# Comparative Analysis of G+1 Building Using E-Tab and Staad Pro Software

**Pranoti Mali**
*dept. of civil engineering*
D.Y.Patil Education Society,
D.Y.Patil Technical Campus,Talsande
malipranoti121@gmail.com

**Shrutika Jadhav**
*dept. of civil engineering*
D.Y.Patil Education Society,
D.Y.Patil Technical Campus,Talsande
shrutijadhav9179@gmail.com

*Abstract—*

Structural analysis and design play a crucial role in ensuring the safety, stability, and durability of buildings. With the advancement of computer technology, structural engineering has increasingly relied on specialized software to perform complex calculations and analysis efficiently. Among the commonly used structural analysis programs, **STAAD.Pro** and **ETABS** are widely used in the design and analysis of building structures. These software tools enable engineers to model structures, apply loads, analyze structural behavior, and design structural members according to standard design codes.

This study focuses on the comparative analysis of a **G+1 building structure** using STAAD.Pro and ETABS software. The primary objective of the study is to review and compare the analysis capabilities, modeling procedures, and structural outputs generated by the two software programs. The comparison includes important structural parameters such as bending moment, shear force, axial force, displacement, and support reactions obtained from the analysis of the building model.

The review also examines previously published research studies related to structural analysis using these software platforms. By analyzing different research works, the study highlights similarities and differences in the results produced by STAAD.Pro and ETABS. The literature indicates that both software tools provide reliable structural analysis results when proper modeling techniques and load conditions are applied. However, ETABS is generally considered more suitable for building structures because of its specialized features for modeling beams, columns, slabs, and shear walls, while STAAD.Pro offers flexibility for analyzing a wide variety of structural systems.

The findings of this study help civil engineering students and structural engineers understand the advantages, limitations, and practical applications of both software tools in structural analysis. The comparative approach also assists in selecting appropriate software for efficient structural design of buildings.

Keywords

1. **STAAD.Pro**
2. **ETABS**
3. Comparative Structural Analysis
4. G+1 Building Structure
5. Structural Design Software
6. Building Modeling
7. Reinforced Concrete Structures
8. Structural Engineering
9. Bending Moment and Shear Force Analysis
10. Computer-Aided Structural Design

## 1. INTRODUCTION

Structural engineering has experienced a major transformation with the introduction of advanced structural analysis and design software. Traditional manual calculations are time consuming and prone to human errors, especially when dealing with complex building structures. Modern civil engineering practice therefore relies heavily on specialized structural analysis software to perform accurate calculations, simulate structural behavior, and ensure safety and stability of buildings. Among the many structural analysis programs available today, STAAD.Pro and ETABS are widely used by engineers for analysis and design of reinforced concrete and steel structures. These programs provide powerful tools to model structures, apply loads, analyze internal forces, and design structural members according to international design codes. Both software packages have their own modeling techniques, analysis procedures, and design capabilities. As a result, understanding the differences between these tools is important for engineers and students working in the field of structural design. A G+1 building, which consists of a ground floor and one upper floor, represents a basic yet important structural system commonly constructed in residential and small commercial buildings. Even though it is relatively simple compared to high rise structures, the analysis of a G+1 building provides a clear understanding of structural load transfer mechanisms, member forces, and design requirements. By modeling such a building in different software platforms, it becomes possible to evaluate the accuracy, efficiency, and reliability of structural analysis tools. The comparative analysis approach allows engineers to model the same structure using different software packages and compare the results obtained from each platform. Important structural parameters such as

bending moments, shear forces, displacement, and support reactions can be studied and evaluated. Differences in modeling approaches, analysis algorithms, and design outputs can also be observed through this process. This review paper focuses on the comparative analysis of a G+1 building using STAAD.Pro and ETABS software. The purpose of this study is to review existing research work related to structural analysis using these tools and to highlight their advantages, limitations, and practical applications in building design. The study also aims to help civil engineering students understand how these software programs can be applied effectively in structural analysis projects. By analyzing previously published research papers and technical studies, this review provides a comprehensive understanding of the methodologies used by researchers to compare structural analysis software. The findings from different studies reveal important insights into modeling efficiency, result accuracy, analysis time, and design capabilities of the two platforms. The results presented in earlier research indicate that both STAAD.Pro and ETABS are capable of producing reliable structural analysis results when used correctly. However, ETABS is often preferred for building structures due to its specialized tools for modeling beams, columns, slabs, and shear walls, while STAAD.Pro is known for its versatility in analyzing various types of structures including bridges, towers, and industrial frameworks. Therefore, conducting a comparative study of a G+1 building using these two software tools provides valuable knowledge for engineering students and practicing structural engineers. The review contributes to the understanding of structural analysis software and supports better decision making in selecting appropriate tools for building design.

