

Learn ArcGIS

Guided lessons based on real-world problems

Collect 3D Features from a Stereo Map

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Collect 3D Features from a Stereo Map

Time: 1 hour



Overview

The Los Angeles city property map for the Hollywood Hills area consists of 2D building footprints that do not have any z-values associated to rooftop vertexes. To visualize new and rebuilt properties it is important to have accurate z values as the area is in hilly terrain and city bylaws regulate maximum heights allowed for new and redeveloped buildings.

Upon inspection and reviewing the area with newer imagery, it is noticeable that several building footprints in the area have changed and that the pace of redevelopment and rebuilding in the area outpaces the rate at which officials can update their database. It is also obvious that many of the newly built and redeveloped homes consist of multiple levels and are terraced to take advantage of elevation in a way that maximizes the view and displays unique architectural details. It is unclear if these buildings now meet bylaws with regards maximum height and a 3D map of building rooftop heights would greatly assist in policing and regulating development.

Using a collection of stereo imagery loaded into a mosaic dataset, you will use stereo viewing and mapping in ArcGIS Pro to collect new 3D rooftop point features. This will help establish a pattern that

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city officials can use to visually analyze imagery and compile three-dimensional (3D) features that can be used to update existing data and determine if bylaws are being broken.

In this lesson you will learn the following:

- Setting up a stereo environment
- Setting up a stereo map collection
- Stereo mapping functionality in ArcGIS Pro
- Creating new features from a stereo map

About

Stereoscopy is a technique that uses overlapping imagery acquired from different locations to produce a 3D model that emulates true binocular vision. The main applications of photogrammetric stereo techniques are the identification, measurement, and manual digitizing of 3D features from vertical overhead imagery.

Recently, with the advent of high-resolution multispectral imagery and availability of digital elevation models (DEMs) and GPS survey control, land base layers are created and updated using an orthorectified image base, and remote-sensing and image processing techniques can be used to automatically identify and classify features at photogrammetric accuracy.

However, a major advantage of manual stereo compilation is its reliance on the combination of human vision and cognitive abilities to identify and collect features not possible with computer vision and processing. Examples include collecting ground elevation points; compiling buildings, roads, and other ground features obscured by vegetation; collecting important breaklines; and identifying features based on physical 3D attributes and cues.

Stereo mapping in ArcGIS Pro means that all the data in the ArcGIS platform is both discoverable and immediately useful in your 3D mapping projects. Stereo feature data can flow out to 3D scenes for visualization, as well as back into the stereo view for editing. This data is also immediately available for GIS modeling and useable in time-critical decision support scenarios.

Prerequisites

- ArcGIS Pro

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- ArcGIS Image Analyst extension
- Either active shutter eyewear or anaglyph 3D glasses

Active shutter eyewear

Active shutter eyewear generally has a better stereo effect because it is deployed as part of an active shutter 3D system, which is a technique for displaying stereoscopic 3D images. Unlike red and cyan color filter (anaglyph) 3D glasses, active shutter glasses are color neutral, enabling 3D viewing in the full color spectrum.

Active shutter 3D systems work by presenting the image intended for the left eye while blocking the right eye's view, then presenting the right-eye image while blocking the left eye and repeating this so rapidly that the interruptions do not interfere with the perceived fusion of the two images into a single 3D image.

If you are using active shutter eyewear, you will need the [appropriate hardware](#).

Anaglyph 3D eyewear

Anaglyph 3D is the name given to the stereoscopic 3D effect achieved by encoding each eye's image using filters of chromatically opposite colors, typically red and cyan.

Anaglyph 3D images contain two differently filtered colored images, one for each eye. When viewed through the color-coded anaglyph glasses, each of the two images reaches the eye it's intended for, revealing an integrated stereoscopic image. This tricks the brain into perceiving the fused images as a three-dimensional scene or composition.

Download the sample data

1. Download the [SampleData.zip](#) compressed folder.
2. Once the download is complete, unzip the file.
3. Locate and select the **SampleData** folder, and then move or copy the folder and its contents directly to your computer's C drive.
4. Confirm the following folder structure exists at the location you have selected **\SampleData\Vexcel-Hollywood\0_MosaicDataset\VexcelHollywood.gdb**.

Now you have sample data to use in your stereo workflow.

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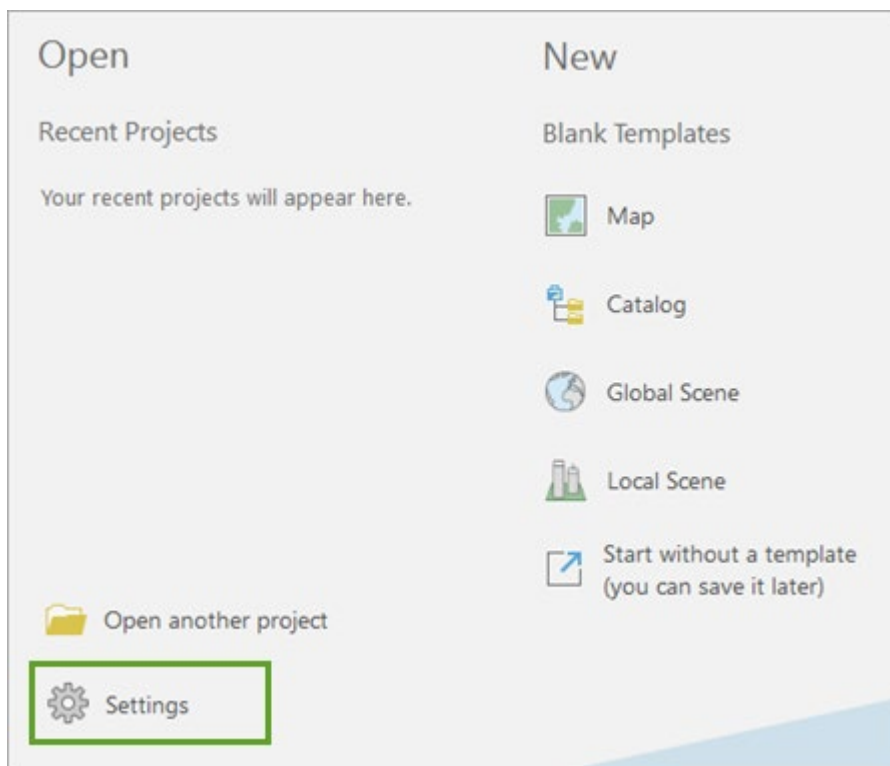
Set up the stereo environment

In ArcGIS Pro, stereo mapping includes a stereo map viewer that displays and manipulates stereo image pairs from satellite and aerial sensor platforms. The stereo display supports multispectral, three-band, and panchromatic imagery; direct enhancement of imagery; superimposition of 3D GIS data on stereo imagery; zooming and roaming; and other adjustments.

[Preparing imagery for stereo viewing in ArcGIS](#)

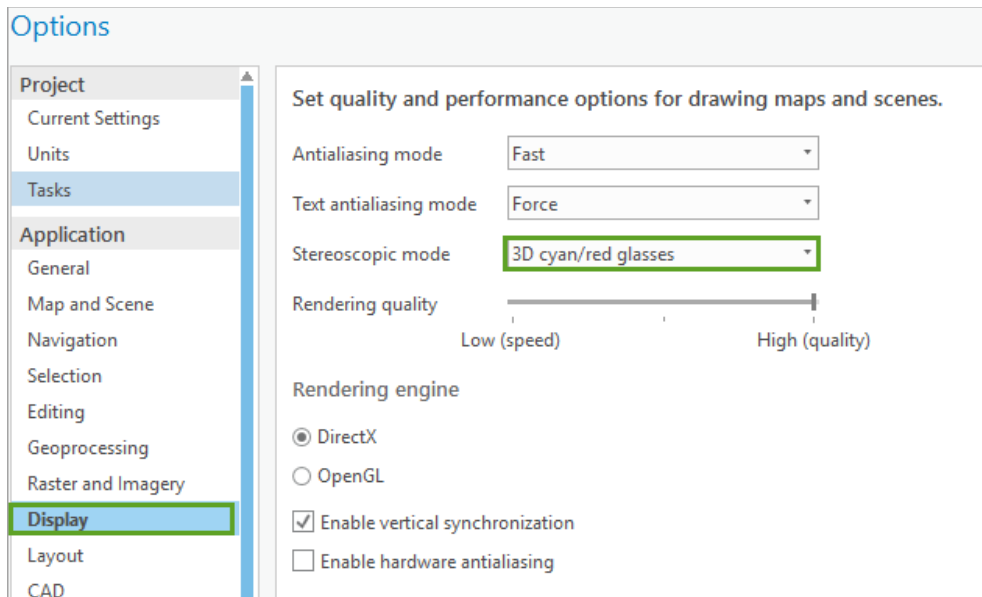
To display data in stereo mode in ArcGIS Pro, you need to turn on the correct stereoscopic mode. This task only needs to be performed once, and the application will always use this mode for new projects you create until you change modes.

1. Start **ArcGIS Pro**. On the bottom of the start screen, click **Settings**.



2. Click **Options**.
3. Click the **Display** tab.
4. For **Stereoscopic mode**, choose either **3D cyan/red glasses** or **3D shutter glasses**, depending on the type of eyewear you are using.

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If you are using shutter glasses, make sure that your system meets the display [requirements](#).

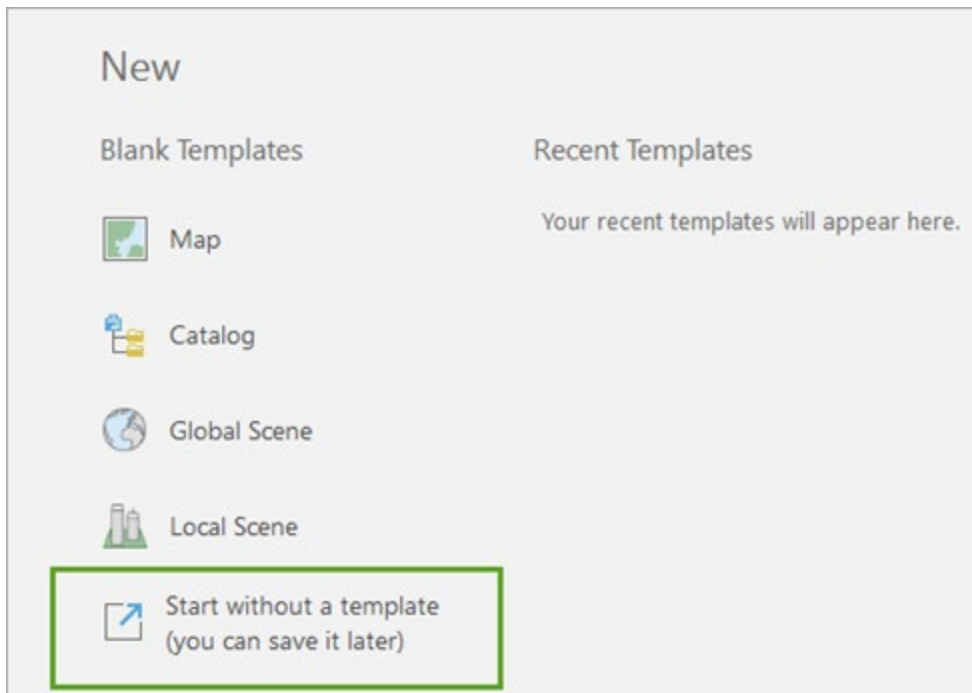
A warning appears at the bottom of the dialog box. Since you do not have a project open currently, you can disregard it.

