

## **Modelling and Analysis of Hospital Building by Using Revit Architecture and Staadpro**

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### **Abstract**

Hospital building provides medical service to the people. The main purpose of our project is satisfies the medical needs of people. In this project we concerned about the plan, analysis and design of Multispeciality hospital building. The plan of the hospital building is done by using AUTOCAD software. The analysis of structures were done by using STAAD Pro as well as IS 456:2000 Code of practice for plain and reinforced cement concrete. The design of RCC slab, beam, column, footing and stair case is based on working stress method as per IS 456:2000 code. Using Revit architecture performing modelling of hospital building Revit is 3D building information modeling capable with tools to plan and track various stages in the building's lifecycle, from concept to construction and later maintenance and demolition using staadpro can perform both analysis and design of building structure and its detailing with beam, column and footing design using staad foundation Additionally, STAAD.Pro is interoperable with applications such as RAM Connection, Auto PIPE, SACS and many more engineering design and analysis applications to further improve collaboration between the different disciplines involved in a project. STAAD can be used for analysis and design of all types of structural projects from plants, buildings, and bridges to towers, tunnels, metro stations, water/wastewater treatment plants and more. STAAD Building Planner is a module that enables seamless generation of building models that can be analyzed and designed thereafter in the program itself. Operations like defining geometry, making changes in the geometric specifications are matters of only few clicks in this workflow. Autodesk Revit is building information modelling software for architects, landscape architects, structural engineers, mechanical, electrical, and plumbing.

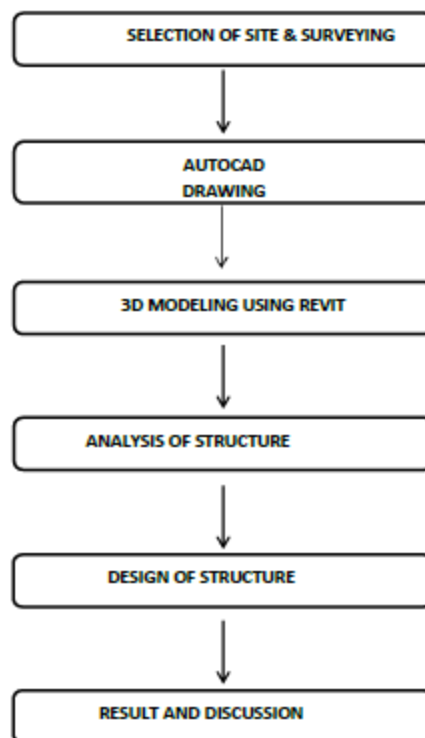
### **1. Introduction**

Hospital building provides medical service to the people. The main purpose of our project is satisfying the medical needs of people. In this project we concerned about the plan, analysis, and design of Multi-Speciality hospital building. The plan of the hospital building is done by using AUTOCAD software. The analysis of structures was done by using STAAD Pro as well as IS 456:2000 Code of practice for plain and reinforced cement concrete. The design of RCC slab, beam, column, footing, and staircase is based on working stress method as per IS 456:2000 code. Using Revit architecture performing modelling of hospital building Revit is 3D building information modelling capable with tools to plan and track various stages in the building's lifecycle, from concept to construction and later maintenance and demolition using STAAD Pro can perform both analysis and design of building structure and its detailing with

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Autodesk Revit is building information modelling software for architects, landscape architects, structural engineers, mechanical, electrical, and plumbing (MEP) engineers, designers, and contractors



**Fig.1** Frame size

## 2. Literature Review

Structural analysis and design software based on the finite element method. It is capable of analysing and designing civil engineering structures such as buildings, bridges, plane and space trusses. It can generate loads (wind and earthquake) as per building codes of selected countries. It can carry out design of steel and reinforced concrete buildings as per codes of selected countries. It can carry out linear elastic (static and dynamic) and nonlinear dynamic

analysis (although i am not sure how good the nonlinear analysis algorithms are, not having used those features). It has a simple and easy to learn user interface. It is currently developed by bentley systems inc. It was originally developed by research engineers inc. In California. It was one of the earliest structural analysis and design software with a user-friendly gui and support for building codes of countries other than us, uk, and other developed countries.

