

PLAN AND MODELLING OF DUPLEX MODERN HOUSE BY USING REVIT SOFTWARE

A MINI PROJECT REPORT SUBMITTED IN PARTIAL
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BACHELOR OF TECHNOLOGY

IN

CIVIL ENGINEERING

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CERTIFICATE

This is to certify that the Mini Project Report entitled "PLAN AND MODELLING OF DUPLEX MODERN HOUSE BY USING REVIT SOFTWARE" that is being submitted by

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in partial fulfillment of the requirement for the award of B.Tech in Civil Engineering in the **RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY**, Nandyal (Affiliated to J.N.T University, Anantapur) is a bonafide record of confide work carried out by them under our guidance and supervision. The results embodied in this technical report have not been submitted to any other university or institute for the award of any Degree.

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Date:

Dedicated to my beloved parents, and teachers who have worked hard throughout my education.

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Abstract

Revit software is a Professional software which provides building information modelling for architects, structural engineers, designers and contractors developed by Autodesk. Autodesk Revit architecture, which renders complete vision of construction. With BIM technology it is easy to model the building and we can connect to revit architecture, Revit structure, built for Building Information Modelling (BIm).Using this software it is planned to prepare a model on DUPLEX MODERN HOUSE which provides all requirements and good infrastructure. So we are using our knowledge and planning to build a DUPLEX MODERN HOUSE. First we are going to plan the area and Dimensions of the Duplex Modern House as per our desired values and we will design elevation to provide great aesthetic look.

Keywords:

Autodesk Revit,BIM,Families,Mass,Levels,Duplec Modern House Information,3D Modelling,Duplex Modern House Tools and Benefits.

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Chapter 1

INTRODUCTION

1.1 Introduction

The Revit Architecture software will give the plan view, 3d model with excellent elevation, detailing diagrams, schedules for each structural elements, and with V-ray rendering software we can have realistic view with high efficiency, Building information modeling (BIM) gives the information about project design, its different views, scope, quantities, and phases when you need it.

The purpose of Autodesk Revit Architecture is made for BIM. BIM is an integrated process built on coordinated, reliable information about a project from design through construction and operations.

Revit Architecture collects information about each structural element's material its visualization realistic in nature and its design such as thickness height and in schedule it will give no of data such as cost, type of family, no. of brick, nu of doors, no. of windows etc across all other representations of the project.

1.2 Literature Review

The concept of BIM goes back in 1975. Building Description System (BDS) was the first system relatively close to modern BIM . It was described from the architectural expert Charles Eastman (1975).

Autodesk Revit is a building information modelling software for architects ,landscape architects, structural engineers , mechanical , electrical , and plumbing (MEP) engineers , designers and contractors . The original software was developed by Charles River Software , founded in 1997, renamed Revit Technology Corporation in 2000, and acquired by Autodesk in 2002.

Saeed Reza Mohandes(2012): Due to numerous steps of construction industry and its complicated and extensive structure, errors and reworks often might happen in this section. As such, BIM (Building Information Modeling) is regarded as a beneficial tool in minimizing the waste and improving the efficiency of building construction. This paper reviews and summarizes a substantial amount of requisite information relating to BIM from the literature reviews between 2005 and 2012. It has discussed the concept, explained the history, planning and implementation process and the benefits of using BIM in construction industry.

J Vinoth Kumar (2009): In India 49 % of the respondent use Revit as measure Revit tool . The BIM is new and promising approaching India which is gradually gaining acceptance by the owners, Architects, Engineers and Builders.BIM is in field to better communicate and integrate construction information . The study concentrated on the deployment of the model to support planning scheduling and tracking of the job site operation in India.

Prof. Sachin A , Mr. Mahesh G (2020): Revit Architecture is an innovative way to virtually design and manage project. Predictability of building performance and operations is greatly improved. The study includes utilization of Revit Architecture for visualization , 3D Co-ordinates , planning and scheduling.

1.3 Objectives

1. Modelling of Duplex Modern House in Revit according to the bye-laws in BIM.
2. By using Revit we are visualizing the Duplex Modern House in 2D and 3D view.
3. Making of model by using Revit software in BIM.

Chapter 2

Tools used

2.1 Drawing Area

The drawing area of the Revit Architecture window displays views (and sheets and schedules) of the current project. By default, each time you open a view in a project, the view displays in the drawing area on top of other open views. You can use commands on the Window menu to arrange the project views.

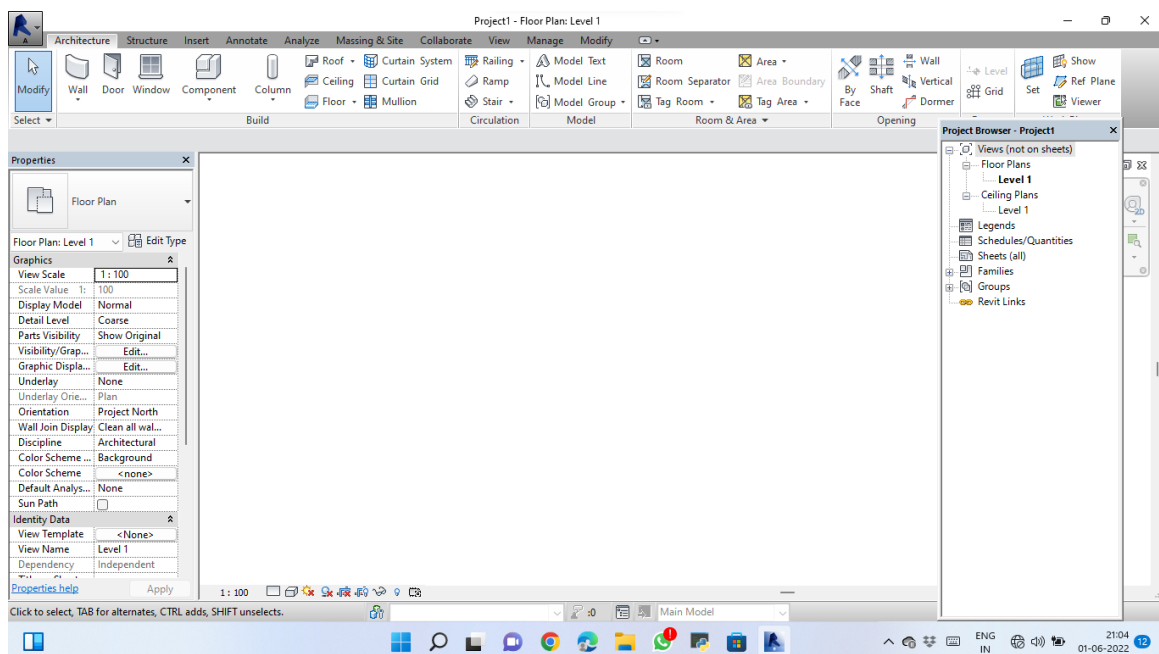


Figure 2.1: Empty Drawing area in Revit

2.2 Drawing Tools

From the figure we can see that there are 11 drawing tools in the Revit Software.

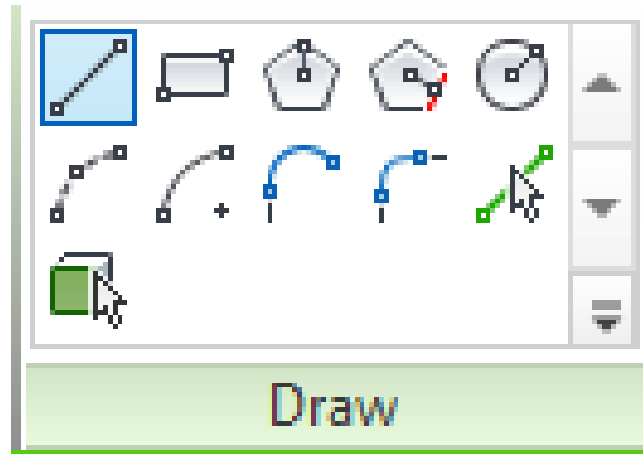


Figure 2.2: Drawing tools in the Revit software

- 1.Line Drawing Tool
- 2.Rectangular Drawing Tool
- 3.Inscribed polygon Drawing Tool
- 4.Circumscribed polygon Drawing Tool
- 5.Circle Drawing Tool
- 6.Fillet Arc Drawing Tool
- 7.Tangent End Arc Drawing Tool
- 8.Center End Arc Drawing Tool
- 9.Start End-Radius Arc Drawing Tool
- 10.Pick Lines Drawing Tool
- 11.Ellipse Drawing Tool

2.3 Modify Tools

From the figure we can see that there are 17 modify tools in the Revit software.

