BERN STAPLES

ON AUTODESK REVIT

NORTHLAKE CHRISTIAN SCHOOL

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SPECIAL THANKS TO THOMAS MORTON

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The source code of this document may be found under a public GIT repository here: `http://www.github.com/hendenburg/onautodeskrevit`

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Introduction

The following guide and user manual utilizes Autodesk Revit, a BMI program which is used to create Architectural Visualizations [1]. The guide is based on Autodesk's own guide [2]

[1] Autodesk. Revit. http://www.autodesk.com/products/revit-family/overview, 2016. Computer Software

[2] Autodesk. *Getting Started with Autodesk Revit Building*. Autodesk, 2006

Starting Revit

To start Revit, either find the program via its icon, or by searching for Revit by bringing up the search menu with the Windows Key

Getting adjusted to Revit

The Figure 1 represents an accurate representation of a Revit opening screen. When opening a Revit project file this screen is circumvented.

Starting your first project, and an introduction to Revit's interface

Let's antiquate ourselves with the introduction page. The introduction page is made up of two primary sections: Projects and Families. For the time being you can ignore the Families section, and focus only on the former.

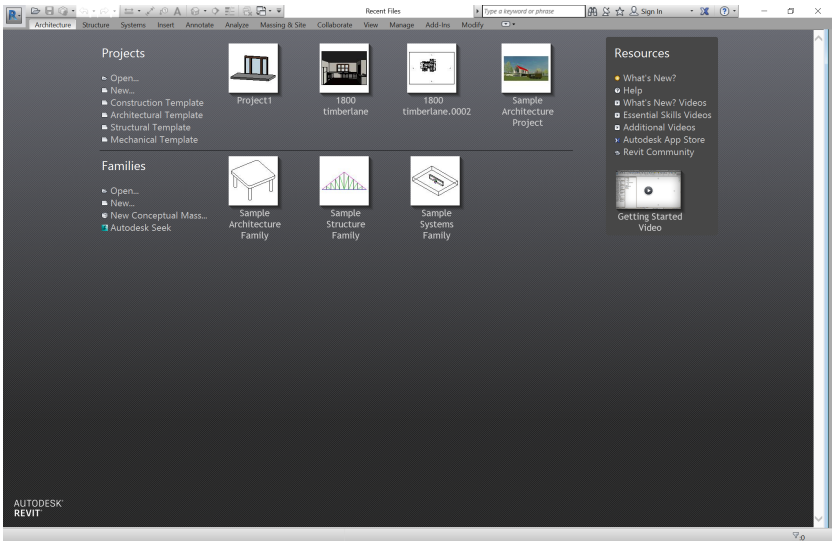


Figure 1: This figure shows the opening page when you open up the Revit Application.

There are three major parts to the Revit Application Main Page.

Among the links are: Open... which opens an already existing project, and New... which presents to you the process to create a new project, and various templates. The images and captions within the project section are existing projects that have been opened recently.

We are going to start a new project. If you click on New... you should have a popup window like in Figure 2.

Once you click Browse... you should be taken to another popup. The popup, which is shown in figure 3 has a list of templates used in Revit Projects. The template you will want to you is called default. Once the template is selected click Ok and be off onto the project.

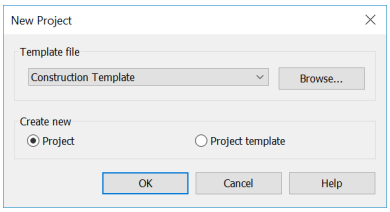


Figure 2: This is new file popup, you see this whenever you wish to create a new project. You will always be creating a Project, not a Project Template.

You will not be creating any files with the Construction Template

if you can't find it, the file path is:
`ProgramData▸Autodesk▸RVT 2016▸Templates▸US Imperial▸default`

