



Google™



Geo



Education

Google Geo-Modeling Basics for K-12 Education

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A look at all of the class content at a glance.

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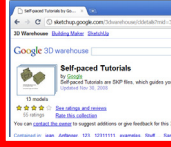
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Course Description

Some other facts you should know about this class.

:: Overview

GeoModeling is the process of creating small and efficient 3d models for use in Google Earth by using aerial photography, Street View, and your own photographs. With all of these techniques and resources combined we are able to create surprisingly accurate 3d models without ever leaving our desk. GeoModels are so efficient because the detail is held in photo-textures rather than in 3d surfaces. Google offers two free applications for GeoModeling; SketchUp and Building Maker.

:: Prior Skills

To be successful, in this course you should already be able to:

- Define fundamental SketchUp and Earth terms including: orbit, surface, edge, placemark
- Demonstrate mouse skills including: double-click, single-click, drag, and right-click (context-click).
- Demonstrate fundamental computer skills including: start an application, copy files to desktop, internet navigation.
- Prerequisites: EDU SketchUp Basics, EDU Earth Basics
- You will need a basic 3-button scroll wheel mouse to use SketchUp efficiently.

:: Learning Objectives

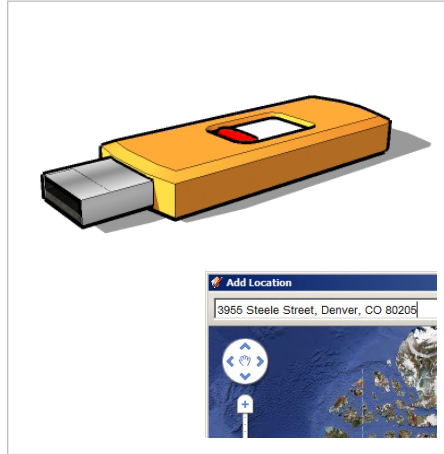
Upon completion of this course you should be able to:

- Geo-locate a SketchUp model, add a place
- Apply photo-textures to a surface using Street View imagery
- Import your own photography for use as photo-textures
- Use Building Maker to generate 3d models
- Build an accurate GeoModel step by step
- Share your models with the world through the 3d Warehouse
- Submit your models for inclusion in the Google Earth 3d Buildings layer.

Introduction

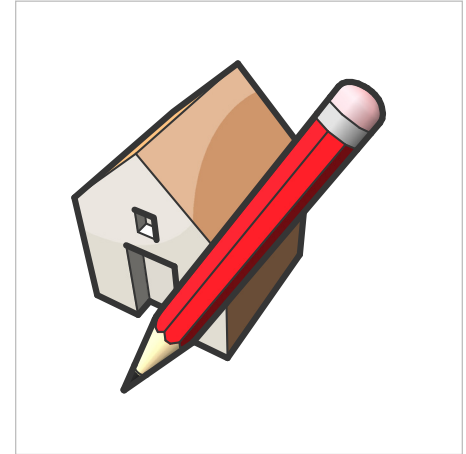
Why GeoModeling?

:: GeoModeling allows us to contribute to the 3d experience in Google Earth. We can build our communities, enrich the 3d buildings layer, and ultimately put a small town on the 3d digital map. Let's first prepare our computers for class and review the navigation controls in SketchUp.



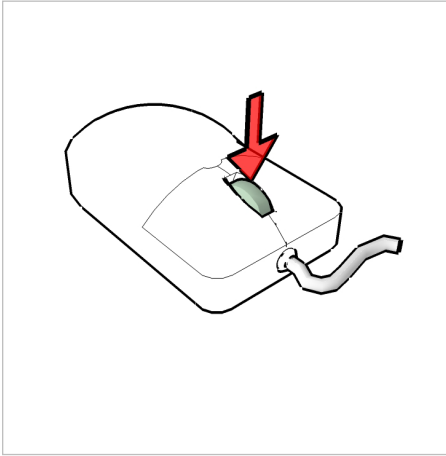
➤ Copy Class Files

Copy the GeoModeling Basics Class Files folder to your desktop for easy access during class.



➤ Launch SketchUp

Open SketchUp from the icon on your desktop, or from the Start bar.



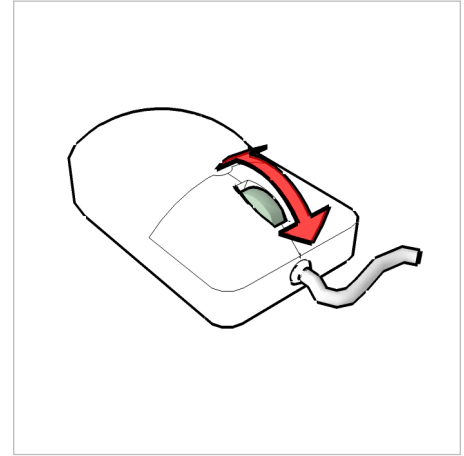
Orbit

Push down on the scroll wheel button to navigate around your model.