- 1.Align Modify Tool
- 2.Offset Modify Tool
- 3.Mirror–Pick Axis Modify Tool
- 4.Mirror–Draw axis Modify Tool

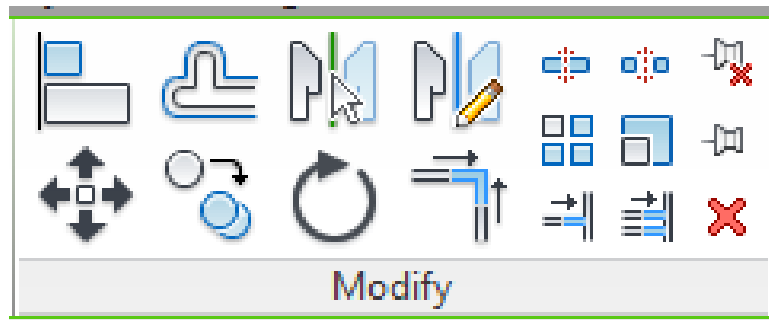


Figure 2.3: Modify tools in the Revit software

- 5.Split Elements Modify Tool
- 6.Split with Gap Modify Tool
- 7.Array Modify Tool
- 8.Scale Modify Tool
- 9.Unpin Modify Tool
- 10.Pin Modify Tool
- 11.Delete Modify Tool
- 12.Trim or Extend Multiple Elements Modify Tool
- 13.Trim or Extend Single Elements Modify Tool
- 14.Trim or Extend at Corners Modify Tool
- 15.Rotate Modify Tool
- 16.Copy Modify Tool
- 17.Move Modify Tool

2.4 Project Browser

To the right of the Design Bar is the Project Browser. The Project Browser is a listing of all views, families, and groups in the project. You can select any of the items listed in the Project Browser. A convenient way to open a view is to double-click the view name in the Project Browser list.

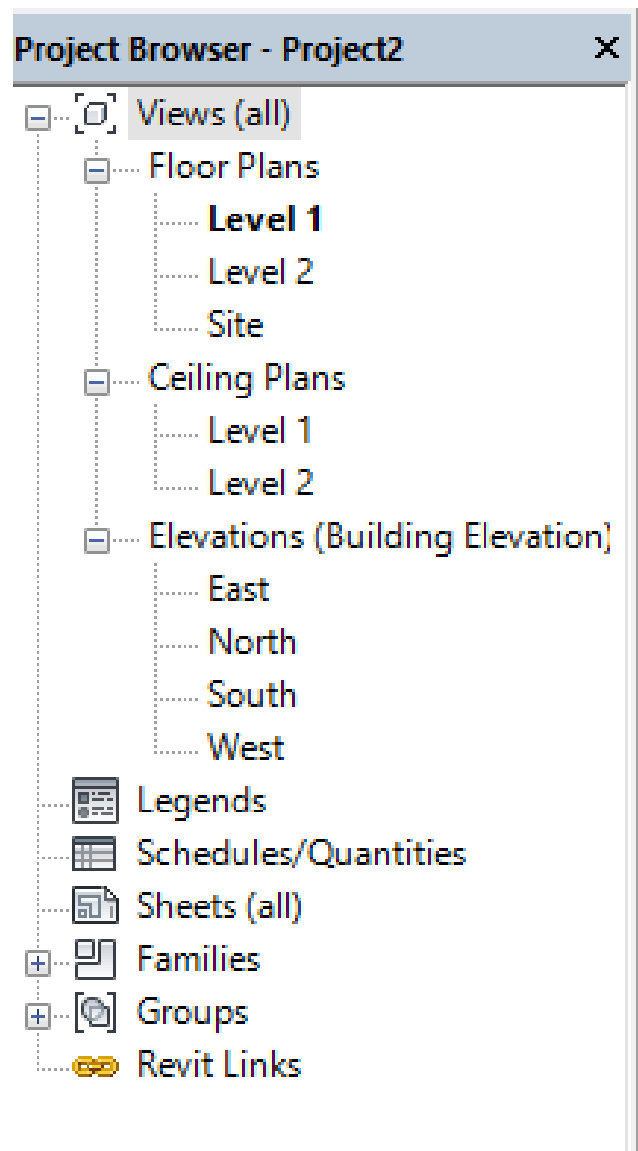


Figure 2.4: Project browser of the model

2.5 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.

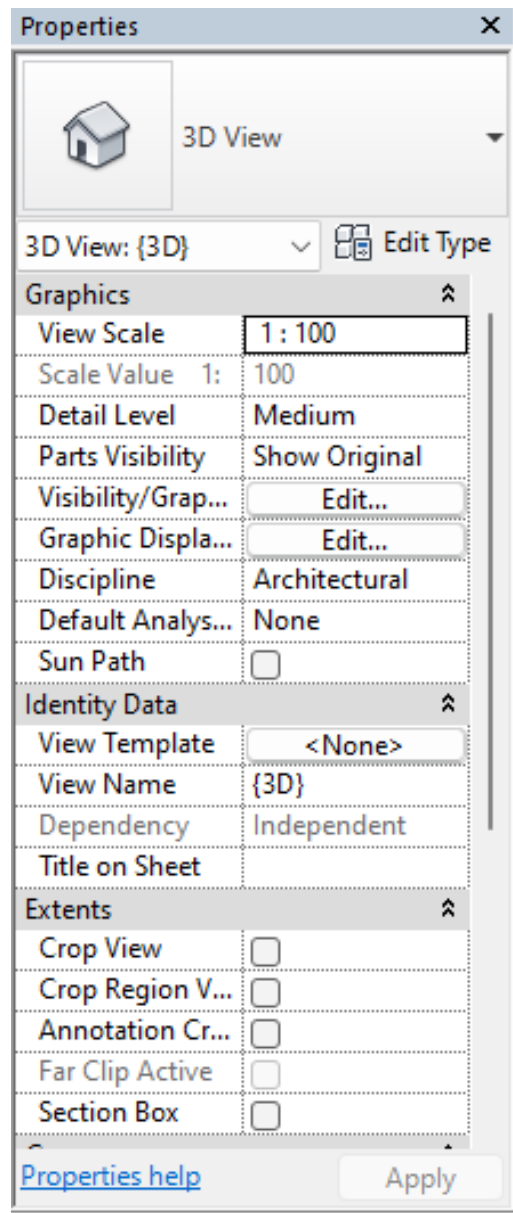


Figure 2.5: Properties of the model

2.6 Status bar

At the lower left corner of the drawing area is the Status Bar, which displays the status of the current command or the name of a highlighted element.

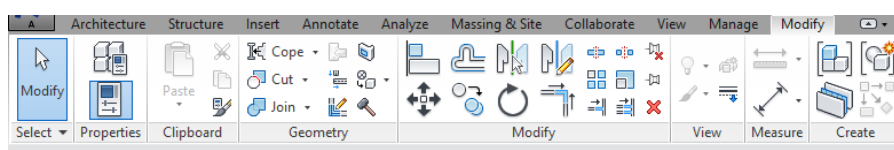


Figure 2.6: Status bar of the model

2.7 View control bar

At the lower left of the drawing area, above the Status Bar, is the View Control Bar. The controls are graphical shortcuts to various View commands, namely scale, detail level, graphics style, advanced model graphics, shadows, crop region, and temporary hide/isolate. Some views, such as sheets, drafting, and rendered views, have limited controls.

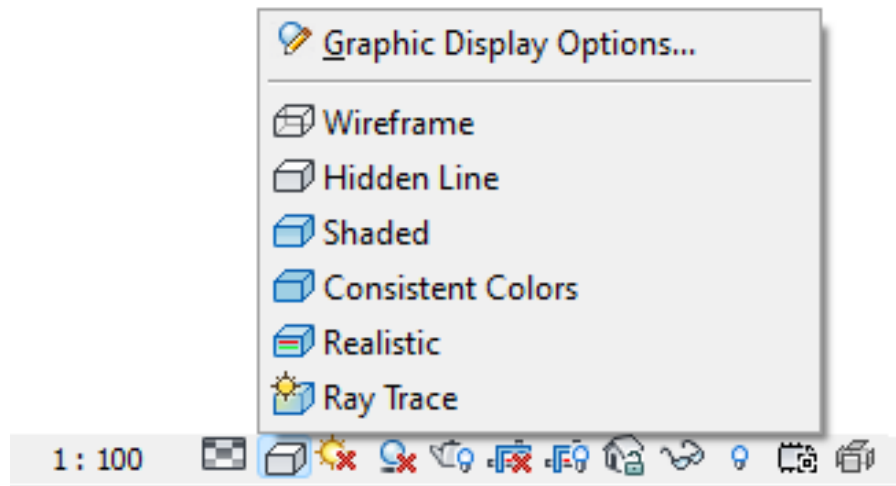


Figure 2.7: View control bar of the model

2.8 Rendering

The process is done because to show the variation of climatic conditions in different states of various countries. The rendering is done to show the lighting of various climatic i.e; day and night of seasons.