#### REVIT ARCHITECTURE:

Building Information Modelling (BIM) is an intelligent 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insight and tools to plan more efficiently, design, construct, and manage buildings and infrastructure. There is still a place for CAD software like AutoCAD, which designers still use for detailing and documenting we can import Revit model into STAAD. Pro by using the ISM format. To transfer Revit model into STAAD.Pro with ISM you will need to install two programs. Structural Synchronizer is the engine that makes ISM work, and the ISM Revit Plug-in that adds the commands to the Revit menu

The Revit work environment allows users to manipulate whole buildings or assemblies (in the project environment) or individual 3D shapes (in the family editor environment). Modelling tools can be used with pre-made solid objects or imported geometric models. However, Revit is not a NURBS modeller and lacks the ability to manipulate an object's individual polygons except on some specific object types such as roofs, slabs and terrain or in the massing environment

Revit can be used as a very powerful collaboration tool between different disciplines in the building design sphere. The different disciplines that use Revit approach the program from unique perspectives. Each of these perspectives is focused on completing that discipline's task. Companies that adopt the software first examine the existing workflow process to determine if such an elaborate collaboration tool is required.

When a user creates a building, model, or any other kind of object in Revit, they may use Revit's rendering engine to make a more realistic image of what is otherwise a very diagrammatic model. This is accomplished by either using the premade model, wall, floor, etc., tools, or making her or his own models, walls, materials, etc. Revit 2010 comes with a plethora of predefined materials, each of which can be modified to the user's desires increase when increase in input motion. The reduction factor decreases he of earthquake

### **3. Proposed System**

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Revit includes categories of objects ('families' in Revit terminology). These fall into three groups:

- System Families, such as walls, floors, roofs, and ceilings, built inside a project

- Loadable families/components, which are built with primitives (extrusions, sweeps, etc.) separately from the project and loaded into a project for use
- In-Place Families, which are built in-situ within a project with the same toolset as loadable components

An experienced user can create realistic and accurate families ranging from furniture[15] to lighting fixtures, as well as import existing models from other programs. Revit families can be created as parametric models with dimensions and properties. This lets users modify a given component by changing predefined parameters such as height, width, or number in the case of an array. In this way a family defines a geometry that is controlled by parameters, each combination of parameters can be saved as a type, and each occurrence (instance in Revit) of a type can also contain further variations. For example, a swing door may be a Family. It may have types that describe different sizes, and the actual building model has instances of those types placed in walls where instance-based parameters could specify the door hardware uniquely for each occurrence of the door.

Due to the copyright nature of project work, it is rare and impractical to be able to buy fully 3D modelled Revit project models. Indeed, as most projects are site specific and bespoke, obtaining an existing model is in many instances unsuitable. However, there are circumstances where new practices or students that are training to learn Revit, do have a need to refer to completed models. Sources for these are limited, however they can be purchased at websites like BIM Gallery and downloaded from websites like GRADCAD.

Although Revit software comes with a range of families out of the box (OOTB), they are limited, so users can find a need to build their own families or buy them from online stores such as PLANSORT, BIMBANDIT or ANDEKAN. A number of websites offer families for free including Revit City, AUGI, BIMOBJECT, BIMSMITH, National Bim Library and BIM&CO



**Fig.2** Proposed Door Placing

#### **4. Conclusion**

The plan was drawn by Auto – cad2017 The analysis of the structure was done by using STAAD – PRO Software. The structural elements are designed by using working stress method and IS 456 – 2000 code provision The design project was helped as to acquire knowledge about the various analysis and design concept and code provision. When you are done with this course you will know how to utilize the different types of families and parameters in Revit 2016 to create complex and customized designs quickly and efficiently in your projects.

#### **References**

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