Pan

Push down on the scroll wheel button and hold down the Shift key to slide your screen up, down, left and right.



Zoom

Roll the scroll wheel forward and backward to zoom in and out.

GeoModeling with Streetview and Maps.

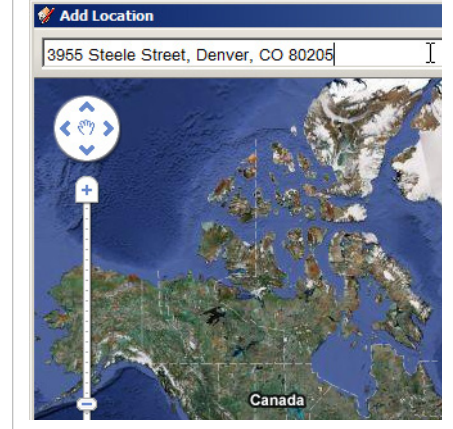
Use building footprint and snapshots.



Google Toolbar

Open the Google Toolbar by clicking on the View dropdown menu and choosing “Toolbars > Google”. On Mac this launches a customize toolbar dialogue box where you can add the Google Toolbar.

∴ One method for gathering photo-textures is by adding a location and then using streetview imagery to add detail to your 3d model. SketchUp includes a simple interface for finding and grabbing perspective pictures of buildings that can be easily distorted to perfectly fit our 3d models.



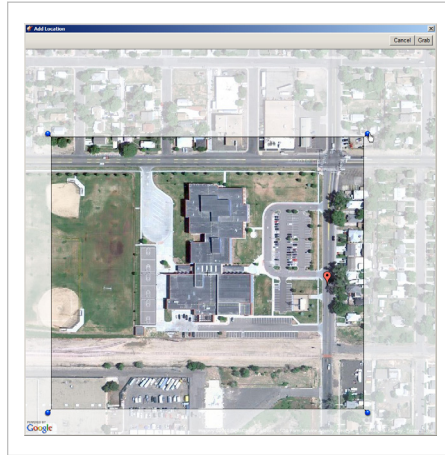
Add Location

Click on the Add Location icon on the Google Toolbar. Type into the text field “3955 Steele St, Denver, Co 80205” and then click on the Search button.



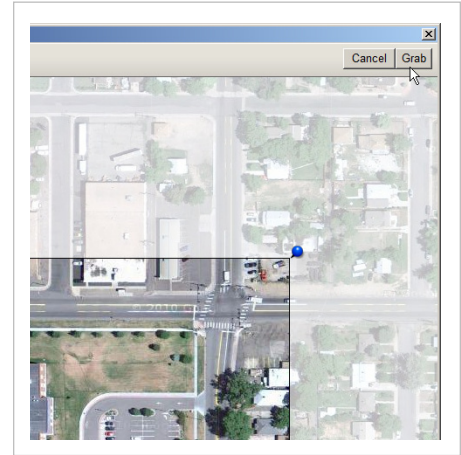
Select Region

Click on the “Select Region” button.



Select Region

Click and drag on the pins to draw a box around the site to import. For this exercise we will include the streets for reference.



Grab

Click on the “Grab” button to import the aerial imagery into SketchUp.



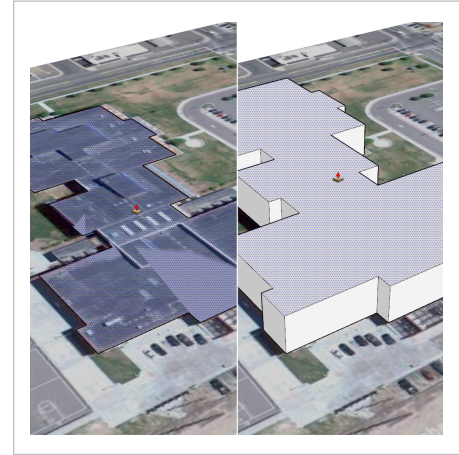
Trace Building

Using the Line tool, trace the building footprint.



Trace Building

Pay close attention to staying on axis and using inferences to keep geometry properly aligned.



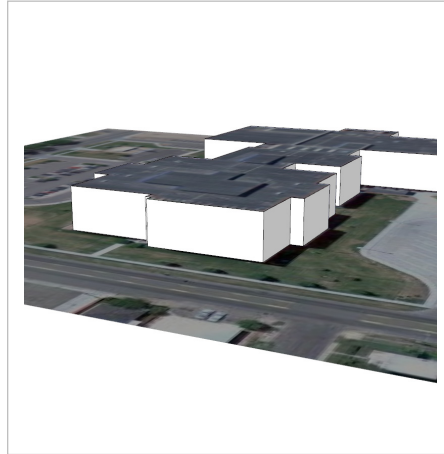
Pull Building Up

1) Using the Push/Pull tool, click once on the building footprint surface. 2) Move the cursor away from the starting point and let go of the mouse. 3) Type [30' Enter].



