

1.AUTODESK REVIT ARCHITECTURE



Figure 02: Autodesk Revit Architecture

Overview

Revit- a very popular product from Autodesk is a design software used by architects, engineers and interior designers to draw, map and create construction documents and rendered images and also collaborate with other design teams. Architects use Revit to design homes, commercial buildings, landscapes and Interior designers use it to design 3D layouts that include both geometric and non-geometric information. Civil and mechanical engineers also use Revit to design bridges, roads, tunnels and other structures with specific instructions. The advantage of creating a building design model with Revit Architecture is that each design model can be stored in a single database file in a digital format.

Prerequisites:

Revit Architecture training course is suitable for architects, civil/Arch engineering students & professionals, interior designers and AutoCAD draftsmen pursuing Revit BIM jobs. Working knowledge on architectural design, drawing and other engineering experience are recommended.



Figure 03: Autodesk Revit Architecture

Course Objective:

Revit Architecture course empower you with the powerful features of Revit. Course aims to make participants more productive by giving them the ability to produce drawings and redefine images of buildings and help navigate user interface, architectural objects such as floor, walls, roofs, windows, and stairs. This course will assist in the creation of schematic design through construction documentation. After completing this course students and professionals can work with BIM technology and look for designations such as Revit technicians (Architecture) or Revit BIM modellers and Interior BIM professionals.

key Contents:

- Introduction to Revit Architecture
- Building Information Modeling
- Starting a Project
- Project Settings
- Modeling Basics
- Wall, Door, Components, Windows
- Roof, Floor and Slab
- Railing, Ramp, Stairs
- Linking Revit and CAD Files
- Import CAD files
- Room Areas and Openings
- Annotation Details
- Dimensions /Detail View and Sheet Composition
- Walkthrough and Render
- Massing & Site
- The Basics of Family
- Extrusion, Blend, Revolve Sweep and Blend Sweep



Figure 04: Autodesk Revit

WEEK 1

4 APRIL 2022 –12 APRIL 2022

1. WEEK 1: INTRODUCTION TO REVIT ARCHITECTURE& BIM

What is Revit Architecture:



Figure 05: Official Autodesk logo

- The Revit platform for building information modeling is a design and documentation system that supports the design, drawings, and schedules required for a building project.
- Revit, a very popular product from Autodesk, It is a design software used by architects, engineers and interior designers to draw, map and create construction documents and rendered images and also collaborate with other design teams.
- Civil and mechanical engineers also use Revit to design bridges, roads, tunnels and other structures with specific instructions.
- Architects use Revit to design homes, commercial buildings, landscapes and Interior designers use it to design 3D layouts that include both geometric and non-geometric information.
- The advantage of creating a building design model with Revit Architecture is that each design model can be stored in a single data base file in a digital format.

Building Information Modelling:

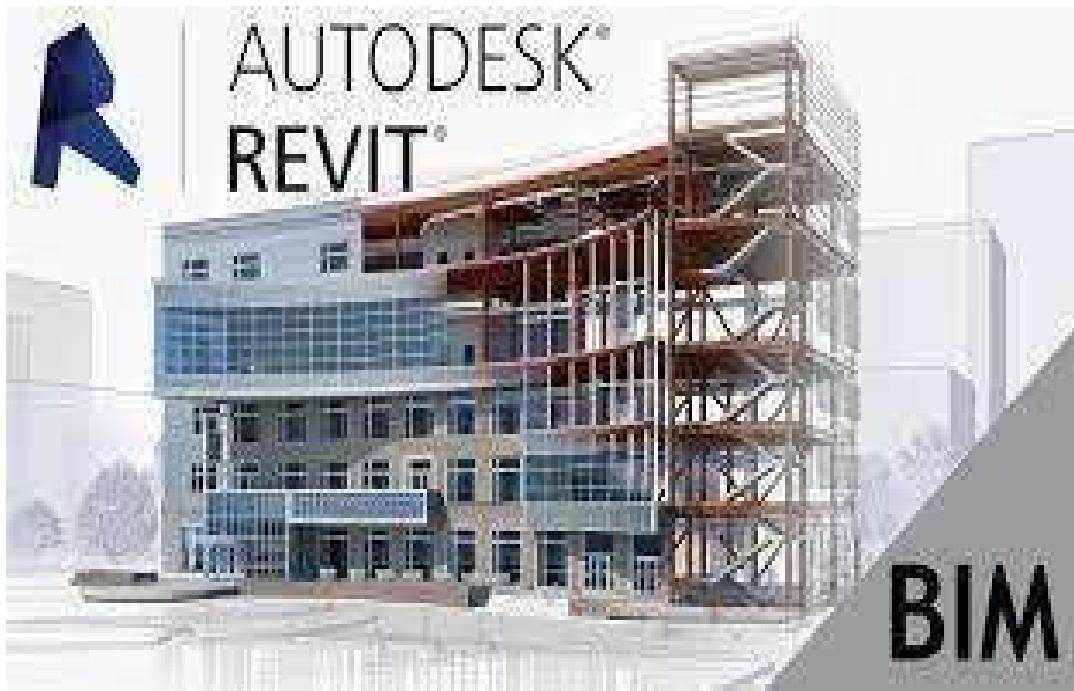


Figure 06: Autodesk Revit BIM

Building Information Modeling (BIM) is the foundation of digital transformation in the architecture, engineering, and construction (AEC) industry. As the leader in BIM Autodesk is the industry's partner to realize better ways of working and better outcomes for business and the built world.

Building Information Modeling (BIM) is the holistic process of creating and managing information for a built asset. Based on an intelligent model and enabled by a cloud platform, BIM integrates structured, multi-disciplinary data to produce a digital representation of an asset across its lifecycle, from planning and design to construction and operations.

4.2.1 What is BIM used for:

BIM is used for creating and managing data during design, construction, and operation. BIM integrates disciplinary data to create detailed digital presentations that are managed in an open standards platform-time cellulite. Using Wild gives you greater visibility, better decision making, more stable, a co-ring on ABC.

What is the process of BIM?

The process of BIM supports the creation of intelligent data that can be used throughout the lifecycle of a building or infrastructure project.

A. Plan:

Inform project planning by combining reality capture and real-world data to generate context models of the existing built and natural environment.



Figure 07: Plan

A. Design:

During this phase, conceptual design, analysis, detailing and documentation are performed. The preconstruction process begins using BIM data to inform scheduling and logistics.



Figure 08: Design

B. Build:

During this phase, fabrication begins using BIM specifications. Project construction logistics are shared with trades and contractors to ensure optimum timing and efficiency.



Figure 09: Build

C. Operate:

BIM data carries over to operations and maintenance of finished assets. BIM data can be used down the road for cost-effective renovation or efficient deconstruction too.



Figure 10: Operate

Why is BIM important?

According to the UN, by 2050 the world's population will be 9.7 billion. The global AEC industry must look to smarter, more efficient ways to design and build not just as a means to keep up with global demand but to help create spaces that are smarter and more resilient too.

BIM not only allows design and construction teams to work more efficiently, but it allows them to capture the data they create during the process to benefit operations and maintenance activities. This is why BIM mandates are increasing across the globe.

User Interface:

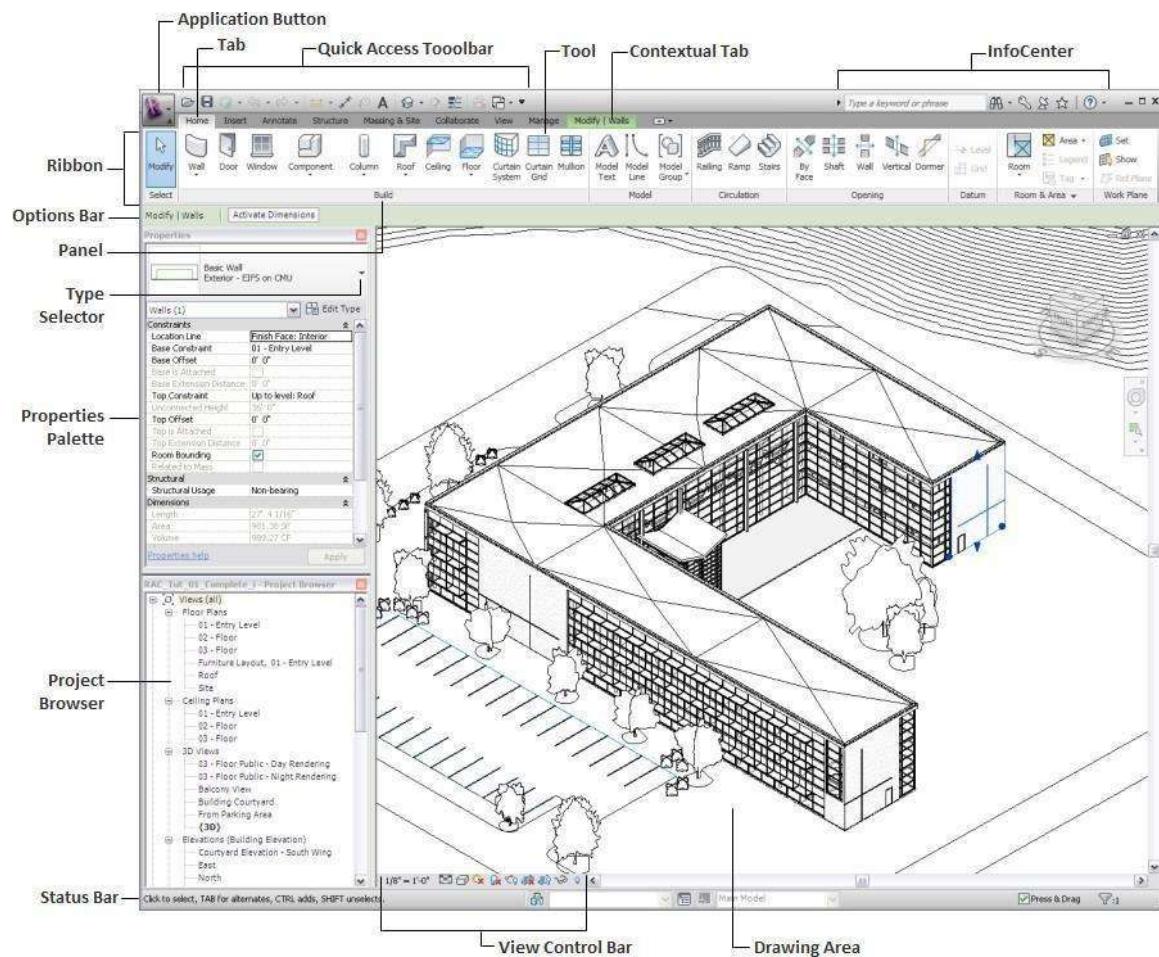


Figure 11: User Interface of Revit Architecture

1. Application button
2. Tab
3. Quick Access toolbar
4. Tools
5. Contextual tab
6. Info center
7. Ribbon
8. Options bar
9. Project browser
10. Properties
11. Status bar
12. Type selector

Tabs & Tools widely used in my model:

A. Quick Access Toolbar:

The Quick Access toolbar contains a set of default tools. You can customize this toolbar to display the tools that you use most often.

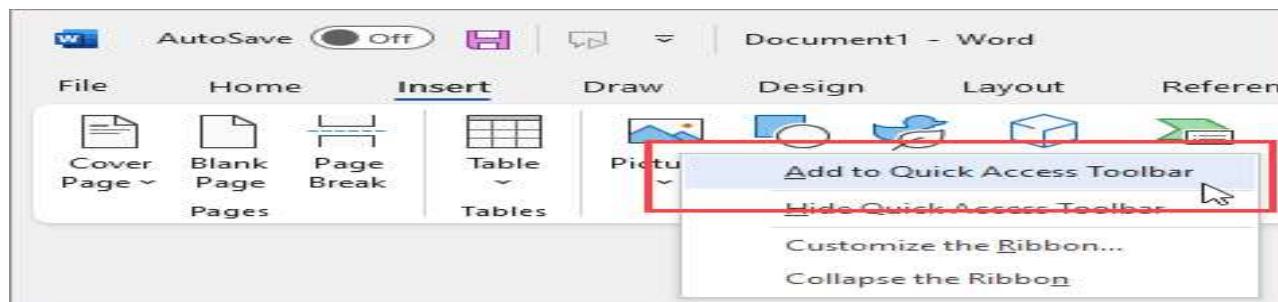


Figure 12: Quick Access toolbar

B. Ribbon:

The ribbon displays when you create or open a file. It provides all the tools necessary to create a project or family.

As you resize the Revit window, you may notice that tools in the ribbon automatically adjust their size to fit the available space. This feature allows all buttons to be visible for most screen sizes.

Figure 13: Ribbon



C. Contextual ribbon tabs:

When you use certain tools or select elements, a contextual ribbon tab displays tools that relate to the context of that tool or element. In many cases, the contextual tab merges with the Modify tab. A contextual ribbon tab closes when you exit the tool or clear the selection.

You can specify whether a contextual tab automatically comes into focus or the current tab stays in focus.

You can also specify which ribbon tab displays when you exit a tool or clear a selection.

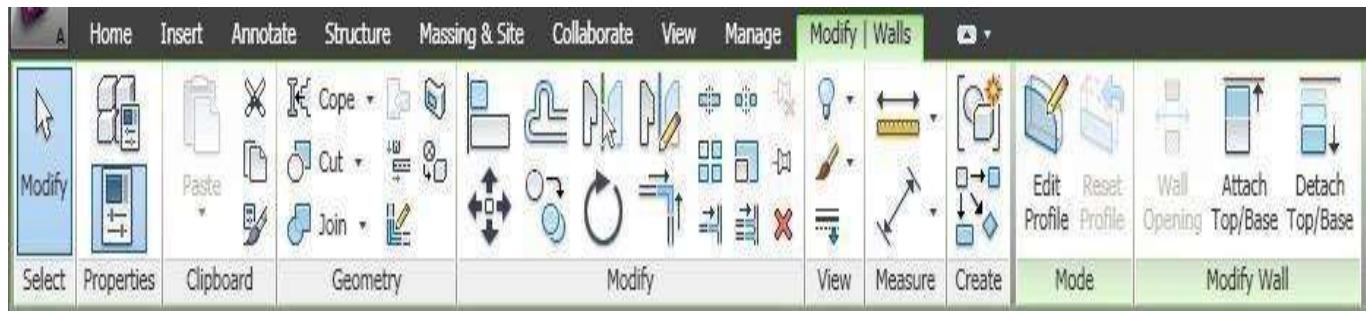


Figure 14: Contextual ribbon tabs

C. Project Browser:

The Project Browser shows a logical hierarchy for all views, schedules, sheets, families, groups, linked Revit models, and other parts of the current project. As you expand and collapse each branch, lower-level items display.

- To change the size and location of the Project Browser
- To show the Project Browser, click View tab
- User Interface panel, and select the Project Browser checkbox.

- To hide the Project Browser, click View tab, User Interface panel, and clear Project Browser, or click the Close button (the red X) at the top of the browser.
- To resize the Project Browser, drag one of its borders.
- To move the Project Browser, drag the browser's title bar within the Revit window. As you move the cursor, an outline indicates where the browser will move to, and what its shape will be.
- Release the mouse button to place the browser in the desired location. You can also drag the Project Browser outside the Revit window to the desktop.

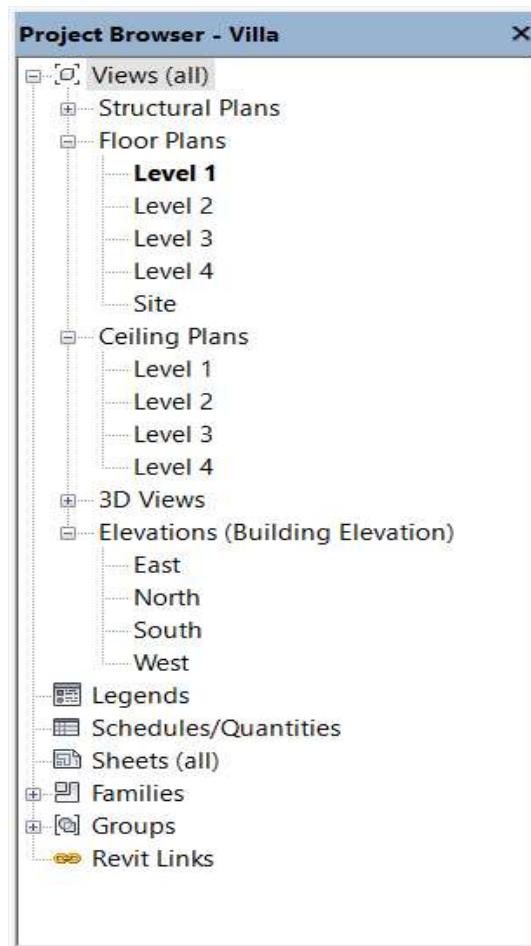


Figure 15: Project browser

D. Properties Palette:

The Properties palette is a modeless dialog where you can view and modify the parameters that define the properties of elements in Revit.

Opening the Properties Palette

When you start Revit for the first time, the Properties palette is open and docked above the Project browser.

On the left side of the drawing area. If you subsequently close the Properties palette, you can reopen it using any of the following methods:

- Click Modify tab ► Properties panel ► (Properties).
- Click View tab ► Windows panel ► User Interface drop-down ► Properties.
- Right-click in the drawing area, and click Properties.

