

3. Revit® Architecture...	72
Introduction...	72
3.1 The Revit Interface:.....	72
3,2 The Project Browser ...	104
3.3 File Types and Families	109
3.4 Creating a Project	118
3.5 Using Information from Other Sources.....	121
References.....	172

3. Revit ® Architecture :

Introduction :

We sure you've seen plenty of presentations on how wonderful and versatile this 3D Autodesk® Revit® revolution is. You may be thinking, "This all seems too complicated for what I do. Why do I need 3D anyway?"

The answer is: You don't need 3D. What do you do to get a job out—that is, after the presentation when you're awarded the project? First, you redraw the plans. Next comes the detail round-up game we have all come to love: pull the specs together and then plot. This is a simple process that works.

Well, it worked until 3D showed up. Now we have no real clue where things come from, drawings don't look very good, and getting a drawing out the door takes three times as long.

That's the perception, anyway. I've certainly seen all of the above, but I've also seen some incredibly coordinated sets of drawings with almost textbook adherence to standards and graphics. Revit can go both ways—it depends on you to make it go the right way. This chapter will dive into the Revit graphical user interface (GUI) and tackle the three topics that make Revit .

3.1 The Revit Interface:

In Revit, the vast majority of the processes you encounter are in a flat 2D platform. Instead of drafting, you're placing components into a model. Yes, these components have a so-called third dimension to them, but a logical methodology drives the process. If you need to see

the model in 3D, it's simply a click away. That being said, remember this: There is a big difference between 3D drafting and modeling. With that preamble behind us, let's get on with it.

First of all, Revit has no command prompt and no crosshairs. Stop! Don't go away just yet. You'll get used to it, I promise. Unlike most CAD applications, Revit is heavily pared down, so to speak. It's this way for a reason. Revit was designed for architects and engineers. You don't need every command that an individual designing a car would need. An electrical engineer wouldn't need the functionality that an architect would require. In Revit, however, the functionality I just mentioned is available, but it's tucked away so as not to interfere with your architectural pursuits.

Either way, it's a simple concept. You just need to slow down a bit from your CAD habits. If you're new to the entire modeling/drafting notion, and you feel you're going too slowly, don't worry. You do a lot with each click of the mouse.

You'll find that, as you get comfortable with Revit, there are many, many choices and options behind each command.

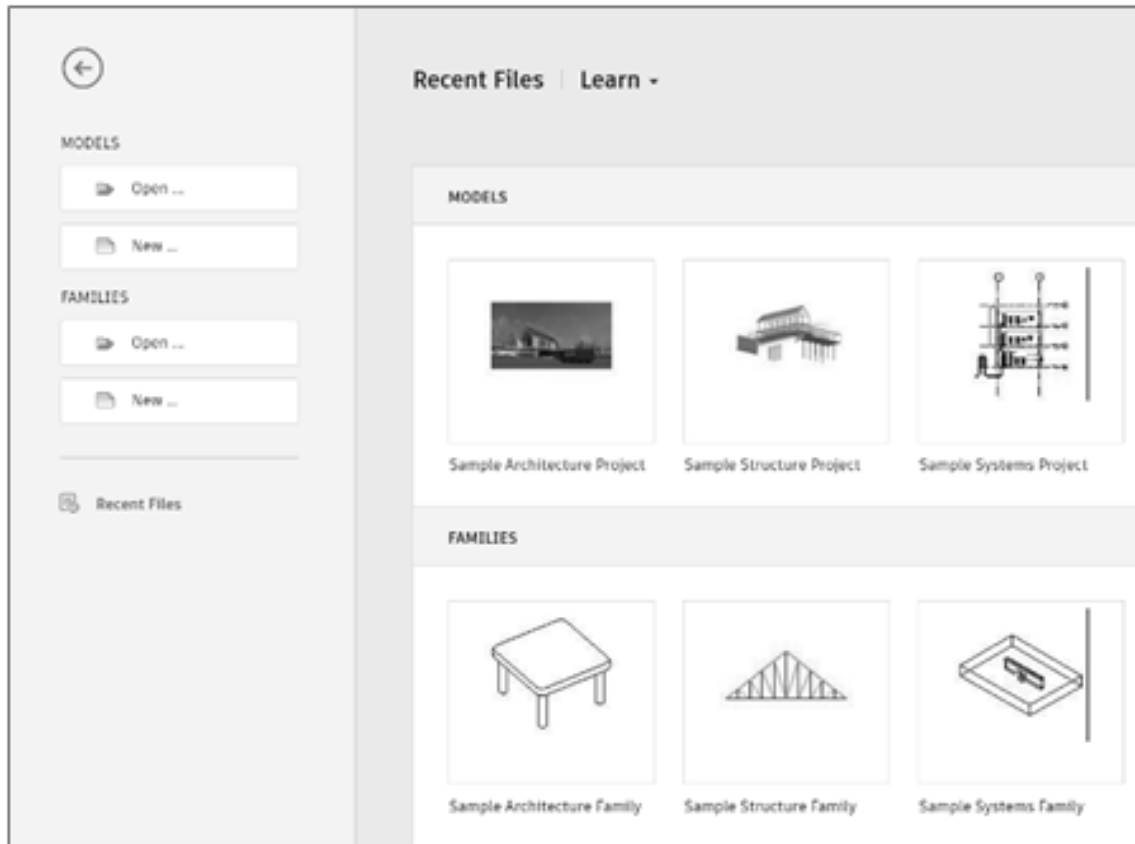
Let's get started:

First : To open Revit, click the icon on your desktop (see Figure 3.1).



FIGURE 3 . 1 You can launch Revit from the desktop icon.

Second : After you start Revit, you'll see the Recent Files window, as shown in Figure 3.2. The top row lists any projects on which you've been working; the bottom row lists any families with which you've been working. At the top of the dialog is the Learn pull down. This will give you access to the Autodesk Help website.



FIGUR E 3 . 2 The Recent Files window lists any recent projects or families on which you've worked

. To the left of the dialog is the Models area. Click the Open. . . link.

Third : The New Project dialog shown in Figure 1.3 opens. Click the Tem- plate File drop-down menu, and select Architectural Template. If you're a metric user, click the Browse button.

This will open Windows Explorer. Go up one level, and choose the S Metric folder. Select the file called default Metric. rte. If you cannot find this file.

Now that the task of physically opening the application is out of the way, we can delve into Revit. Revit has a certain feel that Autodesk® AutoCAD® converts, or Micro Station converts, will need to grasp. At first, if you're already a CAD user, you'll notice many differences between Revit and CAD. Some of these differences may be off-putting, whereas others will make you say, "I wish CAD did that." Either way, you'll have to adjust to a new workflow.

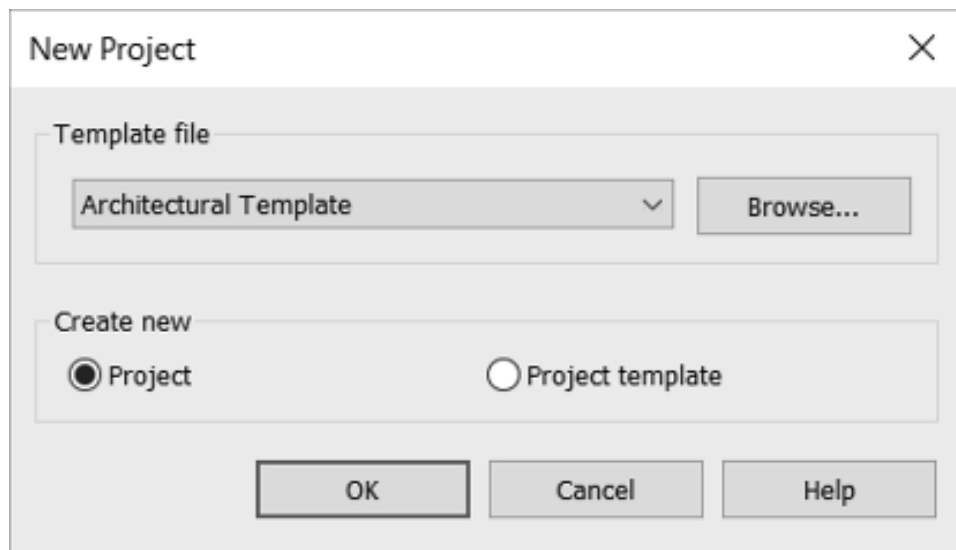


FIGURE 3 . 3 The New Project dialog allows you to start a new project using a preexisting template file, or you can create a new template file.

The Revit Workflow:

This new workflow may be easy for some to adopt, whereas others will find it excruciatingly foreign.

Executing a command in Revit is a three-step process:

1. At the top of the Revit window is the Ribbon. A series of tabs is built into the Ribbon. Each tab contains a panel. This Ribbon will be your Revit launch pad! Speaking of launch pads, click the Wall button on the Architecture tab, as shown in Figure 3.4.

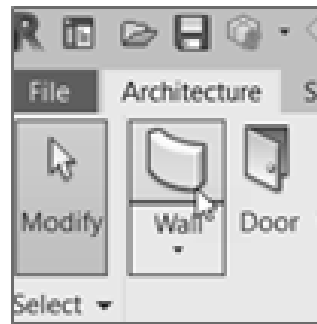


FIGURE 3 . 4 The Ribbon is the backbone of Revit.

2. After you click the Wall button, notice that Revit adds a tab to the Ribbon with additional choices specific to the command you're running, as shown in Figure 3.5. You may also notice that Revit places an additional Options bar below the Ribbon for even more choices.

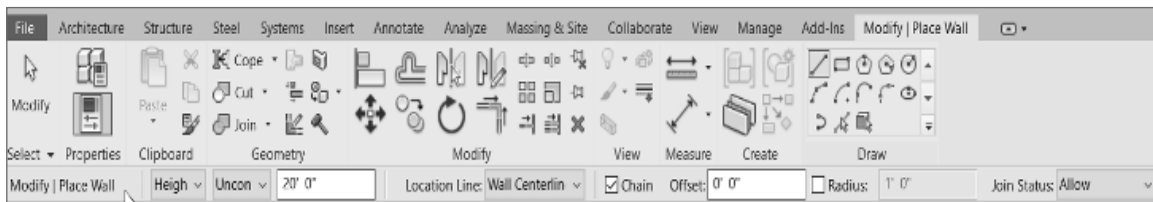


FIGURE 3 . 5 The Options bar allows you to have additional choices for the current command.

3. After you make your choices from the Ribbon and the Options bar, you can place the object into the view window. This is the large drawing area that takes up two-thirds of the Revit interface. To place the wall, simply pick a point in the window and move your pointer in the direction that you want the wall to travel. The wall starts to form. Once you see that, you can press the Esc key to exit the command. (I just wanted to illustrate the behavior of Revit during a typical command).

Using Revit isn't always as easy as this, but just keep this basic three-step process in mind and you'll be okay:

1. Start a command.
2. Choose an option from the temporary tab or the Options bar that appears.
3. Place the item in the view window.

Thus, on the surface Revit appears to offer a fraction of the choices and functionality that are offered by AutoCAD (or any drafting program, for that matter).

This is true in a way. Revit does offer fewer choices to start a command, but the choices that Revit does offer are much more robust and powerful.

Revit keeps its functionality focused on designing and constructing buildings. Revit gets its robust performance from the dynamic capabilities of the application during the placement of the items and the functionality of the objects after you place them in the model. You know what they say: never judge a chapter by its cover—unless, of course, it's the chapter you're reading right now.

Let's keep going with the main focus of the Revit interface: the Ribbon. You'll be leaning on the Ribbon extensively in Revit.

Using the Ribbon:

You'll use the Ribbon for the majority of the commands you execute in Revit. As you can see, you have little choice but to do so. However, this is good because it narrows your attention to what is right in front of you.

When you click an icon on the Ribbon, Revit will react to that icon with a new tab, giving you the specific additional commands and options you need. Revit also keeps the existing tabs that can help you in the current command, as shown in Figure 3.6 Again, the focus is on keeping your eyes in one place.

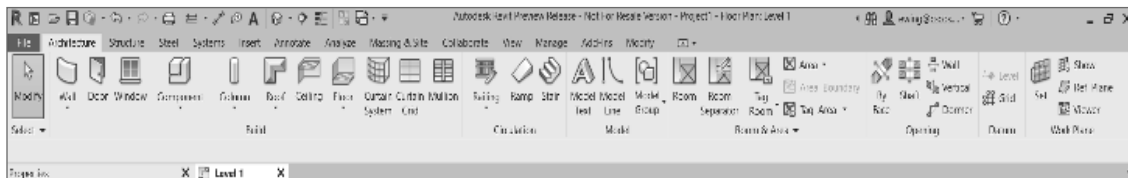


FIGURE 3 . 6 The Ribbon breakdown showing the panels

In this chapter, I'll throw quite a few new terms at you, but you'll get familiar with them quickly. We just discussed the

Ribbon, but mostly you'll be directed to choose a tab in the Ribbon and to find a panel on that tab.

To keep the example familiar, when you select the Wall button, your instructions will read: "On the Build panel of the Architecture tab, click the Wall button."

THAT Too Lbar Above THE Ribbon?

This toolbar is called the Quick Access toolbar. I'm sure you've seen a similar toolbar in other applications. It comes filled with some popular commands. If you want to add commands to this toolbar, simply right-click any icon and select Add To Quick Access Toolbar. (see Figure 3.8).



Figure 3.8 Quick Access Toolbar

To the left of this toolbar is the Revit Application icon. Clicking this icon gives you access to more Revit functions that will be covered later in the chapter. One great icon that I like to have docked on the Quick Access toolbar is the Select Objects (or Modify) icon. I like to add this icon as shown in the following graphic:

Now that you can see how the Ribbon and the tabs flow together, let's look at another feature in the Ribbon panels that allows you to reach beyond the immediate Revit interface.

The Properties Interface

When you click the Wall button, a new set of commands appears on the Ribbon. This new set of commands combines the basic Modify commands with a tab specific to your immediate process. In this case, that process is adding a wall.

You'll also notice that the Properties dialog near the left of the screen changes, as shown in Figure 1.7. The Properties dialog shows a picture of the wall you're about to place. If you click this picture, Revit displays all the walls that are

available in the model. This display is called the Type Selector drop-down (see Figure 3.8).

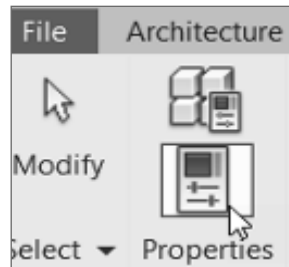


FIGURE 3 . 8 Click the Properties button to display the Properties dialog. Typically, the dialog is shown by default.

The objective of the next exercise is to start placing walls into the model:

1. Close Revit by clicking the close button in the upper-right corner.
2. Reopen Revit, and start a new project (Metric or Imperial).
3. On the Architecture tab, click the Wall button.
4. In the Properties dialog, select Exterior - Brick And CMU On MTL. Stud from the Type Selector.
(Metric users, select Basic Wall - Exterior Brick On MTL. Stud. This will look somewhat different throughout the chapter, but you get a break. It is slightly easier to work with than the Imperial wall type).

Element Properties

There are two different sets of properties in Revit: instance properties and type properties. Instance properties are available immediately in the Properties dialog when you place or select an item. If you make a change to an element property, the only items that are affected in the model are the items you've selected.

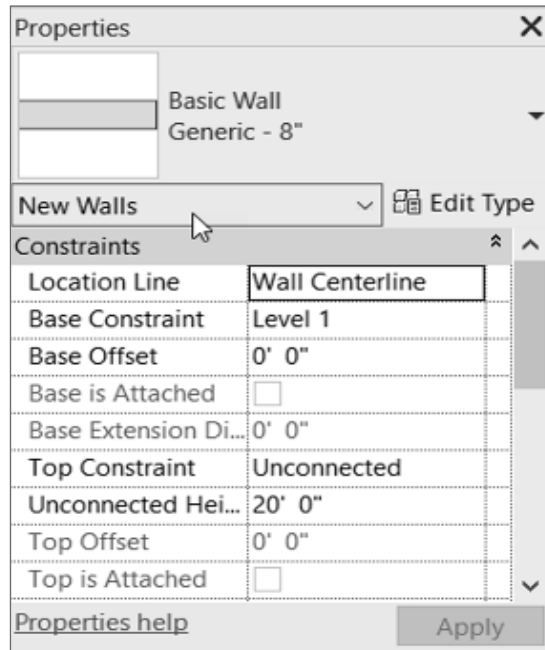


FIGURE 3 . 8 The Properties dialog gives you access to many variables associated with the item you’re adding to the model.

The Properties Dialog

As just mentioned, the Properties dialog displays the instance properties of the item you’ve selected. If no item is selected, this dialog displays the properties of the current view in which you happen to be.

You also have the ability to combine the Properties dialog with the adjacent dialog, which is called the Project Browser (we’ll examine the Project Browser shortly). Simply click the top of the Properties dialog, as shown in Figure 1.9, and drag it onto the Project Browser. Once you do this, you’ll see a tab that contains the properties and a tab that contains the Project Browser (also shown in Figure 3.8).

Let’s take a closer look at the two categories of element properties in Revit.

Instance Properties.

The items that you can edit immediately are called parameters or instance properties. These parameters change only the object being added to the model at this time. Also, if you select an item that has already been placed in the model, the parameters you see immediately in the Instance Properties dialog change only that item you've selected. This makes sense—not all items are built equally in the real world. Figure 3.9 illustrates the instance properties of a typical wall.

