iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** III **Month of publication:** March 2026

DOI: https://doi.org/10.22214/ijraset.2026.78586

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue III Mar 2026- Available at www.ijraset.com

Analytical Study on Seismic Behaviour and Earthquake Resist Design of Building Structure

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Abstract: ***This research paper presents an analytical study on the seismic behaviour and earthquake-resistant design of multi-storey reinforced concrete buildings by evaluating the effect of column shape, size, and orientation on structural performance. A G+14 storey Special Moment Resisting Frame building is modeled and analyzed using STAAD Pro software as per IS 1893 seismic code provisions. Different structural models are developed by varying column configurations to study their influence on key seismic response parameters such as base shear, top storey displacement, storey drift, stiffness, and fundamental time period. The comparative analysis shows that optimized column orientation significantly improves structural stiffness and reduces lateral displacement and drift. Models with unfavorable column orientation and variable column size across building height exhibit increased flexibility and reduced seismic resistance. The study confirms that the strong column-weak beam principle serves as a fundamental element which enables structures to exhibit ductile behavior during seismic events. The research findings present practical design guidelines which help engineers choose suitable column designs that improve earthquake protection and building safety and performance in areas with seismic activity for reinforced concrete structures. The researchers investigated and validated the most recent methods used for analyzing and detecting diabetic retinopathy through color retinal photography that employs deep learning techniques. The researchers analyzed the color characteristics of fundus images from the visual diabetic retinopathy dataset. The paper identifies specific research problems which require additional investigation according to its findings.***
Keywords: Seismic Behaviour, Earthquake Resistant Design, Reinforced Concrete Buildings, Structural Stiffness, Column Configuration etc.

I. INTRODUCTION

Earthquakes stand as one of the most destructive natural disasters, which endangers the safety of buildings and the stability of infrastructure across the entire globe. The increasing urban population requires construction of multiple high-rise buildings, which creates an urgent need for effective methods to design seismic-resistant structural systems. Engineers choose reinforced concrete (RC) structures, which provide permanent strength and budget efficiency and engineering performance, as their main building material in contemporary construction projects. The past earthquake events demonstrate that poorly designed RC buildings face high seismic force vulnerability, which results in extensive structural destruction and fatalities, according to reference [1].

The seismic behaviour of a structure depends on multiple factors which include its mass distribution and its stiffness and its ductility and its structural configuration. Stiffness serves as the primary factor that determines how much lateral displacement and storey drift will occur during earthquake ground motion. Buildings with insufficient stiffness experience excessive deformation which may result in structural failure. The study of how structural components perform impacts seismic performance improvements, so engineers must learn about structural elements like beams, columns and shear walls [2].

The main structural components of RC buildings which bear loads are their columns and these columns determine how stiff the structure will be and how it will respond to dynamic forces. The lateral force distribution and energy dissipation capacity of seismic excitation are determined by the column shape and size and orientation. Rectangular columns which builders position along their strong axis deliver better stiffness performance than square columns which control building movement through lateral forces [3]. Researchers have investigated how column geometry affects seismic response yet existing research studies individual parameters rather than studying their combined effects. Modern seismic design codes such as IS 1893 (Part 1): 2002 provide guidelines for calculating seismic forces based on zone factor, building importance, soil condition, and structural configuration. The codes establish requirements to protect human life and maintain building structural integrity during seismic events. The guidelines need structural analysis to be implemented in practice with advanced software tools for evaluation [4].

Engineers use STAAD Pro and ETABS advanced structural analysis software to perform seismic evaluations on multi-storey buildings. The software enables engineers to study how structures react to various loading scenarios which leads to better design choices. Designers use response spectrum analysis together with nonlinear analysis methods to assess how structures perform when facing seismic forces according to reference [5].

Researchers have studied how RCC structures and steel structures and composite structures perform when faced with seismic loads. RCC structures provide greater mass and stiffness than composite structures which deliver superior flexibility and energy absorption capabilities according to reference [6]. Seismic behavior and building performance assessment both rely on soil-structure interaction and material degradation throughout time according to reference [7].

Recent research has focused on performance-based seismic design methods which protect buildings from serious damage during major ground movements while keeping people safe. Engineers use pushover analysis together with nonlinear time history analysis to study how buildings behave when experiencing seismic activity according to reference [8]. The methods provide insight into how structures fail which helps engineers design better building systems.

The existing research about seismic design shows many studies but few investigations that examine how column shape and size and orientation affect seismic performance. The existing research focuses on assessing how entire structures behave instead of studying how specific column designs impact performance [9]. Therefore, there is a need for comprehensive analytical studies that compare different column configurations under identical seismic loading conditions.

The review paper explains seismic behavior and structural response elements and earthquake-resistant building design methods. The study identifies existing research gaps while providing future research directions to enhance structural safety and earthquake resilience in regions vulnerable to earthquakes [10].