You can dock the palette to either side of the Revit window and resize it horizontally. You can resize it both horizontally and vertically when it is undocked. The display and location of the palette will persist from one Revit session to the next for the same user. Typically, you keep the Properties palette open during a Revit session so that you can

- Select the type of element you will place in the drawing area, or change the type of elements already placed.
- View and modify the properties of the element you are placing or of elements selected in the drawing area.
- View and modify the properties of the active view
- Access the type properties that apply to all instances of an element type

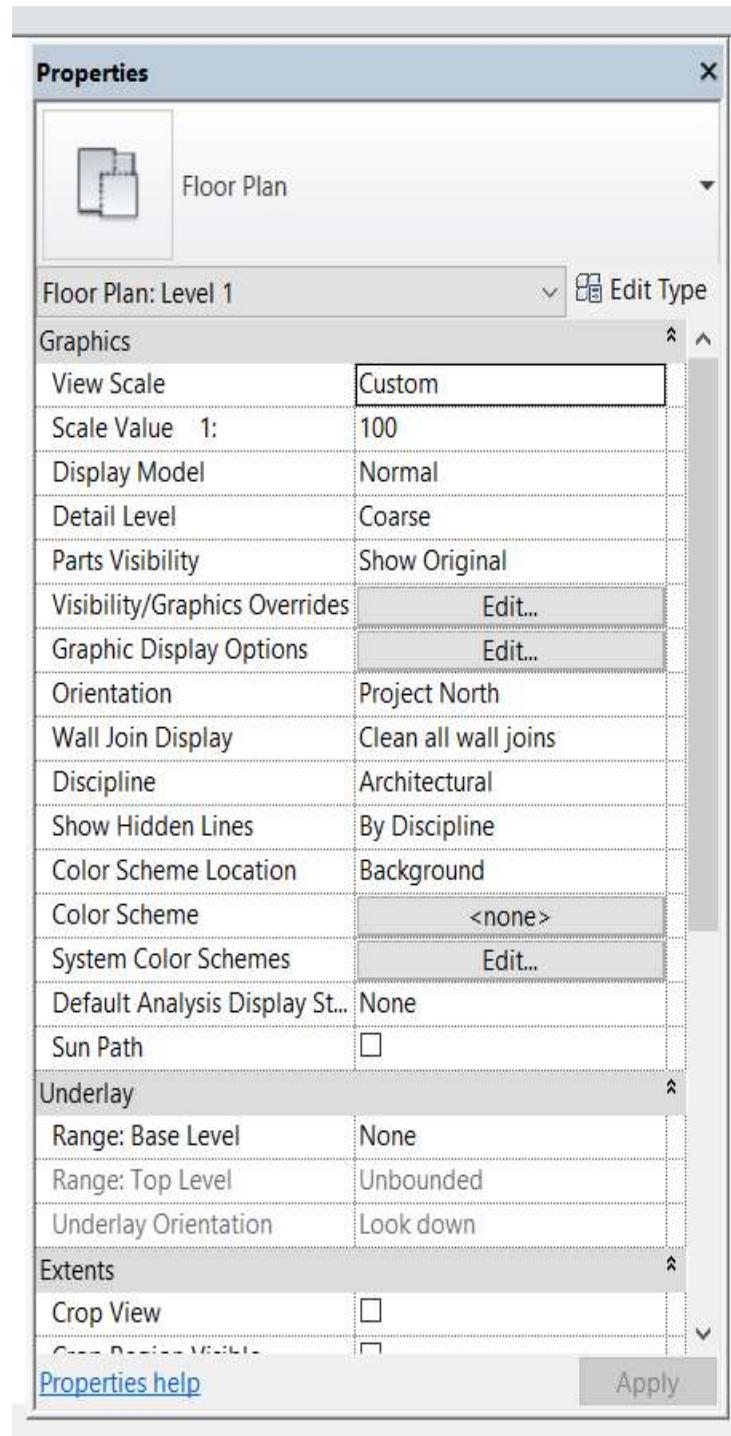


Figure 16: Properties palette

E. Drawing Area:

The drawing area of the Revit window displays views (and sheets and schedules) of the current project. Each time you open a view in a project, by default the view displays in the drawing area on top of other open views. The other views are still open, but they are underneath the current view. Use tools of the View tab.

- Windows panel to arrange project views to suit your work style. The default color of the drawing area background is white; you can invert the color to black.

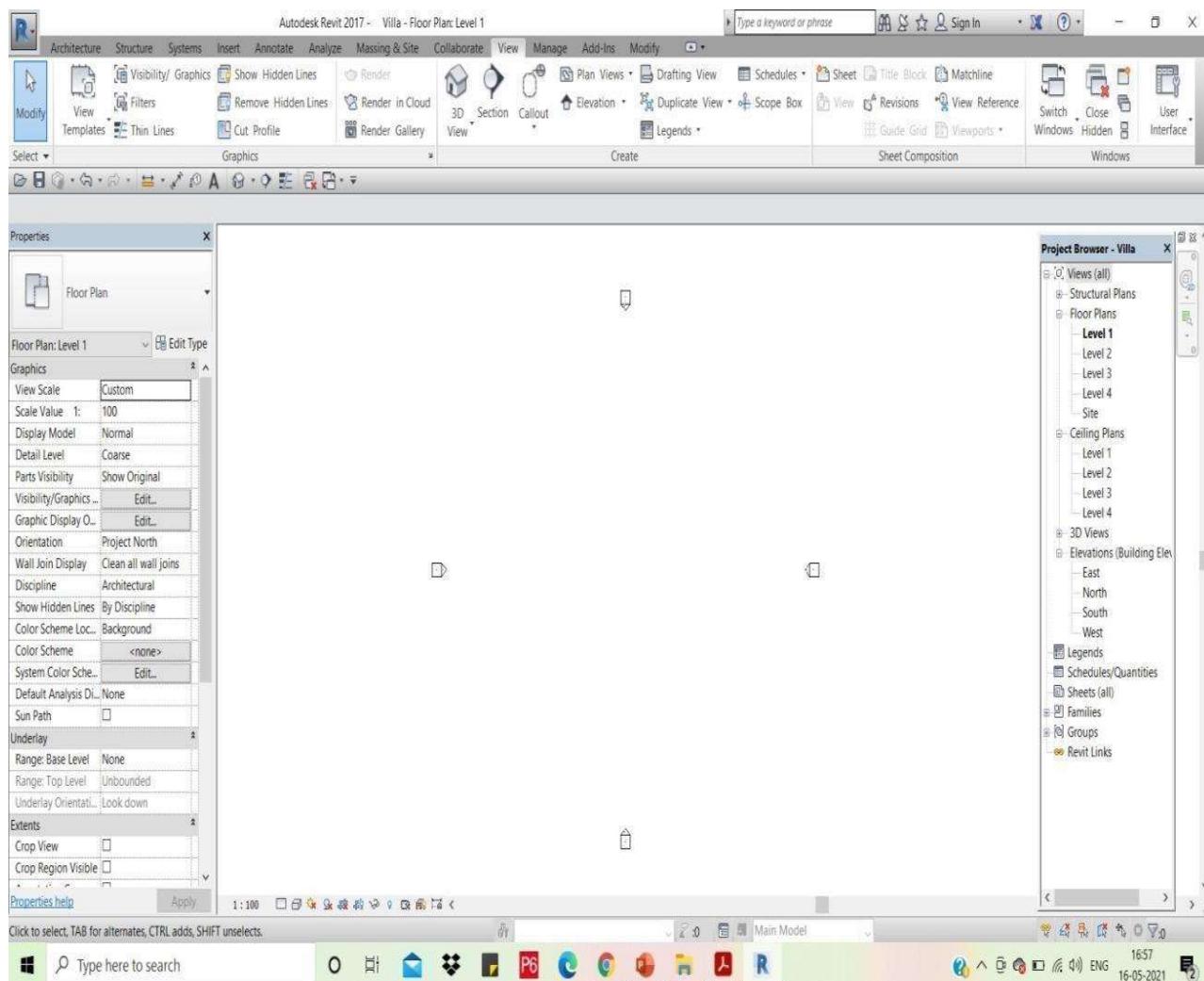


Plate 01: Drawing area

WEEK 2

13 April 2022 – 20 April 2022

5. WEEK 2: STARTING THE PROJECT & BUILDING THE MODEL

AIM : To Create a 2 storey 3BHK villa model using Autodesk revit architecture



Figure 17: 3BHK Villa model

Line diagram of all floor plans:

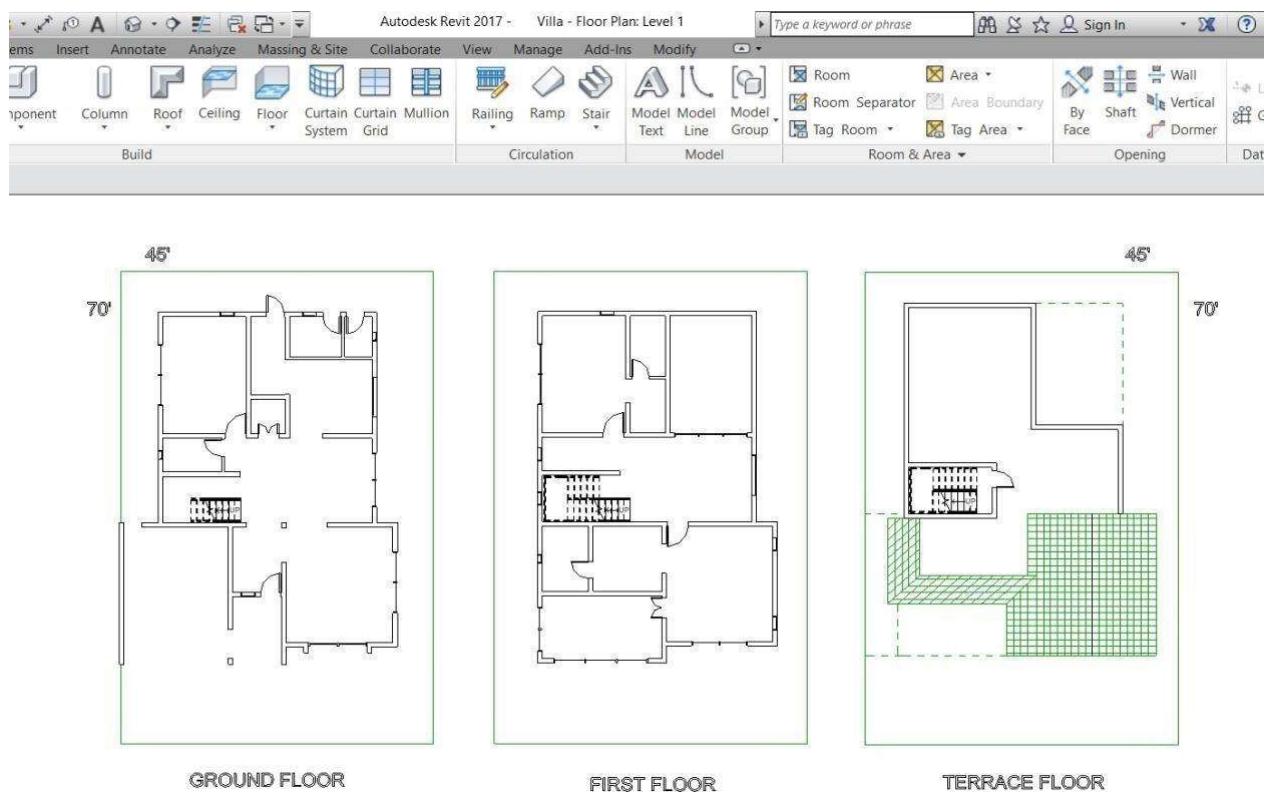


Plate 02: Line diagram

How I created the Line diagram:

1. Setting the Units to Feet and Inches
2. The site dimension is 45 X 75 ft
3. Creation of ground, first and terrace floors in level 1, 2 & 3 respectively.
4. The floor height given for each floor is 10ft Using the Wall tool, the line diagram for ground, first and terrace floor is created.



Figure 18: Wall, Door & Window tool

5. Doors, Windows and Staircase to all 3 floors are added using Door, Window and Staircase tools in the toolbar.
6. The glass windows for living area and bed rooms have been created using Store front wall.
7. The text tool is used to all the 3 floors using model text tool.

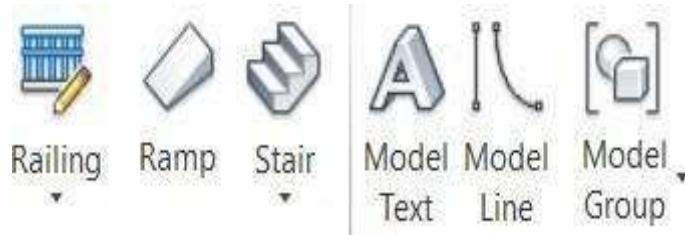


Figure 19: Railing, Stair & Model text tool

Floor plans created using Autodesk AutoCAD:



Figure 20: Floor plans created using AutoCAD

Step 1 – 8 together into a model in 3D (Elevation - West):

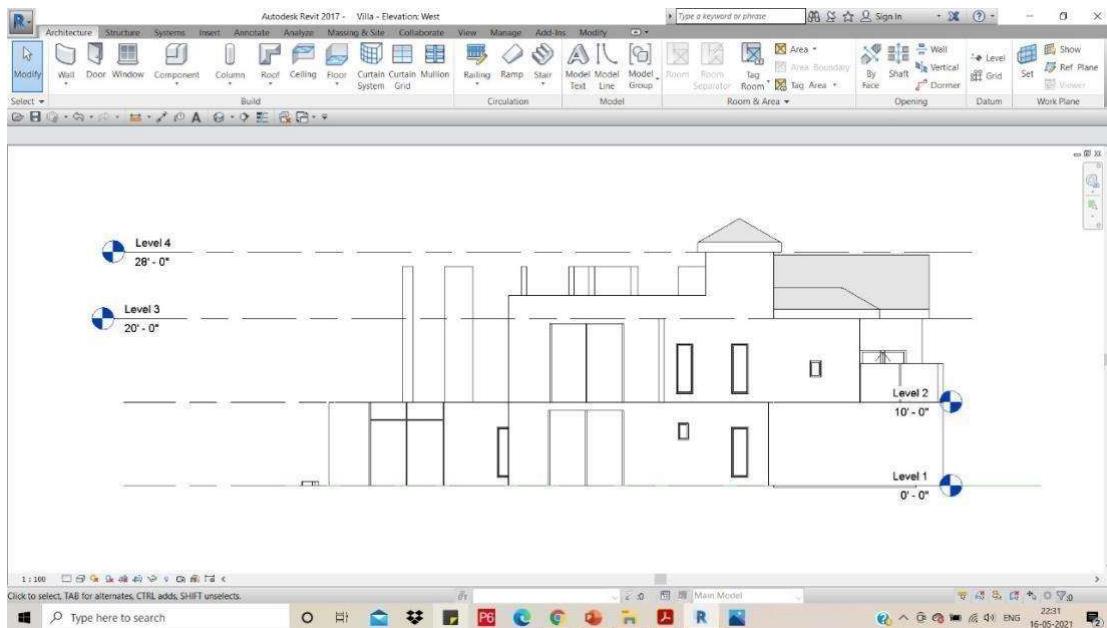


Plate 03: 3D model (Elevation view)

Step 1 – 8 together into a model in 3D (corner view):

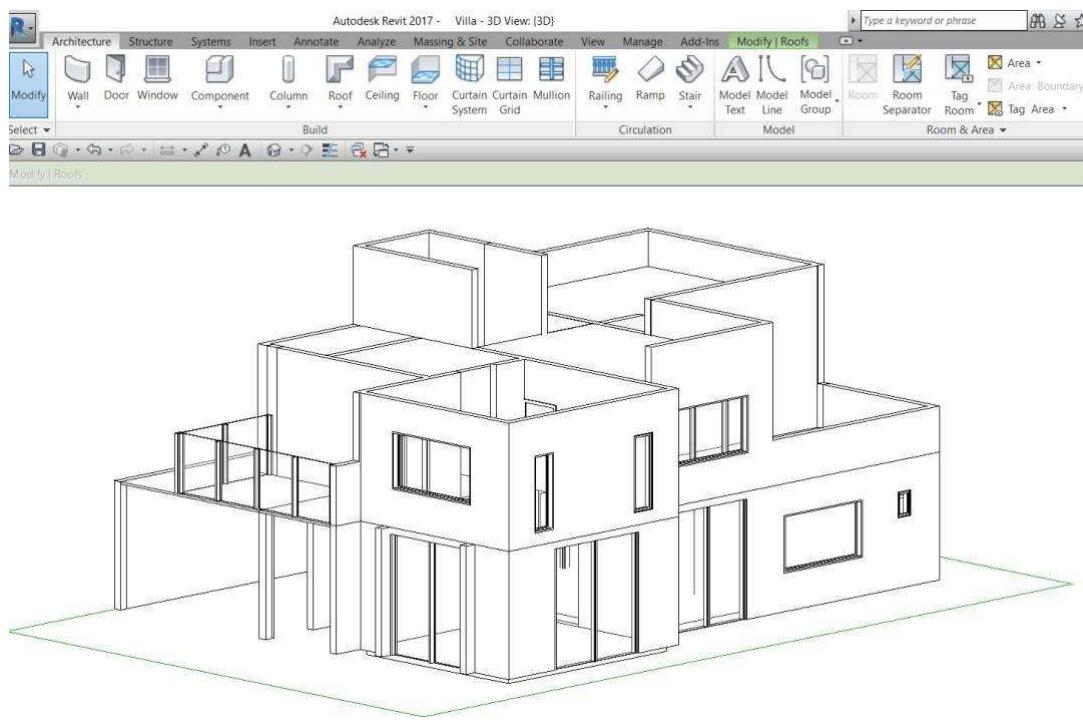


Plate 04: 3D model (corner view)

WEEK 3

21 April 2022 – 28 April 2022

6. WEEK 3: DETAILING OF THE MODEL

Adding Flooring, Ceiling, Roofing and Balcony:

- Flooring is provided to the required area using the Floor tool in the toolbox.
- Ceiling is provided to all the floors as and when it is required using Ceiling tool in the toolbox
- Later, Roofing is provided by using Roof by footprint option to give a sloping effect on the roof
- A glass railing of required length is provided along the length of the balcony



Figure 21: Roof, Ceiling & Floor tools

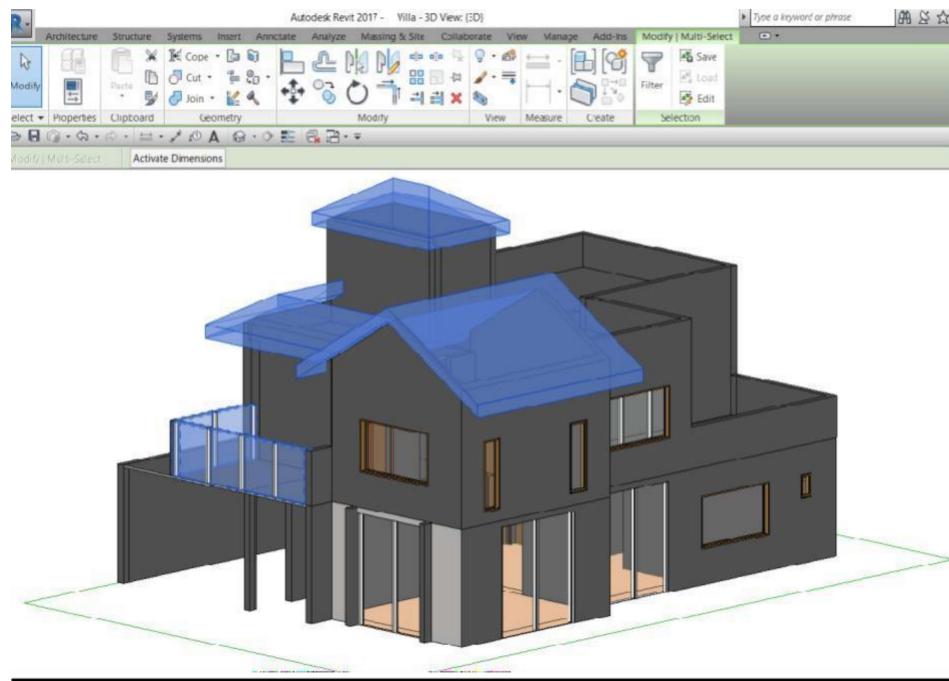


Plate 05: 3D model for flooring, ceiling & Roofing

Material application & New material:

1. The material for the flooring in the interiors of the house was provided with Cherry material with 6 inches thick & the flooring material for car parking is concrete, also with 6 inches thick.
2. The material for the ceiling is provided with Compound ceiling with 6inches thickness.
3. A new material for the sloped roofing has been provided based on the requirement to a Maroon colored roof tile.

