AS323494

More than Digital Cardboard – Design Workflows from AutoCAD to FormIt to Revit

David Cohn
4D Technologies, LLC

Learning Objectives

- Learn how to connect AutoCAD, FormIt, and Revit for an optimal workflow
- Learn how to determine what to model and what not to model in FormIt
- Learn how to use the FormIt Converter add-in for Revit
- Learn how to move Revit projects into VR using Revit Live

Description

In the real world, one program just can't do it all. This class will discuss the workflow for using multiple Autodesk products in a production environment. Discover how to start with a pencil sketch or AutoCAD drawing, develop a massing model using FormIt, and then move that model to Revit software to finalize the design and develop construction documents. We'll also discuss other tools you can then use to create renderings and animations, and even move your model into virtual reality (VR) using Revit Live.

Speaker(s)

David is the Senior Content Manager for CADLearning® products at 4D Technologies, where he develops content standards and creates microlearning that is immediately actionable and leads to better knowledge retention for Autodesk AutoCAD, AutoCAD LT, and ReCap users. He has more than 35 years of hands-on experience with AutoCAD and 20 years with Revit as a user, developer, author and consultant, and is an Autodesk Certified Professional for both AutoCAD and Revit. A contributing editor to Digital Engineering magazine, he is also the former senior editor of CADalyst magazine, and he is the author of more than a dozen books about AutoCAD. A licensed architect, David was also one of the earliest AutoCAD third-party software developers, creating numerous AutoCAD add-on programs. As an industry consultant, David has worked with many companies, including Autodesk. He has taught college-level AutoCAD courses and has consistently been a top-rated speaker at Autodesk University.

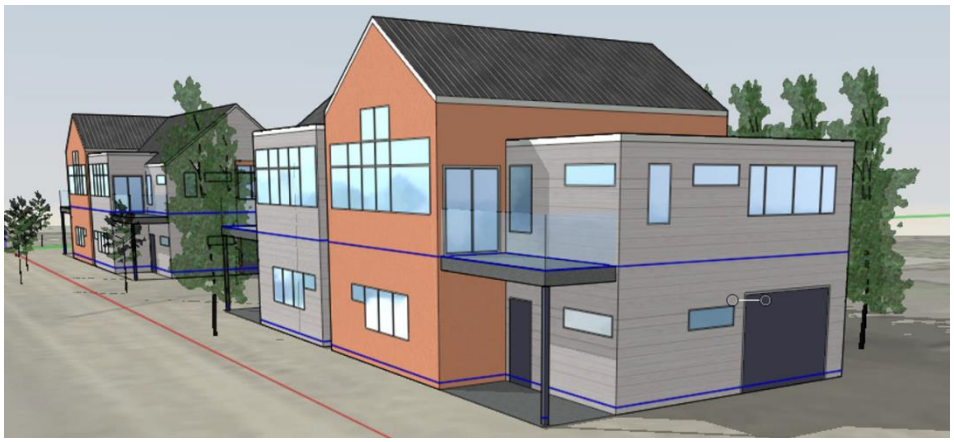
Introduction

As an architect or designer, Autodesk's software allows you to develop, design, and visualize your ideas. Most of the time, this process involves a talented team of individuals who must work together to complete a design and present it to the client. The design software that each team member uses can determine whether this process is seamless, or full of errors. Autodesk's products are meant to work together, so that transitioning from one step in the project to the next is easy.

The example for this class is a townhouse project—a pair of identical two-story duplexes. We will use three Autodesk products—AutoCAD, FormIt, and Revit—to take this project from a pencil sketch to a massing study to a finished design in Revit.

FormIt for Concept Design

Autodesk FormIt is a conceptual design tool that helps users capture building design concepts when ideas occur, anytime, anywhere.



It is available as:

- A Windows program
- A web app you can run in a browser
- An app you can install on an iPad (the Android version is no longer available).

Advantages of Starting Designs in FormIt

There are several advantages to starting a design using Autodesk FormIt:

- Create designs in a portable, digital format
- Incorporate real-world site information (satellite images) to orient your designs
- Use real building and environmental data to support design brainstorming
- Move your preliminary designs to centralized data storage for easy access
- Use both 2D and 3D geometry creation tools—sketch in 2D and/or place 3D primitives
- Modify faces with easy push and pull techniques, various transform tools, and Boolean operations
- Refine the design using Revit

Use Actual Location Data

You can set the location of your project to correspond with its actual position anywhere in the world. Setting the location is very important for the accuracy of downstream analysis. It also allows you to import a scaled satellite image for use as a background reference. Use the Location tool in FormIt to set the location and capture a satellite image.

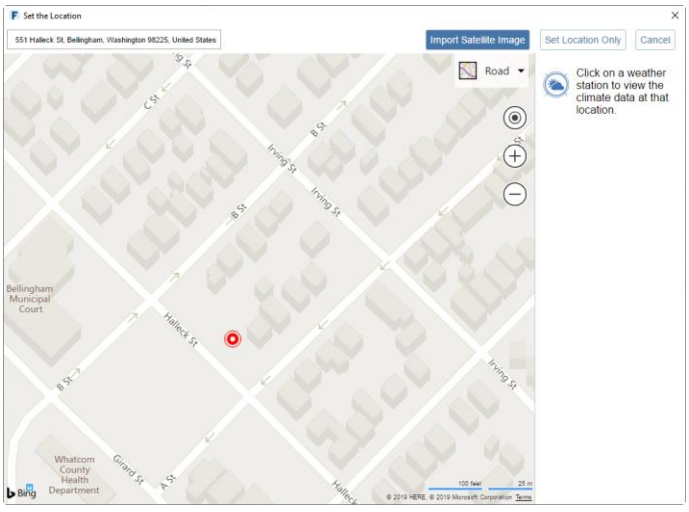
To set the project location:

1. Make sure that the **Properties Palette** is visible.
2. In the **Action Bar**, click **Location**.

   The program displays the **Specify the location** dialog. Initially, you see a map of the entire world. Use the map to browse for a location. You can use tools in the map window or the buttons and roller-wheel on the mouse to pan and zoom.
3. In the search field, start typing the site address (such as “551 Halleck Street, Bellingham, WA”). Then, do one of the following:

   - As you type, you can see possible locations that match your search. When you see the exact location you are looking for, select it.
   - Type the entire address, and then press **ENTER**.

   The map quickly zooms to that address, and you see a red pin marking that location.



4. You can optionally move the red pin to another location on the map. For this exercise, zoom in, and then click and drag the red pin and locate it in the middle of the property.

	Earlier versions of FormIt used Google Maps for its map and satellite data. Autodesk has now switched to using Bing for its map data. As a result, some of the additional functionality—such as the ability to toggle terrain data and to see a street view—is no longer available. Because this particular townhome project was completed several years ago, the latest map images now include the finished townhomes. For demonstration purposes, the class presentation includes a video showing the location being set using an older version of FormIt. That video was captured when FormIt still utilized Google Maps.

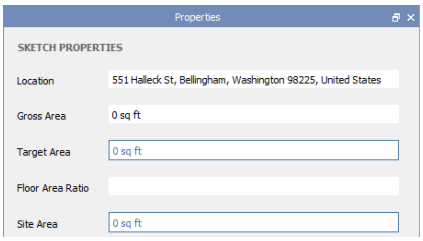
You can use tools in the map window to switch between a standard road map and a detailed aerial view. When displayed as an aerial view, you can toggle labels on and off.