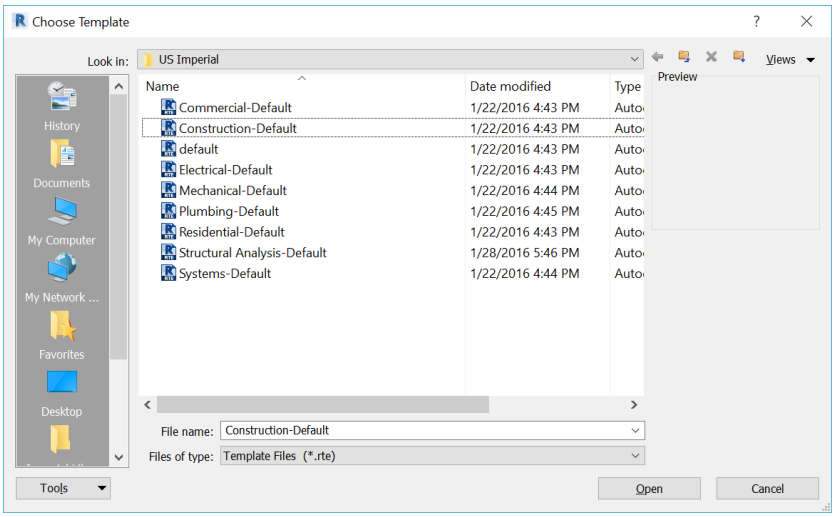


Figure 3: A list of the templates that will popup on your screen

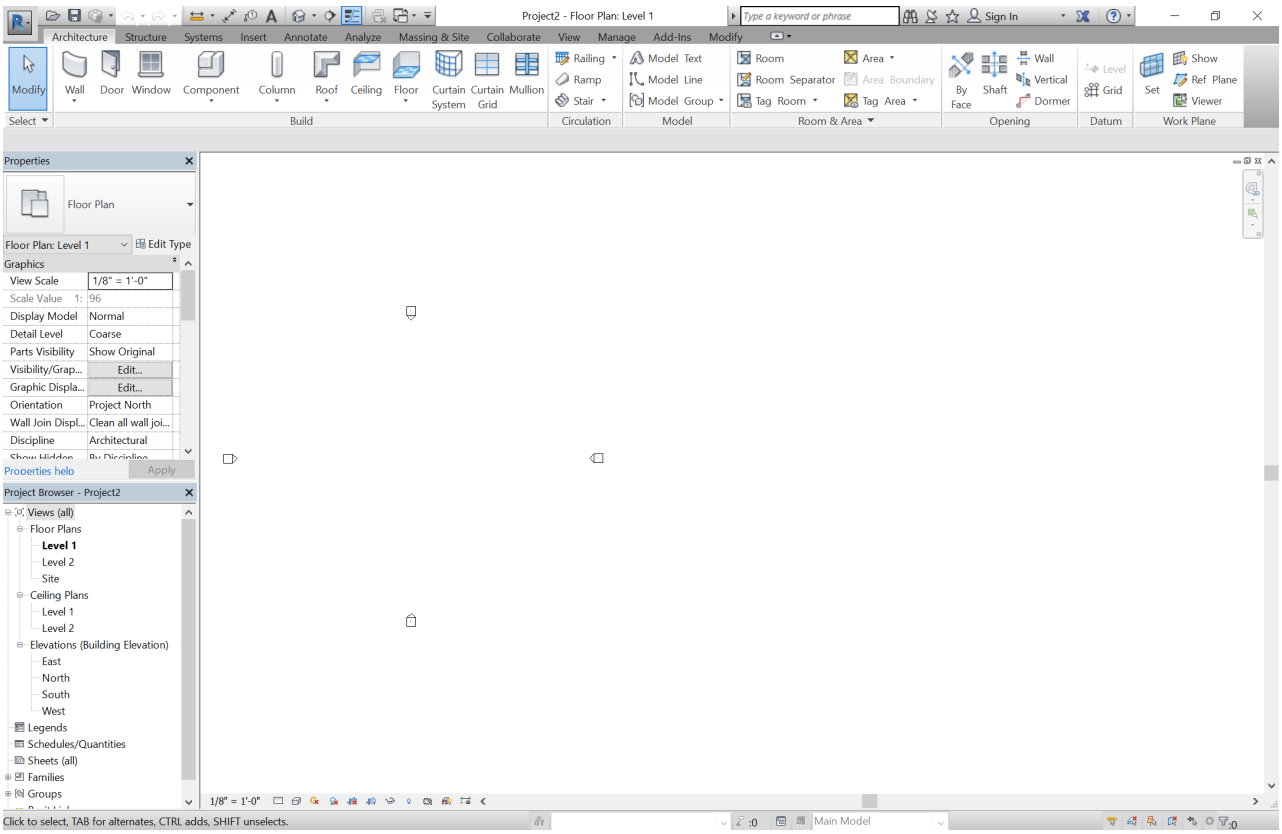


Figure 4: A full screen example of the Revit workspace. Composed of multiple ribbon banners, and views. The large whitespace is the plane on which you have your building

Elements of the Revit Interface

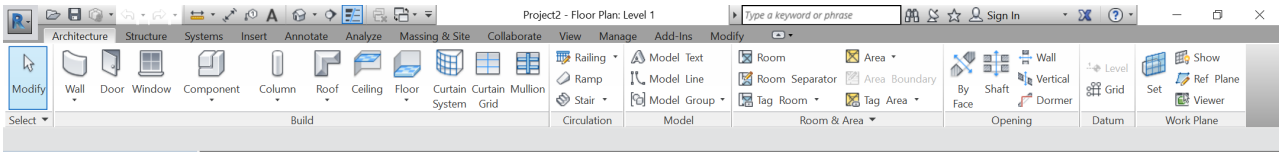


Figure 5: The revit top bar, at it's base.

In the figure 5 you can see what we will refer to as the Top Bar, this will be the location where all the tools of this program are located.

You can see icons for each tool, and above those is a line of tabs, called Ribbons, starting with Architecture, then Structure, Systems, etc. When you click one of the ribbon labels you are taken to a new section of tools.

As you create the house below, you will become familiar with all these tools; each tool is essential in the creation of a functioning model.

You won't be using the majority of these tabs, but it's smart to know what they do, along with the tools inside. See the Menu Tools sections reference for more. For the majority of this tutorial the only tabs will be: Architecture, Annotate, Massing & Site, View, and Modify

The Architecture tab, which is show in Figure 5, contains the tools to create the basic formation of a house: the foundation, the floors, the walls, and the windows.

Beware: overuse of the Massing & Site > Toposurface, and the Massing & Site > Site Component tools can lead to your computer becoming slow and sluggish.

The Annotate tab which is shown in the figure 6 contains the tools which you use to markup the project. These tools document your creation, while also making presentation easier. They can be used to determine the size of your model, the angels of you walls, the width of you house for a variety of reasons.

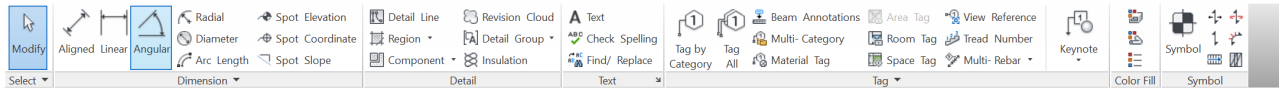


Figure 6: A picture of the Annotation bar in revit.

The Massing & Site tab, in figure 7 is used to model and map the terrain of your model.

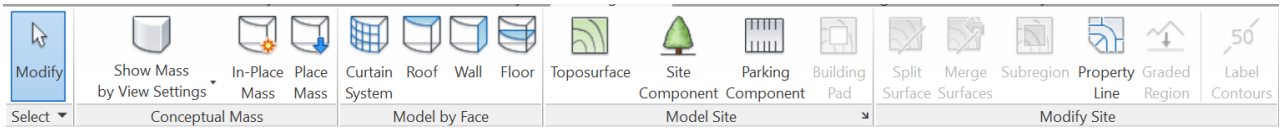


Figure 7: A picture of the Massing & site bar in revit.

The View tab, shown in figure 8, contains essential tools for viewing and presenting your project. The View > 3d View tool will become vital for visualizing your house in the future.

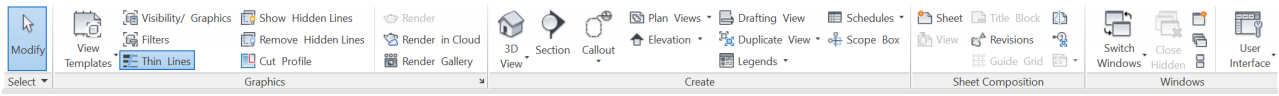


Figure 8: A picture of the View bar in revit.

The Modify tab, in figure 9, is different from the others. While the previous tabs were meant to interact with the building, this tab is primarily focused on interacting with the objects that make the building up. For instance, splitting a singular wall is done inside the modify tab.

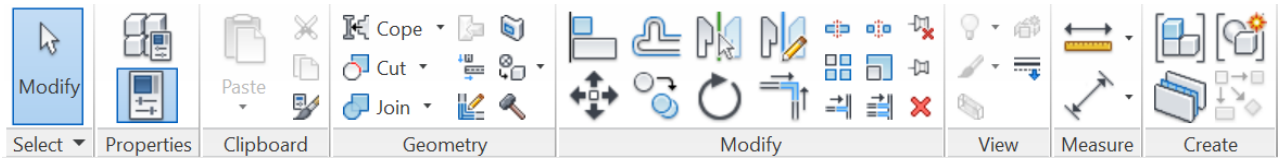


Figure 9: A picture of the Modify bar in revit.

Chapter 1 - Creating Your House

Figure **??** is a picture of what your house will look like.

On the right in figure 10, you can see the Revit Sidebar. This sidebar, which should be on the left hand of your revit window, is the detail window for everything you do. in the Revit Sidebar > Properties you can see the type of object, and the specifications for it. in the Revit Sidebar > Project Browser you can see a list of all the views and documents associated with your project.

Selecting and Creating Elevations

The following guide's purpose is to establish an understanding of altitudes and elevations in 3d architecture.

