https://doi.org/10.48047/AFJBS.6.15.2024.4918-4929

AFJBS African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

DYNAMIC ANALYSIS OF MULTI-STOREY BUILDING FOR DIFFERENT SHAPES

Amgoth sujith singh[1], D. V. Tanuja[2], Dr. C. Venkata Siva Rama Prasad[3]

[1]MTech Student, Department of Civil Engineering, Malla Reddy Engineering College, Secunderabad -500100, Telangana, India.
[2]Assistant Professor, Department of Civil Engineering, Malla Reddy Engineering College, Secunderabad -500100, Telangana, India.
[3]Associate Professor, Department of Civil Engineering, Malla Reddy Engineering College, Secunderabad -500100, Telangana, India.

Volume 6, Issue 15, Sep 2024

Received: 15 July 2024

Accepted: 25 Aug 2024

Published: 05 Sep 2024

doi: 10.48047/AFJBS.6.15.2024.4918-4929

Abstract

Structures with sporadic shapes are more helpless against tremor harm, particularly in high seismic zones. By evaluating parameters like storey overturning moment, storey drift, displacement, and design lateral forces, this study aims to comprehend the behavior of such structures. A 15-story working in four unique shapes (Rectangular, L-shape, H-shape, and C-shape) was examined utilizing ETABS 9.7.1. The findings indicate that, particularly in high seismic zones, buildings with severe irregularities experience greater deformation. Also, story upsetting second reductions with level, and customary structures have higher base shear contrasted with sporadic ones.

Keywords: Various shapes, Dynamic investigation, Multi-story, Building and ETABS.

1. Introduction

Urbanization has prompted the development of taller structures, which are helpless against seismic tremor harm. Every year, around 100,000 seismic tremors of extent more prominent than three happen, making critical death toll and harm structures, especially those with conflicting plans and mass conveyance. Studying the seismic behavior of reinforced concrete (RC) structures is essential because the magnitude and location of an earthquake can have a significant impact on the extent of damage. This study underlines the significance of appropriately breaking down and planning structures, particularly in high seismic zones, to lessen harm. In this review, dynamic examination of various structure shapes utilizing ETABS programming is led.

With innovative headways and stylish requests, structures with unpredictable structures have become more normal. Studies in the past have demonstrated that the shape, dimensions, and position of structural elements have an effect on a structure's dynamic behavior. As a result, irregular building design and analysis necessitate high precision. This study centers around a G+15 celebrated RC outline working with various mathematical inconsistencies, keeping the arrangement region consistent. Reaction range examination utilizing ETABS 2016 was performed to evaluate the effect of these abnormalities. Six building models, one regular and five with irregular plans (Hexagonal, Circular, Elliptical, Sector, and Y-shaped), are the focus of this investigation. The designs are exposed to gravity and sidelong loads as indicated by IS 1893-2002 and planned utilizing IS 456-2000 principles. The principal objective is to direct powerful investigation on four underlying shapes (Rectangular, C-molded, H-formed, L-molded) and contrast their reactions with different powers, minutes, and relocations.

The review expects to guarantee these designs can endure run of the mill burdens, distortions, and seismic impacts. The importance of earthquake-resistant design has increased as urbanization drives the construction of taller buildings, particularly in large cities. Structural design now relies heavily on earthquake engineering, particularly in seismically active regions. In light of the increasing frequency and unpredictability of earthquakes, the difficulty lies in providing sufficient stability and strength to withstand lateral loads. Structures intended for common burdens may not be protected against seismic tremor powers, making it fundamental to consider factors like normal recurrence, damping, establishment type, and malleability in quake safe plans. Urbanization has made tall designs fundamental, however they are profoundly helpless to seismic harm. Around 100,000 earthquakes occur annually, claiming a significant number of lives and causing damage to reinforced concrete structures. These tremors are frequently the result of inconsistent seismic responses and irregular designs. This study accentuates the significance of examining and planning RC designs to actually survey their seismic presentation.