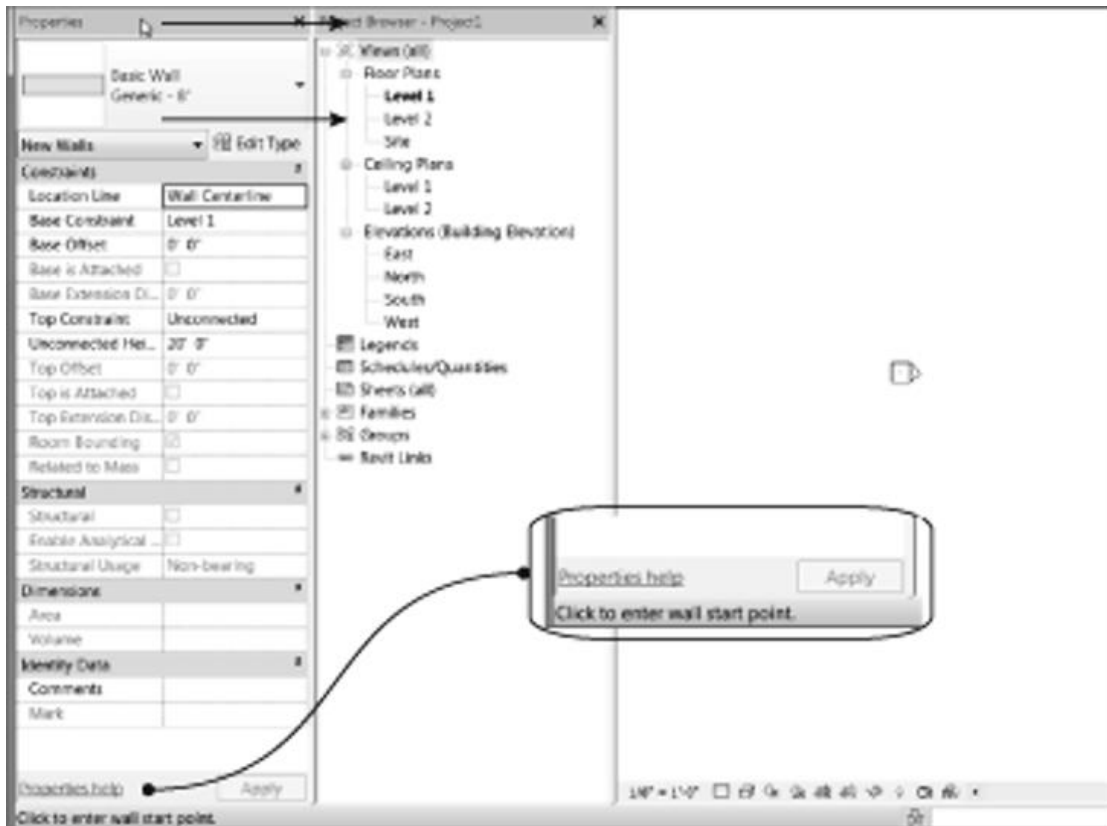


FIGURE 3 . 9 Dragging the Properties dialog onto the Project Browser

Type Properties:

Type properties (see Figure 3.11), when edited, alter every item of that type in the entire model. To access the type properties, click the Edit Type button

in the Properties dialog, as Figure 1.12 shows.

At this point, you have two choices. You can make a new wall type (leaving this specific wall unmodified) by clicking the Duplicate button at the upper right of the dialog, or you can start editing the wall's type properties, as shown in Figure 3.10.

Now that you've gained experience with the Type Properties dialog, it's time to go back and study the Options bar as it pertains to placing a wall:

1. Because you're only exploring the element properties, click the Cancel button to return to the model.

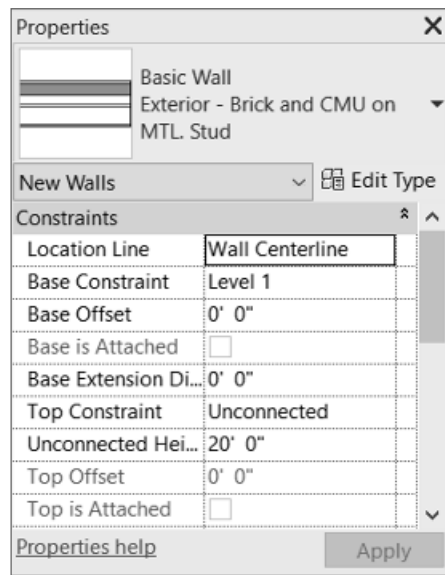


FIGURE 3 . 1 0 The instance properties change only the currently placed item or the currently selected item

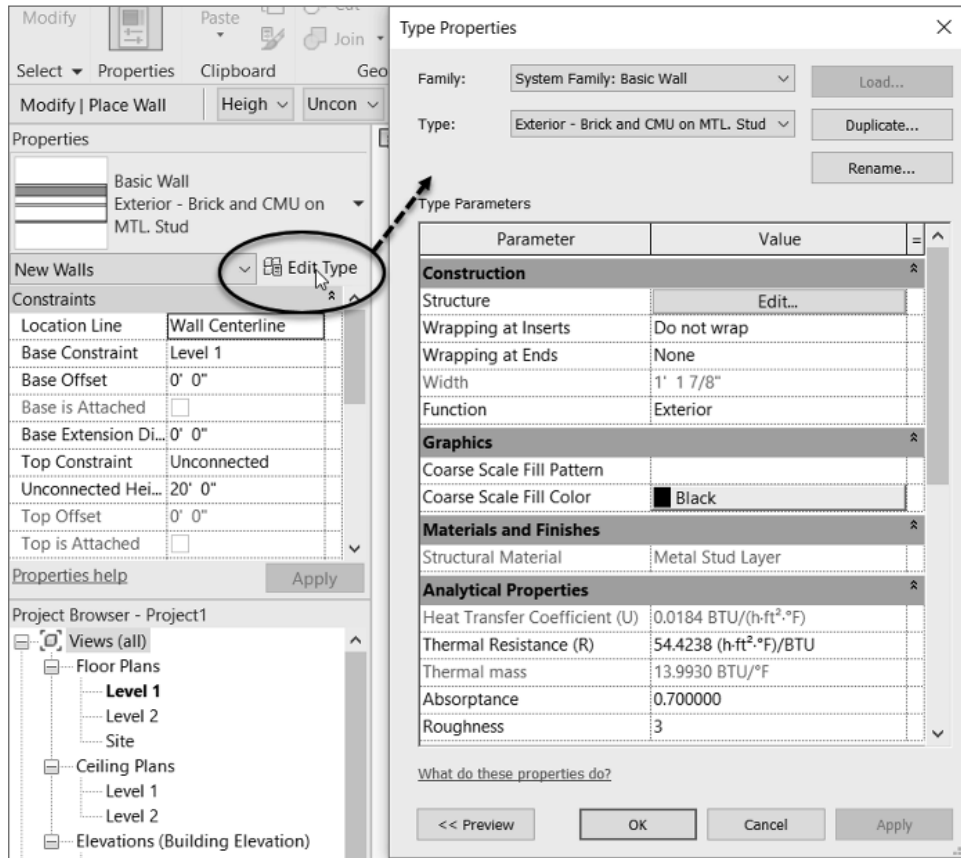


FIGURE 3 . 1 1 The type properties, when modified, alter every occurrence of this specific wall in the entire model.

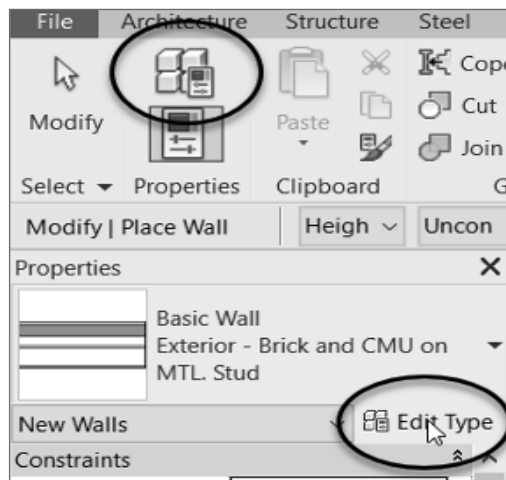


FIGURE 3 . 1 2 The Edit Type button allows you to access the type properties.

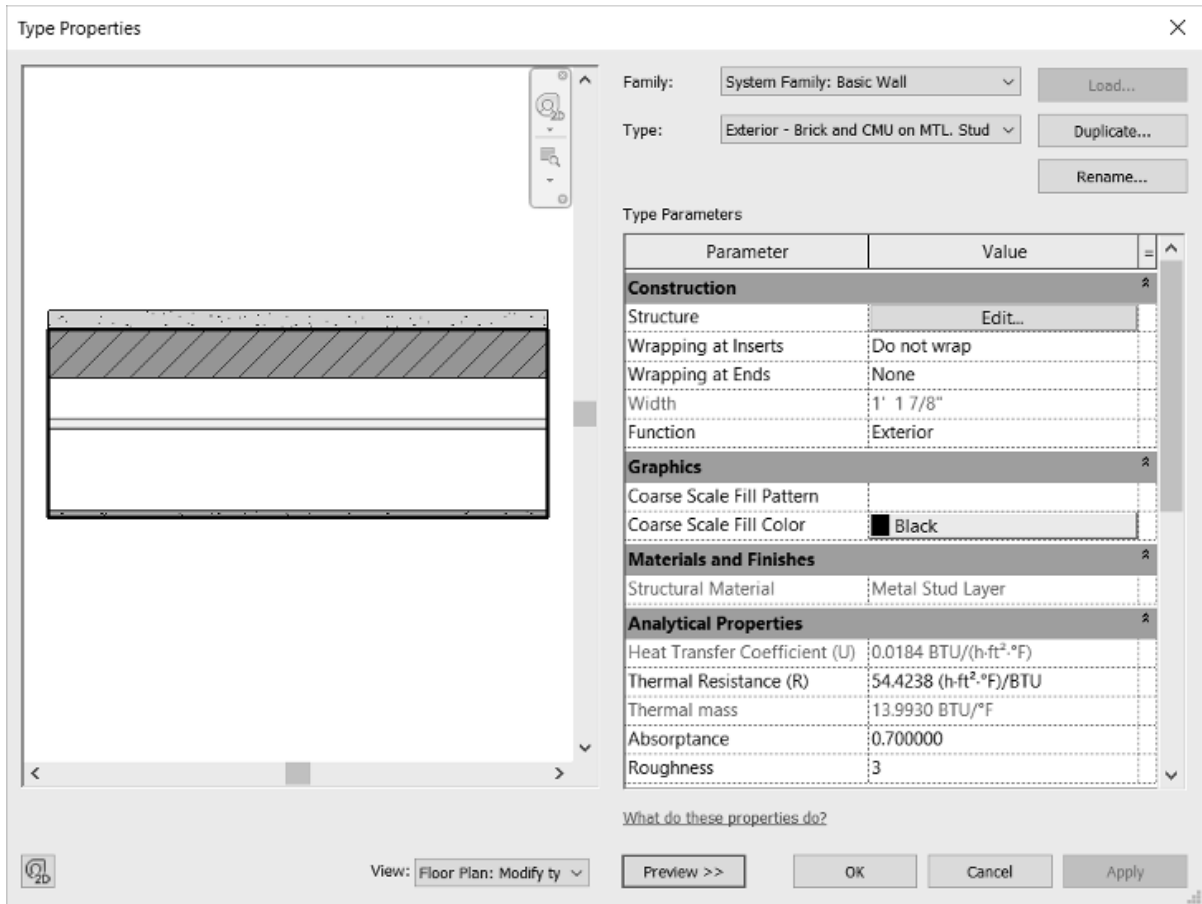


FIGURE 3 . 1 3 The type properties modify the wall system’s global settings.

Click the Preview button at the bottom of the dialog to see the image that is displayed.

2. Back in the Options bar, find the Location Line menu. Through this menu, you can set the wall justification. Select Finish Face: Exterior (see Figure 3.14).

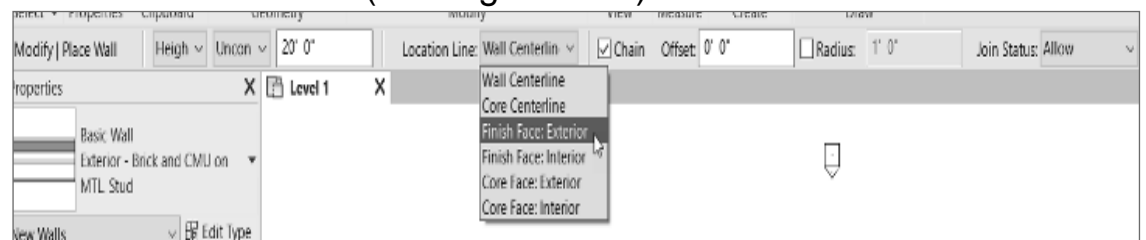


FIGURE 3 . 1 4 By selecting Finish Face: Exterior, you know the wall will be dimensioned from the outside finish.

3. On the Options bar, be sure the Chain check box is selected, as Figure 3.14 shows. This will allow you to draw the walls continuously.
4. The Draw panel has a series of sketch options. Because this specific wall is straight, make sure the Line button is selected, as shown in Figure 3.15.

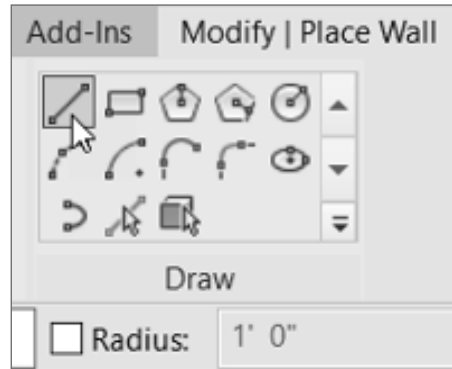


FIGURE 3 . 1 5 You can draw any shape you need.

Get used to studying the Ribbon and the Options bar—they will be your crutch as you start using Revit! Of course, at some point you need to begin placing items physically into the model. This is where the view window comes into play.

The View Window

To put it simply, the big white area where the objects go is the view window. As a result of your actions, this area will become populated with your model.

Notice that the background is white—this is because the sheets you plot on are white. In Revit, what you see is what you get . . . literally. Line weights in Revit are driven by the object, not by the layer. In Revit, you aren't counting on color #5, which is blue, for example, to be a specific line width when you plot. You can immediately see the thickness that all your lines will be before you plot (see Figure 3.16).

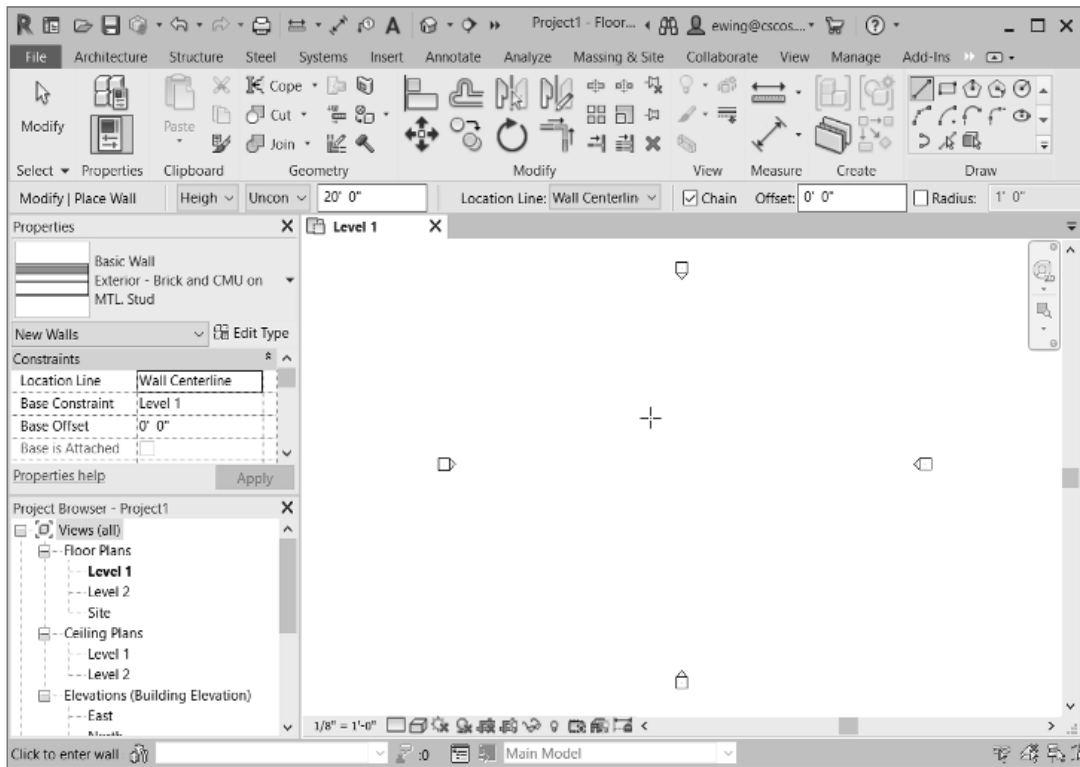


FIGURE 3 . 16 The view window collects the results of your actions.

To continue placing some **walls** in the model, keep going with the exercise. (If you haven't been following along, you can start by clicking the Wall button on the Architecture tab. In the Properties dialog box, select Exterior - Brick And CMU On MTL. Stud [or Basic Wall - Exterior Brick On Mtl. Stud for metric users]. Make sure the wall is justified to the finish face exterior.) You may now proceed:

- With the Wall command still running and the correct wall type selected, position your cursor in a location similar to the illustration in Figure 1.17. Pick a point in the view window.
1. With the first point picked, move your cursor to the left. Notice that two things happen: the wall seems to snap in a horizontal plane, and a blue dashed line locks the horizontal position. In Revit, there is no Ortho. Revit aligns the typical compass increments to 0°, 90°, 180°, 270°, and 45°.
2. Also notice the blue dimension extending from the first point to the last point. Although dimensions can't be typed over, this type

of dimension is a temporary dimension for you to use as you place items. Type 100 (30000 mm), and press the Enter key. Notice that you didn't need to type the foot mark (') or mm. Revit thinks in terms of feet or millimeters. The wall is now 100 (30000 mm) long (see Figure 3.17).