Apply Roof Texture

1) Select the Paint Bucket tool. 2) Hold down Alt (Command on Mac) and click on the aerial imagery to sample material, let go of Alt. 3) Click on the roof surface to apply the aerial imagery to the roof.



Reposition View

Navigate to the north side of the building that is closest to the street. This is where we will start with our Street View imagery.



Select a Surface

Using the Select Tool, click on the surface on the west side of the north elevation.



Photo Textures

1) Click on the “Photo Textures” icon in the Google Toolbar to launch the Street View dialogue.

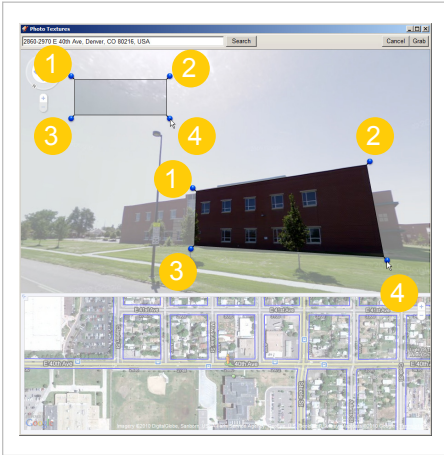


Reposition View

1) Click and drag within the Street View window to look around and find the best view of the building.
 2) You can also use on screen navigation to look around and zoom.
 3) Click on the Select Region button.

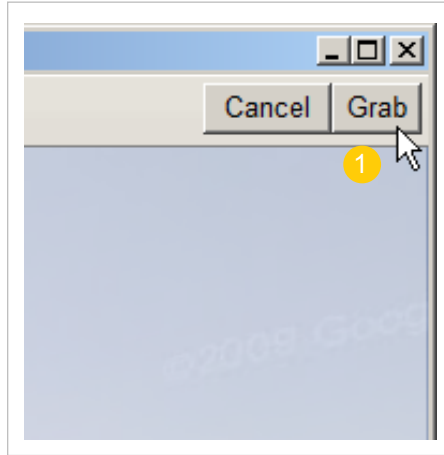
TIP :: 1) Double click further down the road to travel faster. 2) Click on the arrows to move your position one shot at a time. 3) Drag the Street View position icon on the map below to a new viewpoint.





Select Region

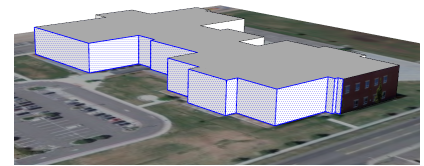
Click and drag on the pins to reposition the region selection on the same wall in the Street View image as the one you selected in the SketchUp model.



Grab

1) Click on the “Grab” button at the top right corner of the dialogue box to finish. This will automatically apply the selected region to the selected surface in your model.

5 MINUTE EXERCISE :: Repeat this process for the other surfaces that are near a road and have available Street View imagery.



GeoModeling with Photographs

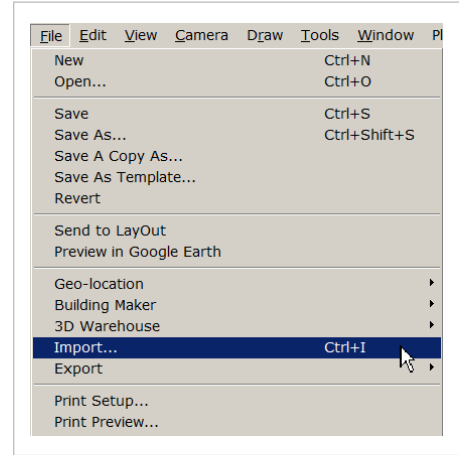
Use your own photos.

:: Even though Google Street View covers a huge amount of area, what happens if there is no Street View imagery available for our location? Not to worry, we are able to use our own photographs as photo-textures applied to our 3d model.



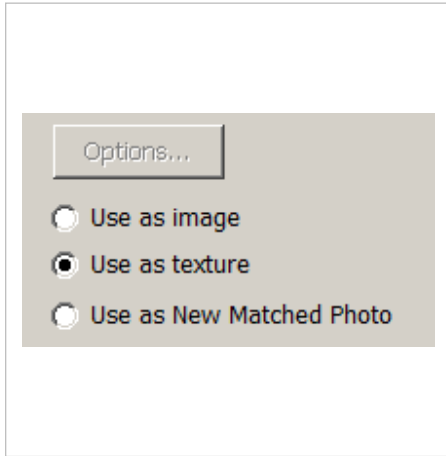
Reposition View

Navigate to a view of the north end of the west side of the building. This area is the start of a decrease in quality for Street View imagery because there was no road on this side of the building.