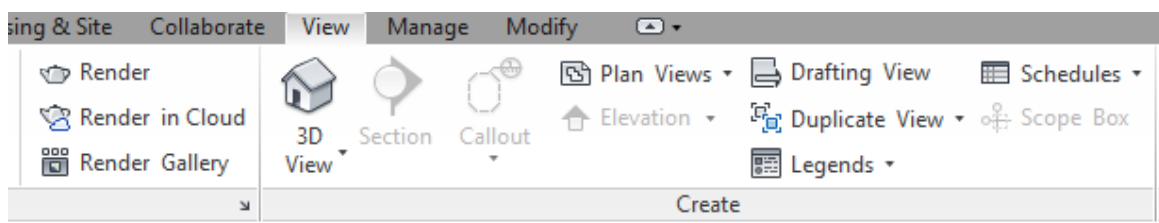


Figure 2.8: Used to perform rendering effects

2.9 Annotate Tools

These tools are used to apply dimensions to the project.

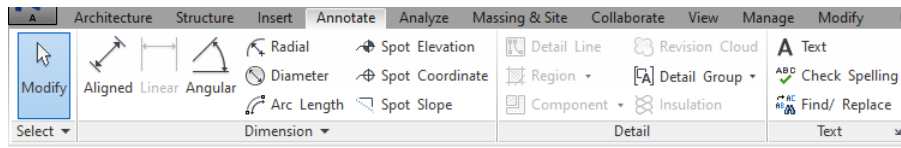


Figure 2.9: View control bar of the model

2.10 Opening wall

To cut a rectangular opening in a wall

Open an elevation or section view where you can access the wall that will host the opening.

Click (Wall Opening).Where is it?

- 1.Architecture tab, Opening panel (Wall Opening)
- 2.Structure tab, Opening panel (Wall Opening)
- 3.Select the wall that will host the opening.
- 4.Sketch a rectangular opening.
- 5.After you specify the final point of the opening, the opening displays.
- 6.We can also open and modify the wall by editing its profile.

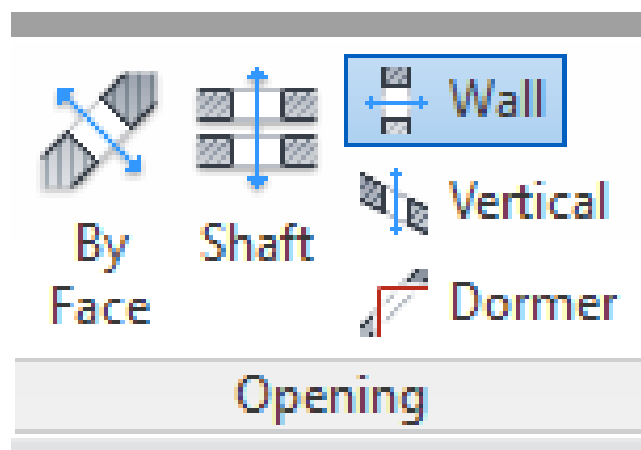


Figure 2.10: Command for wall openings

2.11 3-D View

The 3d view is important to know the correct shape and viewing of all sides.

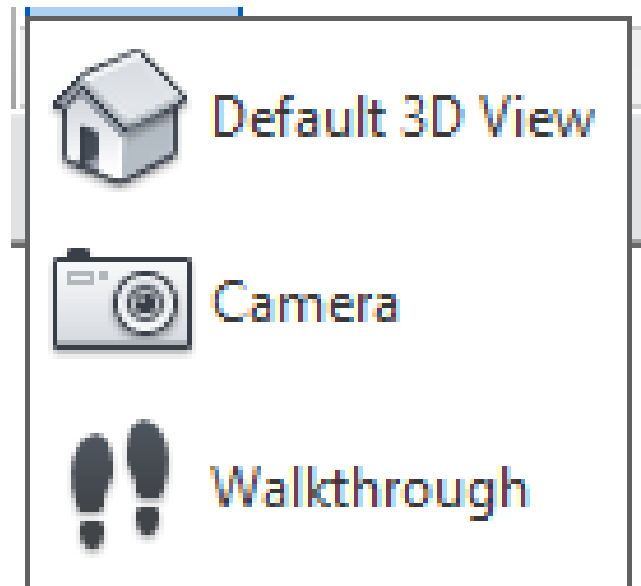


Figure 2.11: Used to view the model in particular view

2.12 Camera

The camera is used to fix the view of any direction and by giving the height to it. It will display the view of the particular area. It is a part of view to clarify it.

2.13 Walk through

The walkthrough is the command of which we can go through it and watch everything inside the room passing to the each and every element of any room with including furniture and walls and each and every door element.

2.14 Section Box

This tool is used to temporary cutting of model to see the inside elements. For a complex building it is difficult to see the inside area in 3D view, it will be overcome by using Section box tool.

2.15 Set work plan

A work plane is a virtual 2-dimensional surface. A work plane is used in the following ways: as the origin for a view, for sketching elements, for enabling tools in particular views, such as Rotate and Mirror in a 3D view, for placing, work plane-based components, Each view is associated with a work plane. An elevation view associated with a vertical work plane.

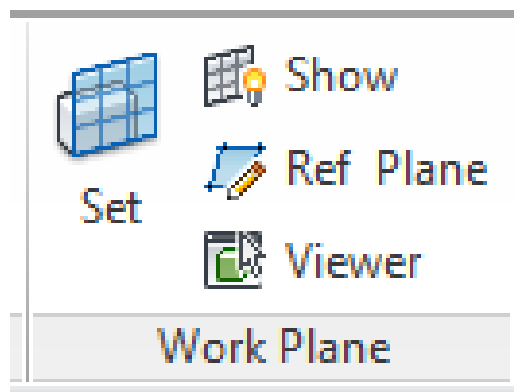


Figure 2.12: Used to set the work plan

2.16 View cube

Use the View Cube to navigate 3D views. This navigation tool allows you to receive visual feedback of the current orientation of a model and to adjust the viewpoint of the model.

The View Cube tool is a persistent, clickable and draggable interface that you use to switch between standard and isometric views of your model. When you display the View Cube tool, it is shown in one of the corners of the window over the model in an inactive state.

The View Cube tool provides visual feedback about the current viewpoint of the model as view changes occur. When the cursor is positioned over the View Cube tool, it becomes active. You can drag or click the View Cube, switch to one of the available pre-set views, roll the current

view, or change to the Home view of the model.

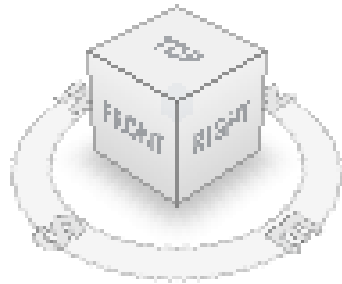


Figure 2.13: View cube in the Revit software

Chapter 3

COMPONENTS

3.1 Walls

There are two types of walls i.e; non-bearing wall or a structural wall in the building model. Like other basic elements in a building model, walls are instances of predefined system family types, which represent standard varieties of wall function, composition and thickness.

3.2 Doors

The doors are different types of different panel i.e; single and double doors and curtain doors panel doors .By using with the help of components the doors has fixed of single panelled doors .The doors can also be fixed from the load family we can load and fix it.

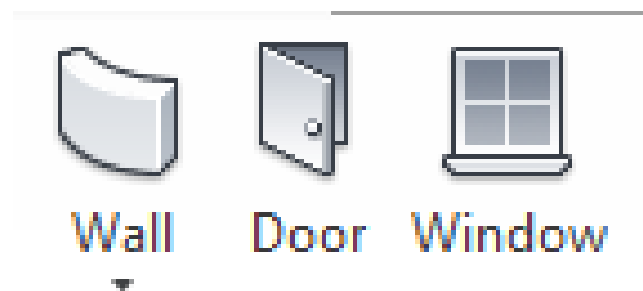


Figure 3.1: Icons of the particular elements such as Wall, Door, Window

3.3 Windows

The windows are of same as doors. The windows are load from load family and (or) from direct the components as per dimensions.

3.4 Furniture

The furniture has been placed to the respective classes and department like chairs, desk and benches. This was also Implement from the load family and kept wherever it is necessary to the classes.

3.5 Staircases

The stair case are of having various shapes of different types i.e; L-shape, round stairs, circular shape. The stairs cases are of done through selecting by run command and select to the required level of different floors.

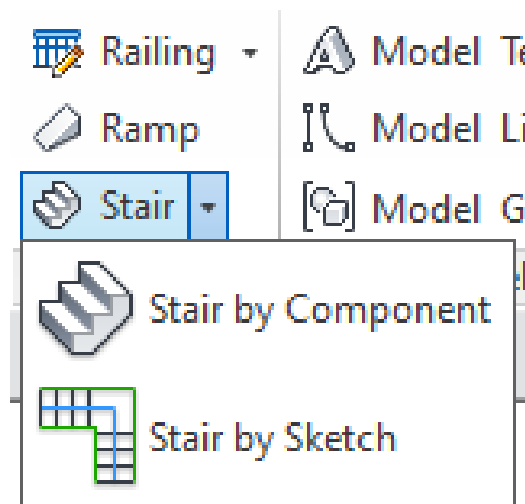


Figure 3.2: Stair case command

3.8 Curtain wall

Put the drawing in the structure plan levels Select the curtain wall in walls and place on the previous constructed concrete wall. Then give the base offset of desired values. Now put the drawing in 3D view now we can see the curtain wall.