II. PROBLEM IDENTIFICATION

1) Earthquake damage to reinforced concrete buildings occurs because designers failed to include proper seismic design parameters and necessary structural stiffness elements [1].
2) The building's column system suffers from two main problems because engineers made wrong decisions about which column shape and size and orientation to use [2].
3) Buildings experience their most extreme upward movement when designers create columns with incorrect weight distribution throughout the building's height [3].
4) Designers who follow traditional design methods create designs that prioritize gravity forces instead of designing for optimal seismic performance [4].
5) The research currently available investigates only one aspect which studies how different column shapes and sizes affect building performance in earthquakes [5].
6) Improper execution of the strong column weak beam system increases the possibility that the building will suffer from sudden brittle material failures [6].
7) Designers need to use advanced analytical tools more extensively during the design process because current practices do not provide accurate methods to assess a building's seismic performance [7].
8) Seismic analysis frequently overlooks how soil-structure interaction and material degradation affect structural behavior during earthquakes [8].
9) Construction projects do not yet adopt performance-based seismic design methods as their standard design procedure [9].
10) The actual design and analysis work needs to happen because it shows how engineers should establish the best column design to make buildings safer during earthquakes and other structural emergency situations [10].

III. SCOPE OF STUDY

The research examines how different column shapes and sizes and orientations of columns affect the seismic performance of RC buildings. The project requires a building model to be created in STAAD PRO which will assess crucial seismic parameters including base shear and drift and time period. The study evaluates different column designs to determine their effects on the complete structural stiffness and stability of the building. The research uses IS 1893 and IS 13920 standards to create designs that achieve compliance with earthquake resistance requirements. The research studies the most effective column design which provides better protection against seismic forces. The research study focuses on seismic analysis while excluding wind effects and other dynamic load assessments.

The design results provide engineers with reference materials to develop better earthquake-resistant construction methods. The research results help create better structural systems which meet the needs of all high-rise buildings located in earthquake-prone regions.

IV. METHODOLOGY

A. Proposed system

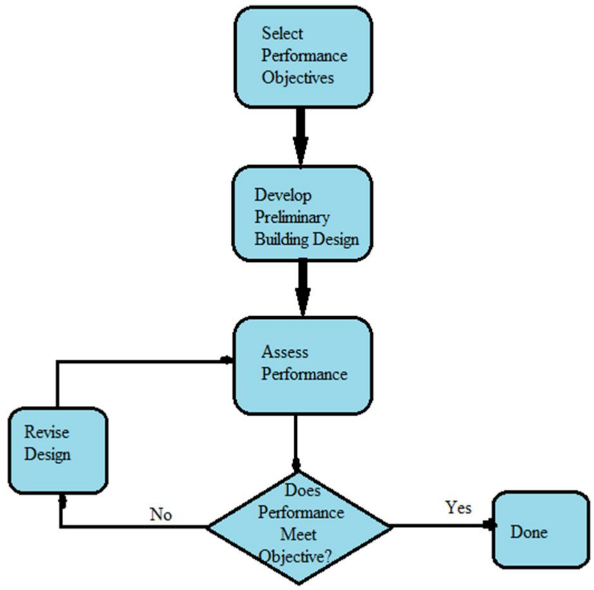

Figure 1. Flow chart of performance-based design

The analytical study evaluates the seismic performance of multi-storey reinforced concrete (RC) buildings by examining how various column shapes and sizes and orientation patterns affect building performance during earthquakes. The study examines how these parameters affect building stiffness and strength and overall seismic response during lateral ground motion. The researchers use STAAD Pro software to conduct advanced structural analysis which includes development of multiple building models that share the same loading and boundary conditions.

The methodology entails development of RC building models which maintain identical height and building footprint while testing different column configurations that include square columns and rectangular columns with various aspect ratios and columns with multiple orientation patterns. The researchers examine how different column dimensions affect building stiffness distribution throughout the structure. The models follow the guidelines stated in IS 456:2000 and IS 1893 (Part 1):2016 and IS 13920:2016 standards.

Response Spectrum Analysis measures base shear and top storey displacement and storey drift and fundamental time period. The study uses the strong column–weak beam design concept together with performance-based design principles. Results help identify optimal column configurations that enhance seismic safety, structural efficiency, and cost-effective earthquake-resistant design.

B. Buildings Parameters

The current research examines how a moment-resisting reinforced concrete building responds to seismic forces during major earthquake events. The G+14 storey RC structure has been modeled and analyzed because Seismic Zone V represents a location with high earthquake risk. The analysis is performed using a suitable structural analysis software to accurately simulate the building's seismic response.

The space frame system of the structure uses beams and columns to combine forces through moment action to resist lateral forces. The study assesses fundamental time period and base shear and top storey displacement and storey drift as key response parameters to analyze the dynamic and deformation behavior of the structure. The results show that Y-direction stiffness decreases because the structure contains fewer columns which makes the structure more weak. Therefore, the Y-direction is selected for detailed seismic evaluation.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
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Volume 14 Issue III Mar 2026- Available at www.ijraset.com

Table 1: Detail of the models

Model No.	Model Code	Details
1	M-1	Building with square columns
2	M-2	Building with rectangular columns(longer side of columns along X axes)
3	M-3	Building with rectangular columns(longer side of columns along X axes)
4	M-4	Building with varying column size from mid-building height
5	M-5	Building with varying column size for each five stories