## 2. Literature Review

### Balwinder Jallotra, Dhirendra Singhal (2017)

This study presents a comparative review of structural analysis and design software such as STAAD.Pro, ETABS, and SAP2000. The authors discussed how these tools differ in terms of modelling approach, analysis features, user interface, and output formats. The research indicates that ETABS is more suitable for multistorey buildings due to storey-based modelling, while STAAD.Pro is flexible and used for various structural types. SAP2000 is also effective for complex structures and advanced analysis. The paper concludes that selection of software depends on structure type, project requirements, and engineer's comfort in modelling. Reference [2]

### K. Venu Manikanta, Dr. Dumpa Venkateswarlu (2016)

This research compares the design results of multistorey buildings using STAAD.Pro and ETABS for both regular and irregular plan configurations. The study shows that irregular buildings behave differently under loads due to uneven stiffness distribution, leading to higher displacement and member forces. The authors compared parameters such as bending moments, shear forces, axial forces, and reinforcement requirements. The results show variations between STAAD.Pro and ETABS outputs due to different modelling assumptions and load distribution methods. This study supports the need for comparative analysis, especially for irregular structures. Reference [3]

### S. Jyotirmayee, B. Dileep Kumar Reddy, M. Rakesh (2024)

This paper focuses on the comparative study of design of a commercial building using ETABS and STAAD.Pro. The authors modelled the same building in both software and applied identical load combinations. The study compared member forces, displacement, and reinforcement output. The results show that ETABS provides more detailed building-based outputs like storey response, drift, and design reports, making it easier for multistorey building analysis. STAAD.Pro also provides accurate results but requires careful modelling and interpretation. The paper concludes that both software are reliable but ETABS is more user-friendly for building structures. Reference [4]

### Mohamed Shahraz, Mohammed Danish Hasnain, Abdul Hameed Siddiqui (2022)

This research analyses a G+10 regular residential building subjected to wind load using STAAD.Pro V8i and ETABS 2020. The main focus is on lateral load behaviour such as displacement, drift, storey shear, and base reactions. The study shows that wind loads significantly affect higher storeys and structural stability. The comparison indicates that ETABS provides better storey-level analysis results and graphical representation of drift and shear, while STAAD.Pro gives accurate force outputs but with different interpretation methods. The paper highlights the importance of wind load analysis and software comparison for high-rise buildings. Reference [5]

## Objectives of the Study

The primary objective of this review paper is to understand and analyze the differences between STAAD.Pro and ETABS software when applied to the structural analysis of a G+1 building. The study aims to examine modeling techniques, load application procedures, and analysis outputs generated by both programs. It also focuses on evaluating structural parameters such as bending moment, shear force, axial force, and displacement obtained from the analysis results. Another objective of the study is to review previously published research work related to structural analysis using these software tools and summarize the findings reported by different researchers. The review also aims to identify advantages and limitations of both software packages in the context of building design. Understanding these factors helps engineering students and professionals choose the appropriate analysis tool depending on the requirements of their structural project. Finally, the study intends to provide a clear understanding of how structural analysis software contributes to efficient and accurate building design in modern civil engineering practice.

## 4. Research Methodology

The research methodology for this review paper is based on the analysis of previously published journal articles, conference papers, and technical reports related to structural analysis using STAAD.Pro and ETABS. Relevant research papers were selected based on their focus on comparative analysis of structural software or building analysis using either of the two programs. These papers were reviewed to understand the modeling approaches, analysis procedures, and results obtained by different researchers. The collected literature was then examined to identify common findings and differences reported in the studies. The review process involved summarizing key observations related to structural behavior, analysis accuracy, modeling efficiency, and software usability. Based on the findings from the literature, conclusions were drawn regarding the effectiveness of STAAD.Pro and ETABS for structural analysis of buildings. The review methodology helps provide a clear understanding of how these software tools are applied in practical structural engineering projects.

## 5. Scope of the Study

The scope of this study is limited to reviewing research related to structural analysis of building frames using STAAD.Pro and ETABS software. The review focuses specifically on low rise building structures such as G+1 buildings. The study highlights differences in modeling capabilities, analysis results, and design features of the two software programs. However, it does not involve direct experimental testing or detailed structural modeling within the scope of this review paper. The findings of this review can help guide future research in the area of structural software comparison and support students in selecting appropriate tools for academic projects and professional practice.

## 6.Conclusion

This review paper examined previous research related to the use of ETABS and STAAD Pro for structural analysis of reinforced concrete buildings. Both software tools are widely used in structural engineering practice and provide reliable analytical results when proper modelling procedures are followed. The literature review indicates that ETABS is particularly suitable for building structures because of its storey based modelling system and building specific analysis features. These capabilities make it efficient for evaluating parameters such as storey displacement, storey drift and seismic response. STAAD. Pro on the other hand, offers a flexible modelling environment capable of analysing various types of structural systems. Its member based modelling approach allows engineers to perform detailed structural analysis for different structural forms. Based on the review of previous studies, it can be concluded that both software programs are effective tools for analysing low rise buildings such as G+1 structures. However, ETABS may provide greater convenience for building specific analysis, while STAAD. Pro offers broader structural modelling flexibility

## 6. References

• Salamn Azhar, Justin W. Brown, Anoop Sattineni ISARC 2010 : A case study of building performance analysis using building information modelling .

• Balwinder lallotra, Dhirendra Singhal 2017 : A comparative study of structural analysis and design software – STAAD Pro, E-Tab and SAP 2000

• K.Venu Manikanta, Dr. Dumpa Venkateswarlu 2016 : Comparative study of design results of a multi –storied building usinf STAAD Pro and E-Tabs for regular and irregular plan configuration.

• S. Jyotirmayee, B Dileep Kumar Reddy, M Rakesh 2024 : A comparative study on design of commercial building using E-Tab and STAAD Pro

• Mohmed Shahraz, Mohammed Danish Hasnain,Abdul hameed Siddiqui 2022 : Comparative study on analysis of G+10 regular residential building subjected to wind load by STAAD Pro, Pro V8i and ETABS 2020 software.