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Analysis of (G+3) Hostel Building

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Abstract: ***The principal objective of this project is the comparative study on design and analysis of hostel building (G+3) of area 2050 sqm, by AUTOCAD, STAAD.Pro and ETABS software's. Our project deals with the plan and style of Hostel Building. Designing involves identifying the forces and stresses which arise within that structure, perform analysis to urge moments and shear forces on different elements of the structure then design the structure for ultimate loads, dead load, wind load, live load, earthquake load (Indian Earthquake zone 3) and moments etc. AUTOCAD, ETABS and STAAD.Pro may be softwares tool to style functional design of plan. Estimation includes finding the quantities of materials required for the development of the structure and requirements of labour etc. During this project work, an effort is formed consistent with Building by laws and style of hostel building as per is: IS-456-2000, IS-1200 and SSR. The layout planning may be a part of urban development it includes planning of hostel houses, commercial complexes, service roads, primary health centers, school...& other amenities sewerage system for whole layout (includes treatment, sewer main, storm water drains), water distribution system. This article includes design & estimation of hostel building in plot of layout planned.***

Keywords: Planning, Designing, Estimating, Building, Hostel Building, Auto CAD, ETABS and STAAD.Pro etc.

I. INTRODUCTION

With the emerging knowledge in scientific fields and the rise of new materials and technology, architecture engineering began to separate, and the architect began to concentrate on aesthetics and the humanist aspects, often at the expense of technical aspects of building design. Meanwhile, the industrial revolution laid open the door for mass production and consumption. Aesthetics became a criterion for the middle class as ornamental products, once within the province of expensive craftsmanship, became cheaper under machine production. Vernacular architecture became increasingly ornamental. House builders could use current architectural design in their work by combining features found in pattern books and architectural journals.

About the Project: A building frame consists of number of bays and storey. A multi-storey, multi-paneled frame is a complicated statically intermediate structure. A design of R.0 building of G+3 storey frame work is taken up. The building in plan consists of columns built monolithically forming a network. The size of building is 57.6 x 35.6 m. The number of columns are 71. It is residential complex.

II. LITERATURE REVIEW

Mr. Suyog R Jadhav et.al 2021 This study includes the planning of Residential Building using AutoCAD, Design using Is Code and concludes with the cost estimate for the entire project. Planning, designing and estimating, these are the tree steps which are very important while constructing any structure. In this project we have detailed discuss about the planning, designing and estimating of the residential building.

Imad Shakir Abbood et.al 2021 This paper has presented a general overview of high-rise buildings regarding basic definition, safety features, design issues, structural stability, linear and nonlinear analysis for both static and dynamic procedures resulting from wind and seismic activities. Brief descriptions of various structural systems that are available in both literature and the public domain are reported. In addition, a critical review of available simplified models and seismic energy base design are also presented. Moreover, this review could avail as a massive foundation for future works.

D.Ramya et.al 2015 this study finds STAAD.Pro software is more flexible to work compared to the ETABS software. The quantity of steel requirement is 9.25% less for

the design of G+10 multi-storied building using ETABS compared with the STAAD analysis. The quantity of concrete requirement is same for the design of the G+10 multi-storied building using both STAAD and ETABS analysis. By the intensive study of "Comparative study on Analysis and Design of G+10 multi-storied building by both STAAD and ETABS software's" the "economical sections" was developed by ETABS software.

Yash Raj Rana's 2015 By the analysis results, we can find that the base reactions for the dead load of whole structure is coming little bit different from all the softwares.

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Besides this, we can find base reactions for the live load of the building are equal through all the softwares. From the design results of beam, we can conclude that ETABS gave lesser area of steel as compared to STAAD Pro and STRUDS. It is found that the ETABS give more precise and accurate results as compared to the STAAD-Pro and STRUDS. Even the manual calculations for design go in favour of ETABS.

Prashanth.P et.al 2012 according to this study, we may conclude that ETABS gave lesser area of required steel as compared to STAAD PRO. It is found out from previous studies on comparison of STAAD results with manual calculations that STAAD.Pro gives conservative design results which is again proved in this study by comparing the results of STAAD.Pro, ETABS and Manual calculations (refer below table). Form the design results of column; since the required steel for the column forces in this particular problem is less than the minimum steel limit of column (i.e., 0.8%), the amount of steel calculated by both the softwares is equal. So, comparison of results for this case is not possible.