Table 2: Structural Data

Details Parameters	
No. of Stories	G+14
Plan shape	Rectangle
Plan dimension	20m*30m
Typical floor height	3.5m ground level and 3m for all above floors
Typical Column size	(600mm*600mm) for M-1 model
	(500mm*700mm) for M-2 and M-3 models
Column size for M-4 model	(500mm*700mm) from G.L to 7 storey
	(400mm *600mm) from § to 15 storey
Column size for M-5 model	(500mm*700mm) from G.L to 5 storey
	(400mm*600mm) from 6 to 10 storey
	(300mm*500mm) from 11 to 15 storey
Typical Beam size	300mm x 500mm
Slab thickness	130mm

Table 3: Seismic Parameters

Type of analysis	**Response Spectrum**
Seismic zone	V
Soil type	Medium(II)
Response reduction factor (R)	5 for SMRF
Imp. factor (I)	1
Damping	for RCC, 2% for steel
Grade of concrete	M25
Grade of steel	Fe 415
Live load	3kN/ sq.m.
Floor finish	1.5kN/sq.m.

Plan of model M-1

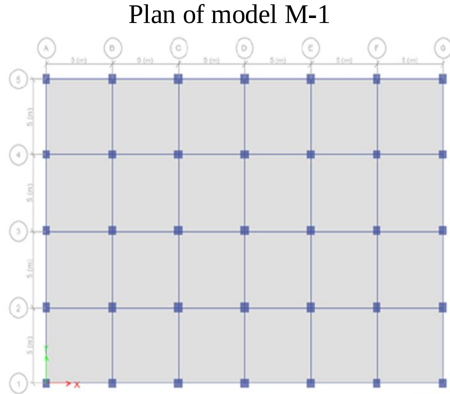

Figure 2. Plan of model M-1

Plan of model M-2

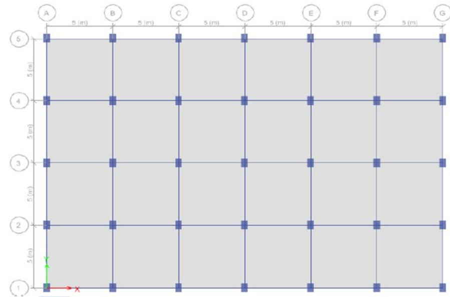

Figure 3. Plan of model M-2

Plan of model M-3

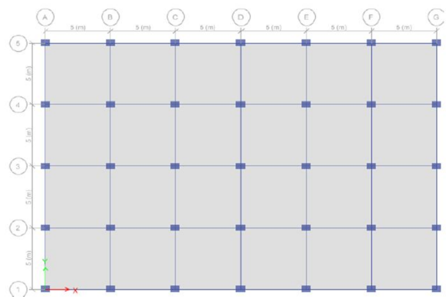

Figure 4. Plan of model M-3

C. Data For Models

Modelling – STAAD PRO Software

Loading – Loading will be taken from

- As per IS-875 (Part 1) 2002 for dead load is 2KN/M2.
- As per IS-875 (Part 2) 2002 for live load is 4KN/M2.
- The earthquake parameter considered from Indian Standard code as per IS 1893: 2002 for analysis Some of Seismic Factor and data taken are mentioned in given below tables.

Earthquake different parameter used for analysis.

Table 4: Analysis Some of Seismic Factor and data

Parameters	Values	Page No.	Table	Clauses
Importance factor	1	18	7	6.4.2.
Response Reduction Factor	3	23	8	6.4.2.
Soil Type	II	16	2	6.4.2.

Zone factor for different Seismic Zone as per Clause (6.4.2) in IS 1893 2002

Table 5: Zone factor for different Seismic Zone as per Clause

Seismic zone	Seismic Intensity	Zone factor (Z)
II	Low	0.10
III	Moderate	0.16
IV	Severe	0.24
V	Very severe	0.36

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Data Of Modelling :
- Type Of Structure Multi Story : Special Moment Resisting Frame : RCC
- Zone : II, III, IV, V.
- Layout Of Plan Dimension : 35x28 m
- No. of Stories : 14
- Total Height Of the Building : 41m
- Floor Heights : 3m
- Material : Concrete M30 & Steel Fe 415
- Section Properties –
  - Beam 450 x 450 mm
  - Column 600 x 450 mm
  - Slab Thickness 200 mm
- Seismic Analysis : Equivalent Static method as per IS 1893 – 2002.

The structural model in this study is a multi-storey reinforced concrete Special Moment Resisting Frame (SMRF) designed to evaluate seismic behaviour under varying earthquake intensities. The building is analysed for Seismic Zones II, III, IV, and V to assess performance across different risk levels. It has a plan size of 35 m × 28 m, 14 storeys, and a total height of 41 m with uniform storey height. The structure uses M30 concrete, Fe 415 steel, and is analysed using the Equivalent Static Method as per IS 1893:2002.

