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"Analysis and Planning of Residential Building by Using AutoCAD and Revit."

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Abstract - *The design communication is gradually being changed from 2D based to integrated 3D digital interface. Building Information Modeling (BIM) is a model-based design concept, in which buildings will be built virtually before they get built out in the field, where data models organized for complete integration of all relevant factors in the building lifecycle which also manages the information exchange between the AEC (Architects, Engineers, Contractors) professionals, to strengthen the interaction between the design team. BIM is a shared knowledge about the information for decisions making during its lifecycle. There's still much to be learned about the opportunities and implications of this tool. In this paper we have shown the comparison and work done on both software named AutoCAD and Revit.*

***Key Words*: AutoCAD, Revit, Drafting, Modelling**

1. INTRODUCTION

AutoCAD is used by AEC (Architecture, Engineer, and Construction) to generate and optimize 2D and 3D designs. AutoCAD is a Computer-Aided Design (CAD) drafting software, marketed by Autodesk. On the other hand, Revit is powerful tool for everyone in construction industry to make 3D Parametric Drawings with single database for every element involved in design.

1.1 Difference between AutoCAD and Revit

The major dividing factor for both software is they are both work as different bases which is CAD and BIM respectively for AutoCAD and Revit. CAD is Computer-Aided Design. CAD software provides technology for architects, engineers, and construction professionals to design and create precise 2D and 3D drawings, replacing manual drafting with an automated process. Besides BIM is Building Information Modeling. It is an intelligent 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insight and tools to efficiently plan, design, construct, and manage buildings and infrastructure.

The biggest difference is that AutoCAD is a CAD software and Revit is software for BIM. While AutoCAD is a general drawing tool with broad application, Revit is a design and documentation solution, supporting all phases and disciplines involved in a building project. Revit is used to coordinate all data inputs (including CAD) and produce federated project deliverables. Both programs are often used within the same firm, with BIM and CAD specialists working on different elements of a project.

1.2 Introduction to AutoCAD

AutoCAD is globally used by surveyors, designers, engineers, drafters. Globally, AutoCAD has proven as an efficient and user-friendly program. AutoCAD software is recognized internationally for its remarkable editing capabilities, which make it likely to digitally draw building plans or recreate 3D images. This software was developed in the year 1982 by Autodesk. AutoCAD consist of some Drawing Commands such as Line, Polyline, Circle, Rectangle, Eclipse, Arc, Hatch, Construction line, etc. There are some Modification tools available to modify in existing drawing such as Extended, Trim, Offset, Mirror, move, Copy, Scale, Fillet, Rotate, Erase, Align, Break, etc.

1.3 Uses of AutoCAD

AutoCAD can be defined as the use of computer systems to assist in the creation, modification, optimization of a design. In this, we can create both 2D and 3D drawings used in construction and manufacturing. It was developed by John Walker in 1982 with the help of AUTODESK and maintained it successfully. It is most commonly used for creating and modifying 2D & 3D designs for professional drafting with detail measurement information about the conceptual design and layout of the product, also available in 14 different languages with respect to location. Users can customize the CAD software with available add-on apps as per project requirements. User specialized tool setting can be done to view and design product in wireframe and surface modelling. Widely preferred in the industries of mechanical, telecom, civil, architectural engineering. It stands on demand to students and industries because of its requirements

1.4 Commands of AutoCAD

List of Commands:

Unit (UN): It can be used for controls coordinate and angle display formats and precision.
Line (L): It can be used for making simple lines in the drawing.

Circle (C): It is the command used for making a circle in AutoCAD.
Polyline (PL): This command can be used to make a Polyline in your drawing.
Rectangle (REC): This command will make a rectangle in AutoCAD.
Arc (ARC): As the name suggests, this command can be used to make an arc in AutoCAD.
Ellipse (EL): As the name suggests, this command can be used to make an ellipse with the major and minor axis.
Copy (CO): This command is used to copy object(s) in AutoCAD.
Trim (TR): This command is used for trimming a geometry.
Scale (SC): This command is used to change the scale of an object.
Block (B): This command is used for creating a block; the properties of the block can be defined using the block definition window.
Insert (I): This command can be used to insert an existing block or a drawing as a block in AutoCAD.
Test style (ST): Using this command you can open text style window which controls properties of the default AutoCAD text style.
Explode (X): This command can be used to explode objects like Polyline to simple lines, an array or a block to a simple geometry etc.
Fillet (F): This command can be used to add rounded corners to the sharp edges of the geometry; these round corners are also called fillets.
Layer (LA): This command can be used to open layer properties manage palette which is a tool for creating and managing layers in a drawing.