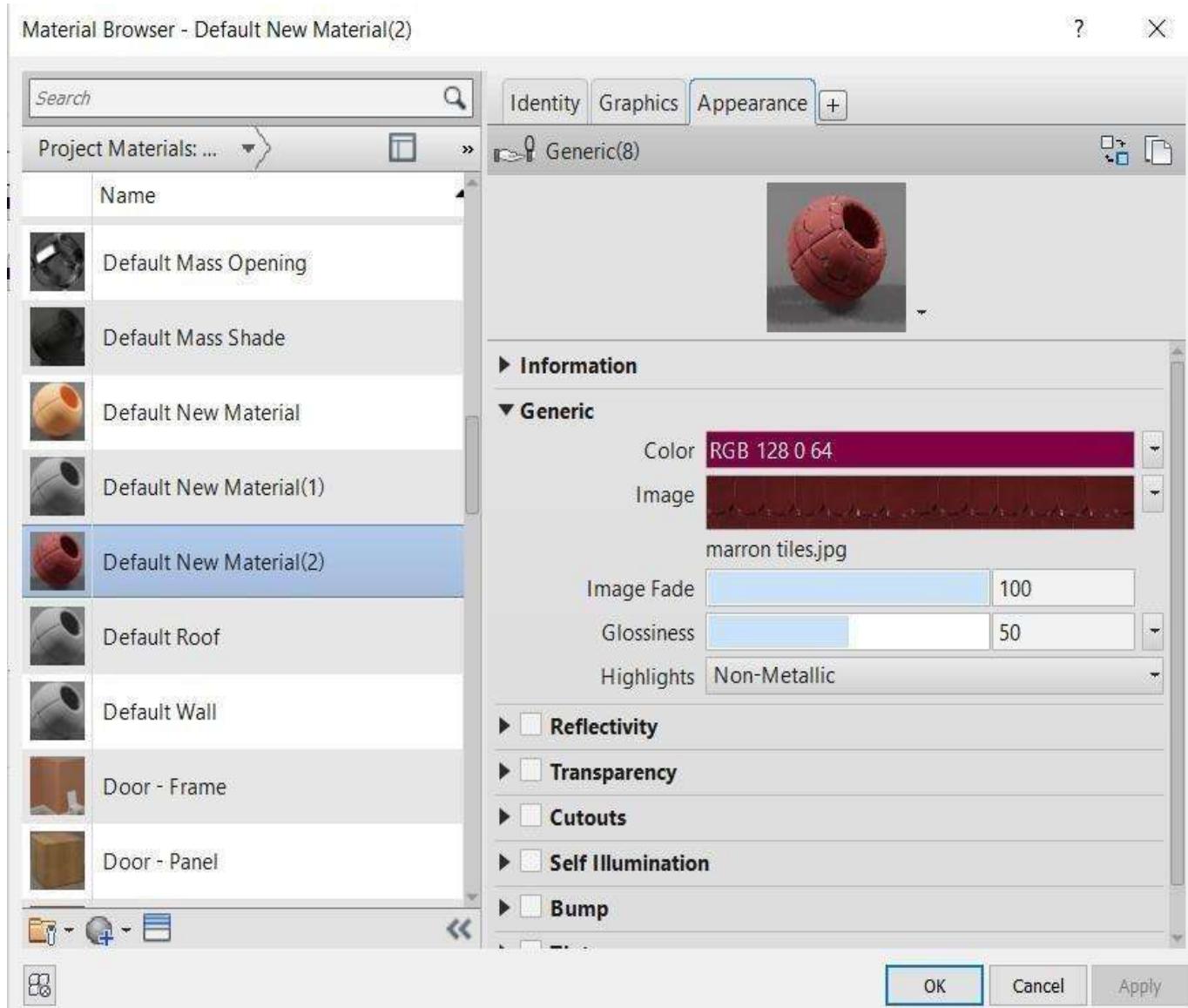


Plate 06: Material application

Step 1 – 3 Together into a model in 3D (corner view):

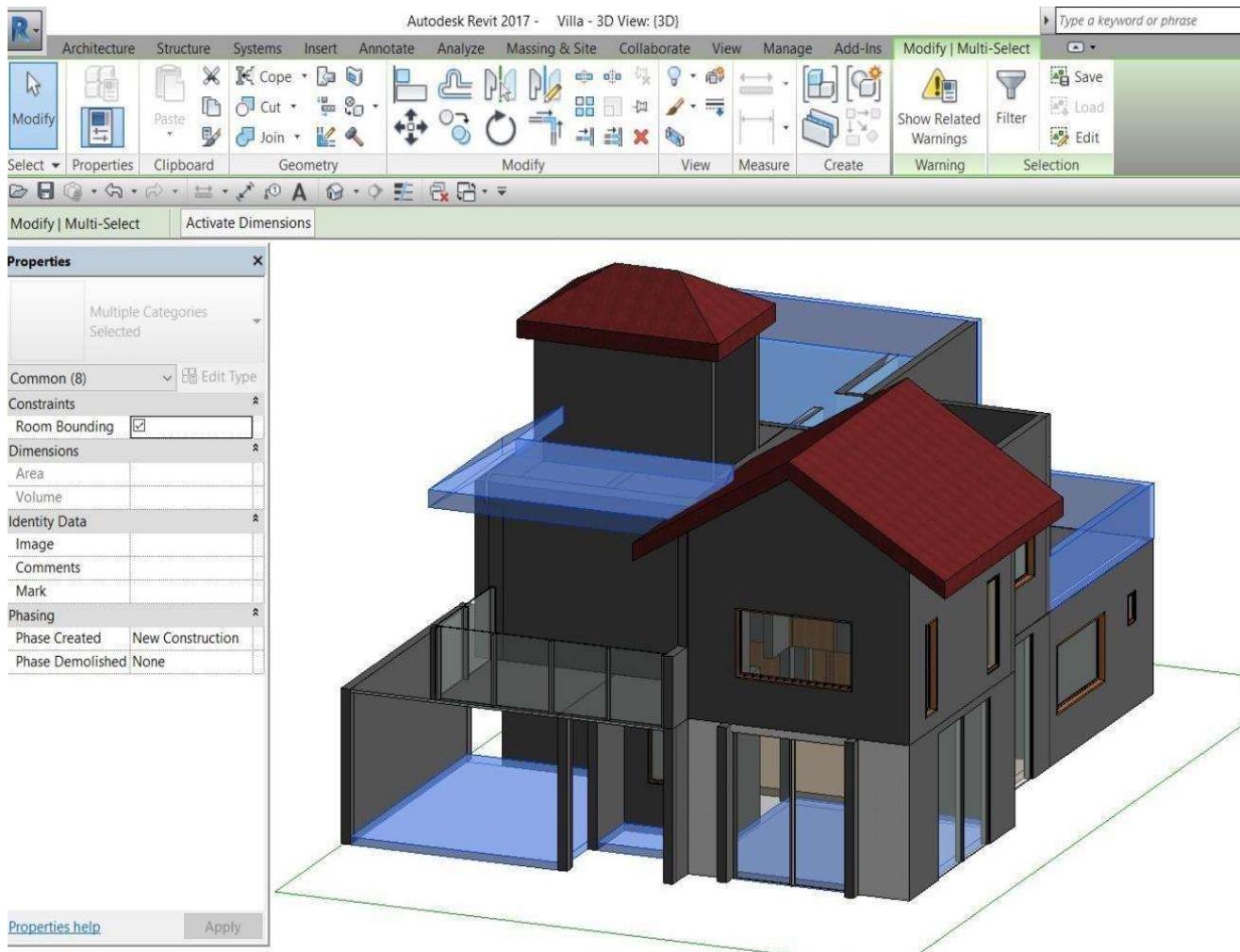


Plate 07: 3D model (corner view)

Massing & Site: Topo surface, Site component:

1. Massing is basically the sense of space which the building encloses, and helps to define both the interior space and the exterior space of the building.

2. A topo surface was created using the tool topo surface from the toolbar.

This surface is created to provide a bottom surface for the model to stand and to place required site components.

3. Site components are those which enhances the naturality of the model.

4. Site components such as plants, flower pots, trees, street lights have been created in the required levels as shown in the below figure.