V. DESIGN ANALYSIS

A. Modelling

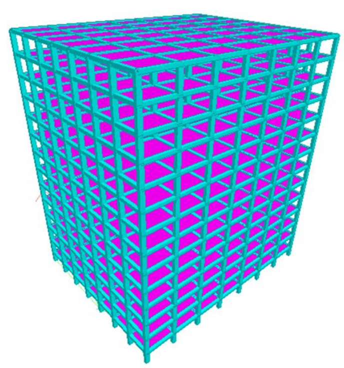

Figure 5. Modelling of G+14 Building

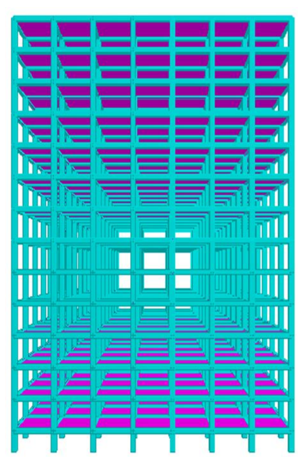

Figure 6. Isometric View on Modelling of G+14 Building

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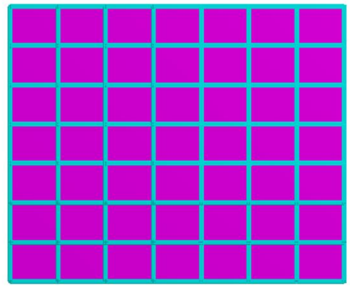


Figure 7. Front View on Modelling of G+14 Building

- Elevation view of M-2

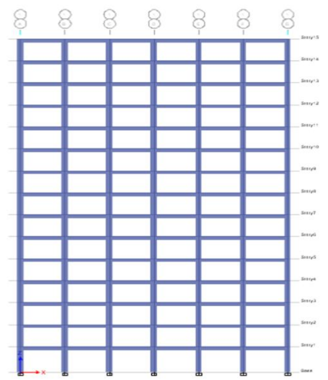


Figure 8. Elevation view of M-2

- Elevation view of M-4

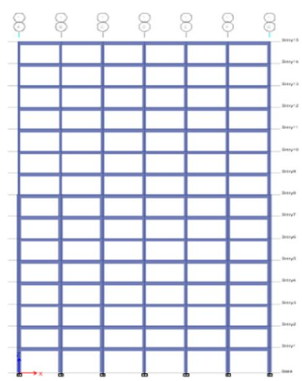


Figure 9. Elevation view of M-4

- Elevation view of M-5

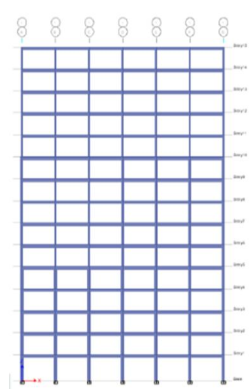


Figure 10. Elevation view of M-5

- Load Analysis

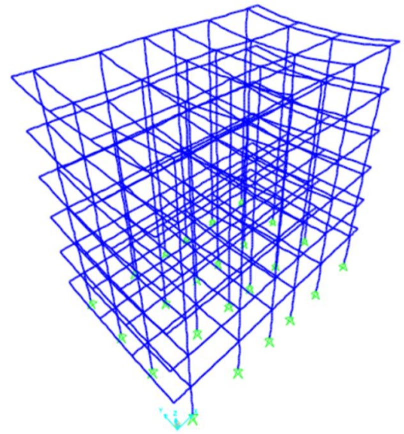


Figure 11. Load Analysis

B. Analysis of Modelling

- For load analysis

Table 1. For load analysis

Output Case	Case Type Text	Global FX KN	Global FY KN	Global FZ KN	Global MX KN-m	Global MY KN-m	Global MZ KN-m
DEAD	LinStatic	-5.185E-14	-2.043E-14	15102.407	109492.4537	-181228.889	7.816E-14
Live	LinStatic	-B.507E-15	-7.105E-15	10022.4	72662.4	-120268.8	8.527E-14
SDL	LinStatic	-9.298E-15	-2665E-14	7308	52983	-87696	-2.593E-13
Push X	LinStatic	-18.84	-5.64	233E-14	81.474	-271.876	6891
Total Dead	Combination	-6.1156.14	-4.707E.14	22410.407	162475.4537	-268924.889	-1.812E-13
1.2/1.6	Combination	-8.699E-14	-6.788E-14	42928.3229	311230.3844	-515139.95	-8.1E-14
Service load	Combination	-6.965E-14	-5.418E-14	32432.807	235137.8537	-389193.69	-9.592E-14

The load analysis results in Table 6 present the global force and moment responses of the building under various loading conditions. Dead load, live load, and superimposed dead load are evaluated using linear static analysis, showing that dead load contributes the maximum vertical force and bending moments. Lateral push load in the X-direction produces smaller forces but noticeable moments. Factored load combinations generate the highest force and moment values, governing structural design. Overall, the analysis confirms structural safety under gravity and lateral loads.

