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Planning and Design of G+1 Multipurpose Community Hall

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Abstract—

This project is about the planning, analysis, and design of a Community Hall building by using standard engineering methods and codes. The structure was analyzed with the help of STAAD Pro V8i to understand how the loads act on different members, while the drawings were created using Auto cad 2024. The main structural parts such as slabs, beams, columns, and footings were designed as per IS 456:2000, IS 875, and SP:16 design aids. The Limit State Method was used so that the building is strong, safe, and durable during its use. Different types of loads like dead load, live load, wind load, and self-weight were considered according to the National Building Code (NBC 2016). The Community Hall is planned to serve social, cultural, and public needs, by providing safe and comfortable spaces for gatherings and functions. The design also focuses on economy, stability, and proper use of materials so that the structure is both reliable and cost-effective. This project highlights how modern computer-aided tools such as STAAD Pro and Auto cad make the process of design and detailing more accurate and efficient. \

Keywords— Auto cad 2024, STAAD Pro v8i, IS Codes.



I. INTRODUCTION

Our project work deals with the planning, analysis, and design of a G+1 Community Hall building. The proposed structure is a two - storey hall planned to meet the needs of social, cultural, and community gatherings. The design focuses on providing sufficient space for multipurpose activities such as meetings, functions, and recreational events. Analysis of loads and design of structural elements such as slabs, beams, columns, and footings have been carried out as per Indian Standard codes. The building is designed to be safe, economical, and user-friendly while ensuring long-term durability.

The G+1 Community Hall building has been designed keeping in mind future requirements and sustainable practices. With the growing demand for energy and water, the project also incorporates renewable and eco-friendly solutions. Solar panels are proposed for electricity generation, while rainwater harvesting and solar distillation methods are included for water management. These features help reduce dependency on non-renewable resources and make the structure more sustainable.

The main objective of the project work is:

- To plan and design a two-storey (G+1) Community Hall building.
- To analyze the building frame using STAAD Pro V8i.
- To prepare detailed structural drawings using AutoCAD 2020.
- To design all structural members (slabs, beams, columns, and footings) as per IS 456:2000, IS 875, and SP:16.

II. LITERATURE REVIEW

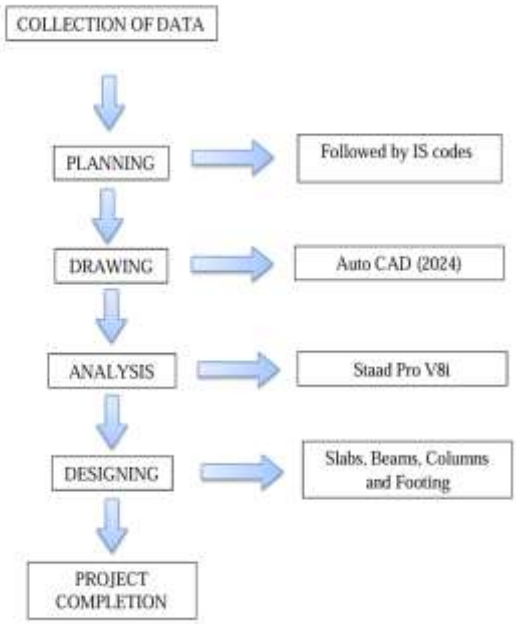
The selected papers provide a comprehensive overview of the latest research and developments in the field of G+1 Community Hall buildings. They cover a wide range of topics, including planning, analysis, design, estimation, construction, and operation. The papers also highlight the unique and innovative approaches that are being developed to design and build G+1marriage hall buildings that are comfortable for occupants. These buildings have the potential to play a significant role in meeting the world's private space of population needs.

Abhinav R. and Murthy V. (2025) studied the design optimization of reinforced concrete public buildings focusing on community use. Their project included the stages of load estimation, structural modelling, and reinforcement detailing using STAAD Pro V8i. Dead and live loads were considered as per IS 875 (Part 1 & 2), while design was performed in accordance with IS 456:2000.

Agarwal S. and Thomas J. (2025) examined the analysis and design of a large span community hall using STAAD Pro software. The research emphasized the correct application of IS codes and the importance of proper load combinations to achieve structural stability. Their project focused on reinforced concrete beam and slab design for public gatherings. Results indicated that computer-aided modelling ensures uniform load distribution, accurate stress results, and better understanding of member behavior under different loading conditions.