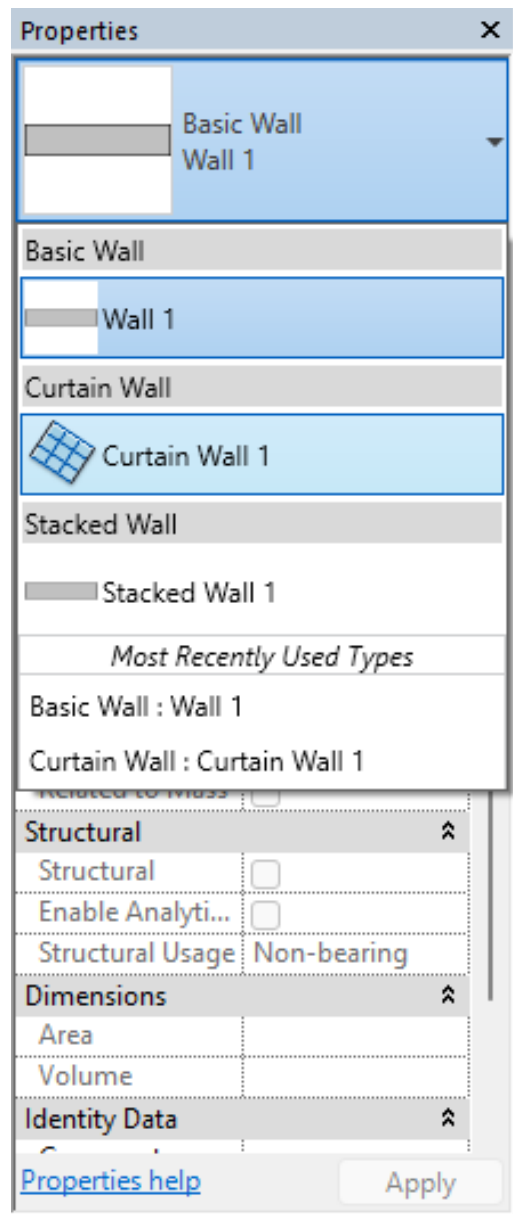


Figure 3.5: Curtain wall

3.9 Lights

Light family comprises of different types of lighting systems. We can create lighting system on own. Generally lights are placed by load family in Revit and then to lighting system.

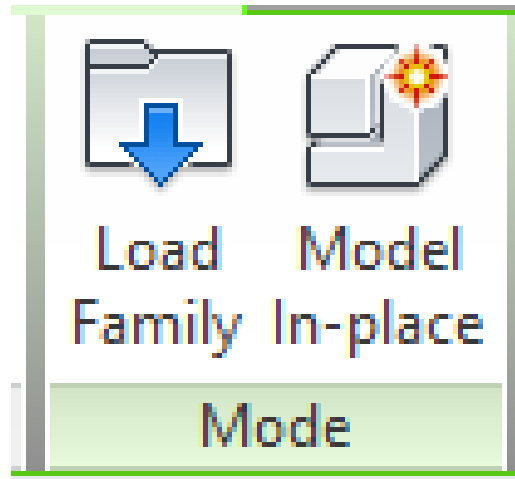


Figure 3.6: Used to place lighting system into the project

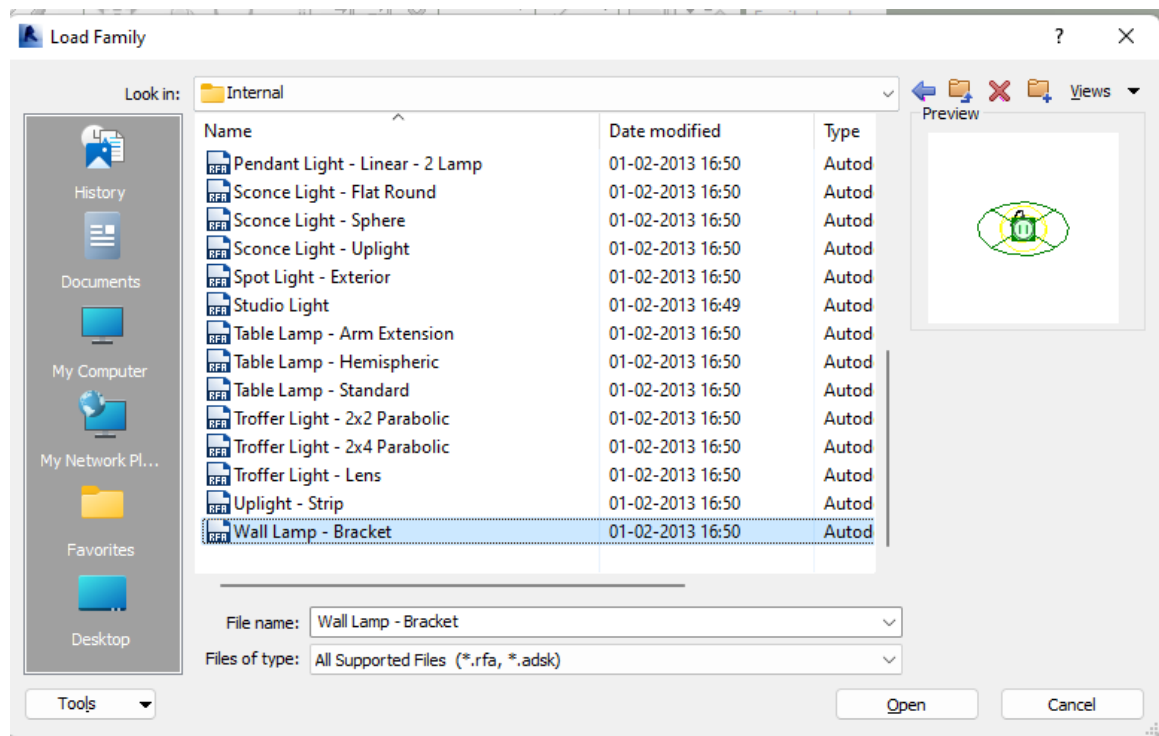


Figure 3.7: Different types of lights we have used in project

Chapter 4

Revit Architecture Procedure

4.1 Chapter project

In the drawing area, under Projects, click New In the New Project dialog, under Create New, verify that Project is selected. Under Template file, verify the second option is selected, and click Browse. In the left pane of the choose Template dialog, click Training Files, and open Select default.rte Default Metric.rte , and click Open. In the New Project dialog, click ok Name and save the project file: Click File menu Save. In the left pane of the Save As dialog, click Training Files, and then, in the file window, double-click Imperial [Metric]. For File, enter getting started, and click Save.

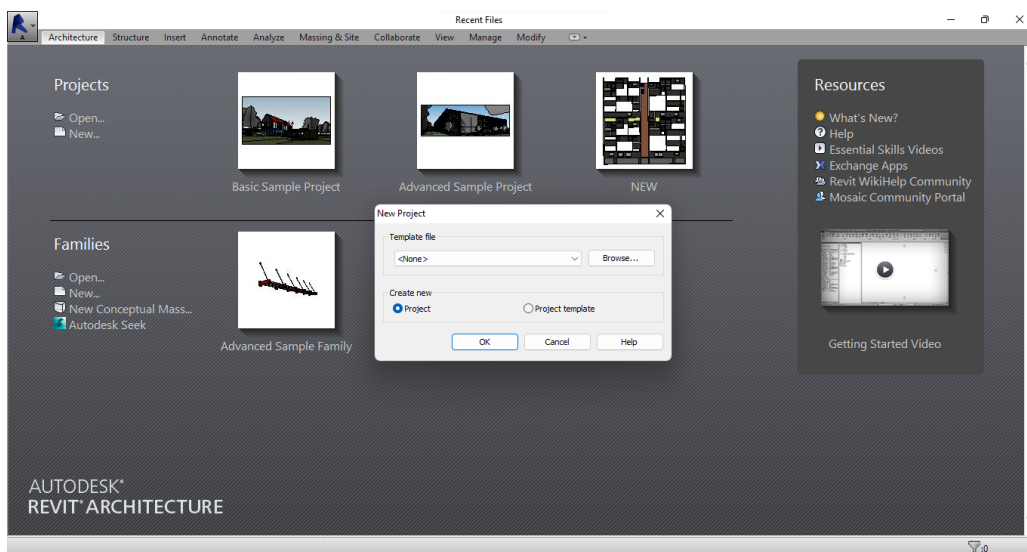


Figure 4.1: Creating project procedure

4.2 Creating Levels

On the Design Bar, click Level. On the Options Bar, click (Pick Lines), and for Offset, enter 3m In the Drawing area, highlighting the 01 Lower level line; when a dashed lines is displayed above the level line, click to create a level (Level 3). Using the same method, create a level above Level 3, On the Design Bar, click Modify to end the command. Rename the new levels and all corresponding view on the Design Bar, click Modify. Save the project.

