Learn ArcGIS
Guided lessons for real world problems, with real GIS solutions

Create Multipatch Features and Texture Editing

www.learn.arcgis.com

esri | THE SCIENCE OF WHERE™

380 New York Street
Redlands, California 92373 – 8100 USA

Time: 1 hour, 30 minutes

Overview

Working in 3D environments involves more than making features look realistic. It also involves precision, analysis, visual perspectives, and so on. Working in 3D requires new, accurate x, y, and z content, as well as modifying that content, especially when working with real-life scenarios. These aspects are always changing, so you must be able to modify them in a 3D scene environment.

As an urban planner, you have been tasked with creating multipatch features and performing texture editing for an urban area. As part of the workflow, you will extrude, edit, and symbolize the building footprints. After converting building footprints to multipatch features, you will apply textures to the buildings to make them as realistic as possible.

In this lesson, you will learn to do the following:

- Extrude and edit the building footprints
- Symbolize the building footprints
- Add and configure preset trees
- Set a constant elevation
- Edit a 3D grid for a building workflow
- Create a new feature from existing data
- Create a multipatch feature
- Perform textured editing

Download the data

First, download the data.

1. Download the **Create-New-Content.zip** compressed folder.

2. Locate the downloaded file on your computer and extract it to a location you can easily find,

such as your Documents folder.
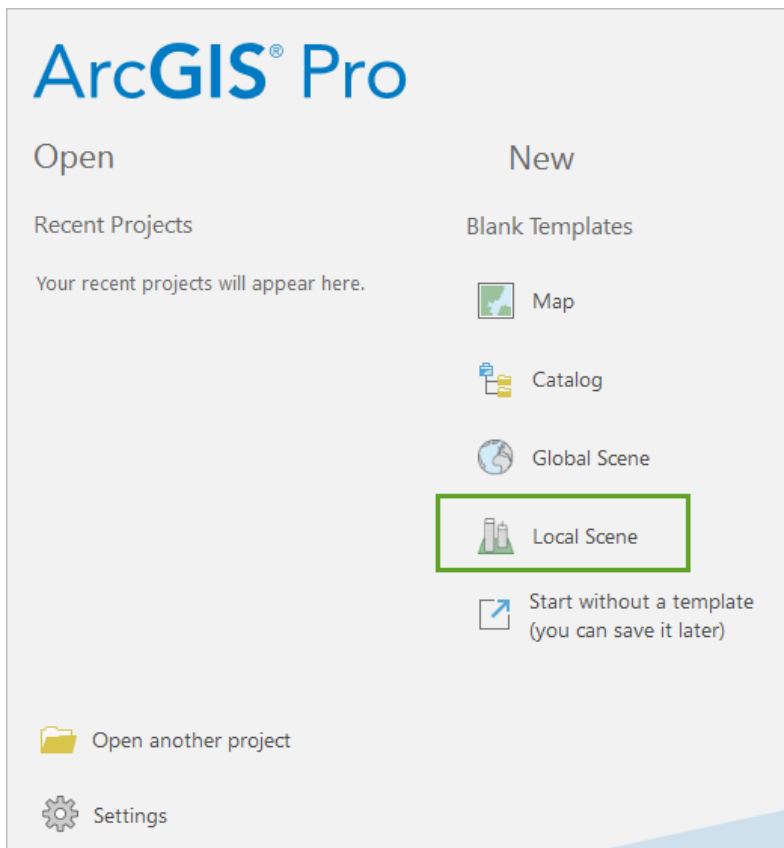
3. Open the **Create New Content** folder.

The study area is centered around Redlands, California.

Open map package

First, you need to create a project using the Blank project template.

1. Start ArcGIS Pro and under **New**, click **Local Scene**.

Note: If you don't have ArcGIS Pro or an ArcGIS account, you can sign up for an ArcGIS free trial.

2. On the Quick Access toolbar, click Save [ ] or press Ctrl+S to save your project.

3. Name the project **3D-Editing** and choose a suitable location.

4. On the **Insert** tab, in the **Project** group, click **Import Map** [ ].

5. Browse to or search for **Create_New_Content.mpkx** to import this local scene.
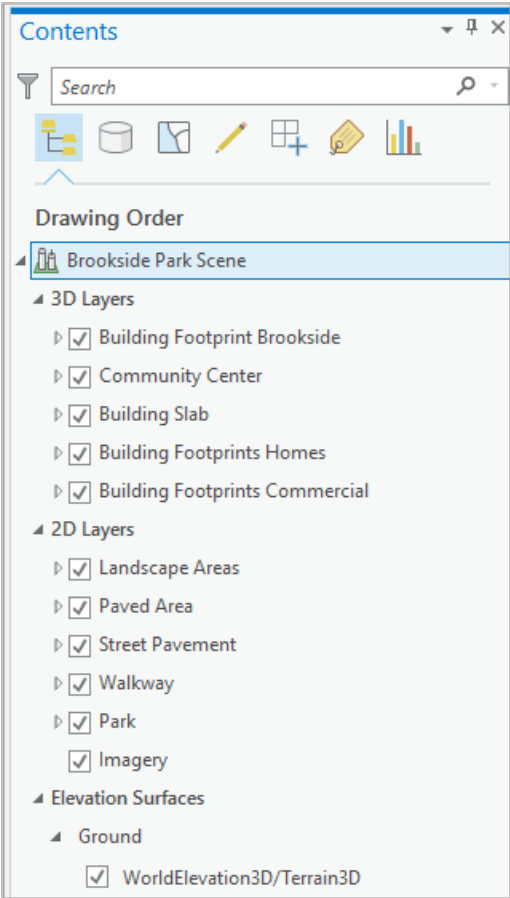
6. Click **OK**.

The Brookside Park scene opens.

Extrude the building footprints to represent height

Spend a few minutes familiarizing yourself with the scene content and the 2D and 3D layers organized in the scene contents layer.
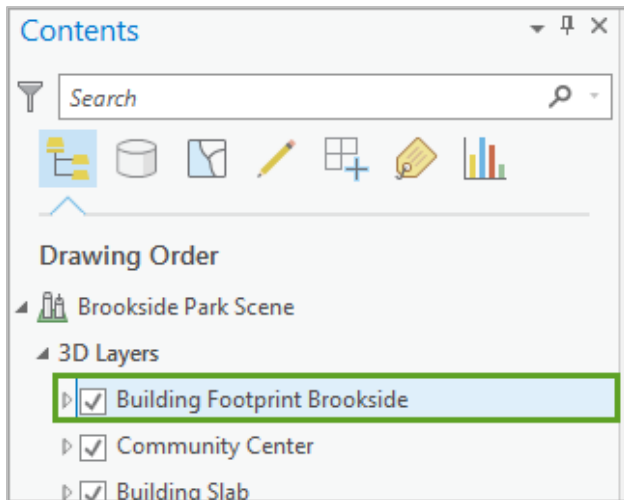
Creating multipatch features and texture editing

1. On the **Map** tab, in the **Navigate** group, click **Bookmarks** and choose the **Brookside Apartments** bookmark.
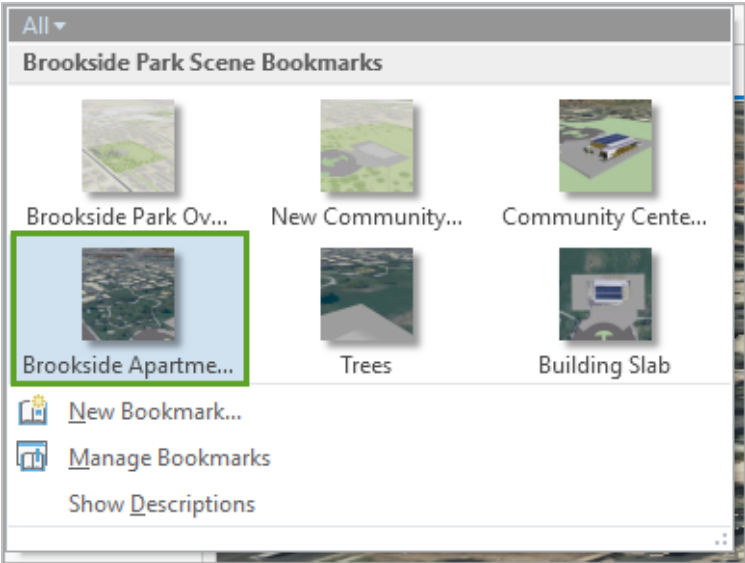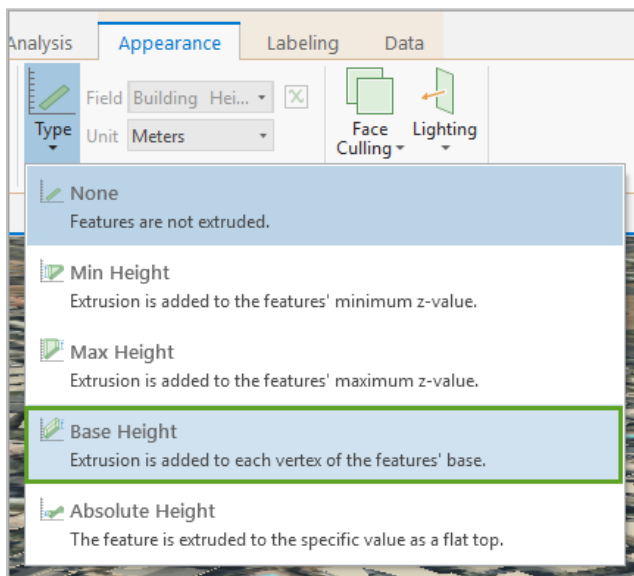
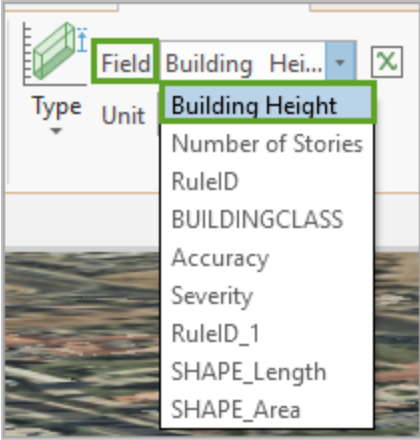2. In the **Contents** pane, click the **Building Footprint Brookside** layer to select and activate it.

3. In the **Appearance** tab, **Extrusion** group, click the **Type** drop-down menu and click **Base Height**.
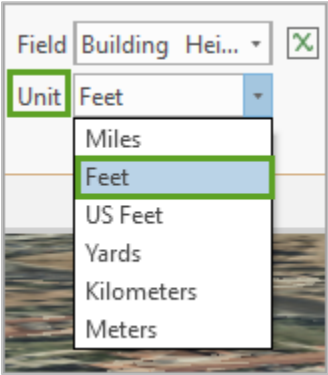

4. Click the **Field** drop-down list and select the **Building Height** field to use this attribute field information.
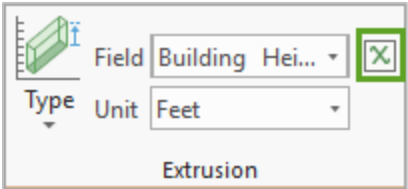
5. Click the **Unit** drop-down list and select **Feet**.