Figure 22: Topo surface, Site component tool

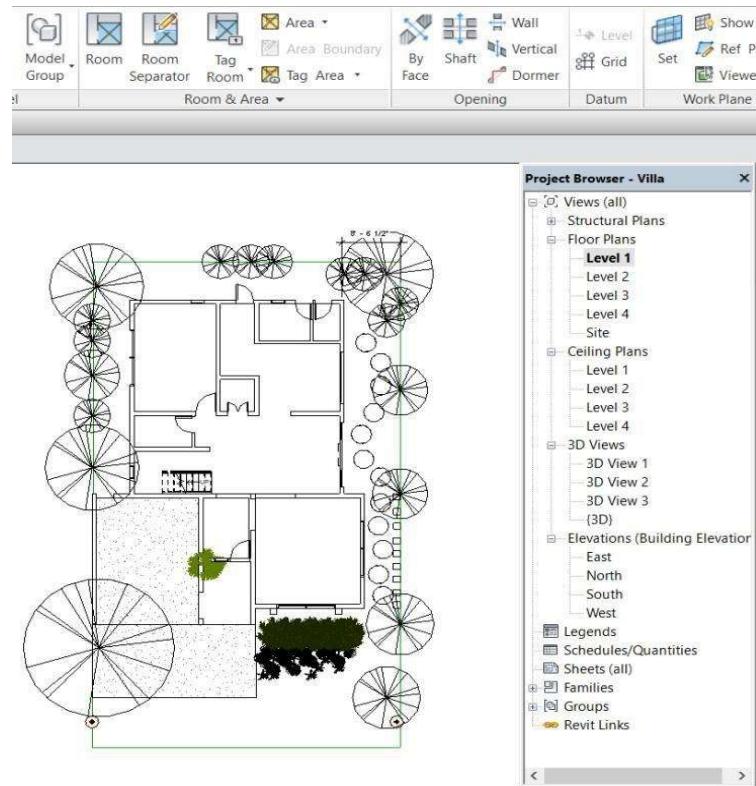


Plate 08: Level 1 floor plan

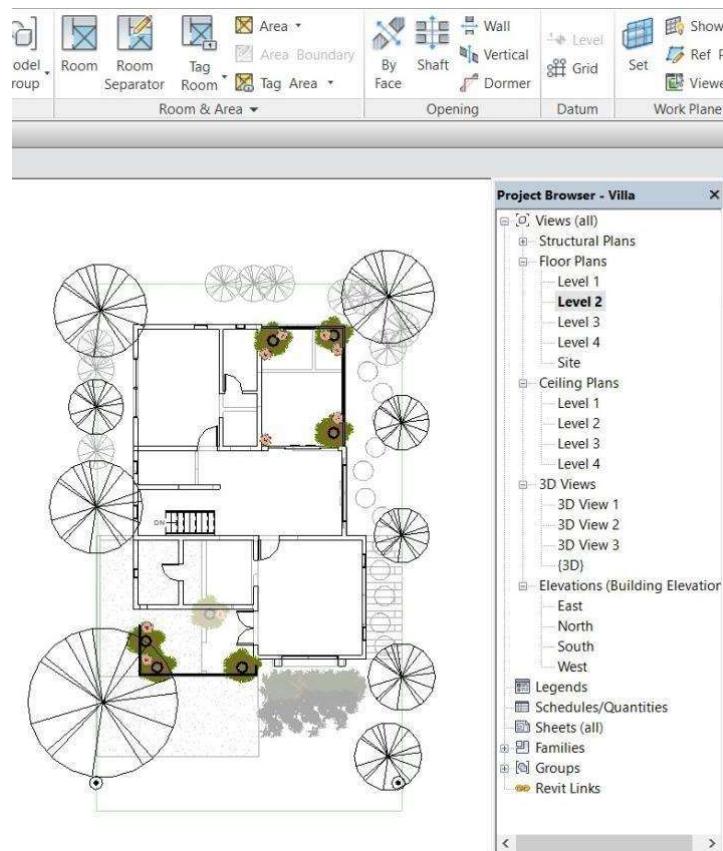


Plate 09: Level 2 floor plan

6.3.1 3D Model of the house with Massing & Site components:

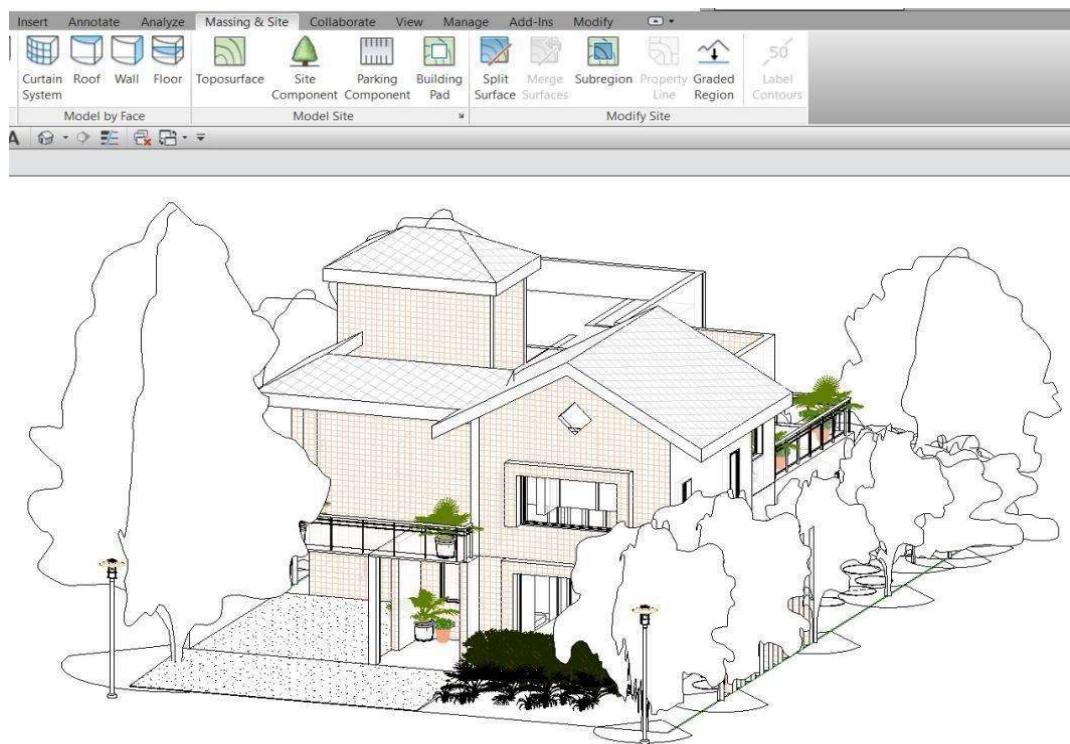


Plate 10: 3D model in hidden lines

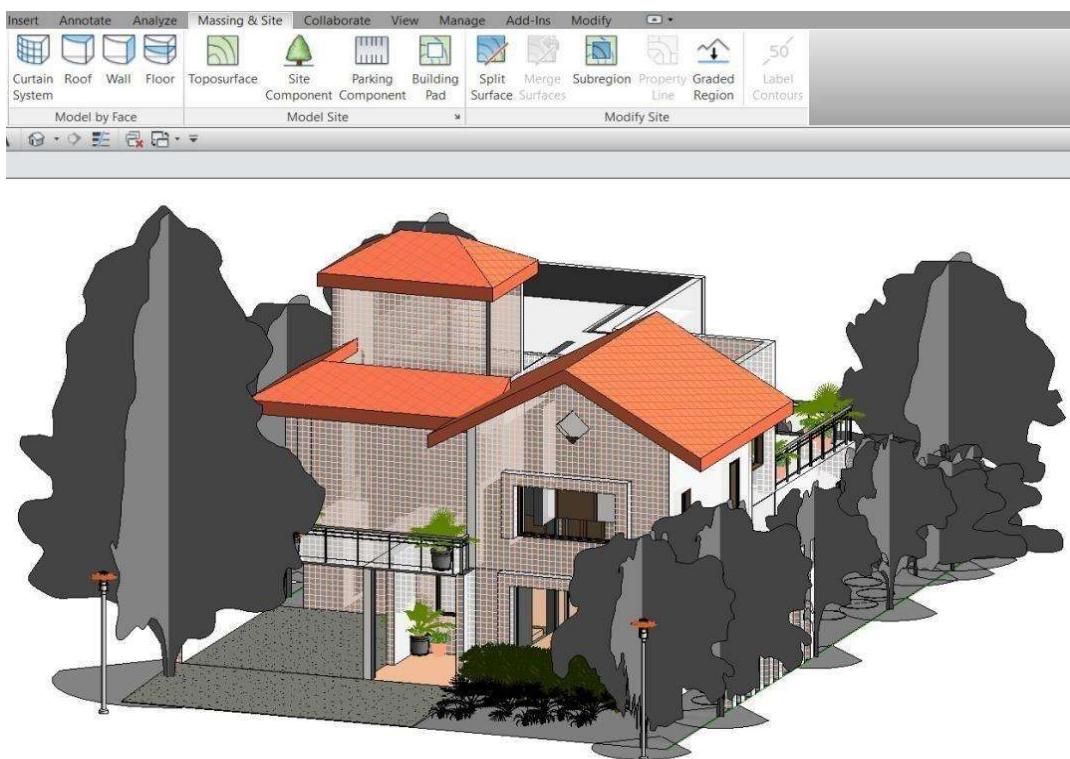


Plate 11: 3D model in shaded effect

Extrusions and opening:

1. Extrusions are solid or void structures that are very easy to create on a work plane and then extrude that profile perpendicular to the plane on which it is sketched to obtain the required design.
2. Wall openings are created based on the design requirement by selecting the wall, where the opening has to be created and then using the tool Wall openings, the desired shape opening wall is created.