1. Within Sidebar > Project Browser > Elevations is the elevations list.
2. Refer to figure 11 and click on the Sidebar > Project Browser > Elevations > South button
3. You should see elevation lines in the main workspace. if you click along the line once, it will become like figure 12, you should click and drag the leftmost circle to the right until the line becomes shorter.
4. Each elevation has two main elements, the name and the altitude. Generally your foundation should be several feet under the ground.
5. You have two elevations currently: Level 1 and Level 2
6. You can either use your scroll wheel too zoom into the elevations, or you can use the keybinding: Ctrl + Z + F
7. If you click on the text of Level 1 where it says 0'-0" it will allow the input of a new altitude
8. Click on the altitude of both Level 1 and Level 2 and change their altitudes

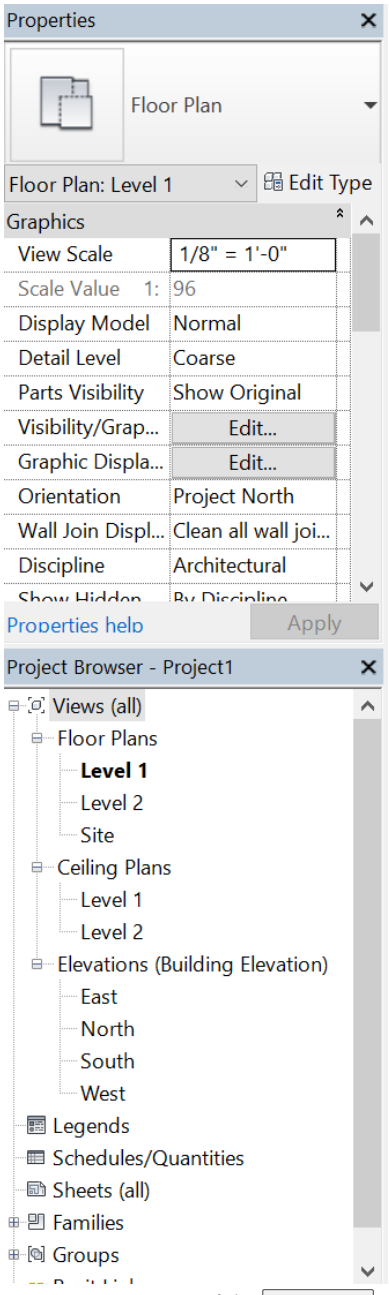


Figure 10: A picture of the Revit Sidebar

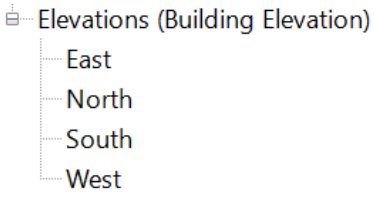


Figure 11: A view of the elevations: East, North, South, and West

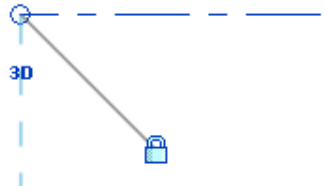


Figure 12: Elevation lines that have been clicked once

- For Level 1 where the altitude should be -14'0"
- for Level 0 where the altitude should be 10'0"

-4'0" generally is a good altitude to keep your foundation base, Level 1 is the foundation for this house, for instance.

Creating additional elevations

9. If you right click on the uppermost elevation, Level 2, you should get a context menu, it should include the option: Create Similar. If you click on that option it should select the Architecture > Level tool which creates an annotation, but it also has the same selected options as the elevation you selected.

A context menu is what happens when you right click, the first option should be cancel, in this case, the option you're looking for should be the 10th down

10. If you look at Figure 13 you should see what is called the Options Bar, on it you can see multiple options: Make Plan View and Offset: which equals 0'0"

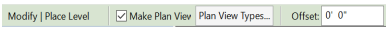
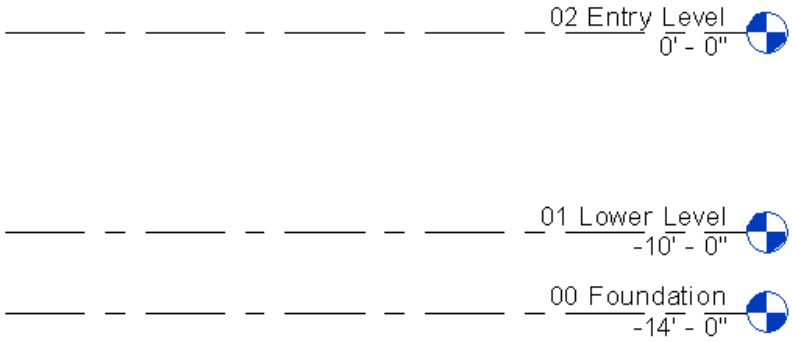


Figure 13: The options bar, which is mostly used to set chain settings and offsets

11. To create an elevation that is 10' above Level 1 Change the Option Bar > Offset: to equal 10'0" while Create Similar is selected, and click from the leftmost point of Level 2 and drag to the rightmost point. Reference figure 14



Make sure that your elevations look similar to this figure

12. Use the same procedure as used to create Level 3 to create another elevation at 10'0". To do this, make sure your Options Bar > Offset: is set to 10' and create a similar elevation above Level 3

13. Similar in method to changing a elevation's altitude is changing an elevation's name. For instance, click on Level 1 where it says 'Level 1', so that it becomes a text box like when changing the altitude. Enter the following name: 00 Foundation
    - Name the Level 1 this: 00 Foundation
    - Name the Level 2 this: 01 Lower Level

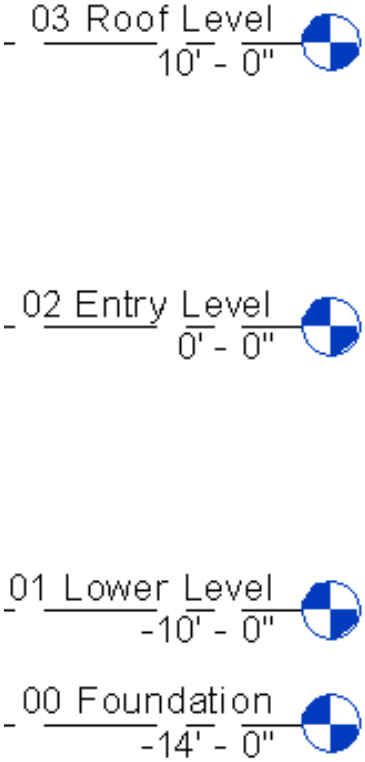


Figure 15: Make sure that your final elevations are named likewise

- Name the Level 3 this: 02 Entry Level
- name the Level 4 this: 03 Roof Level

Chapter 2 - Creating the Base of the House

The purpose of this guide is to instruct in the method of creating the foundation for the project.

Creating the Retaining Walls

1. Select this view Sidebar > Project Browser > Floor Plans > 00 Foundation

2. Zoom into the lower right quadrant of the workspace

3. From there, select the following tool: Architecture > Wall Tool. When you click on the screen with this tool selected you create points, just like on a graph you click or drag another point out to create a line, or a wall in this case.

4. If you remember the Sidebar for the interface explanation, there was Sidebar > Properties, inside this is the options for the wall.

Settings	Basic Wall Retaining - 12" Concrete
Location Line	Wall Centerline
Base Constraint	00 Foundation
Base Offset	0'0"
Top Constraint	Up to 02 Entry Level
Top Offset	0'0"

5. Click to create a base point, a line should begin to follow your cursor. You can easily create a wall by pointing your cursor in a direction, and typing in the distance.

6. create a base point and move your cursor to the left: type 40'

7. If chain was selected in Option Bar > Chain: then, you should just be able to move the cursor up and type in 22', otherwise click on your last created point and repeat the aforementioned steps

8. Repeat the same steps, moving your cursor right and typing: 40'

This is why we named our elevations the way we did in the previous chapter. Our floor plans are listed alphabetically in the Project Browser so when we have the numbers preceding the name, they are both descriptive, and correctly ordered.