The building footprints display with extrusion representing their height. Currently all buildings have a default height of 10 feet.
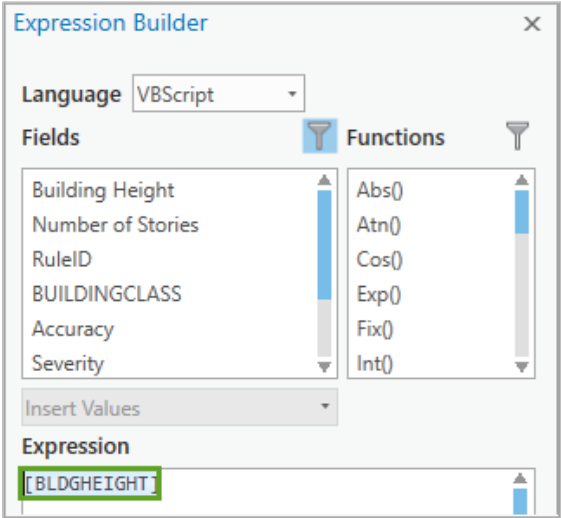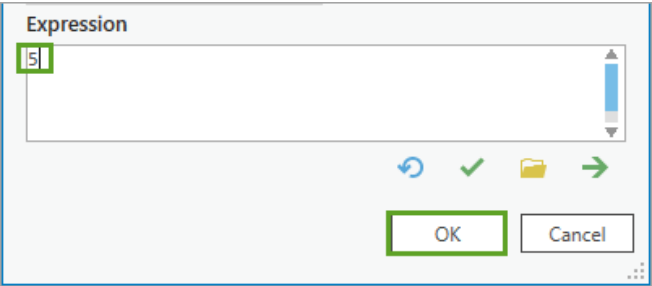
6. Click **the Extrusion Expression** button to open the **Expression Builder** window.

7. In the **Expression Builder** window, delete the current **[BLDGHEIGHT]** expression.
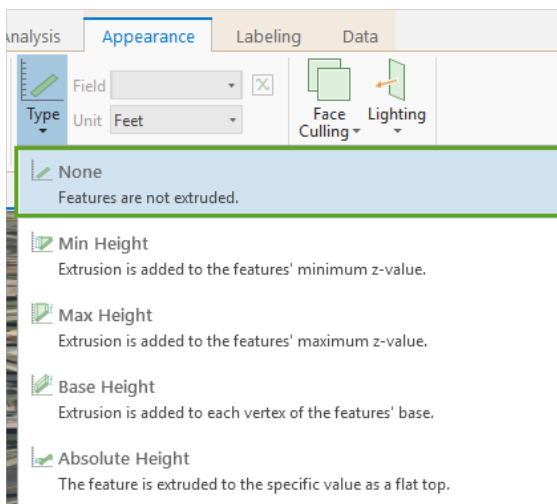
8. Type **5** and click **OK**.

The building footprints update showing an extrusion of 5 feet for all buildings.
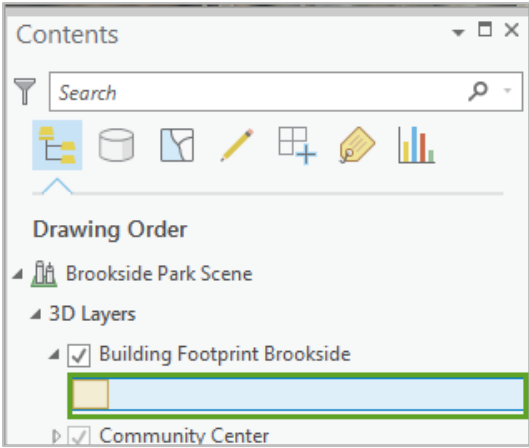
9. Click on the **Type** drop-down arrow and select **None** to remove extrusion in preparation for the
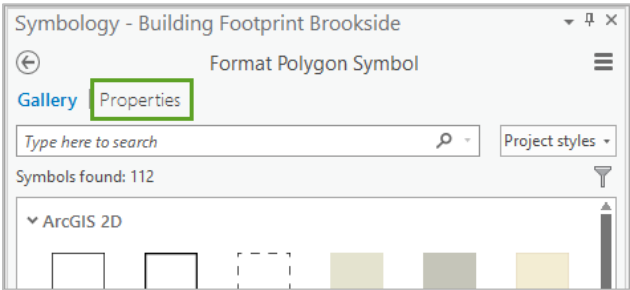   next step.

Symbolize the building footprints using procedural symbols

1. In the **Contents** pane, click the **Building Footprint Brookside** layer symbol icon to display
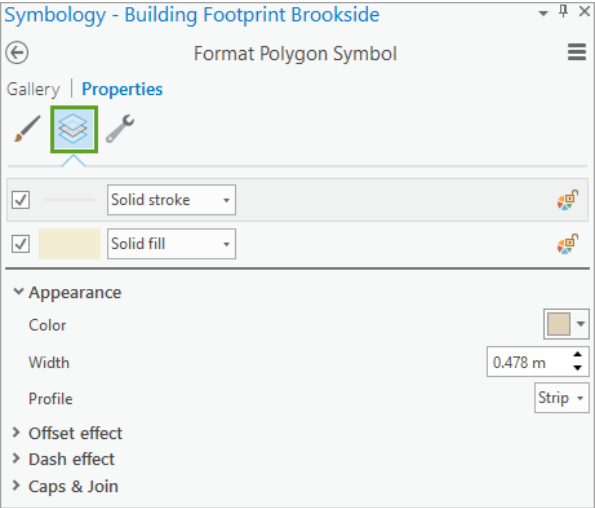   the **Symbology** pane.

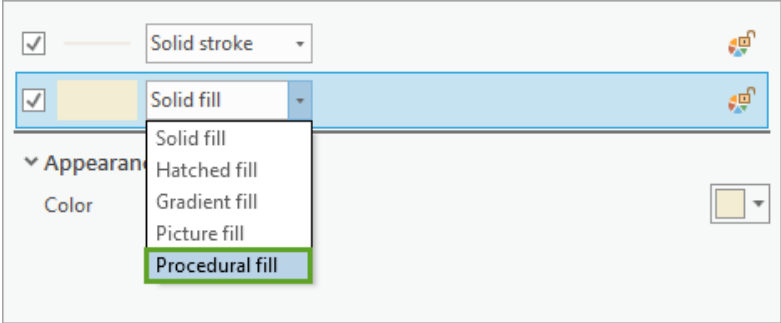2. In the **Format Polygon Symbol** pane, click the **Properties** tab.

3. In the **Properties** tab, click the **Layers** button.

4. Click the **Solid fill** drop-down menu and select **Procedural fill**.

5. Click the **Rule** button to open the **Select Rule Package** browser window.

6. Browse for **Create New Content > Files > RPK** and choose **Int_City_2014.rpk**.
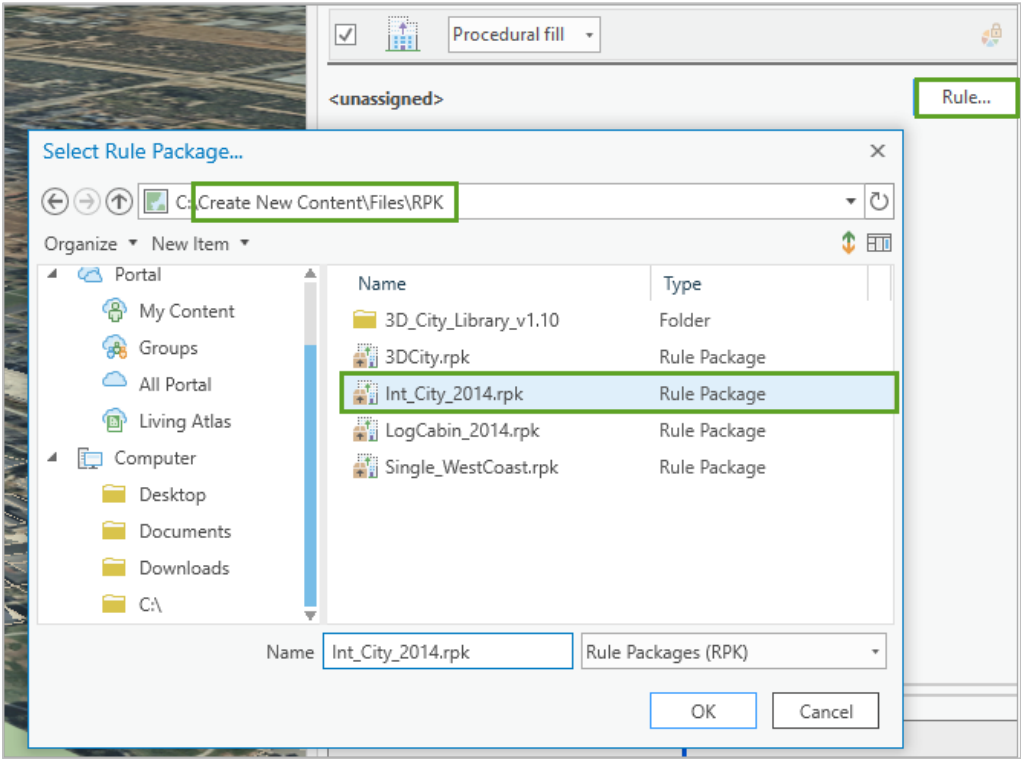
The **Int_City_2014** properties pane updates.
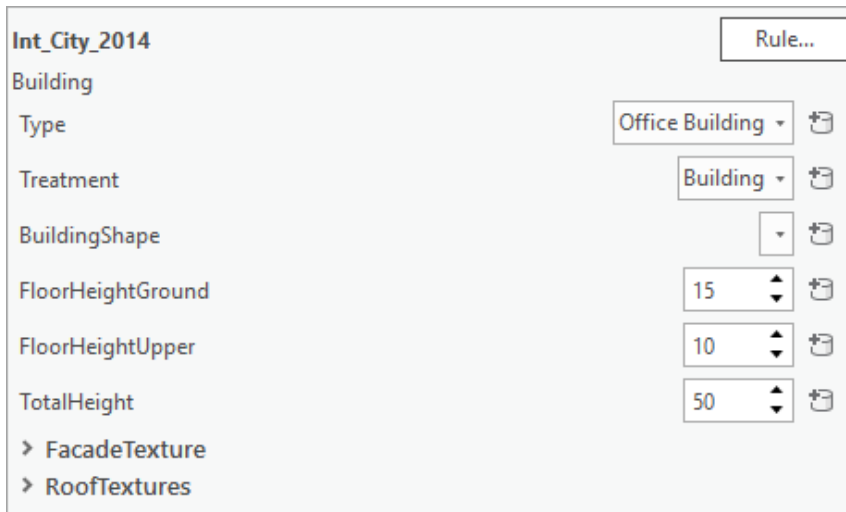
7. In the **Int_City_2014** properties pane, for **Type**, choose **Apartment Building**.

