



AUTODESK UNIVERSITY 2006

# Realize Your Ideas

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Autodesk

## Functional Wall Fundamentals

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**BD31-5** It's time to move beyond the basics of two lines and create real walls. First, we'll cover the elements that make up the properties of a wall. Then we will look at how to create new wall types with internal details and fully defined materials. There's more to walls than you might think. This class will cover all the essential fundamentals to making your Revit walls fully functional.

### About the Speaker:

David has more than 20 years of hands-on experience with AutoCAD as a user, developer, author, and consultant. He is an application engineer with The PPI Group, a contributing editor to *Desktop Engineering* magazine, the former publisher and editor-in-chief of *CADCAMNet* and *Engineering Automation Report*, the former senior editor of *CADalyst* magazine, and the author of more than a dozen books on AutoCAD. A licensed architect, David was also one of the earliest AutoCAD third-party software developers, creating numerous AutoCAD add-on programs. As an industry consultant, David has worked with many companies including Autodesk. He teaches college-level AutoCAD courses and is always a popular presenter at both Autodesk University and AUGI CAD Camps.

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## Introduction

Walls are a basic part of any building. In Revit, walls are created by selecting a wall type and then sketching the location of the wall in a plan view or 3D view. Revit creates the thickness, height, and other properties of the wall around the location line of the wall, based upon the properties of the wall type you selected.

While Revit Building comes with many types of walls already predefined, it is actually quite a simple task to create and modify wall properties and the appearance of walls. You can modify wall properties before you start a project or after you have already drawn walls.

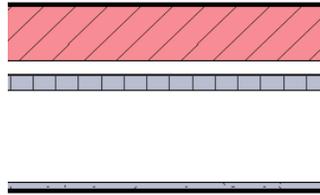
Although walls initially have the same properties throughout their vertical height, you can create vertically compound walls that incorporate reveals and sweeps. For example, you can include soldier courses in brick walls and easily include parapets at the tops of walls.

You can also create vertically stacked walls walls, which are walls that comprise several different subwalls stacked on top of each other.

## Understanding Compound Wall Properties

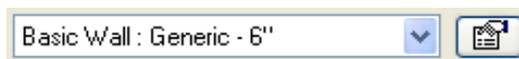
It is important to understand what makes up a wall. A wall is a compound structure consisting of parallel layers. The layers can consist of either a single continuous plane of material, such as plywood, or multiple materials, such as gypsum board, studs, insulation, air spaces, bricks, and sheathing. In addition, each layer within the assembly serves a particular purpose. For example, some layers provide structure support while others act as thermal barriers. Revit Building considers the function of each layer and matches the layers appropriately.

You can represent each layer by setting the layer's material, thickness, and function.



## Wall Components and Structure

You can create new wall assemblies by editing an existing wall assembly. To edit a wall assembly, select the wall type and then click the Properties button.



Revit displays the Element Properties dialog box. You can then modify an existing wall type or create a new one by editing its assembly.

## Wall Elements

The Elements Properties determine the thickness, height, and appearance of the wall and depend on the wall's family type. The Element Properties dialog box contains two areas that control the elements within the assembly. The top area controls the Type Parameters. The bottom area controls the Instance parameters.