After locating the project, you can view historical climate data for any nearby weather station. For example, after searching for the address, you also see several weather stations. When you click a weather station, a dialog opens that displays temperature graphs. You can switch to a wind rose graph by selecting the desired graph on the right.

At this point, you can optionally import a satellite image and add it to the project for reference, model scale, and true north. But you can also easily add a satellite image later.

5. In this case, simply click **Set Location Only**.

   The dialog closes, and you once again see the design area. In the Properties palette, note that the **Location** has been filled in with the actual location of the project.



Working with Satellite Images

You can include a satellite image for use as a background reference. That image can be added when you initially locate the project, or after the location has been established. Since we did not import the satellite image when we initially located the project, we will import it now.

To import the satellite image:

1. In the **Action Bar**, click **Location**.

   Since the location has already been established for this project, you see a red pin on the map indicating the location. If you had not yet set the location, you would need to do so before importing the satellite image.

2. Click **Import Satellite Image**.

   You immediately see a satellite image of the site. Use the roller-wheel on the mouse and/or the tools in the map window to zoom out and pan until you see the entire site, as well as some of the surrounding streets and property.

3. Once you are satisfied, click **Finish Importing**.

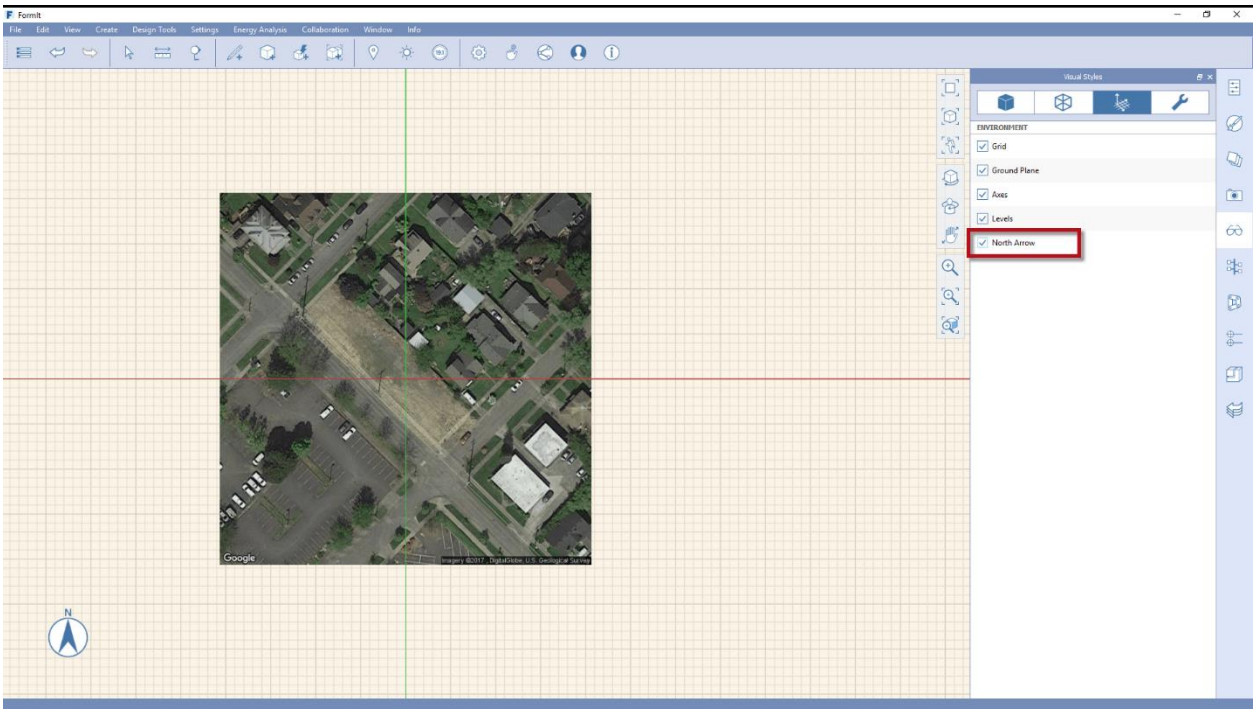
   The satellite image is immediately imported to scale, with True North facing up.

Toggling the North Arrow

You can toggle on the North Arrow so that you can see an interactive indicator of true north.

To toggle the North Arrow:

1. In the **Palette**, switch to the **Visual Styles** tab.
2. Select the **Environment** panel.
3. Select the **North Arrow** checkbox.



☞ **Tip:** You can also toggle the North Arrow by using the keyboard shortcut **D N**.

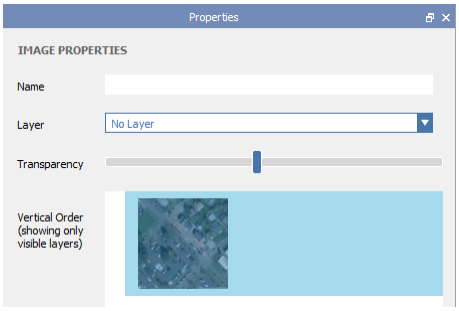
Zoom out so you can see the entire satellite image and then orbit within the 3D view. Notice that as you change the orientation, the North Arrow continues to point to true north.

Adjusting the Transparency of the Satellite Image

You can adjust the transparency of the satellite image so that the objects you model are prominently displayed.

To adjust the transparency:

1. Double-click the satellite image.
2. In the Palette, switch to the **Properties** tab.
3. Adjust the **Transparency** slider to lower the transparency to approximately 50 percent.



☞ **Tip:** You can also assign a name. In the desktop app, the Name field is blank. In the browser version, the name “Satellite” would already be assigned. If layers have already been established, you could also set the layer for the satellite image.

Adjusting the World Axes

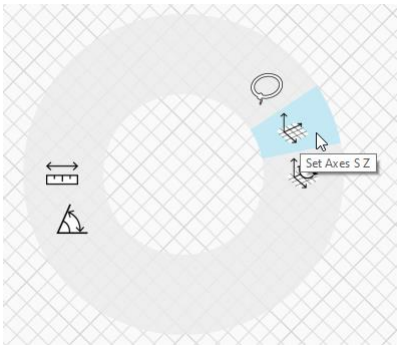
The default grid can be modified by changing the world axes.

When you first begin a sketch, the World Axes are displayed as three lines—red, green, and blue—corresponding to the X-, Y-, and Z-axes, respectively. Even after you set the location for your project, the Y-axis initially aligns with true north. Since you will likely create sketches that align with the grid, this may not be the most convenient orientation. You can easily rotate the grid, however, so that it aligns with your model.

Although you can rotate the world axes while working in either a top view or a 3D view, it is often easiest to do this in a top view.

To adjust the world axes:

1. In the **Navigation** toolbar, click **Top View** and select **Top View**.
2. Zoom out so that you can see the entire satellite image.
3. Right-click anywhere on the ground plane to display a context menu, and then click **Set axes**.



4. Locate the origin of the axes in a corner of the site as displayed in the satellite image.
5. Click and drag the dot at the end of either the X- or Y-axis to rotate the axes until they align with the edge of the property along the street.