Plan and vertical irregularities are common in modern buildings, resulting in significant eccentricity between the mass and stiffness centers and damaging lateral responses during earthquakes. Planning and breaking down such sporadic structures requires undeniable level designing exertion, as they are more inclined to harm contrasted with normal designs. Indian Standard Code (IS 1893) orders abnormalities into plan and vertical sorts, including torsional, re-participant corners, and delicate story issues, among others. The ETABS software was chosen for its user-friendliness, compliance with Indian standards, adaptability, and accuracy for this project, which involves dynamically analyzing multi-story buildings in the following shapes: rectangular, C, L, and H. ETABS is ideal for a variety of structural applications due to its advanced design and analysis capabilities.

1.1 Objectives

The essential objectives of the task are to assess horizontal powers, minutes, avoidances, and story float and relocations, scaling elements, and modular shapes, as well as to lead dynamic examination and get seismic exhibitions for different designs situated in the moderate tremor zone of India. to add to the making of a reference guide for planners, designers, engineers, and understudies on the most proficient method to control tremor load in elevated structures by involving Etabs programming comparable to different structure shapes. to acquire a comprehension of the Etabs programming. The proposition's essential objectives are to lead dynamic examination, assess horizontal powers, upsetting minutes, diversions, and story float, and decide the seismic exhibitions of different structure shapes in India's serious tremor zone (V).

- Fundamental targets of this task are to perform dynamic examination.
- To determine the seismic properties of various building shapes in India's severe earthquake zone (V).
- Understanding the structure's behavior in a high seismic zone and evaluating the Storey overturning moment are the primary goals of this study.
- Dynamic (reaction range) examination has been performed to concentrate because of state of a structure on its reaction to different stacking
- To examine the structure of the 15-story R C-framed building.
- To examine crucial structural members under critical load combinations.
- To make the structure affordable and quake safe against seismic impact.

2. Literature Review

Suravase et al. (2017) focused on how mathematical arrangement inconsistencies affect RCC multi-outlined structure. In this examination, four models, to be specific Rectangular, L shape, H shape and Square shape with focus territory of G+10 observed R.C frame building presented to seismic quake load. Dislodging control quitter assessment is finished by using ETABS programming. The author is going to make the assumption that the rectangular structure model will collapse after the L-shaped building and the other structures.

Ullas et al. (2017) investigated how different arrangement molded structures answered breeze vibrations. In ETABS 2016, structures of the planar shapes Y, V, and are displayed and dissected. Story powers don't change with building shape, so it is seen that they are no different for all structures. Equal evacuation is seen as most noteworthy for Y shape when stood out from that of various shapes and the sidelong removing and the story float is seen least for notwithstanding shape structures and thusly it is the steadiest shape among the picked shapes.

The impact of shape and plan setup on the seismic reaction of construction (ZONE II and V) was the subject of research by Ravi et al. (2016). Seven models of G+11 story working with one ordinary game plan and remaining unusual plans like E, H, T, L, C, and notwithstanding (+) shape plan have been taken for study. The area of arrangement for each design is the same. The construction's reaction is broken down using STAAD-Expert V8i. For testing, the Reaction Range strategy is used. Base shear, time span, and joint relocation are examples of reaction boundaries that have been assessed and considered. Buildings with a regular square plan have the same maximum base shear value as those with other plan configurations in zones II and V, while those with an "L" plan configuration have the lowest base shear value. Regular buildings have the least amount of displacement compared to other shapes, whereas "L"-shaped buildings have the most, so it can be avoided. In high seismic zones, unpredictable molded structures are particularly helpless against quake deformity. Sultan et al. carried out the dynamic analysis of multi-story buildings of various shapes. (2015).

In the ETABS 9.7.1 variant, four 15-story models with rectangular, L-shape, H-shape, and c-shape plans are demonstrated. The Reaction range strategy and comparable static power were used for the examination. As per the discoveries, quakes fundamentally affect sporadic shapes, especially in high seismic zones. Base shear is something different for L-shape building and C-shape building is more powerless difference with any excess shapes.

