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Load Analysis and Structural Design of a G+3 School Building using STAAD.Pro and RCDC

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ABSTRACT: Rapid urbanization and increasing demand for educational infrastructure require safe and economical structural design solutions for multi-storey buildings. Structural analysis and proper load distribution play a critical role in ensuring the stability and durability of such structures. This study presents the load analysis and structural design of a reinforced concrete G+3 school building using modern civil engineering software tools.

The architectural layout of the building was prepared using AutoCAD and the structural model was developed in STAAD.Pro. Various loads acting on the building such as dead load, live load, and seismic load were calculated according to Indian Standard codes including IS 456:2000, IS 875 (Part 1 and 2), and IS 1893:2016. Structural analysis was performed to determine internal forces such as bending moments, shear forces, and axial forces in structural members. Based on these results, reinforced concrete elements such as slabs, beams, columns, and footings were designed using RCDC software.

The integrated use of structural design software significantly improves design accuracy and efficiency while reducing manual calculation errors. The results confirm that the designed structure satisfies safety, serviceability, and strength requirements as per codal provisions. The study demonstrates the effectiveness of modern structural analysis tools in the design of multi-storey educational buildings.

KEYWORDS: Structural Analysis, STAAD.Pro, RCDC, Reinforced Concrete Design, Load Analysis, Multi-Storey Buildings, Civil Engineering Software

I. INTRODUCTION

The rapid growth of urban population has increased the demand for efficient and safe infrastructure, especially educational buildings such as schools and colleges. Due to limited land availability, multi-storey structures are commonly adopted to accommodate a large number of occupants within a limited area. Proper structural analysis and design are therefore essential to ensure the safety, durability, and functionality of such buildings.

Structural design involves evaluating the effects of various loads acting on a building and designing structural members capable of safely resisting these loads. The primary loads considered in building design include dead load, live load, wind load, and seismic load. These loads must be calculated according to relevant codal provisions to ensure structural stability.

In recent years, structural engineering has increasingly relied on advanced software tools to perform accurate and efficient analysis. Programs such as AutoCAD, STAAD.Pro, and RCDC allow engineers to model complex structures, analyze load combinations, and design reinforced concrete members in accordance with Indian Standard codes.

The objective of this study is to perform load analysis and structural design of a G+3 school building using modern structural analysis software and verify that the design satisfies safety and serviceability requirements.

II. LITERATURE SURVEY

Several researchers have studied the structural analysis of multi-storey buildings using advanced engineering software. Srividya and Naresh analyzed a multi-storey building using STAAD.Pro and ETABS and reported that both tools provide reliable structural analysis results, although STAAD.Pro offers better integration with reinforcement detailing software such as RCDC.

Patel and Thakur compared manual design methods with software-based structural design and concluded that STAAD.Pro significantly improves accuracy while reducing computation time. Their research highlighted that automated design tools help minimize human errors and optimize reinforcement detailing.

Ranjan and Jaiswal conducted a study on the structural analysis of G+3 buildings using AutoCAD and STAAD.Pro. Their findings showed that software-based analysis enables engineers to handle complex load combinations and structural configurations more effectively than traditional manual calculations.

Pema et al. investigated reinforced concrete building design using RCDC and emphasized the advantages of automated reinforcement detailing and bar bending schedule generation. Their study confirmed that integrated structural design software enhances efficiency and ensures compliance with codal requirements.

Recent research by Sharma and Desai on institutional buildings further demonstrated that accurate load combinations and structural modeling improve the seismic performance and overall safety of multi-storey structures.

III. METHODOLOGY

The methodology adopted in this project follows an integrated structural design approach combining architectural planning, structural modeling, load analysis, and member design.

A. Architectural Planning

The architectural plan of the G+3 school building was prepared using AutoCAD. The building includes classrooms, office rooms, laboratories, staff rooms, meeting rooms, staircases, and parking areas. Structural grid lines and beam-column layouts were finalized based on the architectural layout.