   ☞ **Tip:** You can repeat these steps to fine-tune the alignment. If necessary, on the **Action Bar**, click **Settings** to display the **Settings** panel and toggle off **Snap to Grid**.
6. When you are finished adjusting the axes, click away from the axes to complete the command.

Note that when working in a top view, the project continues to display with true north pointing to the top of the screen. But now that the axes have been aligned parallel with the property line, the grid also has that same orientation, making it much easier to model objects that are parallel to the property line.

In the **Navigation** toolbar, click **3D View** to switch back to a 3D view, and zoom out so that you can see the entire site. If the axes are not visible, in the **Visual Styles** palette tab, on the **Environment** panel, select the **Axes** checkbox to toggle them back on again.

As you orbit, you can see that the axes are now aligned with the site, while the north arrow continues to point to true north.

Incorporating Sketches from Other Sources

Suppose you have already created some sketches of the floor plan. If those sketches were created using AutoCAD, you can import the DWG file, orient it in the proper location on the site, and then start sketching in FormIt, snapping geometry to the underlying AutoCAD objects.

To import an AutoCAD drawing:

1. On the **Action Bar**, expand the **Menu** and select **Import** > **Import 3D Model…**.

   The program displays a **Select file to import** dialog. When you expand the drop-down in the lower-right, you see a list of supported file formats. You can import FormIt .axm files, as well as files saved in the OBJ, SAT, STL, SketchUp SKP, and AutoCAD DWG file formats.

2. Choose **Autodesk DWG (*.dwg)**.

3. Select the file you want to import (such as **First_Floor_Plan.dwg**) and click **Open**.

   The program immediately imports the DWG file as a group and places it into the sketch. You can then rotate and relocate that object.

Suppose you had sketched the plans on a paper napkin, however. You could scan or photograph your sketch, save it as a raster image, and import the image file into FormIt. Then, it's again a simple matter to scale and orient the sketch over the site plan and begin sketching the outline of the building form.

To import an image:

1. On the **Action Bar**, expand the **Menu** and select **Import** > **Import Image…**.

   The program displays a **Select image to import** dialog. When you expand the drop-down in the lower-right, you see a list of supported file formats. You can import PNG and JPG files.

2. Choose **PNG image (*.png)**.

3. Select the file you want to import (such as **Halleck_1st_Floor_Plan.png**, and then click **Open**.

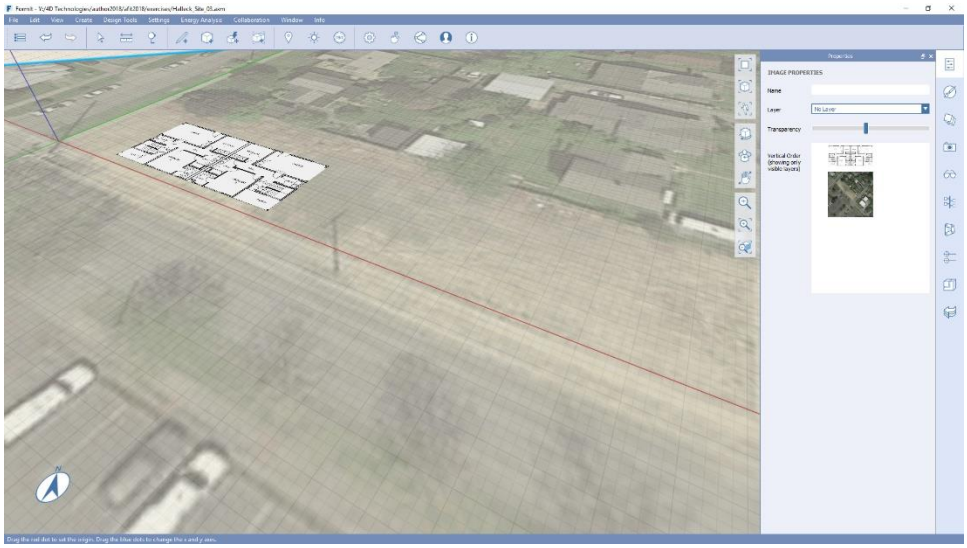
   The program immediately imports the image file and places it on the ground plane.

4. Right-click to display a context menu, choose **Scale**, and change the scale to **38%** (or you could scale the image visually).

5. Right-click to display a context menu, choose **Rotate**, relocate the protractor widget to a corner of the building, realign the widget with the other corner, and then rotate the image so that it is aligned parallel with the X-axis. Then, move the image toward the west end of the site.

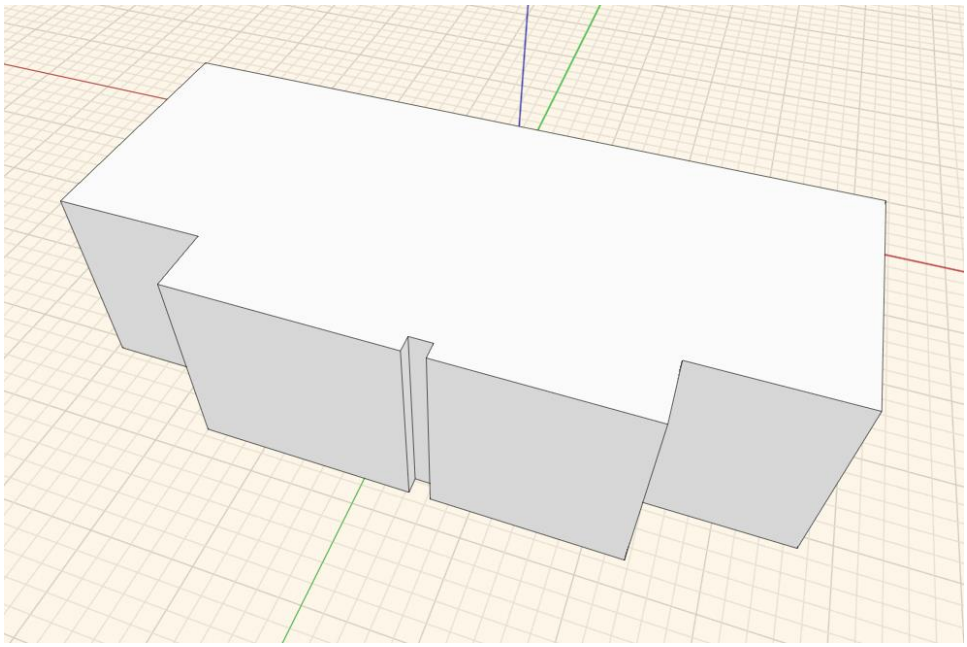
   In the **Properties** palette, you now see the properties of the floor plan image. Again, you can assign it a name and a layer, and adjust its transparency. Also note that in the area below the transparency slider, you can manage the vertical ordering of the images. Since the floor plan image was imported after attaching the satellite image, it appears above that image in the image ordering.

6. In the palette, click and drag the floor plan image and move it below the satellite image. Then, click in a blank spot in the drawing window to deselect the image. Now, the satellite image appears above the floor plan image.
7. In the drawing window, double-click to select the satellite image. Then, in the **Properties** palette, click and drag the satellite image and move it so that it is again below the floor plan image in the image order.



Creating the 3D Design Model

Once you have sketched the building footprint, you can use various tools in FormIt to develop a 3D preliminary design model. Within minutes, you can develop a study model that accurately reflects your conceptual design.