Babu K. and Dinesh R. (2024) carried out a comparative study between manual and software-based analysis for a multi-storey community centre. The building was modelled and analyzed using STAAD Pro V8i software considering both static and live load conditions. The IS 456:2000 code provisions were followed for RCC design.

III. METHODOLOGY



In terms of methodology, the steps followed are the ones that are systematically planned and start from data collection and end up with the completion of the project. At first, the required data such as the building dimensions and structural requirements, and site requirements, are collected. With the help of the collected data, planning is done with respect to Indian Standard codes and design requirements.



After planning, the structural drawings of the slabs, beams, columns, and footings are drawn using AutoCAD 2024. Further, the structural analysis of the slabs, beams, columns, and footings is done using STAAD.Pro V8i in order to analyze the behavior of the structure for the given loading and loading conditions.

Finally, the slabs, beams, columns, and footings are designed using the results obtained from the structural analysis with respect to the relevant design requirements. All the drawings and designs are checked in order to find any mistakes and maintain consistency. Once everything is verified, the project is completed successfully.

IV. RESULTS AND DISCUSSION

1. Ground Floor Plan

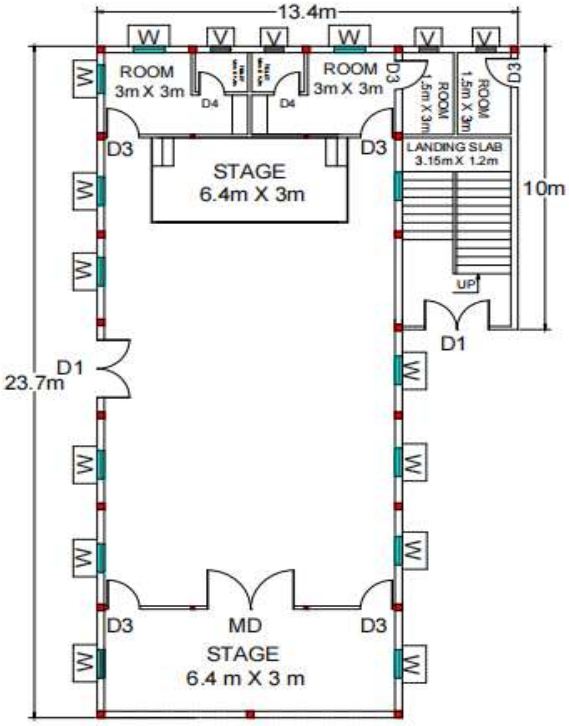


Figure 1: Ground Floor Plan

The building layout reflects the construction of an auditorium that is intended to cater to many people for meeting, functions, and other occasions.

There is a main hall which has seating facilities that are arranged systematically to facilitate a proper view of the stage. The stage, with the dimensions of 6.4 m × 3 m, is situated at the front of the hall. Two rooms, which have the dimension of 3 m × 3 m, are provided close to the stage for some other purpose. The building layout also incorporates toilet facilities, staircase, and landing slab.

2. First Floor Plan

The building plan shows the design of the dining hall along with kitchens and storage rooms. The size of the dining hall is 9.4 m × 16.8 m, which gives enough room for the purpose of dining. The kitchen size is 6.2 m × 3 m and it has been designed for food preparation. There is also a pantry of size 2.9 m × 3.2 m and a store room of size 3 m × 3 m for storage purposes.

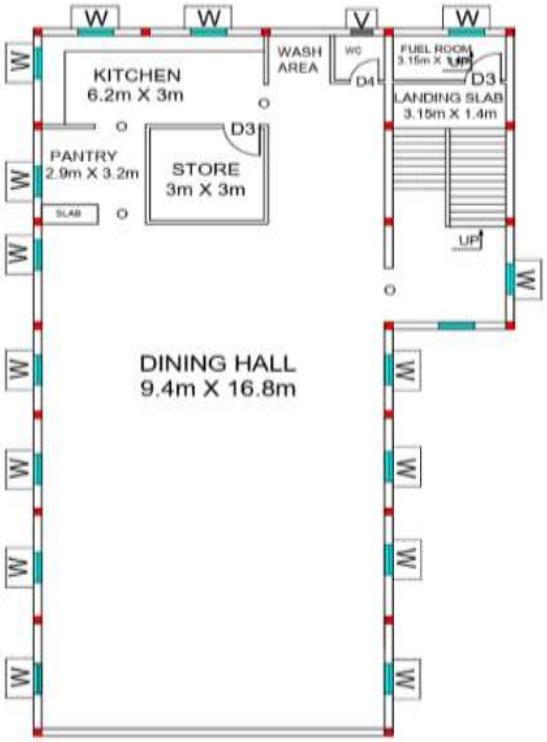


Figure 2 First Floor Plan

3. Elevation

Front elevation of the building demonstrates a symmetrical architectural style having proper planning. The building has a ground floor and a first floor, having a main entrance door and two other doors to the sides of the main door.