It's good to make sure that your walls have the correct base and height. If the program does not let you select the correct height, while not perfect, another option is to choose unconnected for the Sidebar > Properties > Top Constraint and then select the altitude for the elevation point, for instance, the offset would be 10'0" for 02 Roof Level

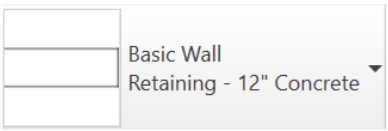


Figure 16: When selecting an object in Revit. There is, of course, different object types. The image in this figure is the Object Selector. For walls specifically, there are multiple types that we use. When referenced, the Object type can be explained as Sidebar > Properties > Object Selector > Basic Wall Retaining - 12" Concrete or plainly as Basic Wall Retaining - 12" Concrete

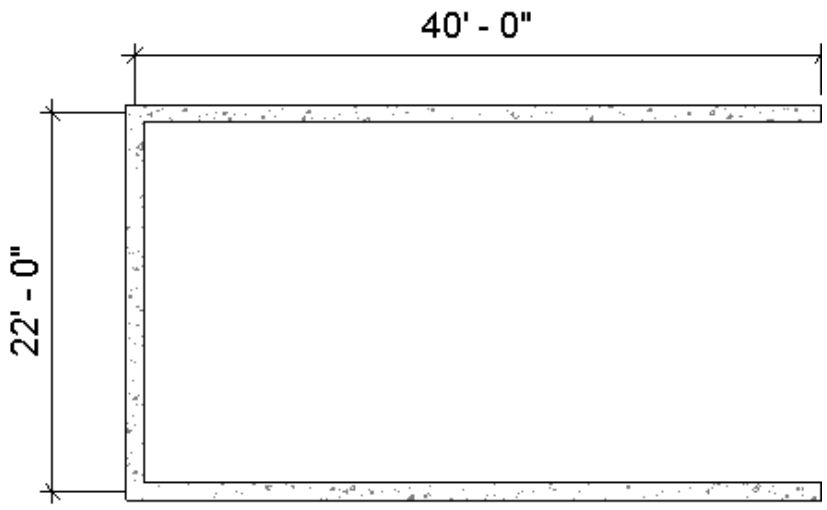


Figure 17: The foundation walls

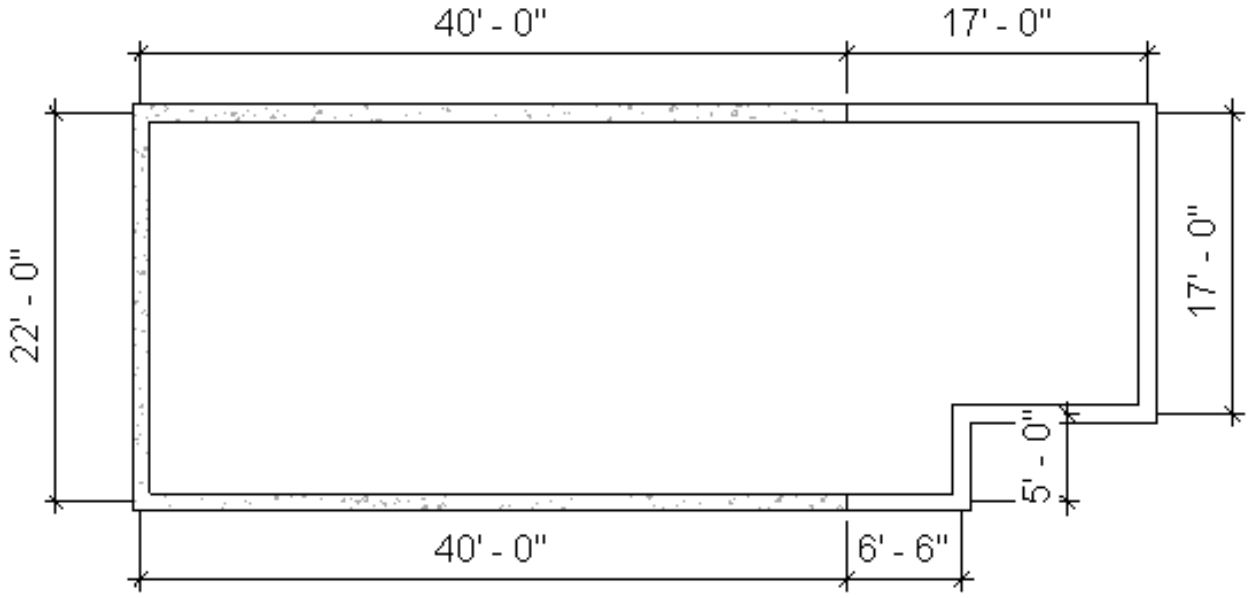
[Revit retaining walls]This is what your walls should look like

Creating your Foundation Walls

9. Select your retaining walls with the following options

Settings	Basic Wall Foundation - 12" Concrete
Location Line	Wall Centerline
Base Constraint	00 Foundation
Base Offset	0'0"
Top Constraint	Up to 01 Lower Level
Top Offset	0'0"

10. Create the walls on the outside
    (a) select the rightmost edge of the bottommost wall with the wall tool selected
    (b) Move the cursor to the right: type 6'6"
    (c) Move the cursor up: type 5'
    (d) move the cursor right: type 10'6"
    (e) meet the intersect where the topmost point of your wall becomes directly right of the rightmost point of the top wall.
    (f) Complete the walls by moving to the left until you hit the top wall.
11. Figure 18 should be the final product of this level



Make sure your walls look like this

Figure 18: The final foundation walls

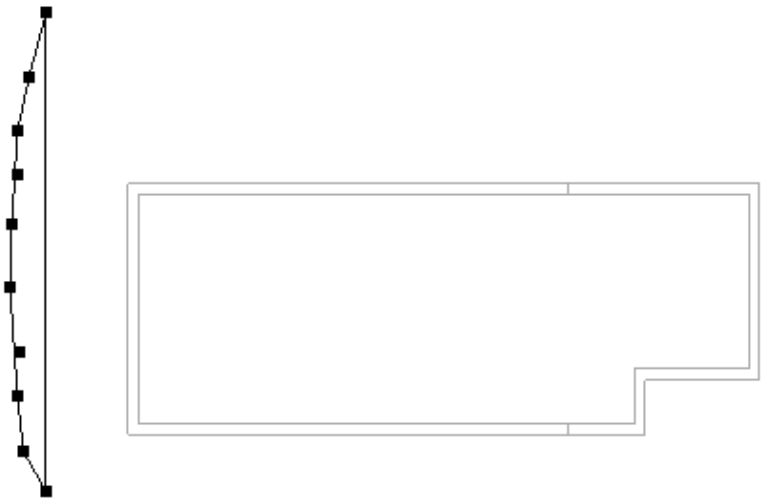
Chapter 3 - Creating the Terrain

The purpose of this guide is to introduce the basics of terrain creation in Revit. This should explain the basics of pads and terrain.

