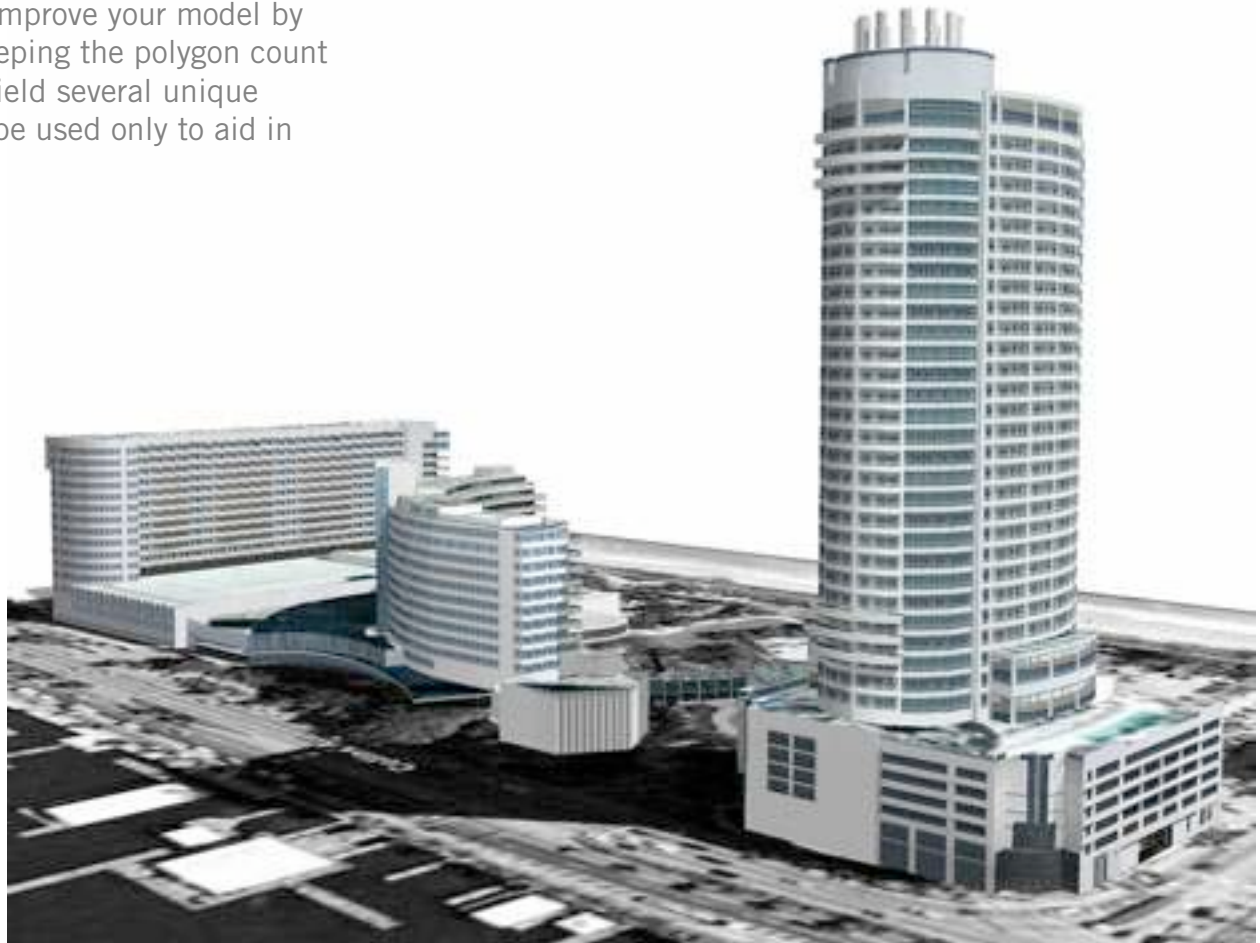
- Matching a photo

- Tracing a matched photo

Google

Photo Texturing

- Using Picasa, crop your image as much as possible without losing any of the building.

- In SketchUp, select File -> Import, select your image, choose "Use as texture" and then open.