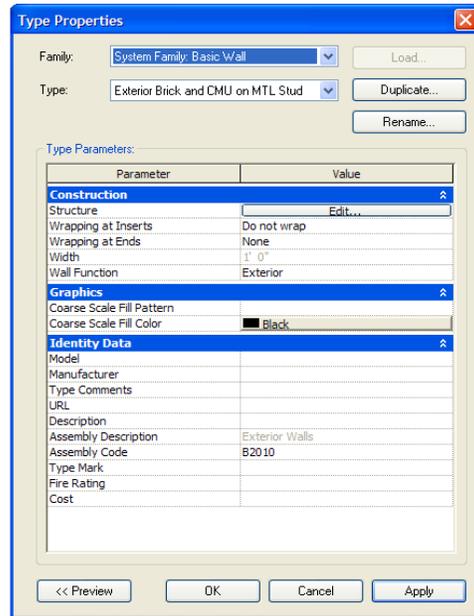
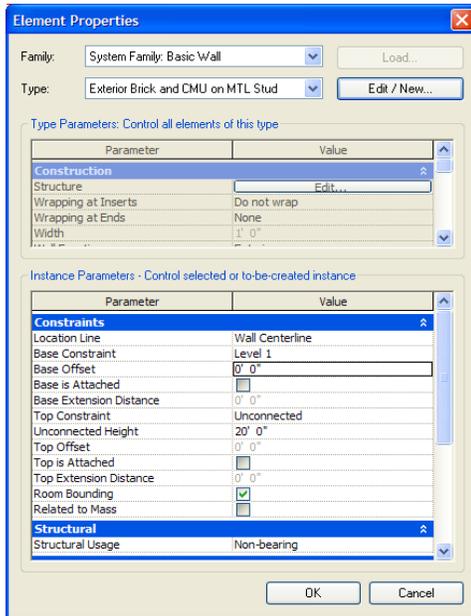
Changes made to the Type Parameters affect all instances of the wall type, whereas changes made to the Instance Parameters only affect the selected wall.

Revit provides a selection of different wall types. When creating a new type, it is best to select an existing wall type similar to the type you want to create, duplicate that wall type, and then alter the copy of the existing wall type. This is much faster than creating a new wall type from scratch.

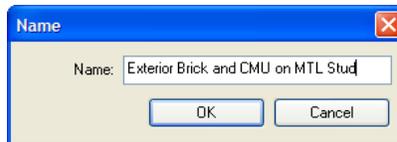
## Wall Properties and Control

To begin creating a new wall type:

1. In the Element Properties dialog box, click the Edit/New button.
2. In the Type Properties, click the Duplicate button.



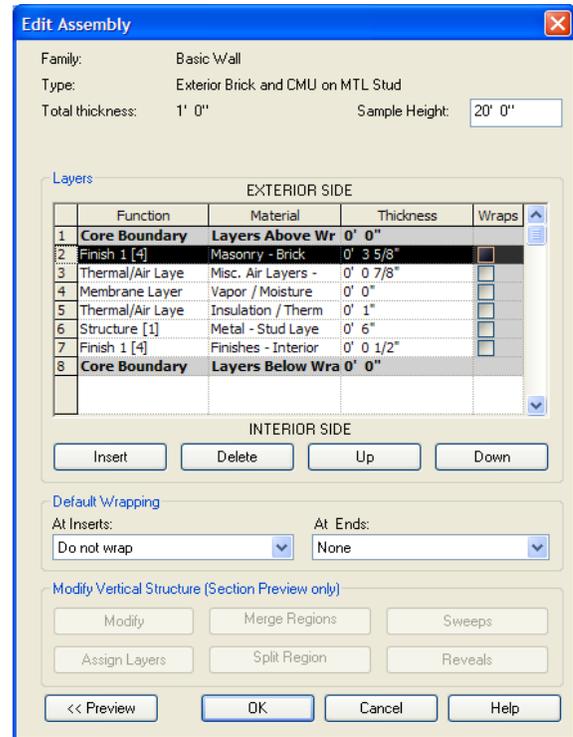
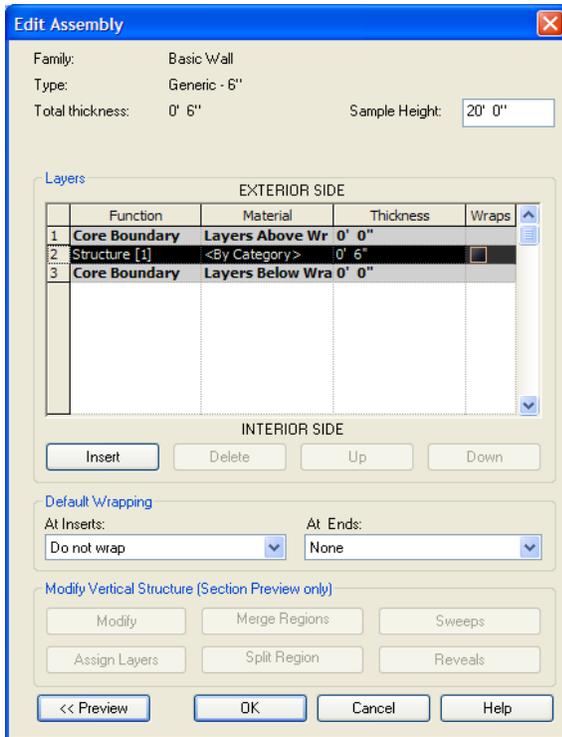
3. In the Name dialog box, give the new wall type a representative name, and then click OK.