- For Base Shear capacity

Table 7. Base Shear(kN) Comparison of all Models considered

Model	Base shear (kN)	Difference (%)
M-1	3462.5	
M-2	3541.5	2.3
M-3	3313.8	-6.4
M-4	3492.4	5.4
M-5	3384.6	-3.1

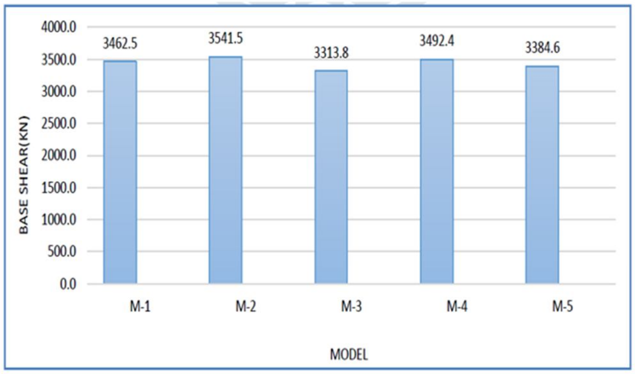


Figure 12. Chart 1. Base shear (kN) Comparison of various Models

The base shear capacity for all building models exists in the comparison found in Table 7. The reference model M-1 demonstrates a base shear value of 3462.5 kN. The model M-2 test results demonstrate a lateral stiffness improvement through a 2.3% increase. The test results for Model M-3 show a decrease of 6.4% because of its reduced stiffness and lower seismic resistance capacity. The column configuration improvements in Model M-4 lead to its highest performance boost of 5.4%, while Model M-5 experiences a 3.1% performance decrease. The different column geometries between these two models demonstrate how column geometry impacts seismic performance.

- For Lateral Displacement

Table 8. Lateral Displacement(mm) Comparison of all Models considered

Lateral Displacement (mm) along Y Direction		
Model	**Displacement (mm)**	**Difference (%)**
M-1	62.917	
M-2	60.75	-3.44
M-3	64.971	6.95
M-4	63.075	-2.92
M-5	66.106	4.81

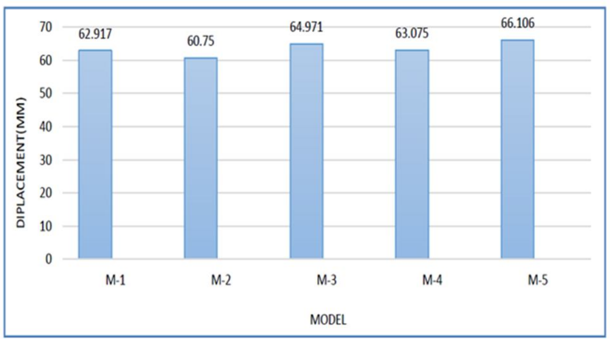


Figure 13. Displacement (mm) Comparison of All models considered

Table 8 shows the lateral displacement results which were measured in the Y-direction across all building models. Model M-1 serves as the reference point because it demonstrates the highest displacement value of 62.917 mm. Model M-2 shows a 3.44% reduction which demonstrates that the model achieved better stiffness and seismic performance, while Model M-4 shows a 2.92% decrease. The results show that Model M-3 has a 6.95% increase in stiffness while Model M-5 has a 4.81% increase in stiffness which shows that both models have diminished structural strength. The results demonstrate that column shape and size and orientation of columns control both lateral displacement and seismic response of structures.

- For Fundamental Time Period

Table 9. Time Period(sec) Comparison of all Models considered

Model	Time Period (Sec)	Difference (%)
M-1	2.23	
M-2	2.21	-0.99
M-3	2.41	8.22
M-4	2.34	5.03
M-5	2.45	9.88

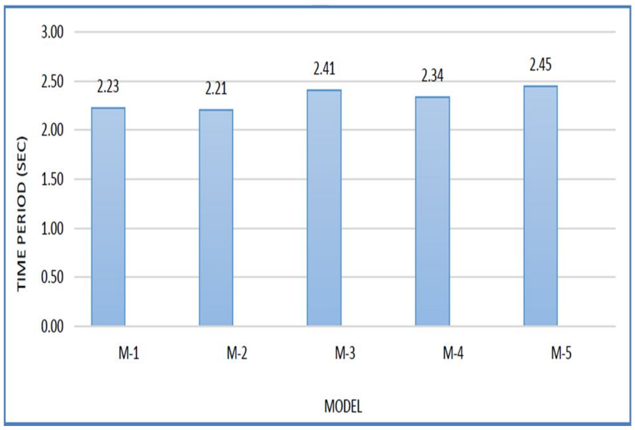


Figure 14. Fundamental Natural Period (sec) Comparison of All models considered

Table 9 presents a comparison of the fundamental time period for all structural models considered in the study. The reference model M-1 demonstrates a time period of 2.23 seconds. Model M-2 shows a slight reduction of 0.99% which demonstrates that the model has gained stiffness with strengthened ability to withstand earthquakes. The two models M-3 and M-4 demonstrate their increased values by 8.22% and 5.03% because of their decreased stiffness which leads to greater flexibility. The most flexible configuration according to Model M-5 shows a total increase of 9.88%. These variations confirm that column shape, size, and orientation significantly influence the dynamic behavior and seismic performance of multi-storey RC buildings.