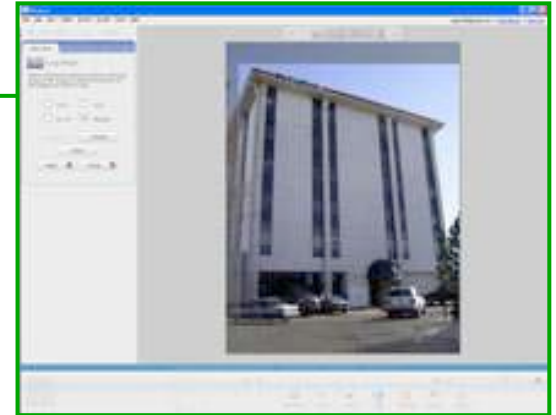- Click on the face you wish to apply the texture to. Then stretch the texture across the face and click again.
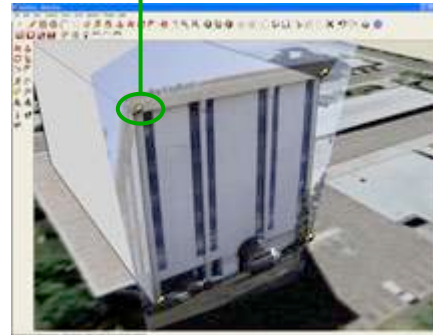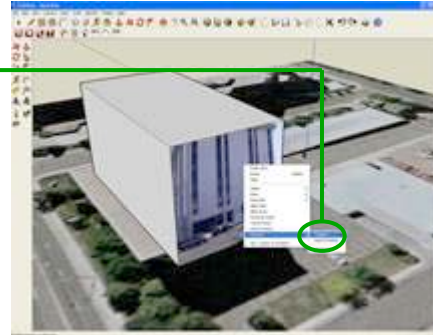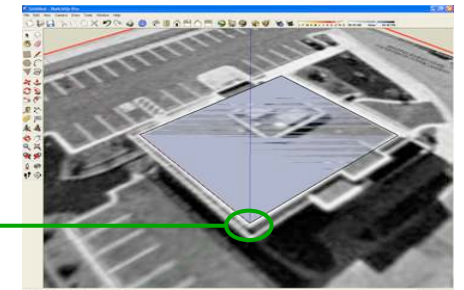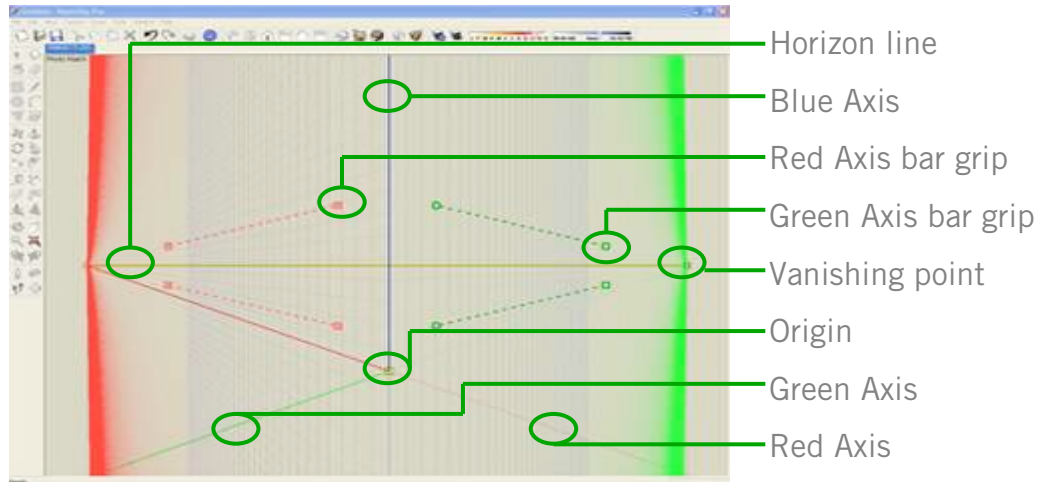

Google

Photo Texturing

Position texture

- Edit your texture by right clicking on the face and choose Texture -> Position.

- There are four pins on the image, click on a pin once to pick it up then move it to a desired corner on the texture. Repeat for the remaining pins and corners.

- Right click on the image and uncheck the "Fixed Pins" option. Then click and drag the pins to the corners of the model.

- Press Enter to finalize texture position.

- Remember to do the same with your roof texture that you saved from Google Earth.

- For more photo texturing options see Advanced User Tips.

Google

Photo Texturing

Matching a photo in SketchUp is the process of setting your model view to match the view of a picture that you took.

- Horizon line
- Blue Axis
- Red Axis bar grip
- Green Axis bar grip
- Vanishing point
- Origin
- Green Axis
- Red Axis

- Find a picture of your building that shows a two point perspective (a corner shot).