8. For **Building Shape**, choose **L-Shaped**.
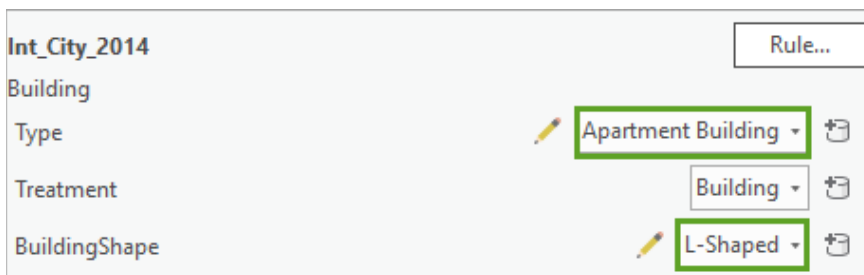
9. For **Total Height**, click the database icon to open the **Set Attribute Mapping** window.

10. From the drop-down menu, choose **BLDGHEIGHT.**

11. Click **OK**.
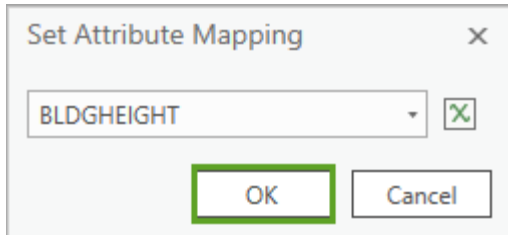
Note: The database icon will be highlighted in blue to indicate that a field is being used.

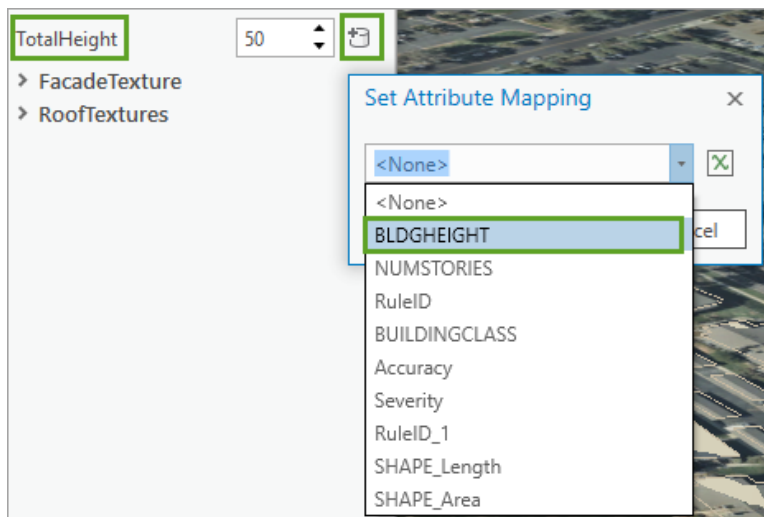12. In the **Symbology** pane, click **Apply** to implement the rule package updates to the building footprints.

The building footprints are now symbolized with models that have been derived from the rule package.

Experiment with the updated scene and observe how the rule package has applied different roof types and additional parameters to the building footprints. Feel free to update and modify additional rule package settings such as facade texture.
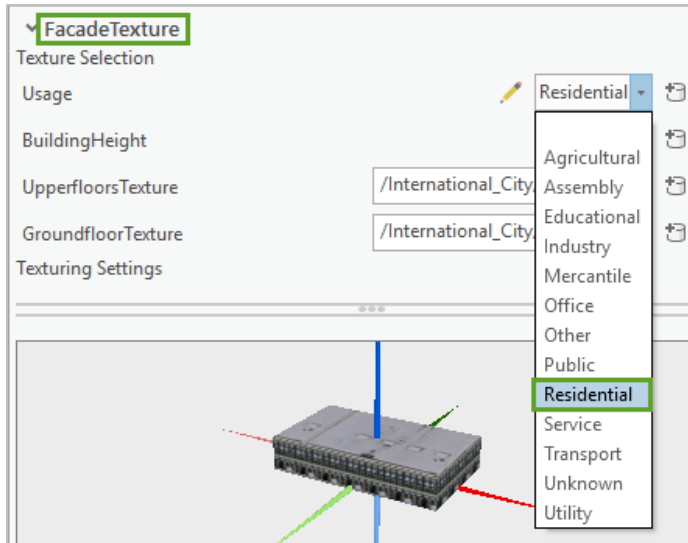
13. Save the project.

Add trees with preset configurations

1. On the **Map** tab, in the **Layer** group, click **Add Preset** and click **Realistic Trees**.
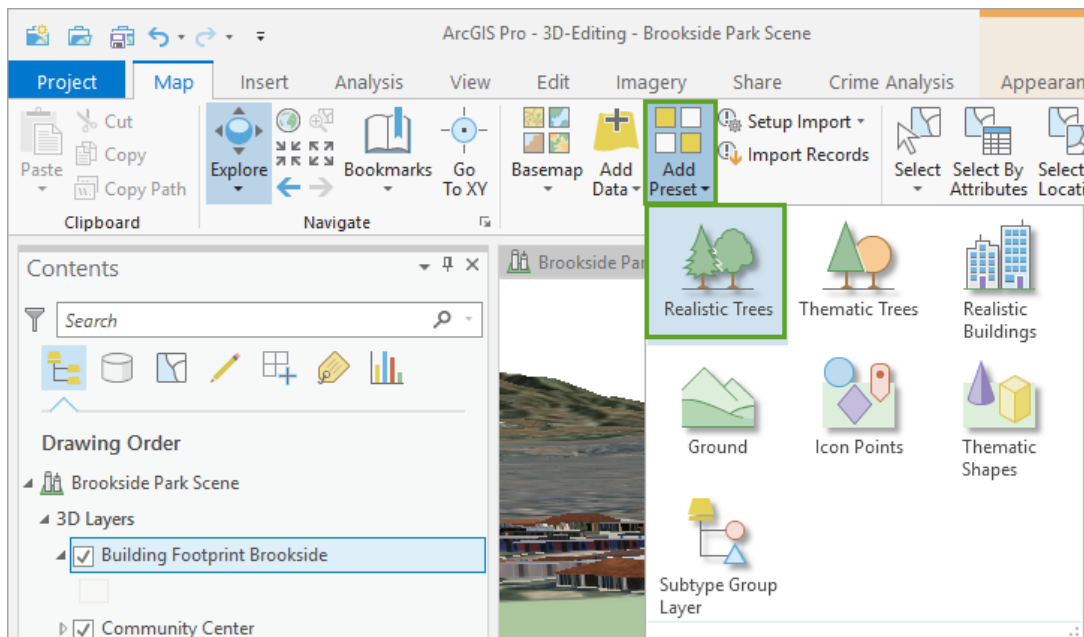
2. In the **Add Data** dialog box, browse for **Create New Content, Brookside Park, and Redlands.gdb > Data** and select the **TreesA** point feature class.
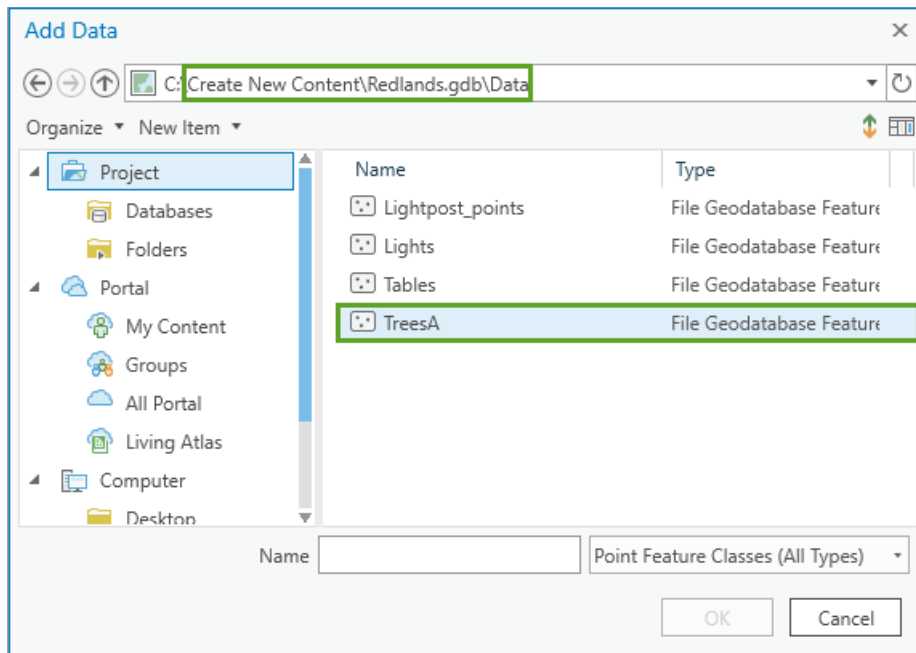
3. Click **OK**.

The scene updates to display trees within the footprint of Brookside Park. However, the trees appear to be giant trees as the unit for their height is incorrectly set to meters. Let's make some corrections to symbology to render the trees more realistically.

4. In the **Symbology** pane for the **TreesA** layer, set the **Unit** to **Feet.**

The tree height is derived from an attribute named Crown Height and the values in the attribute field are in feet, but the default symbol unit is meters. You corrected this and the scene updates to display realistic 3D trees that now render with the correct height for each tree.
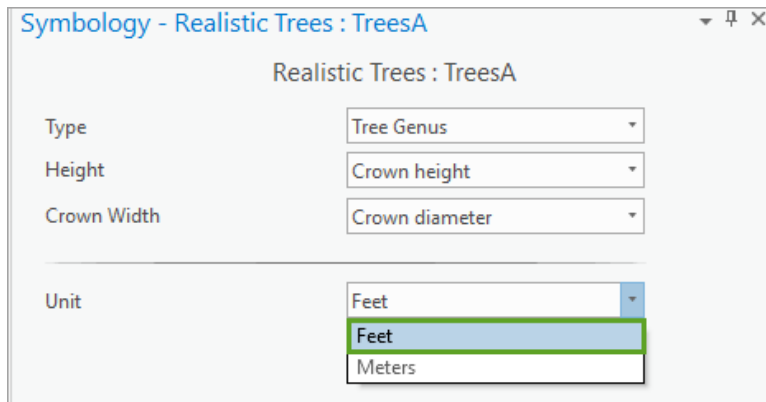

Set constant elevation

A constant elevation plane is a level surface that can be used as a reference for the determination of the elevation of geographic features such as buildings and trees. In other words, it's a baseline from which you can visually determine if a feature is elevated above or below the elevation of the constant plane. It is also useful in 3D editing as it serves as a constant for the defining the z-value of a feature.