Figure 23: Extrusion tool



Figure 24: Wall opening tool

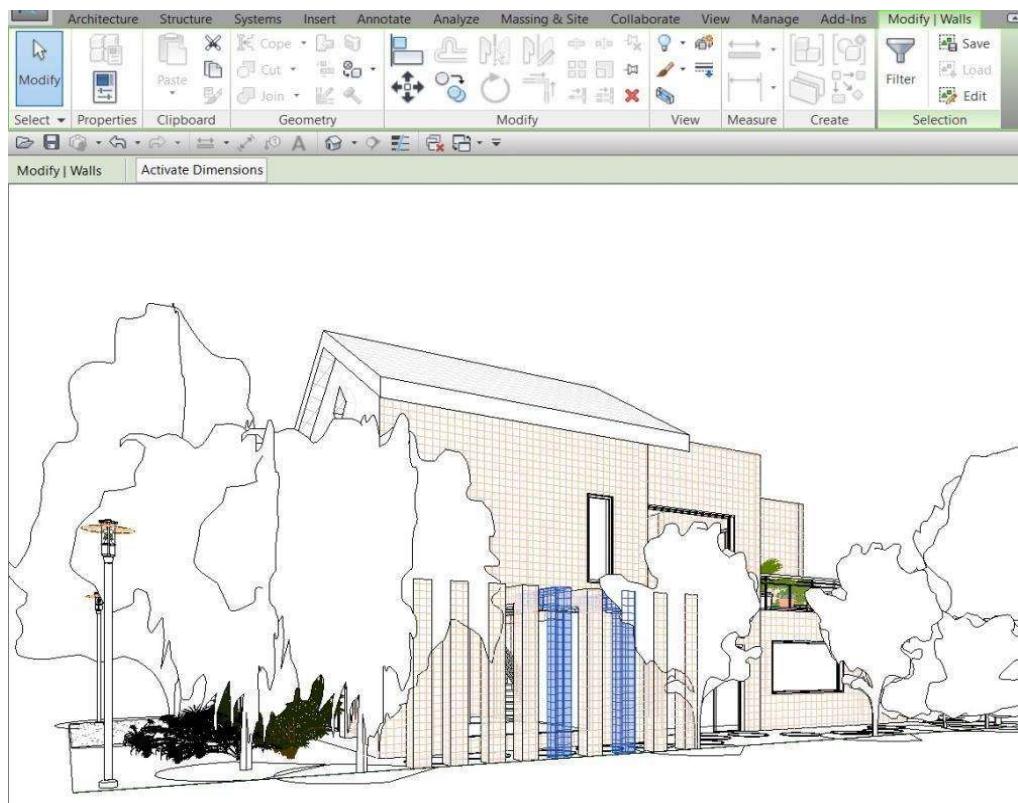


Plate 12: Extrusion

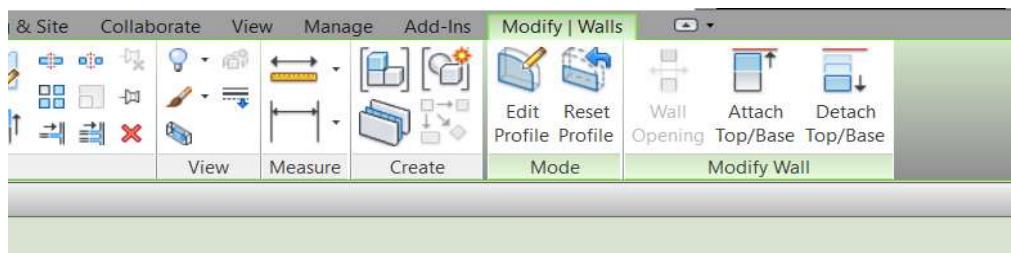


Plate 13: Wall opening

WEEK 4

29 April 2022 – 4 May 2022

7. WEEK 4: FINISHING THE MODEL

Rendering:

1. Rendering is done after the completion of the entire model
2. The model is rendered to create a photorealistic image of the 3D model
3. Revit Architecture begins the rendering process, rendering the entire image progressively.
4. Render the view to create a photorealistic image of the 3D model.
5. Before starting the render process, see best practices for rendering for information about how you can improve performance.
6. After preparing the 3D view and using the Rendering dialog to select desired settings, click Render to render the image.
7. Revit begins the rendering process, rendering the entire image progressively. Revit displays a progress dialog, which shows information about the rendering process.

Note: To cancel the rendering process before it completes, click Stop. When the rendering process is complete, Revit displays the rendered image in the drawing area. You can then do the following:

- Change render settings, and render the image again.
- Adjust exposure settings, and render the image again.
- Save the rendered image as a project view.
- Export the rendered image to a file.
- Display the building model in the drawing area.
- In the Rendering dialog, click Show the model. To display the rendered image again, click Show the rendering.



Figure 25: Rendering tool



Figure 26: 3D model before rendering

Camera:

1. A camera is used to create/capture a perspective 3D view of our model as we want to see through our eyes.
2. The Perspective option controls whether a 3D view displays as perspective instead of orthographic.

Open a plan, section, or elevation view.

- Click View tab ➤ Create panel ➤ 3D View drop-down ➤ Camera.

Note: If you clear the Perspective option on the Options Bar, the view that is created is an orthographic 3D view and not a perspective view.

- Click in the drawing area to place the camera.
- Drag the cursor to the desired target and click to place it.
- Revit creates a perspective 3D view and assigns a name to the view:3D View1, 3D View2, and so on. To rename the view, in the Project Browser right-click it, and select Rename.



Figure 27: Camera tool

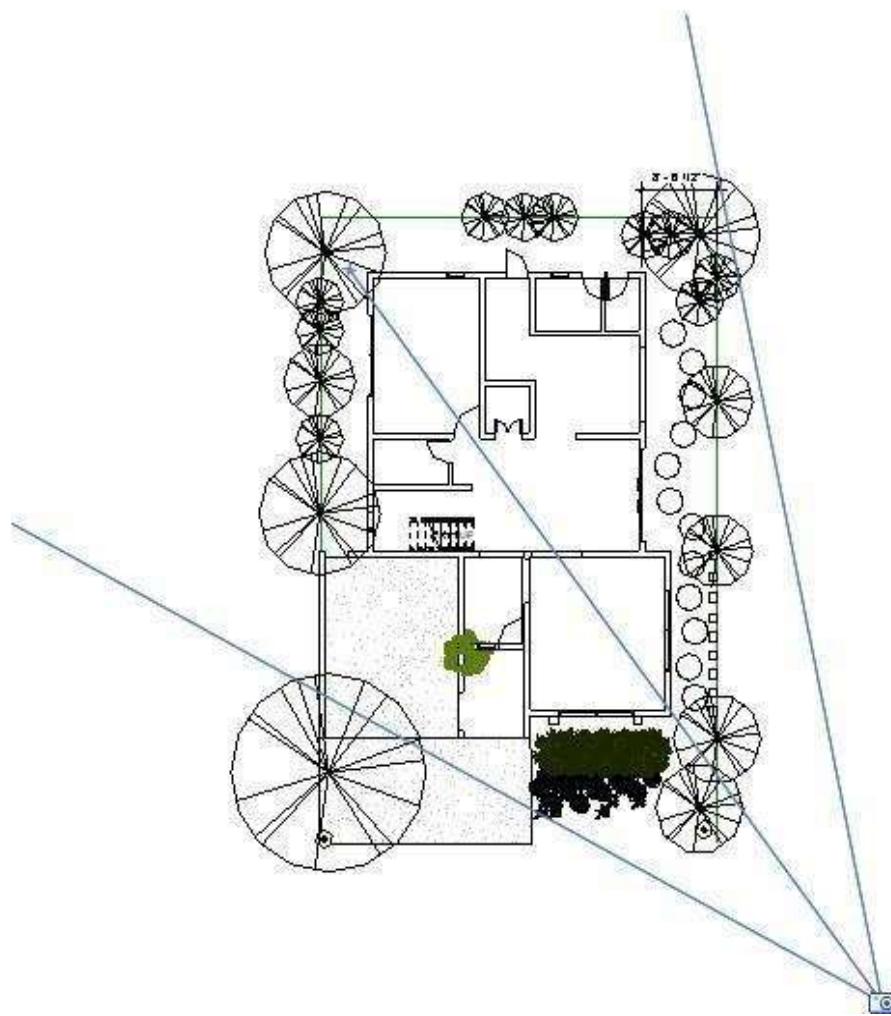
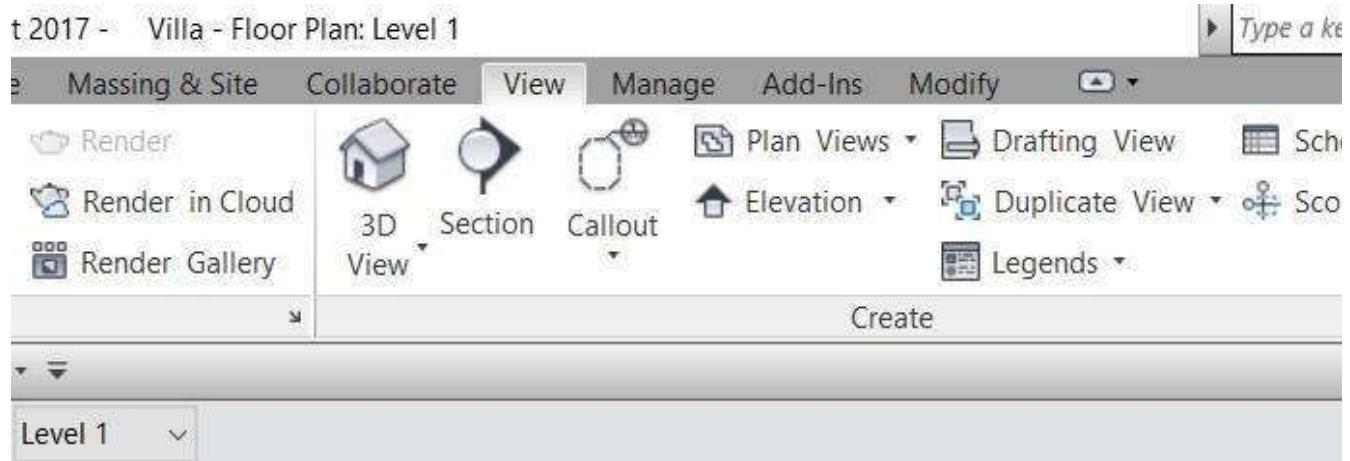