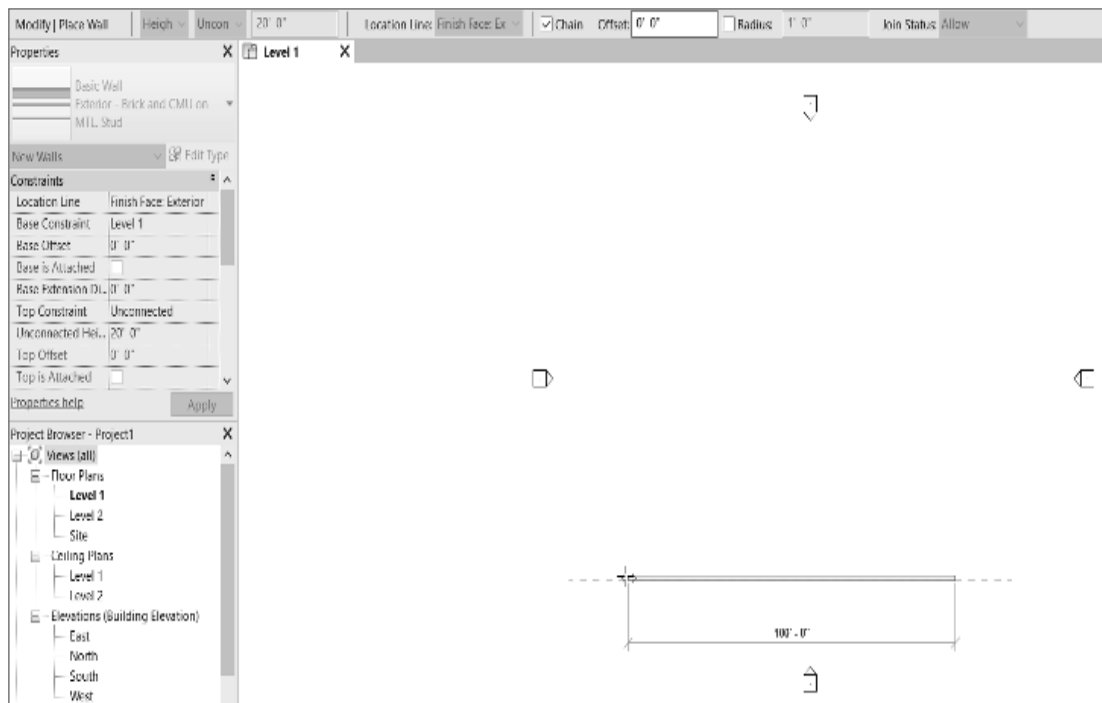


FIGURE 3 . 17 The procedure for drawing a wall in Revit

4. With the Wall command still running, move your cursor straight up from the endpoint of your 100 -long wall. Look at Figure 3.18.

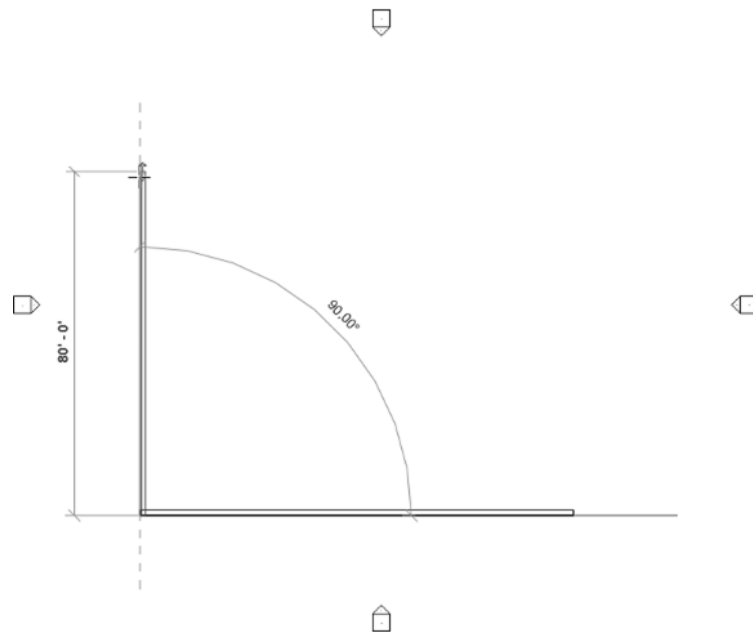


FIGURE 3 . 1 8 How Revit works is evident in this procedure.

5. Type 80 (24000 mm), and press Enter. You now have two walls.
 6. Move your cursor to the right until you run into another blue alignment line. Notice that your temporary dimension says 100 –0 (30000.0).
Revit understands symmetry. After you see this alignment line, and the temporary dimension says 100 –0 (30000.0), pick this point.
 7. Move your cursor straight down, type 16 (4800 mm), and press Enter.
 8. Move your cursor to the right, type 16' (4800 mm), and press Enter.
 9. Press the Esc key twice.
- Do your walls look like Figure 3.19 If not, try it again. You need to be comfort- able with this procedure (as much as possible).

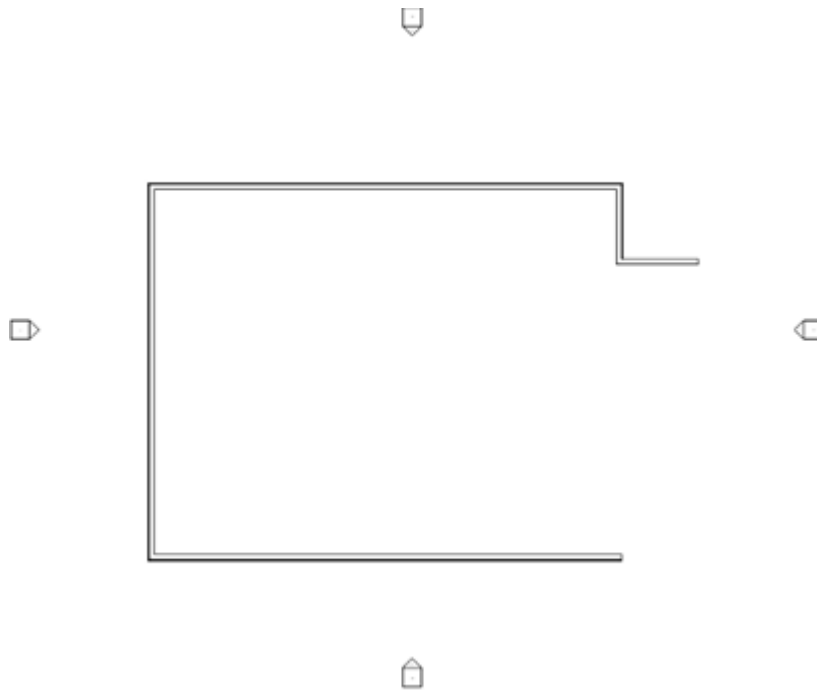


FIGURE 3 . 1 9 Working with Revit starts with the ability to work with the view window and learn the quirks and feel of the interface.

To get used to the Revit flow, always remember these three steps:

1. Start a command.
2. Focus on your options.
3. Move to the view window, and add the elements to the model.

If you start a command and then focus immediately on the view, you'll be sitting there wondering what to do next. Don't forget to check your Options bar and the appropriate Ribbon tab.

Let's keep going and close this building by using a few familiar commands. If you've never drafted on a computer before, don't worry. These commands are simple. The easiest but most important topic is how to select an object.

Object Selection

Revit has a few similarities to AutoCAD and Micro Station. One of those similarities is the ability to perform simple object selection and to execute common modify commands. For this example, you'll mirror the two 16 –0 (4800 mm) L-shaped walls to the bottom of the building:

- 1.Type ZA (zoom all).
- 2.Near the two 16 –0 (4800 mm) L-shaped walls, pick (left-click) and hold down the left mouse button when the cursor is at a point to the right of the walls but above the long, 100 –0 (30000 mm) horizontal wall.
3. You see a window start to form. Run that selection window down and to the left past the two walls. After you highlight the walls, as shown in Figure 1.20, let go of the mouse button, and you've selected the walls.

There are two ways to select an object: by using a crossing window or by using a box. Each approach plays an important role in how you select items in a model.

Crossing Windows

A crossing window is an object-selection method in which you select objects by placing a window that crosses through the objects. A crossing window always starts from the right and ends to the left. When you place a crossing window, it's represented by a dashed-line composition (as you saw in Figure 3.20).

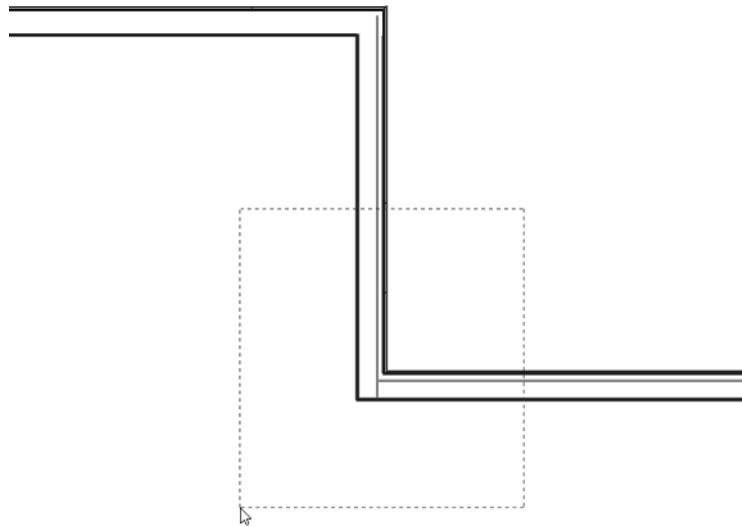


FIGURE 3 . 2 0 Using a crossing window to select two walls

Boxes

With a box object-selection method, you select only items that are 100 percent inside the window you place. This method is useful when you want to select specific items while passing through larger objects that you may not want in the selection set. A box always starts from the left and works to the right. The line type for a selection window is a continuous line (see Figure 3.21).

Now that you have experience selecting items, you can execute some basic modify commands. Let's begin with mirroring, one of the most popular modify commands.

Modifying and Mirroring

Revit allows you either to select the item first and then execute the command or to start the command and then select the objects to be modified. This is true for most action items and is certainly true for every command on the Modify toolbar. Try it:

1. Make sure only the two 16 –0 (4800 mm) walls are selected.
2. When the walls are selected, the Modify | Walls tab appears. On the Modify panel, click the Mirror – Draw Axis button, as shown in Figure 3.22.

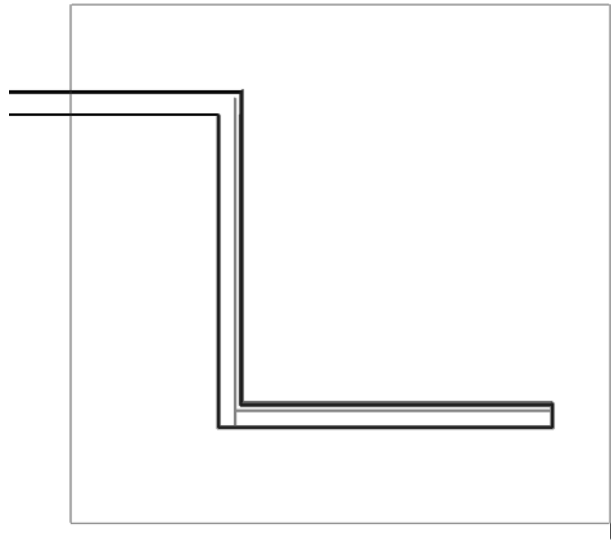


FIGURE 3 . 2 1 To select only objects that are surrounded by the window, use a box.

This will leave out any item that may be partially within the box.

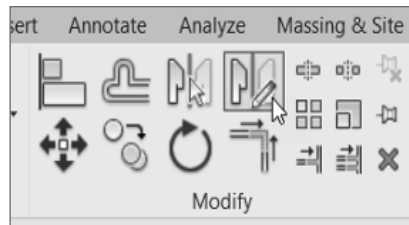


FIGURE 3 . 2 2 The Ribbon adds the appropriate commands.

2. Your cursor changes to a crosshair with the mirror icon, illustrating that you're ready to draw a mirror plane.
3. Make sure the Copy check box is selected (see Figure 3.23).

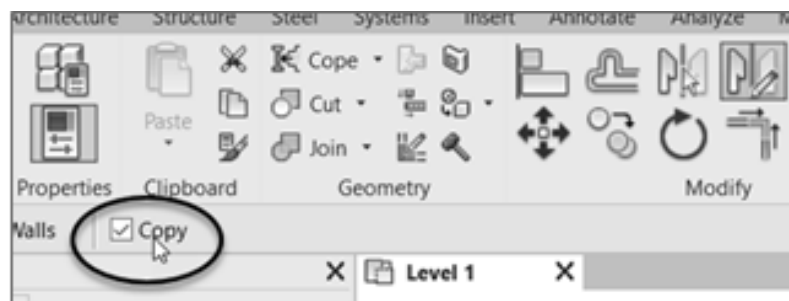


FIGURE 3 . 2 3 There are options you must choose for every command in Revit.

4. Hover your cursor over the inside face of the 80 –0 (24000 mm) vertical wall until you reach the midpoint. Revit displays a triangular icon, indicating that you've found the midpoint of the wall (see Figure 3.24).

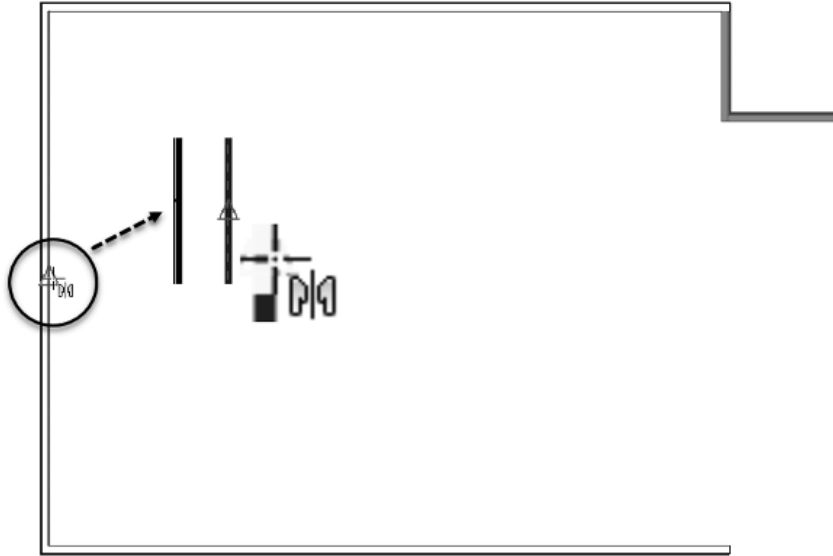


FIGURE 3 . 2 4 Revit has snaps similar to most CAD applications.

In Revit, you'll get snaps only if you choose the Draw icon from the Options bar during a command.

5. When the triangular midpoint snap appears, pick this point. After you pick the point where the triangle appears, you can move your cursor directly to the right of the wall. An alignment line appears, as shown in Figure 3.25. When it does, you can pick another point along the path. When you pick the second point, the walls are mirrored and joined with the south wall (see Figure 3.26).

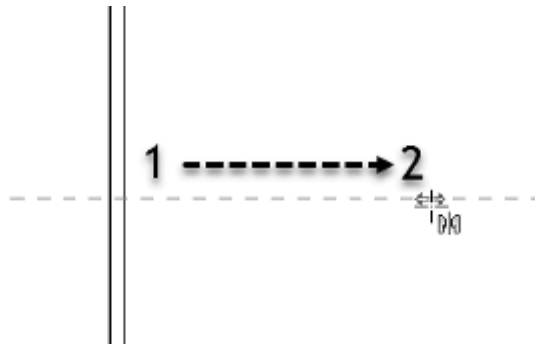


FIGURE 3 . 2 5 Mirroring these walls involves (1) picking the midpoint of the vertical wall and (2) picking a horizontal point along the plane.

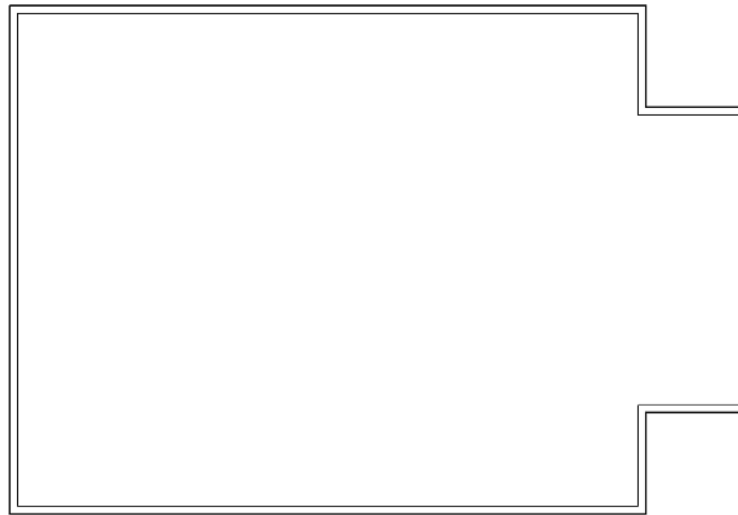


FIGURE 3 . 2 6 Your building should look like this illustration.

Now that you have some experience mirroring items, it's time to start adding components to your model by using the items that you placed earlier. If you're having trouble following the process, retry these first few procedures. Rome wasn't built in a day. (Well, perhaps if they'd had Revit, it would have speed things up!) You want your first few walls to look like Figure 1.26.

Building on Existing Geometry

You have some geometry with which to work, and you have some objects placed in your model. Now Revit starts to come alive. The benefits of using Building Information Modeling will become apparent quickly, as explained later in this chapter.

For example, because Revit knows that walls are walls, you can add identical geometry to the model by simply selecting an item and telling Revit to create a similar item.

Suppose you want a radial wall of the same exact type as the other walls in the model. *Perform the following steps:*

1. Type ZA to zoom the entire screen.
2. Press the Esc key.
3. Select one of the walls in the model—it doesn't matter which one.
4. Right-click the wall.
5. Select Create Similar, as shown in Figure 3.27.

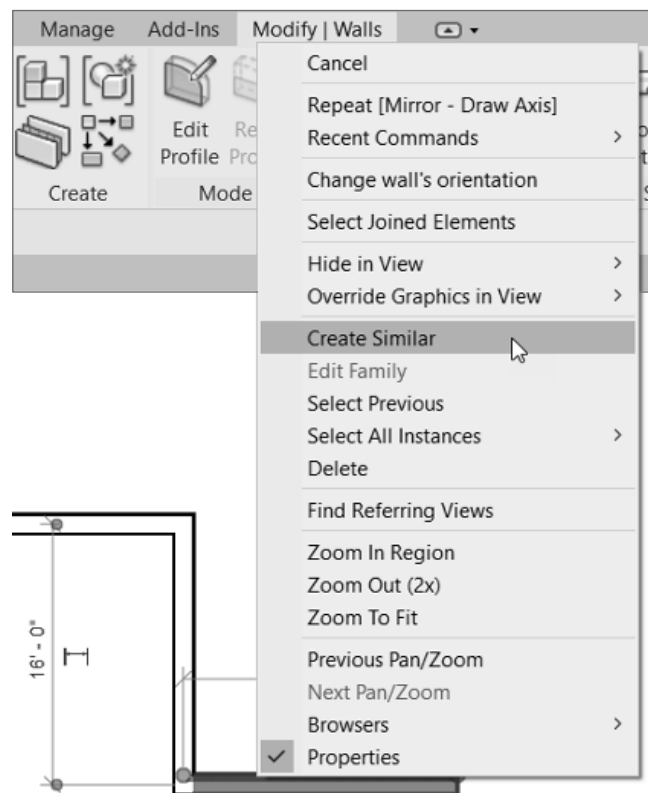


FIGURE 3 . 2 7 You can select any item in Revit and create a similar object by right-clicking and selecting **Create Similar**.

