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MODELLING AND LAYOUT OF DUPLEX HOUSE(G+1) USING REVIT SOFTWARE

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ABSTRACT:
In this project, a Duplex House is designed and visualized using Autodesk Revit, a Building Information Modelling (BIM) software that streamlines architectural design and documentation. Revit is utilized to develop detailed 2D and 3D architectural plans, including floor layouts, sections, elevations, and structural components, all within a single integrated platform. The software's parametric modelling and intelligent building components enable precise and efficient design modifications. High-quality realistic renderings of both the interior and exterior spaces are generated directly within Revit using built-in rendering tools and materials libraries. This approach not only ensures design accuracy but also provides an immersive visual representation, supporting better decision-making and more effective presentation to clients and project stakeholders

INTRODUCTION:

The design and visualization of residential buildings have been greatly enhanced by the use of Building Information Modelling (BIM) tools such as Autodesk Revit. This project focuses on the complete architectural development of a Duplex House using Revit, which allows for the seamless integration of 2D drafting and 3D modelling within a unified environment. Revit enables the creation of detailed architectural plans, including floor layouts, elevations, sections, and structural components, with high precision. The software's parametric modelling capabilities make it easy to apply design changes consistently across the entire model. Realistic visualizations of both interior and exterior spaces are generated directly in Revit using built-in materials, lighting systems, and rendering tools. By utilizing Revit, this project showcases how modern architectural workflows can be streamlined for better efficiency, accuracy, and presentation quality. The result is a well-coordinated, visually rich representation of the duplex house, providing clear insights for both designers and stakeholders.

LITERATURE REVIEW:

1. 1.The first paper with the term Building Information Modelling, as we are using it now a days, was published on 1992 at the Technical University of Delft (Nederveenet al., 1992).
2. Xinan Jiang (2008): The model or project is a frame structure consists of a one residential building. In Revit first 3D model and then get directly 2D drawing with material quantity
3. Saeed Reza Mohandes (2005-2012):Due to numerous steps of construction industry and its complicated and extensive Erudite Journal of Engineering Technology and Management Sciences structure, errors and reworks often might happen in this section. As such, BIM (Building Information Modelling) is regarded as a beneficial tool in minimizing the waste and im proving the efficiency of building construction. This paper reviews and summarizes a
4. Vipul Gupta (2016): The developed 3D Model can be beneficial in future planning and advance concepts like Geo Design. The world has moved from 2D to 3D modelling and adding of query mechanism to the functional 3D model would indeed increase the scope of engineering.
5. E. Rakesh Reddy, S. Kailash kumar (2019) A clear design and modelling of a commercial

METHODOLOGY:

Here's a condensed methodology section for your Duplex House project using Revit software: Methodology – Duplex House Using Revit Software The methodology for designing and visualizing the Duplex House using Autodesk Revit follows a systematic approach that integrates both architectural design and visualization processes within a Building Information Modelling (BIM) environment. The key stages of the workflow are outlined below:

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Modelling and laying out a duplex in Autodesk Revit requires a structured methodology that incorporates architectural design principles, BIM standards, and software-specific workflows. Below is a comprehensive methodology broken into phases to guide you through modelling and laying out a duplex using Revit:

METHODOLOGY FOR MODELING A DUPLEX IN REVIT

1. Planning and Requirements Gathering: • Define Scope: Determine number of units (2, for a duplex), floors, rooms per unit, and shared/common areas. • Gather Inputs: Site plan, client requirements, local building codes, and structural constraints. • Select Revit Template: Choose a relevant Revit template (Architectural Template is standard).
2. Project Setup in Revit: • Create New Project: Open Revit and start a new project using the chosen template. • Set Units and Levels: o Use Manage > Project Units to set to metric or imperial. o Use elevation views to set Levels (e.g., Ground Floor, First Floor, Roof). • Grid Lines: Create horizontal and vertical grids to define the structural layout.
3. Modelling the Duplex Structure: A. Floor Plans • Use Architecture > Wall to draw: o External Walls: Load or create appropriate wall types. o Internal Walls: Separate spaces like bedrooms, living rooms, kitchens, etc. • Add doors and windows: o Use predefined Revit families or custom ones. • Create floors using Floor Tool, and sketch outlines based on the wall footprint. B. Vertical Circulation • Add stairs or ramps as needed between levels. • Add railings and landings. C. Roof • Use Roof by Footprint or Roof by Extrusion for complex shapes. • For duplexes, often two pitched roofs or one continuous roof is used. D. Structural Elements (if needed) • Add columns, beams, and foundation as per structural plan.
4. Layout and Detailing A. Room Tags and Names • Use Architecture > Room to define rooms. • Apply room tags for identification (Living, Bedroom 1, etc.). B. Furniture and Fixtures • Add components such as beds, sofas, kitchen units, plumbing fixtures. • Load families from Revit library or external sources (Revit City, BIM object). C. Dimensions and Annotations • Add dimensions (Annotate > Aligned) for walls, doors, and windows. • Use text, tags, and callouts for clarity.
5. Visualization and Presentation: A. 3D Views • Use Default 3D View or create custom perspectives. • Apply section boxes to isolate units or floors. B. Rendering • Use built-in rendering engine or export to software like En scape or Twin motion. • Apply realistic materials and lighting. 22
6. Documentation and Sheets: A. Create Sheets
7. Collaboration and Output: • View > Sheet to create sheets for plans, elevations, sections. • Add title blocks, legends, north arrows. B. Detailing • Add wall sections, floor details, stair details. C. Schedules • Create room, door, window schedules to automate listing. 4 .TOTAL BUILT UP AREA: The Built-up Area refers to the total area covered by the building, including the carpet area (usable space inside the walls) and the thickness of all walls, as well as areas occupied by balconies, terraces (with roof), and other enclosed spaces. In other words, it includes: • Carpet area (actual usable rooms) • Thickness of internal and external walls • Balcony and utility areas • Staircases (within the unit) • Covered verandas It does not include open spaces like gardens, driveways, or open terraces without a roof. Formula: Built-up Area = Carpet Area + Wall Thickness + Balcony/Utility Area Total built-up area of the house: We need to add the area of both the ground floor and the first floor based on the room dimensions provided in the floor plans. Ground Floor Area Calculation: Let's approximate based on the outer dimensions: • Width: From the car garage + living/dining/kitchen area = 8.5 m • Length: From front porch to back (living + kitchen depth) = 11.5 m Approximate • Ground Floor Built =8.5x11.5= 97.75 sq. meters 2.First Floor Built-Up Areas: Family hall+3bedrooms+2bathrooms= similar to the ground floor. Approximate First floor Built-up Area: 8.5 m x 8.5 =72 .25 ✓ Total built up area: 97.75 + 72.25 = 170 sq. meters 97.75 + 72.25 = 170 sq.m5 + A. Work sharing (if team-based) • Use Collaborate > Work sets to enable multi-user work. B. Export • Export to PDF, DWG, or IFC depending on client or engineer requirements. FLOOR PLAN: Ground floor plan: This is a ground floor plan of a residential building with dimensions of 8.5 feet by 11.5 feet. Below is