To create the 3D model:

1. Begin by sketching in 2D.

   Sketch a closed boundary in the shape of the townhouse footprint. You can follow the outline in the imported drawing or image file.

   FormIt creates a two-dimensional face within the boundary edges.

   You can then select that face and pull it upwards, extruding the geometry to create a three-dimensional shape. You can then start manipulating that shape.

   Once created, you can select a face, edge, or vertex and then push or pull that geometry to alter the shape and size of the objects in your model.

2. Pull the resulting townhouse face up along the Z-axis to create a solid.

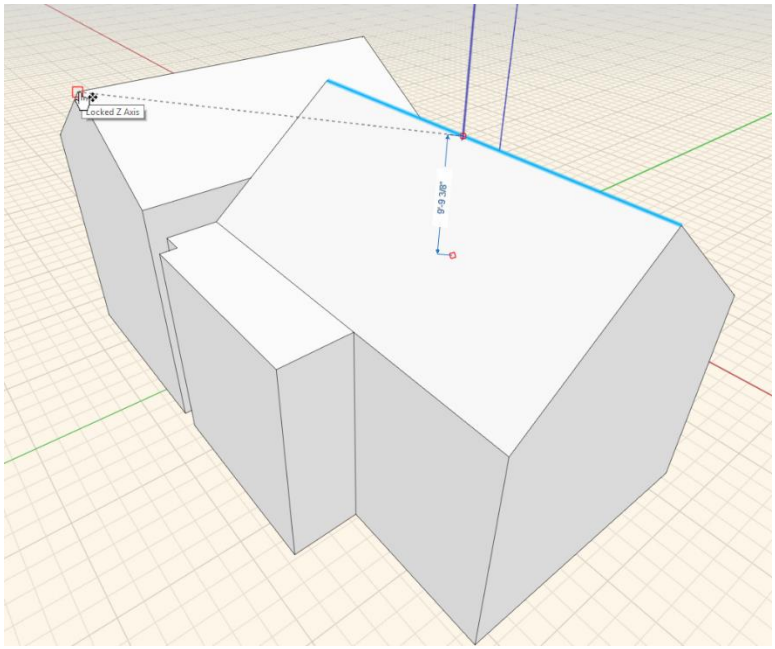
   By combining these pushing and pulling actions with snaps and references, you can model quickly and accurately.

3. Sketch lines to divide the top face of that solid.

4. Pull the ridge line up along the Z-axis to create a gable roof.

5. Use tools in FormIt to adjust the slope of the roof so that it has an 8:12 slope.

6. To create a second gable roof that intersects the first, you can sketch several additional lines to further divide the roof, pull the intersecting ridge line up, and quickly snap it into vertical alignment with the top of the other ridge.



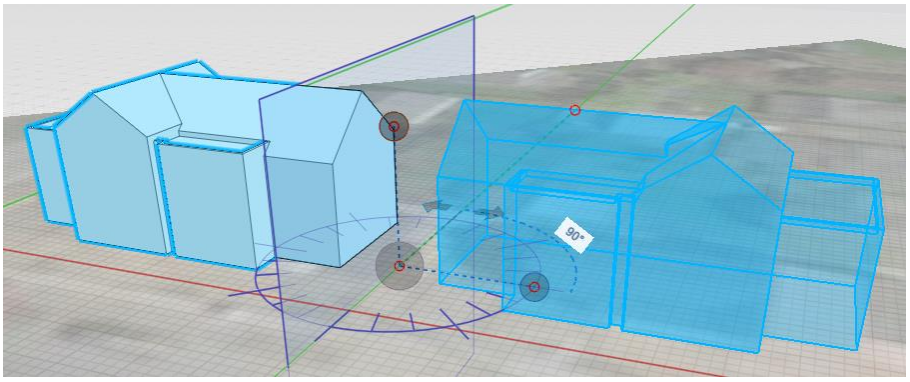
   You can then continue to use these push and pull techniques, along with other sketching tools, to continue to develop the 3D model.

Make a Mirrored Copy of the Townhouse Model

Since the site has a second townhouse that is a mirror image of the first, you can select the townhouse model and mirror it to create the second townhouse. You can work in either a 3D or top-down view.

To mirror the townhouse:

1. Double-click the townhouse model to select the entire object.
2. Right-click the object to display a context menu and select **Mirror**.
3. Relocate the mirror widget to the east of the existing townhouse, and then reorient the mirror plane.



4. Once you are satisfied, click in an empty spot (or press **ESC**).

Now that you have two instances of the townhouse, it is a good idea to name them.

To name the individual models:

1. With the east copy of the townhouse model still selected, in the **Properties** palette, click in the **Name** field and type "**East Townhome**".
2. Press **ESC** to deselect the east townhouse.
3. Double-click to select the west townhouse.
4. In the **Properties** palette, click in the **Name** field and type "**West Townhome**".

Properties and Levels

Since every object in a FormIt model has properties, when you select an object, you immediately see information, such as the volume and floor area.

Oftentimes, when working on a design project, you will have already established the total floor area as part of the design parameters. You can enter this information as part of the project properties, and then use tools in the Properties palette to see how close you are to your target.

To set the target area:

1. In the **Properties** palette, click in the **Target Area** field, type "**7350**", and press **ENTER** to specify a target square footage value of 7350 square feet.

Now that you have set the target area, you can use tools in FormIt to see how close your design comes to that target. When you double-click to select one of the townhouse models, in the

Properties palette, you can see that the building has a volume of 42,646 cubic feet. But the Area by Level field remains blank until you establish layers and then use those levels as the basis for calculating the floor area.

Levels enable you to slice masses into individual floors and calculate the gross area for the project. Levels are also retained when you import the FormIt model into Revit. You can add individual levels or multiple levels.

To add a level:

1. In the **Levels** palette, click the **Add Level** tool.

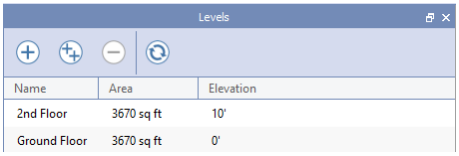
   As soon as you do, a new level is added. The program assigns it the default name “Level 1” and places it at an elevation of 0'.

2. Click the tool again to add a second level.

   Now you can see that the project has two levels. The second level has been assigned the default name “Level 2” and has been placed at an elevation of 12'.

After adding one or more levels, you can change the elevation of a level, delete a level, and rename levels.

3. Double-click **Level 1** and then change its name to **Ground Floor**.
4. Double-click **Level 2** and change its name to **2nd Floor**.
5. Double-click the 2nd Floor elevation and change it to **10'**.



Once you have created levels, you can use them to report the area per level.

6. Switch to the **Properties** palette.
7. With the East Townhome object still selected, select the **Use levels** checkbox.

   As soon as you do, the palette updates. Now the **Area by Level** field shows the total gross area of all levels, and in the lower portion of the palette, you see the name of each level along with its area and elevation value. In the model, you see an outline of the 2nd Floor on the east townhouse, but you do not see levels on the west townhouse.

8. Double-click the West Townhome object to select it.
9. In the **Properties** palette, select the **Use levels** checkbox.

   Now you see the level information for the west townhouse.