6. On the Modify | Place Wall tab, click the Start-End-Radius Arc button, as shown in Figure 3.28.

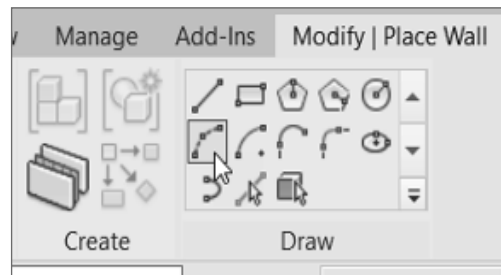


FIGURE 3 . 28 Just because you started the command from the view window doesn't mean you can ignore your options.

7. Again with the options? Yes. Make sure Location Line is set to Finish Face: Exterior (it should be so already).

8. With the wheel button on your mouse, zoom into the upper corner of the building and select the top endpoint of the wall, as shown in Figure 3.29. The point you're picking is the corner of the heavy lines. The topmost, thinner line represents a concrete belt course below.

If you're having trouble picking the correct point, don't be afraid to zoom into the area by scrolling the mouse wheel. (Metric users do not have the concrete belt. Just pick the outside heavy line representing the brick face.)

9. Select the opposite, outside corner of the bottom wall. Again, to be more accurate you'll probably have to zoom into each point as you're making your picks.

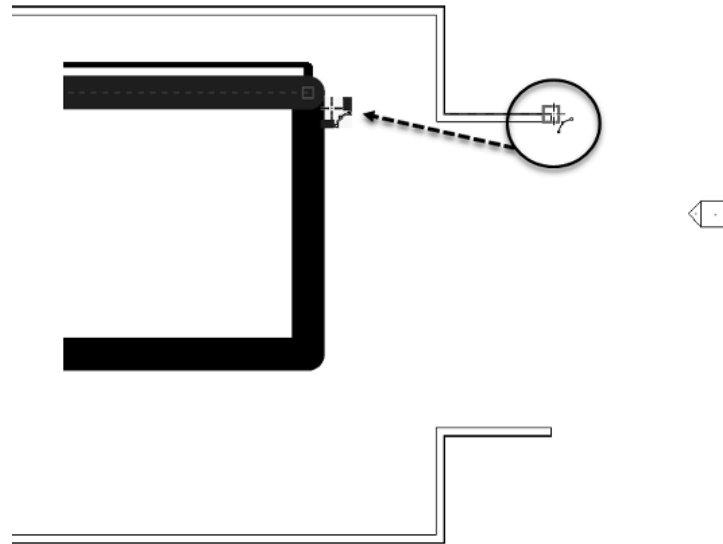


FIGURE 3 . 2 9 Select the top corner of the wall to start your new radial wall.

10. Move your cursor to the right until you see the curved wall pause. You'll see an alignment line and possibly a tangent snap icon appear as well. Revit understands that you may want an arc tangent on the two lines you've already placed in your model.

11. When you see the tangent snap icon, choose the third point. Your walls should look like Figure 3.30.

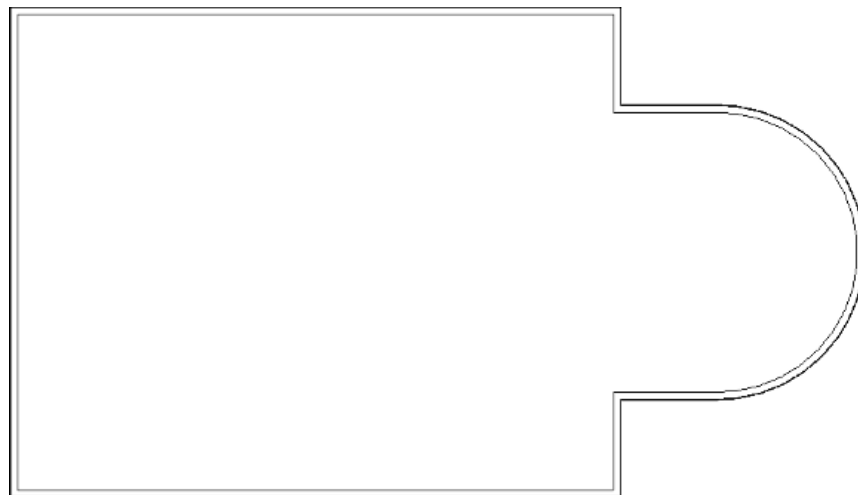


FIGURE 3 . 30 The completed exterior walls should look like this illustration.

Just because you've placed a wall in the model doesn't mean the wall looks the way you would like it to appear. In Revit, you can do a lot with view control and how objects are displayed.

View Control and Object Display

Although the earlier procedures are a nice way to add walls to a drawing, they don't reflect the detail you'll need to produce construction documents. The great thing about Revit, though, is that you've already done everything you need to do. You can now tell Revit to display the graphics the way you want to see them.

The View Control Bar

At the bottom of the view window, you'll see a skinny toolbar (as shown in Figure 3.31). This is the View Control bar.

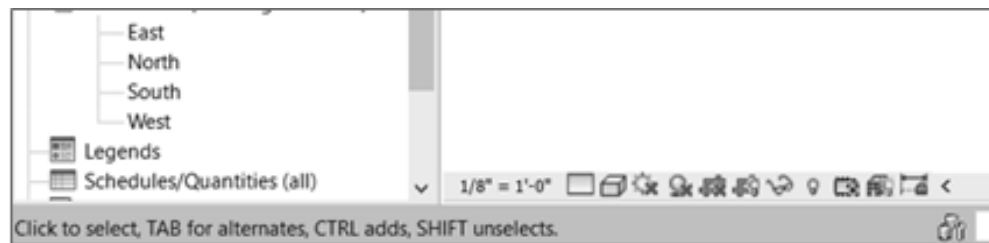


FIGURE 3 . 3 1 The View Control bar controls the graphical view of your model.

It contains the functions outlined in the following list:

Scale

The first item on the View Control bar is the Scale function. It gets small mention here, but it's a huge deal. In Revit, you change the scale of a view by selecting this menu. Change the scale here, and Revit will scale annotations and symbols accordingly (see Figure 3.32).

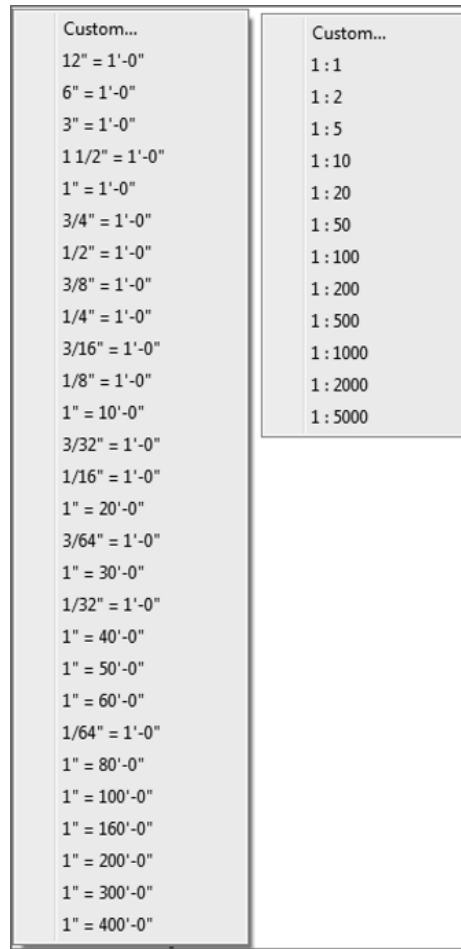


FIGURE 3 . 3 2 The Scale menu allows you to change the scale of your view.

Detail Level : Detail Level allows you to view your model at different qualities. You have three levels to choose from: Coarse, Medium, and Fine (see Figure 1.33).

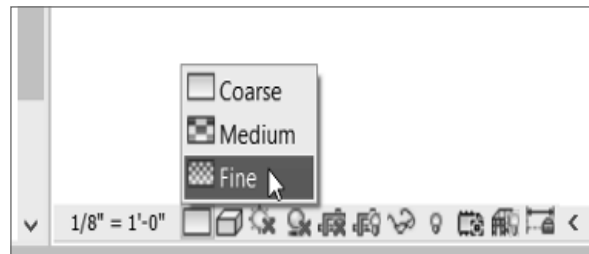


FIGURE 3 . 3 3 The Detail Level control allows you to set different view levels for the current view.

If you want more graphical information with this view, select Fine. To see how the view is adjusted using this control, follow these steps:

1. Click the Detail Level icon, and choose Fine.
2. Zoom in on a wall corner. Notice that the wall components are now showing in the view.

There are other items on the View Control bar, but we'll discuss them when they become applicable to the exercises.

The View Tab

Because Revit is one big happy model, you'll quickly find that simply viewing the model is quite important. In Revit, you can take advantage of some functionality in the Navigation bar. To activate the Navigation bar, first go to the View tab and click the User Interface button. Then go to the default 3D view, and make sure the Navigation bar is activated, as shown in Figure 1.34.

One item we need to look at on the Navigation bar is the steering wheel.

The Steering Wheel

The steering wheel allows you to zoom, rewind, and pan. When you click the steering wheel icon, a larger control panel appears in the view window. To choose one of the options, you simply pick (left-click) one of the options and hold down the mouse button as you execute the maneuver.

To use the steering wheel, follow along:

1. Go back to Floor Plan Level 1, and pick the steering wheel icon from the Navigation bar.
2. When the steering wheel is in the view window (as shown in Figure 3.35), left-click and hold Zoom. You can now zoom in and out.

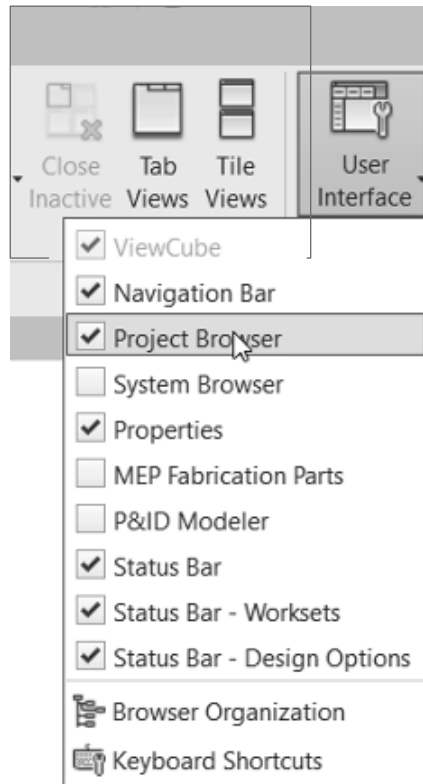


FIGURE 3 . 3 4 The View tab allows you to turn on and off the Navigation bar.

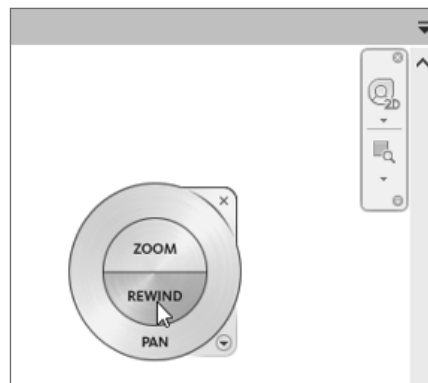


FIGURE 3 . 3 5 You can use the steering wheel to navigate through a view.

3. Click and hold Rewind in the steering wheel. You can now find an older view, as shown in Figure 3.36.

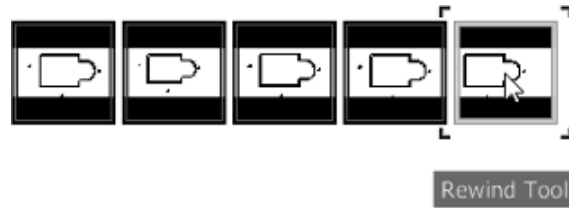


FIGURE 3 . 36 Because Revit doesn't include zoom commands in the Undo function, you can rewind to find previous views.

4. Do the same for Pan, which is found on the outer ring of the steering wheel. After you click and hold Pan, you can navigate to other parts of the model.

Although you can do all this with your wheel button, some users still prefer the icon method of panning and zooming. For those of you who prefer the icons, you'll want to use the icons for the traditional zooms as well.

When you're finished using the steering wheel, press Shift + W or right-click and choose Close Wheel.

Traditional Zooms

The next items on the Navigation bar are the good-old zoom controls. The abilities to zoom in, zoom out, and pan are all included in this function, as shown in Figure 3.37.

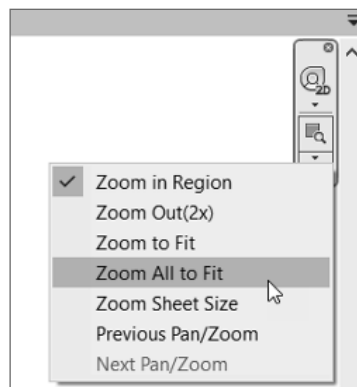
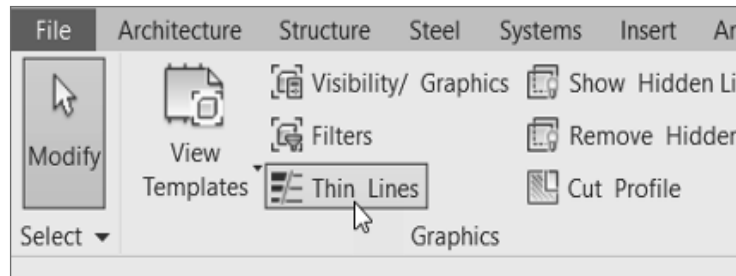


FIGURE 3 . 37 The standard zoom commands

Of course, if you have a mouse with a wheel, you can zoom and pan by either holding down the wheel to pan or wheeling the button to scroll in and out.

Thin Lines

Back on the View tab, you'll see an icon called Thin Lines, as



shown in Figure 3.38. Let's talk about what this icon does.

FIGURE 3 . 38 Clicking the Thin Lines icon lets you operate on the finer items in a model.

In Revit, there are no layers. Line weights are controlled by the actual objects they represent. In the view window, you see these line weights. As mentioned before, what you see is what you get.

Sometimes, however, these line weights may be too thick for smaller-scale views. By clicking the Thin Lines icon, as shown in Figure 3.38, you can force the view to display only the thinnest lines possible and still see the objects.

To practice using the Thin Lines function, follow along:

1. Pick the Thin Lines icon.
2. Zoom in on the upper-right corner of the building.
3. Pick the Thin Lines icon again. This toggles the mode back and forth.
4. Notice that the lines are very heavy.

The line weight should concern you. As mentioned earlier, there are no layers in Revit. This subject will be covered throughout this chapter.

3D View

The 3D View icon brings us to a new conversation. Complete the following steps, which will move us into the discussion of how a Revit model comes together:

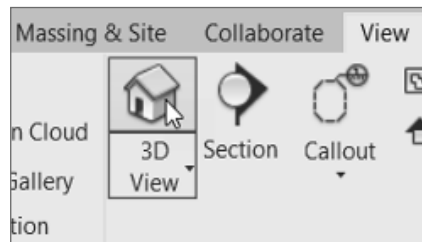


FIGURE 3 . 3 9 The 3D View icon will be used heavily.

1. Click the 3D View icon, as shown in Figure 3.39.
2. On the View Control bar, click the Visual Style button and choose Realistic, as shown in Figure 3.40.
3. Again on the View Control bar, select the Shadows On icon and turn on shadows, as shown in Figure 3.41.

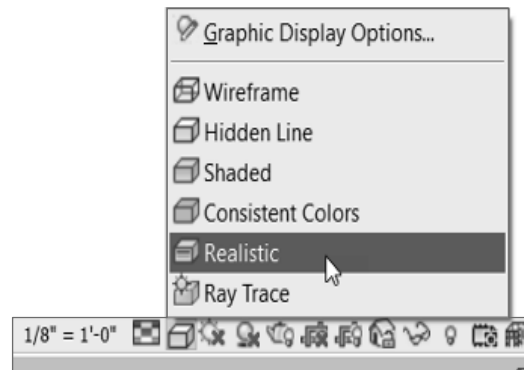


FIGURE 3 . 4 0 The Visual Style button enables you to view your model in color. This is typical for a 3D view.

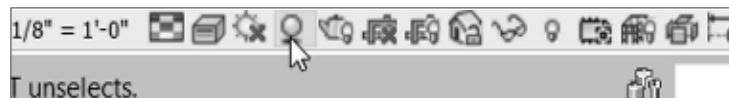


FIGURE 3 . 4 1 Shadows create a nice effect, but at the expense of RAM.

Within the 3D view is the View Cube. It's the cube in the upper-right corner of the view window. You can switch to different perspectives of the model by clicking the quadrants of the cube (see Figure 3.42).

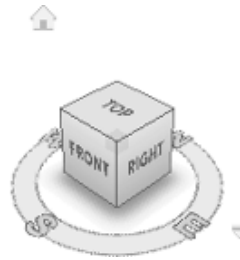


FIGURE 3 . 4 2 The View Cube lets you look freely at different sides of the building.

Your model should look similar to Figure 3.43. (Metric users, you do not have the concrete belt or the concrete block coursing below the brick.)

Go back to the floor plan. Wait! How? This brings us to an important topic in Revit: the Project Browser.

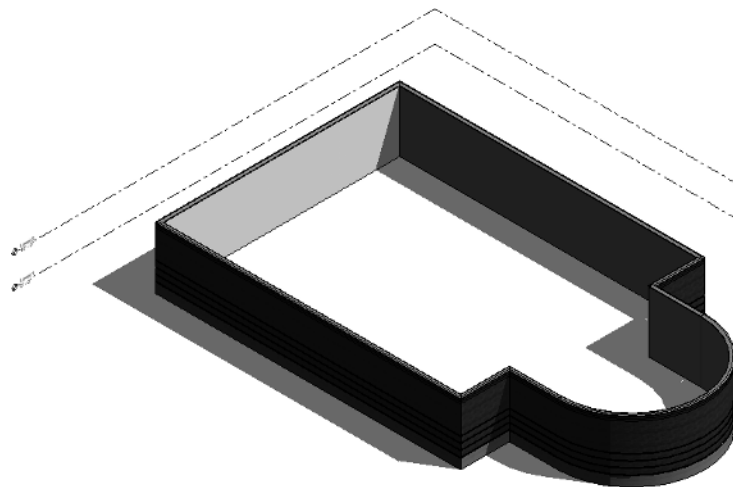


FIGURE 3 . 4 3 The model with shadows turned on

3.2 The Project Browser

Revit is the frontrunner of BIM. BIM has swept our industry for many reasons.