- Import your terrain from Google Earth and trace the footprint of your building.

- Look at the picture you selected, align your axis in SketchUp so that the origin sits on the matching corner as shown in your picture.

Google

Photo Texturing

- File -> Import, select your image, choose "as new matched photo" and then click open…

- Move the origin to the matching corner on your image.

- Align the Green and Red bars with horizontal lines on the building in the image.

- Move the mouse over the blue axis and click and drag to zoom. Match your traced footprint with the building in your photograph.
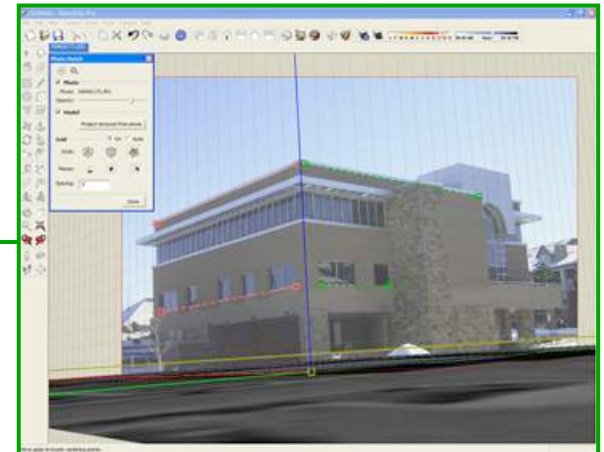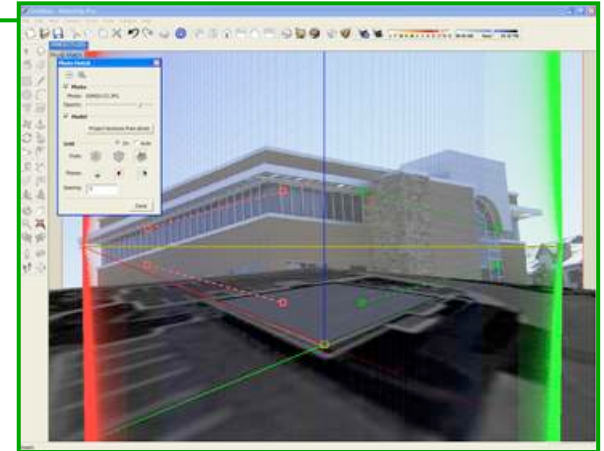
- Click Done.

Don't panic.

Be sure to not align to the ground as it may not be horizontal.

Google

Photo Texturing

- Now you can trace the building outline, remember only to pan and draw, orbiting will close the photo matching option. You can get back to the matched photo by clicking on the scene tab at the top of your model window.

- After you have finished tracing your picture, click "Project textures from photo" or right click -> project photo on a specific face to texture your newly made model.

- Remember to redefine your axis and origin if you choose to match your model to a new photo.
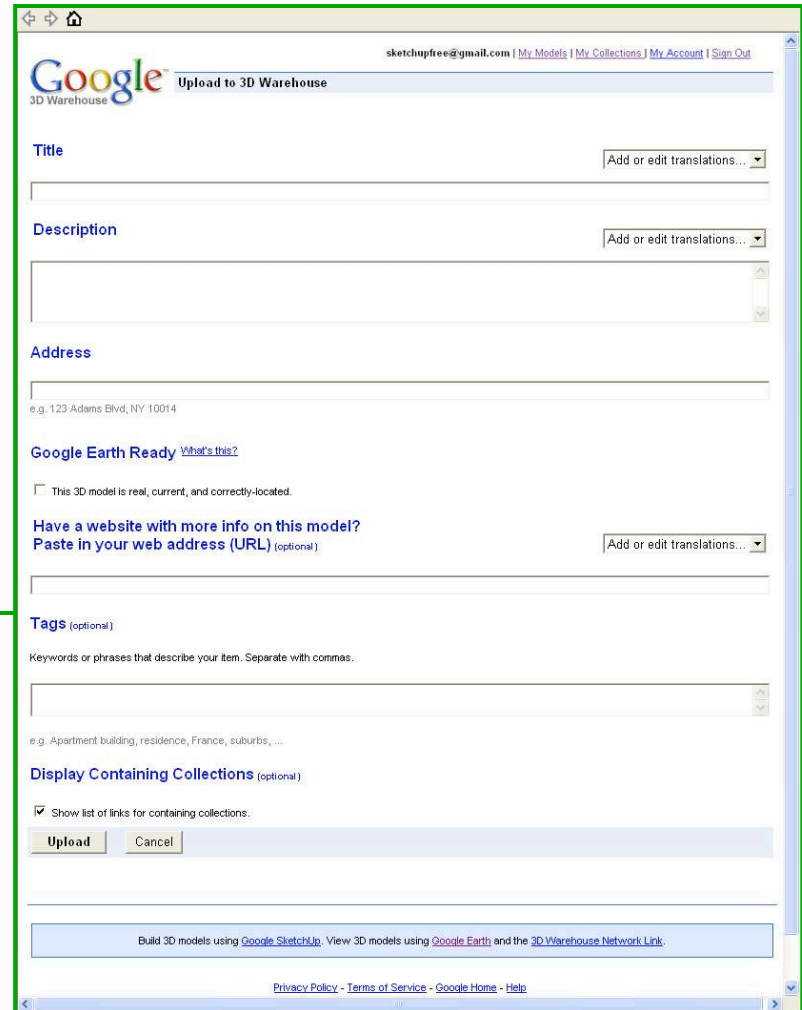
Wireframe