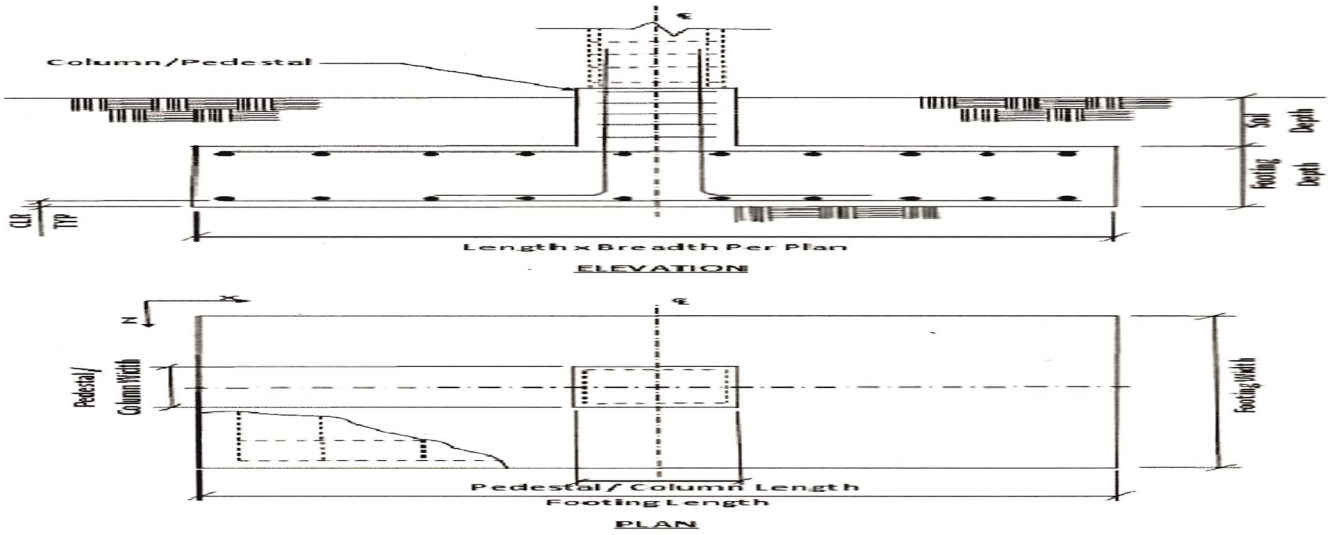
Prof. N. M. Sayyed et.al 2022 This project includes the planning of Residential Building using AutoCAD, Design using Is Code and concludes with the cost estimate for the entire project. The cost estimate for the project has been calculated using Long Wall Short Wall Method in Microsoft Excel. For the Abstract cost CPWD Schedule of rates has been followed. In this project Planning, Designing, and Estimating of Residential Building.

III. METHODOLOGY

A. Center Line Plan

The figure given below represents the center line diagram of our building in staad pro. Each support represents the location of different columns in the structure. This structure is used in generating the entire structure using a tool called transitional repeat and link steps. After using the tool the structure that is created can be analyzed in staad pro under various loading cases. Below figure represents the skeletal structure of the building which is used to carry out the analysis of our building.

1) *Dead Loads:* Dead loads consist of the permanent construction material loads compressing the roof, floor, wall, and foundation systems, including claddings, finishes and fixed equipment. Dead load is the total load of all of the components of the components of the building that generally do not change over time, such as the steel columns, concrete floors, bricks, roofing material etc.
2) *Live Loads:* Live loads are produced by the use and occupancy of a building. Loads include those from human occupants, furnishings, no fixed equipment, storage, and construction and maintenance activities. As required to adequately define the loading condition, loads are presented in terms of uniform area loads, concentrated loads, and uniform line loads. The uniform and concentrated live loads should not be applied simultaneously n a structural evaluation. Concentrated loads should be applied to a small area or surface consistent with the application and should b e located or directed to give the maximum load effect possible in end-use conditions.
3) *Floor load:* Floor load is calculated based on the load on the slabs. Assignment of floor load is done by creating a load case for floor load. After the assignment of floor load our structure looks as shown in the below figure. ye sign indicates that floor load is acting downwards.