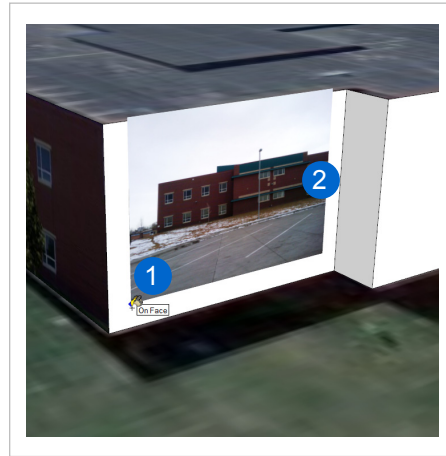
Import Image

Click on the File dropdown menu and choose "Import". Select the GEOMODELING_Bruce Randolph 01.jpg file from the GeoModeling Basics Class Files folder on your desktop.



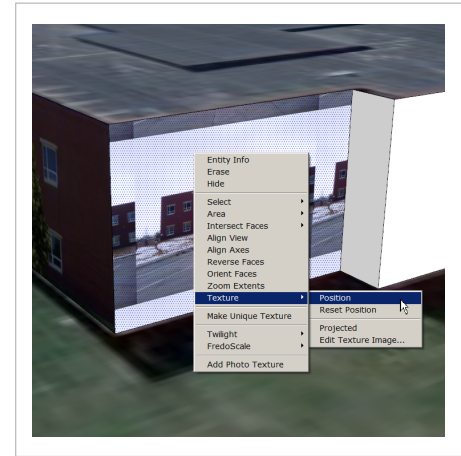
🖱️ Title

Check the “Use as texture” option at the right side of the dialogue box. On Mac this is a dropdown below the file name.



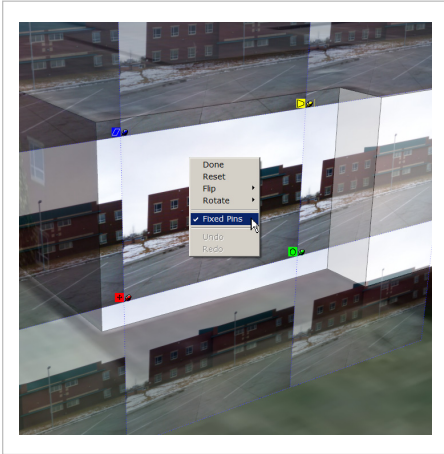
🖱️ Place Photograph

1) Click near, but not on, the bottom left corner of the surface to place the photo-texture. 2) Move cursor away from starting point and click again at an appropriate scale.



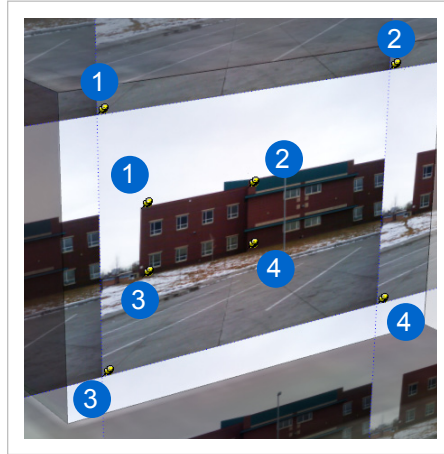
🖱️ Texture Tweaker

Right click on the surface and choose “Texture > Position” from the context menu.



Unfixed Pins

Right click again on the surface and uncheck the “Fixed Pins” option within the context menu. The pins will change from multi-colored to all yellow.



Reposition Pins

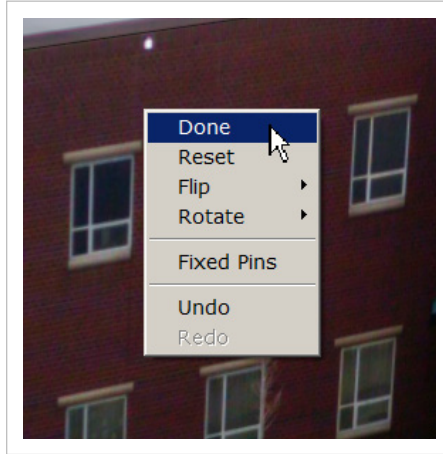
Click once on a pin to pick it up and click again to put it down. Reposition each pin from the corner of the photograph to the corner of the building in the photograph.

TIP :: All of the same navigation tools are available when in Texture Edit mode. You can also click and drag on the photo-texture to move it. Using the navigation tools will allow you to zoom in and be much more accurate when placing pins.