Shaded

Google
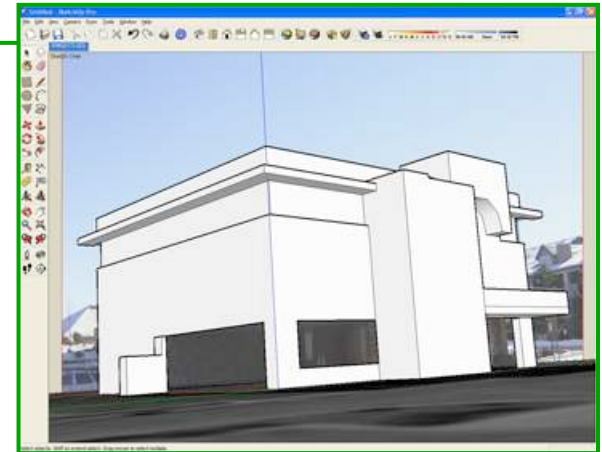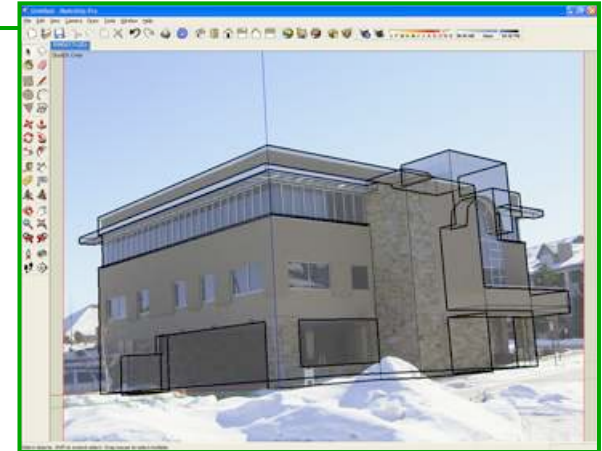
Geo-Modeling Checklist

☐ Delete extra geometry inside and outside of your building.

☐ Turn your hidden geometry on, View -> Hidden Geometry, and check for excess hidden lines.

☐ Make sure your building is aligned with the base of the building in your Google Earth snapshot.

☐ Toggle the terrain button and confirm that your building is planted in the ground.

☐ Export your model to Google Earth, File -> Export -> 3D Model and choose Google Earth 4 (.kmz).

☐ Open the .kmz in Google Earth to check that it accurately represents the building.

☐ Make sure your SketchUp file is under 10MB for a successful upload to the 3D Warehouse.

☐ Try for a minimal number of faces (polygons), Window -> Model Info -> Statistics. Less then 500 is ideal for most buildings.

Google

Uploading Your Model

- In SketchUp hide your lines and profiles for a cleaner screenshot. View -> Edge Style -> uncheck Display edges and Profiles.

- Position your view on screen so that it is attractive. This will become your screenshot in the 3D Warehouse.

- Click on the "Share Model" button.

- Set up a Google Account if you don't already have one, and choose a user name.

- Fill in as many fields as you can with information about the building you modeled. Useful information like city name, architect, building materials, etc. help your building get found on the 3D Warehouse.

- Make sure to check the "Google Earth Ready" checkbox.