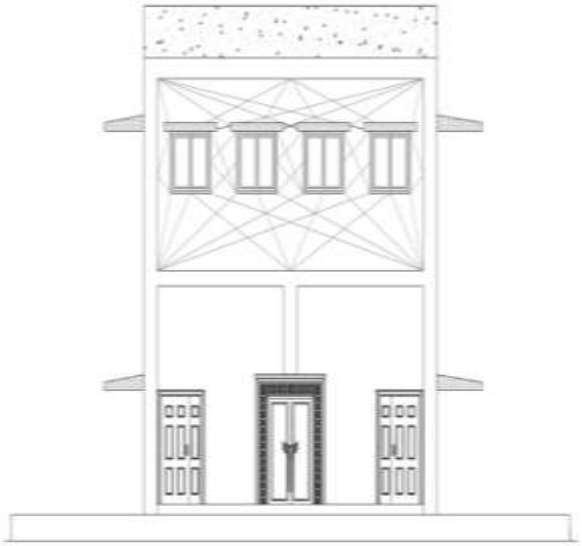


Figure 3 Elevation

There are four windows in the first floor of the building having proper placement for ventilation and lighting. Geometric shapes are used for decoration purposes for the beautification of the building. Simple flat roof and horizontal projection have been used to give simplicity and elegance to the building. Strong foundation has been provided to the building to make it functional and beautiful.

4. PLAN AND DETAILS

i)	Breadth & Length of building	= 23.77m x 13.48m
ii)	Square meter of a building	=13.2m x 23.7m
iii)	Total sq.m	= 365.64m^2
iv)	Room size	= 3m x 3m
v)	Stage size	= 6.4m x 3m
vi)	Landing Slab	= 3.15m x 1.2m
vi)	Toilet	= 1.8m x 1.5m
vii)	Portico	= 9.4m x 3.6m
viii)	Kitchen	= 6.2m x 3m
vii)	Main Door size	= 2.7m x 18m
viii)	Window size	= 1.2m x 1.2m
ix)	Total no. of floor	= G + 1
x)	Single Floor height	= 3.6m

4. Rendering View

The 3D structural model is that of a multi-story structure that is constructed using steel framing. In the structure, there are vertical columns, horizontal beams, as well as two raised deck floors supported using a steel frame. The 3D model enables one to visualize the arrangement of the structure, how loads are distributed in the structure, and assists one to determine the location of structural elements in the structure. The model can be used for structural analysis.

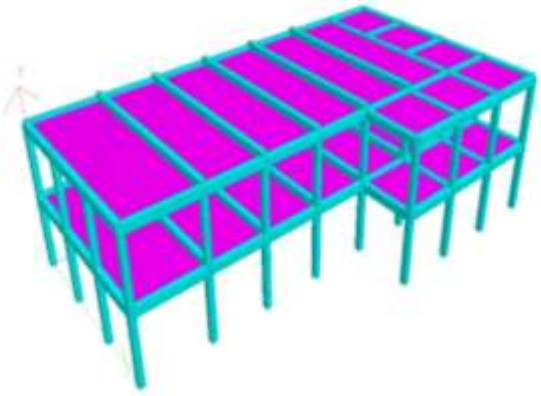


Figure 4 Rendering View

V. CONCLUSION

The proposed Community Hall Building is planned to be built in Nallipalayam. The detailed design was prepared following standard specifications. Structural analysis for beams, columns, and slabs was done using STAAD Pro V8i software based on the Limit State Method to ensure strength, safety, and stability. The analysis showed a maximum bending moment of 70 kNm and a maximum shear force of 65 kN for Beam No. 512, which were also verified manually for accuracy. Using modern software reduced the project time, improved precision, and helped in saving materials and cost. Nowadays, open-air community spaces are becoming more popular for weddings, receptions, and social events because they offer fresh air, natural light, and flexible decoration options. After COVID-19, outdoor celebrations became even more preferred due to better ventilation and safety. Modern wedding trends like Sequel Weddings and Shift Weddings inspired the design of this project.

ACKNOWLEDGMENT

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