4. In the Type Properties dialog box, in the Type Parameters area, click the Edit button to display the Edit Assembly dialog box. It is here that you can specify the layers that comprise the wall assembly.

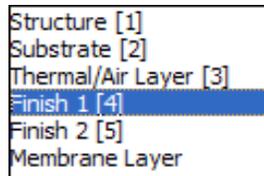
## Defining the Wall Assembly

As previously described, the wall assembly is defined by parallel layers. Each layer has a specified function, material, and thickness. Within the Edit Assembly dialog box, these layers are bounded by core boundaries on the exterior and interior sides of the wall.

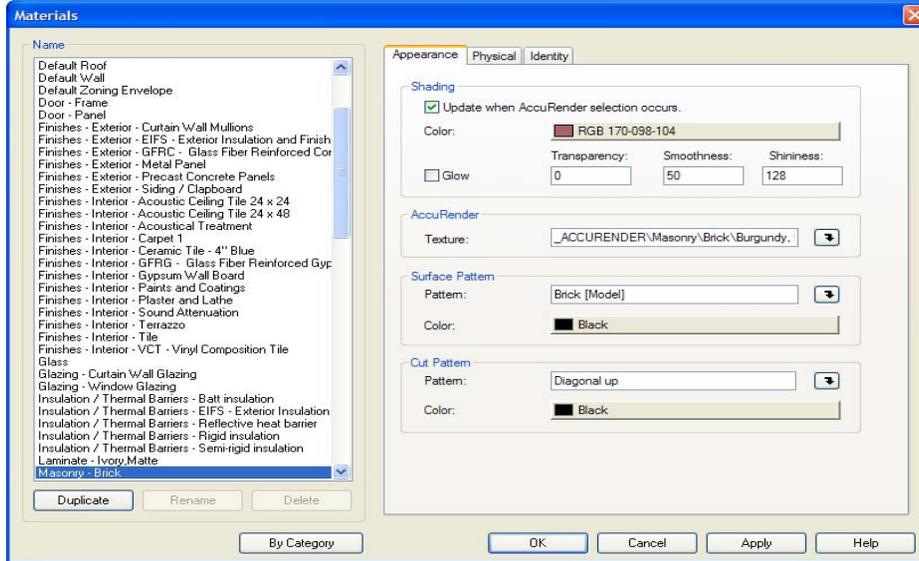


To add a new layer, select a layer by clicking on its number, and then click the Insert button. The new layer will be added above (toward the exterior side) of the layer you selected. You can then specify the following:

- The Function of the new layer – choose from Structure, Substrate, Thermal/Air Layer, Finish 1, Finish 2, or Membrane Layer

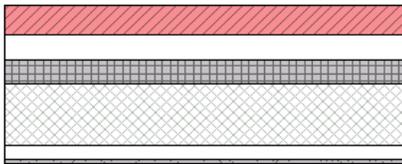


- The Material of the new layer – display the Materials dialog box and then choose from among the materials that are supplied with Revit, or click the Duplicate button and create a new material

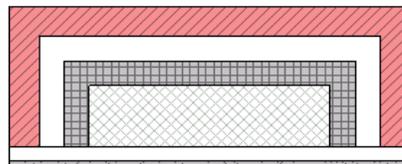


- The Thickness of the layer – You must assign a thickness for each layer you create except for layers whose function is specified as a membrane layer.

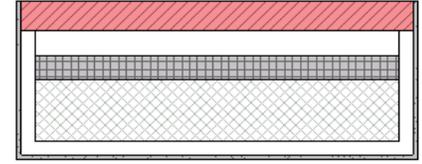
You can optionally specify that a layer wraps at inserts (such as doors or windows) or at the end caps of the wall. Wrapping is visible in plan view only.