Adding a Toposurface

1. Go to the following view: Sidebar > Project Browser > Floor Plans > Site
2. Select the following tool: Massing & Site > Toposurface
3. Select the following options for Options Bar > Elevation: to -0'6"
4. Add points to the left side of the building, like the figure 19

Figure 19: Initial topographic points



Work to make sure yours looks similar, not exact

5. Select the following options for Options Bar > Elevation: to -10'
6. Select the points as in the figure 20
7. Select the following options for Options Bar > Elevation: to -11'
8. Select the points as in the figure 21

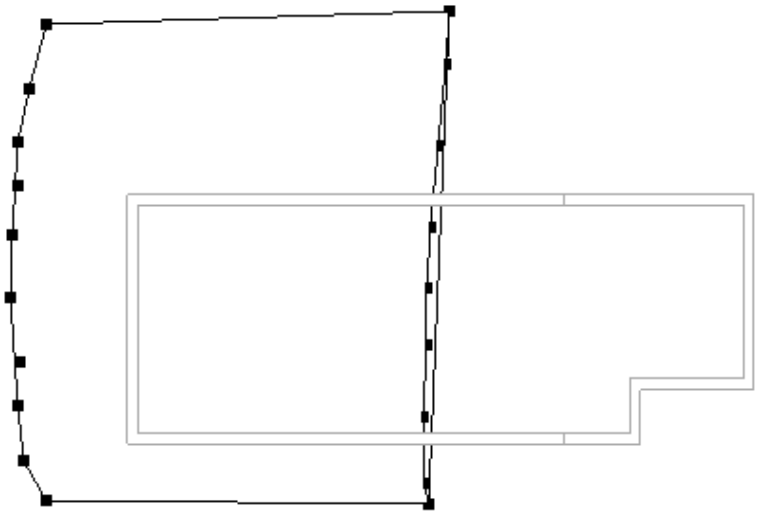


Figure 20: Second set of topographic points

Work to make sure yours looks similar, not exact

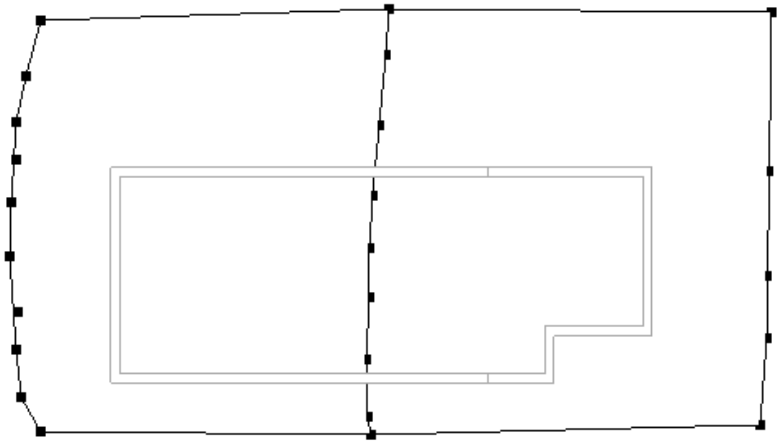


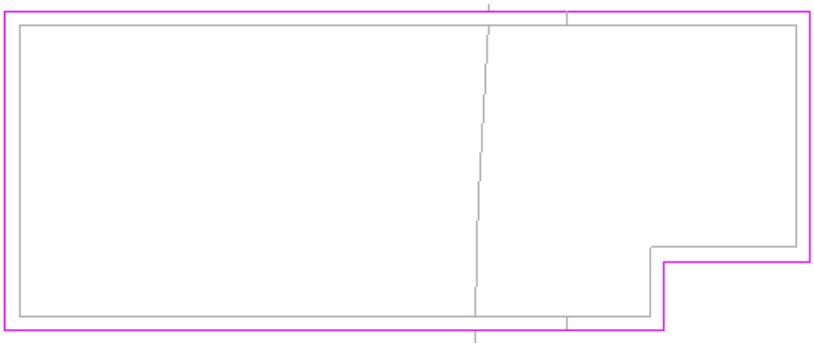
Figure 21: Third topographic points

Work to make sure yours looks similar, not exact

Setting up a Building Pad

Remember that it's best to avoid adding excessive amounts of topographic points, which may slow your computer.

9. Having finished the terrain surface by clicking the big green checkmark.
10. To create a building pad click on each of the walls with the Massing & Site > Building Pad tool.
11. Click each wall, finally click the purple line with three parallel lines attached: click it until the purples lines are only on the exterior of the walls. Reference figure 22



Make sure your pad looks like this, it's not essential but recommended

Figure 22: When building a pad, it's essential that it covers the buildings base, but doesn't extend past it. The pads purpose it to place a solid foundation base, while making sure that the terrain does not enter the floors of your building, so it removes any terrain where it's at.

Creating a 3D view

12. Click on the tool View > 3d View, it will create a new view called Sidebar > Project Browser > 3d Views > {3D} right click on this view to rename it to something, I recommend To Building
13. select your renamed 3d View and use the 3D maneuvering square to change the view. Reference Figure 23

Figure 23: Use the 3d viewcube to move around the 3D environment. If you grip the sides and corners with your mouse, you can drag it to change your view.
The proficient use of this is essential, so make sure you focus on it in later projects.

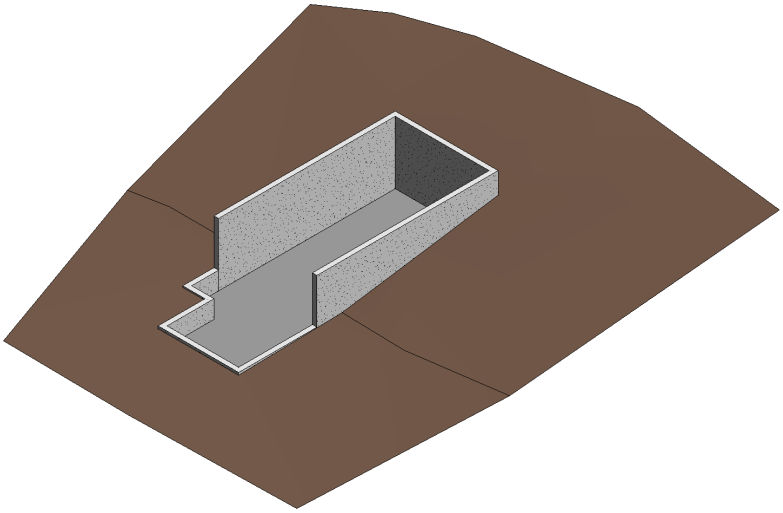


Figure 24: It's Important that everything looks realistic. When presenting your building, you want to an accurate representation of what it would look like. If you wish for further information, either ask your teacher, or reference any information on rendering

Make sure your 3D view looks rather similar to this, but it will vary from person to person

Chapter 4 - Creating Exterior Walls, Floors, and Roofs

The purpose of this guide is to continue on the education of wall creation. This also touches on the creation of wall retained floors, and non retained floors.

Creating Exterior walls

Add walls to the entry level

1. go to the following view: Sidebar > Project Browser > Floor Plans > 00 Entry Level
2. Create the following walls with these options:

Settings	Generic - 6"
Location Line	Core Face Interior
Base Constraint	02 Entry Level
Base Offset	0'0"
Top Constraint	Up to 03 Roof Level
Top Offset	0'0"

3. beginning at the bottom right, trace the interior of the three existing retaining walls, the three rightmost walls, by selecting endpoints. Reference figure 25.

If you are having issues with seeing objects below the current view level, then change the following settings. While you have the view selected in the Sidebar > Properties there is an option called View Range, if you go into that setting and change the View Depth > Level: option to the appropriate level you wish to have your view depth to.