B. Structural Modeling

The structural model was developed in STAAD.Pro by importing the AutoCAD drawing and defining nodes, beams, and columns. Storey heights and grid spacing were defined according to the building dimensions.

C. Material Properties and Member Sections

Material properties such as concrete grade and reinforcement steel grade were defined according to IS 456:2000. Standard cross-sectional dimensions were assigned to beams, columns, and slabs.

D. Load Calculations

Various loads acting on the structure were calculated as per Indian Standard codes:

Dead Load – calculated from the self-weight of structural elements and permanent materials.

Live Load – considered based on building occupancy as per IS 875.

Seismic Load – calculated according to IS 1893 provisions.

E. Structural Analysis

The structural analysis was performed in STAAD.Pro using appropriate load combinations. The software computed internal forces such as bending moments, shear forces, axial forces, and deflections in structural members.

F. Structural Design

Based on the analysis results, structural components including slabs, beams, columns, and footings were designed using RCDC software. Reinforcement detailing and bar bending schedules were generated automatically.

G. Project Planning

Project scheduling and planning were supported using Primavera P6 and Excel for better coordination of structural design activities.

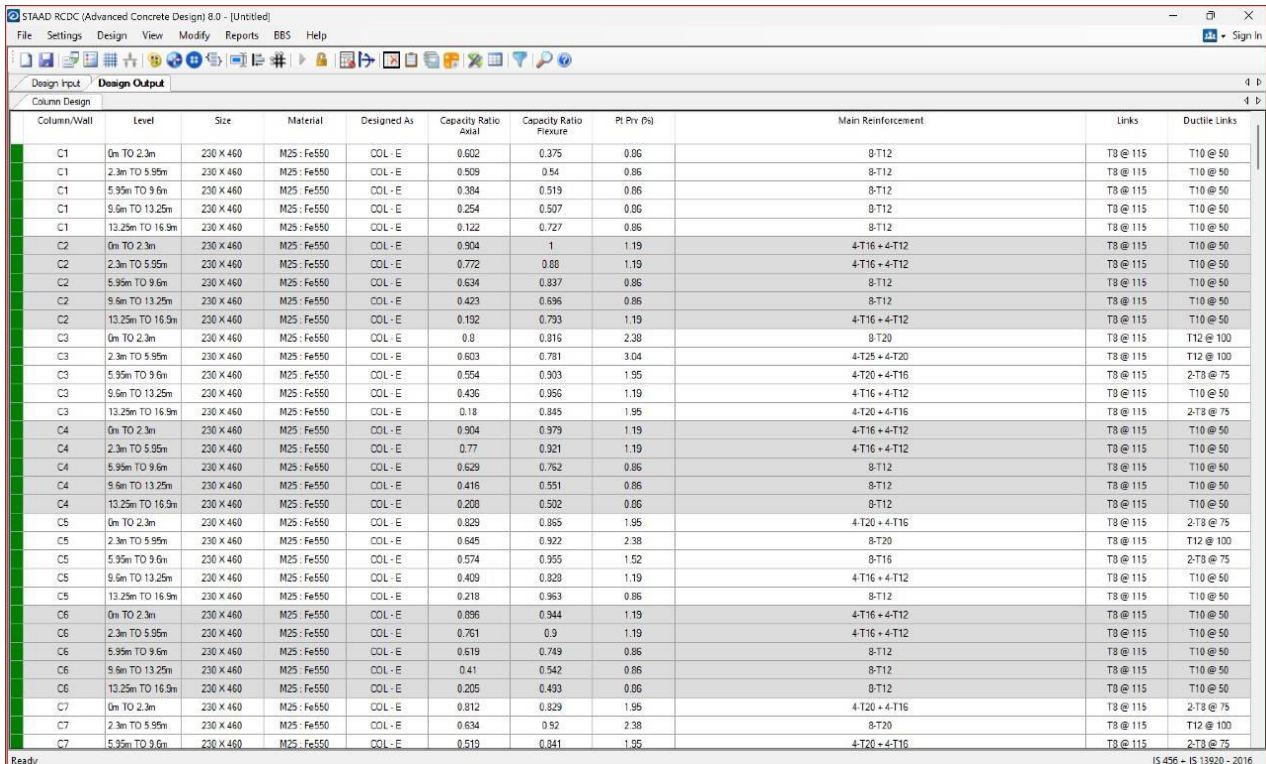
IV. RESULTS AND ANALYSIS

The structural analysis of the G+3 school building was carried out using STAAD.Pro to determine the behavior of the structure under different loading conditions. The software generated detailed outputs including bending moment diagrams, shear force diagrams, axial force distributions, and deflection values for each structural member.

The analysis results indicated that all structural members satisfied the allowable stress limits specified in IS 456:2000. Beams supporting large classroom spans experienced higher bending moments and were designed with adequate reinforcement. Columns were designed to safely transfer loads from the superstructure to the foundation system.

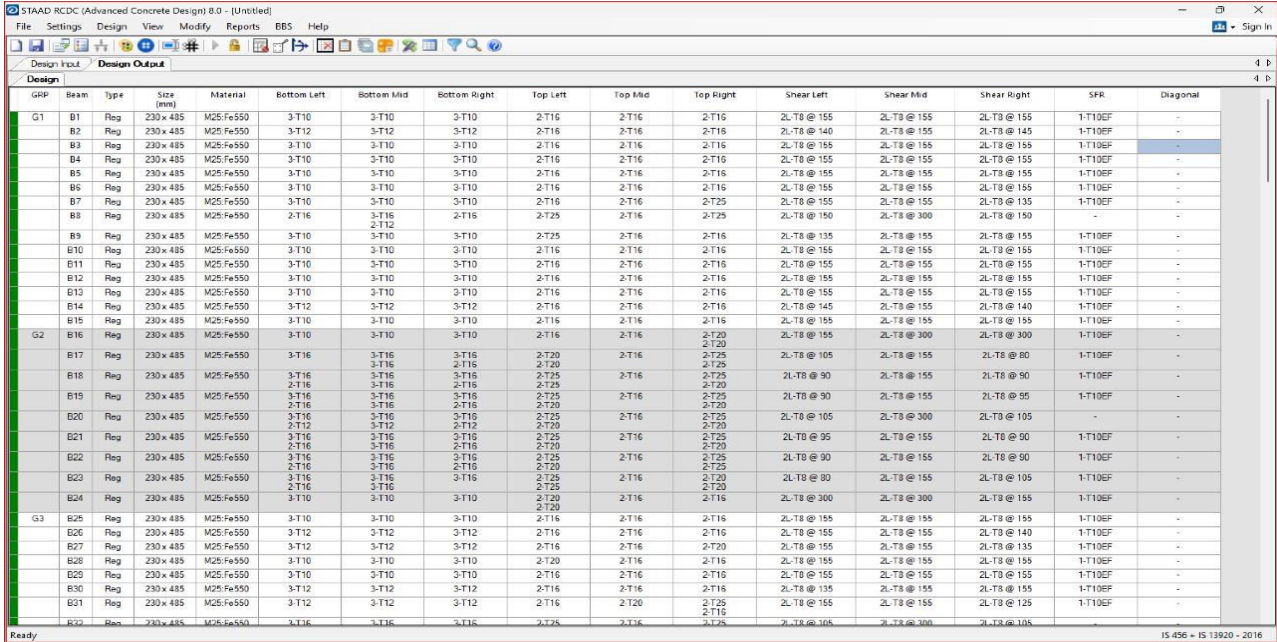
RCDC software was used to design reinforced concrete members and generate reinforcement detailing. The software provided optimized reinforcement layouts and bar bending schedules for beams, columns, slabs, and footings. Manual design calculations were also performed for selected structural members to verify the software results.