4.3 Creating Wall

For creating wall first select LEVEL 1 in the project browser, click on wall icon on the wall in the status bar under the architecture tab. Then select the wall of 300 mm thickness. After that select the rectangle drawing tool in the status bar and draw the rectangle into desire rooms as show in figure. Then inside that rectangle, draw and divide the rectangle into desire rooms as shown in the figure. Then copy the entire level with walls and copy to second level.

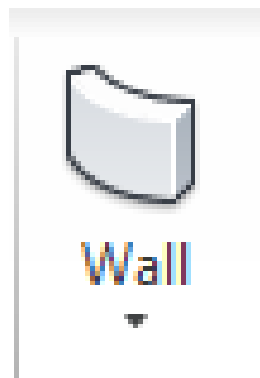


Figure 4.2: Icon is used to select the wall command

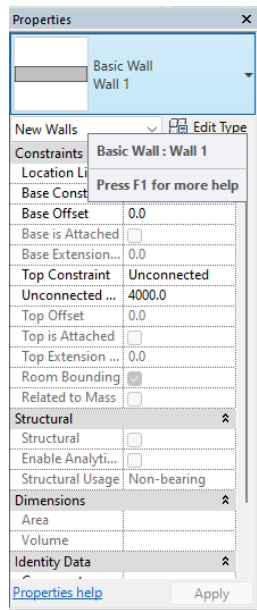


Figure 4.3: Selected wall having required dimension

4.4 Fitting doors and windows

In the project browser select the floor plan in which we want to put doors. From the menu bar select architectural tab and then select doors. If you need different types of doors then click on load family in the tool bar menu and select the type of door. Select the place from the plan where you want to create doors to change the direction of door press space bar from the keyboard. Press esc after completing the placing of doors. Like that select the window icon on the architecture tab place the window in the same manner and then press escape after completion of placing.

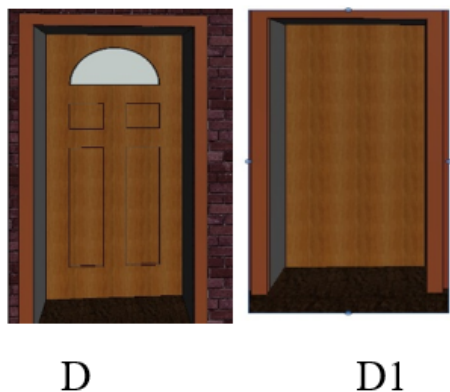


Figure 4.4: Doors are used in project

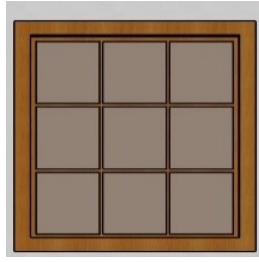


Figure 4.5: Window used in project



Figure 4.6: Doors are placed in the main entrance of building



Figure 4.7: Windows are placed on the side wall of the building

4.5 Creating floor levels

In the project browser select the floor plan in which we want to create floors. From the menu bar select architecture and then select floor in which select architectural floor. Select the drawing tool and draw by using either of the drawing tools such as line, rectangle, trapezoidal etc. Select 3D view to observe the floor. If you want to change the dimension of floor select edit option below component on properties bar and duplicate it by giving the desire dimension and apply and press ok Press esc after completing the placing of the floor. Like that create the floor for different floor individually.



Figure 4.8: Ground floor and First floor in the building

4.6 Ceiling

In the project browser select the ceiling plan in which we create ceiling. From the menu bar select architecture tab and then select ceiling then go to drawing tools or automatic ceiling as per requirements. Give base offset for the ceiling height from the floor in properties bar. If you want to change the dimension of ceiling select edit option in properties bar and duplicate it by giving the desire dimension and apply and press ok Press esc after completing the placing of ceiling.

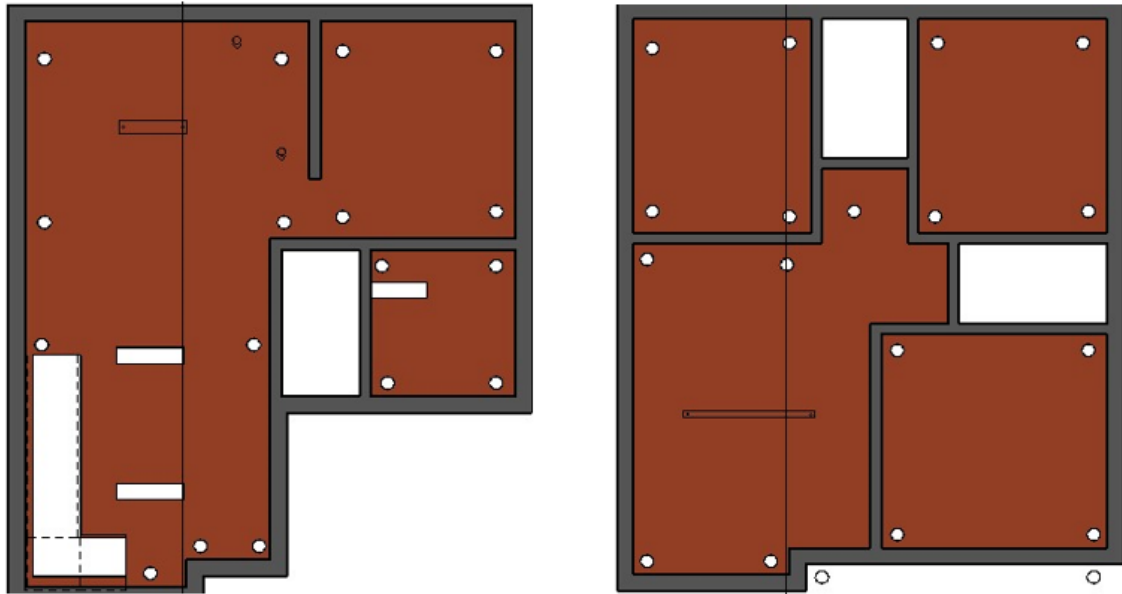


Figure 4.9: Ceiling of Ground floor and First floor

4.7 Staircase

To place the stair case in the project, first select the stair icon in the status bar then there two option will be appeared on the screen.

Two options are

1. Stair case by component
2. Stair case by sketch

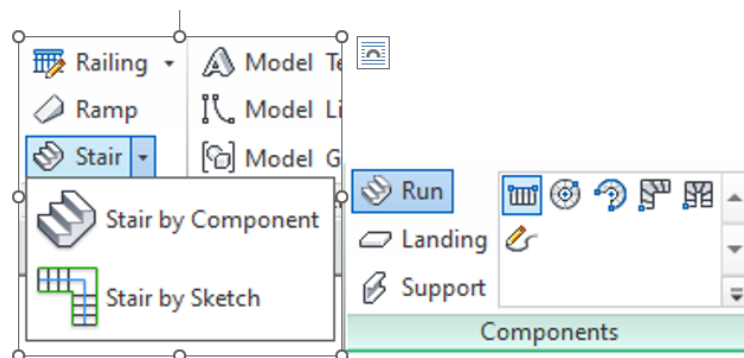


Figure 4.10: Placing of stair case in the project

The first option is for placing the stairs directly as a component and the second is to sketch the stair case by drawing. After clicking the stair by component then go run and select the type of stair case. After selection of stair type, place the stair at any desire location in the project and click ok. Here we can change the dimensions of the stair case by going to its edit type, there we have number of options about there stair case to alter.



Figure 4.11: Stair case in the building

4.8 Curtain wall

In the project browser select the floor in which we want to draw curtain walls. On the Design Bar, click wall. In the type selector, select, type and size of the wall provide required height and depth of wall by clicking in edit menu. If we curtain wall later we can provide curtain grid and mullion as per requirement from design bar. In the drawing area draw wall on the selected level. After completing drawing walls press esc from keyboard.

4.9 Painting

Painting is used to give pleasant appearance to the building. Go to modify tab and then click on painting icon, then there will be two option one is to painting and another one is to remove painting. After clicking in paint, after a little movement material browser dialog box will appear, then select desire color and click on required element.