Stretch Pins

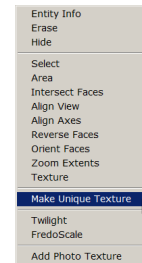
Click and drag each pin from the corner of the building in the photograph to the corner of your model. This will distort the image, but once all four pins are positioned the photo-texture will make sense.



Finish

To finish the texture tweak and save changes, press Enter, or right click and choose “Done” from the context menu.

5 MINUTE EXERCISE :: Use the remaining pictures in the GeoModeling Basics Class Files folder on your desktop to add detail to your model. Once you are finished adding photo-textures, right click on every image that you have added and choose “Make Unique Texture”. This will automatically crop the image and eliminate any pixels that are not being used, ultimately reducing file size and increasing performance.



Building Maker

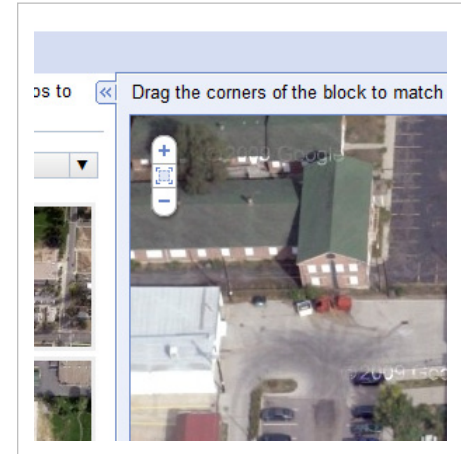
Using Building Maker.

:: Building Maker is an easy-to-use tool which allows us to combine aerial photography and simple shapes into complex models. With a very simple tool set we can combine 3d digital building blocks on top of 2d aerial photos, very similar to building with digital toy blocks. Just as with toy blocks, the blocks in Building Maker come in different shapes, from a standard box-shaped block to blocks that represent different types of roofs. Let's move down the street and build an elementary school in Building Maker.



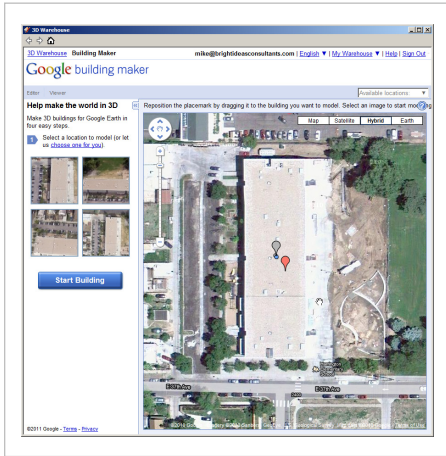
Add New Building

The location where you can create a building is shaded in white. The area shaded in blue is where buildings currently exist



Navigation

Click and drag to pan. Roll scroll wheel forward and backward to zoom. You can also use the on screen controls shown above.



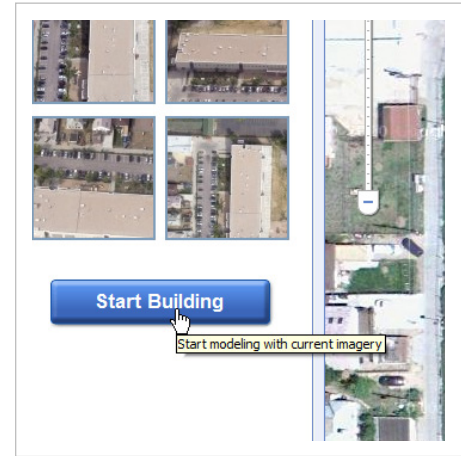
Locate Building

To easily find Harrison Elementary School, zoom out one click and find Schaeffer Park. Harrison Elementary is on the west end of the park.



Choose Building

You can also choose a building by clicking and dragging the place-mark onto the building you wish to model.



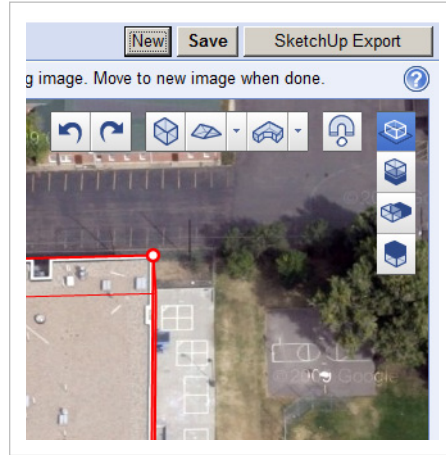
Start Building

Click on the “Start Building” button to launch into modeling mode. You will notice that your view switches to a bird’s eye oblique view.