The integrated use of AutoCAD, STAAD.Pro, and RCDC enabled efficient structural modeling, accurate load analysis, and effective reinforcement detailing. The final design ensured structural stability, durability, and economy. The output designs of Columns, Beams and Footings are shown below



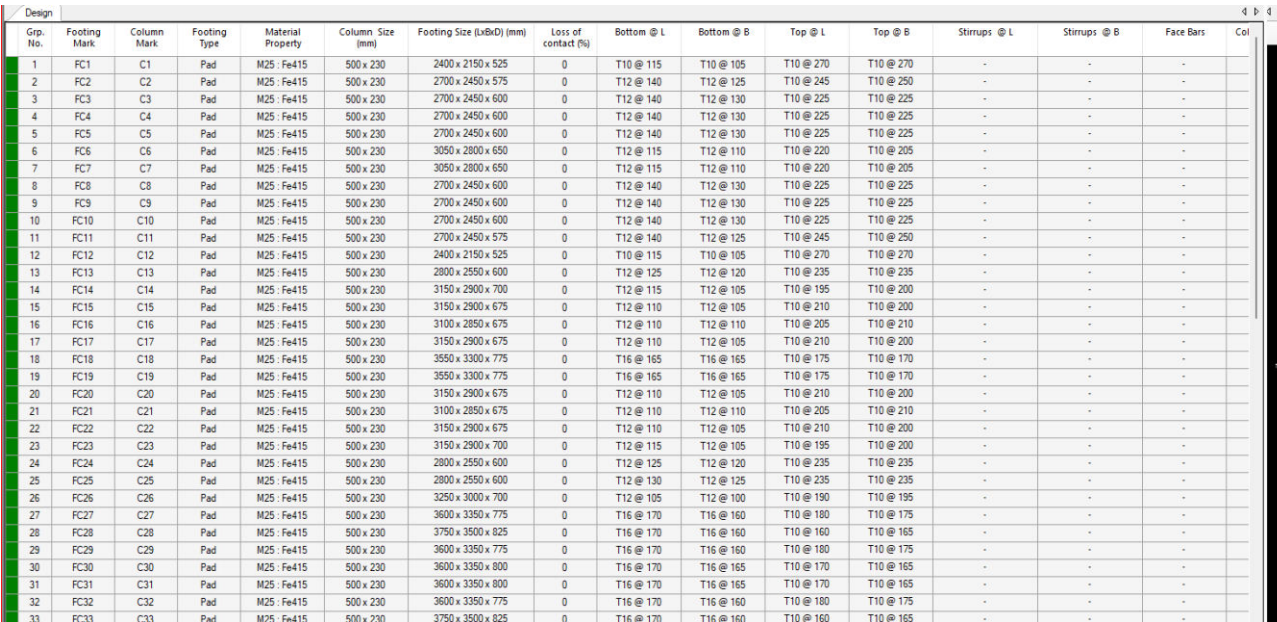
Column/Wall	Level	Size	Material	Designed As	Capacity Ratio Axial	Capacity Ratio Flexure	Pl Pvr (Pa)	Main Reinforcement	Links	Ductile Links
C1	0m TO 2.3m	230 X 460	M25 - Fe550	COL - E	0.602	0.375	0.86	8-T12	T8 @ 115	T10 @ 50
C1	2.3m TO 5.95m	230 X 460	M25 - Fe550	COL - E	0.909	0.54	0.86	8-T12	T8 @ 115	T10 @ 50
C1	5.95m TO 9.6m	230 X 460	M25 - Fe550	COL - E	0.384	0.519	0.86	8-T12	T8 @ 115	T10 @ 50
C1	9.6m TO 13.25m	230 X 460	M25 - Fe550	COL - E	0.254	0.507	0.86	8-T12	T8 @ 115	T10 @ 50
C1	13.25m TO 16.9m	230 X 460	M25 - Fe550	COL - E	0.122	0.727	0.86	8-T12	T8 @ 115	T10 @ 50
C2	0m TO 2.3m	230 X 460	M25 - Fe550	COL - E	0.904	1	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C2	2.3m TO 5.95m	230 X 460	M25 - Fe550	COL - E	0.772	0.88	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C2	5.95m TO 9.6m	230 X 460	M25 - Fe550	COL - E	0.634	0.837	0.86	8-T12	T8 @ 115	T10 @ 50
C2	9.6m TO 13.25m	230 X 460	M25 - Fe550	COL - E	0.423	0.696	0.86	8-T12	T8 @ 115	T10 @ 50
C2	13.25m TO 16.9m	230 X 460	M25 - Fe550	COL - E	0.132	0.793	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C3	0m TO 2.3m	230 X 460	M25 - Fe550	COL - E	0.8	0.816	2.38	8-T20	T8 @ 115	T12 @ 100
C3	2.3m TO 5.95m	230 X 460	M25 - Fe550	COL - E	0.603	0.781	3.04	4-T25 + 4-T20	T8 @ 115	T12 @ 100
C3	5.95m TO 9.6m	230 X 460	M25 - Fe550	COL - E	0.554	0.903	1.95	4-T20 + 4-T16	T8 @ 115	2-T8 @ 75
C3	9.6m TO 13.25m	230 X 460	M25 - Fe550	COL - E	0.436	0.956	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C3	13.25m TO 16.9m	230 X 460	M25 - Fe550	COL - E	0.18	0.845	1.95	4-T20 + 4-T16	T8 @ 115	2-T8 @ 75