Plate 14: Camera focused onto the model



Figure 28: 3D camera view (South)



Figure 29: 3D model camera view (corner)



Figure 30: 3D model camera view (East)



Figure 31: 3D model camera view (West)



Figure 32: 3D model camera view (North)



Figure 33: 3D model camera view (corner)

Walkthrough:

1. A walkthrough is a path through a created building model and create an animation or a series of images to present the model to team members or clients.
2. Walk through can be created inside or around the building.
3. A walkthrough is a simulated tour of a site or building using camera positions placed along a path that you define. Create a walkthrough to present your model to clients or team members.

The walkthrough path consists of camera frames and key frames. A key frame is a frame that can be modified to change the direction and position of the camera. By default, walkthroughs are created as a series of perspective views, but you can also create them as orthographic 3D views.

The following image shows an example of a walkthrough path. The red dots indicate key frames. The blue triangular shape shows the field of view, which defines the width and depth of the camera view.

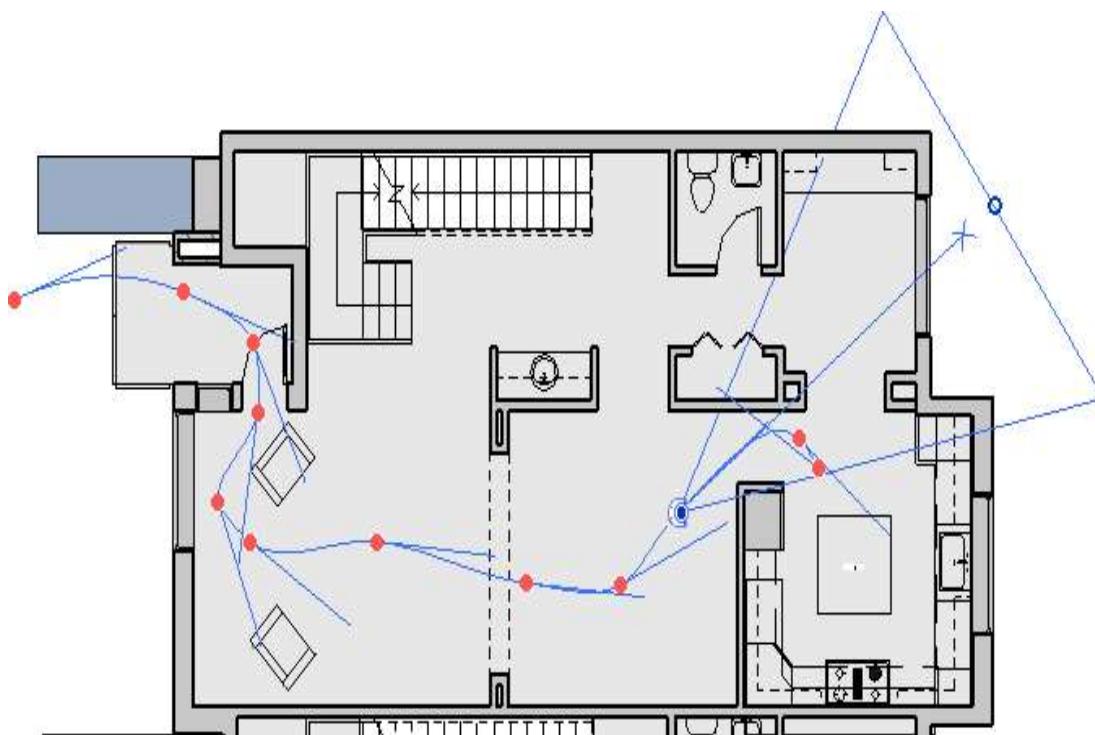


Figure 34: Walkthrough

After you've created a walkthrough, export it to share with others.

When exporting the walkthrough, you can create a series of static images or a video file. When someone views the video, they can't change the path through the model or the camera angles. The walkthrough provides a pre-defined experience of the model.

If you need a real-time walkthrough experience, use Revit Live instead. Revit Live allows you to navigate anywhere in the model without creating a path or setting up camera views. Revit Live does not create a movie file as the Walkthrough feature does, however.

Autodesk 3ds Max modeling and animation software is another alternative to the Revit Walkthrough feature. It allows you to have more control over camera movement and to animate elements in the scene, such as a door opening and closing.

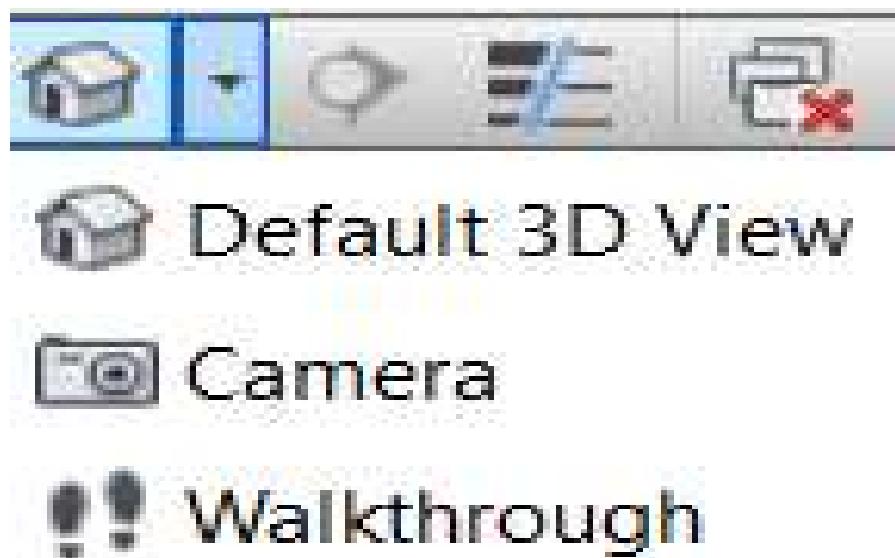


Figure 35: Walkthrough tool

8. SKILLS LEARNED & ENHANCED DURING THE INTERNSHIP PERIOD

Professional Skills:

- 2D Floor planning using Revit Architecture
- Creation of 3D model of a house
- BIM
- Learned to design, simulate, visualize and collaborate a model
- Loading families into the model
- Rendering & walkthrough of the model

Personal Skills:

- Helped me to understand the importance of BIM
- Creative thinking while planning & designing of a model
- Strong hold on AutoCAD & better reading of the drawings

9. REFERENCES

- [1] fig (1) Official company logo, www.educadd.co.in
- [2] fig (2) Autodesk Revit Architecture, fig (3) Official Autodesk logo, fig (4) Autodesk Revit 2021, fig (5) Autodesk Revit Architecture, fig (6) Autodesk Revit BIM, www.autodesk.in
- [3] fig (7) User Interface, fig (8) Quick access toolbar, Ribbon & Contextual tab, fig (9) Properties browser, fig (10) Project browser, fig (12) Wall, Door & Window tool, fig (13) Stair, Ramp & Railing tool, fig (15) Roof, Ceiling & Floor tools, fig (16) Topo surface, Site component tool, fig (17) Extrusion & Wall openings, fig (18) Render tool, fig (20) Camera tool, fig (27) Walkthrough tool, Revit Architecture 2011 User's guide
- [4] Pt (1) Drawing area, Pt (2) Line diagram, Pt (3) 3D model in Elevation view, Pt (4) 3D model in corner view, Pt (5) 3D model of the house, Pt (6) New material application, Pt (7) Material application to the model, Pt (8) Site components, Pt (9,10) Massing in hidden lines & shaded effect, Pt (11,12) Extrusion & Wall opening, Pt (13) Camera, Pt (21-26) 3D model in North, South, East, West & corner view, **Revit 2017**
- [5] fig (11), 3BHK Villa, www.villas.com
- [6] fig (14) Floor plans created using AutoCAD, **Autocad 2017.**