- For Storey Drift

Table 10. Storey Drift Comparison of all Models considered

NO. storey	Model stroey Drift				
	M-1	M-2	M-3	M-4	M-5
15	0.0005	0.0006	0.0005	0.0006	0.0007
14	0.0008	0.0008	0.0008	0.0009	0.0010
13	0.0011	0.0011	0.0011	0.0012	0.0014
12	0.0013	0.0013	0.0013	0.0014	0.0017
11	0.0015	0.0015	0.0015	0.0016	0.0020
10	0.0017	0.0016	0.0017	0.0018	0.0018
9	0.0018	0.0018	0.0018	0.0019	0.0019
8	0.0019	0.0019	0.0019	0.0019	0.0020
7	0.0020	0.0020	0.0020	0.0019	0.0021
6	0.0020	0.0020	0.0021	0.0020	0.0021
5	0.0021	0.0021	0.0021	0.0020	0.0020
4	0.0021	0.0020	0.0021	0.0020	0.0020
3	0.0020	0.0020	0.0021	0.0020	0.0019
2	0.0018	0.0018	0.0020	0.0017	0.0017
1	0.0011	0.0010	0.0012	0.0010	0.0009
0	0	0	0	0	0

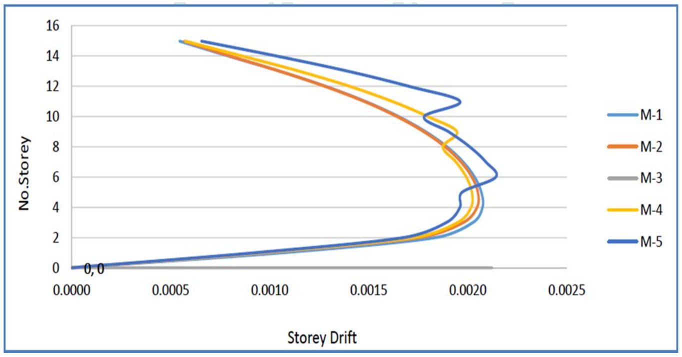


Figure 15. Inter-storey Drift Comparison of All models considered

Table 10 compares the storey drift values from all models at their lowest point to their highest point. The results show that multi-storey buildings exhibit common seismic behavior because their drift starts from lower levels and builds up to mid-height before it starts to decrease towards the uppermost levels. Model M-1 exhibits a maximum drift value which reaches approximately 0.0021. Model M-2 shows lower drift values because it has better stiffness characteristics, which contrasts with Model M-3 that shows slightly more drift. Model M-4 maintains controlled drift, whereas Model M-5 records the highest drift. All models satisfy permissible code limits.

VI. RESULTS ANALYSIS

The present analytical study investigates the seismic performance of a G+14 storey reinforced concrete Special Moment Resisting Frame (SMRF) building by varying column shape, size, and orientation. Five models (M-1 to M-5) were analyzed as per IS 1893 provisions. The researchers studied how different column designs affected seismic performance by testing structural elements through their base shear and displacement and drift and stiffness and time period measurements.

1) *Base Shear Behaviour:* Base shear depends on building stiffness and mass distribution. Model M-4 recorded a high base shear of 3492.4 kN, indicating improved stiffness due to efficient column configuration. Model M-2 also showed higher base shear (3541.5 kN), reflecting better lateral resistance through optimal column orientation. Model M-3 recorded the lowest value (3313.8 kN) due to unfavorable orientation and reduced sectional capacity. Models with excessive reduction in column size showed reduced base shear resistance.
2) *Lateral Displacement Response:* Model M-2 exhibited the minimum top storey displacement (60.75 mm), showing superior stiffness. Models M-3 and M-5 showed maximum displacement, confirming higher flexibility. Proper column orientation along the strong axis effectively controlled lateral movement.
3) *Fundamental Time Period:* Model M-2 showed the lowest time period (2.21 s), indicating higher stiffness. Model M-5 recorded the highest (2.45 s) due to reduced column sizes. Results validated the inverse relation between stiffness and time period.
4) *Storey Drift Performance:* Model M-2 showed uniform and minimum drift. Model M-5 recorded maximum drift due to stiffness reduction. Sudden column size changes caused drift irregularities.
5) *Stiffness Characteristics:* Larger, well-oriented columns improved stiffness. Model M-2 performed best, while variable column sizes reduced stiffness continuity and seismic efficiency.

Table 11: Comparative Summary Table:

Parameter	**M-1 (Reference)**	**M-2 (Optimized Orientation)**	**M-3 (Weak Orientation)**	**M-4 (Variable Size-1)**	**M-5 (Variable Size-2)**
Base Shear (kN)	3462.5	3541.5 ↑	3313.8 ↓	3492.4 ↑	3384.6 ↓
Top Displacement (mm)	62.917	60.75 ↓	64.971 ↑	63.075 ↓	66.106 ↑
Time Period (sec)	2.23	2.21 ↓	2.41 ↑	2.34 ↑	2.45 ↑
Max Storey Drift	0.0021	Lowest	Moderate	Moderate	Highest
Overall Stiffness	Moderate	Highest	Low	Moderate	Lowest
Seismic Performance	Average	Best	Poor	Acceptable	Least Efficient

The table présents a comparative évaluation of five building model base on key seismic réponse paramètres.