5. Click **OK**.

The ArcGIS Pro application is now ready to display data in stereo using the type of stereo viewing glasses you have specified.

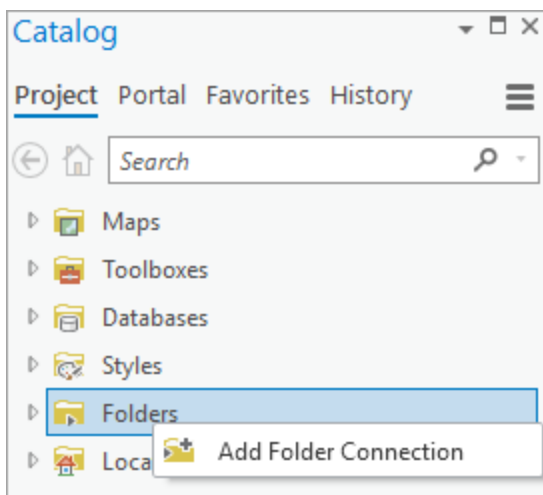
6. Click the **Back** arrow to return to the start screen.
7. Under **New**, click **Start without a Template**.

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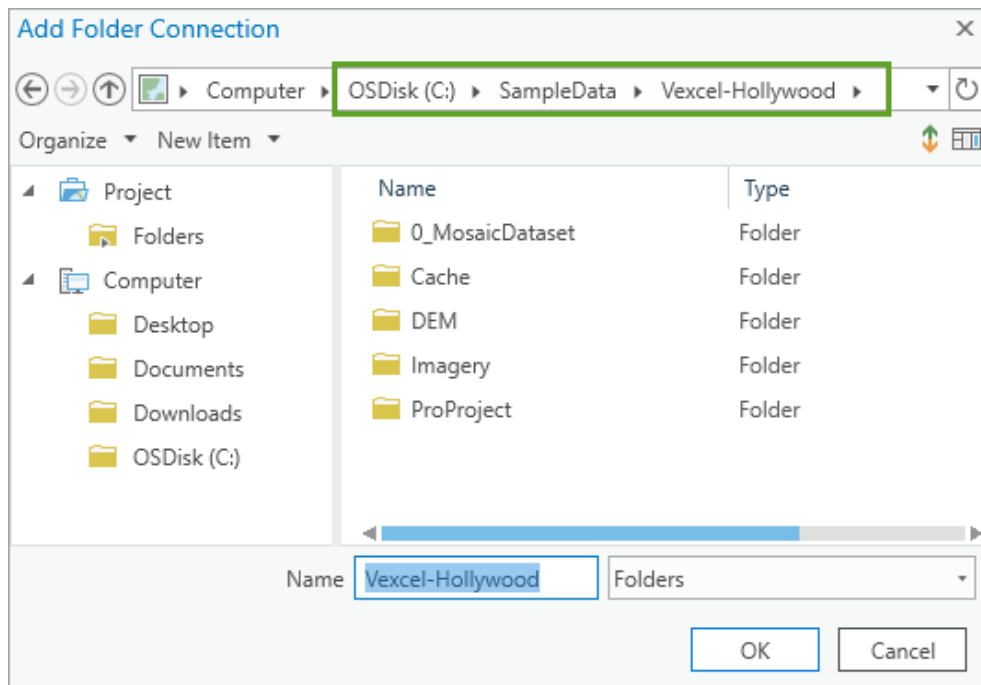
This provides the ability to open ArcGIS Pro without having to first save a project. You can open the application and carry out data management tasks that don't require a project to save changes.

8. In the **Catalog** pane, right-click **Folders** and choose **Add Folder Connection**.

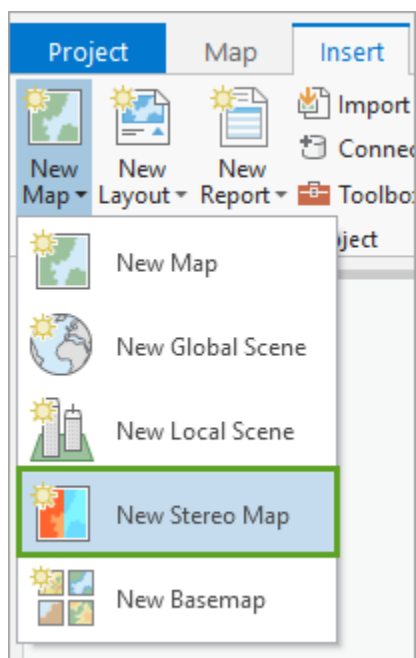


9. On the **Add Folder Connection** dialog box, browse to **\SampleData\Vexcel-Hollywood**.

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10. Click **OK** to create the connection and close the **Add Folder Connection** dialog box.
11. On the ribbon, click the **Insert** tab.
12. In the **Project** group, click the **New Map** drop-down arrow and choose **New Stereo Map**.

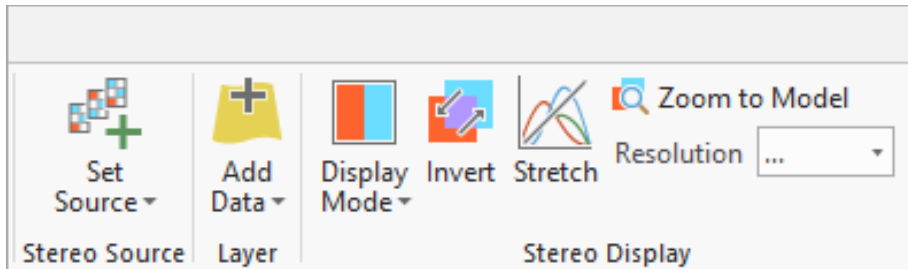


A new stereo map appears in your display, and the **Stereo Map** tab is available. The tab has all the tools you need to view and work with the stereo pairs.

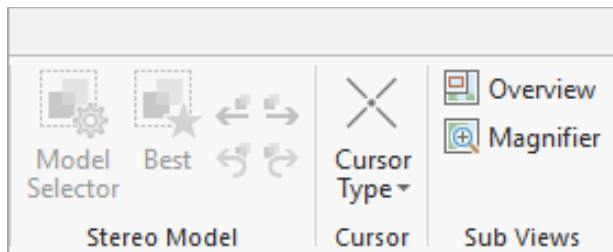
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13. Click the **Stereo Map** tab and review the tools contained in the **Clipboard**, **Navigate**, and **Layer** groups.

The **Stereo Source** group has a split button to set and clear the stereo source. When a stereo map is initiated, you need to identify the data source for the stereo project.



The **Stereo Display** group has tools to set up your selected image pairs for your stereo workflow, and the **Stereo Model** group has the tools to choose the stereo pair you want to work with in the stereo source.



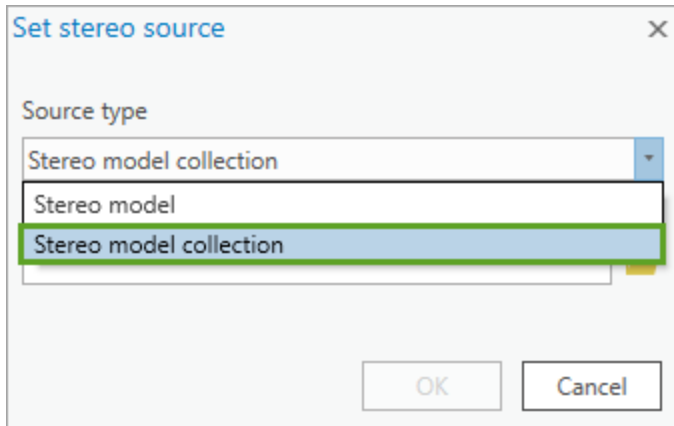
The **Cursor** group allows you to select different cursor shapes, the **Sub Views** group has tools to help you view stereo imagery in an overview or magnifier window and the **Inquiry** group contains **Locate** and **Measure** tools.

14. From the **Stereo Source** group, click the **Set Source** button.

A stereo map's data source is a stereo model consisting of a stereo image pair or a collection of stereo models managed as a mosaic dataset.

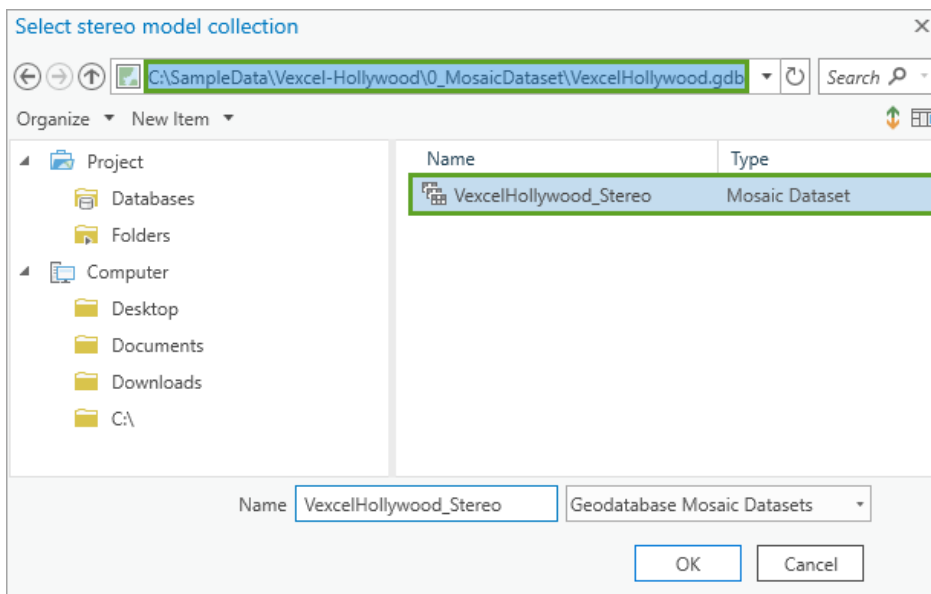
15. On the **Set stereo source** dialog box, choose **Stereo model collection**.

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The browse results are filtered to only display mosaic datasets as a stereo source type.

16. On the **Set stereo source** dialog box for **Source collection**, click the **Browse** button, and then using the folder connection, locate `\SampleData\Vexcel-Hollywood\0_MosaicDataset\VexcelHollywood.gdb`.
17. From `VexcelHollywood.gdb`, select the `VexcelHollywood_Stereo` mosaic dataset and click **OK**.



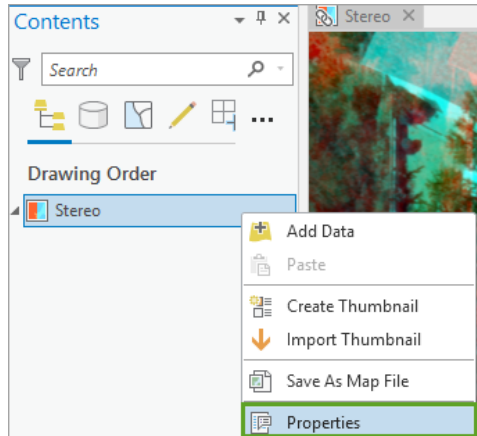
18. On the **Set stereo source** dialog box, click **OK**.

The `VexcelHollywood_Stereo` mosaic dataset is added to the stereo map.