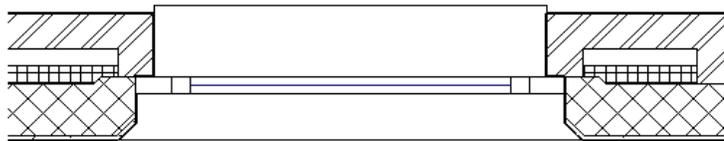
Compound wall with no end-cap wrapping



Exterior wrapping at a wall's end caps



Interior wrapping at the end caps



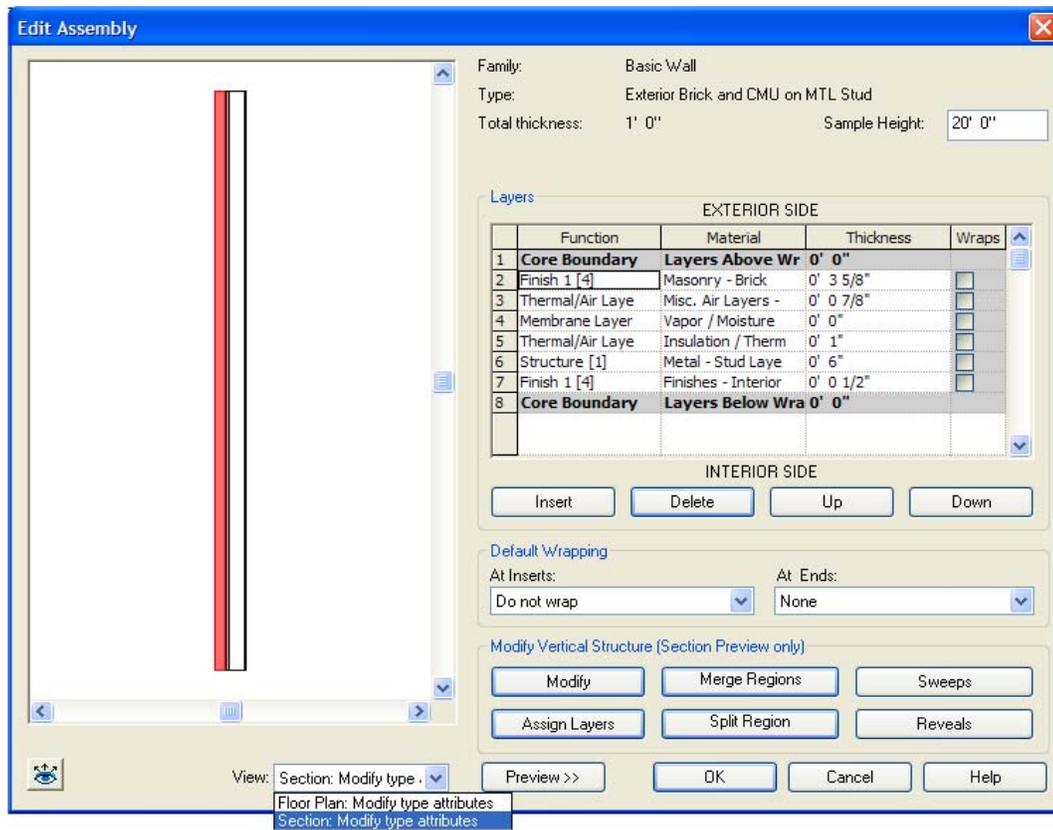
Interior wrapping at window insert

Note that the two layers called Core Boundary cannot be modified and they have no thickness. They are provided as references for dimensions. When you position a wall, you can dimension to its wall centerline, core centerline, the interior or exterior finish face, and the interior or exterior core boundary. Core boundaries are often set to correspond to the face of structural elements. You can add layers outside of the core boundaries.

**NEW!** The new Identity tab is new in Revit Building 9. It enables you to assign identity data to each material in the wall assembly, such as keynote, model, manufacturer, description, cost, and so on.