Add walls to the Lower level

4. Open up the following: Sidebar > Project Browser > Floor Plans > 01 Lower Level
5. Use the following settings:

Settings	Generic - 6"
Location Line	Core Face Interior
Base Constraint	01 Lower Level Level
Base Offset	0'0"
Top Constraint	Up to 03 Roof Level
Top Offset	0'0"

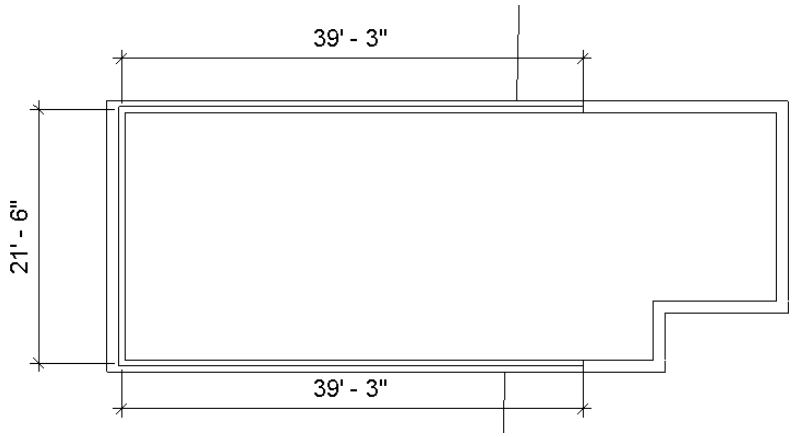


Figure 25: The walls along the retaining walls which reach the exterior walls are meant to border the interior of the retaining walls. By selecting Core Face Interior the walls are more easily alinged with the interior face of the walls.

Make sure your walls look like this, annotations excluded

6. Trace the interior of the Foundation walls, the 5 leftmost walls. Reference figure 26

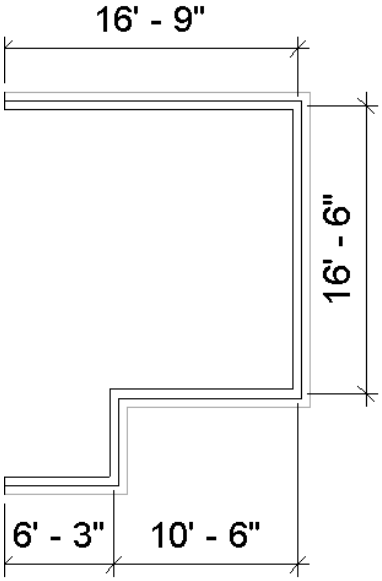
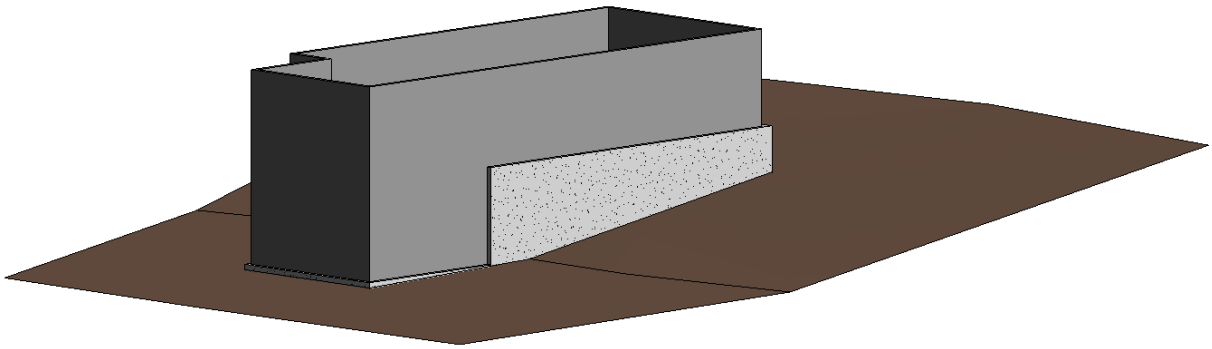


Figure 26: Lower Level Walls
Make sure your walls look like this, annotations excluded



Your 3D view should now look rather similar to this

Figure 27: This is the 3D view of the outer walls. If one of your walls is taller or shorter than the other, make sure that you have the correct height selected in your wall options.

Creating a Roof

7. Go to the following view: Sidebar > Project Browser > Floor Plans > 03 Roof Level
8. the tool you should use is called: Architecture > Build > Roof
9. The Roof should have the following settings in Sidebar > Properties:

Settings	Basic Roof Generic - 12
Base offset	0'0"
Rafter Cut	Plumb Cut
Slope	1" / 12"

Draw a roof line

10. When you select the roof tool, you are brought to the modify tab, you will want to select the line tool, which is under Modify | Create Roof Footprint > Draw > Line Tool. Selecting that tool allows you to create a roof in the same was as a wall, except to create a roof, you must create a closed perimeter with your lines to define the roof.
11. Make sure the option: Options Bar > Chain: is not checkmarked, this means that when you click to create two points, it automatically starts to make the next points.
12. Make sure the option: Options Bar > Defines Slope: is checkmarked. This means that the future slope that you have will be based on this side of the roof.

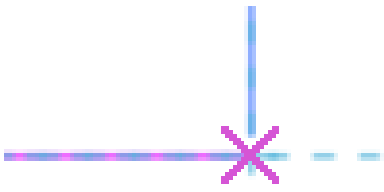


Figure 28: when you push a line past a walls end, it will give you guides in relation to other objects in the project. So for this one, you will want to click only when it gives you guide lines that reach to the rightmost wall.

13. Trace the southernmost walls past the end, where it becomes parallel with the endpoints of the rightmost wall. The intersection should look like Figure 28

Draw an offset roof line

14. As you did when creating an elevation line, to create a roof line that is offset from the roof, you will want to select an offset.
15. Select the option for your wall line: Options Bar > Offset: should equal -3'0" as well as make sure that Options Bar > Defines Slope: is not checked for the remaining lines.
16. On your workspace, click on the last point you made and travel upward until you hit the top edge of the leftmost wall.
17. Travel to the left until you hit the rightmost part of the to wall.
18. Travel down until your last line is perpendicular with your first.
19. Make your Options Bar > Offset: to be 0' and connect the lines together, reference Figure 29 for an idea of what the finished product should be

Be sure when creating any object with an offset that the result is indeed offset from the initial line that you placed. Failing to realize this and fix the error just means more work for you.

Make sure that your roof looks exactly like this, or at least similar

Figure 29: Your finished roof lines should be a singular line with define slope right against the southern wall. the rest of the lines should be offset 3'0" all along the wall

Creating Floors

Creating Lower Level Floors

20. Open up the view: Side Bar > Project Browser > Floor Plans > 01 Lower Level
21. Select the Architecture > Floors tool, which you use to make floors, unsurprisingly

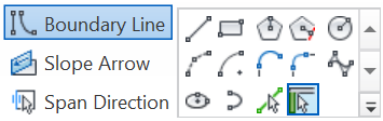


Figure 30: The tool you are using to create a floor is specifically made to fill a room or a certain amount of rooms by selecting the boundaries of the floor based on the surrounding walls.

Make sure you are using the tool with the surrounding marquee

22. The default tool selected should be sufficient, make sure you have the right tool selected, it's the Modify | Create Floor Boundary > Draw > Pick Walls tool, check figure 30

23. Click all the walls in **??**. This should be the same method as creating the building pad, except make sure that the lines are all interior rather than exterior.