10. Press **CTRL** and double-click the East Townhome object.

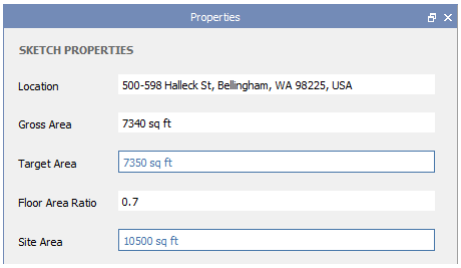
    With both townhomes selected, the Properties palette now shows the combined volume and area of both buildings. Note in particular the total area value.

11. Press **ESC** to deselect the models.

☞ **Tip:** When you create a level, it exists throughout the entire project. But since you can select which levels apply to each object, when modeling multiple buildings with different floor levels, you can choose which levels are applied to each object.

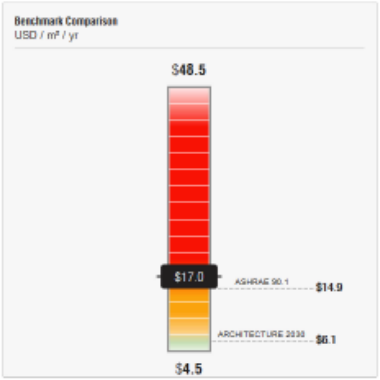
With nothing selected, in the **Properties** palette, you once again see the properties for the entire sketch. In the **Location** field, you see the location, but it has now updated to reflect the addresses of the two townhomes. In addition, the **Gross Area** field shows the total area of the two townhomes. And since you had established a target area, you can now compare the actual gross area to that target.

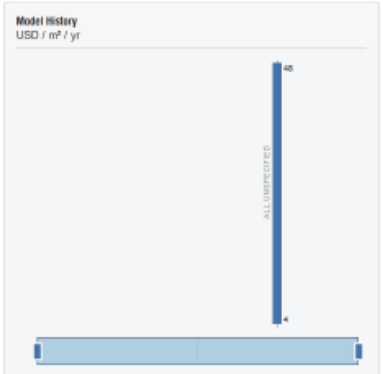
Note that the **Floor Area Ratio** and **Site Area** fields are still blank. The program will calculate the Floor Area Ratio, but in order for it to do so, you must first enter the Site Area value. Since the townhome site encompasses 10,500 square feet, enter that value in the **Site Area** field. As soon as you do, the program immediately displays the Floor Area Ratio.



This is all very useful information when developing a preliminary design.

At this point, you could use the FormIt model to perform sun and shadow studies, or even run a preliminary energy analysis using the same Insight building performance tools found in Revit.





Creating a Presentation Model

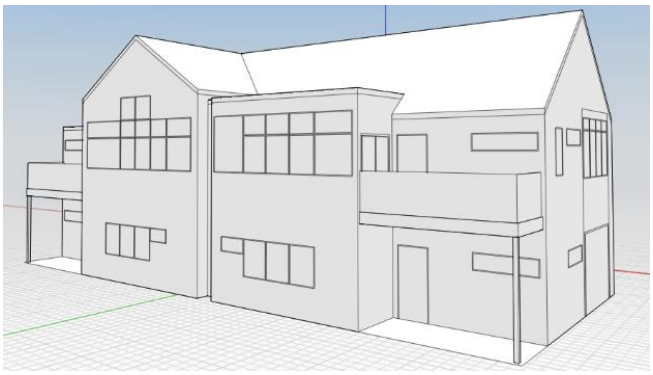
Thus far, the models are nothing more than massing studies. This is exactly the type of model you want to pass off to the team members who will continue to develop the design in Revit.

But you can use tools in FormIt to embellish the model to create design presentations, complete with doors, windows, materials, and entourage elements.

☞ **Tip:** Save a version of the FormIt massing model for import into Revit, and then save a separate copy for use in developing the presentation model.

It is extremely easy to sketch two-dimensional geometry on any face within the FormIt model. When you do, each bounded area becomes an individual face. You can then use tools in FormIt to apply different materials to those faces to create a presentation model.

For example, you could sketch windows and doors on the exterior faces of the building mass.



You can then drag and drop materials onto those faces to create a very realistic-looking model.

You can even add entourage objects—such as people, vehicles, and trees—and even use tools in FormIt to create short animations.

But again, remember that you must add all of this additional embellishment in a different version of the FormIt model than the one you will import into Revit. Not only is this additional information unnecessary for use in Revit, if it were included in the model imported into Revit, it would make it very difficult for you to use the FormIt model as the basis for developing the design further in Revit.

Hand the Project Off to Revit

Once the preliminary design has been approved, you can use the FormIt model as the basis for developing construction documents using Revit.

Since the two townhomes are identical mirror images, delete the east townhouse and save the massing model version of the model with just a single instance of the townhouse.

There are actually two different ways you can hand the project off to Revit.

- Save the FormIt model locally.
- Save the FormIt model to BIM 360 Docs.

NOTE: Starting with v17.0, FormIt uses BIM 360 Docs for cloud storage, replacing A360 Drive. BIM 360 Docs is Autodesk's premier cloud storage solution and brings new benefits to FormIt customers.

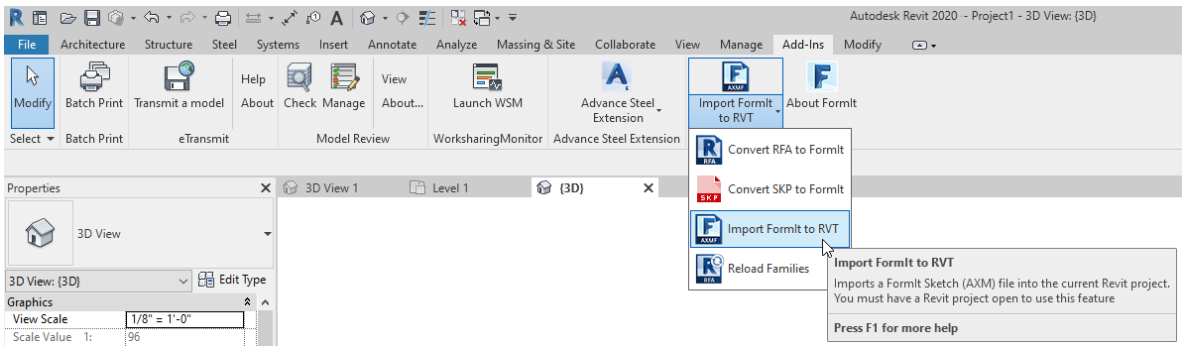
Regardless of the method you use to save the FormIt sketch, it is saved as a FormIt AXM file. You can then use the FormIt Converter add-in to import the FormIt model into Revit as a mass object, and then convert the FormIt walls, levels, and roofs into actual Revit components.

Importing FormIt Models into Revit

Once the FormIt model is ready for further development, the design can be handed off to Revit.

To import a FormIt model into Revit, you need to use the FormIt Converter add-in. This add-in includes multiple tools. You can use the FormIt Converter add-in to convert Revit families to FormIt groups and FormIt files to Revit files. You can also use the add-in to convert SketchUp files to FormIt files. And if you have converted Revit families into FormIt groups, you can then convert those groups back into Revit families for zero data loss when working with BIM components in FormIt.