1. In the Brookside Park scene status bar located in the lower left of the scene, click the **Dynamic Constraints** button to enable this function.
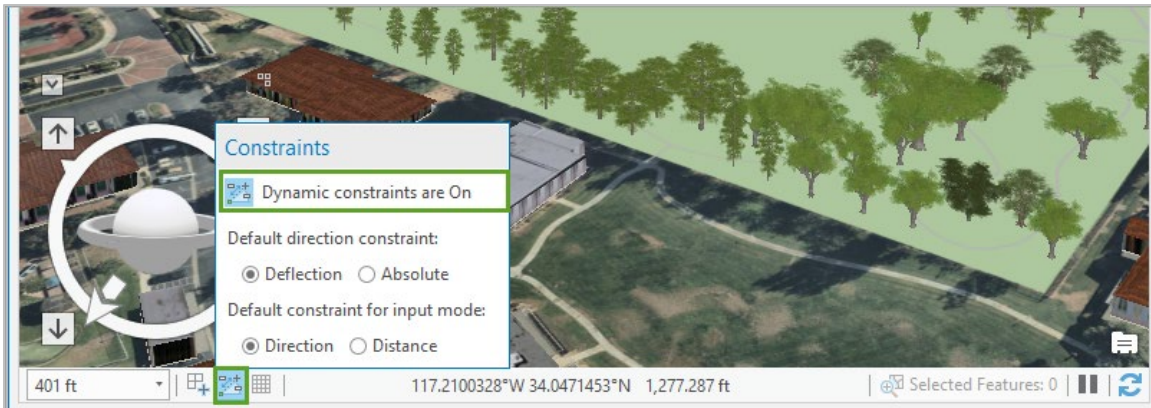
2. On the **Map** tab, in the **Navigate** group, click **Bookmarks** and choose **Community Center South View**.

3. Using the Navigator, explore the community center building and surrounding area.

4. Click the **Building Slab** bookmark to display the community center building slab from above.
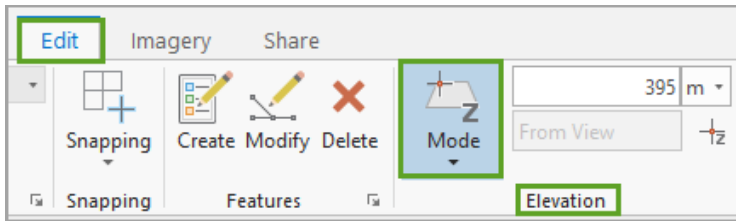

You need to determine the elevation of the building slab to generate a constant elevation plane at the same height as the slab.
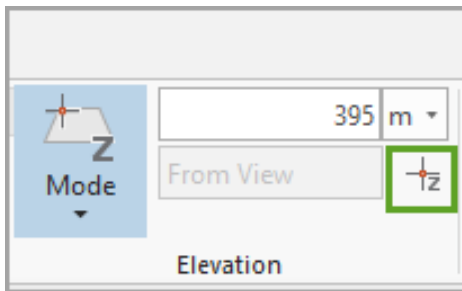
5. On the **Edit** tab, in the **Elevation** group, click the **Mode** button to enable a constant Z mode.
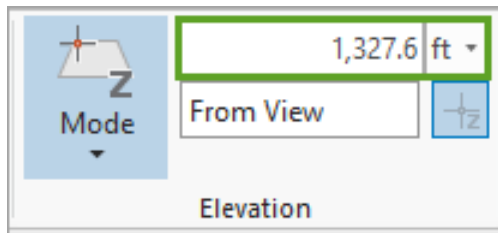
6. In the **Elevation** group, click the **Get Z from View** button.

7. In the scene, click the **Building Slab** polygon with the active **Get Z from View** button.

The elevation derived from the slab polygon should be 1,327.6 feet. (Your elevation could vary.)

8. Next, change the elevation units to **meters (m)**.
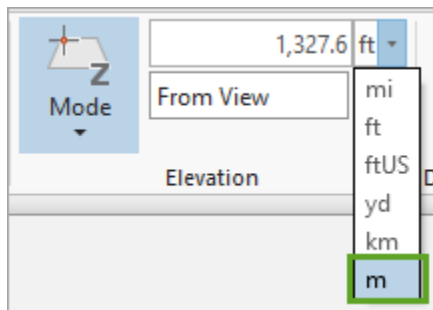
The units in meters updates to 404.65 m. For our purposes, we need a constant plane generated at 395 meters.

9. In the elevation dialog box, update the value to the exact value of **395,** then press **Enter**.

The scene updates and now displays a constant elevation plane at an elevation of 395 meters. This is essentially a level surface taken as reference for the determination of elevations of other geographic features such as buildings and trees.
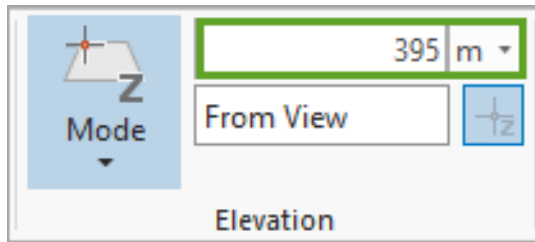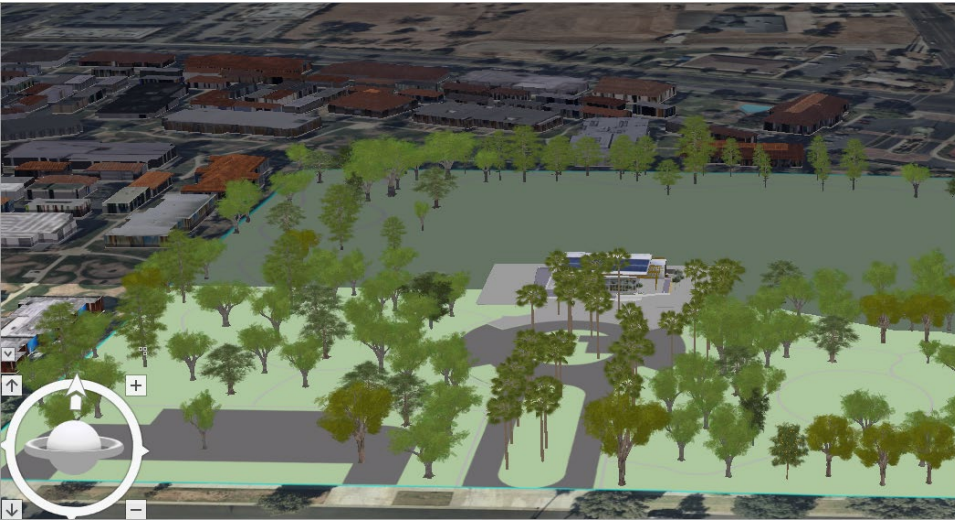
The constant elevation plane displays in the scene as a transparent medium gray overlay.

Notice how the constant plane extends north of the building slab, meaning that these areas are at 395 meters, or lower than 395 meters, and that areas south of the slab are higher than 395 meters, as they are not covered by the plane.

10. Using the explore tool, zoom out and tilt the scene to get a better perspective of the extent of the area covered by the constant elevation plane.

Working with the 3D grid

Before editing and creating new 3D features, it is useful to generate a 3D grid that will serve as a reference and guide for the new or updated features. Next, you will setup a 3D grid.

1. Click the **Building Slab** bookmark to display the community center building slab from above.
2. In the **Brookside Park** scene status bar located in the lower left of the scene, click the **Grid** button to enable this function.
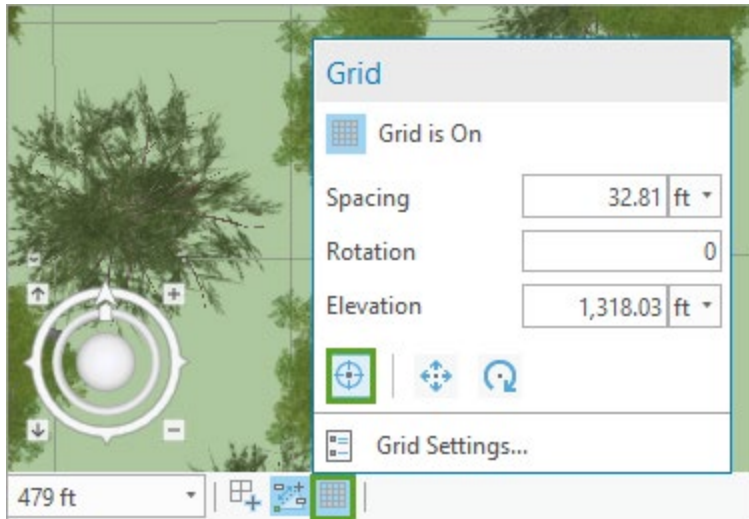
Note, a display 3D grid will show up in the scene.

3. Hold the mouse pointer over the grid button to display the **Grid** properties pane.

4. In the **Grid** properties pane, click the **Set Origin and Rotation** button.

5. For **Origin**, snap to and click on the lower left corner of the **Building Slab** polygon feature.
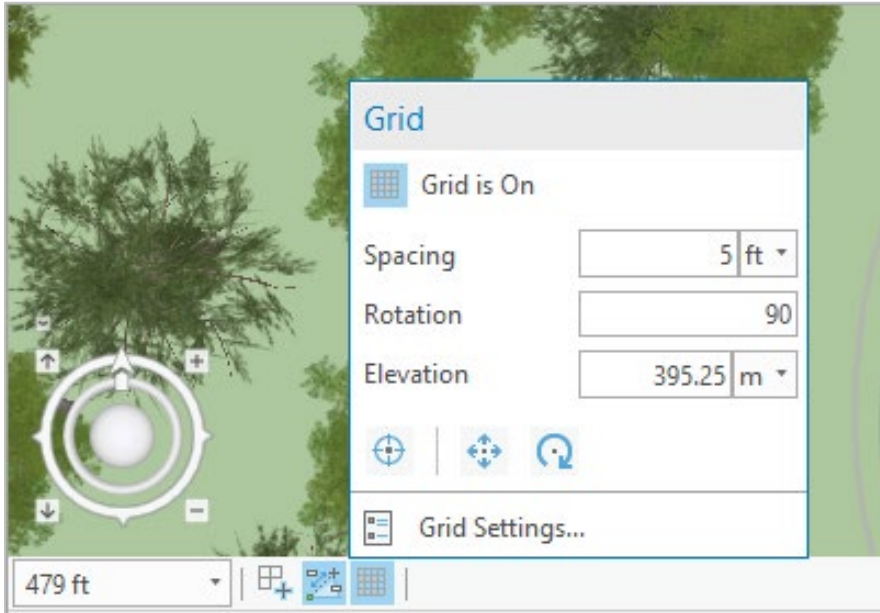

6. Once again, hold the mouse pointer over the grid button to display the **Grid** properties pane.

7. In the **Grid** properties pane, update:

- **Elevation** to **395.25** meters.

- **Rotation** to **90** degrees.

- **Spacing** to **5** ft**.**

Now your editing grid should be aligned to the **Building Slab** polygon feature.