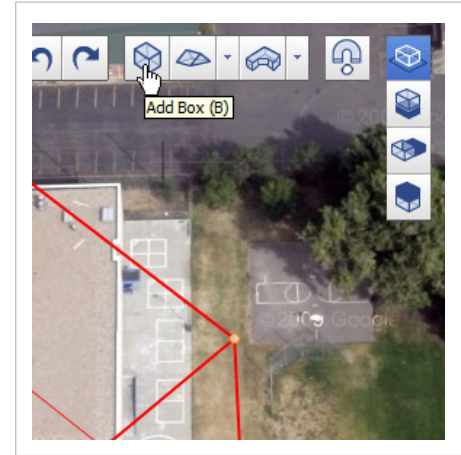
Aerial Photography

The photographs to the left of your screen will be used to create a 3d model. Once a photo is finished it will stay blue.



Toolbar

All of the Building Maker tools are available at the top right of your screen.



Add a Box

Click on the Add Box icon (B) to add the first block and start our building.



➤ **Constrain Position**

To match the new box with the building we need to constrain points, but only points that we can clearly see. Click and drag the bottom left corner of the box to the bottom left corner of the building.



➤ **Constrain Width**

Click and drag the bottom right corner of the box to the bottom right corner of the building. You will notice that the rest of the box is starting to align with the photograph.



➤ **Constrain Height**

Click and drag the back top left corner of the box to the back top left corner of the building. Again, you will notice that the building is coming into closer alignment with the photograph.



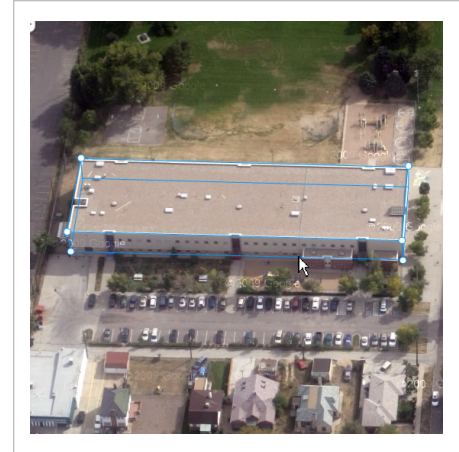
Define Other Points

Take a moment to click and drag other points to match the photograph. Remember, only define points that you can clearly see, such as the remaining three corners on the top.



Next Image

1) Click on Image 2 in the gallery, 2) or click on “Next Image” at the bottom of your screen. Notice that the box is slightly misaligned when overlaid on this photograph.



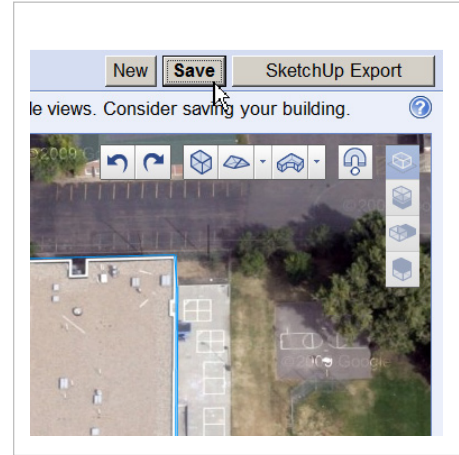
Constrain Points

Zoom in and constrain other points that you can see clearly. Once you have defined enough points to complete a photograph the box will turn from orange to blue.

TIP :: A block is orange if it is unselected and has no points that have been adjusted (constrained) to a position in at least two images. A block is blue when it is unselected and has points that have been adjusted (constrained) in at least two images. A block is red when it is selected.

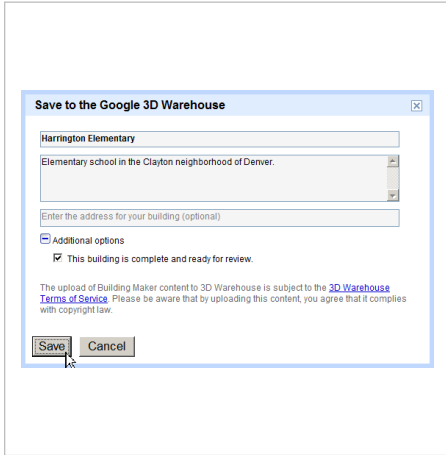
Align your blocks in minimum of one aerial image per side of a building plus the roof (five images for a four-sided building). Aligning your blocks to clear images of each side of the building will help to ensure proper photo texturing of the building.

5 MINUTE EXERCISE :: Repeat these steps for at least one image representing each side of the building plus one for the roof. We must constrain points to a photo for that photo to be used in photo texturing.