Dr. S. K Dubey (2015) presented a paper on Strong Assessment of Plans Presented to Quake Weight. He studies reinforced concrete buildings' seismic behavior. The reaction range strategy and the time history technique are used to break down the structure. The 20-story private structure's related design has been displayed. Rizwan and peera, a P.G. understudy at JNTUA, Anantapur, led a concentrate on unique investigation of multi-story structures for different shapes. Multi-story working dynamically for various shapes as proposed by Mohammed Rizwan King and D. GousePeera Division of Primary Planning P.G student, JNTUA, Anantapur. The purpose of this study is to determine how the design behaves in a high seismic zone and to evaluate the story upsetting second, story float, and dis situation in a 15-story-high structure based on four completely unexpected shapes—rectangular, L-shape, H-shape, and C-shape—as well as the design's behavior. As a result, it has been demonstrated that unpredictable shapes are significantly affected by earthquakes, particularly in high seismic zones, and that C-shaped buildings are more vulnerable than other shapes.

Md Shehzad Choudhary et al. (2018) used ETABS to conduct a close focus on seismic examination of a multistory building with stomach interruptions. An ordinary 15 and 20 story RC structures having shear wall were exhibited with and without stomach inconsistency and separated by response range methodology. They assumed that models having piece opening has lower story migration, story float, story shear, measured period than standard design model and assortment in the lump thickness diminishes the introduction of the designs during shudder.

J. Sreenath et al. (2018) focused on the effect of stomach abnormality in the seismic response of multi-story building. They have looked at how various models with different stomach openings behaved and considered seismic boundaries like maximum dead weight, base shear, and most extreme story floats based on reaction range results. Shear force values were higher in buildings without diaphragm discontinuity than in buildings with different slab openings. Seismic investigation of a RC outline with stomach irregularity was the subject of examination by Reena Sahu and Ravi Dwivedi (2017). Both static and response spectrum analysis were carried out with STAAD.Pro. The seismic parameters of base shear, maximum storey drifts, shear force, bending moment, and axial force were compared across a number of models with varying proportions of diaphragm openings.

The reaction range investigation yielded a lower base shear than the static examination. G+9 renowned sporadic structures were dismantled by Pradeep Pujar et al. (2017) to determine their seismic execution with and without shear walls. The building plan's I, L, and C states were up for review. Three models of uncovered frame &three models with shear walls were considered for the audit. Using E-tabs V 15.0.0 programming, an identical static strategy was used to investigate the models. The relationship has been done by thinking about the limits, for instance, story dislodging, story float and base shear. It has been assumed that L-shape, C-shape structures with Shear walls are having exceptional outcomes in base shear, story float and migration. The L-shape building has next to no expanded base shear, though the I-shape working with shear wall has expanded base shear in both the X and Y bearings. The design with shear wall gives better execution against the seismic shake when differentiated and uncovered frame building.

S. Mangesh Suravase et al. (2017) carried out seismic assessment on G+10 observed R.C frame structures with different course of action shapes, for instance, square, H-shape, L-shape& square shape with focus. The level and plan region of each building model remained unchanged. For seismic analysis, the pushover analysis method was utilized by the ETABS software. The investigation has been concluded by taking into account the boundaries, such as observed relocation and base power. It has been deduced that the conventional structure resists tremor for a longer period of time and endures for a longer period of time. Seismic resistance is lower in the H and L irregular building model shapes. The sporadic structure model shape-O is more resistant to earthquakes than buildings in the H and L shapes.