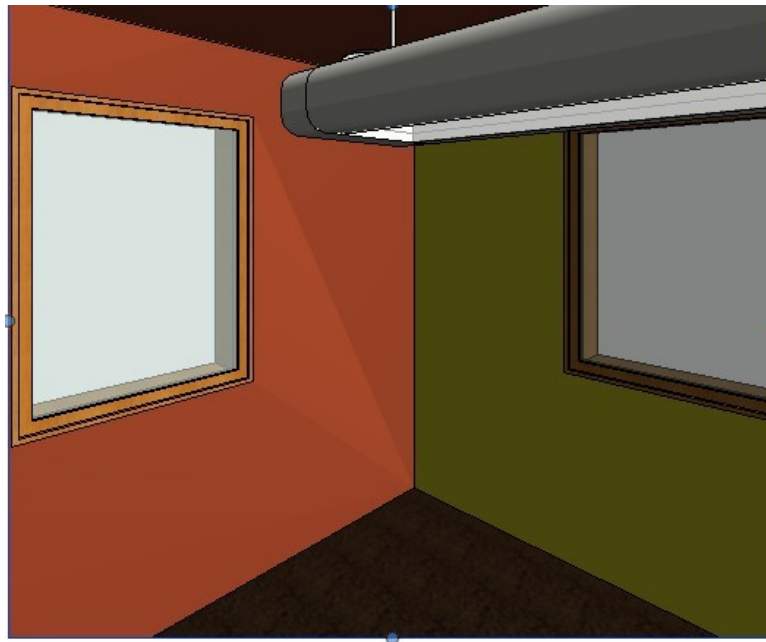


Figure 4.12: Painted on Walls

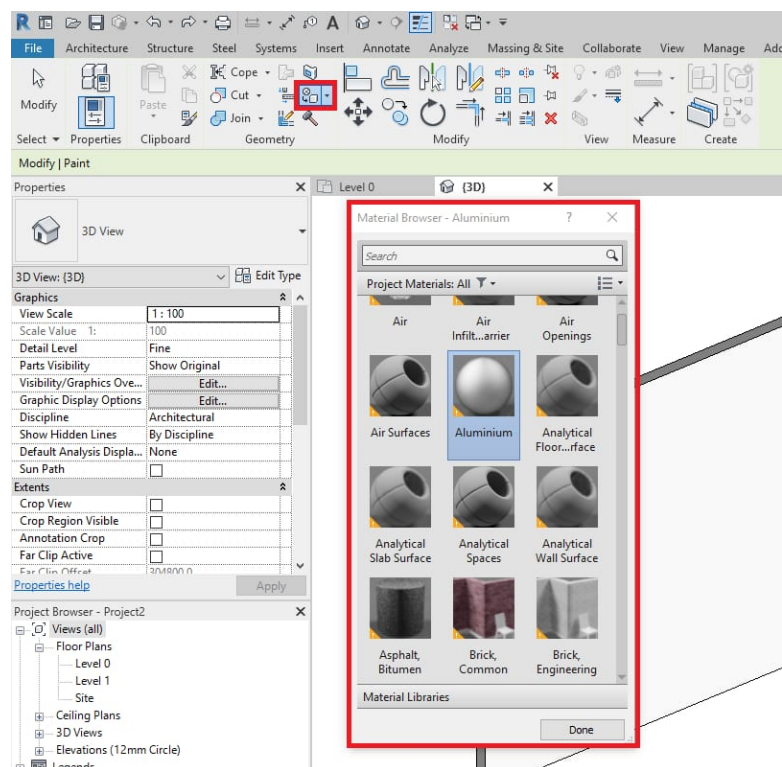


Figure 4.13: We can see that the procedure to perform painting

4.10 Rendering

Rendering is the option to create photo realistic image of building model. Select view option in the menu bar there will be rendering option appear in the tool bar. Click rendering the execute rendering browser appear with different option. Change the different parameter as per requirement such as quality setting, resolution, lighting setting, background setting etc. If we want regional photo realistic image go to region and select still day, single day, multi day or lighting and then select place (name of city), time and date then apply. Start render it takes few seconds to complete the rendering then we can export image file.