- The reference model of M-1 shows moderate stiffness and average seismic performance and balanced response values.
- The optimized column orientation of Model M-2 produces the highest base shear which demonstrates improved stiffness and enhanced ability to withstand seismic forces.
- The lowest top storey displacement and shortest time period in M-2 confirm its superior lateral stiffness and reduced flexibility.
- Model M-3, having weak column orientation, records lower base shear, higher displacement, and longer time period, reflecting poor seismic resistance.
- Model M-4 shows moderate improvements in base shear but increased time period due to variation in column size, indicating acceptable but non-optimal performance.
- Model M-5 performs the worst, with highest displacement, maximum storey drift, longest time period, and lowest stiffness.
- Storey drift values indicate that M-2 experiences smooth and controlled deformation, while M-5 shows critical drift concentration.
- Overall, the table clearly demonstrates that optimized column orientation significantly enhances stiffness and seismic performance, while variable column sizes reduce structural efficiency.

VII. CONCLUSION

The research study analyzed how a G+14 building with reinforced concrete Special Moment Resisting Frame system responded to earthquakes through different column designs which included changes to their shape and size and position. The analysis used standard seismic procedures to assess key response parameters which included base shear and top storey displacement and storey drift and stiffness and fundamental time period. The comparative results demonstrate that column configuration serves as a critical factor which determines how multi-storey buildings respond to seismic events.

The study found that the optimized column orientation model (M-2) exhibited the best seismic response because it achieved higher base shear capacity and reduced lateral displacement and lower storey drift and the shortest fundamental time period which showed improved stiffness and earthquake force resistance. Proper alignment of rectangular columns along the weaker structural direction significantly increases their ability to carry lateral loads while it maintains control over excessive deformation.

The unfavorable orientation that the models exhibited through their design showed reduced structural strength which made them more susceptible to seismic activity. The models with different column sizes (M-4 and M-5) displayed irregular stiffness patterns which resulted in increased flexibility. The research results demonstrate that engineers need to understand the strong column–weak beam concept as it protects buildings from earthquakes while providing safe economical code-compliant design methods.

1) Column orientation significantly governs building stiffness and seismic response.
2) Optimized column alignment reduces displacement and storey drift.
3) Higher stiffness results in lower time period and better seismic control.
4) Variable column sizes introduce stiffness irregularities.
5) Model M-2 demonstrated the best overall seismic performance.

REFERENCES

[1] Dr. K. R. C. Reddy, Sandip A. Tupat, "The effect of zone factors on wind and earthquake loads of high-rise structures" IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)e-ISSN: 2278 – 1684,p-ISSN: 2320-334XPP 53-58

[2] Dr. Suchita Hirde, Mr. Vinay Magadum, "Severity of Earthquake Forces against Wind Forces for Multi-storey RCC Building" IOSR Journal of Mechanical and Civil Engineering (IOSRJMCE)e - ISSN: 2278 – 1684,p-ISSN: 2320 - 334X PP 71–75

[3] Kosta Talaganov, Mihailgarevski, Daniloristic and Vladomicov, "comparative dynamic stability study of a high –rise structure exposed to seismic and wind effects – case" STUDY 13th World Conference on Earthquake Engineering Vancouver, B.C., Canada August 1-6, 2004 Paper No. 778.

[4] Azlan Adnan and Suhana Suradi, "Comparison on the effect of earthquake and wind loads on the Performance of reinforced concrete buildings" The 14th World Conference on Earthquake Engineering, October 12-17, 2008, Beijing, China.