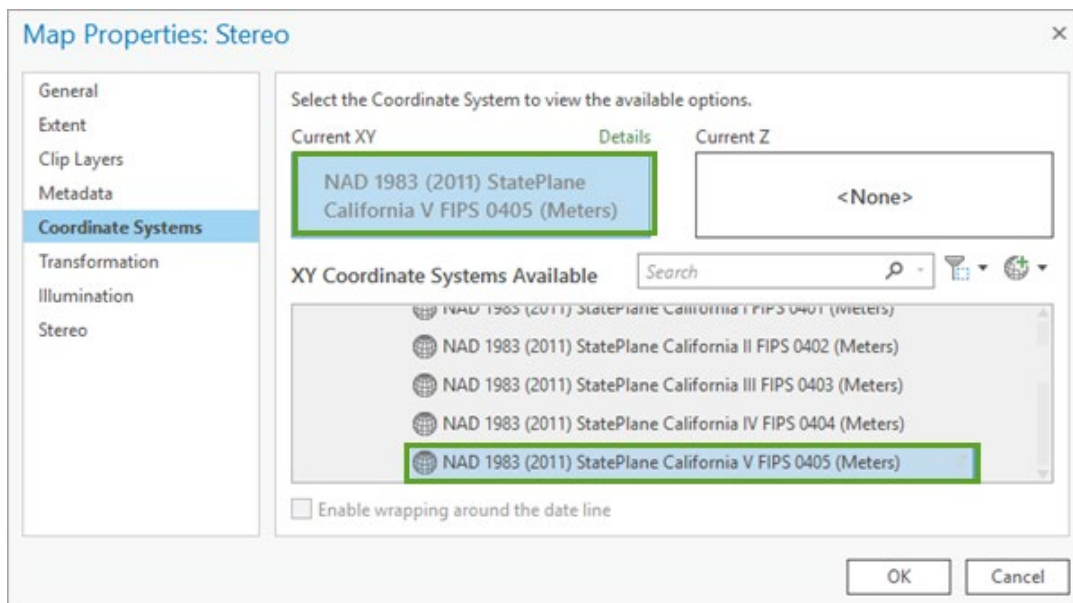
Note: If you saved the `SampleData` folder to a location other than the C drive, your mosaic dataset stereo images may not display. You will need to use the [Repair Mosaic Dataset Paths tool](#) to update mosaic dataset source image paths to the new location, or move the folder to the C drive.

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19. In the **Contents** pane, right-click **Stereo** and choose **Properties**.



20. On the **Map Properties: Stereo** dialog box, click **Coordinate Systems**.



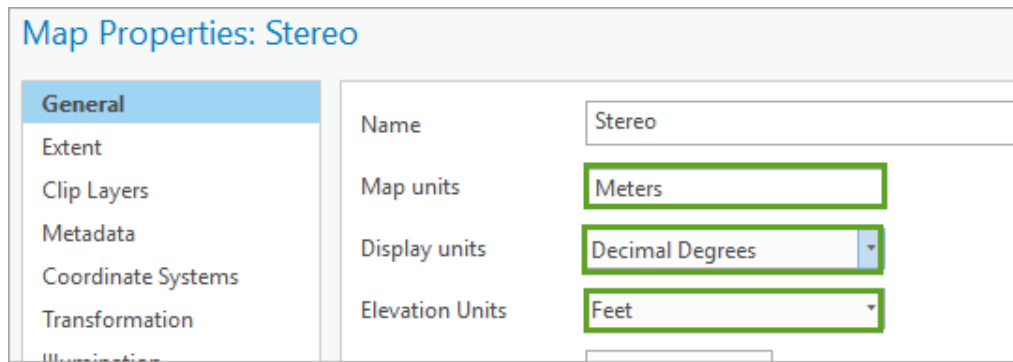
Verify that the stereo map coordinate system is defined as

NAD_1983_2011_StatePlane_California_V_FIPS_0405. This is the same projection as the mosaic dataset.

Note: The spatial reference of the stereo source cannot be changed, but the stereo map can display the supported layer in any projection. However, best practice is to avoid reprojection whenever possible.

21. On the **Map Properties: Stereo** dialog box, click **General** and review the current unit properties.

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Notice the following:

- Map units are set to meters.
- Display units are set to decimal degrees.
- Elevation units are set to feet.

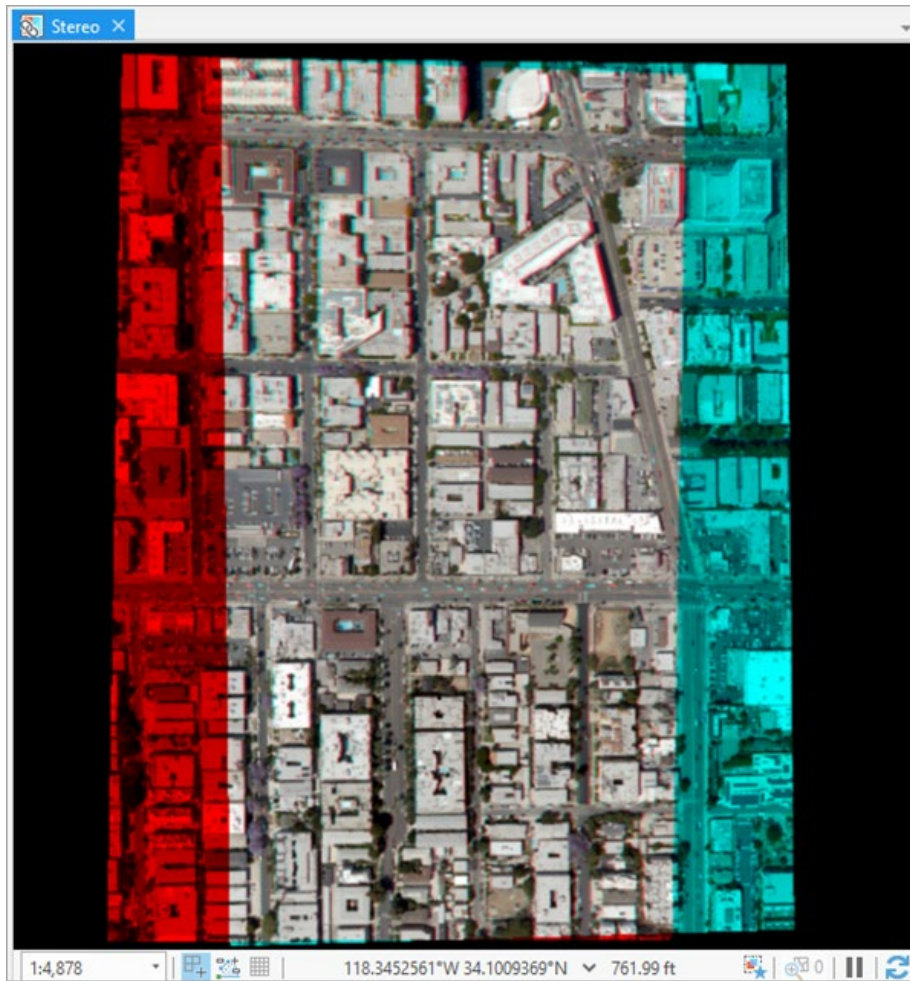
These can be modified based on project requirements.

22. Click **Cancel** to close the **Map Properties** pane.

23. Review the stereo map view.

When a stereo pair is loaded, the stereo map view displays two images where the epipolar lines are parallel to the x-axis. Epipolar is the geometry of stereo vision and results when two cameras view a 3D scene from two distinct positions, resulting in constraints between the image points.

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In the stereo map, the cursor always returns x, y, and z, which are displayed in the current projection units below the map.

24. In the **Stereo Map** display, use pan and ctrl zoom to navigate the imagery. If you like, experiment using navigation keys to manipulate the cursor and map display.

Review the [Stereo map navigation](#) help topic for more details.

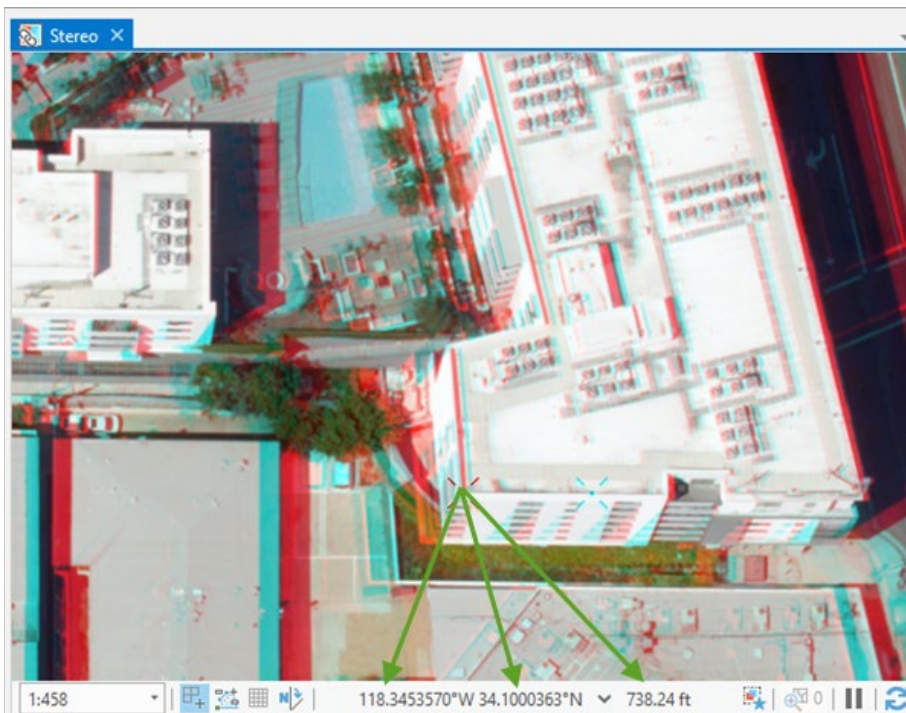
25. Locate and zoom to the triangular building near the upper right of the map.

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26. Using the cursor, point to one of the building corners and review the measurement details reported in the lower center of the map.

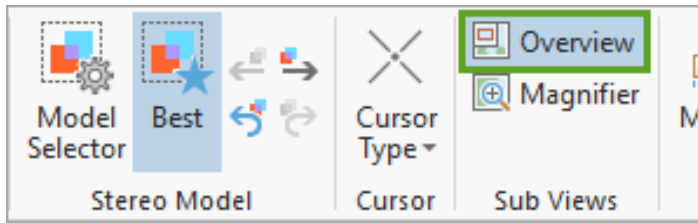
Note: Your current Z-value will not change as you roam across the image, later you will adjust the z-coordinate before collecting a feature.



Notice that the x- and y-values are reported in decimal degrees and the z-value in feet. If no vertical datum is defined, the z-unit (ft) will be the same as that defined in the mosaic dataset.

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27. Next use your stereo glasses to explore (pan and zoom) the stereo map in 3D.
28. On the **Stereo Map** tab, in the **Sub Views** group, click **Overview**.



The **Overview** window appears in the upper left corner of the stereo map and shows the zoomed-out location of your current extent. This can help you navigate around the stereo pairs in your project without leaving your current stereo display resolution.

Hint: Press the **O** shortcut key to turn the **Overview** window on or off.