One of the biggest reasons is that you have a fully integrated model in front of you. That is, when you need to open a different floor plan, elevation, detail, drawing sheet, or 3D view, you can find it all right there in the model.

Also, this means your workflow will change drastically. When you think about all the external references and convoluted folder structures that make up a typical job, you can start to relate to the way Revit uses the Project Browser. In Revit, you use the Project Browser instead of the folder structure you used previously in CAD.

This approach changes the playing field. The process of closing the file you're in and opening the files in which you need to do work is restructured in Revit to enable you to stay in the model. You never have to leave one file to open another. You also never need to rely on external referencing to complete a set of drawings. Revit and the Project Browser put it all in front of you.

To start using the Project Browser, follow along:

1. To the far left of the Revit interface are the combined Project Browser and Properties dialogs. At the bottom of the dialogs, you'll see two tabs, as shown in Figure 1.44. Click the Project Browser tab.

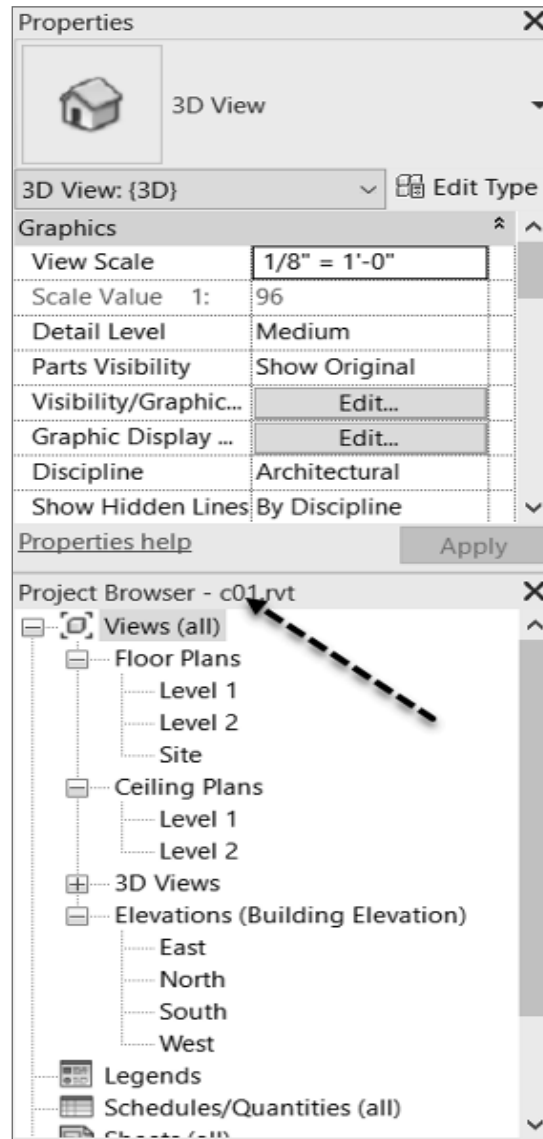


FIGURE 1 . 4 4 The Project Browser is your new BIM Windows Explorer.

2. The Project Browser is broken down into categories. The first category is Views. The first View category is Floor Plans. In the Floor Plans category, double-click Level 1.
3. Double-click Level 2. Notice that the walls look different than in Level 1. Your display level is set to Coarse. This is because any change you make on the View Control bar is for

that view only. When you went to Level 2 for the first time, the change to the display level had not yet been made.

4. In the view window, you see little icons that look like houses (see Figure 3.45). These are elevation markers. (Metric users, yours are round.) The elevation marker to the right might be in your building or overlapping one of the walls. If this is the case, you need to move it out of the way.

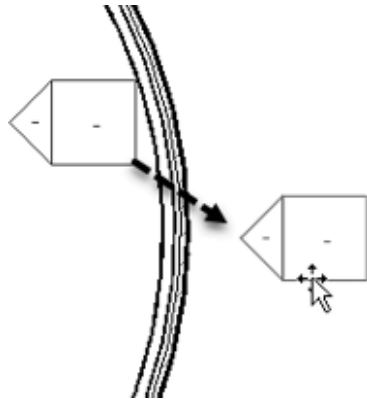


FIGURE 3 . 4 5 Symbols for elevation markers in the plan.

If you need to move them, you must do so by picking a window. There are two items in an elevation marker.

5. Pick a box around the elevation marker. When both the small tri- angle and the small box are selected, move your mouse cursor over the selected objects.
6. Your cursor turns into a move icon. Pick a point on the screen, and move the elevation marker out of the way.
7. In the Project Browser, find the Elevations (Building Elevation)category. Double-click South.
8. Also in the Project Browser, notice the 3D Views category. Expand the 3D Views category, and double-click the {3D} choice. This brings you back to the 3D view you were looking at before this exercise.

Now that you can navigate through the Project Browser, adding other components to the model will be much easier. Next, you'll begin to add some windows.

Windows

By clicking all these views, you're simply opening a view (window) of the building, not another file that is stored somewhere. For some users, this can be confusing. (It was initially for me.)

When you click around and open views, they stay open. You can quickly open many views. There is a way to manage these views before they get out of hand.

In the upper-right corner of the Revit dialog, you'll see the traditional close and minimize/maximize buttons for the application. Just below them are the traditional buttons for the files that are open, as shown in Figure 3.46. Click the X to close the current view.

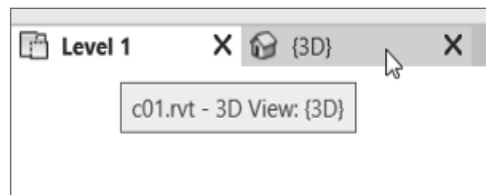


FIGURE 3.46 You can close a view by clicking the X for the view.

This doesn't close Revit—or an actual file for that matter—it simply closes that view.

In this case, you have multiple views open. This situation (which is quite common) is best managed on the View tab. To use the Window menu, perform the following steps:

1. On the Windows panel of the View tab, click the Switch Windows button, as shown in Figure 3.47.

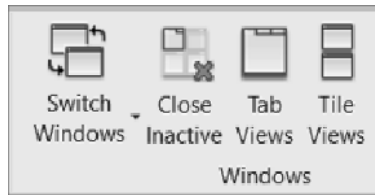


FIGURE 1 . 4 7 The Switch Windows menu lists all the current views that are open.

2. After the menu is expanded, look at the open views.
3. Go to the {3D} view by selecting it from the Window menu and clicking the 3D icon at the top of the screen or by going to the {3D} view in the Project Browser.
4. On the Windows panel, click Close Inactive.
5. In the Project Browser, open Level 1.
6. Go to the Windows panel, and select Tile Views.
7. With the windows tiled, you can see the Level 1 floor plan along with the 3D view to the side. Select one of the walls in the Level 1 floor plan. Notice that it's now selected in the 3D view. The views you have open are mere representations of the model from that perspective.

Each view of the model can have its own independent view settings.

8. Click into each view, and type ZA. Doing so zooms the extents of each window. This is a useful habit to get into.

You're at a safe point now to save the file. This also brings us to a logical place at which to discuss the various file types and their associations with the BIM model.

3.3 File Types and Families

Revit has a unique way of saving files and using different file types to build a BIM model. To learn how and why Revit has chosen these methods, follow along with these steps:

1. Click the Save icon (see Figure 3.48).
2. In the Save As dialog, click the Options button in the lower-right corner (see Figure 3.49).

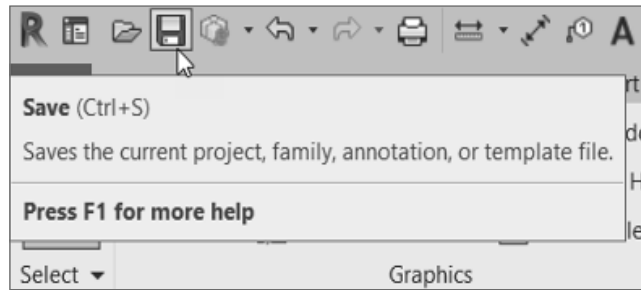


FIGURE 3 . 48 The traditional Save icon brings up the Save As dialog if the file has never been saved.

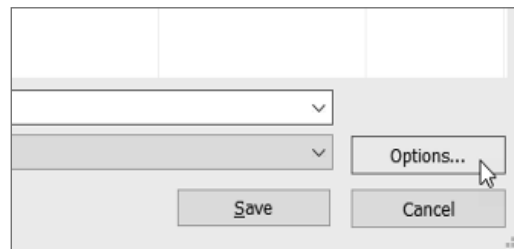


FIGURE 3 . 49 The Options button in the Save As dialog lets you choose how the file is saved.

3. In the File Save Options dialog is a place at the top where you can specify the number of backups, as shown in Figure 3.50. Set this value .

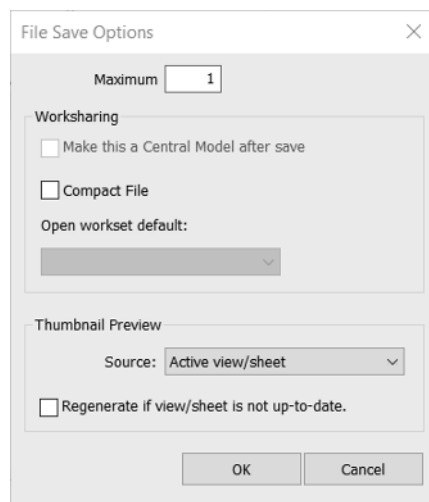


FIGURE 3 . 50 The options in the File Save Options dialog box let you specify the number of backups and the view for the preview.

4. Revit provides this option because when you click the Save icon, Revit duplicates the file. It adds a suffix of 000 to the end of the file- name. Each time you click the Save icon, Revit records this save and adds another file called 000 , leaving the 000 file intact. The default is to do this three times before Revit starts replacing 000002, and 0003 with the three most current files.

5. In the Preview section, you can specify in which view this file will be previewed. I like to keep it as the active view. That way I can get an idea of whether the file is up to date based on the state of the view. Click OK.

6. Create a folder somewhere, and save this file into the folder. The name of the file used as an example in the chapter is ER.rvt. (NER stands for “No Experience Required.”) Of course, you can name the file anything you wish, or you can even make your own project using the steps and examples from the chapter as guidelines.

Now that you have experience adding components to the model, it’s time to investigate exactly what you’re adding here. Each component is a member of what Revit calls a family .

System and Hosted Families (.rfa)

A Revit model is based on a compilation of items called families. There are two types of families: system families and hosted families. A system family can be found only in a Revit model and can’t be stored in a separate location. A hosted family is inserted similarly to a block (or cell) and is stored in an external directory. The file extension for a hosted family is rf

System Families

System families are inherent to the current model and aren’t inserted in the traditional sense. You can modify a system family only through its element properties in the model. The walls you’ve put in up to this point are system families, for example. You didn’t have to insert a separate file in order to find the wall type. The system families in a Revit model are as follows:

- Walls
- Floors
- Roofs
- Ceilings
- Stairs
- Ramps
- Shafts Rooms
- Schedules/quantity takeoffs
- Text
- Dimensions
- Views

System families define your model. As you can see, the list pretty much covers most building elements. There are, however, many more components not included in this list. These items, which can be loaded into your model, are called hosted families.

Hosted Families

All other families in Revit are hosted in some way by a system family, a level, or a reference plane. For example, a wall sconce is a hosted family in that, when you insert it, it's appended to a wall. Hosted families carry a file extension of .rf . To insert a hosted family into a model, follow these steps:

1. Open the NER- 1 rv file or your own file.
2. Go to Level 1.
3. On the Architecture tab, click the Door button.
4. On the Modify | Place Door tab, click the Load Family button, as shown in Figure 3.51. This opens the Load Family dialog.

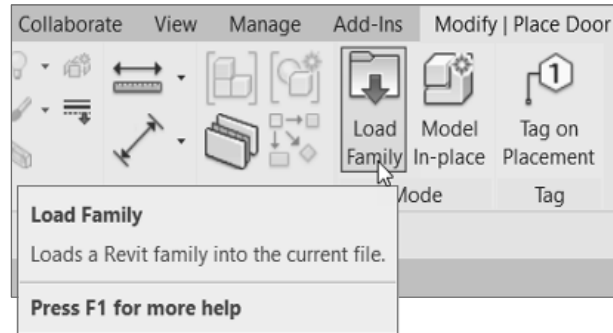


FIGURE 3 . 5 1 You can load an RFA file during the placement of a hosted family.

5. Browse to the D r directory.

Note that, if you're on a network, your directories may not be the same as in this chapter. Contact your CAD/BIM manager (or whoever loaded Revit onto your computer) to find out exactly where they may have mapped Revit.

6. Notice that there is a list of doors. Open the ommercial folder, select Door-Exterior-Double_Two-Lite.rfa, and click Open. (Metric users, select M Double-Panel 2.rfa.)

7. In the Properties dialog, click the Type Selector, as shown in Figure 1.52. Notice that in addition to bringing in the door family, you have seven different types of the door. These types are simply variations of the same door. You no longer have to explode a block and modify it to fit in your wall.

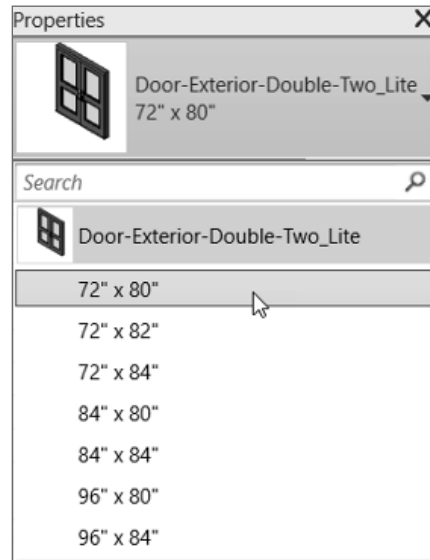


FIGURE 3 . 5 2 Each family RFA file contains multiple types associated with that family.

8. Select Door-Exterior-Double-Two_Lite 72 x 80 as shown in Figure 1.52.
9. Zoom in on the upper-left corner of the building, as shown in Figure 1.53.
10. To insert the door into the model, you must place it in the wall. (Notice that before you hover your cursor over the actual wall, Revit won't allow you to add the door to the model, as shown in Figure 3.53.) When your pointer is directly on top of the wall, you see the outline of the door. Pick a point in the wall, and the door is inserted. (We'll cover this in depth in the next chapter.).

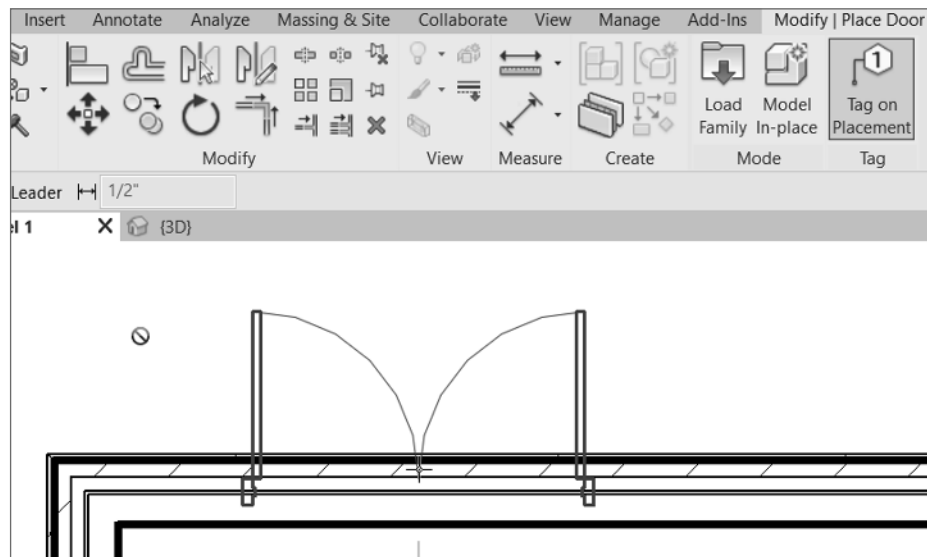


FIGURE 3 . 5 3 Inserting a hosted family (rf)

11. Delete the door you just placed by selecting it and pressing the Delete key on your keyboard. This is just practice for the next chapter.

You'll use this method of inserting a hosted family into a model quite a bit in this chapter and on a daily basis when you use Revit. Note that when a family is loaded into Revit , there is no live path back to the file that was loaded. After it's added to the Revit model, it becomes part of that model. To view a list of the families in the Revit model, go to the Project Browser and look for the Families category. There you'll see a list of the families and their types, as Figure 1.54 shows.

The two main Revit file types have been addressed. Two others are also crucial to the development of a Revit model.

Using Revit Template Files (.rte)

The r extension pertains to a Revit template file. Your company surely has developed a template for its own standards or will do so soon. An .r e file is the default template that has all of your company's standards built into it. When you start a project, you'll use this file. To see how an r e file is used, follow these steps:

1. Click the File Tab, and select New Project.
2. In the resulting dialog, shown in Figure 3.55, click the Browse button.

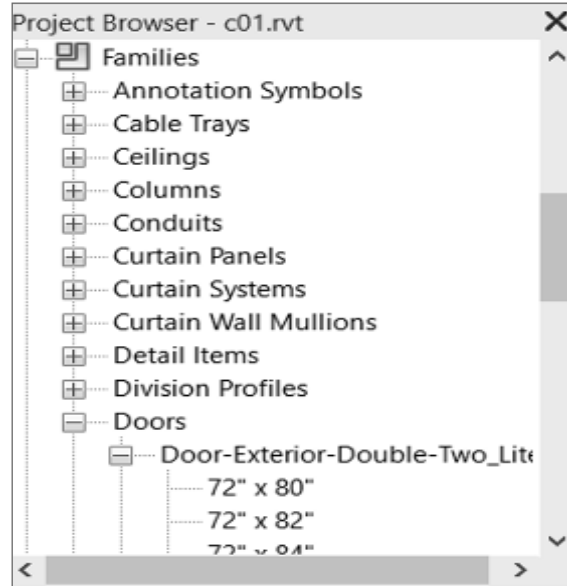


FIGURE 3 . 5 4 All the families are listed in the Project Browser.