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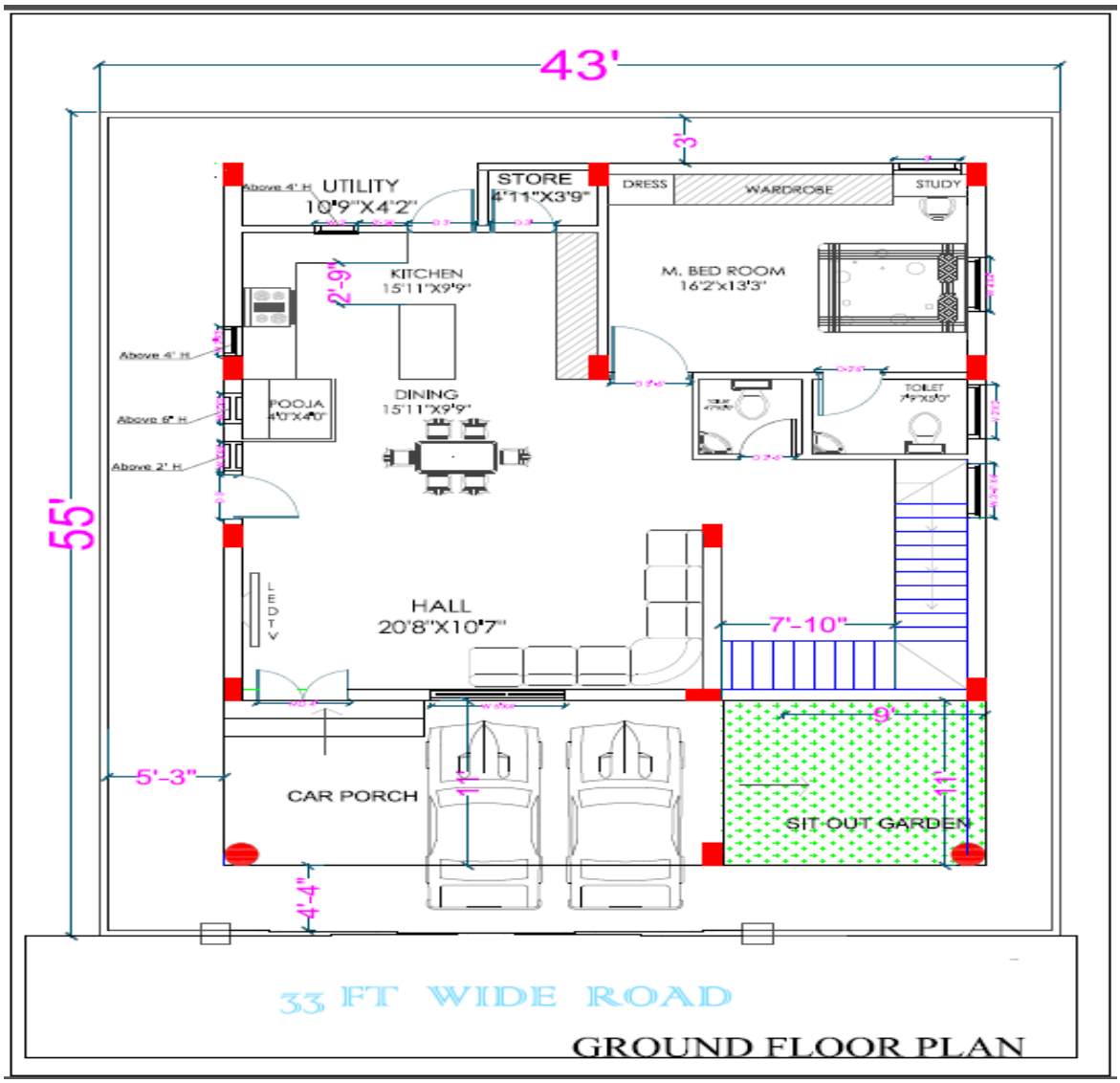

a detailed description of the layout: The layout optimizes functionality and efficient use of space area, suitable for a small family. 1.Ground Floor Plan:1. Living Room Size: 3.5m × 4.0mWell positioned near the entrance. Connected directly to the staircase and dining area. 2. Dining Area Size: 3.5m × 4.0mCentrally located. Accessible from both kitchen and living room. 3. Kitchen Size: 3.5m × 4.0mL-shaped counter for efficient working space. Position adjacent to the dining area. 4. Bedroom Size: 3.5m × 4.0 m . Near the bathroom, suitable for elderly or guests. 5. Bathroom Size: 1.4m × 2.2mCommon toilet, accessible to guests and bedroom users. 6. Car Garage: Covered parking for one vehicle. Direct access to the house through the main entrance. 7. Staircase: Positioned near the entrance. Connects ground to first floor efficiently. 23 First floor plan: First floor plan: • 1.Family Hall Size: 6.2m × 4.3mSpacious and centrally located. Acts as a lounge area or secondary living room. • Bedroom 1 & 2 Size: 3.5m × 4.0m (each)Share a common bathroom (1.6m × 2.0m). Ideal for children or guests. • Master Bedroom Size: 4.2m × 4.0mAttached bathroom (2.75m × 1.5m). More privacy and space. • Terrace: Accessible through the family hall. Open space for outdoor activities or gardening. • Bathrooms: Two bathrooms: one common and one attached. Efficient placement for easy access. Design Strengths: Functional zoning: Public spaces (living/dining) on ground, private on first good ventilation (multiple windows W, W1). First Floor Built-Up Areas: Family hall+3bedrooms+2bathrooms= similar to the ground floor. Approximate First floor Built-up Area: 8.5 m x 8.5 =72 .25 sq. meters