29. On the stereo map, in the overview area, move the gray extent indicator box to pan around the stereo map.



30. In the **Sub Views** group, check **Overview** to turn it off, and check **Magnifier** to turn it on.

The **Magnifier** window appears in the lower right corner of the stereo map and shows a zoomed-in view of the location of your cursor. This can help you view an object closely, without having to leave your current stereo display resolution.

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31. On the stereo map, move your cursor around and notice how the magnifier displays an enlarged view of features located below the current cursor position.



32. In the **Sub Views** group, check **Magnifier** to turn it off.

Hint: Press the **W** shortcut key to turn the **Magnifier** window on or off.

33. Remove your stereo glasses before continuing.

Locate features for updating

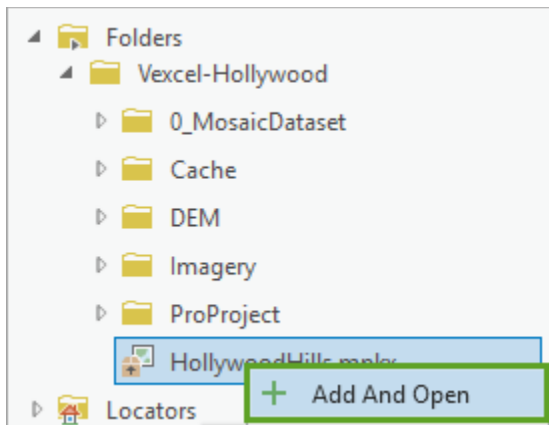
Next, you will select a stereo pair containing features for updating from the stereo model. However, before selecting a stereo pair and the roof of a building to update, you should locate a property that has recently been redeveloped and may not comply with local height restrictions.

1. In the **Catalog** pane, expand **Folders**.
2. If necessary, expand the **Vexcel-Hollywood** folder.

HollywoodHills.mpkx is a packaged 2D map displaying the World Topographic basemap and a layer of building footprints for homes in the Hollywood Hills that require review and possible updating.

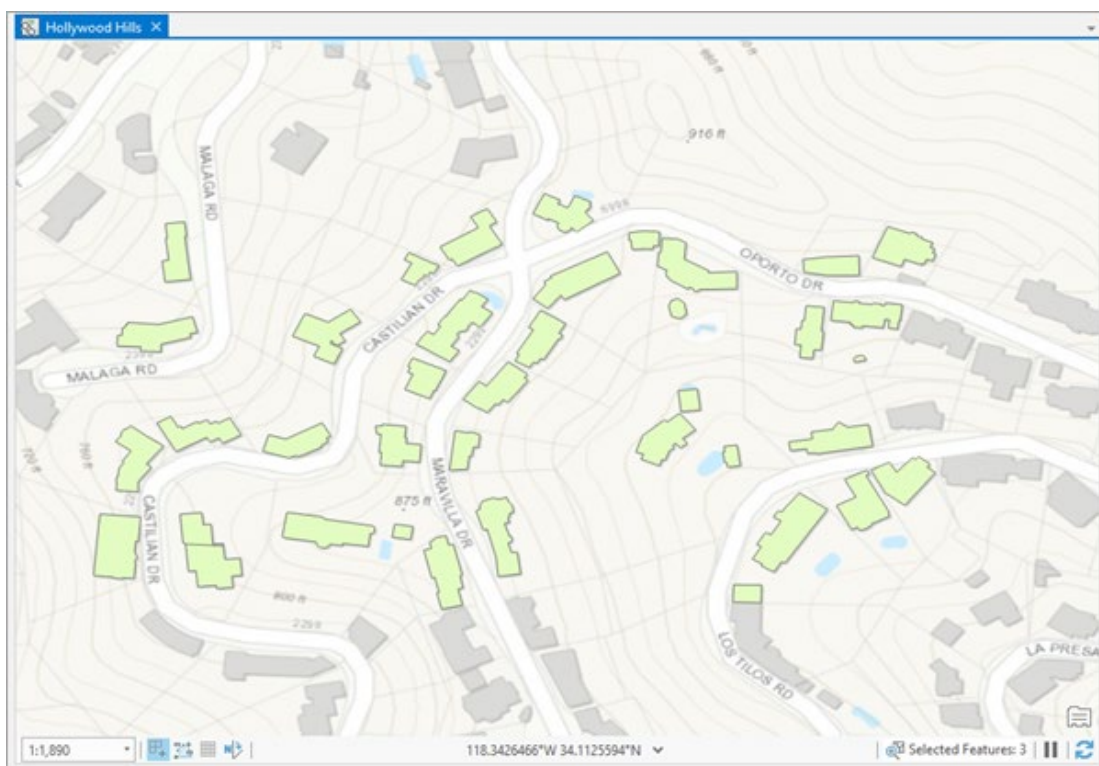
3. Right-click **HollywoodHills.mpkx** and choose **Add And Open**.

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A 2D map named Hollywood Hills is added to your project. It contains one 2D layer of building footprints.

4. Select the **Hollywood Hills** map.
5. On the ribbon, in the **Navigate** group, click **Bookmarks** and select the **Update Focus** bookmark.

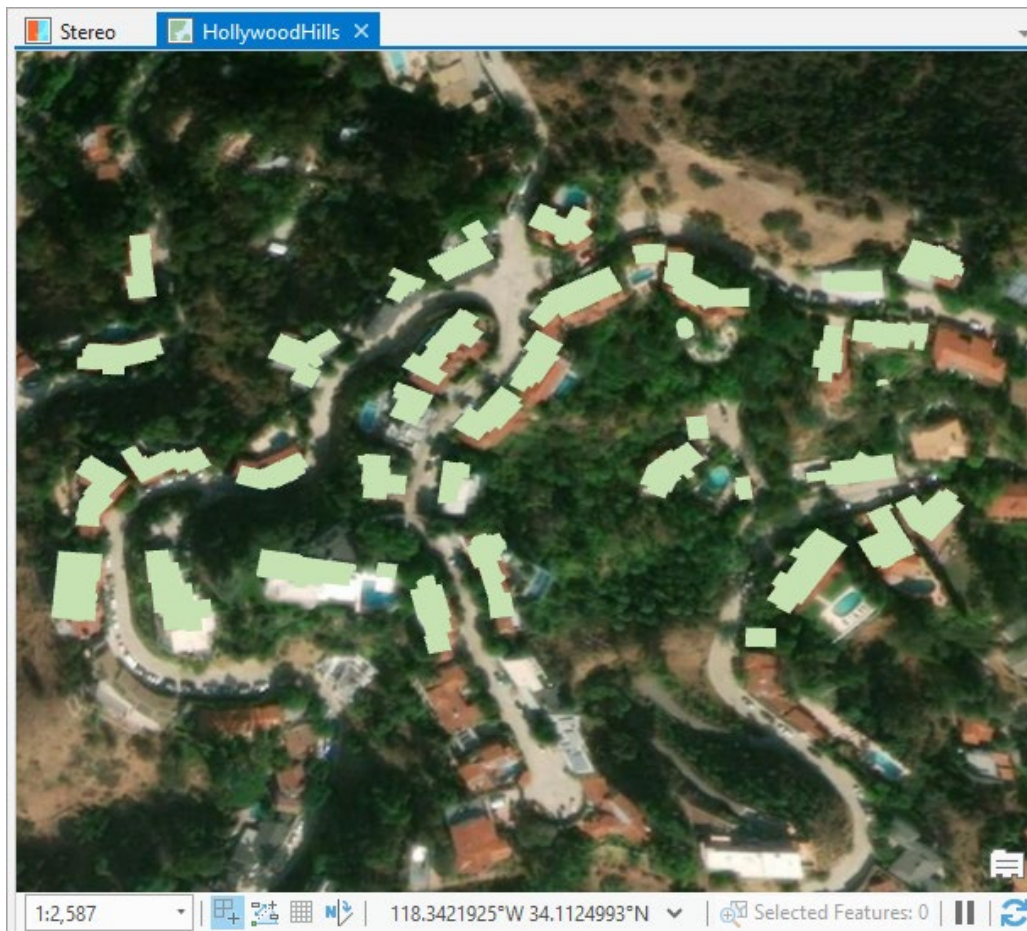


6. In the **Contents** pane, use the check box to turn the **buildingfootprints** layer on and off and observe the building footprints on the underlying basemap.

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With the current basemap and the 2D building footprints, it is difficult to gain an accurate perspective of the heights of buildings and if any buildings exceed height restrictions.

7. On the **Map** tab, in the **Layer** group, change the basemap to **Imagery**.
8. Once again, turn the **buildingfootprints** layer on and off and observe the building footprints on the underlying basemap.



This time it is easier to observe elevation changes, but it is still difficult to observe building heights in relation to elevation.

9. From **Bookmarks**, select **Redeveloped Building**.

The map updates and it is clear that building footprints in this area look different than those on the basemap. You should investigate these, as it appears that several original buildings have either been rebuilt or extensively modified.

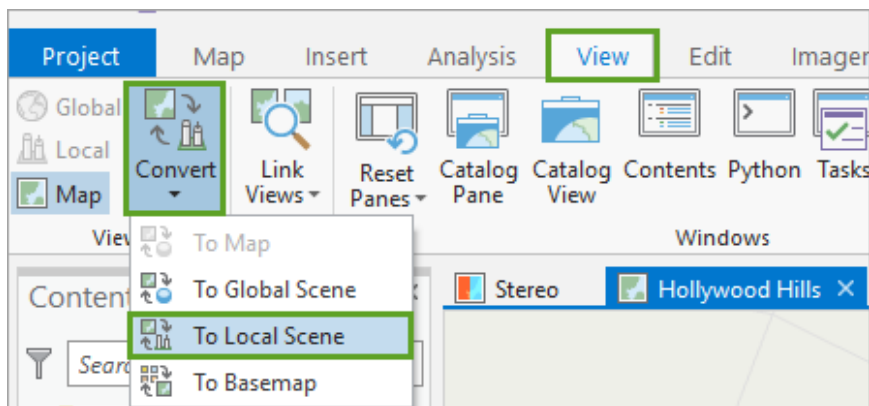
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The outline of one of the buildings on Maravilla Dr appears different and should be investigated.

Next, you will convert the 2D map to a 3D local scene to observe the effect of terrain.

10. Change the basemap to **Topographic**.
11. On the ribbon, on the **View** tab, click **Convert** and choose **To Local Scene**.

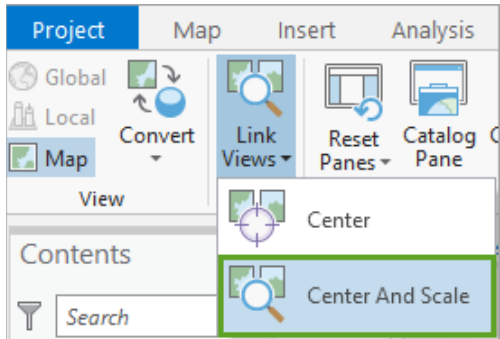


A new local scene named Hollywood Hills_3D is added to the project. It would be useful to link the 2D and 3D maps as well as the stereo map, so the same extent and scale are displayed in all maps.

12. Click the **Stereo** view tab to activate the stereo map.
13. In the **Stereo** map, pan and zoom to the large triangular structure consisting of two buildings located near the center of the stereo map.

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14. On the **View** tab, in the **Link** group, click **Link Views** and select **Center and Scale**.



