Planning, Analysis and Design of (G+5) Hospital building using STAAD.Pro

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Abstract: Structural engineering is a field of building managing the investigation and plan of structures that help or stand up to loads which is typically viewed as a claim to fame inside structural designing. This field for the most part relies on a point by point information of burdens, physical science, and materials to comprehend and anticipate how structures support and oppose self-weight and forced loads. As indicated by this paper, the basic designer is to outline the structures for a given arrangement of the individual structures under most secure innovation in the processing field. This product procedure influences the auxiliary specialists to determine every one of the individuals in a proposed working with different loads and bolster conditions. All these products are created as the premise of cutting edge and prerequisite. Limited component investigations, which incorporate the impact of dynamic load, for example, wind impact, seismic tremor impacts and so on. The main aim of this paper is to study the methods implemented in the previous studies. The findings of this literature review are analyzed to implement in the case study under consideration. Analyze the plan of hospital building by using software technique, under this title we are discussed the various structures design procedure by limit state method. In this hospital it is helpful to all kinds of people like poor or rich. The patients not necessary to go outside of campus, all the facilities are available inside of campus. This hospital building contains the various departments. The various departments are contained in this building like ENT, Surgery, Neurology, Cardiology, Pediatrics', Urology, and etc. In this project we have designed the following structures design of slab (one way slab and two way slabs), design of beam, design of column, design of staircase, design of ramp, design of footing. The plinth area of this building is 2956m2 This is a G+5 structure. This project has M25 grade of concrete and Fe415 grade of steel used to design of above structure. This project designed under limit state method which is more than other methods of designing. All the design procedure are followed code book are IS456-2000, Sp16-1980, National building code book-2005, the minister of health section 44 act 1977. This software will save our time so the following software are used
Auto cad 2015 and STAAD.Pro, the most prominent using software for design and analysis of respective building by STAAD.Pro software for accuracy and safety regards, in this paper STAAD.Pro has been used for analyzing wind loads, live load, dead load, bending moment, shear force, bending moment, torsional moment action on the hospital building

Key words: Hospital, Health, Design, STAAD.Pro, Concrete.

1. Introduction

The hospital building is universally accepted as the most effective intervention to achieve significant improvement in the health states of a population especially in respect of infant, child and maternal care. The Alma (international conference definition) declaration of 1978 signed by most nations of the world and health policy document (1983) of the government of India identify health care as a key strategic intervention for providing universal access to health care.

Depending upon the size of town or city the type of hospital is decided Hospital and dispensaries come under health buildings. The people are treated for various diseases and also given advice in respect of health. They are also advised how to keep environment clean so as to avoid the slaughter of various diseases. For the purpose of clarification the building for health may be termed as dispensaries, clinics, maternity homes, nursing homes, laboratories, child welfare centers and general hospital. A dispensary used to mean a room where compounded. Now its meaning has been widened. Now dispensary means a place whose medicines are prescribed and given to the patients. It is not necessarily a single room but consists of doctor’s room, pharmacy room, dressing room and waiting room. In Maternity homes and nursing homes both of them cares for special treatments. Here the patients are allowed to stay for short duration.

This building design is based on Krishnagiri location. This design houses all the facilities keeping in mind the comfort level of the public in accessing those facilities. All departments of a hospital are included in the design and it is analyzed not only on structural grounds but also on ease in accessing the facilities within. Each wing is separately oriented in such a way that disturbance in movement between the buildings are minimized. This paper details the previous studies and analysis carried out and compares every one of them, to get an idea of how to implement data for the design of building under consideration in an effective manner.

2. Literature Review

MVK. Satish et.al (2017) he examined and designed a G+3 hospital building and its facility arrangement reaction to seismic load were studied using STAAD.Pro and after were investigated through a 3Dnon linear reaction history examination and corrected with non-linear static working methodology (NSP), this study recommends utilization of modular NSP rather than first mode NSP as
it gives better result while comparing building structures.

**Safwanahmad et.al (2017)** designed a G+2 hospital building using STAAD.Pro by applying suitable loads and sectional details to component within the main aim of this factor was to study the extent of credibility of using STAAD.Pro for analysis.

**Dr.Ashokkumar et.al (2017)** designed a G+3 hospital building using substitute frame method in STAAD.Pro the efficiency of analyzing using software over manual method was analyzed and a comparative analysis was carried out.

**Adiyanto (2008)**, analyzed a 3-storey hospital building using STAAD Pro. Seismic loads were applied to the building. The dead loads and live loads were taken from BS6399:1997 and seismic loads intensity is based on equivalent static force procedure in UBC1994. Result showed that the building can withstand any intensity of earthquake. It means that the buildings were suitable to be built in any area located near the epicenter of the earthquake.

**Sankar. J et.al (2016)** designed and developed a G+4 hospital building and analyzed using STAAD.Pro. Effects of seismic load were monitored by calculating base shear and displacement along the member research findings indicate variation among different zone using a comparative analysis.

**Tejvat Venkatesh et.al (2017)** designed and analyzed a hospital building for seismic and wind forces. The building was analysed for the reactions toward wind forces by using STAAD.Pro and earthquake loads were analyzed by Equivalent static method with base shear criteria. The G+4 structure was analyzed for structural stability towards considered forces.

**Alkesh Bhlerao et.al (2016)** studied the effects of wind on different structural orientation of RCC buildings. The study aims at identifying an optimum structural shape of building which could withstand the wind forces under consideration. The building was a G+25 structure analyzed for structural stability using ETABS software. U-shape structure is not preferred as it gives the maximum displacement and maximum drift due to its geometric shape most susceptible for wind load. Bundled tube symmetric RCC structure is need to analyzed for special provision and improved cladding surface to attain optimized result.

**D. Ramya et.al, (2015)** compared the design and analysis over a multi-storey G+10 building with STAAD.Pro and ETABS softwares. The basic wind speed for this study was taken as 33.0 m/s and the shear force and bending moment over each of the component of the building was calculated for different combination of loads. This study shows that STAAD.Pro is more flexible when compared to ETABS software in terms of analysis of structure.

### 3. DATA COLLECTION

Since hospital is the important for emergency. The objective of this study is to make comparisons of analysis and design of...
A (G+5) hospital building. Cases of wind loads will be applied to the building the building will be designed according to the Krishnagiri district considerations. The present study deals with an Equivalent Static Analysis of 5 story RCC hospital building using Structural Analysis and Design (STAAD Pro.) software and the designing are done in AUTOCAD. The use of CAD process provides enhanced graphics capabilities which allows any designer to Conceptualize his ideas Modify the design very easily Perform animation Make design calculations.

Fig.1. Ground Floor plan  
Fig.2. First Floor plan

Fig.3. Third Floor plan  
Fig.4. Fourth Floor plan

Fig.5. 3D elemental structure

**STAAD.Pro ANALYSIS**

The building plan designed with the help of AUTOCAD, is analyzed for its structural stability towards considered forces using STAAD.Pro analysis software. The plan is developed into an entire 3-D structure and the basic details such as shear and displacement are studied.
4. Results and discussions
From the analysis procedure with STAAD.Pro, the design for concrete and steel reinforcement is shown below.

5. Conclusion
This paper analyses various studies carried out over planning, designing and analyzing a structure with the help of different software. All the studies considered above give a suggestion of adopting STAAD.Pro over other software for analyzing a building structure. Due to its flexibility and its provision for economic
sections both in terms of steel and concrete, STAAD.Pro is adopted for further analysis procedure.

6. References


