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ANALYSIS AND DESIGN OF A S+4 RESIDENTIAL BUILDING

M.V.PADMAJA, M.SAIDEEPAK, M.V.SURESH, M.PRASANNA, A.V.PHANI MANOJ

¹UG Student Civil department, Seshadri Rao Gudlavalluru Engineering College, Gudlavalluru, A.P, INDIA

²UG Student Civil department, Seshadri Rao Gudlavalluru Engineering College, Gudlavalluru, A.P, INDIA

³UG Student Civil department, Seshadri Rao Gudlavalluru Engineering College, Gudlavalluru, A.P, INDIA

⁴UG Student Civil department, Seshadri Rao Gudlavalluru Engineering College, Gudlavalluru, A.P, INDIA

⁵Assistant Professor, Civil department, Seshadri Rao Gudlavalluru Engineering College, Gudlavalluru, A.P, INDIA.

1.ABSTRACT

This study uses STAAD Pro software to analyse and design a G+4 residential structure. The structure was created in accordance with the Indian Standard Code (IS 456:2000). Building structural analysis and design are done using the STAAD Pro programme. The analysis includes figuring out the building's stability, load-carrying capacity, and reactivity to various loads. Based on the study's findings, the design determines the right materials, section sizes, and reinforcement details for the structural members. The design also takes the building's economy, use, and safety into account. The analysis and design's findings are reported in terms of the structural members' stress, deflection, and reinforcing information. The study's findings indicate that the G+4 apartment block is safe, stable and economy.

Keywords : Autocad , Staadpro , Shear force , Bending moment

2.INTRODUCTION

A multi-story building with four stories above ground and a ground floor is referred to as a G+4 residential building. It is intended to offer several families or people in metropolitan locations secure

3. LITERATURE REVIEW

The literature on G+4 residential buildings offers useful insights into numerous facets of these structures' design, construction, and upkeep. Here is a summary of some recent and significant research on G+4 homes:

1. P. R. Khan et al.'s study "Design of G+4 Residential Buildings Using Precast Concrete Technology" was published in 2021.

This study investigates the design and construction of G+4 residential structures using precast concrete technology. Precast concrete has several benefits, including better quality, quicker construction, and less waste. The authors

and comfortable living quarters. To meet diverse living demands, the building often consists of a mix of apartments or units of varying sizes and configurations

A G+4 building can provide more individualised and communal living experiences because it is smaller than high-rise buildings. While still having enough privacy and independence in their living spaces, residents can take advantage of shared amenities like lifts, parking spots, and recreation areas.

To guarantee the safety, functioning, and beauty of the structure, the design and construction of a G+4 residential building necessitate meticulous planning and attention to detail. Local building rules, structural integrity, environmental considerations, and resident needs are just a few of the things that architects and engineers must take in to account.

Overall, a well-designed and well-built G+4 residential block may offer urban people a convenient and comfortable place to live while also helping to create sustainable and livable communities.

methodology that focuses on safety issues in the design of G+4 residential buildings. The authors offer tactics such smoke detection and suppression systems, communication systems, evacuation routes, and fire-resistant materials.

5. By M. A. Hoque et al. (2017), "Sustainable design of G+4 residential buildings"

This study examines the possibilities for environmentally friendly design in G+4 residential structures and suggests a set of sustainability standards that take into account economic, social, and environmental concerns. The writers offer tactics include installing green roofs, collecting

highlight these benefits and offer suggestions for how to use precast concrete effectively in construction projects.

2. S. J. Kim et al.'s "Energy-efficient design of G+4 residential buildings" (2020)

This study focuses on the G+4 residential structures' energy efficiency and suggests a design strategy that combines passive and active strategies to cut down on energy use and greenhouse gas emissions. Building orientation, insulation, shading, natural ventilation, and effective lighting and heating systems are just a few of the measures the authors advise.

3. T. H. Kim et al.'s study "Structural performance of G+4 residential buildings during earthquakes" was published in 2019.

The seismic performance of G+4 residential buildings in Korea is examined in this study, and the usefulness of various structural methods in reducing earthquake damage is assessed. The authors come to the conclusion that G+4 structures can have effective seismic protection provided by reinforced concrete frames with shear walls and steel bracing systems.

4. The article "Design for safety in G+4 residential buildings" by S. S. Kim et al. (2018)

In order to integrate risk assessment, hazard mitigation, and emergency response planning, this study provides a

rainwater, using renewable energy sources, managing garbage, and involving the community.