3. Browsing throws you into a category with several other templates. You can now choose a different template.

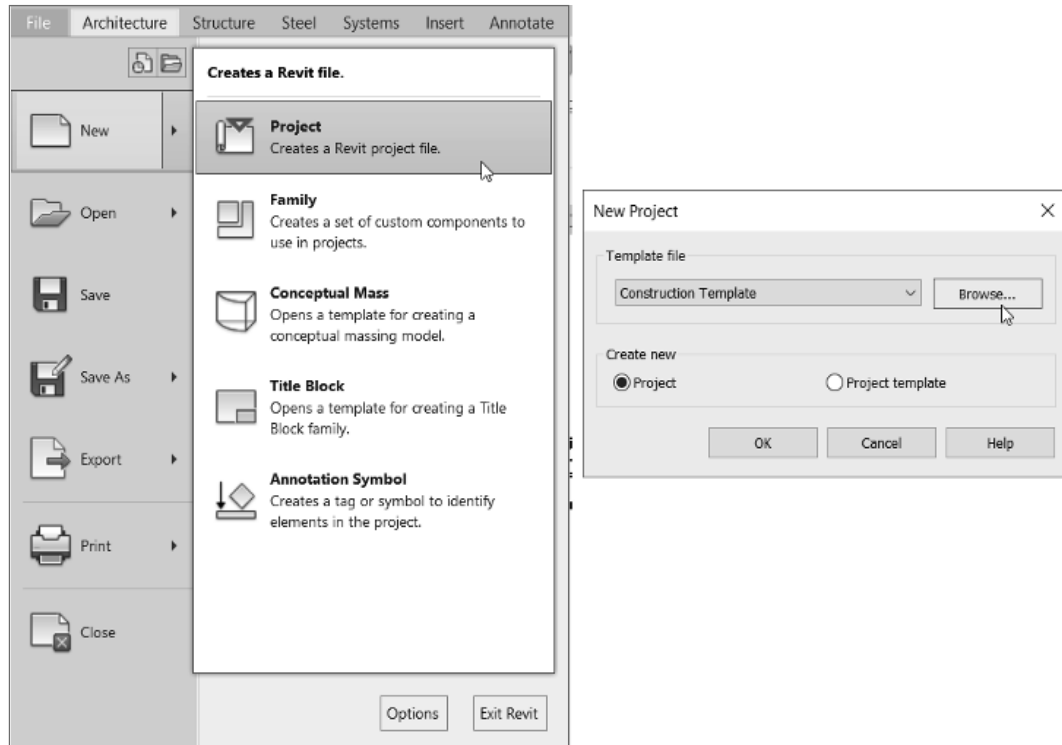


FIGURE 3 . 5 5 A new Revit model is based on an RTE template file.

4. Click Cancel twice.

Whenever you start a project, you'll use the RTE template. When you start a new family, however, you'll want to use an RFT file.

Using Revit Family Files (.rft)

The rf extension is another type of template—only this one pertains to a family. It would be nice if Revit had every family fully developed to suit your needs. Alas, it doesn't. You'll have to develop your own families, starting with a family template. To see how to access a family template, perform these steps:

1. Click the File tab, and select NewFamily to open the browse dialog shown in Figure 1.56.

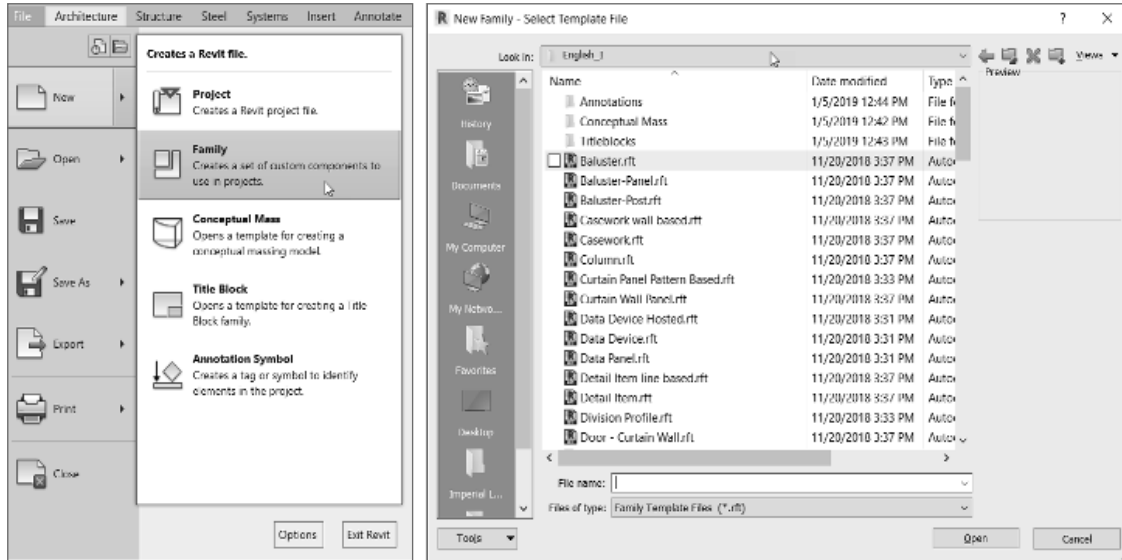


FIGURE 4 . 5 6 The creation of a family starts with templates.

1. Browse through these templates. You'll most certainly use many of them.
2. Click the Cancel button.

3.4 Creating a Project

When creating a project in Revit Architecture, *you can* :

- Use default settings, which are defined in a project template. Revit Architecture includes a default template called : *Default .rte*, which contains several settings to help you begin the design process immediately. For information about changing the default template, see [File Location Options](#) .


- Use a [custom template](#).

Creating a Project Using Default Settings

Use this procedure when you want to use the default template. It skips the step of specifying the template to use when creating the project.



Do one of the following:

- Press *Ctrl +N*.
- On the [Recent Files](#) window, under Projects, click New.

Revit Architecture creates a project file, using settings in the default template. The default project name displays in the title bar of the Revit window. To assign a different file name, click  > (Save As).

Creating a Project Using a Template

Use this procedure when you want to be able to specify the template to use when creating the project.

- 1 .Click  > New >  (Project).
- 2 .In the New Project dialog, for Template file, click Browse.
- 3 .Navigate to the location of the desired project template, select the template file (with the file type RTE), and click Open.

Revit Architecture provides several project templates, which reside in the Metric Templates or Imperial Templates folder in *the following location*:

- **Windows XP:**

C:\Documents and Settings\All Users\Application Data\Autodesk\<product name and release>

- **Windows Vista or Windows 7:**

C:\ProgramData\Autodesk\<product name and release>

You can use one of these templates or [create your own templates](#) as needed to maintain corporate standards or to simplify the setup process for different types of projects.

- 4 .For Create new, click Project.
- 5 .Click OK.

Revit Architecture creates a project file using the settings defined by the specified template. The default project name appears in the title bar of the Revit window. To assign a different file name, click 

➤  (Save As).

Related topics

- [Creating a Template](#)
- [Project Template Settings](#) .

Before You Begin a Project

Before you start adding content to a Revit project, consider the following approaches to the design process:

- **Using levels and grids.** Begin the design process by defining levels and grids for the model. See [Levels and Grids](#) .

- **Importing data.** If you started the design process using another CAD program (such as AutoCAD), you can import existing data. Revit Architecture imports various CAD formats, including DWG, DXF, DGN, and ACIS SAT files, as well as Sketch Up (SKP) files and Industry Foundation Classes (IFC). See [Import/Link Overview](#) .

- **Massing.** You can start a project by designing a conceptual model. After you create basic shapes with the massing tools, you can convert mass faces to building elements. See [Massing Studies](#) and [Conceptual Design Environment](#) .

3.5 Using Information from Other Sources

Read these topics to learn how to incorporate information from other sources into Revit projects.

Import/Link Overview

- The Import and Link tools allow you to import or link to various file formats.
- Different file formats may be imported with different qualities of geometry. For information about variations in imported geometry, see [Suitability of Imported Geometry](#).
- When you import files, you may need to zoom in the drawing area to see the imported data. See [Zooming Project Views](#).
- For information about linking Revit models, see [Linked Models](#).

Suitability of Imported Geometry

When you import a file into Revit Architecture, the format of the imported file may support varying qualities of geometry. These variations are caused by the file type, the export settings, and the import settings.

Some tools and capabilities in Revit Architecture require specific types of geometry. For example:

- The Join Geometry tool requires volumetric geometry.
- Rendering an image requires that faces are associated with material properties.
- The Roof by Face tool requires geometry with suitably sized faces for flat roof panels or a NURB representation of a complex, shaped roof panel.
- Masses require volumetric geometry to calculate volume, surface area, and floor area faces. See [Considerations for Imported Geometry in Mass or Generic](#)

Model Families and Importing Massing Studies from Other Applications .

You can import many different types of file formats into Revit Architecture. When you export a file from the originating application for use with Revit Architecture, you can set a variety of export options. With these many variations of file formats and export options, it is important to ensure that the exported file.

provides the geometric data needed for the Revit capability that you plan to use. To optimize results with various file formats, consult the documentation provided with the exporting applications.

Implications of Importing vs. Linking for Xrefs

Suppose you use AutoCAD to generate a DWG file that contains external references (xrefs). When you import or link the DWG file, Revit Architecture displays the geometry from the nested xrefs. The decision to import or link a file to a Revit project affects what you can do with the xref information:

- If you **import** the file, you can explode the nested xrefs to Revit elements. However, if the xref file is updated after the import, Revit Architecture will not automatically reflect changes to the xref file.
- If you **link** the file, Revit Architecture automatically updates the geometry to reflect changes to the xref files. However, you cannot explode the nested xrefs to Revit elements.

For more information, see [Exploding Imported Geometry](#) .

Importing or Linking CAD Formats

Open a Revit project, and use the Import CAD or Link CAD tools to import or link vector data from other CAD programs such as AutoCAD (DWG and DXF), Micro

Station[®] (DGN), Sketch Up (SKP and DWG), and ACIS (SAT). Revit Architecture supports importing most DGN surfaces and solids with the exceptions of cones, B-Spline surfaces, and Smart Solids.

In addition to using the Import CAD and Link CAD tools, you can import CAD files using drag-and-drop from Windows[®] Explorer onto a model, drafting, or sheet view of Revit Architecture. See [Importing CAD Files Using i-drop](#) .

You can mirror imported and linked CAD files. See Mirroring Elements.

NOTE Revit Architecture :

imports ACIS solids from SAT files. SAT file formats later than version 7.0 do not import into Revit Architecture. You should determine which version your solid modeling program is creating. Some solid modeling products (such as form-Z[®]) create SAT file formats later than version 7.0 by default.

Snapping to Imported Geometry

Suppose that you import an AutoCAD[®] drawing into Revit Architecture and then want to trace over walls in that drawing. As you place the cursor near the lines representing the walls, it can snap to the lines or the midpoint between the lines.

Proxy Graphics from AutoCAD Files

Revit Architecture supports reading in proxy graphics from AutoCAD files. Proxy graphics are AutoCAD's representations of AutoCAD Architecture objects. Unlike AutoCAD Architecture objects, proxy graphics have no intelligence.

Proxy graphics can exist for many types of data in AutoCAD, including Mechanical Desktop (MDT) parts and AutoCAD Runtime extension (ARX) objects. If you set the Proxy graphics command to 1 in AutoCAD, Revit Architecture can then import ARX objects and AutoCAD Architecture objects (such as walls and floors) in the DWG or DXF file.



Subdivision Surfaces and Solids Created in AutoCAD

Revit Architecture can import DWG files containing subdivision surfaces and solids created in AutoCAD. Some complex subdivision meshes may fail to convert to a traditional solid or surface altogether, or generate a problematic solid or surface. Other highly complex SubD meshes may not import completely or at all.

Cutting Imported Geometry

When you import a 3D DWG file into a Revit Architecture project, the imported DWG geometry will not be cut. For example, if you create a level at the elevation of a typical wall and then go to that plan view, the imported geometry will not cut at that level. However, if you import the geometry into a cut table in-place family (such as Generic Model), the geometry will cut in accordance with Revit Architecture's cut planes.

Importing or Linking CAD Files Using the Import CAD and Link CAD Tools

- 1 Click Insert tab ➤ Import panel ➤  (Import CAD), or click Insert tab ➤ Link panel ➤  (Link CAD).

If you link the file instead of importing it, see [Implications of Importing vs. Linking for Xrefs](#).

- 2 In the Import CAD Formats or Link CAD Formats dialog, navigate to the folder that contains the file to import or link.
- 3 Select the file.
- 4 Specify the import or link options. See [Import and Link Options for CAD Formats and Revit Models](#) .
- 5 Click Open.
- 6 If you chose to manually place the imported data, it displays in the drawing area and moves with the cursor. Click to place the imported data.
You may need to zoom in to see the imported data. See [Zooming Project Views](#) .

Related topics

- [Importing or Linking CAD Formats](#) .
- [Moving a View-Specific Import to the Foreground or Background](#) .

Importing CAD Files Using i-drop

Revit Architecture supports the Autodesk i-drop® drag-and-drop feature. When i-drop objects are pulled from an i-drop-enabled web page, Revit Architecture downloads the file and imports it as if it were pulled from a local file.

When you drag-and-drop a file, the file is imported with the default settings. If you want to use different settings (for example, Manual - Origin rather than Auto - Center to Center), import the file using the Import CAD tool. (See [Importing or Linking CAD Files Using the Import CAD and Link CAD Tools](#).)

To import CAD files using i-drop

1. From an i-drop-enabled web page, click the thumbnail image of the object.
2. Drag the file from the web page into Revit Architecture.
3. Release the object directly into the active view.

Importing Files from Sketch Up

Google™ Sketch Up® is a general purpose modeling and visualization tool. Revit Architecture uses building information modeling (BIM), in which building elements understand their relationship to each other. When working on a design project, you can use both products to leverage the unique strengths of each. For example:

- If you want to model an initial design pass or quickly model a single element, start with Sketch nUp. Later, use Revit Architecture to refine the design.
- If you want to design entire building masses and then associate real building elements to them, use Sketch Up for the design phase. Later use Revit Architecture for the detailed planning phase.

To use a Sketch Up design in Revit Architecture, import a SKP file from SketchUp directly into Revit Architecture. As an alternative, you can use Sketch Up to export a DWG file, and then import that DWG file into Revit Architecture.

To incorporate a SketchUp design into a Revit project, use the following general process:

- 1 Use Revit Architecture to create a family outside the project or an in-place family within the project.
- 2 Import the SketchUp file into the family.
- 3 If you created the family outside the project, load the family into the project.

Related topic

- [Importing Massing Studies from Other Applications](#) .

Importing SKP Files

Before importing a SKP file from SketchUp into Revit Architecture, do the following:

- Make sure you import the geometric data needed for the Revit capability that you plan to use. See [Suitability of Imported Geometry](#) .
- Review [Limitations of SketchUp Data Imported to Revit Architecture](#).
- Review [Best Practices When Importing Masses](#) .

To import Sketch Up files

1 Create an in-place family in a Revit project, or create a family in the Family Editor.

See [Revit Families](#) .

2 Click Insert tab ➤ Import panel ➤  (Import CAD).

3 In the Import CAD Formats dialog, navigate to the folder that contains the Sketch Up file.

4 For Files of Type, select the SKP file type

5 Select the file to import.




6 Specify the desired import settings.

The following settings are recommended:

- Colors: Preserve
- Layers: All
- Import Units: Auto-Detect
- Positioning: Auto - Origin to Origin
- Place at: Level 1 or Ref. Level
- Orient to View

7 Click Open.

You may need to do the following to see the Sketch Up-based form:

- Switch to a 3D view.
- To improve visibility, on the View Control Bar, for Visual Style, select  (Shaded with Edges).
- Click Home tab > Work Plane panel >  (Set). In the Work Plane dialog, select a plane.
- Type **ZF** (Zoom to Fit) to adjust the drawing area to show the entire mass.
- If you are creating a mass family, click Massing & Site tab > Conceptual Mass panel >  (Show Mass).

Limitations of Sketch Up Data Imported to Revit Architecture

Revit Architecture treats the data imported from Sketch Up as a large block of geometry that resists being manipulated (in the ways that you can usually manipulate geometry that is native to Revit Architecture). However, you can change the layer settings from Sketch Up. (For example, to assign colors or materials on a by-layer basis, click Manage tab > Settings panel > Object Styles, and change settings on the Imported Objects tab.) When you import a Sketch Up design into a Revit mass family and then load the mass family into a Revit project, you can convert mass faces (from the Sketch Up design) into walls, floors, and roofs. (See [Importing Massing Studies from Other Applications](#) .)

When creating content in Sketch Up for use in Revit Architecture, consider the following restrictions:

- **Exploding 3D data:** In Revit Architecture, you will not be able to explode 3D data. If you try this, 3D faces will disappear, and you will receive a warning message.
- **Parameters:** In Revit Architecture, you cannot add parameters to control geometric flexing. However, you can add some controls that manipulate imported data, such as the location of an imported element and its material assignments.
- **Visibility/graphics:** In Revit Architecture, you cannot manipulate the geometry or isolate parts of whole elements with visibility/graphics settings.
- **Two-sided surfaces:** If a material or color is assigned to only one side of a surface in Sketch Up, Revit Architecture applies the material or color to both sides of the surface by default. If there is material on both sides of the surface,

Revit Architecture applies the Face 1 material to both sides. If faces are flipped and painted differently in Sketch Up, they may not display the correct material in Revit Architecture.

- **Sketch Up properties:** The following Sketch Up properties are currently not supported in Revit Architecture import: Texture Image Maps, Transparency, “Smooth” Curved Surfaces, Text and Dimensions, Raster Images, and saved “Pages”.
- **Cut planes:** Imports cannot be cut by a cut plane unless imported into a cut table family category. See [Cut table Families](#) .
- **Sketch Up and massing:** Not all Sketch Up imports are appropriate to massing. See [Suitability of Imported Geometry](#) .

Also see [Importing Massing Studies from Other Applications](#) .

- **Scaling:** Groups or components that have been scaled in their entirety with the SketchUp Scaling tool may be incorrectly scaled when imported to Revit Architecture. Exploded SketchUp models should import at the correct scale.

Importing ACIS Objects

Revit Architecture supports the import of ACIS objects contained in DWG, DXF, and SAT files. (ACIS objects describe solids or trimmed surfaces.) For example, you can create ACIS objects using the AutoCAD commands Draw Solids and Draw Region. You can also import Smart Solids™ from Micro Station® into Revit Architecture. To import ACIS objects, use the procedure [Importing or Linking CAD Files Using the Import CAD and Link CAD Tools](#) .