- Click Upload!

Best of the 3D Warehouse

After uploading your geo-located model it is on its way to the "Best of the 3D Warehouse" layer in Google Earth. Here is how you find out if you made the cut.

- Check to see if your model has a blue Google Earth ribbon on the 3D Warehouse.

- In Google Earth turn on the Best of the 3D Warehouse layer and fly to your buildings location.

- Your building should appear along with a little yellow house that shows you more information.

Models will not appear in the layer immediately. They must go through a review process before being selected. Please allow for up to 30 days for this process.
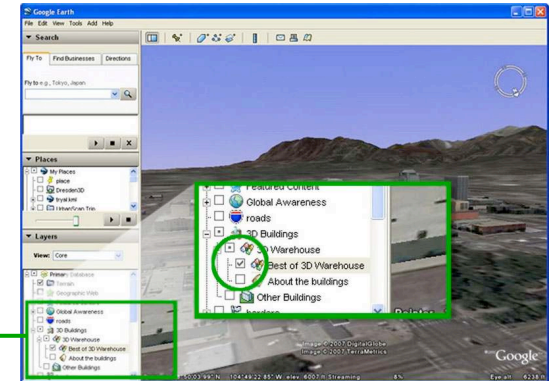
Google

SketchUp Tips

SketchUp tips and tricks

- Ground effects

- Curves and projections

- Hide and unhide

SketchUp Tips

- Adding color to your imported Google Earth terrain.

http://sketchupdate.blogspot.com/2007/06/adding-color-to-your-earth-snapshots.html
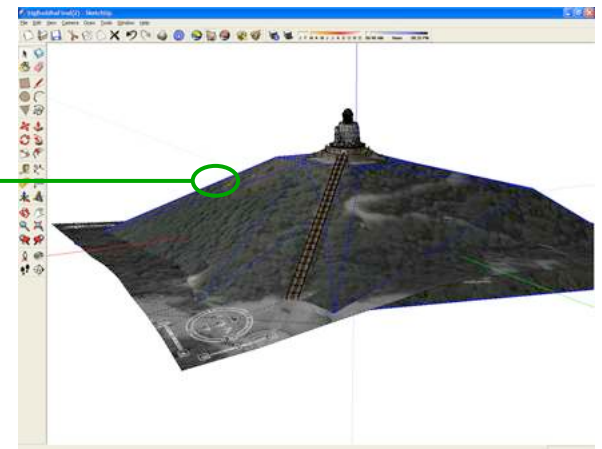
- Make sure to save an image from Google Earth at the same time you import your terrain into Google SketchUp.

- Unlock your terrain, right click -> Unlock.

- Double click to enter the group.

- Insert the image you saved at the same time you imported your terrain on to the face.

- Position the texture by dragging corners of the image to match the corners of the face.

- Modeling terrain.

- Sometimes the terrain in Google Earth does not match the actual terrain. When this happens you can model the terrain in Google SketchUp. Remember to keep it as low-poly as possible and to project the Google Earth ground texture onto your new terrain.

Google

SketchUp Tips

- Projecting textures

- Right click on a texture and choose projected. This can be helpful for applying images to curved or angled faces.

Remember the when projecting textures you want the source texture to be at the normal to the curve.
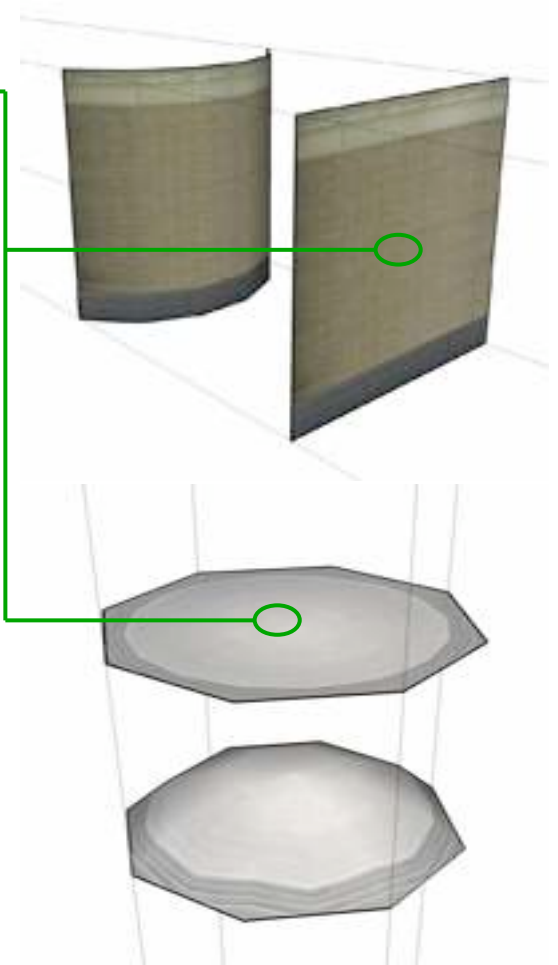
- Softening your curves