## Previewing the Wall Assembly

While you are creating or modifying the wall assembly, it is often helpful to view a preview image of the resulting wall assembly. To do so, click the Preview button to expand the Edit Assembly dialog box. Once the preview is visible, you can choose to view it in either a plan or section view.



Note that you can also click within the preview area and then zoom and pan within the preview to see the wall layers in greater detail. You can pan and zoom by using the roller wheel on a mouse or by right-clicking and selecting options from a shortcut menu.

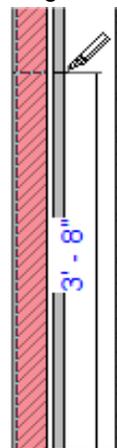
## Splitting Regions

You can split regions within the wall to create compound vertical or horizontal walls. The Split Region command divides a layer, or regions, either horizontally or vertically into new regions. When you split a region, the new regions assume the same material.

When you click the Split Region button, a knife appears, allowing you to select a region/layer to split. In the example, the brick is being split at 3'-8" from the base of the wall.

After splitting the region, if you need to modify the location of the split, click the Modify button and then click on the split line. You will then be able to adjust the split dimension.

To remove the split, click Merge Region button and then click on the split line.

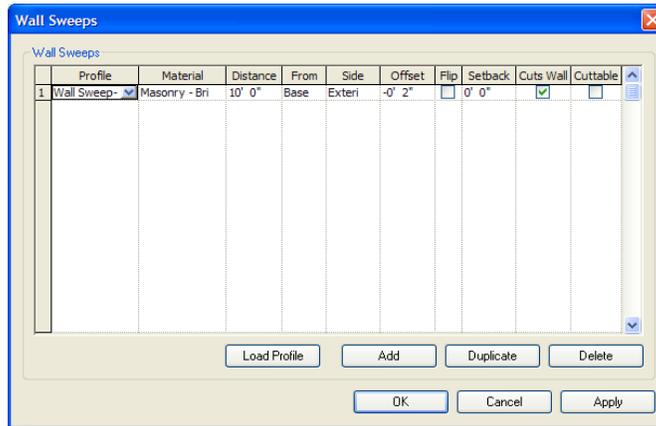


## Sweeps and Reveals

A sweep is a material which runs the entire length of the face of the wall, such as a parapet or precast sill, regardless of whether it has an offset or not. In order to add a sweep or reveal, you must first display a section preview. Once you do this, you will notice that the vertical structure tools are now active.

To add a sweep:

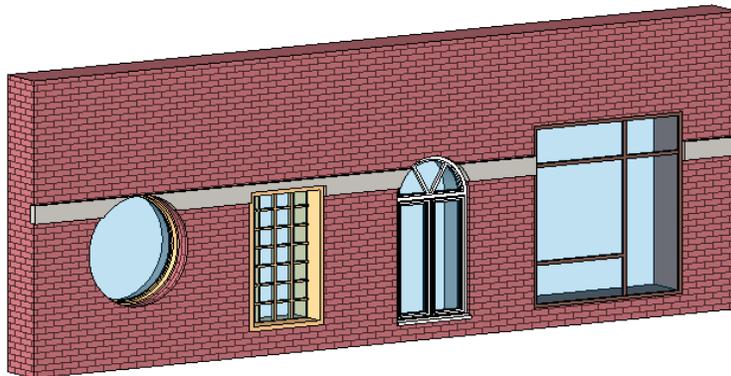
1. Under Modify Vertical Structure, click Sweeps.
2. In the Wall Sweeps dialog box, click Add.
3. In the wall Sweeps dialog box, you must specify the Profile, Material, and other settings to control the placement of the sweep.



The Distance determines the distance of the sweep from either the Base or the Top of the wall. The Side determines the side of the wall the sweep is on. Specify a value if necessary for the offset. A negative value moves the sweep toward the core of the wall. Select Flip to measure the distance from the top of the sweep profile rather than the bottom. Use the Setback value to specify the sweep setback distance from inserts, such as windows and doors. Select Cuts Wall if you want the sweep to cut geometry out of the host wall.

Note that when a sweep is offset and embedded in the wall, it cuts the geometry from the wall. In complex models with many sweeps, you can increase performance by not selecting this option.