All maps in the project are linked. Both the Hollywood Hills and Hollywood Hills_3D maps display the same extent and features, but the stereo map needs to be updated to display the stereo pair that covers the Hollywood Hills area. Before you update the stereo pair, review the linked maps.

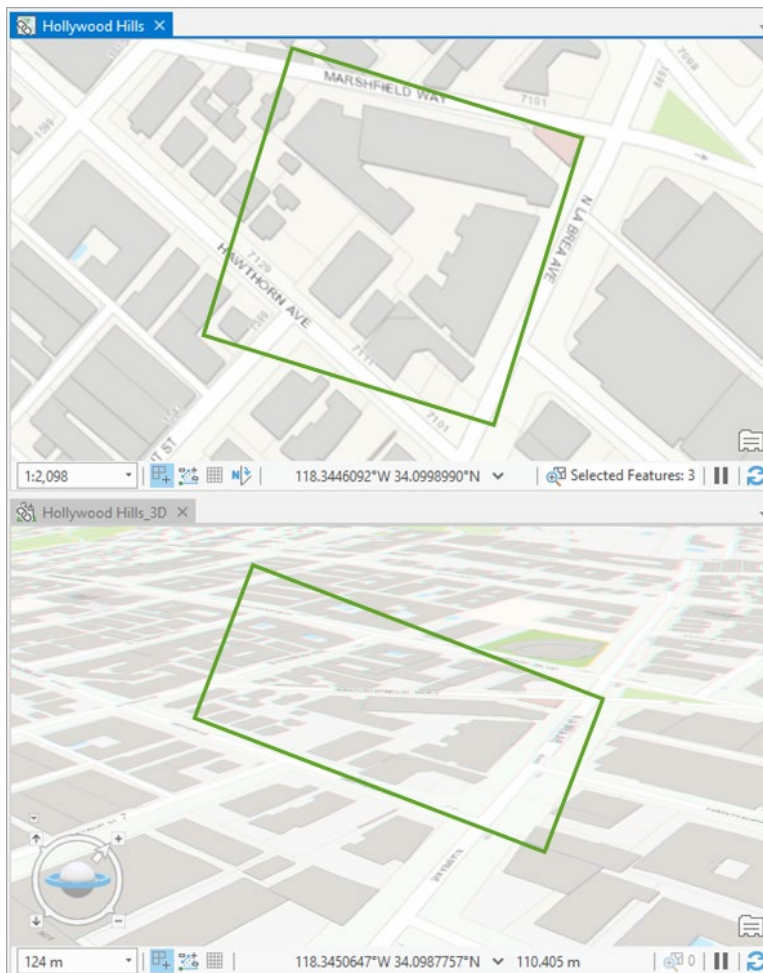
15. If necessary, hide the **Catalog** pane and then reposition and dock the Hollywood Hills and Hollywood Hills_3D maps to the right of the stereo map.

Hint: To move and dock a map view, click and drag its view tab. Point to one of the docking targets that appear to dock the view to that target.



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16. In the Hollywood Hills_3D scene, use the navigator tool to tilt the scene and change direction. Notice how the linked Hollywood Hills 2D and stereo maps update in response to your navigation.



17. Click the **Hollywood Hills** map and zoom to your target building by applying the **Redevelopment building** bookmark.

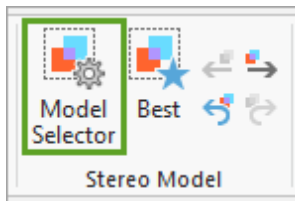


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Update the stereo pair to Hollywood Hills

Next, you'll update the stereo map to cover a pair of images that fall within the Hollywood Hills area you are updating.

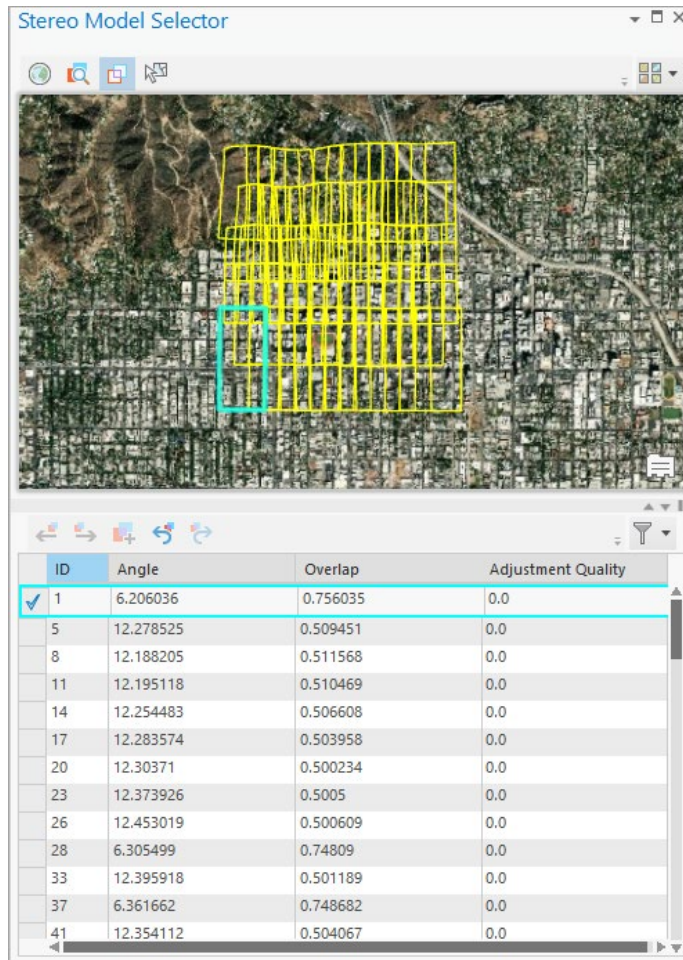
1. Click the stereo map to activate the **Stereo Map** tab.
2. On the **Stereo Map** tab, in the **Stereo Model** group, click the **Model Selector** button.



The **Stereo Model Selector** pane opens, which allows you to manage and select stereo pairs for display.

For more details on the **Stereo Model Selector** pane, review the [Stereo Model Selector pane](#) help topic.

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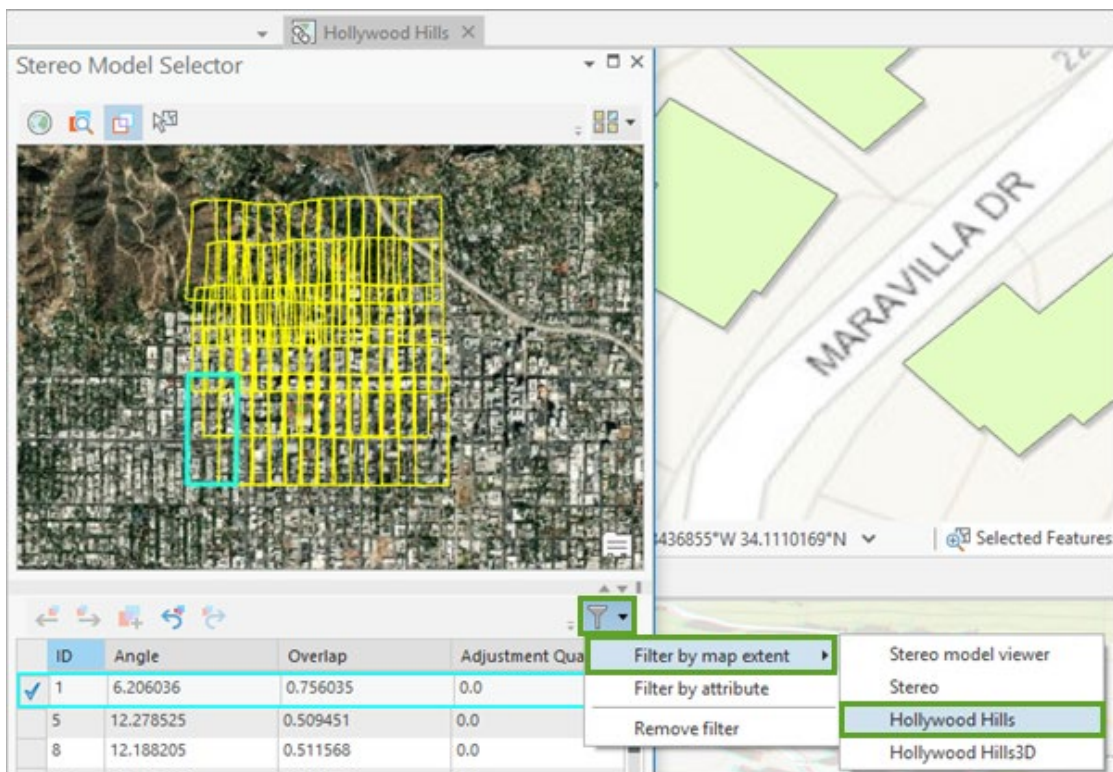
The top of the **Stereo Model Selector** pane displays the footprints of all the stereo pairs in your stereo source. The bottom of the pane lists all the available stereo pairs, which can be filtered by polygon, map extent, or attribute.

3. In the **Stereo Model Selector** pane, click the **Define stereo model collection using a filter** button.

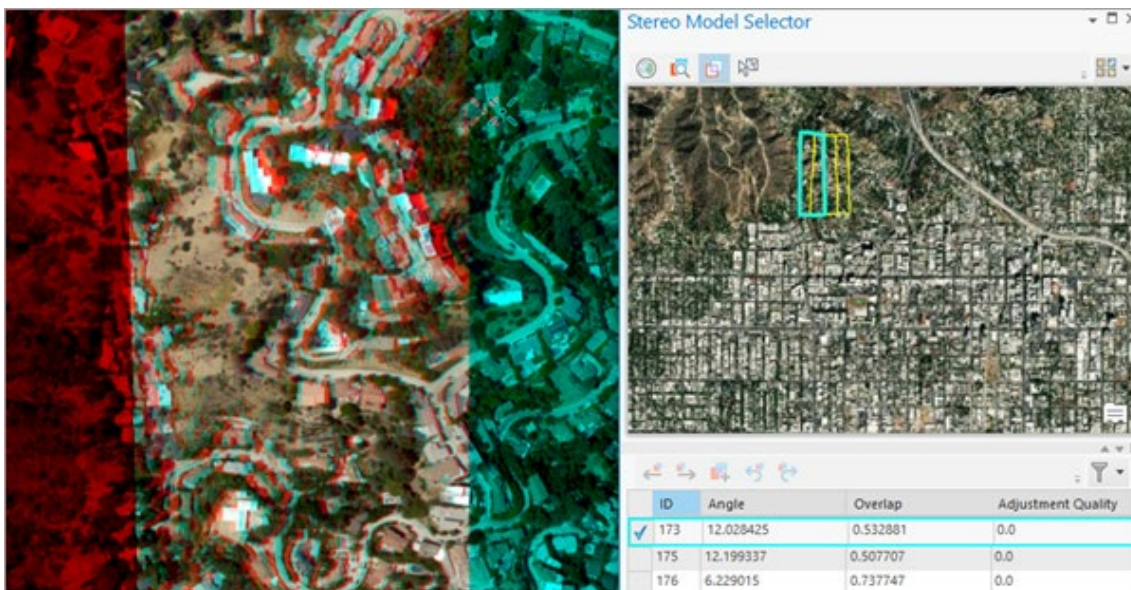
When a stereo model is added to the stereo map, the first stereo pair in the model is displayed (generally the pair located in the lower left of the collection). Using the **Stereo Model Selector** pane, you can change and select the stereo pair that you want to work with from the mosaic dataset source.