These evaluations of the literature demonstrate that G+4 residential buildings have drawn considerable interest from academics and professionals across a range of disciplines. They shed important light on the planning, building, and upkeep of these facilities and emphasise the

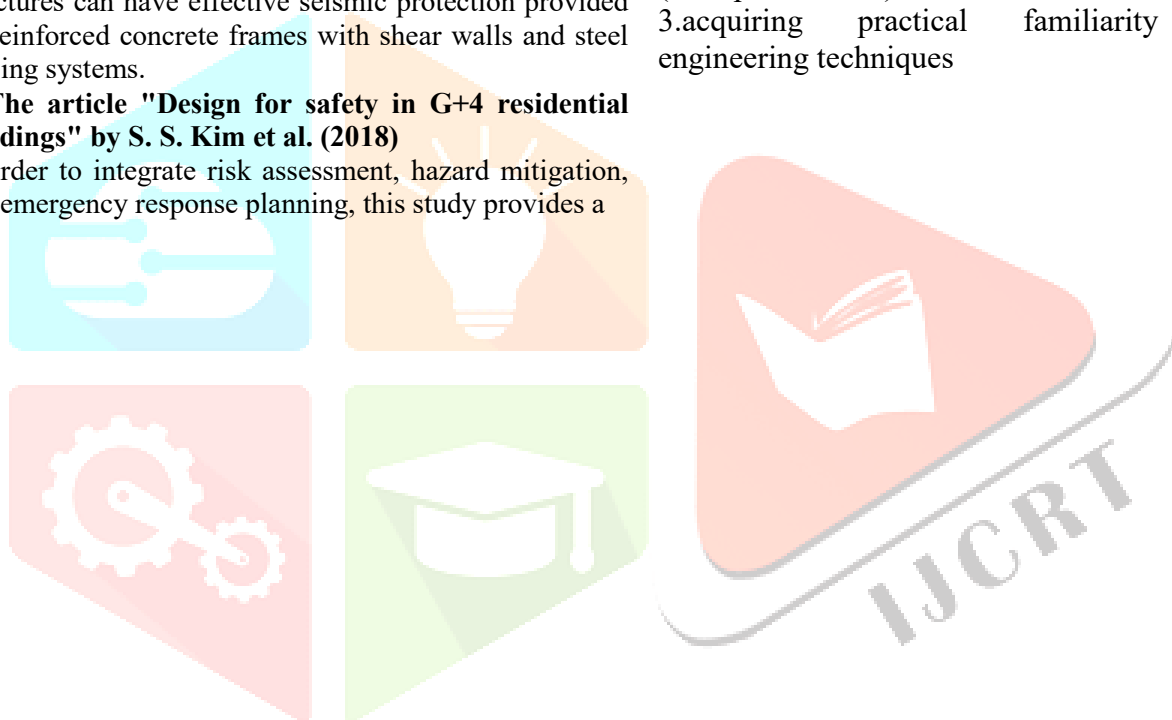
significance of elements like security, energy efficiency, seismic resilience, sustainability, and community involvement.

4. OBJECTIVES

1. Completely analysing and designing the primary structural components of a multi-story building, such as the slabs, columns, and shear force

2. learning about structural design programme (staadpro autocad)

3. acquiring practical familiarity with engineering techniques



5.METHODOLOGY

PLANNING	Using autocad
ANALYSIS	Using stadd pro as well as comparison with manual calculations
DESIGN	Using stadd pro as well as comparison with manual calculations

7.BUILDING DATA FOR ANALYSIS:

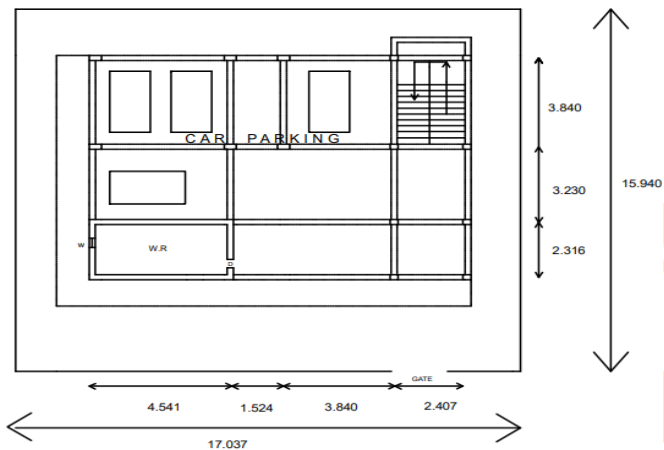
Table 7.1 The dimensions and size of individual elements

Parameters	Dimensions
Heigh of floor	3.2 m
wall	0.23
column	0.23*0.45
beam	o.23*0.45
slab	0.12
Parapet wall	0.125*1.0