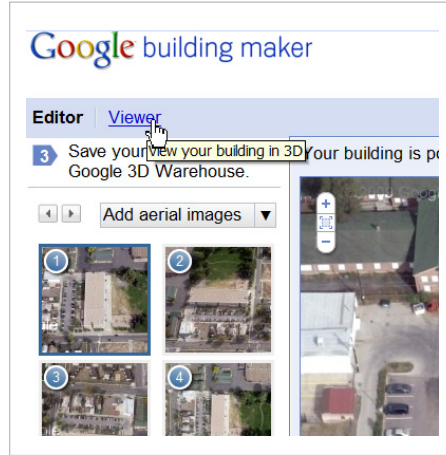
Save Model

Click on the “Save” button to add the model to your 3d Warehouse collection and preserve your work.



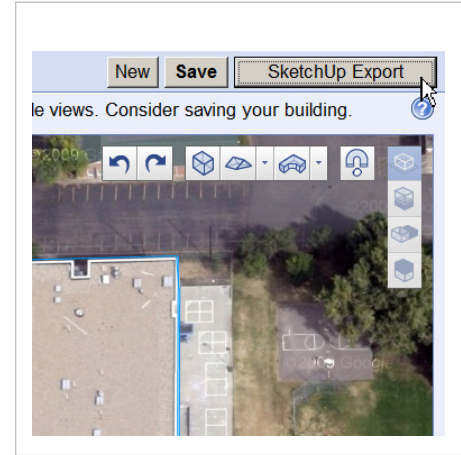
Model Information

Give your model a title and description. Also indicate whether this model is ready for the Google Earth 3d Buildings Layer.



Google Earth Viewer

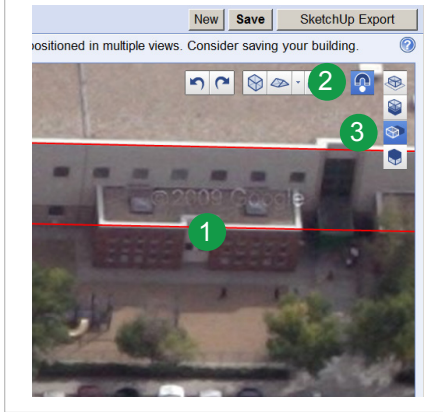
Click on the “Viewer” button to see your model photo textured and presented in Google Earth. If there are two buildings on top of each other click on the Hide Buildings button.



SketchUp Export

Click on the “SketchUp Export” button to view your model in SketchUp. You can either load this model into your current model, or open the SketchUp model in a new window.

INTERMEDIATE



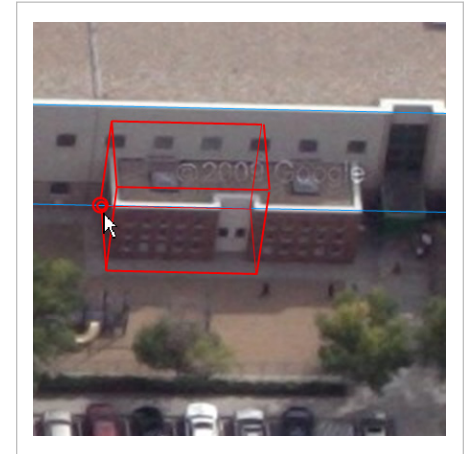
➤ Add Another Box

1) Pre-select the existing box. 2) Click on the magnet icon to toggle snapping of points and lines on. Keyboard shortcut "S". 3) Click on the "Place block inline with selected" icon.



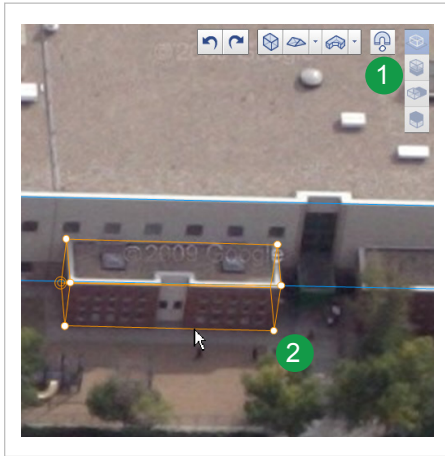
➤ Add Box

Click on the "Add box" icon to add a new box. Keyboard shortcut "B". Since we added an alignment the new box will automatically be placed next to the existing box.



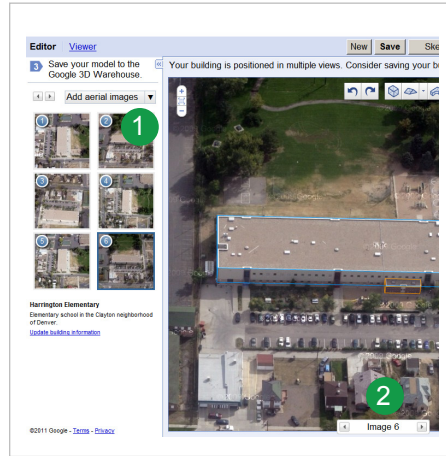
➤ Position Box

Click and drag the box from the back left corner and allow it to snap to the bottom edge of the existing box. You know the point is snapping properly when there is an additional circle around the point.