3. Methodology

There are a few important steps in the study's methodology. In the first step, the ETABS 2016 software uses grid lines to create the building model. Material properties pertinent to the design are then characterized, trailed by determining the aspects and attributes of casing segments. To complete the model, wall and slab sections are defined, and diaphragms are included to guarantee accurate analysis. Loads and burden blends are applied by plan prerequisites. To evaluate the building's response to seismic forces, the seismic analysis is carried out using the Response Spectrum Method, which is outlined in IS 1893 (Part 1) for this purpose. At long last, the construction is planned in view of the examination results to guarantee it meets the essential wellbeing and execution standards. This approach use PC helped primary examination to survey the structure's dynamic way of behaving, integrating different mode shapes and reaction boundaries to give an extensive assessment of seismic execution.

4 Modelling and Analysis

The buildings are modeled in this study using ETABS, and their constant plan area is 720 m2. The designs are exposed to different burdens, including self-weight, dead burden, live burden, and seismic burden. Oneself load of the design incorporates the heaviness of shafts, segments, and chunks. For the dead burden (DL), as determined in IS 875 (Section 1), the estimations incorporate wall burdens and railing wall loads. The wall load is calculated by multiplying the weight unit of brick masonry, which is 20 kN/m3, by the wall thickness, which is 0.230 m, and the height, which is 3 m, to get 13.8 kN/m.

The wall load for the parapet wall on the top floor is calculated by multiplying the weight unit of brick masonry, which is 20 kN/m3, by the wall thickness, which is 0.115 m, and the height, which is 0.90 m. This yields a value of 2.07 kN/m. The live burden incorporates a story heap of 4 kN/m² and a rooftop heap of 2 kN/m², as per IS 875 (Section 2). For seismic burden examination, boundaries depend on IS 1893 (Section 1: 2002), with a seismic zone of V (Z = 0.36), soil type II, a significance component of 1, a reaction decrease element of 5, and a damping proportion of 5%.

4.1 Plan Details

The building under investigation has a plan area of 32 meters in the x direction and 24 meters in the y direction. Center-to-center, the columns are 4 meters apart. It is a fifteen-story working with a story level of 3 meters. Each narrows in the model has a width of 4 meters. The pillar and segment sizes are 0.45 meters by 0.45 meters, while the piece thickness is 0.125 meters. Steel grade Fe415, a concrete grade of 30 MPa, and a variety of column sizes—650 mm by 650 mm for the first five stories and 500 mm by 500 mm for the remaining stories—are some of the building's material properties and dimensions. With a parapet wall height of 0.9 meters and a main wall thickness of 230 millimeters, the beam size remains constant at 450 millimeters by 450 millimeters.

4.2 Building Details

The examined structure has aspects of 40 meters by 32 meters and is likewise a fifteen-story working with a 3-meter story level. Each narrows width is kept up with at 4 meters. The building has a slab with a thickness of 0.15 meters and shear walls. A concrete grade of M30 and a steel grade of Fe500 are among the properties of the material. The beam measures 230 mm by 500 mm and the column measures 700 mm by 500 mm uniformly across all stories. The primary wall thickness is 230 mm.

4.3 Material and Loading Parameters

The concrete used is grade M30, with a characteristic compressive strength of 30 N/mm2, and the steel is grade Fe500, with a yield strength of 500 N/mm2, as specified in IS 456:2000. Beams and columns are provided with a 45 mm cover. Stacking boundaries incorporate dead loads (DL), live loads (LL), and quake loads (EQ) according to IS 1893 (Section 1): 2002. The self-weight of the structure as well as wall loads are included in the dead load, which was determined to be 13.8 kN/m. Floor finishes have live loads of 2.5 kN/m2 and 2 kN/m2 respectively. A seismic zone of V (Z = 0.36), soil type II, an importance factor of 1, a response reduction factor of 5, and damping of 5% are the seismic parameters.

4.4 Building Configuration

A computer program is used in the study to look at reinforced concrete buildings under wind and earthquake loads, taking into account revisions to IS 1893 Part 1 (2002). Moments, lateral shear forces, and torsional shear forces are all calculated by the program for the base shear, center of mass, and center of rigidity. From Zone II to Zone V, four building models with consistent bay lengths and twenty stories are examined across various seismic zones. Boundaries, for example, seismic zone factors, wind speeds, reaction decrease elements, and material properties are definite in a table, showing varieties in seismic zone factors, essential breeze speeds, and different variables influencing the design.