8. Save the project.

Draw an additional concrete step for the building slab

In the following steps, you will create and design a rectangular concrete step north of the slab to provide an additional step down to a lower grass area. Remember, you have set a constant elevation value of 395 meters. As a result, your newly constructed slab will be constructed at this elevation.

1. If necessary, click the **Building Slab** bookmark to display the community center building slab from above.

2. On the **Edit** tab, in the **Features** group, click **Create** to activate the **Create Features** pane.

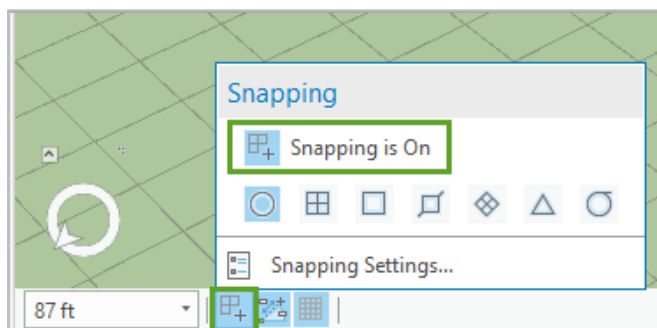3. In the **Create Features** pane, expand the **Building Slab** feature template.
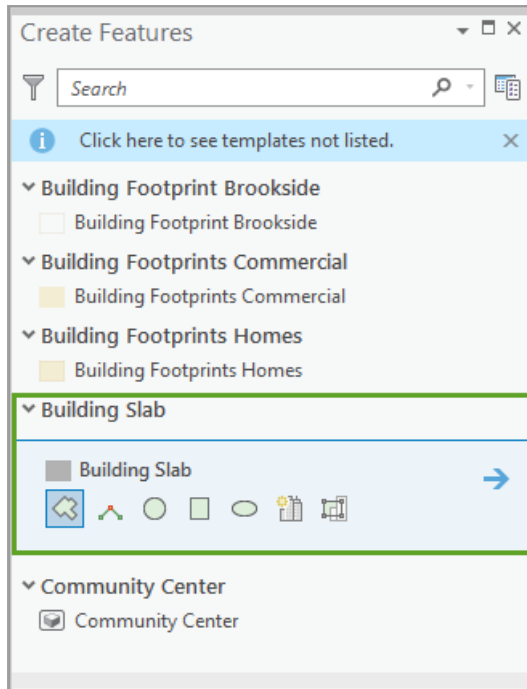
4. If the polygon construction tool is not active by default, click it to activate it.

5. In the Brookside Park scene status bar in the lower left of the scene, click the snapping button to turn on snapping.

6. Hold the mouse pointer over the snapping button to display the **Snapping** properties pane.

In the **Snapping** properties pane, notice how you can modify the type of snapping from the default.
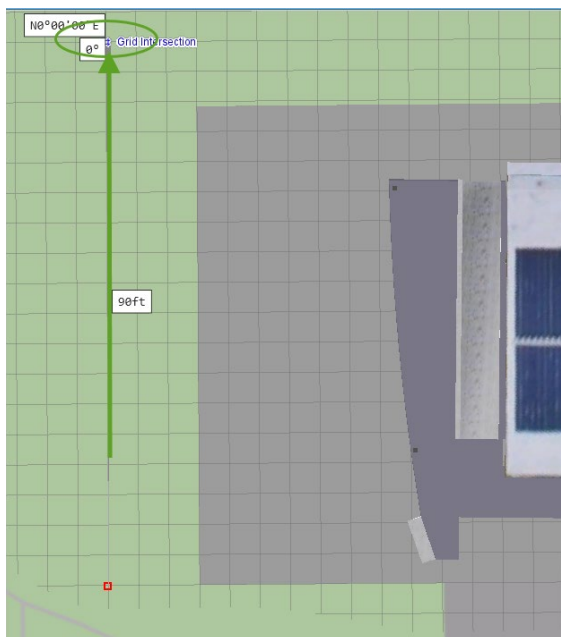
7. Ensure that you have point snapping selected.

Next, you will start feature construction.

8. For the start point, snap to a grid intersection to the lower left of the building slab with an offset and left-click to start the sketch.

9. Move the pointer north along the grid, parallel with the existing slab to create the first segment.
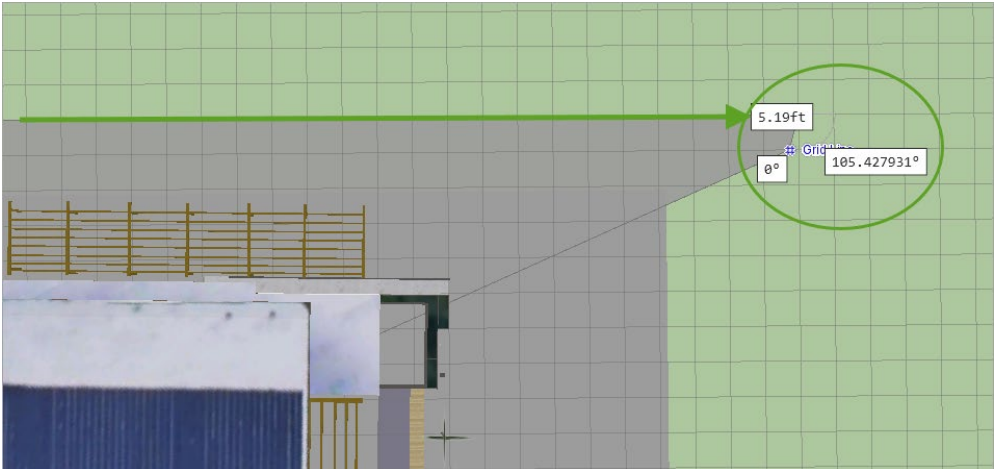

10. Make another left-click to add a vertex, offset from the existing corner.
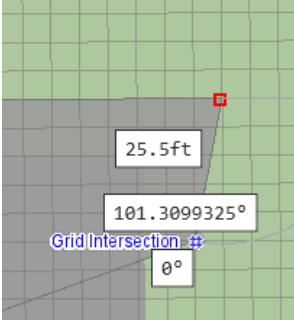
Your first line segment should be created.

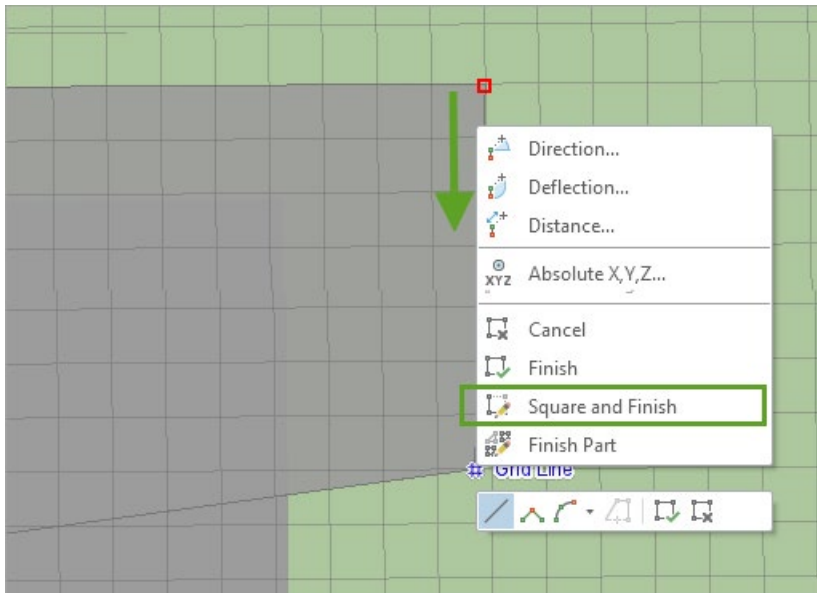11. For the second segment, move the pointer east along the grid, parallel with the existing slab.

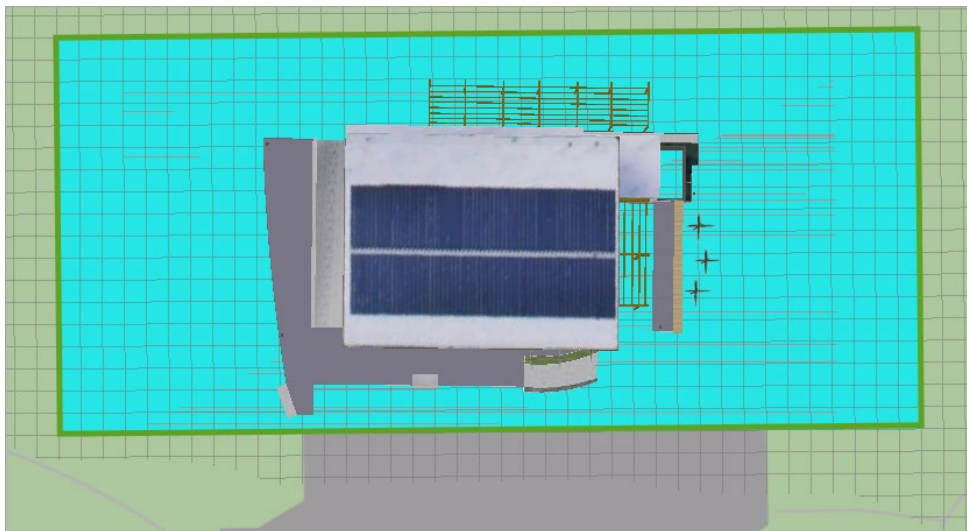12. Left-click to create the vertex offset from the existing structure.

The second line segment should be created.

13. For the remaining line segments, right-click to open the construction tool context menu.

14. Click **Square and Finish** to complete the polygon.

You should now have a new rectangular polygon feature that steps down to the grass area.

15. On the **Edit** tab, in the **Manage Edits** group, click **Save**.

16. Click **Yes** to commit your edits to the geodatabase.

17. On the **Edit** tab in the **Elevation** group, click the **Mode** button to disable the constant elevation mode.

18. Save the project.

Note: You can also repeat this entire section on feature creation, using dynamic constraints to enter the direction, offsets and distance, and so on for the polygon's line segments. By pressing **Tab** you will be able to move from each input box to the next one. This workflow is recommended for high-precision workflows in which accuracy and attention to detail is of importance.