Figure 4.14: Building with rendering effects



Figure 4.15: Building with rendering effects at night time

4.11 Placing Of Lighting System In The Project

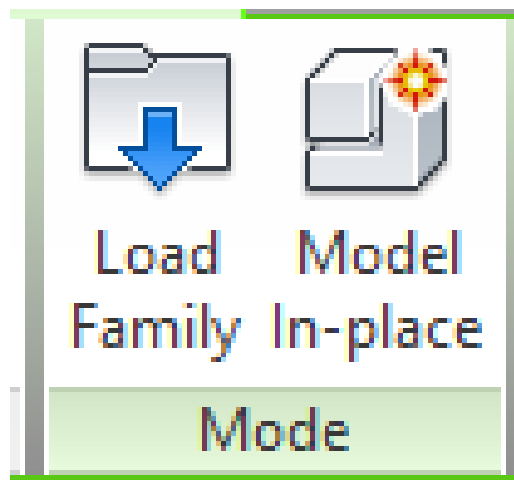


Figure 4.16: Apply lighting system by load family



Figure 4.17: Building front view with lighting system



Figure 4.18: Terrace with lighting system



Figure 4.19: Lights used in Hall

Chapter 5

Overview of Duplex Building

5.1 Plan Views of Duplex Building using Revit

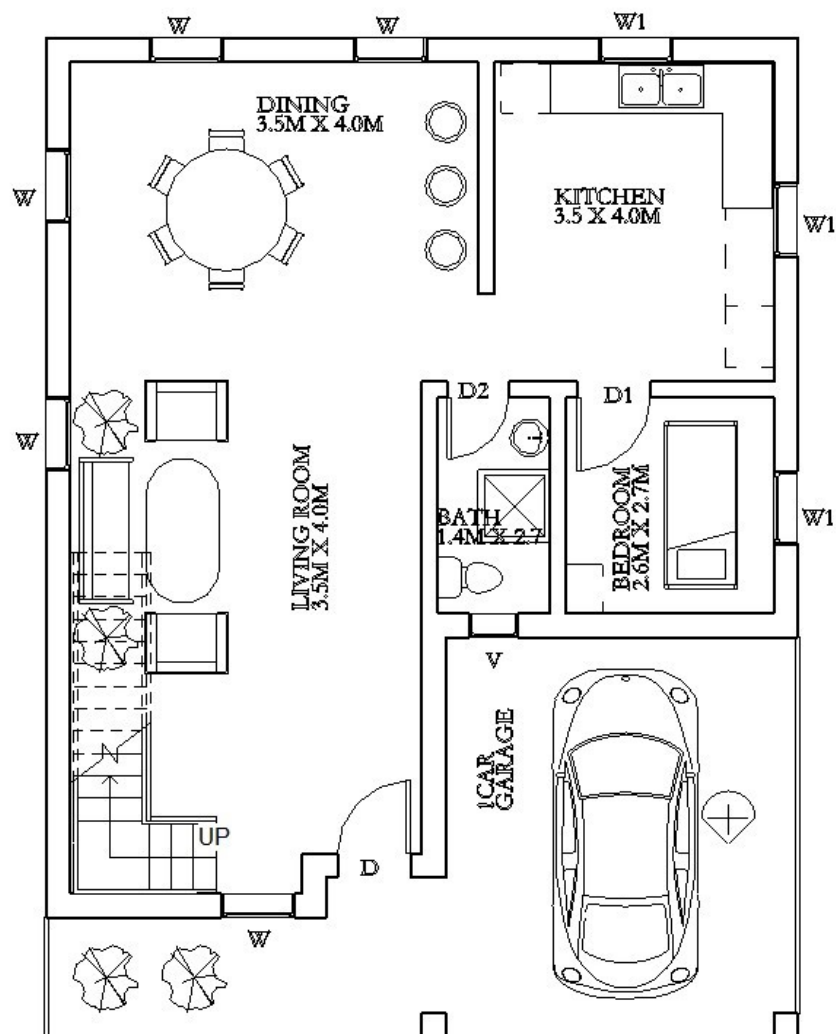


Figure 5.1: Plan view of ground floor in the building by Revit

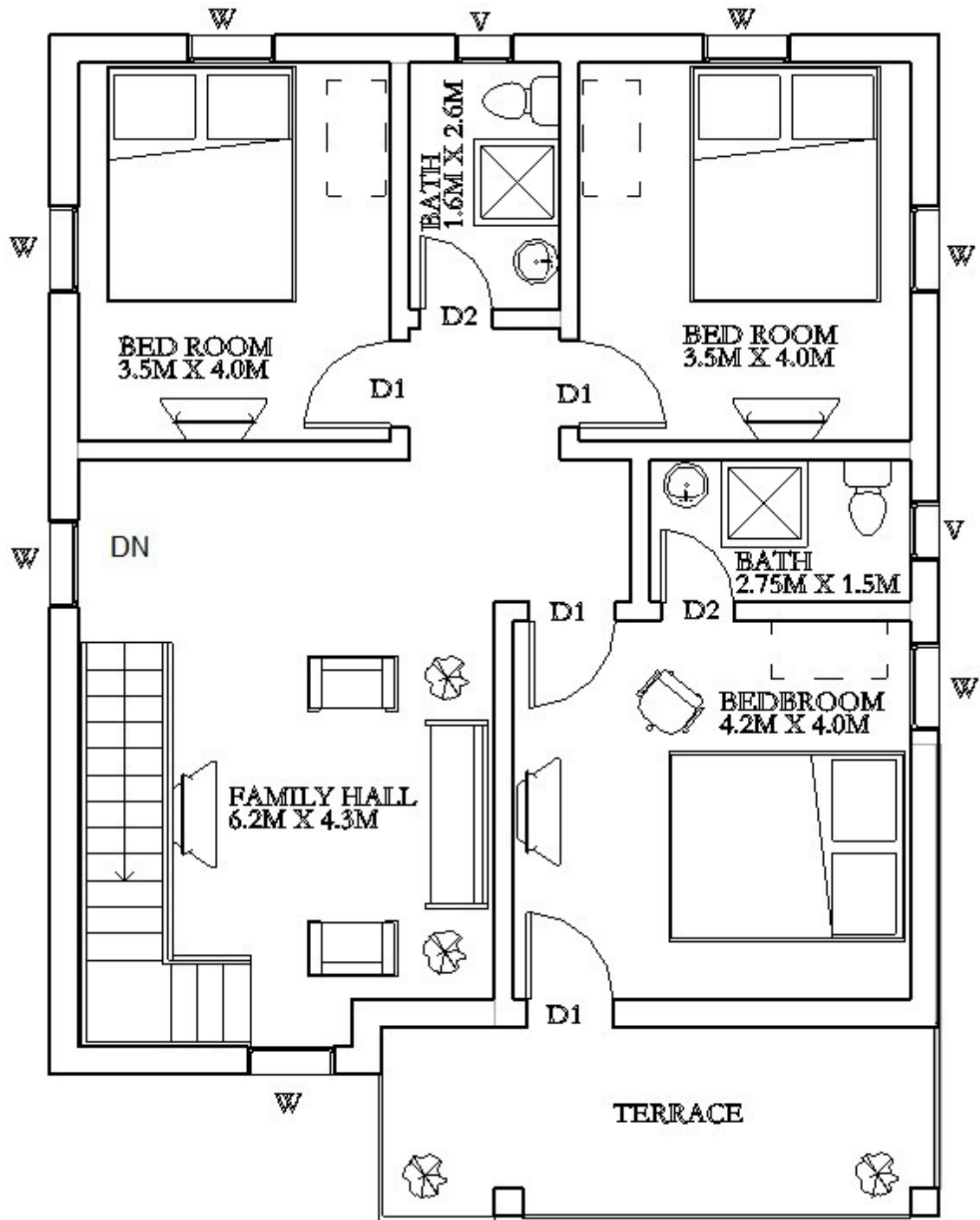


Figure 5.2: Plan view of first floor in the building by using Revit

5.2 Column layout plan

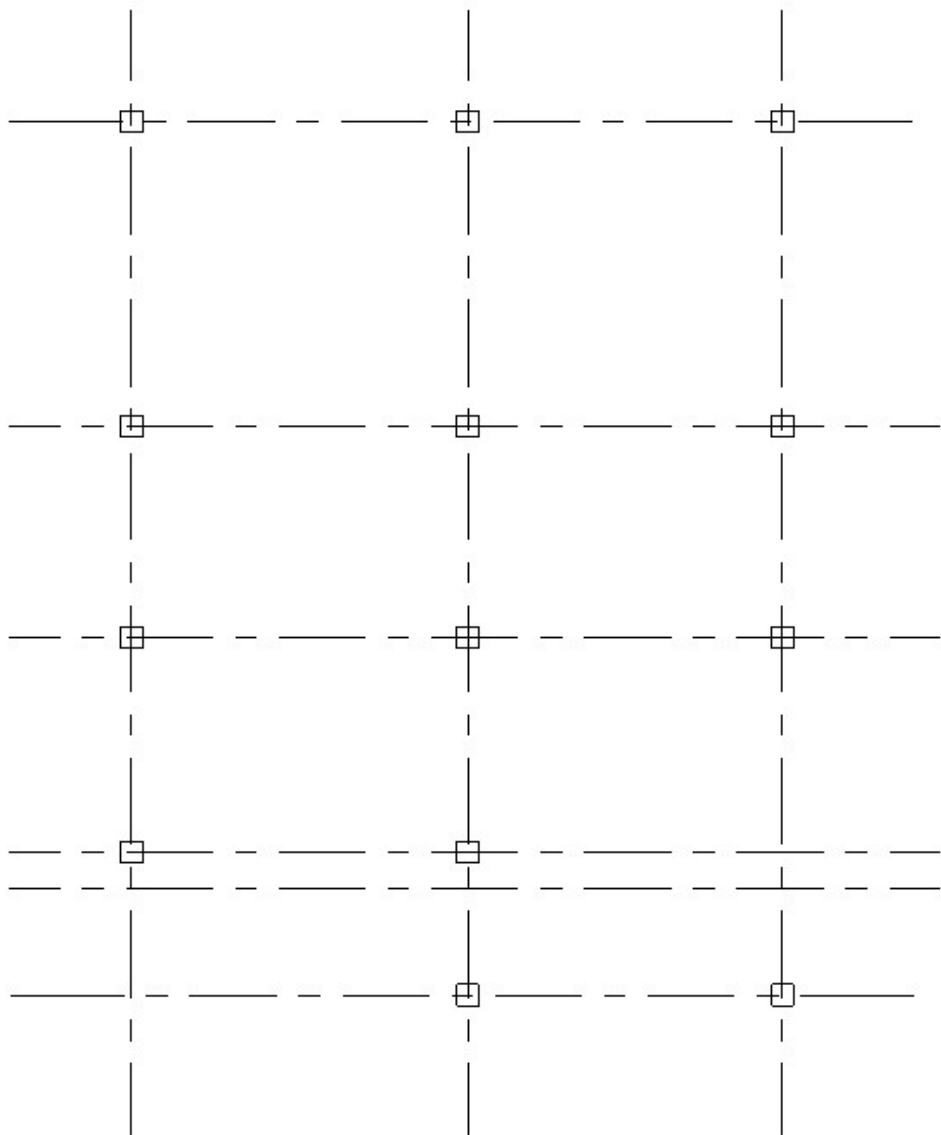


Figure 5.3: Column layout plan

5.2.1 Dimensions of Building

Dimensions	Feets	Square feets	Meters
Plan Dimension	32'X40'	1280	9.6 X 12

Table 5.1: Plan Dimensions

5.2.2 Column Dimensions

Dimensions	Meters
Column Dimension	0.3 X 0.3
Beam Dimension	0.3 X 0.3

Table 5.2: Column Dimensions

5.2.3 Dimensions of Openings

Components	Inches	Meters
MAIN DOOR(D)	48" X84"	1.20X2.10
BEDROOM DOORS(D1)	36" X84"	1.07X2.10
BATHROOM DOORS(D2)	32" X84"	0.81X2.10
WINDOWS(W)	48" X54"	1.20X1.37
WINDOWS(W1)	42" X54"	1.07X1.37
VENTILATORS(V)	24" X18"	0.60X0.45