In order to use the FormIt Converter, you must first download and install the Revit add-in from Autodesk. Once you do, the next time you start Revit and open a project, on the **Add-Ins** ribbon, you will see the **FormIt Converter** panel. You can then use the tools in this panel to convert Revit family files into content that can be loaded into FormIt, convert SketchUp files into content that can be loaded into FormIt, import a FormIt sketch into the current Revit project, and replace FormIt content in a Revit project with the original Revit family.



To import the FormIt model into Revit:

1. Start a new Revit project. (You should choose an appropriate template when starting the new project.)
2. On the **Add-Ins** ribbon, in the **FormIt Converter** panel, expand the split-button and select **Import FormIt to RVT**.
3. In the **Open** dialog, navigate to the folder in which you saved the FormIt sketch, select it, and click **Open**.

The FormIt model is immediately imported into Revit as a *conceptual mass family*. You can think of a mass in Revit as a 3D shape. It does not contain any wall, roof, or floor elements. It is simply a 3D object. But mass families support Revit's **Model by Face** tools. You can use these tools to place wall, roof, and floor elements on the faces of the conceptual mass.

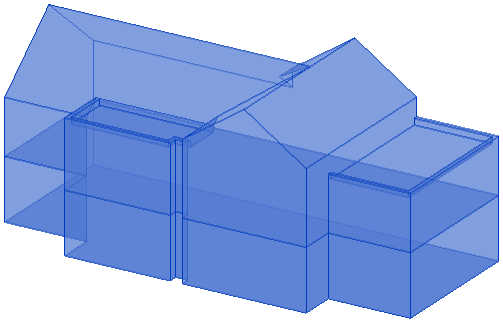
In addition, if levels have been defined in the FormIt model, those levels will be imported into Revit. This is helpful because levels in Revit develop the framework for the model and are used to create views. Also, if materials are applied in the FormIt model, they will be imported into Revit as well. This helps with visualizing the conceptual mass in Revit. In addition, those same materials will be used if you then send the Revit model to Revit Live.

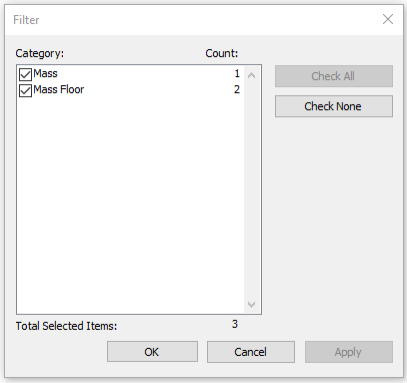
When you switch to the default 3D view, you do not see anything. That is because by default, conceptual masses are not visible.

To see the conceptual mass:

1. Switch to the **Massing & Site** ribbon.
2. In the **Conceptual Mass** panel, expand the **Show Mass by View Settings** split-button and select **Show Mass Form and Floors**.

Now you can see the mass objects and the mass floors. When you use a selection window to select the entire mass and then open the **Filter** dialog, you can see that there is one mass object and two mass floors (which correspond to the levels that had been established in the FormIt model).





☞ **Tip:** Since the site has two instances of the townhouse that are mirror images, there are two different approaches you can take to develop the design in Revit:

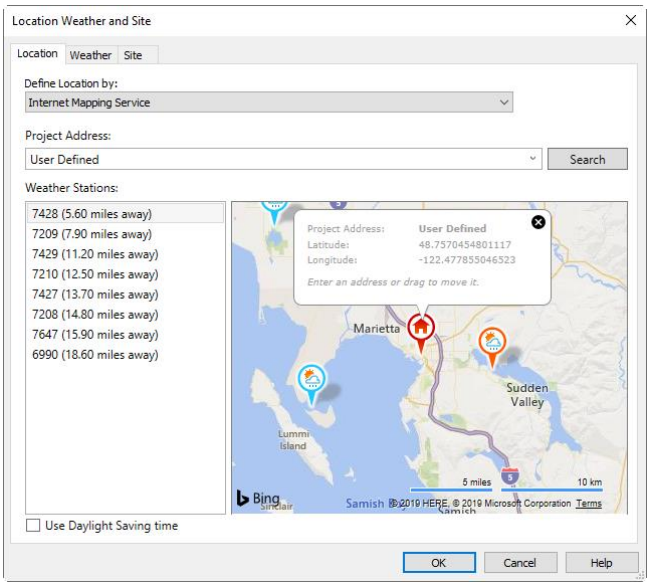
- Import the FormIt model of the two masses with location information.
- Import a single mass instance without location information, and then place two instances into a site in Revit.

Setting Project North

If the location has already been defined in the FormIt model, the location in the Revit project will update when the FormIt model is imported.

To see the project location in Revit:

1. On the **Manage** ribbon, in the **Project Location** panel, select **Location** to open the **Location Weather and Site** dialog.



Both Revit and FormIt use the same Insight service when performing energy analysis. In FormIt, this enables you to study solar gain and perform a preliminary energy analysis early on in the design process. Once you begin working on the design in Revit, you can create rooms or spaces and place more detailed Revit elements to perform more detailed—and therefore more accurate—energy analyses.

Since the location was already established in FormIt, the conceptual mass objects are aligned properly in relation to true north. But by default, true north and project north are initially the same. So, you will need to adjust project north.

To adjust project north:

1. Open the **North** or **South** elevation view.
2. Select the **Level 1** datum line and adjust its length so that it extends beyond the extents of the conceptual mass. The Level 2 datum line updates as well.
3. Open the **East** or **West** elevation view and repeat step 2.
4. Open the **Level 1** plan view.
5. Use a selection window to select the elevation callouts.
6. On the **Modify | Multi-Select** ribbon, in the **Selection** panel, click **Filter**.
7. In the **Filter** dialog, click **Check None**.
8. Select **Elevations**, and then click **OK**. Now, only the elevation callouts are selected.

9. On the **Modify | Elevations** ribbon, in the **Modify** panel, click **Delete**.

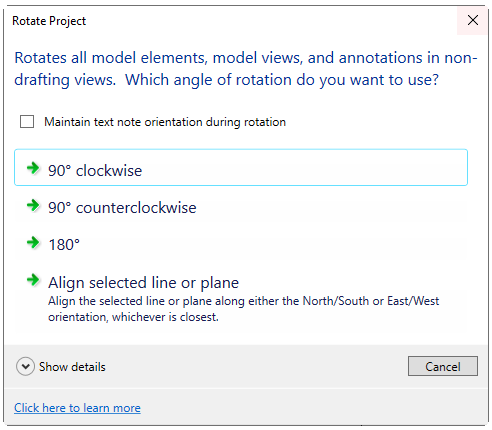
   The program displays a warning dialog to let you know that the four elevation views will be deleted.

10. Click **OK**.

    You deleted the four elevation views because they were aligned with true north. Later, you will create new elevation views that align with project north.

11. On the **Manage** ribbon, in the **Project Location** panel, expand the **Position** drop-down and select **Rotate Project North**.