1.5 Introduction to Revit

Revit is a 3D parametric modelling software package for building information modelling (BIM). Parametric modelling means you can create each of the following from within the tool, providing a single database for all the elements involved in your design:

- Parameters
- Relationships
- Properties
- Model data

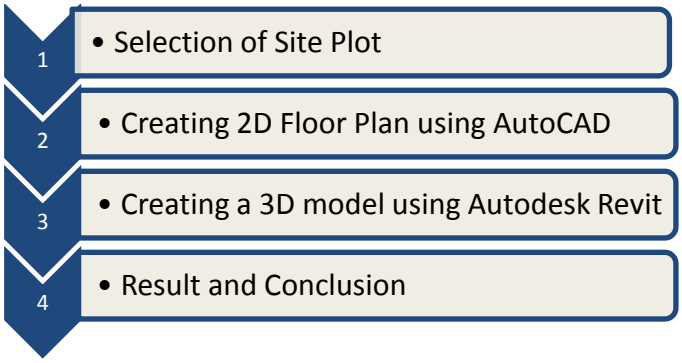
1.6 Uses of Revit

Revit is commercial building information modelling (BIM) software by the company Autodesk. It's generally used by architects, structural engineers, mechanical, electrical, and plumbing (MEP) engineers, designers, and contractors. Autodesk Revit allows users to create, edit, and review 3D models in exceptional detail. Revit allows you to place real-life building components such as windows, walls, and doors Instead of drawings, making a design more precise. Furthermore, it can help you generate floor plans, elevations, sections, details, and schedules. Before the BIM methodology was introduced, these tasks were both complex and time-consuming. Nowadays, thanks to BIM software such as Revit, the design process has become more straightforward and efficient.

2. Scope of work

- The scope of the study is to explore and evaluate the advantages of integration which will enables the ease of project.
- It is viable career option as implementation of software is done for better development.
- BIM digitalizes the life of building which gives solution to every phase of structure.
- BIM increases productivity, infrastructure value and quality
- Reduction of cost and time

3. Methodology



4. Project details

NOTE:
1. PLAN DRAWN AS PER CLIENT REQUIRMENT
2. CLIENT IS RESPOCIBLE IF THERE IS ANY CHANGES IN PLANS AND CONSTRUCION

1) Residential building:

Figure 01: Map View

Location- Simanagar Society, Surat
Total Area of plot- 2200 sq. Ft
Size of the building- 51'-5.5" X 32'-9"
Include:

- Ground floor
  - Drawing room
  - Leaving room
  - Office/Study
  - 02 bed room
  - A Kitchen
  - Parking area
  - 02 attached bath and a Toilet
- First floor
  - Drawing room
  - Leaving room
  - Office/Study
  - 02 bed room
  - A Kitchen
  - 02 attached bath and a Toilet