C4	0m TO 2.3m	230 X 460	M25 - Fe550	COL - E	0.904	0.979	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C4	2.3m TO 5.95m	230 X 460	M25 - Fe550	COL - E	0.77	0.921	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C4	5.95m TO 9.6m	230 X 460	M25 - Fe550	COL - E	0.629	0.762	0.86	8-T12	T8 @ 115	T10 @ 50
C4	9.6m TO 13.25m	230 X 460	M25 - Fe550	COL - E	0.416	0.551	0.86	8-T12	T8 @ 115	T10 @ 50
C4	13.25m TO 16.9m	230 X 460	M25 - Fe550	COL - E	0.208	0.502	0.86	8-T12	T8 @ 115	T10 @ 50
C5	0m TO 2.3m	230 X 460	M25 - Fe550	COL - E	0.829	0.865	1.95	4-T20 + 4-T16	T8 @ 115	2-T8 @ 75
C5	2.3m TO 5.95m	230 X 460	M25 - Fe550	COL - E	0.645	0.922	2.38	8-T20	T8 @ 115	T12 @ 100
C5	5.95m TO 9.6m	230 X 460	M25 - Fe550	COL - E	0.574	0.955	1.52	8-T16	T8 @ 115	2-T8 @ 75
C5	9.6m TO 13.25m	230 X 460	M25 - Fe550	COL - E	0.409	0.828	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C5	13.25m TO 16.9m	230 X 460	M25 - Fe550	COL - E	0.218	0.963	0.86	8-T12	T8 @ 115	T10 @ 50
C6	0m TO 2.3m	230 X 460	M25 - Fe550	COL - E	0.896	0.944	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C6	2.3m TO 5.95m	230 X 460	M25 - Fe550	COL - E	0.761	0.9	1.19	4-T16 + 4-T12	T8 @ 115	T10 @ 50
C6	5.95m TO 9.6m	230 X 460	M25 - Fe550	COL - E	0.619	0.749	0.86	8-T12	T8 @ 115	T10 @ 50
C6	9.6m TO 13.25m	230 X 460	M25 - Fe550	COL - E	0.41	0.542	0.86	8-T12	T8 @ 115	T10 @ 50
C6	13.25m TO 16.9m	230 X 460	M25 - Fe550	COL - E	0.205	0.493	0.86	8-T12	T8 @ 115	T10 @ 50
C7	0m TO 2.3m	230 X 460	M25 - Fe550	COL - E	0.812	0.829	1.95	4-T20 + 4-T16	T8 @ 115	2-T8 @ 75
C7	2.3m TO 5.95m	230 X 460	M25 - Fe550	COL - E	0.634	0.52	2.38	8-T20	T8 @ 115	T12 @ 100
C7	5.95m TO 9.6m	230 X 460	M25 - Fe550	COL - E	0.519	0.841	1.95	4-T20 + 4-T16	T8 @ 115	2-T8 @ 75