Table7.2building materials

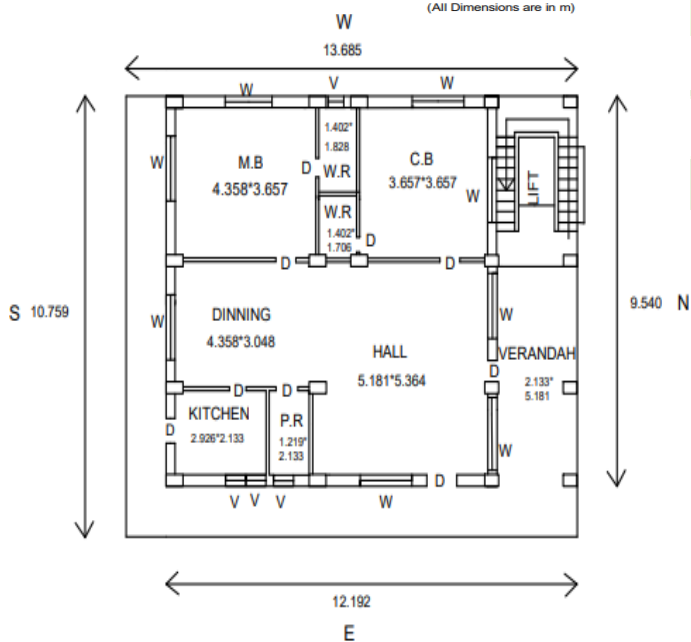
Unit weight of RCC	25 kN/m^3
Unit weight of concrete	24 kN/m^3
Unit weight of brick	19.2 kN/m^3
Yield stress of steel bars	415 N/m^2
Location	Vijayawada
Floor height	3.2m
Number of floors	Stilt+4

6.PLANNING



PLAN OF STILT FLOOR

(All Dimensions are in m)

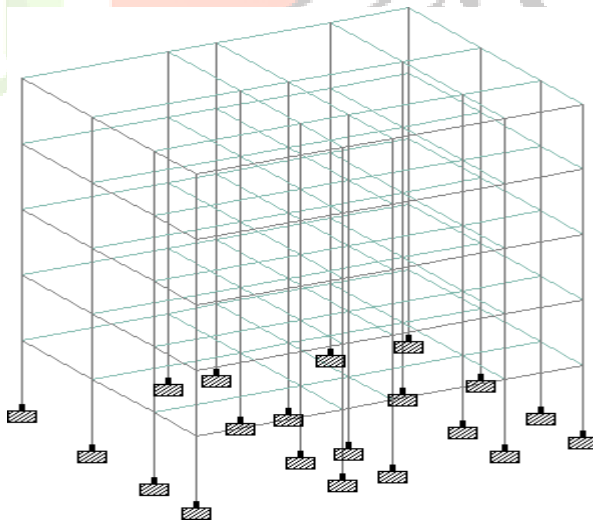


I,II,III,IV FLOORS PLAN

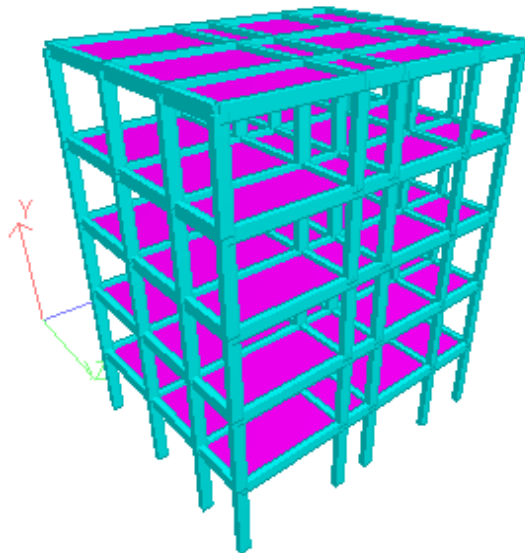
(ALL DIMENSIONS ARE IN METERS)