4. Choose the **Filter by map extent** option and select **Hollywood Hills**.

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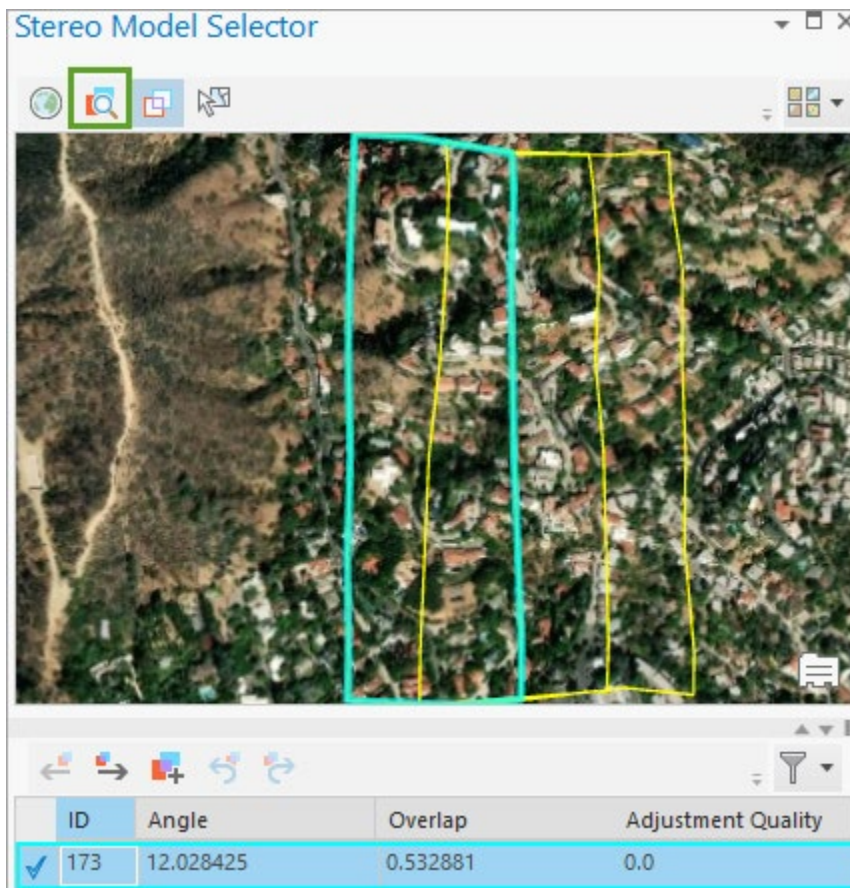


The **Stereo Model Selector** pane updates to display stereo pairs filtered to the extent of the Hollywood Hills 2D map.



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5. In the **Stereo Model Selector** pane, click the **Zoom to selected** button to review the extent of the stereo pair with ID 173.



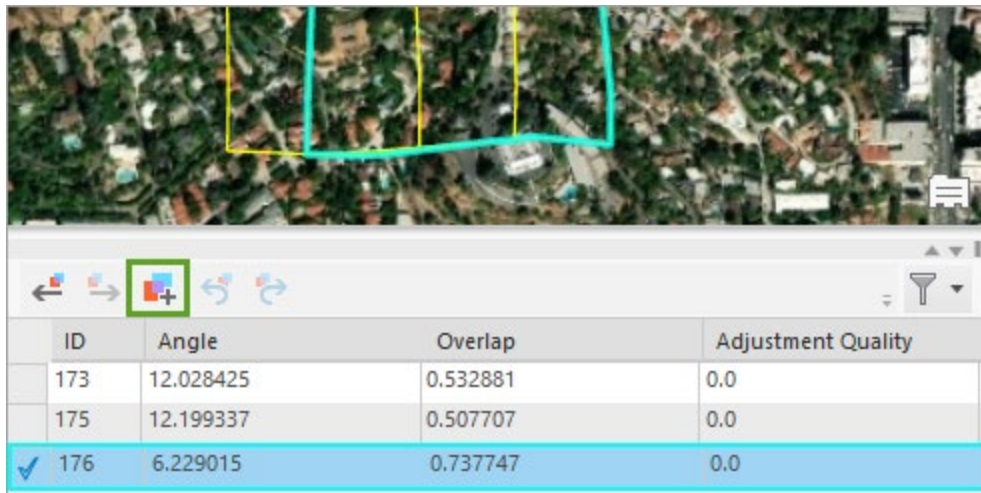
Review the additional stereo pairs filtered by the extent of the Hollywood Hills map. Notice that the selected pairs overlap each other.

6. In the **Stereo Model Selector** pane, select the stereo pair with ID 176.

This pair appears to cover the Hollywood Hills area around Maravilla Drive and is centered within the area you have identified as showing a large amount of redevelopment.

7. In the **Stereo Model Selector** pane, use the **Zoom to selected** button to review the extent of the stereo pair.
8. Next, click the **Add to stereo** button to load the selected stereo model.

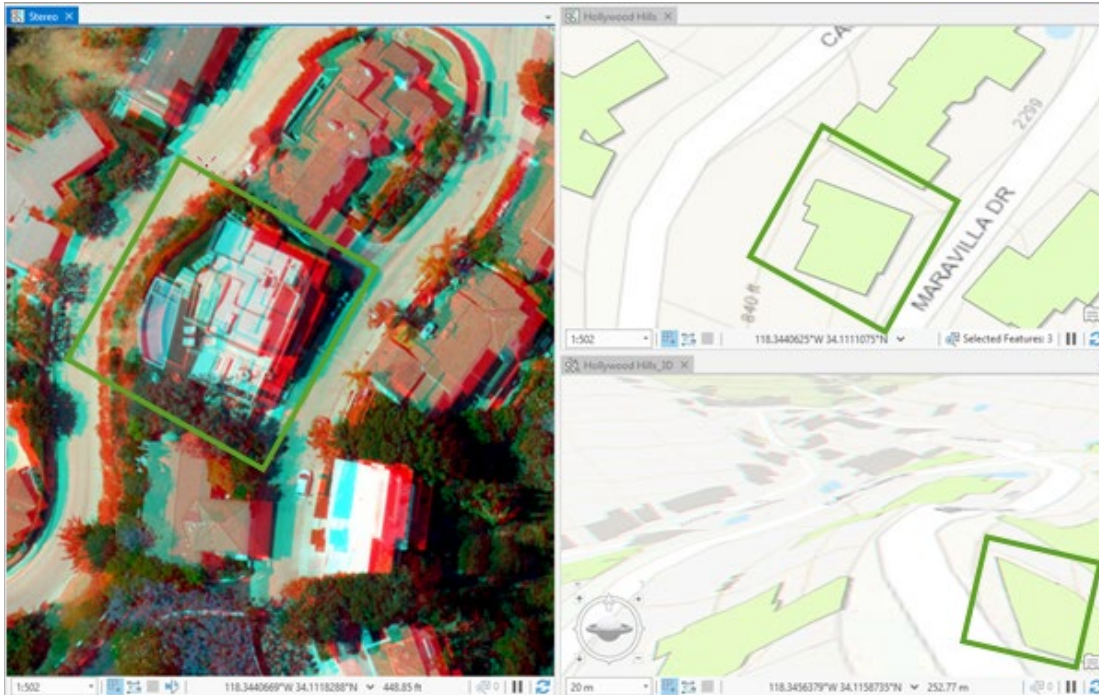
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9. Close the **Stereo Model Selector** pane.
10. In the stereo map, use the left mouse button to pan and the right mouse button to zoom to navigate the stereo map in roaming mode.
11. With your cursor active in the stereo map, press **F8** to temporarily change the stereo pointer mode from roaming to fixed.

This allows you to navigate the map without panning the mouse. Notice that the fixed mode also affects the linked map and scene.
12. Return to roaming mode by pressing **F8** again.
13. Use the Redevelopment Building bookmark or map navigation tools to focus on the house you identified earlier.
14. In the stereo map, zoom in on the house by pressing the **Ctrl** key while rotating the wheel button.

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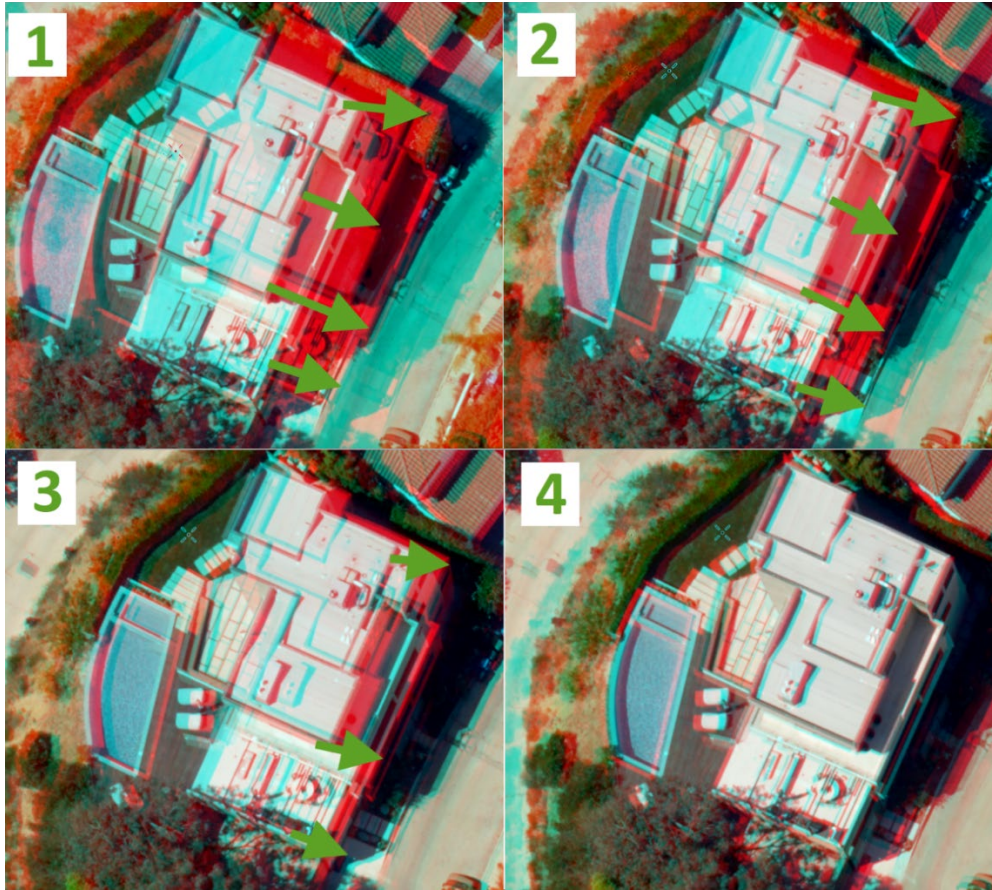


15. Put on your 3D glasses and examine the house in 3D.

The right and left images are offset from each other, making it difficult to effectively view the building 3D. You can correct this by adjusting the x-parallax.

16. In the stereo map, while wearing the 3D glasses, press **Ctrl + Right Arrow** or **Ctrl + Left Arrow** to change the x-parallax. The two images move toward or away from each other in the x (horizontal) direction. Keep moving the images until they merge into a single image and look clear.