IV. CONCLUSION

Designing using Software's like Staad reduces lot of time in design work. Details of each and every member can be obtained using staad pro. All the List of failed beams can be obtained and also Better Section is given by the software. Accuracy is improved by using software. We can conclude that there is difference between the theoretical and practical work done. As the scope of understanding will be much more when practical work is done. As we get more knowledge in such a situation where we have great experience doing the practical work. Knowing the loads we have designed the slabs depending upon the ratio of longer to shorter span of panel. In this project we have designed slabs as two way slabs depending upon the end condition, corresponding bending moment. The coefficients have been calculated as per I.S. code Methods for corresponding lx/ly ratio. The calculations have been done for loads on beams and columns and designed frame analysis by moment distribution method. Here we have a very low bearing capacity, hard soil and isolated footing done. In the process of carrying out this project, we learnt to apply the theoretical aspects of Estimation on a live project. We have learnt the process of Estimation and Costing and we understood that it is an essential aspect in a project for the arrangement of financial resources necessary for the completion of the job. Our calculation it are based on precise measurements which gave us approximate and Accurate values. The structural estimate had been prepared in detail such that the values can be used in the actual project being carried out. Also, the abstract of the estimated cost was prepared such that the current on going rate per unit of each item of work were considered. Hence the estimated costs of the structural requirements of the project are accurate too. Therefore, this project is not a rough, but fairly accurate in its results of both the estimated quantities as well as the estimated cost, and is quite useful for the ongoing project on which it is made.

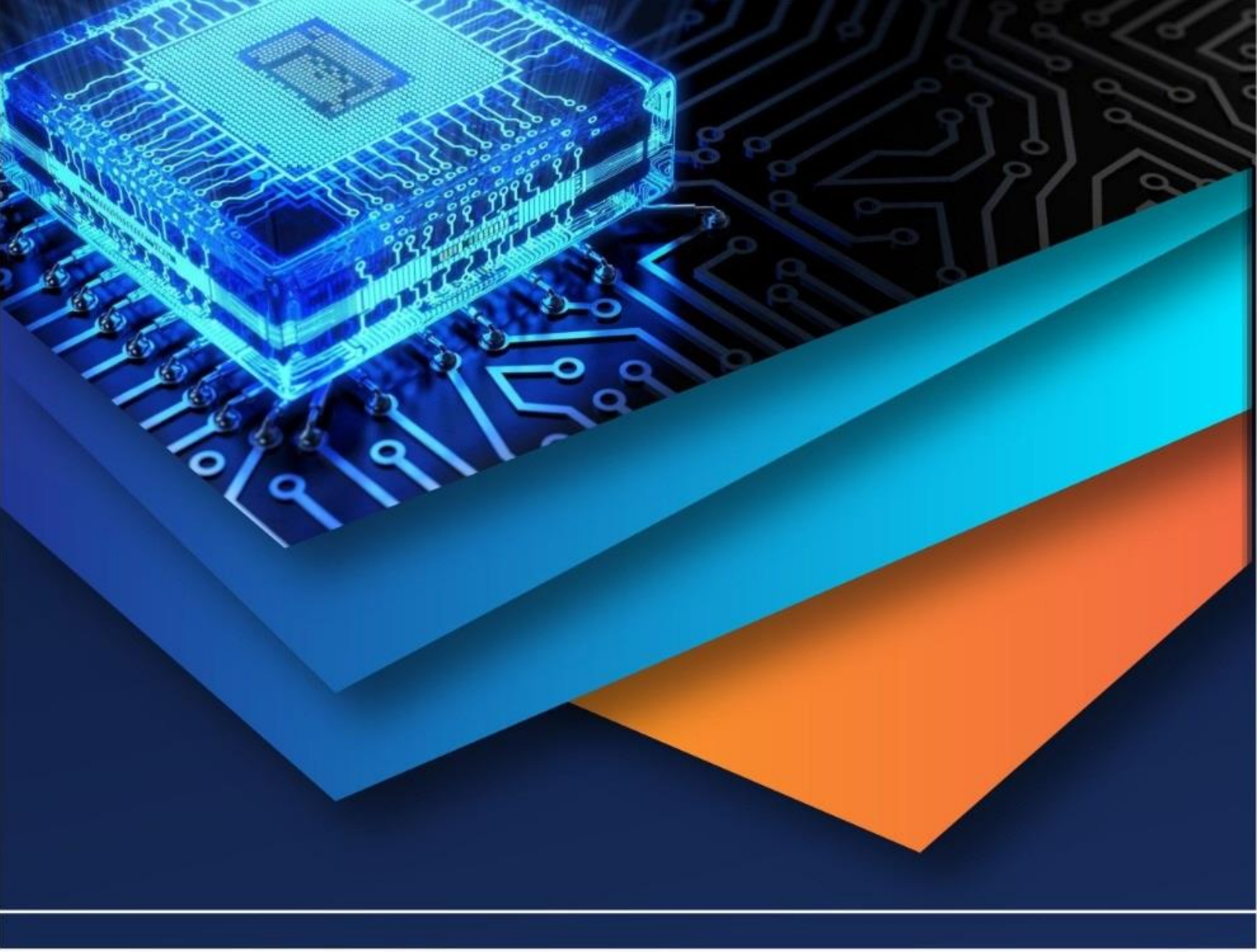
The use of the import function in Auto CAD definitely has some advantages. It can help to reduce the time it takes to produce the drawings needed in the work environment. However if the individual that has created the imported file does not receive credit for their work, problems may arise in the future. As well, by using the function people may slowly start to place a lesser value on the intellectual property of others, which will undoubtedly create future conflict. The use of the import function may also be relied on heavily in order to create efficiencies within the industry. This could possibly lead to a decrease in the rate of innovation. It's obvious that the import function has a place in the building industry, but its use will have to be regulated in order to create a balance between the negative and the positive effects it creates.