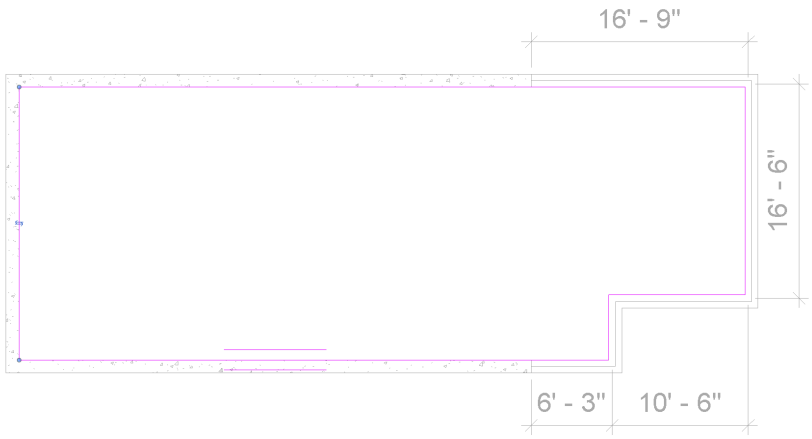


Figure 31: This should be the lower level floors, which are represented by the purple line. Make sure that the purple line is only on the interior

Make sure yours looks exactly like this, or similar.

24. Say no to all popups after creating the floor, for the time being, you do not need to worry about those

The popups are in regards to the wall's geometry that you attach too. You will most likely never need to worry about that.

Creating the Entry Level Walls

25. The creation of the 01 Entry Level walls is a bit more hands on.
26. Navigate to Side Bar > Project Browser > Floor Plans > 01 Entry Level.
27. Instead of the tool you were using before, select the Line Tool
28. Make sure that Options Bar > Chain: is selected
29. From the top right place a point to create the flooring
30. Use the following method to create the upper level floors
    (a) Move to the right and type: 36'
    (b) Move down and type: 16'6"
    (c) Move to the right and type: 25'
    (d) Move down and type: 4'6"
    (e) Then move your cursor to the bottom left of the model and complete the sketch

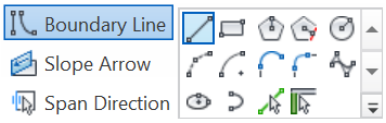


Figure 32: Upper Level Floor Tools
Make sure you are using this tool, not the previous one.

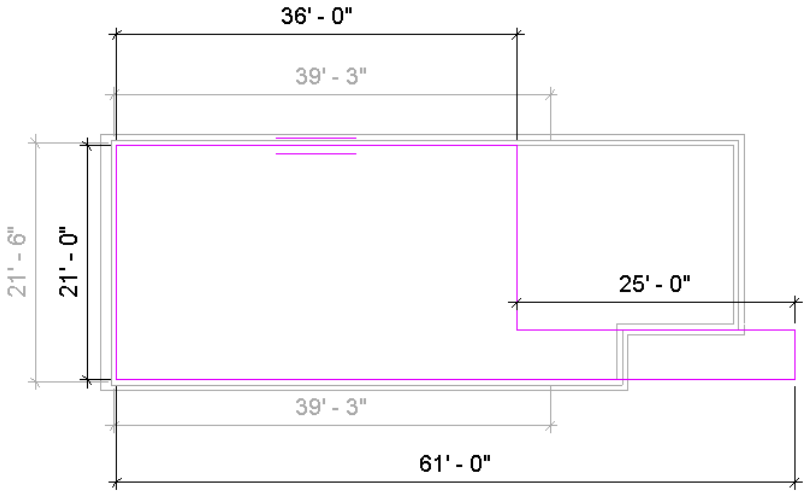


Figure 33: The flooring for the upper level is essential. The fact that it doesn't fully cover that level is for the creation of a single atrium for the living room. As you get further you will see how the windows and stairs coincide with this design.

Your Floor should look, exactly like, or similar to this.

31. Once you have done this, you may finish the floorplan by clicking the large green checkmark

Like before, any alert dialogs that pop up on the screen are not relevant to you, and should be either ignored or,if particularly concerning, consult your instructor.

Viewing Your Floors in 3d

32. Select the view:
Side Bar > Project Browser > 3D Views > [What you named your primary 3D View]

33. Now, using your 3D view wheel, position your building do the front-right corner is at the forefront, this should be the default position

34. , Right click the wall on the right: click on the context menu that comes up. Use the following options: Context Menu > Hide in View > By Element

35. Reference the Figure 35, for a final look at what your 3d view should look like

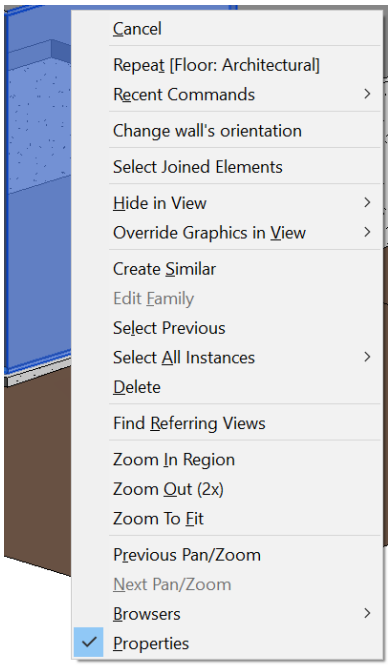
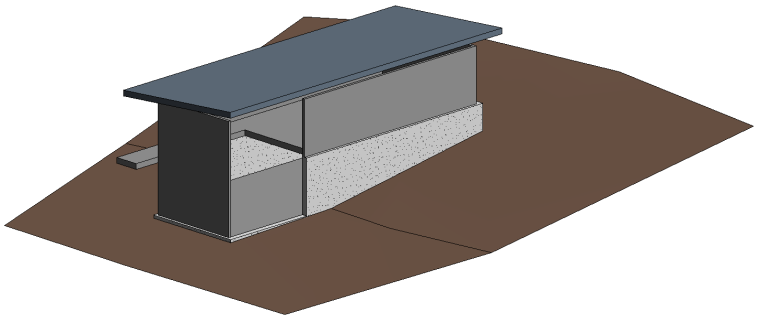


Figure 34: What pops up here should be the caption menu when right clicking a wall.

Figure 35: The final 3d floor view



Your view should look similar to this, excluding view point discrepancies.

Chapter 5 - Creating Interior Walls

In this guide you will continue on your education of wall creation. This time in the perview of interior wals.

Creating Lower Level Interior Walls

1. Open up the following view: Side Bar > Project Browser > Floor Plans > 01 Lower Level

2. Use the following options for your wall properties

Settings	Generic - 6"
Location Line	Wall Centerline
Base Constraint	01 Lower Level Level
Base Offset	0'0"
Top Constraint	Up to 02 Entry Level
Top Offset	0'0"

3. Add walls:

   (a) Beginning at the far left wall, move your cursor until the guide states that you are 20"0' away from the right corner wall. Look at the figure 36 to determine how it should look when you click.

   (b) Create a wall perpendicular to that point, and bring it down until it reaches the far wall.

   (c) At this point, refer to the figure 37 to continue the walls on this level. It is not essential that your walls are exactly the same.