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Note: You may not be able to achieve a perfect registration, but while wearing the 3D glasses you should be able to achieve a very good match and clearly see the house in 3D. As you zoom to specific areas on the image, you will need to readjust the registration to improve accuracy.

Your stereo environment is now set up with a stereo pair. You can start your editing workflow.

Create the BuildingHeights feature class

Now that your stereo model is set up, you are ready to collect 3D features in stereo mode. The editing experience in a stereo map is consistent with the standard editing experience in ArcGIS Pro for creating and editing feature class data. While editing, you can use existing layers, symbols, and templates. The output of your feature creation or editing session is saved directly to a geodatabase.

1. In the **Contents** pane of both the **Hollywood Hills 2D** and **Hollywood Hills_3D** maps, check off the building footprints layer.

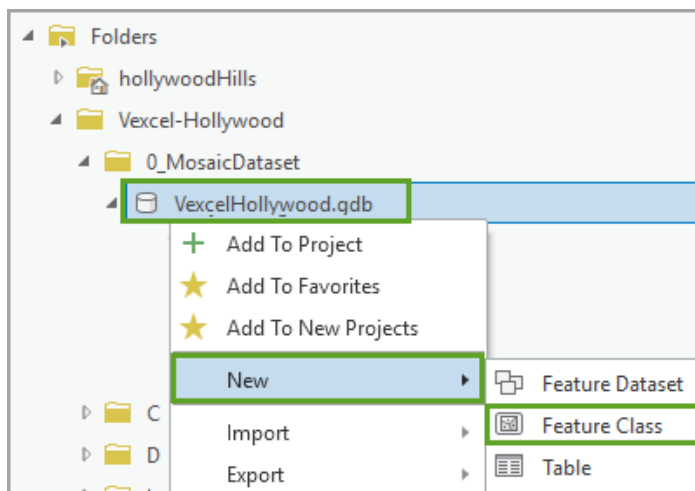
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This layer is a 2D layer obtained from the City of Los Angeles. You will be collecting 3D point features and need a z-enabled feature class to store the new building heights.

2. In the **Catalog** pane, in folder connections, expand the **Vexcel-Hollywood** connection.

Hint: If you hid the **Catalog** pane earlier, on the **View** tab, in the **Windows** group, click **Catalog Pane**.

3. Expand the **0_MosaicDataset** folder and right-click **VexcelHollywood.gdb**.
4. Choose **New** and select **Feature Class**.



5. In the **Create Feature Class** window, make the following changes:
 - For **Name**, type *BuildingHeights*.
 - For **Feature Class Type**, select **Point**.
 - For **Geometric Properties**, ensure **Z Values** is checked.

Collect 3D Features from a Stereo Map

The screenshot shows the 'Create Feature Class' dialog box, 'Define' page. The 'Name' field is 'BuildingHeights', 'Feature Class Type' is 'Point', and 'Z Values' is checked. The 'M Values' checkbox is unchecked. The dialog has a 'Page 1/6' indicator and 'Previous', 'Next', 'Finish', and 'Cancel' buttons.

6. Click **Next**.

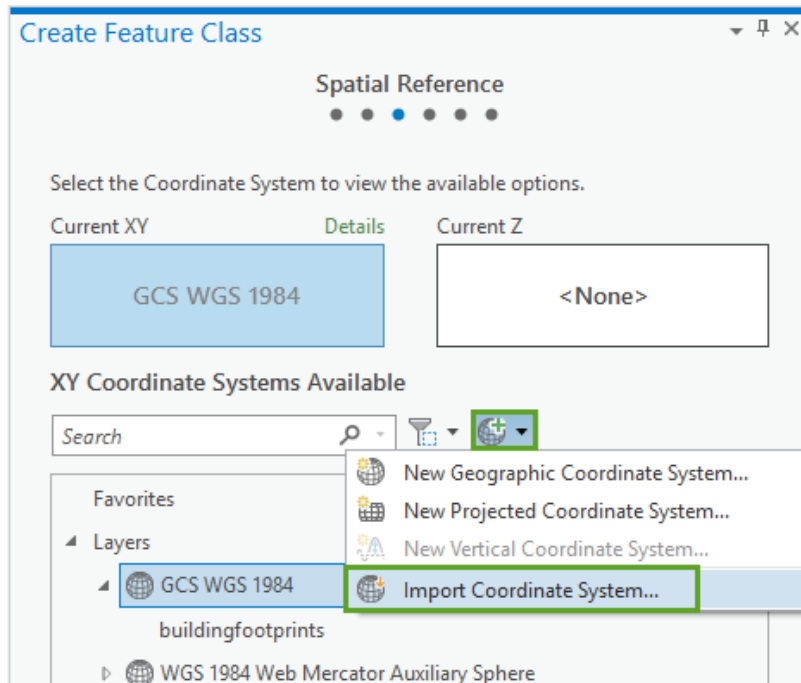
The next page allows you to add attribute fields. You do not want to add fields yet.

7. Click **Next**.

Next, you'll choose the feature class's coordinate system. A coordinate system defines positions and measurement values of geographic features on a map. You'll use the same coordinate system defined for the mosaic dataset in your map.

8. If the **Current XY** coordinate system is already set to **NAD 1983 (2011) StatePlane California V FIPS 0405 (Meters)**, click **Finish**. Otherwise, you'll import this coordinate system.
9. In the **Spatial Reference** window, click the **Add Coordinate System** button.
10. Choose **Import Coordinate System**.

Collect 3D Features from a Stereo Map



11. In the **Import coordinate system** window, browse and select **\SampleData\Vexcel-Hollywood\0_MosaicDataset\VexcelHollywood.gdb\VexcelHollywood_Stereo**.

This will ensure the new feature class has the same coordinate system as the VexcelHollywood_Stereo mosaic dataset.

12. Click **Finish** to create the BuildingHeights feature class.
13. From the **Catalog** pane, add the BuildingHeights feature class to the Stereo map, and then do the same for the Hollywood Hills 2D and Hollywood Hills_3D maps.
14. In each of the three maps, change the point symbology for the BuildingHeights layer to a red dot.

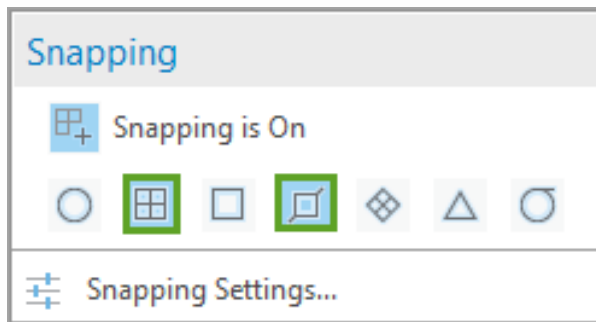
Create features using the stereo map

1. In the stereo map **Contents** pane, click the **BuildingHeights** layer to select it for editing.
2. On the ribbon, click the **Edit** tab.

For more information about editing, see [A quick tour of editing](#).

3. On the **Edit** tab, in the **Snapping** group, click **Snapping** to turn snapping on.
4. In the **Snapping** menu, ensure that both **End** and **Edge** snapping are selected.

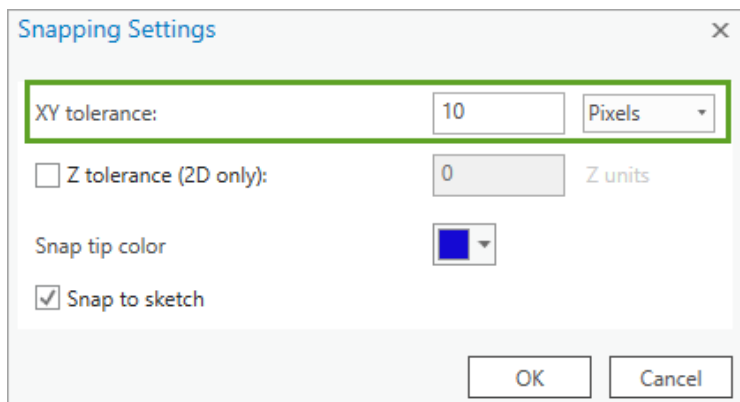
Collect 3D Features from a Stereo Map



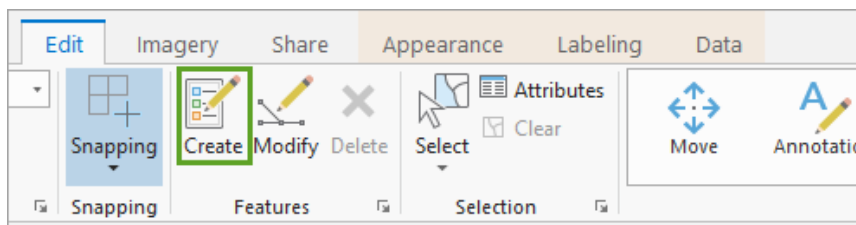
By selecting **End** and **Edge** snapping, new features will snap to the edges or ends of existing features.

5. In the **Snapping** menu, click **Snapping Settings**.

The XY tolerance is set to 10 pixels, which means that snapping will only take place when the new feature is within 1 to 10 pixels of the end or edge of an existing feature.



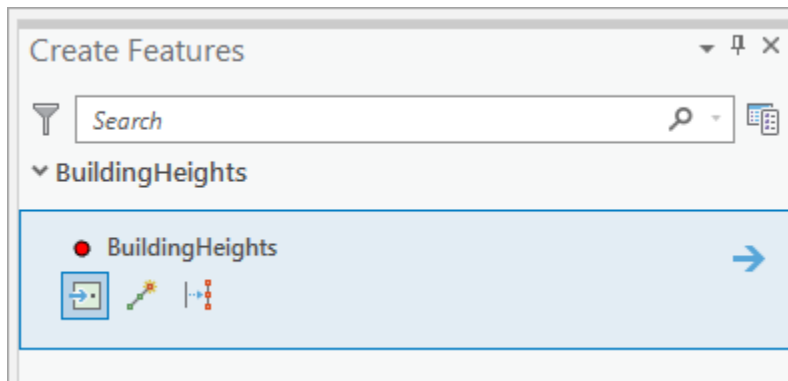
6. Click **OK** to close **Snapping Settings**.
7. In the **Features** group, click the **Create** button.



8. The **Create Features** pane appears.
9. Position and dock the pane before continuing.

Collect 3D Features from a Stereo Map

The **Create Features** pane displays templates for layers that are editable and includes tools that can be used to construct or modify features.



10. Click the BuildingHeights layer template.

Notice that the template has three construction tools: Point, Point At End of Line, and Create Points Along Line.

Before you start collecting a new building height feature, you need to adjust and correct the z-coordinate or floating mark in the stereo map to ensure you are constructing features with the correct z-value.

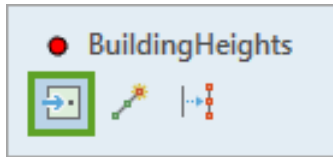
11. In the stereo map, point to the center of the highest roof section of the building and rotate the wheel button to adjust the z-coordinate.



To increase the z-value, rotate the wheel button backward. To decrease the z-value, rotate the wheel button forward. You will have the correct height when the cursor appears to sit on top of the feature you are viewing, and the red and blue crosses come together.