8.ANALYSIS and DESIGN USING STAAD Pro

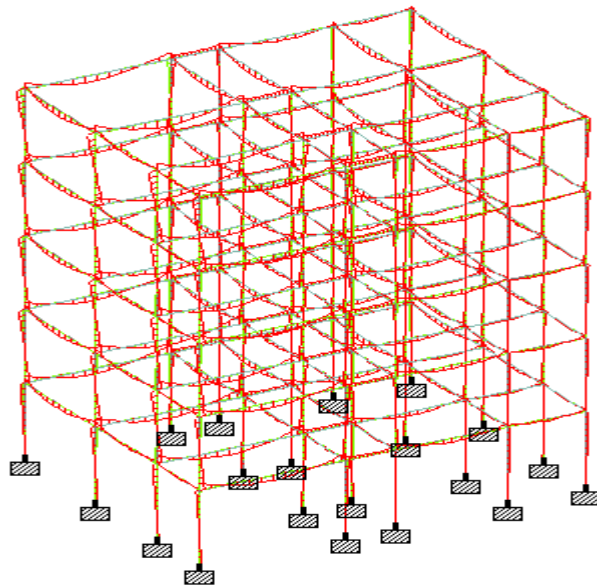
FRAME STRUCTURE



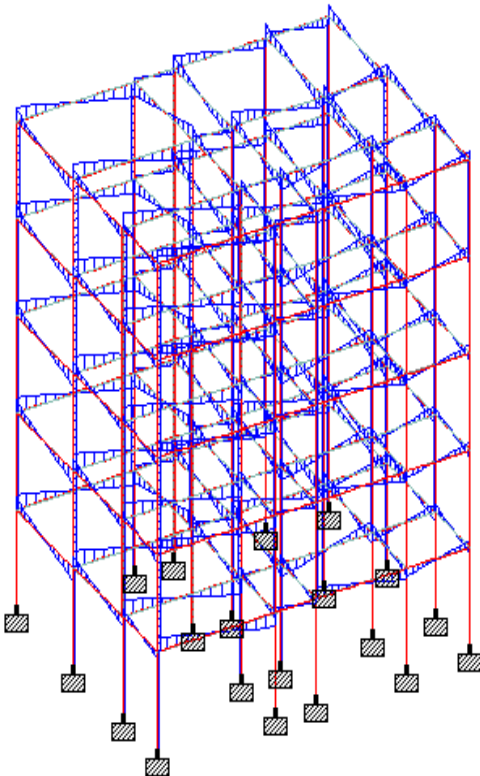
3D STRUCTURE



BENDING MOMENT DIAGRAM



SHEAR FORCE DIAGRAM



DESIGN OF BEAM

Beam no. = 157 Design code : IS-456

3#10 @ 420.00 0.00 To 3009.33 3#10 @ 420.00 3009.33 To 4514.00

15 # 8 c/c 145.00 15 # 8 c/c 145.00

2#12 @ 31.00 0.00 To 4514.00

at 0.000 at 2257.000 at 4514.00

Mz Kn Met	Dist. Met	Load
27.71	2.3	5
-26.3	0	5
-33.6	4.5	5

Fy(Mpa)	415
Fc(Mpa)	30
Depth(m)	0.449999988
Width(m)	0.230000004
Length(m)	4.513999938

DESIGN OF COLUMN

Beam no. = 170 Design code : IS-456

Load	5
Location	Long Col
Pu(Kns)	346.23
Mz(Kns-Mt)	15.99
My(Kns-Mt)	3.92

Fy(Mpa)	415
Fc(Mpa)	30
As Reqd(mm²)	207
As (%)	0.98
Bar Size	12
Bar No	8

9. CONCLUSION

- Using STADD Pro., analysis and design of multi-storey building has completed much quickly and easier than the manual calculation.
- AUTO CAD 2019 is used for developing the plans.
- The dimensions of structural members are specified and the loads such as dead load, live load, floor load roof load are applied.
- Bending moments and shear forces are checked for beams, columns and slabs.
- Manual analysis using kani's method has been done and composed these results with results obtained from the software of STAAD Pro.
- Very less space is required for the storage of the data.
- STAAD.Pro V8i advanced software which provides us a fast, efficient, easy to use and accurate platform for analyzing and designing structures.

IMPOSED LOADS

4.SP-16: DESIGN AIDS FOR REINFORCED CONCRETE TO IS : 456-1 978

5.Indian Standard CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF PILE FOUNDATIONS PART III UNDER-REAMED PILES (First Revision) IS : 2911 (Part III)

6.R.C.C. DESIGNS (reinforced concrete structures) by Dr.B.C.PUNMIA, ASHOK KUMAR JAIN, ARUN KUMAR JAIN (Tenth edition), LAXMI PUBLICATIONS (P) LTD.

7.Building planning and drawing by Dr.N.Kumaraswamy and A.Kameswararao (fourth revised and enlarged edition:2010), Charotar publishing house Pvt. Ltd.

10.REFERENCES

1. Indian Standard PLAIN AND REINFORCED CONCRETE – CODE OF PRACTICE(Fourth Revision) IS:456-2000
2. IS-875(PART-1) : 1987 Indian Standard CODE OF PRACTICE FOR DESIGN LOADS (OTHER THAN EARTHQUAKE) FOR BUILDINGS AND STRUCTURES PART 1 DEAD LOADS — UNIT WEIGHTS OF BUILDING MATERIALS AND STORED MATERIALS.
3. IS-875(PART-2) : 1987 Indian Standard CODE OF PRACTICE FOR DESIGN LOADS (OTHER THAN EARTHQUAKE) FOR BUILDINGS AND STRUCTURES PART 2