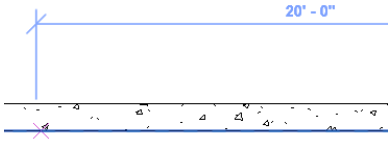


Figure 36: Wall distance guide
It should look like this when you click

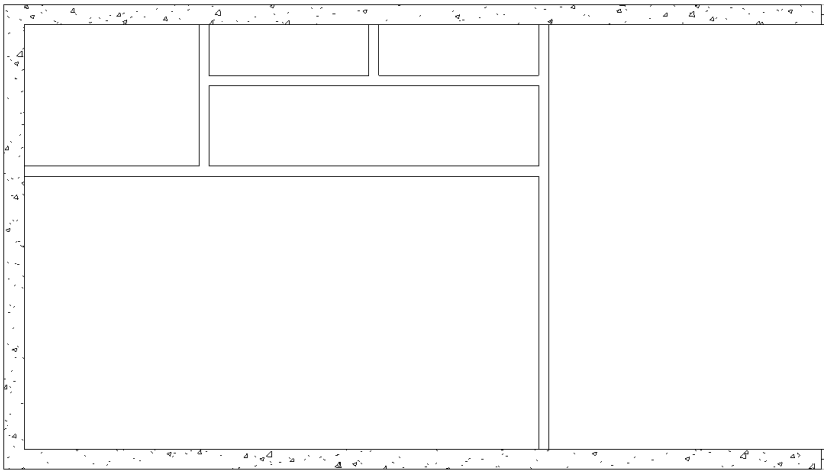


Figure 37: The lower level walls guide

Your walls should look similar, but not exactly like this. All of this can be changed later of course

(d) You should use the Modify | Place Walls > Modify > Split Element tool to split a point in the far right interior wall, to create a hallway.

(e) Select both end of the now split wall, to create the hallway. Check figure 39

Figure 38: The split tool selected

Creating the Upper Level Walls

4. In this section, you're going to take charge on the construction of the upper level walls, following a figure. This should be on view: Side Bar > Project Browser > Floor Plans > 02 Upper Level, and using the following options:

Settings	Generic - 6"
Location Line	Wall Centerline
Base Constraint	02 Upper Level
Base Offset	0'0"
Top Constraint	Up to 03 Roof Level
Top Offset	0'0"

5. In the figure 40 you should be creating the walls that are not halftone, meaning the walls that are the darker shade.

6. When you are done creating the walls, if you wish to remove the ability to see the lowerlevel walls while on that level, use this option while the white background is clicked: Side Bar > Properties > View Level > View Depth > Level: and change the option to Associated Level

Advanced: When you are creating your upper level walls, if you have trouble seeing because you are seeing the lower level walls at fulltone, do this: To select multiple walls for an options hold down the Ctrl key and click the lowerlevel walls that you want to be halftone. When those are selected, rightclick on one of them, and click Context Menu > Override Graphics in View > Element, a popup should come onto your screen. in the top right corner of that popup is a checkbox that says Halftone: if you check that and click apply, then it will be halftone

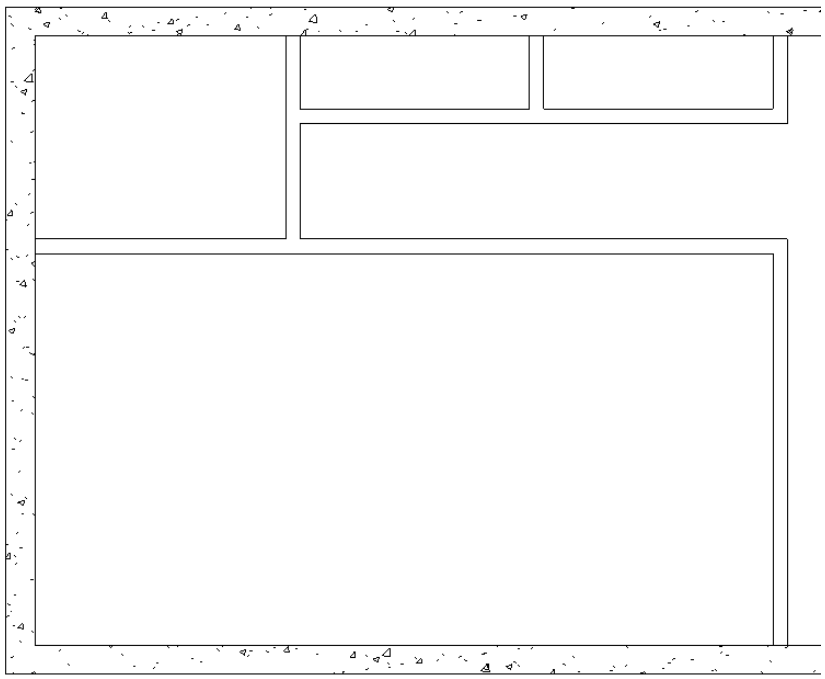
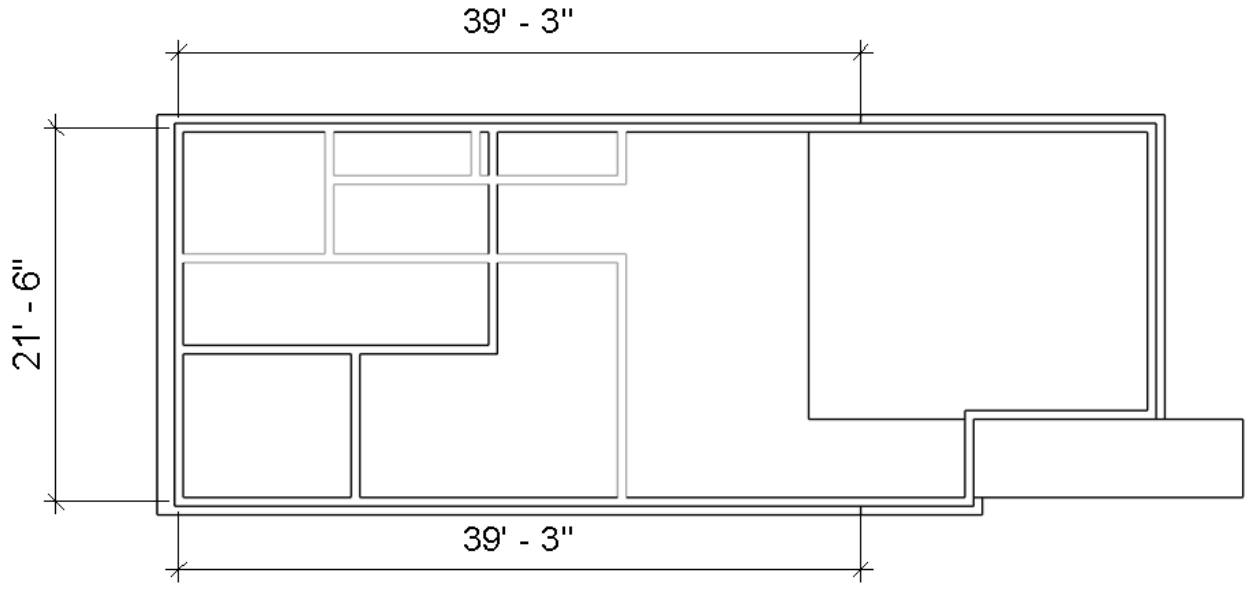


Figure 39: A completed hallway

Your hallway should look very similar, if not exact to this



You can change these up however you want, but make sure they have similar composition

Figure 40: Upper level interior walls

Chapter 6 - Creating Doors and Windows

In this particular section, you will be guided into adding Doors and Windows, which also doubles as a guide to the initial selection of objects

1.

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