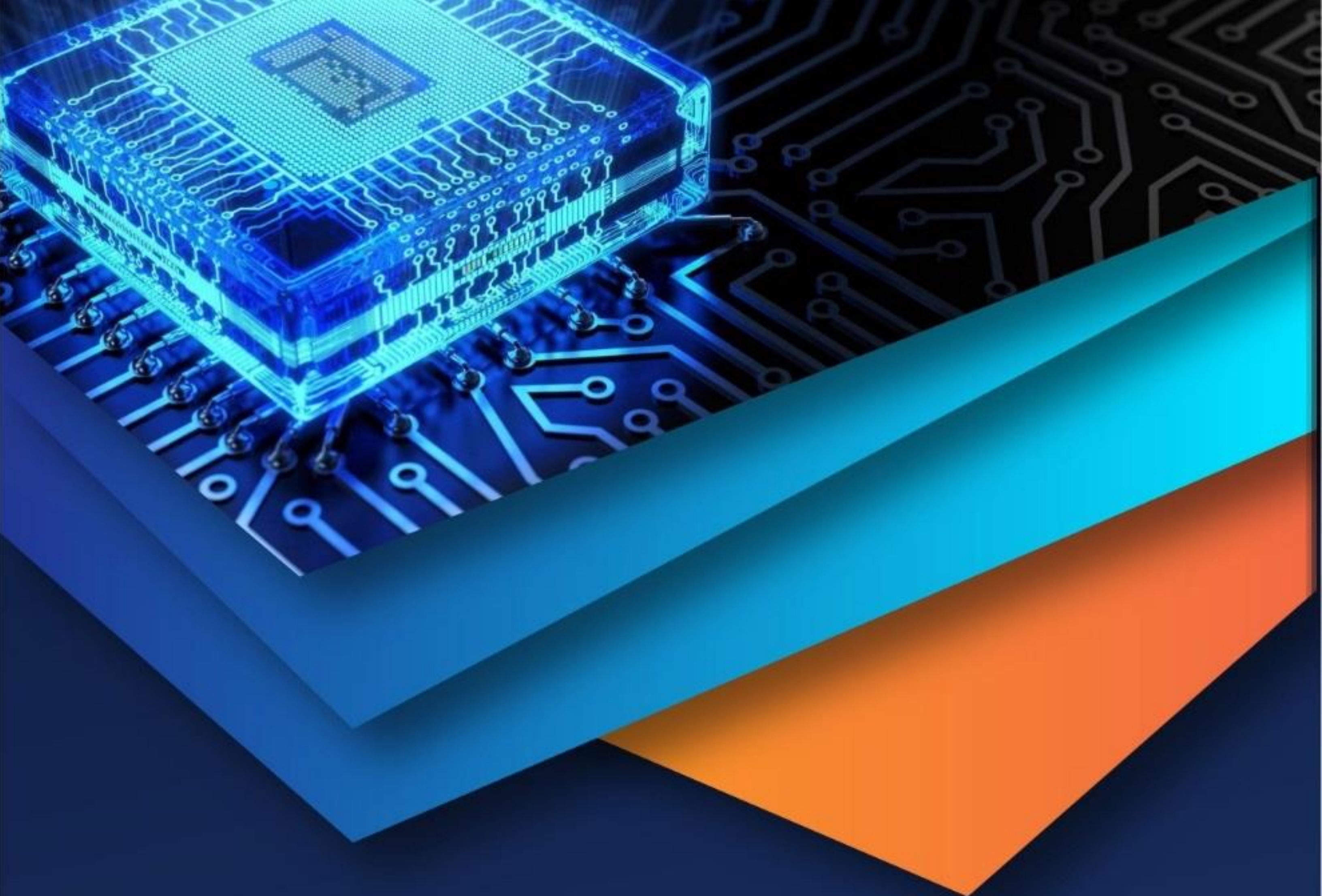
[5] Baldev D. Prajapati and D. R. Panchal, "Study of seismic and wind effect on multi storey r.c.c., steel and composite building" M.E. Research Scholar & Assistant Professor, Applied Mechanics & Structural Engg. Deptt., Faculty of Techno. & Engineering, M. S. University of Baroda, Vadodara – 390001, Gujarat, India.

[6] Khaled M. Heiza and Magdy A. Tayel, "Comparative Study of The Effects of Wind and Earthquake Loads on High-rise Buildings" Civil Engineering Department, Faculty of Engieering, Menoufiya University, EGYPT Vol. 3(1) – March 2012

[7] BimalaPillai, PriyabrataGuha, "Comparison between RCC and steel structure with wind and earthquake effect using Staad pro". ISSN Print: 2394-7500, ISSN Online: 2394-5869,IJAR 2015; 1(6): 28-33

[8] Syed Rehan and S.H.Mahure, "Study of Seismic and Wind Effect on Multi Storey R.C.C. Steel and Composite Building" International Journal of Engineering and Innovative Technology (IJEIT) ISSN: 2277-3754 ISO 9001:2008 Certified Volume 3, Issue 12, June 2014.

[9] Dat Duthinh and Emil Simi, “Safety of Structures in Strong Winds and Earthquakes: Multi-hazard Considerations” Journal of Structural Engineering 136(3) · March 2010 with 18 Reads DOI: 10.1061/(ASCE)ST.1943-541X.0000108
[10] Hany J. Farran “Wind & Earthquake Response in Very Long Span Cable Stayed and Suspension Bridges”
[11] Sanhik Kar Majumder and Prof. Priyabrata Guha, “Comparison Between Wind And Seismic Load On Different Types Of Structures”, International Journal of Engineering Science Invention, ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726, www.ijesi.org Volume 3 Issue 4 || April 2014 || PP.41-54
[12] Nicola Storgaard, “Earthquakes and their effects on buildings” Constructing Architect, 7th semester. https://www.scribd.com/document/347255559/Earthquakes-and-Their-Effects-onBuildings
[13] Prof_Arya, “Steps for safe design and construction of Multistorey reinforced concrete buildings” Fundamentals for seismic design of RCC buildings.
[14] Andrew John Pierre , Irpan Hidayat , Seismic performance of reinforced concrete structures with pushover analysis , The 3rd International Conference on Eco Engineering Development , 2020.
[15] J. Proença, Carlos S. Oliveira And J.P. Almeida , Seismic Performance Assessment Of Reinforced Concrete Structures With Masonry Infilled Panels , Iset Journal Of Earthquake Technology 2019.
[16] Prof. Dilip J.Chaudhari1, Nikhil N. Chopade2 , Performance Based Seismic Design of RC Building with Consideration Of Soil Structure Interaction , International Research Journal of Engineering and Technology (IRJET) , 2018
[17] Paraskevi K. Askouni 1 and George A. Papagiannopoulos , Seismic Behavior of a Class of Mixed Reinforced Concrete-Steel Buildings Subjected to Near-Fault Motions , Infrastructures 2021.
[18] Du Guangqian ,1 Zheng Meng,2 and Wang Shijie , Evaluation of Seismic Performance of Reinforced Concrete Frame Structures in the Context of Big Data , Hindawi Complexity , Volume 2019.



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