- If you draw something that needs smoothing you can do so by selecting the Eraser tool and hold down the Ctrl key while erasing the edges.

Google

SketchUp Tips

- Use hide and unhide to speed up computer performance.

    - Hide parts of your model that you are not working on to keep your computer moving quickly if you are experiencing slowdowns due to larger files. Then you can unhide them when you need reference them again.

- You can also hide unlocked terrain, right click –> Unlock.

- To view hidden geometry, View -> Hidden Geometry.

Google
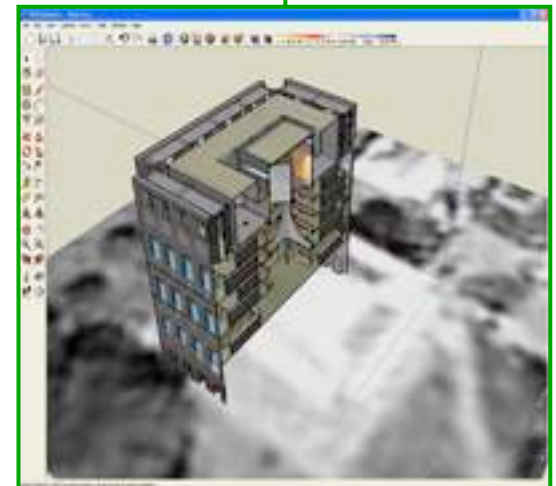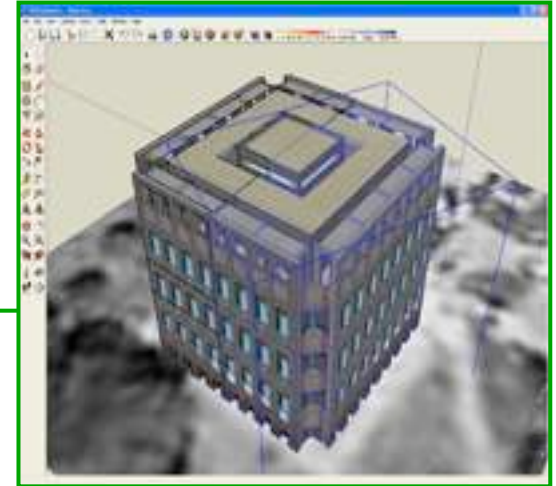
Photoshop Tips

A photo editor, like Adobe Photoshop, can be useful to edit out obstructions in photos (trees, people, cars, etc.)

- Crop out perspective

- Color correction

- Edit out obstructions

- Advanced textures

- Adding to textures

- Saving for web use
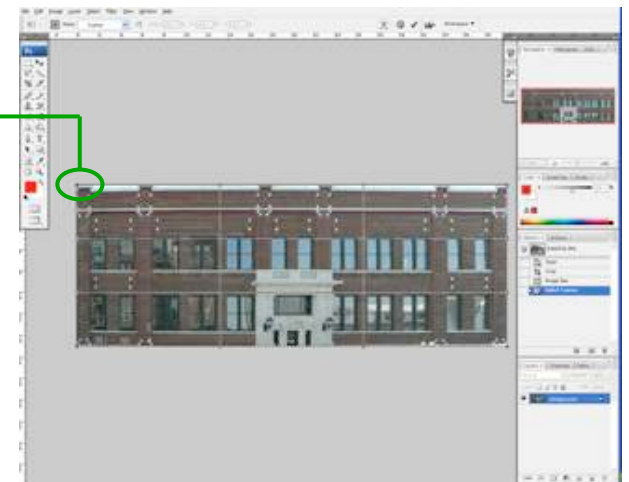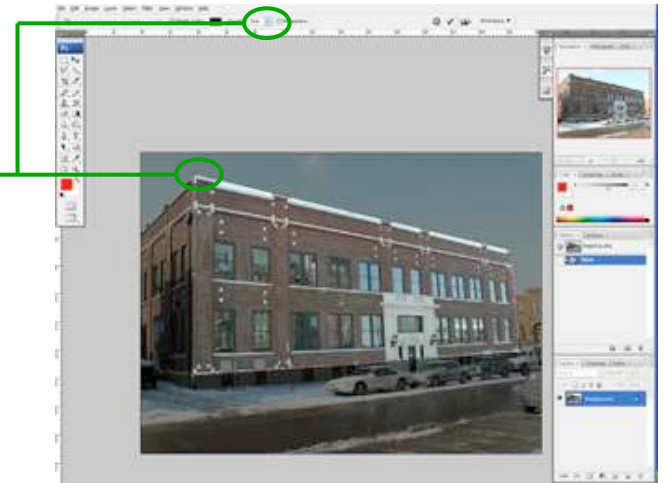
Photoshop Tips