From the comparison result obtained from STAAD Pro and Manual computation, almost all the structural elements passed the checks carried out on them including the deflection, shear forces and bending moment. The list of failed elements was indicated by both MIDAS and STAAD Pro software programs and better section were selected. The analysis and design of the new section were performed again and result came out immediately. The use of Computer Aided tools in structural analysis and design has been proven to be effective from the results output. It was observed that the time for performing the design work is significantly reduced. However, the software programs can be easily misused without observing proper precautions in the analysis and design procedures which can lead to structural failures, costly disputes and poor performing structures. Thus, this explains the importance of comparison between different software packages and more importantly performing hand calculations for like floor and comparing for the same floor in the software packages. Therefore, it can be concluded that the structure has fulfilled the Ultimate Limit State and the Serviceability Limit State requirements. Get efficient foundation design and documentation using plant-specific design tools, multiple design codes with U.S. and metric bar sizes, design optimization, and automatic drawing generation. STAAD Foundation Advanced provides you with a streamlined workflow through its integration with STAAD.Pro or as a stand-alone application. You can design virtually any type of foundation, from basic to the most complex. Easily model complex or simple footings, such as plant foundations supporting vertical vessels, horizontal vessels, tanks and other footings Quickly model common foundations such as isolated, combined, strip, pile caps, and many more Simplify challenging scenarios such as vibrating machine foundation, lateral analysis of piers, or mat design using FEA Efficiently use your structural model with the foundation model through integration with STAAD.Pro, including automatically synced changes in both models

REFERENCES

[1] 'Planning Designing & Estimating of Residential Building' Mr. Suyog R Jadhav, Ms. Sejal S Bhogan, Ms. Renuka V Bhogan, Mr. Sahil D Sawant, Mr. Mukul M Chodankar, Prof. Keshav Ramdas Manerikar 2021.
[2] "High Rise Buildings: Design, Analysis, and Safety – An Overview" Imad Shakir Abbood, Mohammed Ahmed Jasim and Sardasht S. Weli 2021.
[3] "Comparative study on design and analysis of multi-storeyed building (g+10) by STAAD.Pro and ETAB software's" D. Ramya, A.V.S. Sai Kumar 2015.
[4] "Comparison of Analysis & Design Results of a Structural Elements using STAAD-Pro, STRUDS and ETABS Software" Yash Raj Rana, 2015.
[5] "Comparison of design results of a Structure designed using STAAD and ETABS Software" Prashanth.P, Anshuman.S, Pandey.R. K, Arpan Herbert, 2012.
[6] "Review on Proposed Planning and Estimate of 1 BHK Residential Building" Prof. N. M. Sayyed, Prof. Neha Sonone, Swapnil Azad, Shital Rajnire, Rajesh Kumar, Rakesh Kumar, Nikita Bansod, Ketan Jambulkar, 2022.

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