Revit Architecture supports the following types of surfaces when importing ACIS objects:

- Plane
- Sphere
- Torus
- Cylinder
- Cone
- Elliptical cylinder
- Elliptical cone
- Extruded surface
- Revolved surface
- NURB surfaces

You can import NURB (non-uniform rational B-splines) surfaces on ACIS objects in DWG or SAT files into Revit mass or generic model families while you are creating the family. You can then use the Roof by Face and Curtain System by Face tools to create roofs and curtain systems on these imported surfaces. For more information, see [Modeling by Face](#) .

To use ACIS imports for face-based host tools, import geometry into an in-place family of category Mass or Generic Model. Face-based tools work best on ACIS solids. For example, if you create walls by face on a cube, the walls join and miter correctly. If you create a curtain system by face on a solid, you can add corner mullions onto the joins between faces of the curtain system. For more information on face-based tools, see [Creating Building Elements from Mass Instances](#) .

Import and Link Options for CAD Formats and Revit Models

The following options apply to linked or imported CAD format files (on the Import CAD Formats and Link CAD Formats dialogs that display when you click Insert tab ➤ Import panel ➤ Import CAD, or Insert

tab ➤ Link panel ➤ Link CAD). Positioning options also apply to linked Revit models (when you click Insert tab ➤ Link panel ➤ Link Revit).

The following is options and definitions :

Option**Definition*****Current View Only***

Imports a CAD drawing into the active Revit view only. For example, you might want an AutoCAD object to appear only in a Revit floor plan view and not in a 3D view. If you set this option, any text in the imported file is visible and can be cropped by the crop region of the view. If you are using work sharing, the import will belong to a view work set.

If the option is not selected, only lines and geometry are imported, and the import behaves like model geometry: it can be cropped by the crop region of the view. This option is not available in 3D views. If you are using work sharing, the import will belong to a model work set.

Colors**Invert**

Inverts the colors of all line and text objects from the imported file to Revit-specific colors. Dark colors become lighter, and light colors become darker. This can improve readability when the file is in Revit Architecture. This option is set by default.

Preserve

Preserves the colors defined in the imported.

Black and White

Imports the document in black and white.

<u>Option</u>	<u>Definition</u>
---------------	-------------------

<u>Layers</u>	
---------------	--

All	Imports or links all layers. Layers that are not visible in the link are turned off in the current view in Revit Architecture.
------------	--

Visible	Imports or links only visible layers.
----------------	---------------------------------------

Specify	Allows you to select the layers and levels to import or link (on the dialog that displays). Layers not selected are deleted.
----------------	--

If you select Visible or Specify and you are linking the file, when you later reload the linked file, still only the selected or visible layers originally linked are loaded. Any layers not selected or visible are not linked. If you later want omitted layers to be linked, you must delete the link and relink the file.

TIP *If you want to be able to see and hide layers as needed, you can link to all layers, and then click View tab ➤ Graphics panel ➤ Visibility/Graphics to control the visibility of different categories in a view. (See Visibility and Graphic Display in Project Views .) Or you can link to all layers, and then query the import and hide a selected layer in the active view. (See Querying Objects in Layers .*

Option**Import
Units****Definition**

Explicitly sets the unit of measure for imported geometry. The values are Auto-Detect, feet, inch, meter, decimeter, centimeter, millimeter, and Custom factor.

If you specify Auto-Detect for an AutoCAD file created in Imperial (English), then the file imports with feet and inches as the units. If the AutoCAD file was created in metric, then the file imports into Revit Architecture with millimeters as the units.

For Micro Station[®] files, Revit Architecture reads the units from the file and uses them.

Feet, inches, meters, centimeters, decimeters, millimeters are all supported. If the DGN file has custom units, then the unit in Revit Architecture defaults to feet.

For example, the file has a unit called widget where one widget equals 10 meters. When importing the file, select Custom factor for Import Units and specify a value of 10 in the adjacent text box. Each unit from the source file is now equal to 10 meters in the Revit file.

The value you enter here displays in the Scale Factor type property of the import symbol. If the units are known, you can select Custom factor and enter a scale factor. This can increase or decrease the size of the imported elements in Revit Architecture..

Option
Definition
Positioning
**Auto
Center to
Center**

Revit Architecture places the center of the import at the center of the Revit model. The center of a Revit model is calculated by finding the center of a bounding box around the model.

If most of the Revit Architecture model is not visible, this center point may not be visible in the current view. To make the point visible in the current view, set the zoom to Zoom View to Fit. This centers the view on the Revit Architecture model.

**Auto
Origin to
Origin**

Revit Architecture places the import's world origin at the Revit project's internal origin. If the import object has been drawn at a large distance from its origin, it may display at a large distance from the model. To test this, set the zoom to Zoom View to Fit.

**Auto - By
Shared
Coordinates**

Revit Architecture places the imported geometry according to its position with respect to the shared coordinates between the 2 files.

If there is no current shared coordinate system between the files, Revit Architecture notifies you, and uses Auto - Center to Center positioning. See [Shared Positioning](#) .

**Manual
Origin**


The imported document's origin is centered on the cursor.

**Manual
Base
Point**

The imported document's base point is centered on the cursor. Use this option only for AutoCAD files that have a defined base point.

<u>Option</u>	<u>Definition</u>
Manual Center	Sets the cursor at the center of the imported geometry. You can drag the imported geometry to its position.
Place at	Select the level to place the origin/base point.
Orient to View	Revit Architecture places the import at the same orientation as the current view. This option is available only for non–view-specific imports.

Setting Scaling for Imported DWG or DXF Files

- Select an import symbol and click Modify | <File Name> tab > Properties panel >  (Type Properties).
- In the Type Properties dialog, modify Import Units or Scale Factor.
- If you change the import units, the scale factor automatically updates. See [Import and Link Options for CAD Formats and Revit Models](#) .
- Click OK.

Setting Line Weights for Imported DWG or DXF Files

When you import a DWG or DXF file, each layer in the file is assigned a line weight based on the pen number-line weight settings. Revit Architecture can import pen numbers from a DWG or DXF file and map them to a Revit line weight. You can then save these mappings in a text file, and they become the set mappings for the project.

Revit Architecture includes the following files with pen and line weight mappings:

- importlineweights-dwg-AIA.txt
- importlineweights-dwg-BS1192.txt
- importlineweights-dwg-ISO13657.txt
- importlineweights-dwg-CP83.txt

These files reside in the Data folder of the Revit Architecture installation directory.

To set line weights

- 1 Click Insert tab ➤ Import panel ➤  .

The Import Line Weights dialog displays the mappings in the importlineweights-dwg-default.txt file.

- 2 If this is not the file that you want to edit, click Load, navigate to the correct mappings file, and open it.
- 3 In the dialog, match the appropriate pen to the appropriate line weight (for example: Pen Number 1 to Line Weight Number 1, Pen Number 2 to Line Weight Number 2, and so on). Set as many pen-line weight Mapping as desired .

AutoCAD SHX Fonts to TrueType Fonts

When you import AutoCAD drawings that contain text, you can map the AutoCAD SHX fonts to TrueType fonts so they appear correctly in Revit Architecture. You can map to any of your existing fonts.

To map TrueType fonts

- 1 Open the shxfontmap.txt file in a text editor. This file resides in the Data folder of the Revit Architecture installation directory.
- 2 On a new line, enter the SHX file name.
- 3 Press *Tab*.
- 4 Enter the name of the font to map it to.
- 5 Save and close the file.

You do not need to restart Revit Architecture for the font mapping to take effect. If you have already imported the file, you will need to import it again.

Setting Constraint Parameters for Imported Geometry

If you have imported geometry into all views, you can set the base level for it and specify a height offset from that level.

To set constraint parameters

- 1 Select the imported geometry.
- 2 On the **Properties palette**, set the Base Level and Base Offset instance parameters.

Alternatively, you can select the geometry in an elevation view and move it to adjust the base offset value.

Moving a View-Specific Import to the Foreground or Background

You can move a view-specific import symbol between the foreground and the background of a view, with respect to model elements in the view. If the import symbol is in the foreground of the view, it is in front of model elements, such as walls. It is still behind detail components and annotations.

- 1 Select the import symbol.
- 2 On the [Properties palette](#), for Draw Layer, specify Background or Foreground.

Alternatively, select Background or Foreground from the Options Bar.

You can also use the sort order for detail components to move an import symbol in front of or behind detail components. For more information on sort order tools, see [Sorting the Draw Order of Detail Components](#).

Importing Images

You can import raster images to a Revit project to use as background images or as visual aids needed during the creation of a model. By default, images are imported behind the model and annotation symbols; however, you can change the display order. You can import images into 2D views only.

You can import images using the Image tool or by dragging and dropping them from Windows® Explorer.

To import an image

- 1 Click Insert tab > Import panel >  (Image).
- 2 In the Import Image dialog, navigate to the folder containing the image file to import.
- 3 Select the file, and click Open.

The imported image displays in the drawing area and moves with the cursor. The image displays symbolically, with 2 crossing lines indicating the extents of the image.

4 Click to place the image.


Related topic

- [Adding an Image to a Sheet](#) .

Modifying Imported Images

You can modify imported images using tools (such as Rotate and Copy) on the Modify Raster Images tab. This tab displays when you select an imported image in the drawing area.

To modify an imported image

- 1 Select the image so that handles display on the image, and modify the image as follows:
 - To scale the image, drag the corner handles.
 - To move the image, drag it to the desired location.
 - To keep width and height settings proportional while scaling, on the [Properties palette](#), select Lock Proportions.
- 2 On the Properties palette, specify values for the height and width of the image.
- 3 If you want to rotate the image, click Modify | Raster Images tab ➤ Modify panel ➤  (Rotate). See [Rotating Elements](#) .
- 4 If you want to change the draw order, select the image and use the tools on the Arrange panel of the Modify | Raster Images tab.


The draw order of raster images can be controlled in the same manner as detail elements. See [Sorting the Draw Order of Detail Components](#) .

Related topics

- [Importing Images](#) .
- [Deleting Raster Images](#) .

The Manage Images tool lists all raster images in the project, including any rendered images that you have captured. The tool offers the only way for you to delete an image from the project. You cannot remove an image from the project by deleting it from a view or a sheet.

To delete a raster image



- 1 Click Insert tab ➤ Import panel ➤  (Manage Images). The Manage Images dialog lists all raster images in the project.
- 2 Select the image name, and click Delete.
- 3 Click OK when prompted to confirm the deletion.

Importing Building Components

Manufactured building components that are formatted as Autodesk Exchange (ADSK) files provide design and connection data that you can use to accurately place the component in a Revit project. These building components can be designed in mechanical applications, such as Autodesk[®] Inventor[®] and used in Revit Architecture, Revit MEP, and Revit Structure.

To open a building component ADSK file, *do one of the following*:

Deleting Raster Images


- Click  > Open >  (Building Component).
- Click Home tab > Build panel > Component drop-down > Place a Component. Then click Modify | Place Component tab > Mode panel > Load Family, select the ADSK file, and place it in the project.

Building Component ADSK Files

A building component ADSK file provides the following information to aid in the design process:

- Physical appearance of the component in views, such as 3D, which lets you determine clearance for accurate placement .
- Connectors and their placement .
- Data about the component, such as its identity data

Opening or loading an ADSK file automatically creates a family from the category that is based on the Omni Class assignment made on export.

You can also save the ADSK file as an RFA file ( > Save As > Family), which lets you create a family that can be used in multiple projects.. See Revit Families for more information about using families in Revit Architecture.

Working with Building Components

Using a building component ADSK file, you can:

- View the component's bounding box at a coarse detail level. Connectors will still display in their correct locations in the coarse scale view.
 - View the component's detailed appearance at fine and medium detail levels.
 - Change the component's graphic display by changing the detail level in the project. You can also modify the component's visibility settings in the Family Editor to coarse, medium, or fine.
 - View the component in a 3D, plan, elevation, or section view.
 - Place connectors on the component using the Family Editor. See [Connectors](#) .
 - Create new family types from the original component by adding new parameters or changing existing ones using the Family Editor.
 - View or change the component's identity data.
 - Use the component's reference planes or some of its geometry for dimensioning.
 - Tag and schedule the component's parameters.
 - Render the component.
- Restrictions to using a building component ADSK file include the following:
- The geometry of the component cannot be changed in Revit Architecture. Changes to geometry can only be made in the application in which the building component was originally designed.
 - Although the materials assigned in the mechanical application are not imported into Revit Architecture, you

can assign a material in Revit Architecture that applies to the whole component.

- Currently, the workflow is only one-way from Inventor to Revit Architecture. Inventor cannot open ADSK files.

Tips for Working with Building Components

Consider the following when working with building components:

- To optimize model performance in Revit Architecture, whenever possible, work with the building component as a bounding box at coarse scale.

- Because building components can have large quantities of detailed geometry, they might take a few minutes to open. If opening the component takes too long, or if zooming and panning performance is slow, ask its creator to further simplify the model prior to exporting.

- If the component opens in Revit Architecture with a different orientation than expected, either rotate the component in the Family Editor or ask its creator to create a custom Universal Coordinate System (UCS) and re-export the ADSK file using the new UCS.

- Use the Autodesk Inventor Translation report to review the export results. The report lists the contents of the ADSK file. Verify that the model elements were exported as you expected. Double-click the ADSK file to open the report in your Web browser.

Building Component Workflow

The following steps describe a typical workflow for using a building component in a Revit project. For example, suppose a manufacturer published the contents of a rooftop HVAC unit to its website as an ADSK file to be used by engineers and architects. You want to incorporate this building component in your model. Using the component's geometry and

data, you can properly place the component in the project and also create connectors on it, so the component can be used in Revit MEP.

Your workflow looks like the following:

1 Download the building component ADSK file from the manufacturer's website.

2 To open the ADSK file in Revit Architecture, click ... ➤ 

Open ➤  (Building Component).

NOTE You cannot open ADSK files that are associated with a later version of Revit.

3 Load the ADSK file into the project from the Family Editor.

NOTE You can load the ADSK file directly into the project. Click Home tab ➤ Build panel ➤ Component drop-down ➤ Place a Component. Then click Modify | Place Component tab ➤ Mode panel ➤ Load Family, select the ADSK file, and place it in the project.

4 Place the component in the project.

5 Display the component as a bounding box at a coarse level of detail.

6 Display the full geometry at medium and fine levels of detail.

7 View the component in any view.

8 Run an interference check to ensure proper clearance.

9 Tag and schedule the component using its parameters.

10 Dimension the component to its reference planes and to some of its geometry.

11 Create any extra connectors on the component in the Family Editor. When they are connected to building services in Revit MEP, the connectors can be used in flow analysis.

Opening Industry Foundation Class (IFC) Files

Revit Architecture opens Industry Foundation

Classes (IFC) based on the latest International Alliance for Interoperability (IAI) IFC 2x3 data exchange standard. (If you open a file that uses an earlier standard [IFC 2x or 2x2], Revit Architecture supports the format and opens it properly.) For information about the IFC file format, see [Exporting to Industry Foundation Classes \(IFC\)](#) .

When you open an IFC file, Revit Architecture creates a new file based on the default template. For information about selecting the default template, see [Selecting a Template for IFC Files](#) .

You can load your own IFC class mapping files and override the categories and subcategories for IFC objects.

To open an IFC file



 1 Click **File** > **Open** >  (IFC).

2 In the Open IFC File dialog, navigate to the IFC file to import.

3 Select the IFC file, and click Open.

Revit Architecture creates a new file based on the default template.

Selecting a Template for IFC Files



 1 Click **File** > **Open** >  (IFC Options).

2 In the Import IFC Options dialog, click Browse.



3 In the Browse for Template File dialog, navigate to the desired IFC template file, select it, and click Open.

4 In the Import IFC Options dialog, click OK.

Loading an IFC Class Mapping File

- 1  Click **File** > **Open** >  (IFC Options).
- 2 In the Import IFC Options dialog, click **Load**.
- 3 In the Load IFC Class Mapping File dialog, navigate to an IFC class mapping file, select it, and click **Open**.
- 4 In the Import IFC Options dialog, click **OK**.

Overriding Categories and Subcategories for IFC Objects

- 1  Click **File** > **Open** >  (IFC Options).
- 2 In the Import IFC Options dialog, double-click in a category or subcategory, and enter a new value to override the current value.

As an alternative, you can click **Standard** to reset all values to the standard (default) settings.
- 3 Click **OK**, or to save the mappings in a new file, click **Save As**.

Linking AutoCAD Files to a Revit Project

You can link AutoCAD files to a Revit project. For example, you may want to use linked files as follows:

- Some team members use AutoCAD to create details or elevations, but the rest of the project is created using Revit Architecture. You want to link the AutoCAD drawings to the Revit project and place them on sheets. These drawings can then be included in the set of construction documents that Revit Architecture generates.
- Team members from other disciplines (such as

structural engineers or electrical engineers) are using AutoCAD to plan their part of the project. You want to link their AutoCAD drawings to a Revit project to use them as underlays for your project views.

For example, the following floor plan shows a linked file that will be used as an underlay to trace and create structural walls in Revit Architecture. The following FIGURE3. 57

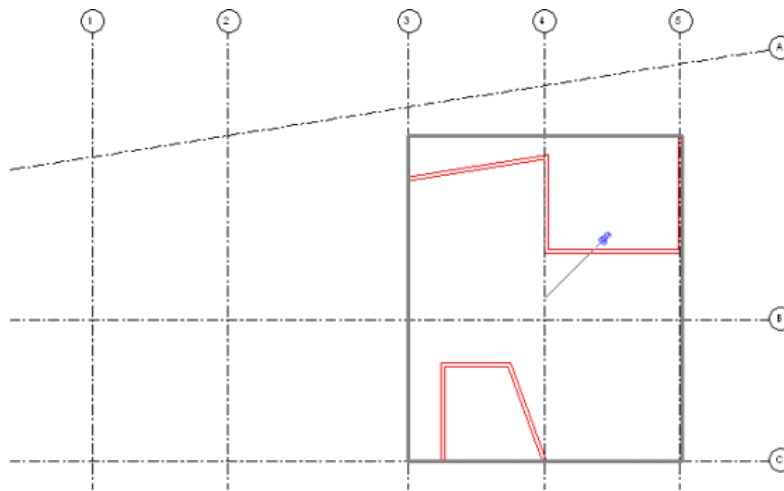


FIGURE3. 57

Related topics

- [Managing Links](#) .
- [Managing Layers in Linked and Imported Files](#) .

How Linking to AutoCAD Files Works

When you link an AutoCAD file to a project, Revit Architecture maintains a link to that file. Whenever you open the Revit project, Revit Architecture retrieves the current, saved version of the linked file and displays it in the project. Any changes to the

linked file are displayed in the Revit project. If the linked file changes while the Revit project is open, reload the file to retrieve the latest changes. (See [Managing Links](#)).