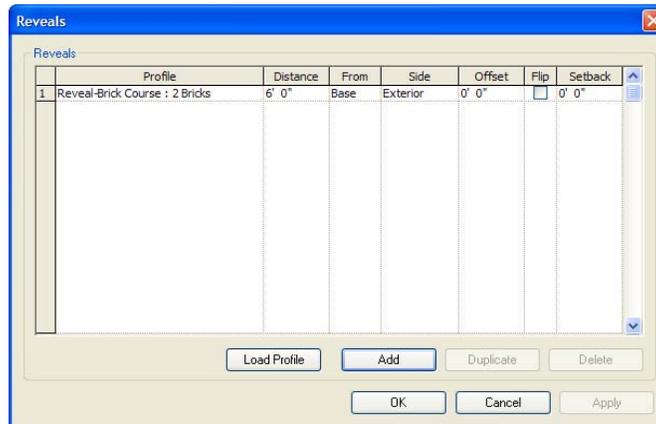
Select Cuttable if you want the sweep to be cut by wall inserts. In the image below, notice how the sweep is cut by the three windows on the left.



A reveal is similar to a sweep except it is a cut, with the same material in the cut as the material it is cutting, such as a reveal brick course.

To add a reveal:

1. In the Edit Assembly dialog box, click Reveals.
2. In the Reveals dialog box, click Add.
3. In the Reveals dialog box, you must specify the Profile and other settings to control the placement of the reveal.



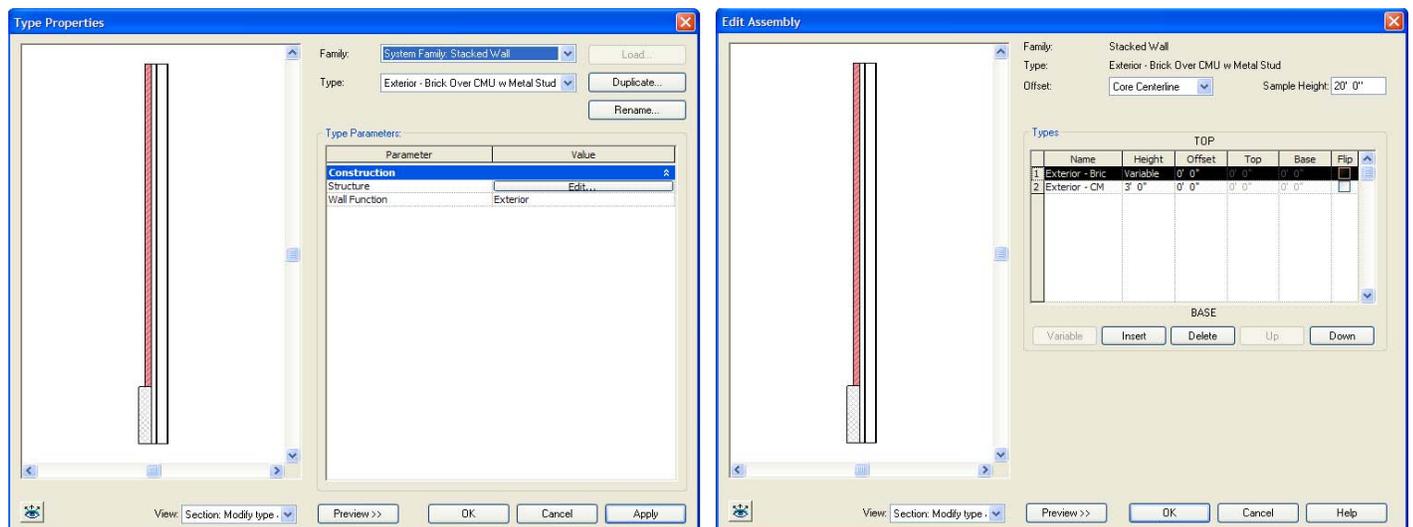
Again, the Distance determines the distance of the sweep from either the Base or the Top of the wall. The other controls behave in a similar fashion to sweeps. Notice that there is no selection for material since the material for the reveal is the same as the material it is cutting.