Multipatch creation

To complete this last step for this lesson we need to open another map package to the existing project.
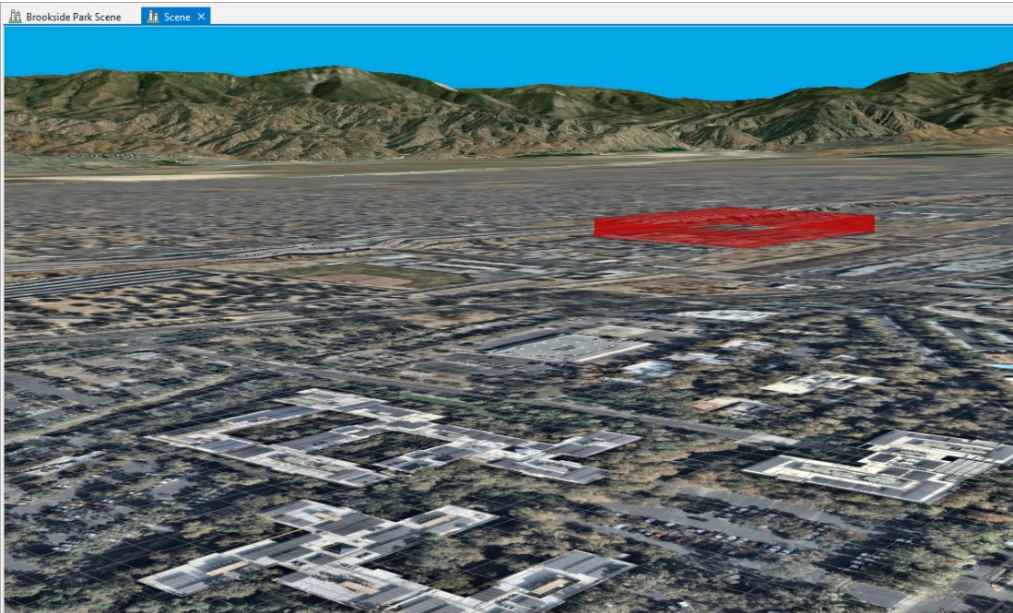
19. On the **Insert** tab, in the **Project** group, click **Import Map**.

20. Browse in the same **Create New Content** lesson folder directory for **ME2.mpkx** to import this scene.
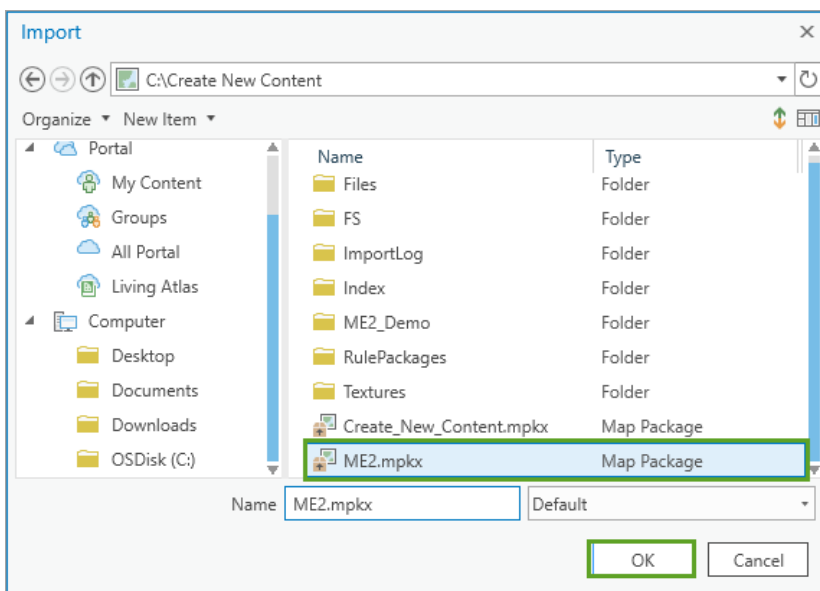
21. Click **OK**.

Creating multipatch features and texture editing

A new scene is added to the project and displays world imagery and several 3D layers.

22. In **Bookmarks** for the new scene, select **Second**.

The bookmark updates the extent to display a new retail development named the Packing House District.
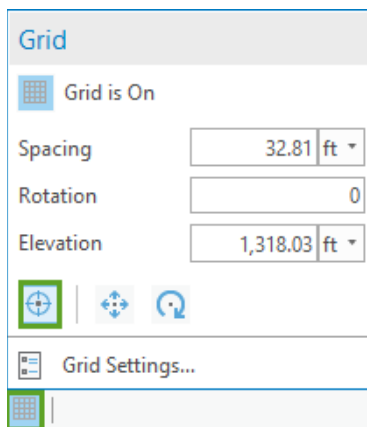
23. In the scene status bar in the lower left of the scene, click the **Grid** button to enable.

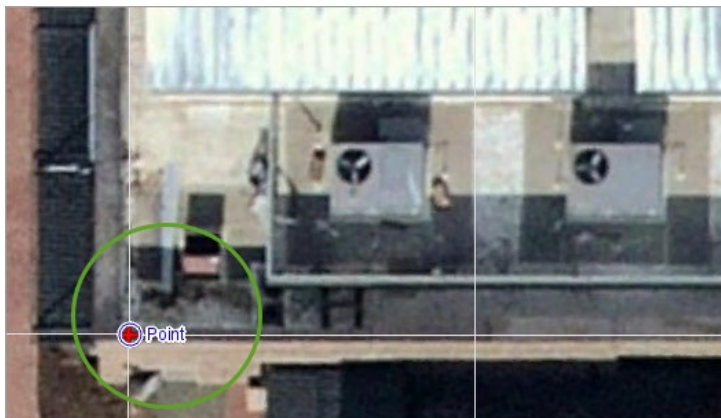24. In **Bookmarks** for the new scene, select **Four**.

25. Hold the mouse pointer over the **Grid** button to display the **Grid** properties pane.

26. In the **Grid** properties pane, click the **Set Origin and Rotation** button. (Your elevation may vary.)

27. For **Origin**, snap to and click the lower left corner of the building from the basemap imagery.

28. Hold the mouse pointer over the **Grid** button to display the **Grid** properties pane.

29. In the **Grid** properties pane, update:

- Elevation to **1,337 ft.**

- Rotation to **360** degrees.

- Spacing to **8** ft**.**

The editing grid should now be aligned to the basemap imagery building.

30. In the scene status bar in the lower left of the scene, click both the **Constraints** and **Snapping** buttons to enable them.

31. On the **Edit** tab, in the **Features** group, click **Create** to activate the **Create Features** pane.

32. In the **Create Features** pane, expand the **New_Building** feature template.
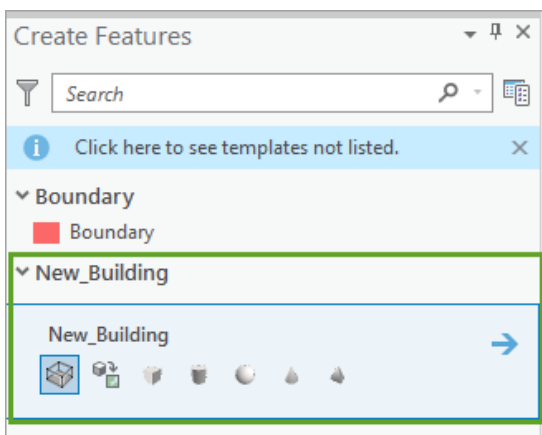
33. Click **the Create 3D geometry** sketch tool.

34. Construct the first vertex by snapping to the bottom left corner of the building.
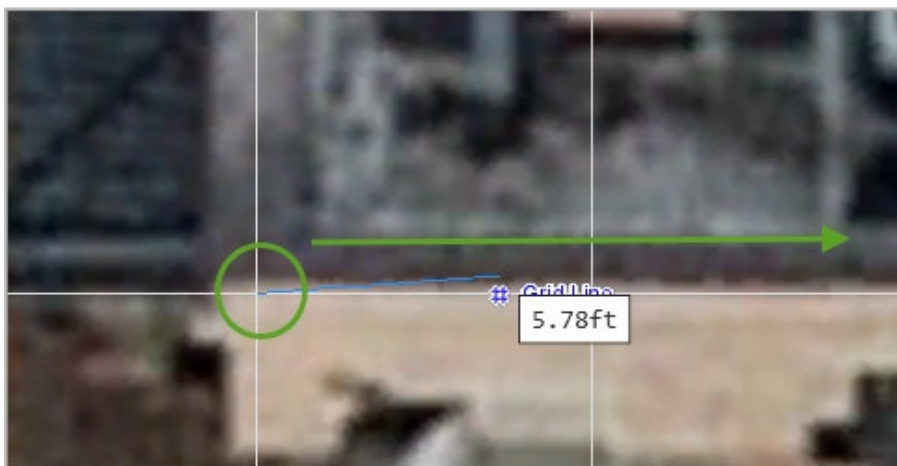
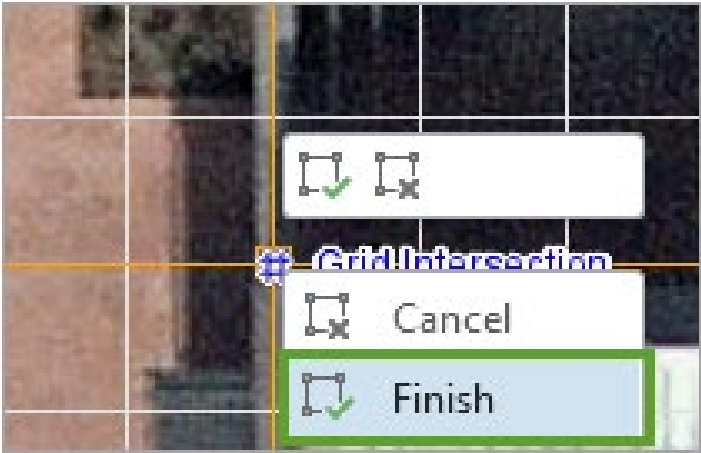35. Next, create a vertex at the right corner of the building.

36. Continue north and create a vertex at the upper right corner.

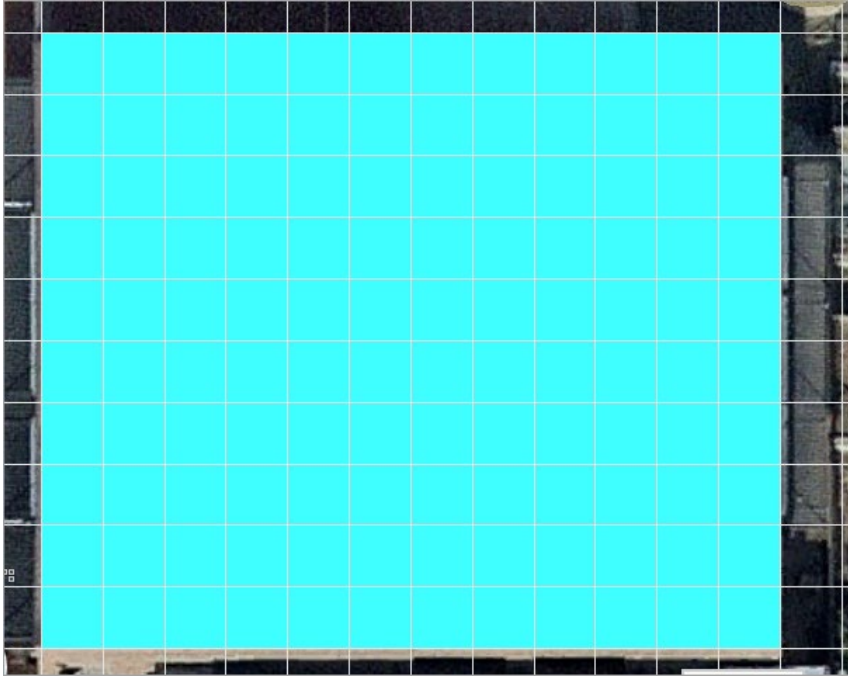37. Add a vertex at the upper left corner.