Table 5.3: Openings Dimensions

5.3 Revit Modeling

5.3.1 Bed rooms

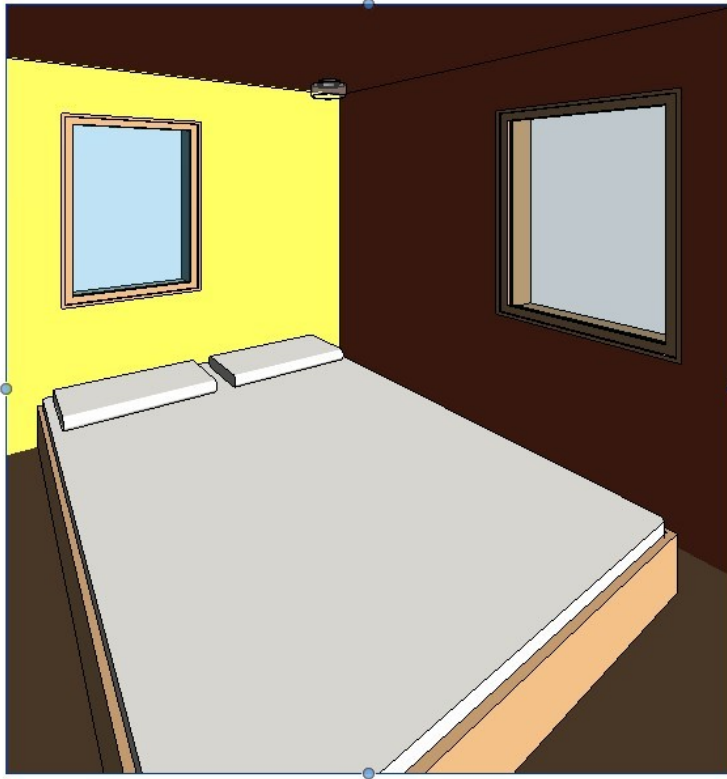


Figure 5.4: Bed rooms

5.3.2 Kitchen



Figure 5.5: Kitchen

5.3.3 Furniture in the Hall

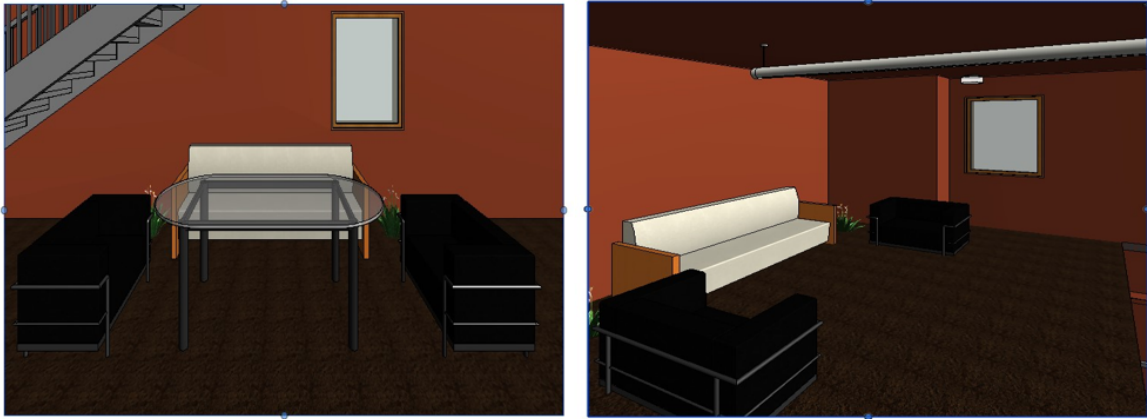


Figure 5.6: Furniture in the Hall

5.3.4 Bathrooms

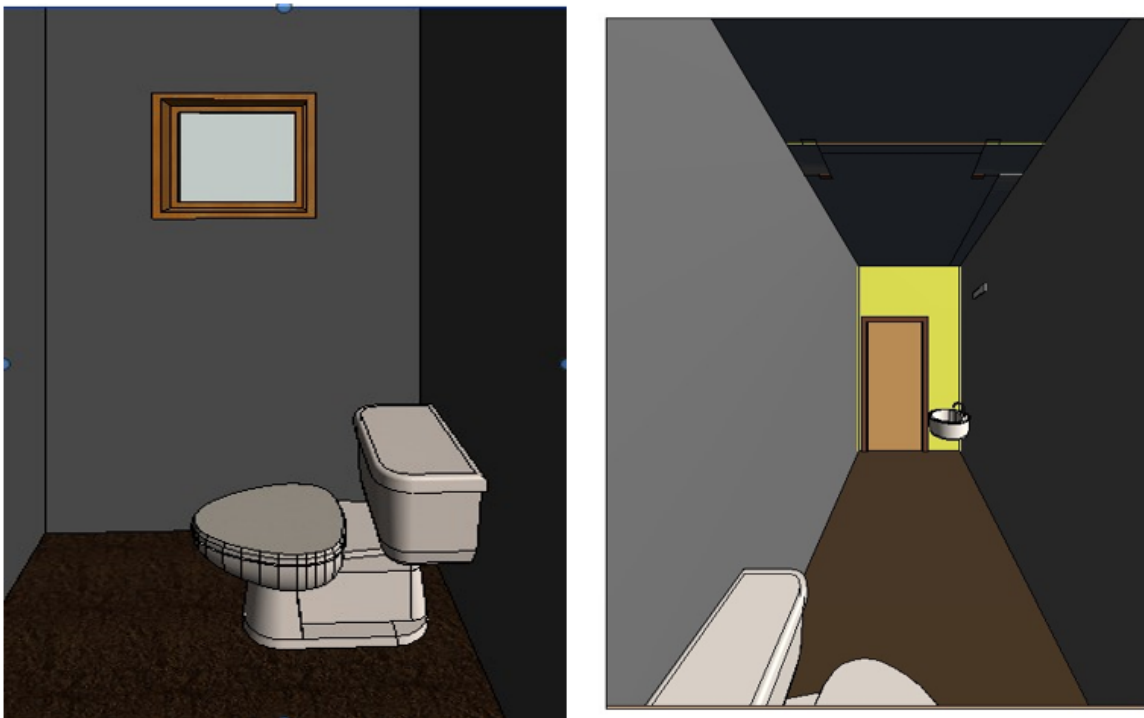


Figure 5.7: Bathrooms

5.4 Final Model

5.4.1 Front view



Figure 5.8: Front view of the building

5.4.2 Side views



Figure 5.9: Side view from West side



Figure 5.10: Side view from East side

5.4.3 Corner views



Figure 5.11: South-west corner view



Figure 5.12: South-East corner view

5.4.4 Cross section

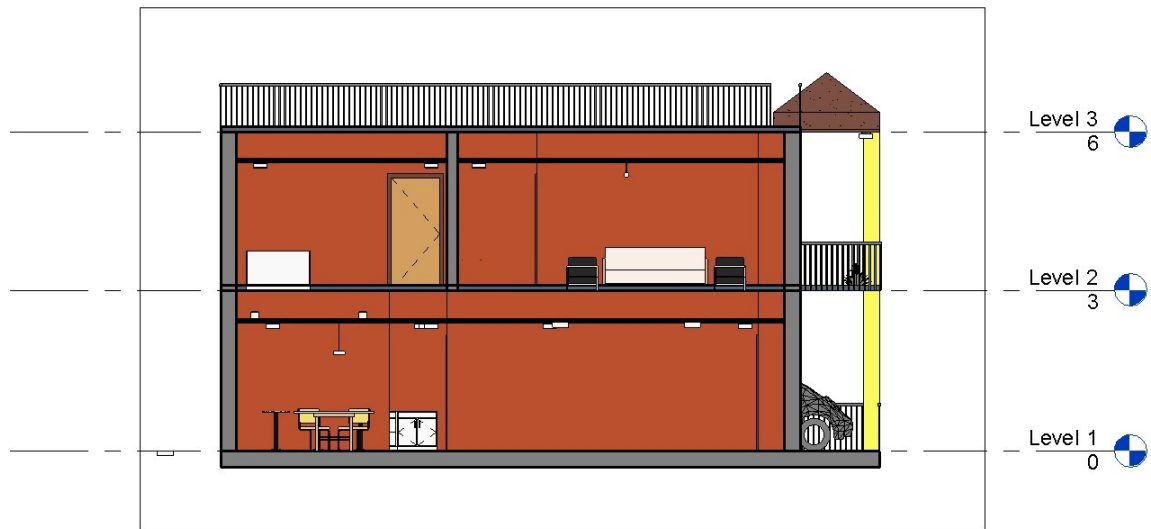


Figure 5.13: Cross section

5.4.5 Column skeleton structure

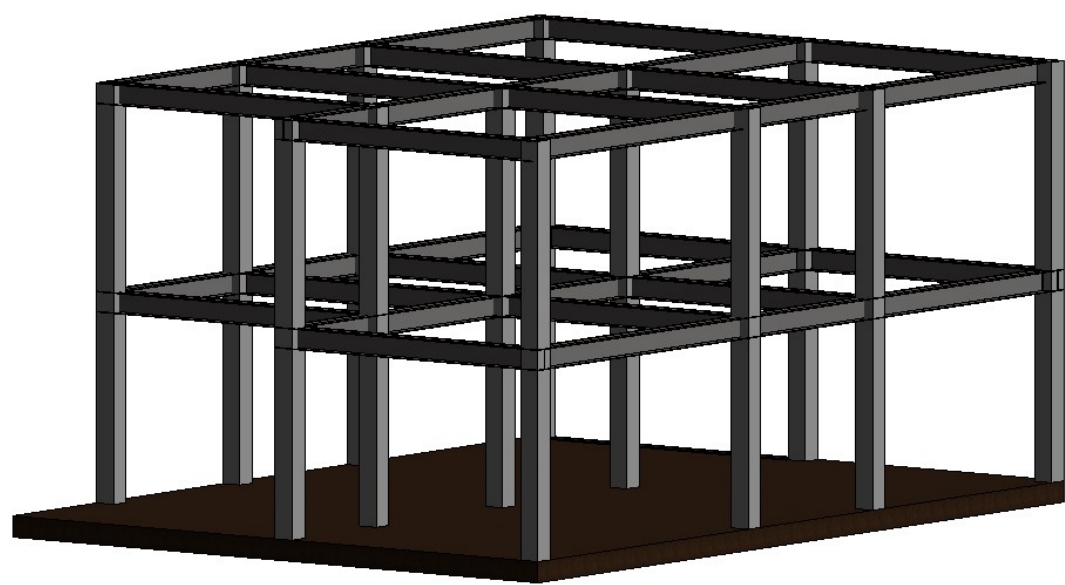


Figure 5.14: Column skeleton structure

5.4.6 Top views



Figure 5.15: Top view of ground floor



Figure 5.16: Top view of first floor

Chapter 6

Conclusion

This project gives the realistic modelling of building and accurate family ranging from furniture to lighting fixtures, as well as import existing models from other softwares like Auto CAD etc. We can get the approximate estimations of building also using Revit Architecture. In this Project we have done planning, modelling, scheduling of Doors and windows and rendering effects for final view of building.

A clear plan and modelling of a Duplex building with the efficient structural and architectural plans. It provides the overall knowledge of material take off and schedule/quantities in the model of the building defined in the project. 3-D realistic view give the clear picture about the components placed in the building.

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