This ability to retrieve the latest changes to an AutoCAD file is the difference between linking and importing. When you import an AutoCAD file, Revit Architecture uses the version of the file that you imported. It does not retrieve or display changes to the imported file.

When you link (or import) an AutoCAD file to a Revit project, you can do the following:

- [Query objects in the file](#) .
- [Hide or delete selected layers in the file](#) .
- [Change the graphic display of layers in the file](#) .

When you link a file to a Revit project, you can control whether the linked file is visible only in the current view, or in all views. As a 2D drawing, the linked file is displayed only in relevant 2D Revit drawings, such as floor plans. In a 3D view, the linked file is displayed as flat, 2D shapes.

Linking to an AutoCAD File

- 1 Open the Revit project.
- 2 If you want the linked file to display only in a particular view, open that view.
- 3 Click Insert tab ➤ Link panel ➤  (Link CAD).
- 4 Specify the file to link, as follows:
 - For Look in, navigate to the location of the file.
 - For File name, specify the name of the file.
 - For Files of type, specify DWG.
- 5 Specify the following options for the linked file:
 - a If you want the linked file to display in the current view only, select Current view only.
If you do not select this option, the linked file is displayed in all relevant 2D views, such as floor plans.

- b For Layers, select one of the following values:
 - **All:** Displays all linked file layers in the Revit project, including hidden layers.
 - **Visible:** Displays visible layers of the linked file in the Revit project. Layers that are currently hidden in AutoCAD do not display in Revit Architecture.
 - **Specify:** Allows you to select the layers to display in the Revit project from a list. After you click Open, Revit Architecture displays the list of layers from which to choose.

6 Specify the desired import options.

For details about these options, see [Import and Link Options for CAD Formats and Revit Models](#).

7 Click Open.

8 If, for Layers, you chose Specify, the Select Layers/Levels to Import/Link dialog lists the layers in the file. Select the desired layers, and click OK.

Unselected layers are not available in the Revit project. (However, the layers still exist in the AutoCAD file.)

Revit Architecture retrieves the current version of the linked file and displays it in the current Revit view.

Related topics

- [Querying Objects in Layers](#) .
- [Hiding and Deleting Layers](#) .

- [Changing the Graphic Display of Layers](#) .
- [Managing Links](#) .

Location of the Linked File

Whenever you open a Revit project that is [linked](#) to a file, Revit Architecture retrieves the current saved version of the linked file. The path to the linked file displays in the Saved Path column of the Manage Links dialog. See [Unresolved References](#) .


If Revit Architecture cannot locate the linked file, it displays the path to the version of the linked file that it retrieved most recently. Revit Architecture is not able to update the link. To reload the linked file from a different location, use the Reload From function of the Manage Links dialog. See [Managing Links](#) .

Use the Path Type column to indicate whether the path is absolute or relative. In general, use a relative path instead of an absolute path.

- If you use a relative path and later move the project and the linked file together to a new directory, the link is maintained. The new working directory becomes the relative path for the linked file.
- If you use an absolute path and later move the project and the linked file to a new directory, the link is broken.

Use an absolute path when you link to a workshared file, such as a central file that other users need to access. This file is likely not to move from its location on the disk.

Linking DWF Markup Files

- 1 Click Insert tab ➤ Link panel ➤  (DWF Markup).
- 2 In the Import/Link DWF File dialog, navigate to the DWF markup file, select it, and click Open.

The Link Markup Page to Revit Sheets dialog opens. Under the DWF View column, the dialog displays the sheet view names that are marked up in the DWF file. The Revit View column displays the corresponding Revit sheet view. If the sheet name from the DWF file is the same as the sheet name from the Revit file, then the Revit sheet name is automatically filled in the Revit View column.

If the Revit sheet view name changed after it was exported to DWF, the Revit View column displays <Not linked> next to the DWF sheet view.

- 3 If the Revit View value is <Not linked>, select a Revit sheet view by clicking the box below the Revit View column, and selecting a name from the list.
You might also do this if you have several other sheet views in the Revit file, and you want to apply the markups to one of the other sheet views. This would make sense only if the other sheet title blocks were the same size as the original.
- 4 Click OK.

The DWF markups are placed on the sheet view as an import symbol. The markups are pinned, which means that you cannot modify their position or copy, rotate, mirror, delete, or group them unless they were created in Autodesk Design Review. See [Modifying DWF Markups Created in Design Review](#) .

Modifying DWF Markups Created in Design Review

If markups were created in Autodesk Design Review using its markup tools, you can modify the Status and Notes properties in Revit Architecture. This feature allows you to add information to the markup or maintain information about its status.

To modify markups created in Design Review

1 - Select a markup object that was created in Design Review.

A markup object might look as follows.in FIGURE 3. 58 .

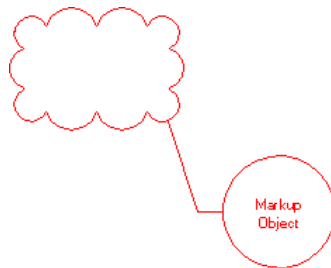


FIGURE 3. 58

2 - On the **Properties palette**, modify the Status and Notes properties as desired.

The changes are saved to the linked DWF file. The changes can be viewed in the DWF file by selecting the corresponding markup object.

Exploding Imported Geometry

When you import a drawing into Revit Architecture, you are importing all the elements, such as blocks and external references (xrefs) from the drawing. (See [Implications of Importing vs. Linking for Xrefs](#))

They are all contained inside a Revit element called an import symbol.

You can explode (disassemble) the import symbol into its next highest level elements: nested import symbols. This is a partial explode. A partial explode of an import symbol yields more import symbols, which, in turn, can be exploded into either elements or other import symbols. This is analogous to exploding in AutoCAD with nested xrefs and blocks. For example, you explode an xref into other xrefs and blocks. Those xrefs and blocks can, in turn, be exploded into more blocks and xrefs.

You can also explode the import symbol immediately into Revit text, curves, lines, and filled regions. This is a full explode.

To explode imported geometry

- 1 Select the import symbol.
- 2 Click Modify | <File Name> tab > Import Instance panel > Explode drop-down > Partial Explode or Full Explode.

Resulting partial explode import symbols can be exploded again by selecting them and clicking Partial Explode. You can continue to do this until all import symbols are converted to Revit elements.

Managing Layers in Linked and Imported Files

When you import or link a CAD file to a Revit

project, you can query, hide, delete, or change the graphic display of layers in the file.

Querying Objects in Layers


When you import or link a file to a Revit project, you can query the file for information about its objects. This allows you to determine the identity of an object and the layer on which it resides. You can also hide the object's layer or delete it.

To query objects in layers

- 1 Open a project view in Revit Architecture.
- 2 Highlight the import symbol for the file, and click to select it.

When you highlight the import symbol, the status bar displays the following:

<imported file name> : Import Symbol : location <Shared> or <Not Shared>.

- 3 Click **Modify** | <File Name> tab > **Import** Instance panel >  (Query).

- 4 Select the object to query, as follows:

- Move the cursor over the import symbol in the view.

Revit Architecture highlights lower-level objects (such as lines) first. Press *Tab* to switch to highlighting of higher-level objects, such as blocks.

- Watch the status bar. When it describes the target object, click to select it. The Import Instance Query dialog opens and displays the following information:

- Type: object type
- Block Name: the block that contains the object, if applicable
- Layer: the name of the layer containing the object
- Style By: indicates whether the object style comes from the layer or by color.

5 To hide the object's layer in the current view, click Hide in view. The selected layer may still be visible in other views.

View Control Bar. To redisplay the layer, click View tab > Graphics panel > Visibility/Graphics. On the Imported Categories tab, select the layer, and click OK.

6 To delete the object's layer from the Revit project, click Delete. The selected layer is no longer visible in any project views.

7 To close the Import Instance Query dialog, click OK.

The query editor remains active so that you can select other entities.

8 Press *Esc* to exit the query editor.

Hiding and Deleting Layers

When you import or link a file to a Revit project, you may not want all of the file's layers to be visible in Revit Architecture. To control the visibility of layers, you can do either of the following:

- **Hide layers:** When you hide layers, they are still available to the Revit project, but they do not display in views. You can make them visible again as needed.
- **Delete layers:** When you delete layers, they are not available to the Revit project. (However, they still exist in the original CAD file.) If you want to restore the layers, you must delete the file and either import or link it to the project again.

Related topic


- [Changing the Graphic Display of Layers](#) .

Hiding Layers

When you import or link a file, you can specify how to hide its layers in each Revit view. For example, you can display all layers in one view, but hide some layers in another view. You can redisplay the layers later, if needed.

If you are not sure on which layer an object resides, see [Querying Objects in Layers](#) .

To hide layers

- 1 Open a project view in Revit Architecture.
- 2 Click View tab > Graphics panel >  (Visibility/Graphics).
- 3 Click the Imported Categories tab.
- 4 In the Visibility column, click to expand the DWG file name of the linked or imported file. Revit Architecture lists the layers in the file.
- 5 Clear the check boxes for any layers that you want to hide in the current view.
- 6 Click OK.

The layers are hidden in the current view only. To redisplay hidden layers, repeat this process and select the desired layers.


Deleting Layers

When you delete layers in either an imported file or a linked file, the layers are no longer available to the Revit project. (However, they still exist in the original CAD file.) If you want to restore the layers, you must delete the file from the Revit project and link to or import it again.

To delete layers in a linked or imported file, use one of the following methods:

- When you link or import the file to the Revit project, in the Import or Link dialog, for Layers, select Visible to display only the layers that are currently visible in AutoCAD, or select to specify the layers to display in Revit Architecture. Any omitted layers are effectively deleted. They are not available to the Revit project.
- If you want to delete an object in a CAD file, and you are not sure on which layer it resides, see [Querying Objects in Layers](#) .
- Delete specified layers, as described in the following procedure.

To delete known layers

- 1Open a project view in Revit Architecture.
- 2Highlight the import symbol for the file, and click to select it. The status bar displays the following:
<imported file name> : Import Symbol : location <Shared> or <Not Shared>.
- 3Click Modify | <File Name> tab > Import Instance panel >  (Delete Layers).
- 4In the Select Layers/Levels to Delete dialog, select the layers to delete, and click OK. The deleted layers do not display in any views in the Revit project.

Changing the Graphic Display of Layers

When you import or link a file to a Revit project, you can control the graphic display of each layer in the file. For example, you can change the line color, weight, and style of the objects. For example, when using a file as an underlay, you can display the entire file in halftone to distinguish it from the Revit model.

Related topic


- [Hiding and Deleting Layers](#) .

Preserving or Discarding Graphic Overrides for Linked Files

When you change the graphic display of layers in a [linked file](#), you can specify whether Revit Architecture preserves or discards the graphic overrides.

When you preserve graphic overrides, Revit Architecture retains any changes made to the graphic display of its layers when it reloads the linked file. Otherwise, Revit Architecture discards graphic overrides when reloading the linked file. This option applies to all CAD files that are linked to the project.

To preserve or discard graphic overrides for linked files

- 1 Open the Revit project.
- 2 Click Manage tab ➤ Manage Project panel ➤  (Manage Links).
- 3 In the Manage Links dialog, do either of the following:
 - To retain the overrides, select Preserve graphic overrides.

- To discard the overrides, clear Preserve graphic overrides.


4 Click OK.

Making Global Changes to the Graphic Display of Layers

When you import or link a file to a Revit project, you can control the graphic display of file layers in all views.

To make global changes to the graphic display of layers :

1 Open the Revit project.

2 Click Manage tab > Settings panel >  (Object Styles).

3 In the Object Styles dialog, click the Imported Objects tab.

4 Click to expand the DWG file name of the file. Revit Architecture lists the layers in the file.

5 For each layer, change the values for Line Weight, Line Color, or Line Pattern, as desired. See [Object Styles](#) .

6 Click OK.

Related topics


- [Preserving or Discarding Graphic Overrides for Linked Files](#) .
- [Hiding and Deleting Layers](#)

Making View-Specific Changes to the Graphic Display of Layers

When you import or link a file to a Revit project, you

can control the graphic display of its layers in individual views.

To make view-specific changes to the graphic display of layers

- 1 Open a project view that shows the file.
- 2 Click View tab > Graphics panel >  (Visibility/Graphics).
- 3 Click the Imported Categories tab.
- 4 If you want the entire file to appear in halftone, select Halftone. See [Halftone/Underlay](#) .
- 5 In the Visibility column, click to expand the DWG file name. Revit Architecture lists the layers in the file.
- 6 To change the graphic display of a visible layer in the file:
 - a Click the Lines column for the layer, and click Override.
 - b In the Line Graphics dialog, specify the line weight, color, and pattern, and click OK.
- 7 In the Visibility/Graphic Overrides dialog, click OK.

Related topics

- [Preserving or Discarding Graphic Overrides for Linked Files](#) .
- [Hiding and Deleting Layers](#) .

Troubleshooting Problems with Linked Files

The following topics describe issues that you may encounter when linking files to Revit projects.

Changes in the DWG File Are Not Reflected in the Revit Project

Symptom: After linking a DWG file to a Revit project, you made changes to the DWG file in AutoCAD. However, the Revit project does not display these changes.

Issues and Solutions: This issue can have several causes:

- The linked file was changed after it was loaded into the Revit project, and the Revit project is still open. To correct this situation, reload the linked file. In Revit Architecture, click Manage tab > Manage Projects panel > Manage Links. In the Manage Links dialog, on the CAD Formats tab, select the linked file in the list, and click Reload. Click OK. Revit Architecture retrieves the most recently saved version of the linked file and displays it in the Revit project.
- See [How Linking to AutoCAD Files Works](#) . The file was imported, not linked. When a file is imported, Revit Architecture does not retrieve or display changes to the imported file. To confirm that the file was linked and not imported, click Manage tab > Manage Projects panel > Manage Links. In the Manage Links dialog, the CAD Formats tab lists all linked files. It does not list files that are imported. Therefore, if the file is not listed here, then it was imported. To correct this situation, go to the view in which the imported file displays, select it, and press *Delete*. Then link to the file. See [Linking to an AutoCAD File](#) .

- Revit Architecture cannot locate the linked file in its saved path.

If the linked file was moved, Revit Architecture cannot locate it, and so it cannot retrieve the latest saved version of the file.

To reload the file from a different location, use the Reload From function of the Manage Links dialog. (See [Managing Links](#) .)

Changes to the Layer Color and Line Style Do Not Display in the Revit Project

Symptom: You made changes to the graphic display of layers in the linked file. After the linked file was reloaded into the Revit project, these changes disappeared.

Issue: To save changes to the graphic display of layers in linked files, select the Preserve Graphic Overrides option on the Manage Links dialog. If this option is not selected, Revit Architecture discards graphic overrides when the linked file is reloaded.

Solution: See [Preserving or Discarding Graphic Overrides for Linked Files](#) .

Layers in the DWG File Do Not Display in the Revit Project

Symptom: Some layers in the linked file do not display in the Revit project.

Issue: The layers may be hidden or deleted.

Solution: To determine whether the layers are hidden or deleted, click View tab ➤ Graphics panel ➤ Visibility/Graphics. On the Imported Categories tab, click to expand the DWG file. Revit Architecture lists the layers in the file.

Layers that are not listed here have been deleted;

they are not available to the Revit project. If you want to restore the layers, you must first delete the linked file and then link it to the project again. When linking, be sure that for Layers, you select All or Select. See [Linking to an AutoCAD File](#) .

If the Visibility option for a layer is cleared, the layer is hidden in the current view. To display the layer, select the Visibility option, and click OK. Revit Architecture displays the layer in the current view.

File Operations (Open, Save, Synchronize) Are Blocked or Slow

Symptom: In some cases, Revit cannot open, save, or synchronize with files.

Issue: Some antivirus software solutions lock files, preventing other applications from accessing them.

Solution: You or your network administrator can define the following file extensions as exceptions in your antivirus filter.

- Revit Projects (RVT)
- Revit Families (RFA)
- Revit Templates (RTE)
- Autodesk Design Package (ADSK)
- Industry Foundation Classes (IFC)
- AutoCAD drawings (DWG)
- CAD Data Transfer (DXF)
- MicroStation drawings (DGN)
- ACIS models (SAT)
- SketchUp drawings (SKP)
- Images (BMP, JPG, and PNG)
- Data (RWS and DAT)

References:

- 1.. Daniel John Stine- Autodesk Revit 2021 Architectural Command Reference- 2021
- 2.. Daniel John Stine- Residential Design Using Autodesk Revit 2021- 1st Edition- 2021
- 3.. Wells, Don. "Extreme Programming: A Gentle Introduction," Extreme Programming, October 8, 2013, <http://www.extremeprogramming.org/>.
- 4.. Ngowtanasuwan, Grit.(2013)"Mathematical Model for Optimization of Construction Contracting in Housing Development Project", Mahasarakham University, Mahasarakham, Thailand.
- 5.. Piotrowski, Christine M. (2011)" problem Solving and Critical Thinking for Designers" John Wiley & Sons, Inc., Hoboken, New Jersey.
- 6.. Balachandran M. (1996) "Knowledge-Based optimum Design - Computation Mechanics Publications 1993. Southamton UK and Boston USA.
- 7.. Arayici, Y., Aoaud, G. (2011), "Building information modelling (BIM) for Construction Lifecycle.
- 8.. Management Chapter 4 In Construction and Building: Design, Materials, and Techniques edited by Sophie G. Doyle, Nova Science Publishers, NY, USA, ISBN: 978-1-61761-211-4.
- 9.. Treasury Task Force (2000). "How to Achieve Design Quality in PFI Projects", Technical Note 7. HMTreasury, London.

10. Piotrowski, Christine M. (2011) "problem Solving and Critical thinking for Designers", John Wiley & Sons, Inc., Hoboken, New Jersey.
11. Building Information Modeling, 1st Edition, Yusuf Arayici & bookboon.com.
12. G. Aouad, R.Cooper, M.Kagioglou, J.Hinks, M.Sexton, A synchronised Process/IT Model to Support the Comaturation of Processes and IT in the Construction Sector, Proceedings of CIB W78, The life-cycle of Construction IT innovations: technology transfer from research to practice Stockholm, 3-5 June (1998).
13. M.K.D. Coomans and H.J.P. Timmermans, A VR-User Interface for Design by Features, Maastricht (1998).
14. <https://www.autodesk.com/products/revit/overview>.
15. <http://support.microsoft.com>.
16. www.wiley.com/go/revit- ne.