Collect 3D Features from a Stereo Map

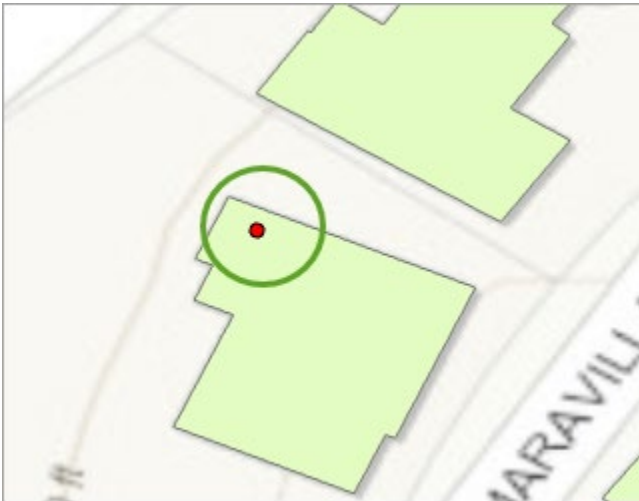
12. In the **Create Features** pane, click the **BuildingHeights** template., then click the **Point** tool.



13. On the stereo map, click and create a point in the center of the highest roof on the building. Each point you create has an x-, y-, and z-value as determined from the stereo map.



14. Review the Hollywood Hills 2D map and notice the new point feature located in the center of the highest roof on the building.



15. Review the Hollywood Hills_3D map and notice the new point feature located in the air above the center of the highest roof on the building.

Collect 3D Features from a Stereo Map



The location of the point above the building footprint is expected, as the 3D scene is displaying the point at its correct z-value (height) as determined from the stereo map.

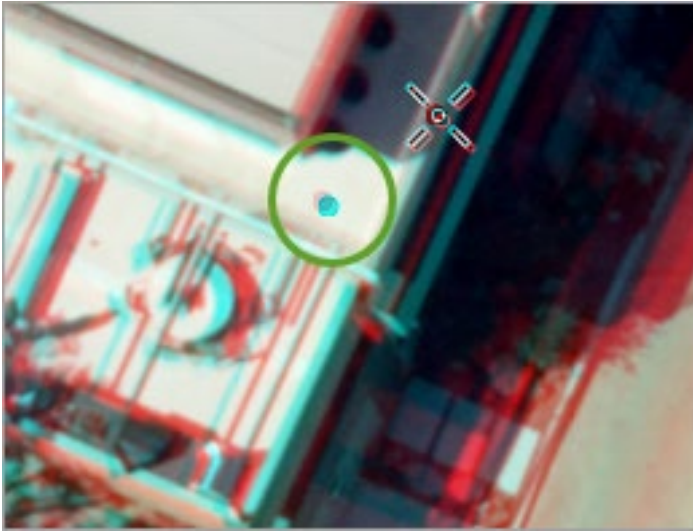
Next, you will create a point for the lower-level terrace facing the street, and you may need to adjust the x-parallax before making the measurement, since focusing on a different height generally requires an adjustment.

16. In the stereo map, zoom to the lower terrace and adjust the x-parallax. As you zoom closer, the stereo pair will need adjustment.
17. In the stereo map, point to the lower terrace of the building and rotate the wheel button to adjust the z-coordinate.



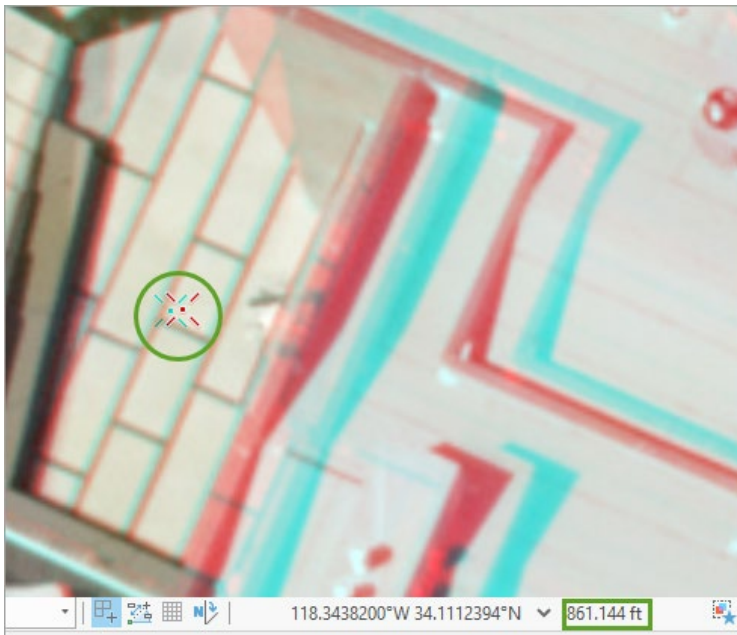
Collect 3D Features from a Stereo Map

18. From the **Create feature** template, use the **Point** tool to create a second point on the lower terrace.



After the terrace point has been collected, all that remains for this building is an anterior addition in the lower middle.

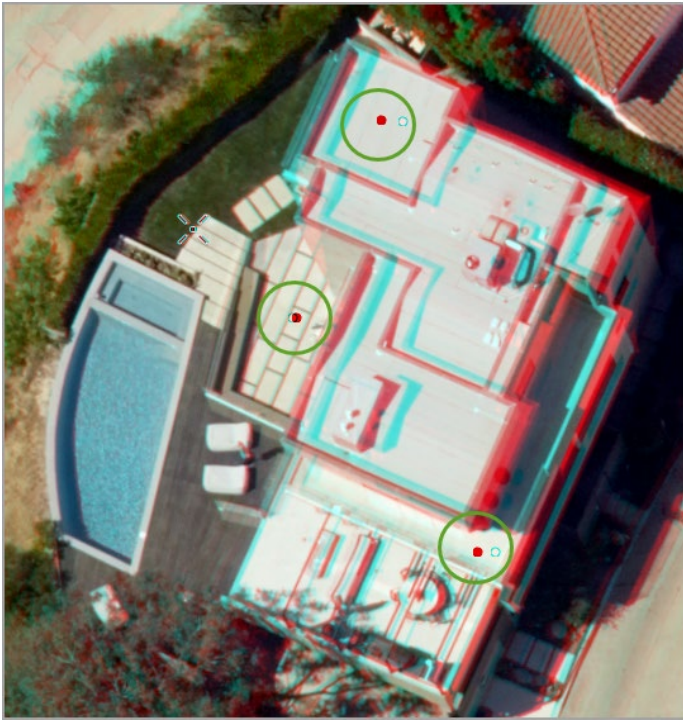
19. Zoom to the anterior addition and adjust the x-parallax.
20. Using the same method as before, adjust the z-coordinate to match the elevation of the anterior addition.



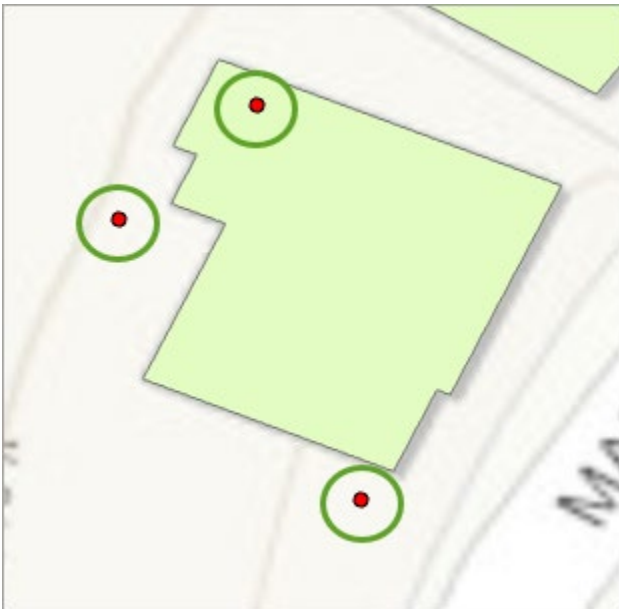
21. From the **Create feature** template, use the **Point** tool to create the third point centered in the anterior addition.

Collect 3D Features from a Stereo Map

22. In the stereo map, verify that you have successfully created three building-height point features.



23. Review the **Hollywood Hills 2D** map and notice the three building-height features above the roof of the building.



24. Review the **Hollywood Hills_3D** map and notice three building-height features above the roof of the building.

Collect 3D Features from a Stereo Map



The anterior addition point appears offset since it is located downslope and at a lower elevation on the hillside.

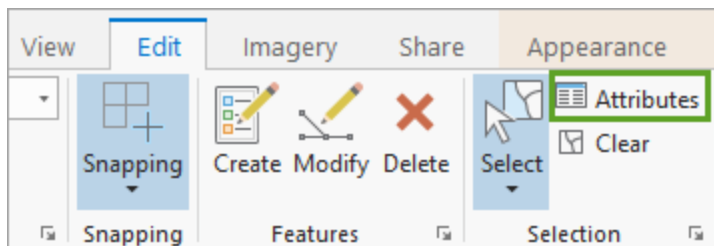
25. On the ribbon, on the **Edit** tab, in the **Manage Edits** group, click **Save**.

26. In the **Save Edits** window, click **Yes** to save all edits.

Edits are saved to the **BuildingHeights** feature class.

27. Open the **Edit** tab and use the **Select** tool to select all three points you collected.

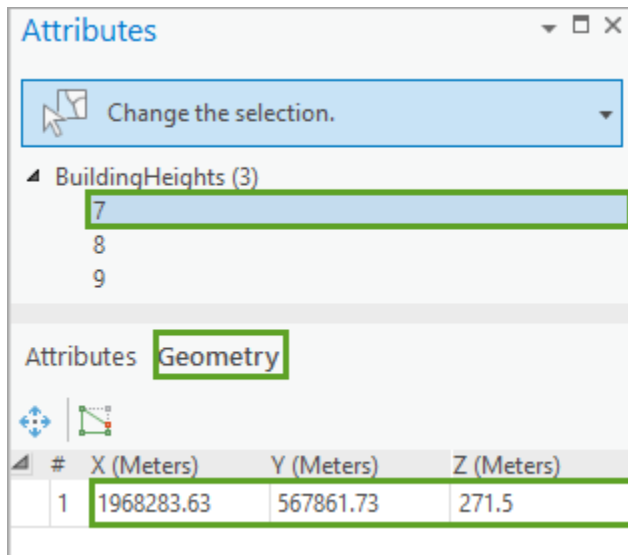
28. When the three points are selected, in the **Selection** group, click **Attributes**.



The **Attributes** pane appears, showing the three selected features.

Collect 3D Features from a Stereo Map

29. Choose the **Geometry** tab from the bottom section of the pane to see the x-, y-, and z-values for each feature.



You should see z-values (in meters) that are largest for the first feature you collected and smallest for the last feature you collected. Note that these -values represent height above sea level.

You can collect additional features from the stereo map as needed.

30. On the **Project** tab, click **Save** to save your Stereo mapping project.

Summary

Using a collection of stereo imagery loaded into a mosaic dataset, you used the stereo viewing and mapping functionality in ArcGIS Pro to collect new 3D rooftop features. This will help establish a pattern that city officials can use to visually analyze stereo imagery to compile 3D features that can be used to update the existing database and determine if bylaws are being broken.

For more information on ArcGIS Pro stereo mapping

- [Introduction to stereo mapping](#)
- [Stereo mapping in ArcGIS Pro](#)
- [Stereo map](#)
- [Stereo Model Selector pane](#)
- [Stereo map navigation](#)