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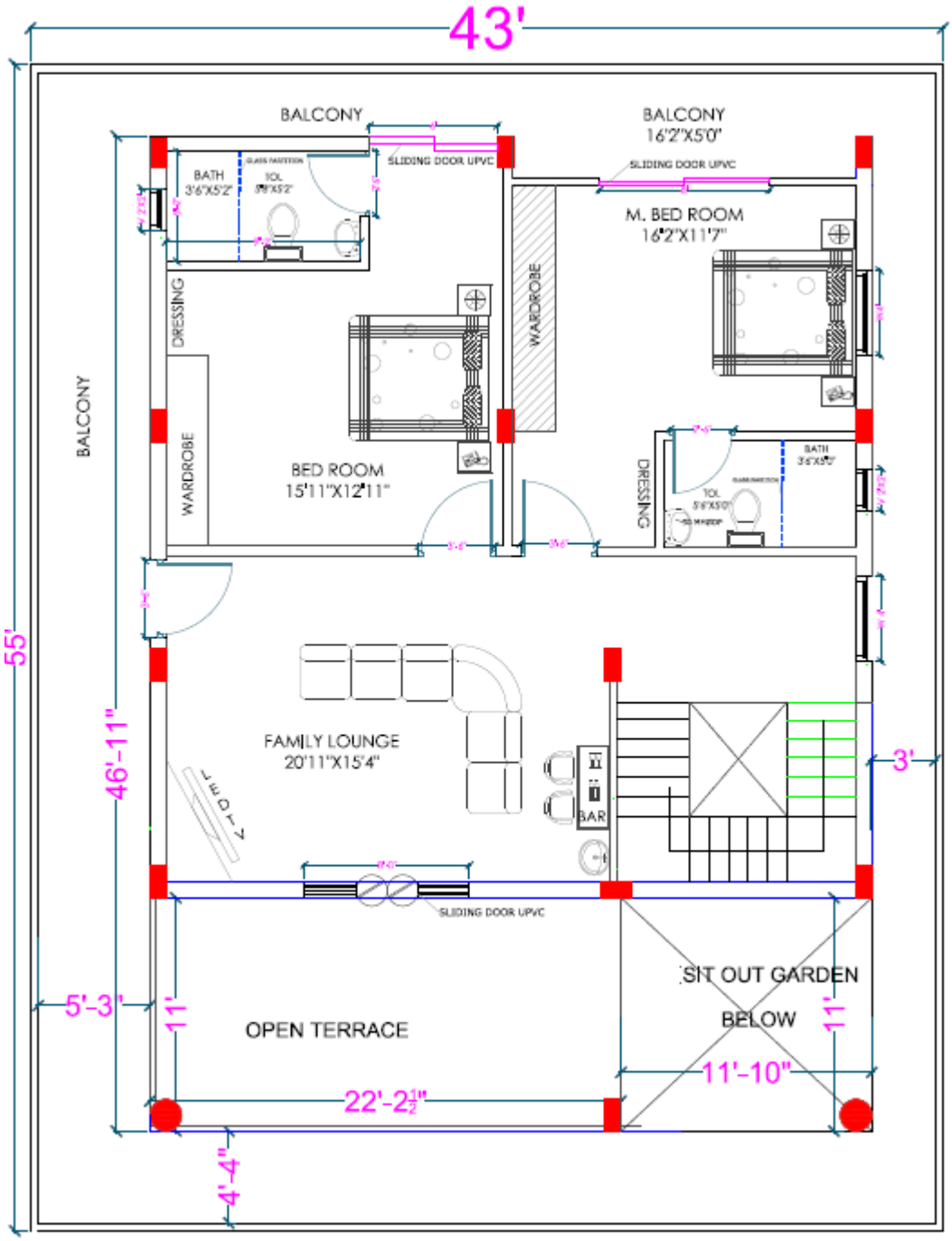

FIRST FLOOR CIVIL PLAN

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CONCLUSION:

This project demonstrates the powerful capabilities of Revit Architecture in designing, modelling, and visualizing a Duplex House with high accuracy and detail. From initial planning to final rendering, every stage was efficiently completed within a single platform. The use of Revit allowed for seamless integration of architectural elements, realistic 3D views, accurate scheduling, and material estimation. By combining detailed modelling with visual realism, the project provides a complete understanding of the building's design, layout, and construction requirements. It highlights how BIM tools like Revit can improve design quality, support better decision-making, and enhance communication with clients and stakeholders. Overall, this project reflects a practical and modern approach to architectural design and visualization.

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