38. Right-click and select **Finish**.
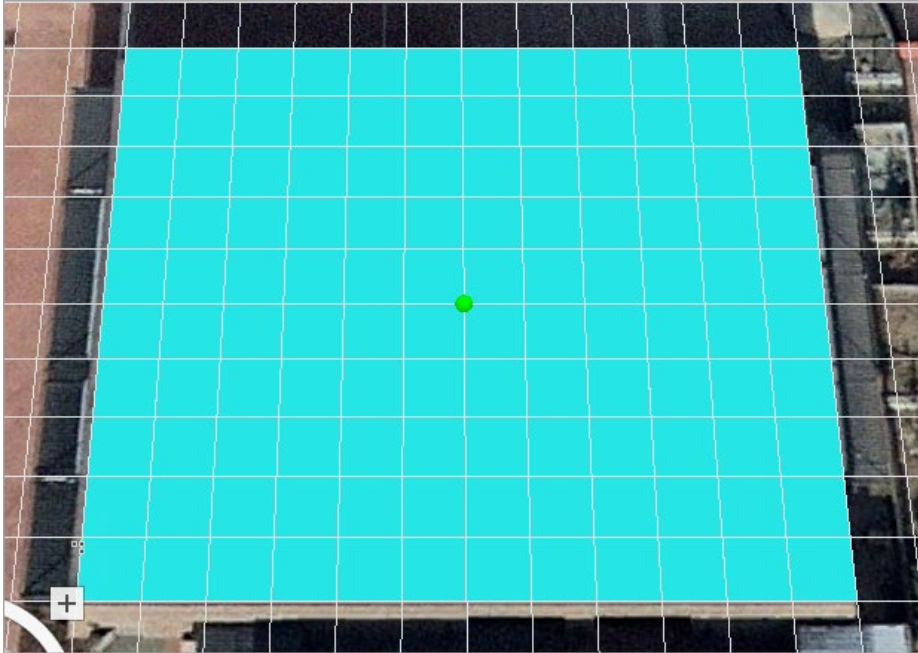

Your new building has been constructed.

39. Click the **Third** bookmark and zoom in to the newly created building.
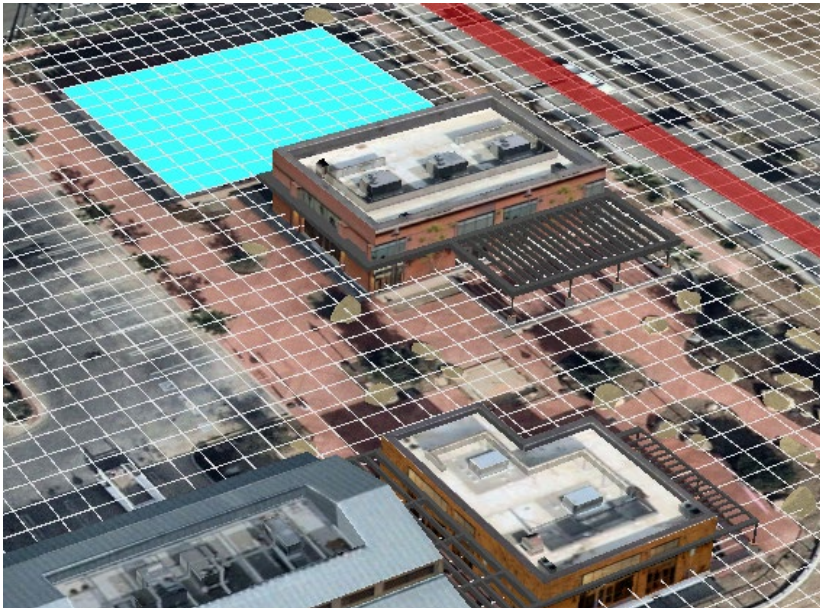
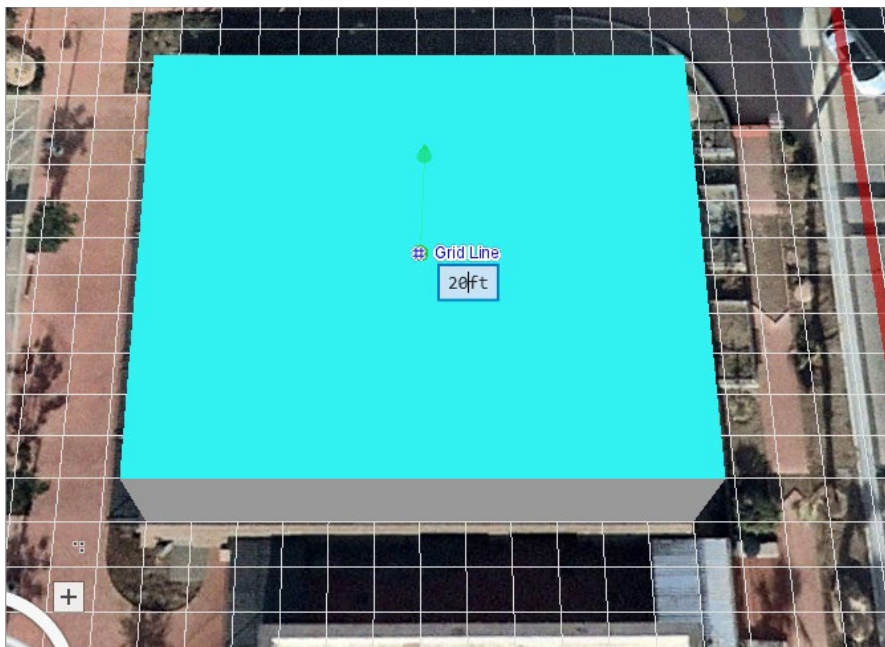40. Move the pointer to the middle of the newly created multipatch face.

A green sphere should display in the middle of the feature.

41. Place the pointer directly over the green sphere, which will turn red.

42. Left-click and hold on the red sphere to interactively pull the face and press **Tab**.
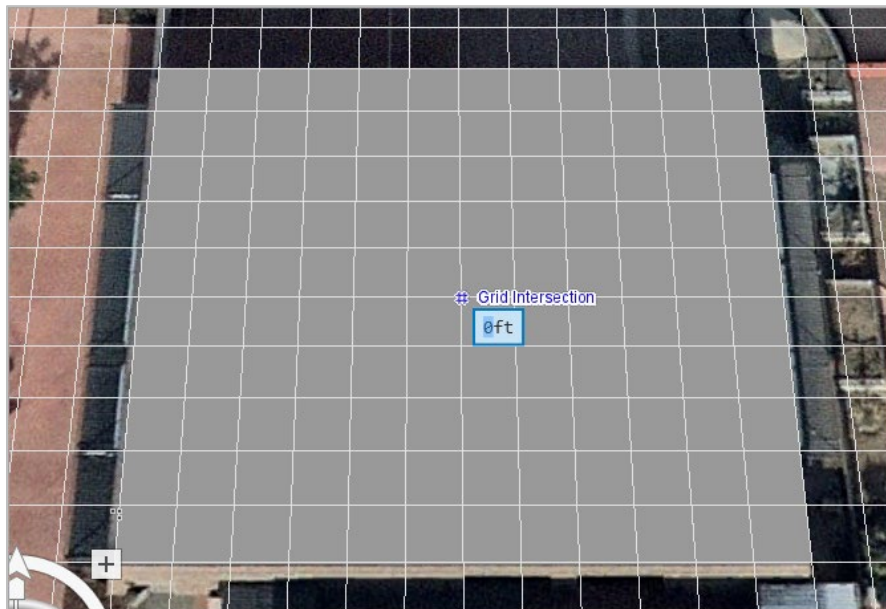
43. Type "20ft" and press **Enter** followed by the **Finish** button or press **F2**.

44. Turn off the **Grid and Snapping** from the status bar.

45. On the **Edit** tab > **Manage Edits** group, click **Save**.

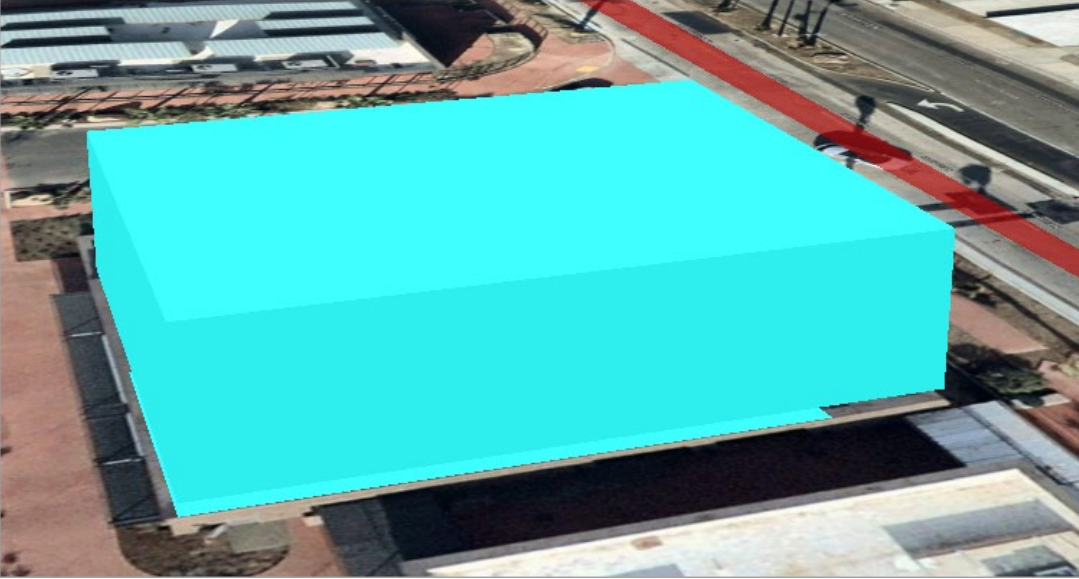46. Click **Yes** to commit your edits to the geodatabase.
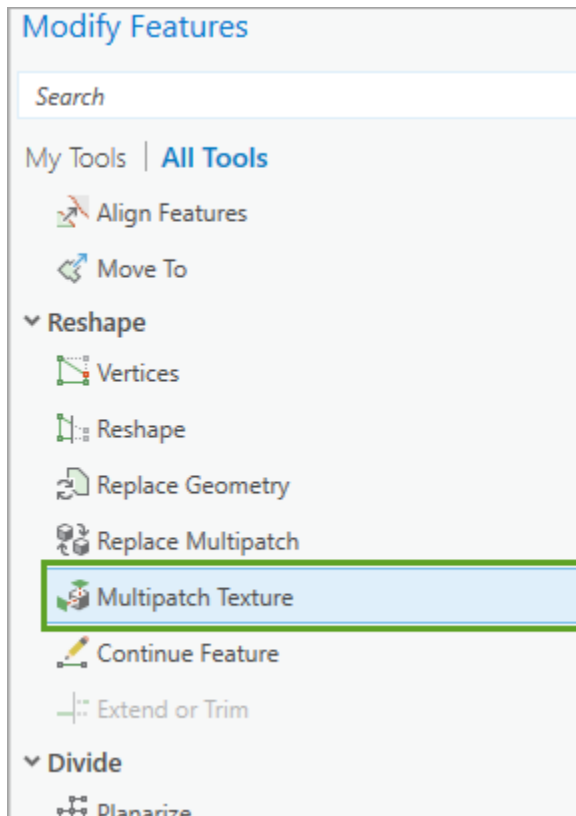