AutoCAD Plan-

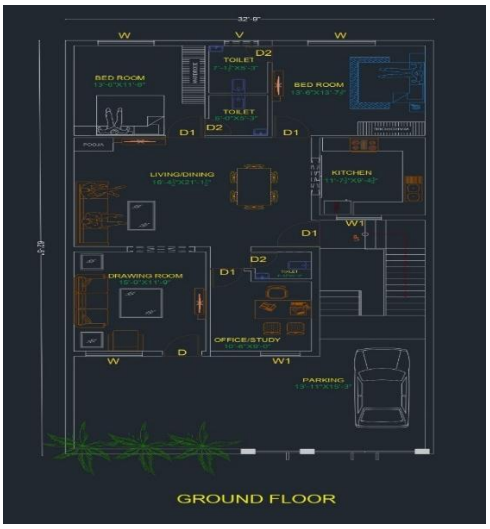


Figure 02: Ground Floor Plan

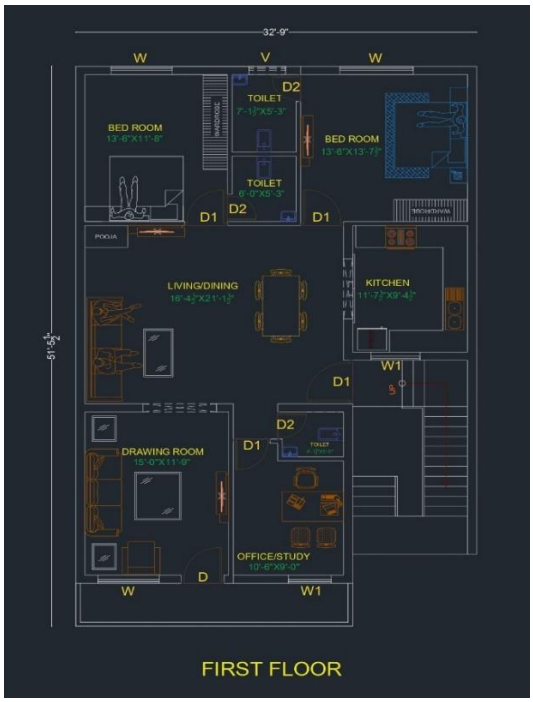


Figure 03: First Floor Plan

Revit Plan-

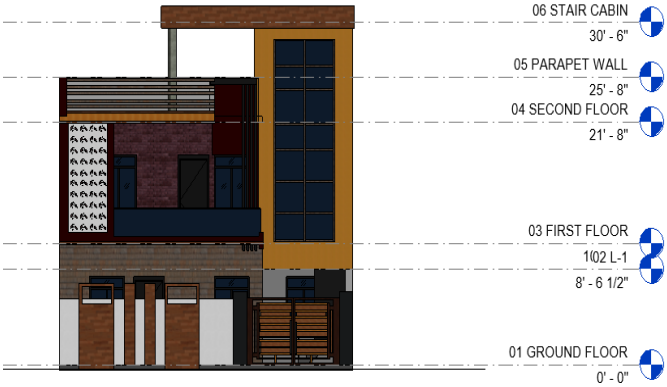


Figure 04: Elevation

Figure 05: Section

Figure 06: 3D View

Figure 07: Rendering Image

Door/Window Schedule:

OPENING SCHEDULE

SR NO.	TYPE	SIZE	QTY	MAT
1	D	4' X 7'	2	WOOD
2	D1	3' X 7'	8	WOOD
3	D2	2'6" X 7'	6	WOOD
4	W	5'X 4'	6	WOOD
5	W1	5' X4'	4	ALUM
5	V	2' X 3'	3	ALUM

Figure 08: Opening Schedule

2) Residential building:

Figure 09: Map View

Location- Sundarvan Row House, Surat
Total Area of plot- 3700 sq. Ft
Size of the building- 55'-10" X 37-5.5"

Include:

- Ground floor
  - Drawing room
  - Leaving room
  - Office
  - Lift
  - 02 bed room
  - Dressing room
  - A Kitchen
  - Parking area
  - Attached bath and a Toilet
  - 02 Common bath and a Toilet
- First floor
  - Drawing room
  - Leaving room
  - Office
  - Lift
  - 02 bed room
  - Dressing room
  - A Kitchen
  - Attached bath and a Toilet
  - 02 Common bath and a Toilet