### Vertically Stacked Walls

Another way of creating a compound wall is to create vertically stacked walls. A stacked wall is one main wall that comprises several different subwalls stacked on top of each other. All subwalls in a stacked wall are attached and have joined geometry to each other. This happens automatically without any extra steps from the user. For example, you can have a stacked wall that comprises an Exterior Brick on Metal Stud and an Exterior CMU on Metal Stud. The two wall types are attached and joined.

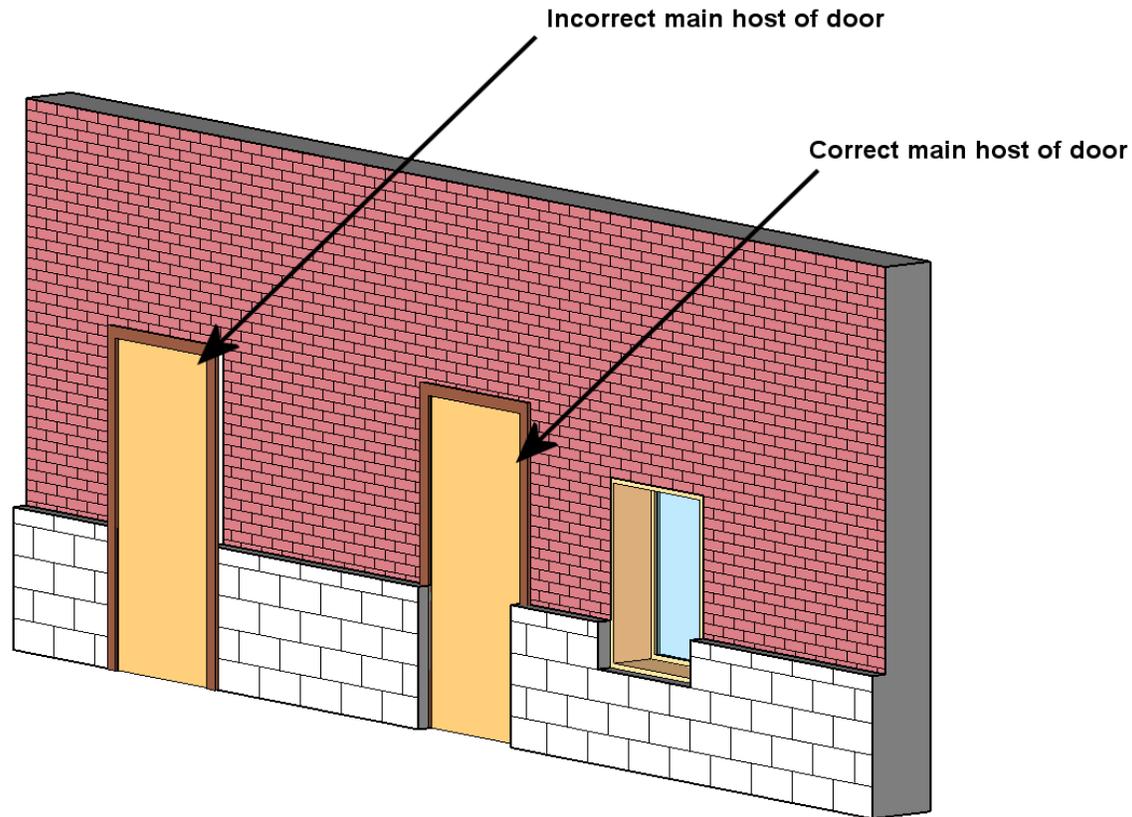
The subwalls you use can only be types in the Basic Wall system family.

The stacked wall type lets you define different wall thicknesses at different heights. You define its structure through its Type Properties.



The leveling is what creates the stacking of a wall.

When you place doors or windows into a stacked wall, you need to pay attention to the portion of the stacked wall you select as the host. The following illustration shows an example of a stacked wall with a door inserted into a correct and an incorrect host.



To change component hosts:

1. Select the component (in this case, the door on the left).
2. From the Options Bar, click Pick Host.
3. Click on the portion of the wall that should serve as the host (in this case, the brick portion of the wall). The door moves to the selected host.

## Summary

This basis understanding of wall components and properties will give you plenty of options in creating wall types for your projects.