(a)



Grp	Beam	Type	Size (mm)	Material	Bottom Left	Bottom Mid	Bottom Right	Top Left	Top Mid	Top Right	Shear Left	Shear Mid	Shear Right	SFR	Diagonal
G1	B1	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B2	Reg	230 x 485	M25:Fe550	3-T12	3-T12	3-T12	2-T16	2-T16	2-T16	2L-T8 @ 140	2L-T8 @ 140	2L-T8 @ 145	1-T10EF	-
G1	B3	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B4	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B5	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B6	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B7	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T25	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 135	1-T10EF	-
G1	B8	Reg	230 x 485	M25:Fe550	2-T16	3-T16	3-T12	2-T16	2-T25	2-T16	2-T25	2L-T8 @ 150	2L-T8 @ 300	2L-T8 @ 150	-
G1	B9	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T25	2-T16	2-T16	2L-T8 @ 135	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B10	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B11	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B12	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B13	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G1	B14	Reg	230 x 485	M25:Fe550	3-T12	3-T12	3-T12	2-T16	2-T16	2-T16	2L-T8 @ 145	2L-T8 @ 155	2L-T8 @ 140	1-T10EF	-
G1	B15	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G2	B16	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T20	2L-T8 @ 155	2L-T8 @ 300	2L-T8 @ 300	1-T10EF	-
G2	B17	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T20	2-T16	2-T20	2L-T8 @ 105	2L-T8 @ 155	2L-T8 @ 60	1-T10EF	-
G2	B18	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T25	2-T16	2-T25	2L-T8 @ 90	2L-T8 @ 155	2L-T8 @ 90	1-T10EF	-
G2	B19	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T25	2-T16	2-T25	2L-T8 @ 90	2L-T8 @ 155	2L-T8 @ 95	1-T10EF	-
G2	B20	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T25	2-T16	2-T25	2L-T8 @ 105	2L-T8 @ 300	2L-T8 @ 105	-	-
G2	B21	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T25	2-T16	2-T20	2L-T8 @ 95	2L-T8 @ 155	2L-T8 @ 90	1-T10EF	-
G2	B22	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T25	2-T16	2-T25	2L-T8 @ 90	2L-T8 @ 155	2L-T8 @ 90	1-T10EF	-
G2	B23	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T25	2-T16	2-T20	2L-T8 @ 80	2L-T8 @ 155	2L-T8 @ 105	1-T10EF	-
G2	B24	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T20	2-T16	2-T20	2L-T8 @ 300	2L-T8 @ 300	2L-T8 @ 155	1-T10EF	-
G3	B25	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G3	B26	Reg	230 x 485	M25:Fe550	3-T12	3-T12	3-T12	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 140	1-T10EF	-
G3	B27	Reg	230 x 485	M25:Fe550	3-T12	3-T12	3-T12	2-T16	2-T16	2-T20	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 135	1-T10EF	-
G3	B28	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T20	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G3	B29	Reg	230 x 485	M25:Fe550	3-T10	3-T10	3-T10	2-T16	2-T16	2-T16	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G3	B30	Reg	230 x 485	M25:Fe550	3-T12	3-T12	3-T12	2-T16	2-T16	2-T16	2L-T8 @ 135	2L-T8 @ 155	2L-T8 @ 155	1-T10EF	-
G3	B31	Reg	230 x 485	M25:Fe550	3-T12	3-T12	3-T12	2-T16	2-T20	2-T25	2L-T8 @ 155	2L-T8 @ 155	2L-T8 @ 125	1-T10EF	-
G3	B32	Reg	230 x 485	M25:Fe550	3-T16	3-T16	3-T16	2-T25	2-T16	2-T25	2L-T8 @ 105	2L-T8 @ 300	2L-T8 @ 105	-	-