Crop out perspective

- Click on the Crop tool. After starting the crop click the "Perspective" checkbox at the top of the screen. This will allow you to move to corners of the crop box to match the perspective of the face you want to crop.

- Hit enter to crop. Sometimes the crop tool leaves a bulge in your image caused by the camera lens. Use the Warp tool.

Using the Warp tool.

- "Ctrl + A" to select everything.

- "Ctrl + T" to start transforming.

- Right click and select Warp.

- Use the anchor points or just click and drag on the image to warp out curves.

- Hit enter to end the transformation.

Using Lens Correction filter

- Start with un-cropped image.

- Select Filter -> Distort -> Lens Correction

- Use "Remove Distortion" slider to correct the lens distortion. For typical point and shoot cameras a value of four will work well.

Google

Photoshop Tips

Color correction

Color correction can be difficult but there are a few easy tools that can have remarkable results.

Quick Mask, "Q" Key
The Quick Mask changes all actions to create areas which are masked (from selection), these show up in red. For example:
- Press "Q" Key.
- Press "Gradient tool" and make a gradient.
- Press "Q" Key again.
- Now you have a selection that is a gradient that you can use to offset a gradient in your image.
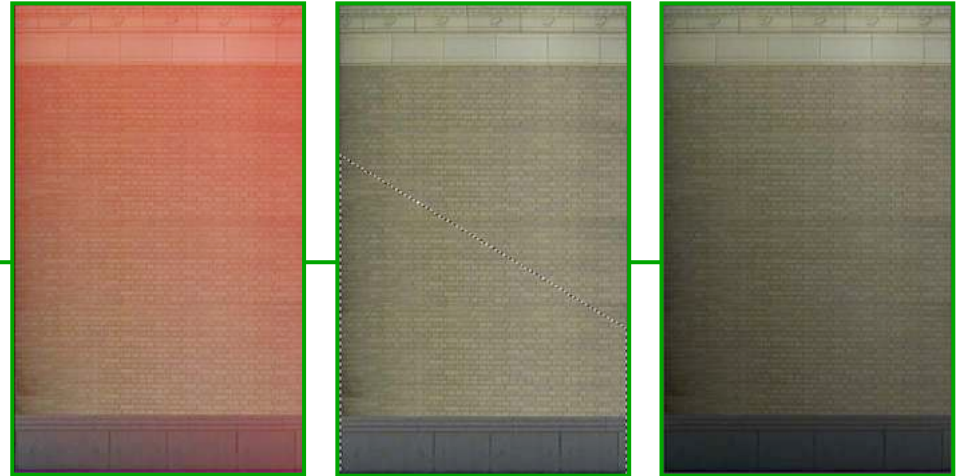
Image -> Adjustments -> Brightness/Contrast

   - Use sliders to adjust the brightness and contrast.

Image -> Adjustments -> Hue/Saturation

   - Use sliders to adjust hue and saturation.

Dodge and Burn
- Use the Dodge tool to add brightness with a brush.

- Use the Burn tool to subtract brightness with a brush.

Google

Photoshop Tips

Edit out obstructions

Use the selection and cloning tools to edit out obstructions.

- Use the Marquee tool to select an area.

- Switch to the Move tool.

- Hold Alt and copy + drag your selection to cover obstructions with similar parts of the photo.

- Adding a feather to your selection can help blend any lines that you don't want to appear in your texture.

- Using the Clone Stamp tool.