12. In the **Rotate Project** dialog, select **Align selected line or plane**.



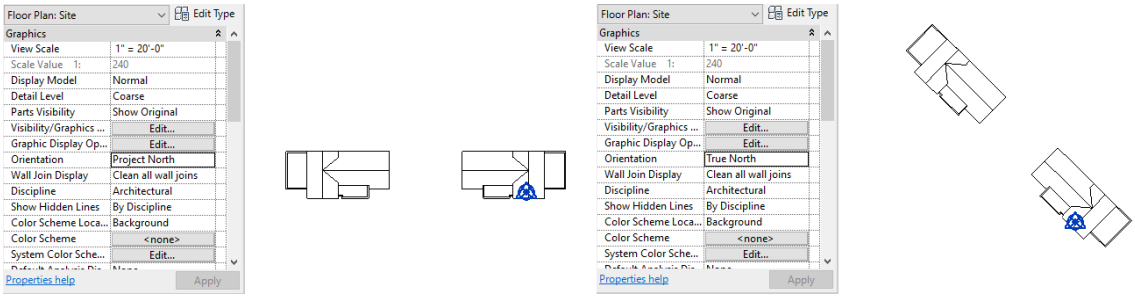
13. Select an edge of the building footprint.

    The orientation of the model changes, and the program displays a warning to let you know that the command successfully processed the elements in the model.

14. Click **OK** to close the warning.

15. Open the **Site** plan view.

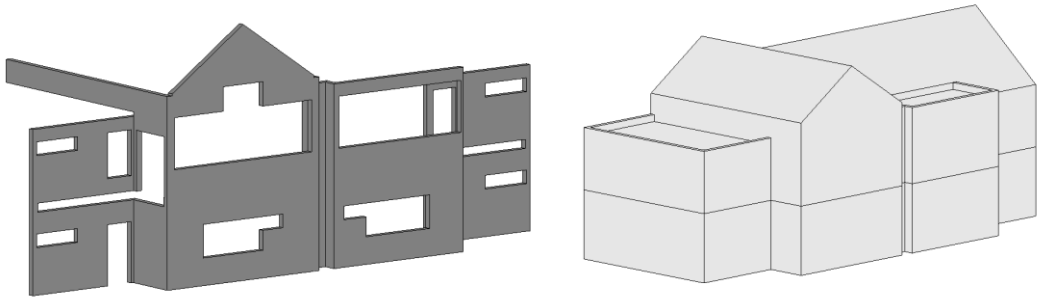
16. In the **Properties** palette, change the **Orientation** from **Project North** to **True North** and then back to **Project North** again so you can see how this affects the display of the project.



While developing the model further using Revit, you will leave the Orientation set to Project North.

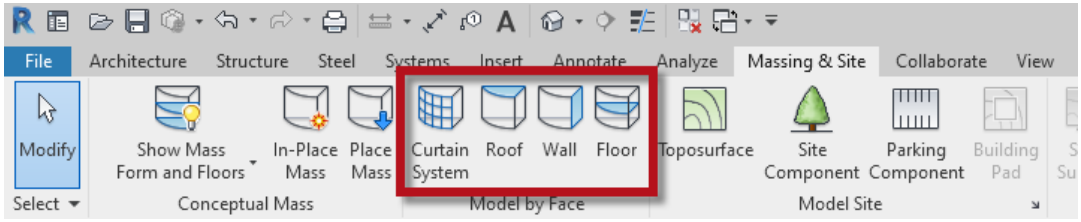
Why export the simple FormIt model rather than one with openings?

Although we developed a version of the townhouse model in FormIt that included openings and materials, we imported the simple massing model into Revit. As we develop the design further using Revit, we want to be able to place Revit doors and windows. Had we imported the version of the FormIt model that included the openings and materials, those openings in the mass model would become openings in the Revit walls, preventing us from placing Revit windows and doors.



Developing the Revit Model

Once the FormIt model has been imported into a Revit project, you can begin creating a building model based on the conceptual mass. To do this, you use tools on the **Massing & Site** ribbon, in the **Model by Face** panel.



- **Curtain System by Face** – creates a curtain system on the face of a mass or generic model
- **Roof by Face** – creates a roof using a non-vertical face on a mass
- **Wall by Face** – creates walls using faces of a mass or generic model
- **Floor by Face** – converts a mass floor into a floor of the building model

With these tools, you select the tool and then select the face of the conceptual mass to place the desired element on that face. Elements placed using these tools will match the shape of the face—the profile of the element will be adjusted to match the profile of the mass face.

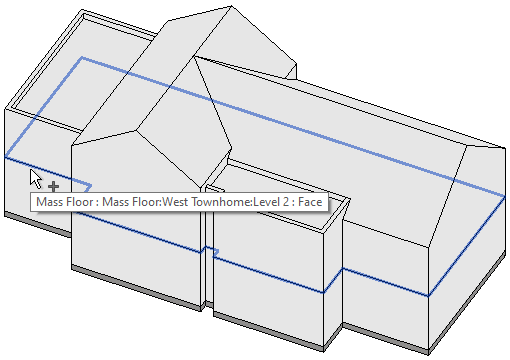
☞ **Tip:** If you subsequently change the mass face, the elements created using these tools will not automatically update. To update the element, you must use the Update to Face tool.

You may find it easiest to convert floors first, then roofs, and then walls.

To create a floor by face:

1. On the **Massing & Site** ribbon, in the **Model by Face** panel, select **Floor by Face**.

2. In the **Properties** panel, expand the **Type Selector** and choose the floor type.
3. Move the cursor over the model. When the floor highlights, select it.

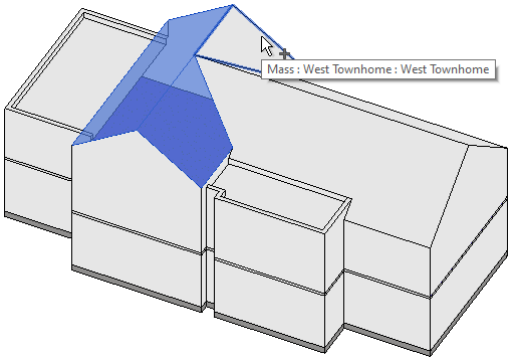


☞ **Tip:** You can select multiple floors to convert them all to the same type.

4. On the **Modify | Place Floor by Face** contextual ribbon, in the **Multiple Selection** panel, click **Create Floor**.

To create a roof by face:

1. On the **Massing & Site** ribbon, in the **Model by Face** panel, select **Roof by Face**.
2. In the **Properties** panel, expand the **Type Selector** and choose the roof type.
3. Move the cursor over the model. When the roof highlights, select it.



☞ **Tip:** You can select roof faces to convert them all to the same type. However, you should only select faces that are part of the same roof.

4. On the **Modify | Place Roof by Face** contextual ribbon, in the **Multiple Selection** panel, click **Create Roof**.

To create a wall by face:

1. On the **Massing & Site** ribbon, in the **Model by Face** panel, select **Wall by Face**.
2. In the **Properties** panel, expand the **Type Selector** and choose the wall type.
3. Move the cursor over the model. When the wall highlights, select it.
4. Repeat step 3 to convert additional walls.

Problems with Joins and Connections

You may find that wall joins and connections are difficult to navigate when creating walls by face, because the profile of the wall will match the profile of the mass face. The wall is not necessarily looking for a parametric relationship with another wall—it is just trying to maintain the profile of the mass face.