(b)



Grp. No.	Footing Mark	Column Mark	Footing Type	Material Property	Column Size (mm)	Footing Size (LxBxD) (mm)	Loss of contact (%)	Bottom @ L	Bottom @ B	Top @ L	Top @ B	Stirrups @ L	Stirrups @ B	Face Bars	Col
1	FC1	C1	Pad	M25: Fe415	500 x 230	2400 x 2150 x 525	0	T10 @ 115	T10 @ 105	T10 @ 270	T10 @ 270	-	-	-	-
2	FC2	C2	Pad	M25: Fe415	500 x 230	2700 x 2450 x 575	0	T12 @ 140	T12 @ 125	T10 @ 245	T10 @ 250	-	-	-	-
3	FC3	C3	Pad	M25: Fe415	500 x 230	2700 x 2450 x 600	0	T12 @ 140	T12 @ 130	T10 @ 225	T10 @ 225	-	-	-	-
4	FC4	C4	Pad	M25: Fe415	500 x 230	2700 x 2450 x 600	0	T12 @ 140	T12 @ 130	T10 @ 225	T10 @ 225	-	-	-	-
5	FC5	C5	Pad	M25: Fe415	500 x 230	2700 x 2450 x 600	0	T12 @ 140	T12 @ 130	T10 @ 225	T10 @ 225	-	-	-	-
6	FC6	C6	Pad	M25: Fe415	500 x 230	3050 x 2800 x 650	0	T12 @ 115	T12 @ 110	T10 @ 220	T10 @ 205	-	-	-	-
7	FC7	C7	Pad	M25: Fe415	500 x 230	3050 x 2800 x 650	0	T12 @ 115	T12 @ 110	T10 @ 220	T10 @ 205	-	-	-	-
8	FC8	C8	Pad	M25: Fe415	500 x 230	2700 x 2450 x 600	0	T12 @ 140	T12 @ 130	T10 @ 225	T10 @ 225	-	-	-	-
9	FC9	C9	Pad	M25: Fe415	500 x 230	2700 x 2450 x 600	0	T12 @ 140	T12 @ 130	T10 @ 225	T10 @ 225	-	-	-	-
10	FC10	C10	Pad	M25: Fe415	500 x 230	2700 x 2450 x 600	0	T12 @ 140	T12 @ 130	T10 @ 225	T10 @ 225	-	-	-	-
11	FC11	C11	Pad	M25: Fe415	500 x 230	2700 x 2450 x 575	0	T12 @ 140	T12 @ 125	T10 @ 245	T10 @ 250	-	-	-	-
12	FC12	C12	Pad	M25: Fe415	500 x 230	2400 x 2150 x 525	0	T10 @ 115	T10 @ 105	T10 @ 270	T10 @ 270	-	-	-	-
13	FC13	C13	Pad	M25: Fe415	500 x 230	2800 x 2550 x 600	0	T12 @ 125	T12 @ 120	T10 @ 235	T10 @ 235	-	-	-	-
14	FC14	C14	Pad	M25: Fe415	500 x 230	3150 x 2900 x 700	0	T12 @ 115	T12 @ 105	T10 @ 195	T10 @ 200	-	-	-	-
15	FC15	C15	Pad	M25: Fe415	500 x 230	3150 x 2900 x 675	0	T12 @ 110	T12 @ 105	T10 @ 210	T10 @ 200	-	-	-	-
16	FC16	C16	Pad	M25: Fe415	500 x 230	3100 x 2850 x 675	0	T12 @ 110	T12 @ 110	T10 @ 205	T10 @ 210	-	-	-	-
17	FC17	C17	Pad	M25: Fe415	500 x 230	3150 x 2900 x 675	0	T12 @ 110	T12 @ 105	T10 @ 210	T10 @ 200	-	-	-	-
18	FC18	C18	Pad	M25: Fe415	500 x 230	3550 x 3300 x 775	0	T16 @ 165	T16 @ 165	T10 @ 175	T10 @ 170	-	-	-	-
19	FC19	C19	Pad	M25: Fe415	500 x 230	3550 x 3300 x 775	0	T16 @ 165	T16 @ 165	T10 @ 175	T10 @ 170	-	-	-	-
20	FC20	C20	Pad	M25: Fe415	500 x 230	3150 x 2900 x 675	0	T12 @ 110	T12 @ 105	T10 @ 210	T10 @ 200	-	-	-	-
21	FC21	C21	Pad	M25: Fe415	500 x 230	3100 x 2850 x 675	0	T12 @ 110	T12 @ 110	T10 @ 205	T10 @ 210	-	-	-	-