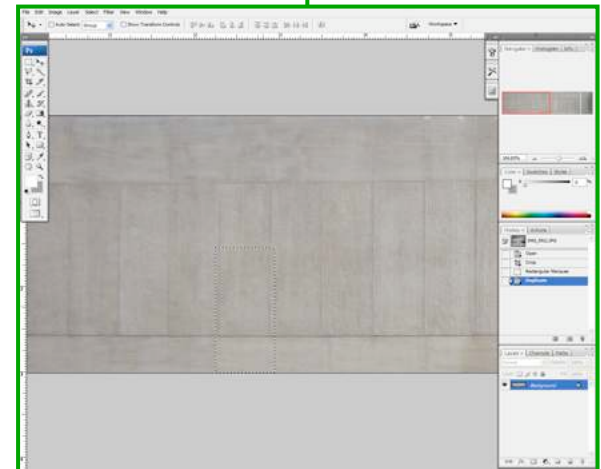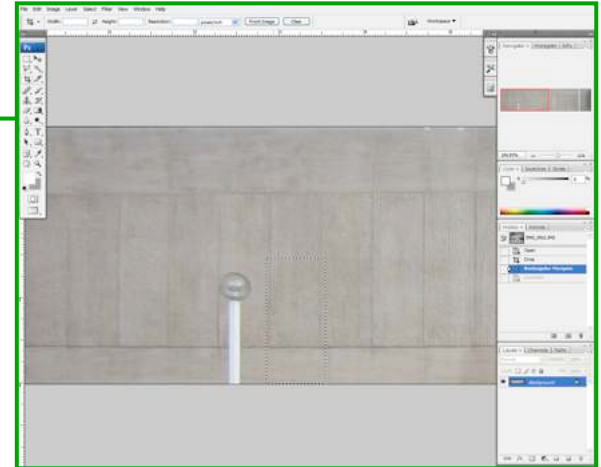- Press the Alt key and use the curser to select a source point.

- The tool then works like a brush that paints from your source point.

- Using the Healing Brush tool.

- Pres the Alt key and use the target to select a source point.

- The tool then works to blend out imperfections.

Google

Photoshop Tips

- Using alpha transparencies.

    - Unlock your background layer (double click on the layer) and erase the unwanted areas of your image with the Eraser tool or by selecting and deleting areas.

    - Save your image for web and select PNG-24.

    - Make sure to sample-paint your texture to the back side of face you put it on.
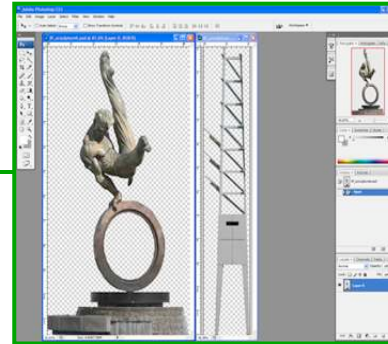
- Making a tiled image.

    - Crop out a section of the image to use for tiling.

    - Use the Offset filter, Filter -> Other -> Offset, to offset your cropped image both horizontally and vertically. The Offset filter will move your image over the specified value and wrap the excess on the other side of the image.

    - Edit out the edges so that your image flows seamlessly in each direction.

Google
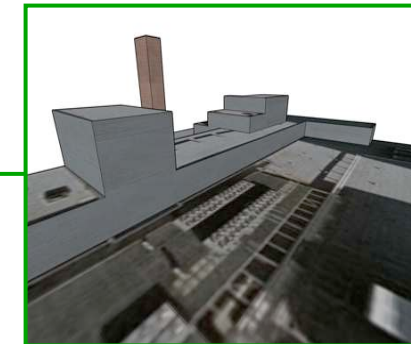
Photoshop Tips

- Adding a reflection

    - Place the desired reflection as a new layer in your file.

    - Lower the transparency until it looks believable.

    - Use the eraser tool or other selection methods to take out any building features that would not reflect.

- Adding a shadow

    - Use the Lasso tool or other selection methods to draw your desired shadow.

    - Right click and add a feather to your selection.

    - Use the brightness/contrast to create a shadow.

Google

Photoshop Tips

Saving for web use

Saving for web is useful to do because it optimizes your textures for faster use in web applications.

- File -> Save for Web

- Choose JPEG (PNG 24 if you have a transparency).

- There are two ways to optimize your file size.

  - Decrease the quality slider

  - Click on the "Image Size" tab

  - Change the size or your image (this will only change the size of the file you save, it will not edit the file you have been working on).

  - This shows you what your file size will be at the current settings.

Google