AutoCAD Plan-

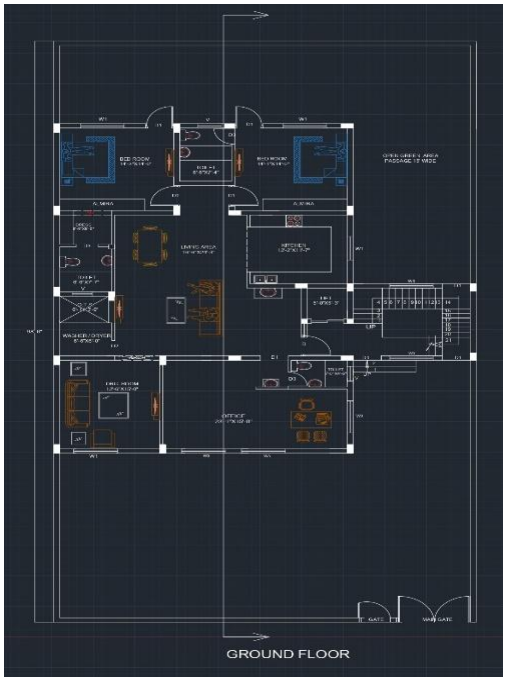


Figure 10: Ground Floor Plan

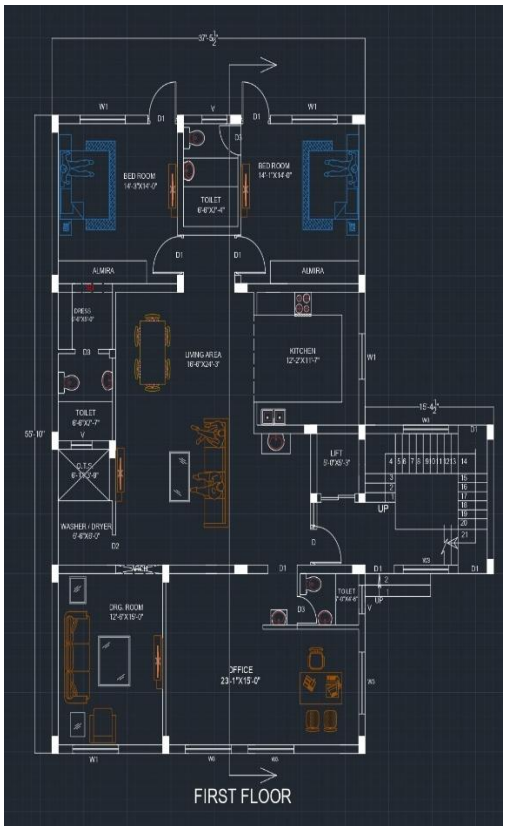


Figure 11: First Floor Plan

Revit Plan-

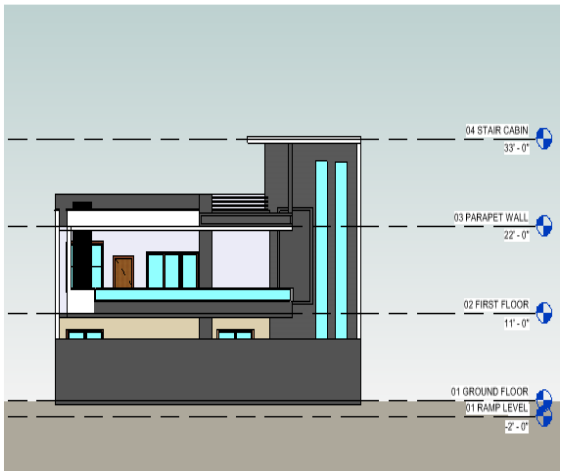


Figure 12: Elevation

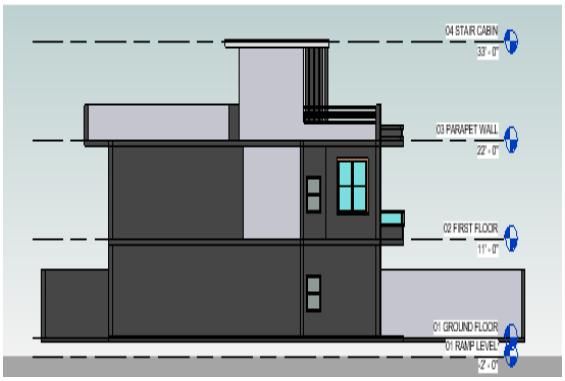


Figure 13: Section

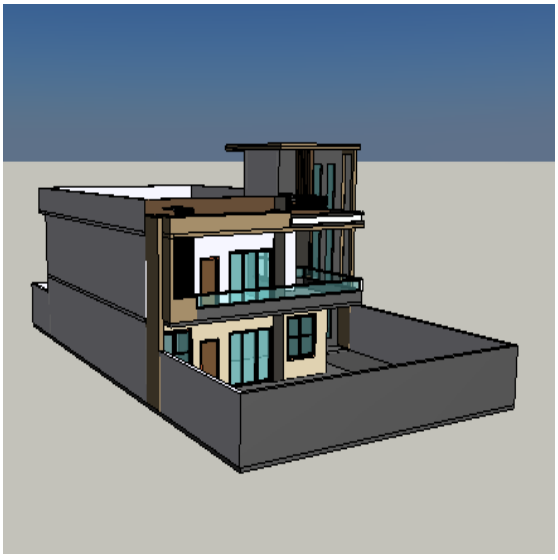


Figure 14: 3D View

Figure 15 Rendering Image

Door/Window Schedule:

OPENING SCHEDULE

SR NO	TYPE	SIZE	QTY	MAT
1	D	6'-0" X 7'-0"	2	WOOD
2	D1	5'-0" X 7'-0"	10	WOOD
3	D2	3'-0" X 7'-0"	4	WOOD
4	D3	2'-6" X 7'-0"	2	WOOD
5	W1	6'-0" X 3'-0"	8	ALUM
6	W2	5'-0" X 3'-0"	6	ALUM
7	V	2'-0" X 3'-0"	6	ALUM

Figure 16: Opening Schedule

5. Result and Discussion

Revit is very handy tool to which provides consistency and helps to coordinate while working on any drawing/model in design Phase. Revit is not only a tool which is used for Drafting purposes but also it is afflicted in analysis of Drawing. We do have used both Revit and AutoCAD to make construction documents, where differences and space of work is quite notably differ both. In AutoCAD you can draw your imagination, simply AutoCAD is draw lines which we used to make by hand but digitally, whereas in Revit you does need decent Library and Family to start and make model. In simple words, in AutoCAD you can draw whatever you want and it gives you the results and per your drawings. In the other hand, Revit needs quite a bit knowledge of Construction as well as it requires user to have higher understanding of the way it works. By these, we can say Revit is not preferable for Design phase of Drawing, but for testament it put forward incredible results of system's integration. The Aim of this research is to set side by side Revit and AutoCAD for interior design and Architecture purposes.

6. Conclusion

The primary goal of the project has been met, which is to gain knowledge in planning, modelling and analysis using software's. Getting familiar with structural software like AutoCAD and Revit. A clear design and modelling of residential building with architectural plans. All the drafting was done by using AutoCAD. Also these drawings made on AutoCAD also served as a base for transfer of the structure for modelling and analysis into Revit. The modeling of the building in Revit software gives a beautiful, realistic 3D view of the building.

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