🖱️ Constrain Points

1) Click on the magnet icon to toggle snapping off. 2) Constrain the other points that you can clearly see.



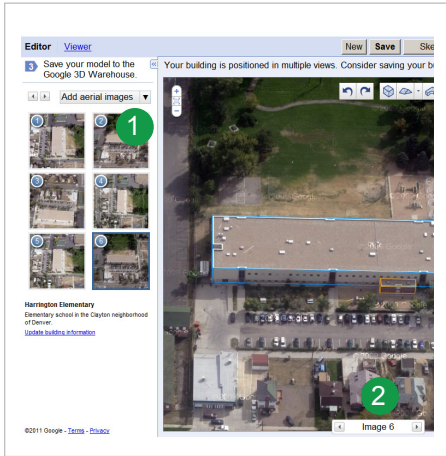
🖱️ Next Image

1) Click on another image in the Image Gallery, 2) or click on the advance image buttons at the bottom of your screen to find another image where you can clearly see corners of the building.



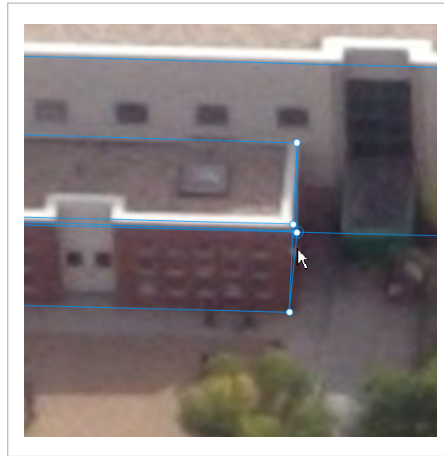
🖱️ Constrain Points

Zoom in and constrain other points that you can see clearly. Once you have defined enough points to complete a photograph the box will turn from orange to blue.



Next Image

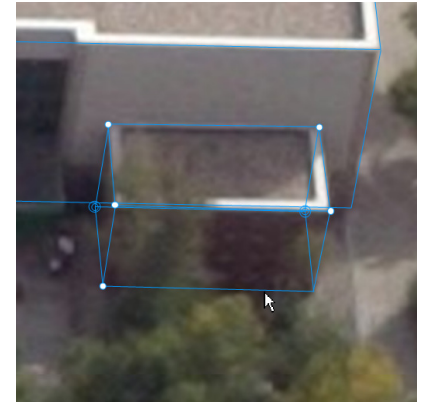
1) Click on another image in the gallery, 2) or click on the advance image buttons at the bottom of your screen to find another image where you can clearly see the other back edge of the new box.



Constrain Points

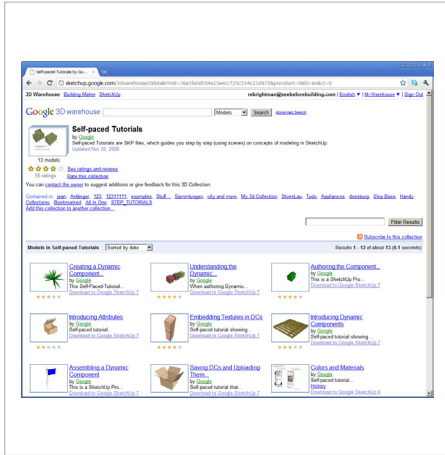
Toggle the snapping of lines and points on and constrain the points in this photograph.

5 MINUTE EXERCISE :: Add the last additional block on your own using the techniques we just learned. Be sure to pay special attention to toggling the snapping of lines and points on and off as well as which line you are snapping to.



Resources

Valuable websites and additional information.



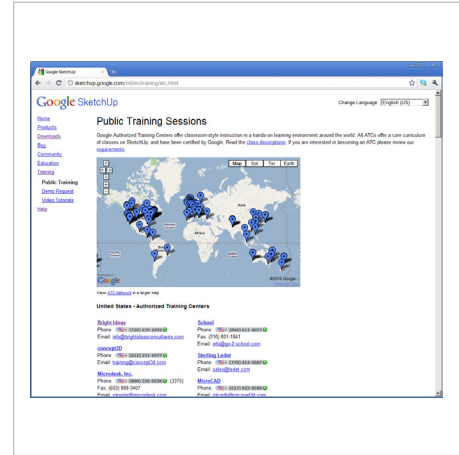
Self-Paced Tutorials

<http://sketchup.google.com/intl/en/training/>



Video Tutorials

<http://sketchup.google.com/intl/en/training/videos.html>



SketchUp ATC's

<http://sketchup.google.com/intl/en/training/atc.html>