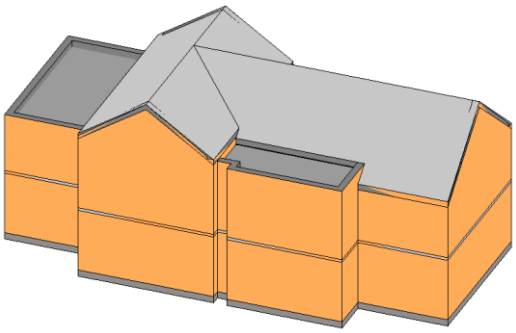
You can use the wall controls to adjust the end points as well as the base and top, just like any other wall. You can also use the Wall Joins tool to adjust wall join conditions and modify the wall profiles.

By using a combination of methods, you should be able complete the building shell.

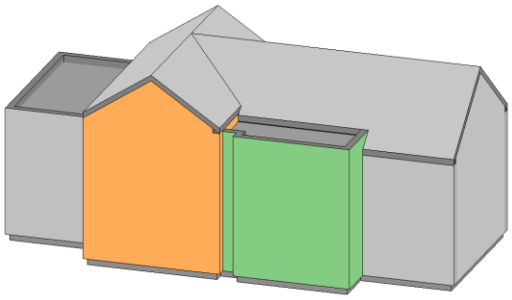
The various model by face tools enable you to quickly create the building shell based on the conceptual mass. Once you have modeled the building shell, the Revit model behaves like any other Revit project. At this point, you should turn off the display of the conceptual mass so that you only see and work with the Revit components.

To turn off the display of the mass model:

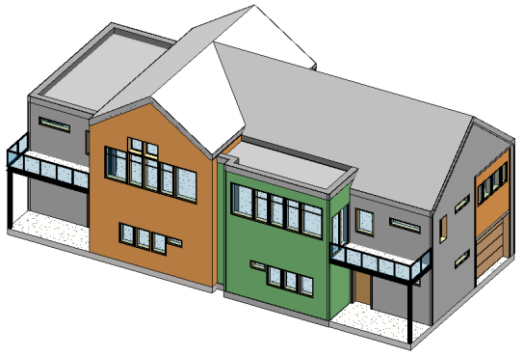
1. On the **Massing & Site** ribbon, in the **Conceptual Mass** panel, expand the split-button, and select **Show Mass by View Settings**.



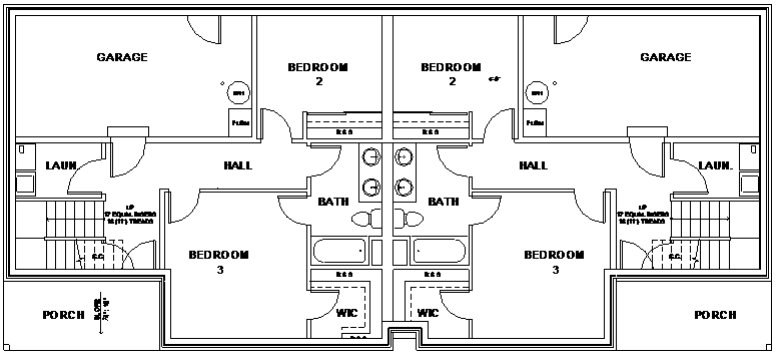
You can then create additional wall types, split the exterior walls in appropriate locations, and change the wall types.



You can then add windows, doors, and other building elements to the Revit model.



You can also link the same 2D plans originally sketched in AutoCAD or the 2D image sketched on a napkin and then scanned to a raster image file and use them to create the interior walls.



You can also add paving and ground surfaces and render the model in Revit.

To create an even more realistic rendering, you can take the Revit model into 3ds Max, apply materials and lighting, and create dynamic camera animations.

Another approach would be to use Revit Live to transform the Revit model into an interactive visualization that you can present or share with others to explore on their own. If you have a VR headset, you can even explore the virtual model.

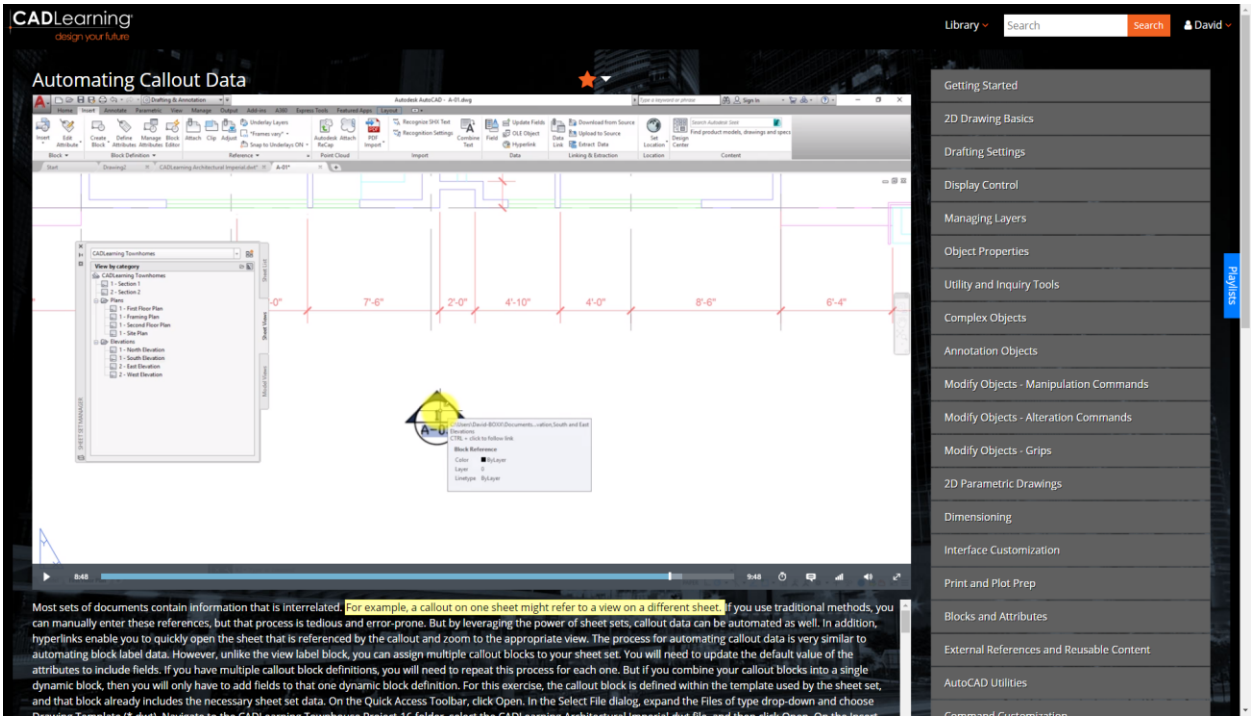
Or, you could use a program such as Twinmotion to quickly add materials and entourage elements, and then produce high-quality images, panoramas, and standard or 360 VR videos in seconds. Twinmotion combines an intuitive interface with the power of Unreal Engine.

Conclusion

The workflow from a design sketch to FormIt to Revit and beyond offers a seamless path you can use to go from conceptual design to construction documents and even to photo-realistic renderings and virtual reality.

To learn more…

Do you want to learn more about the software used in this class? 4D Technologies offers CADLearning lessons for AutoCAD, FormIt, and Revit that include all the materials covered in this class, as well as lessons covering nearly everything else you could possibly want to know about these products.



4D Technologies performance support covers a wide range of Autodesk products for architectural, engineering, construction, manufacturing, and media & entertainment. For additional information, please visit www.cadlearning.com.