47. Save the project.

Texture editing

1. Make sure the newly created multipatch is still selected; if not, select the new multipatch.

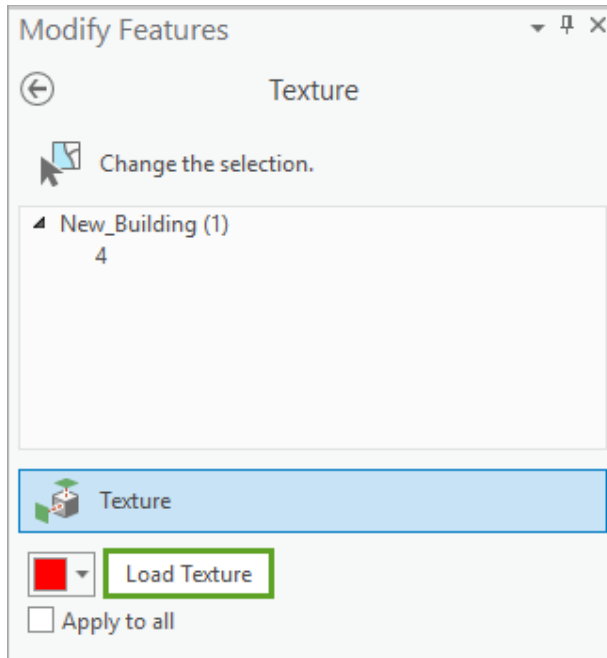# Creating multipatch features and texture editing

2. Click the **Modify** button under the **Edit** tab to open the **Modify Features** pane.
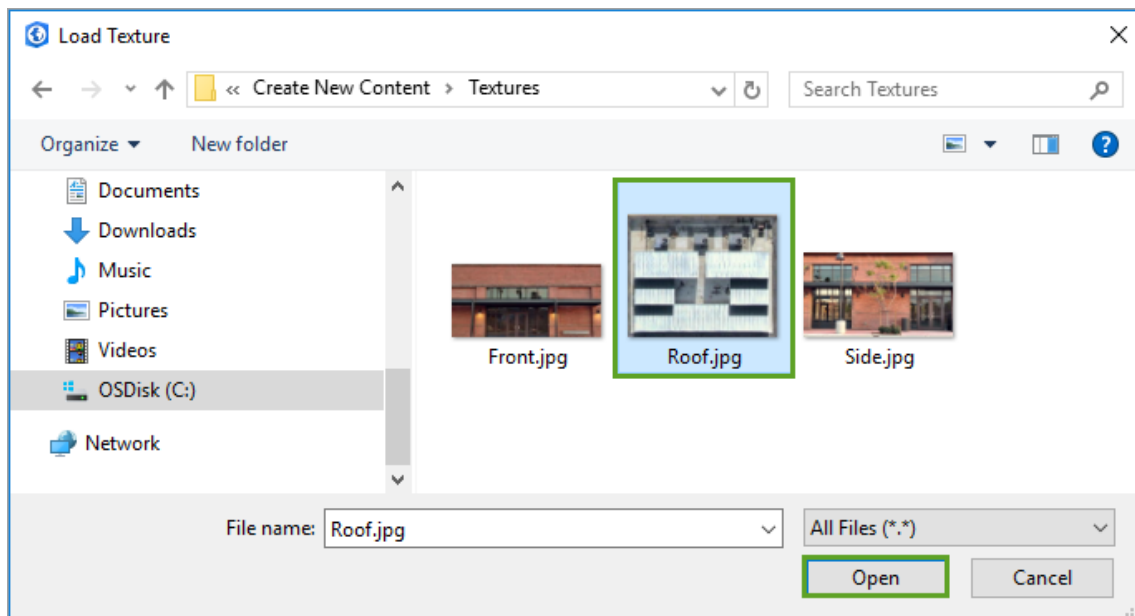
3. Select the **Multipatch Texture** tool.
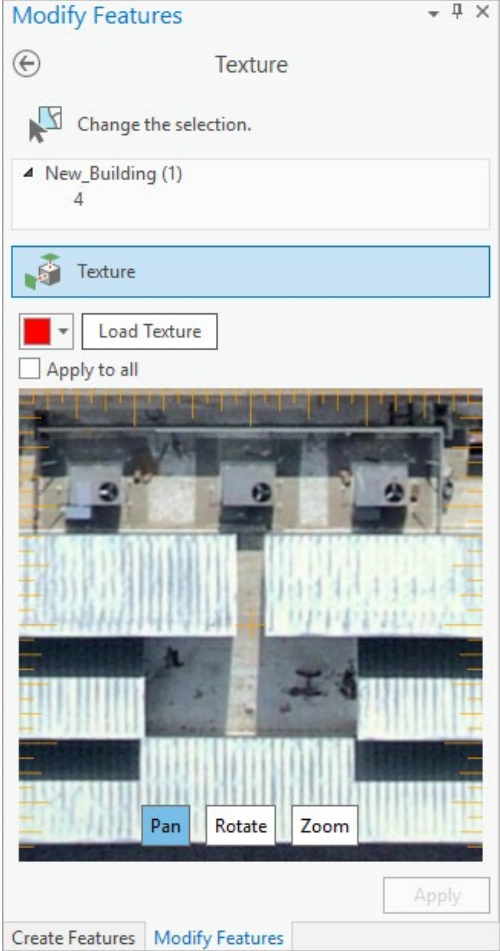

4. Click the **Load Texture** button.

5. Browse in the **Create New Content** lesson directory for a **Textures** folder.
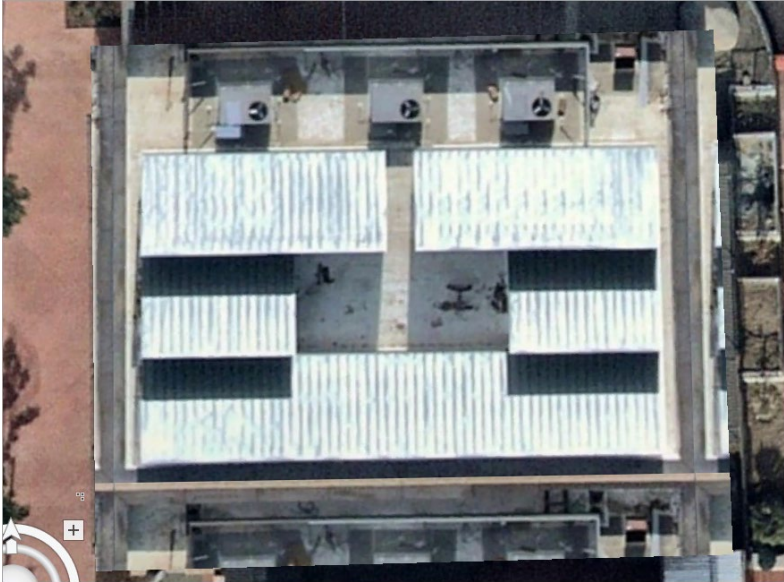
6. Select **Roof.jpg** and click **Open.**

Wait until the preview image appears on the bottom part of the tool.

7. Place the pointer on the roof face and left-click to place it on that face.

8. Once the image is placed on the face, move the pointer back to the preview on the **Modify Features** pane.

9. Move (pan), rotate or scale the preview as needed to fit it correctly on the roof of your new building.

Hint: You could also use the three interactive mouse functions. Left-click hold pans, middle-click hold rotates, and right-click hold zoom**.**

10. Add and place the other two textures to the sides by yourself.
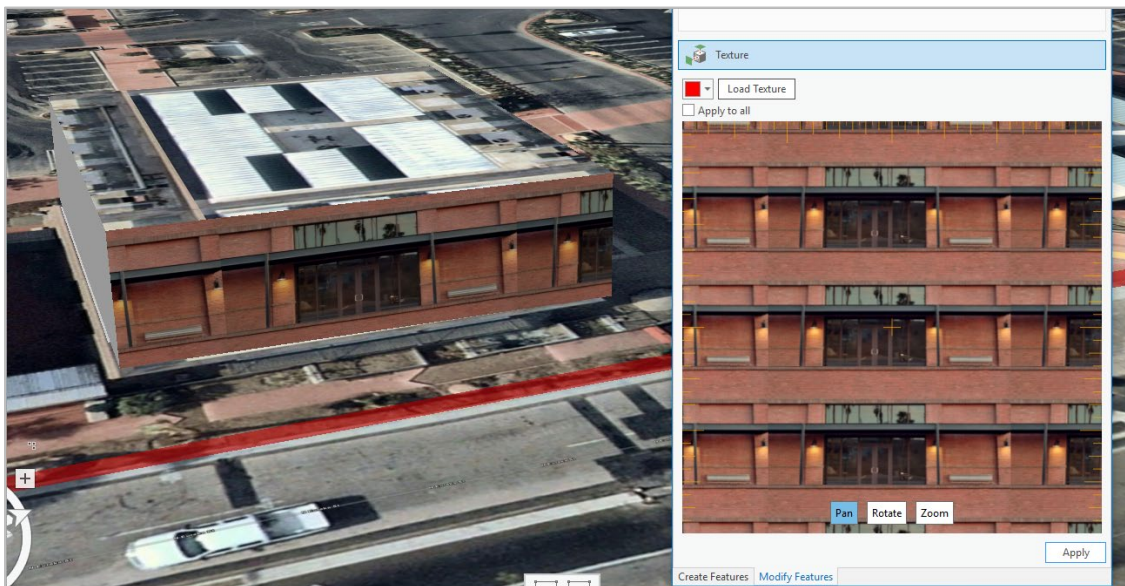
11. When finished, click **Apply** on the tool.

12. On the **Edit** tab > **Manage Edits** group, click **Save**.

13. Click **Yes** to commit your edits to the geodatabase.

14. In the **Scene Contents** pane**,** check the **Other_Buildings** layer.

This will display all the additional buildings that were constructed using the same process that you just learned.

15. Save your project and close ArcGIS Pro.

Summary

In this lesson, you created a realistic building using multipatch editing tools and textures. In the real world, you could encounter simple to complex building geometry and roof forms. The above workflow can be used for different building types and shapes, with little more than a building footprint, height information, and images for texturing.