22	FC22	C22	Pad	M25: Fe415	500 x 230	3150 x 2900 x 675	0	T12 @ 110	T12 @ 105	T10 @ 210	T10 @ 200	-	-	-	-
23	FC23	C23	Pad	M25: Fe415	500 x 230	3150 x 2900 x 700	0	T12 @ 115	T12 @ 105	T10 @ 195	T10 @ 200	-	-	-	-
24	FC24	C24	Pad	M25: Fe415	500 x 230	2800 x 2550 x 600	0	T12 @ 125	T12 @ 120	T10 @ 235	T10 @ 235	-	-	-	-
25	FC25	C25	Pad	M25: Fe415	500 x 230	2800 x 2550 x 600	0	T12 @ 130	T12 @ 125	T10 @ 235	T10 @ 235	-	-	-	-
26	FC26	C26	Pad	M25: Fe415	500 x 230	3250 x 3000 x 700	0	T12 @ 105	T12 @ 100	T10 @ 190	T10 @ 195	-	-	-	-
27	FC27	C27	Pad	M25: Fe415	500 x 230	3600 x 3350 x 775	0	T16 @ 170	T16 @ 160	T10 @ 180	T10 @ 175	-	-	-	-
28	FC28	C28	Pad	M25: Fe415	500 x 230	3750 x 3500 x 825	0	T16 @ 170	T16 @ 160	T10 @ 160	T10 @ 165	-	-	-	-
29	FC29	C29	Pad	M25: Fe415	500 x 230	3600 x 3350 x 775	0	T16 @ 170	T16 @ 160	T10 @ 180	T10 @ 175	-	-	-	-
30	FC30	C30	Pad	M25: Fe415	500 x 230	3600 x 3350 x 800	0	T16 @ 170	T16 @ 165	T10 @ 170	T10 @ 165	-	-	-	-
31	FC31	C31	Pad	M25: Fe415	500 x 230	3600 x 3350 x 800	0	T16 @ 170	T16 @ 165	T10 @ 170	T10 @ 165	-	-	-	-
32	FC32	C32	Pad	M25: Fe415	500 x 230	3600 x 3350 x 775	0	T16 @ 170	T16 @ 160	T10 @ 180	T10 @ 175	-	-	-	-
33	FC33	C33	Pad	M25: Fe415	500 x 230	3750 x 3500 x 825	0	T16 @ 170	T16 @ 160	T10 @ 160	T10 @ 165	-	-	-	-

(c)

Fig 1(a) design output table, showing the final reinforcement design for all columns (b) design output table, showing the final reinforcement design for all beams (c) design output table, showing the final reinforcement design for all footings

V. CONCLUSION

This study presented the load analysis and structural design of a G+3 reinforced concrete school building using modern structural engineering tools. The building was modeled and analyzed using STAAD.Pro, and structural members were designed using RCDC software according to Indian Standard codes. The analysis results confirmed that the structural components satisfy the requirements of strength, stability, and serviceability. The use of integrated structural design software significantly reduced design time and improved accuracy compared to manual design methods. The project demonstrates the practical application of modern structural analysis tools in civil engineering projects. Future studies may focus on advanced seismic analysis, sustainable structural materials, and optimization techniques for further improving structural efficiency and performance.

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