4.5 Loads Acting on Different Shapes of Buildings

The higher gravity loads, wind loads, and dynamic effects of tall buildings necessitate precise evaluation of their loading, which differs from that of low-rise buildings. Live loads are generated by building use, whereas dead loads are generated by permanent structural components. Gravity loads are the dead and live loads advanced during a tremor. Wind loads are critical for tall structures, expanding with level, while quake loads result from seismic aggravations and differ in power.

4.6 Load Combinations

Various load combinations are used to evaluate the most adverse effects on the structure. These include combinations of dead loads, live loads, and earthquake loads. The combinations are designed to ensure safety under different loading scenarios and are based on the relevant design codes. Different combinations such as 1.5(D.L + L.L) and 1.2(D.L + L.L + EQX) are used to determine the most unfavorable conditions for the building.

4.7 Introduction to ETABS Software

ETABS, developed by Computer and Structural Inc. (CSI), is a prominent software used for structural and earthquake engineering analysis. Notably, it was used in designing and analyzing the Burj Khalifa, the world's tallest building. ETABS is chosen for its:

- User-friendly Interface: Easy to navigate and operate.

- Compliance with Indian Standard Codes: Ensures adherence to local regulations.

- Versatility: Capable of solving a variety of structural problems.

- Accuracy: Provides precise solutions.

ETABS offers advanced features, including a sophisticated user interface, visualization tools, and powerful analysis engines for both finite element and dynamic analysis. It supports the design of structures such as low and high-rise buildings, bridges, tunnels, and more.

4.8 Modeling of the Building Using ETABS

This study includes demonstrating G+15 story structures of different shapes (Rectangular, C, L, and H) utilizing ETABS. To make the design work best, the analysis looks at forces, displacements, and moments under various load combinations.

4.9 Analysis of G+15 Building

The G+15 building models were analyzed with ETABS for gravity and lateral loads. Gravity load analysis used a live load of 4 kN/m², while lateral load analysis (wind and earthquake) was conducted based on Indian codes. The lateral load effects were transferred through diaphragm action. Key parameters analyzed include:

- Maximum Storey Drift

- Maximum Storey Displacement

- Storey Shears

Load combinations used in the analysis are:

1. 1.5 DL + 1.5 LL

2. 1.2 DL + 1.2 LL

3. 1.2 DL + 1.2 LL + 1.2 EQX

4. 1.2 DL + 1.2 LL - 1.2 EQX

5. 1.2 DL + 1.2 EQX

6. 1.2 DL - 1.2 EQX

5. **Results & Discussion**

5.1 Storey Shear

Story shear is the proportion of the shear force at a story breakdown to the shear force at all out breakdown. The storey shear values at various floors for various building shapes are as follows: at the 15th storey, the rectangular building has a shear of 891.79 kN, the I building has a higher shear of 1025.70 kN, the T building has a lower shear of 787.46 kN, and the L building has 860.05 kN. Shear values for rectangular, I-shaped, T-shaped, and L-shaped buildings at the 10th storey are 4193.82 kN, 4805.51 kN, 3736.94 kN, and 4078.13 kN, respectively. 5352.18 kN, 6131.67 kN, 4772.11 kN, and 5207.50 kN are the values for the fifth storey, while 5500.63 kN, 6302.03 kN, 4905.95 kN, and 5353.32 kN are the values for the first storey. According to the observation, when compared to rectangular structures, the shear of T-shaped structures decreases by 12% and that of I-shaped structures increases by 15% at the 15th floor.

Table 1: Storey Shear

Storey	**Rectangular shaped (KN)**	**I-Shaped (KN)**	**T-Shaped (KN)**	**L-Shaped (KN)**
Storey 15	891.79	1025.70	787.46	860.05
Storey 10	4193.82	4805.51	3736.94	4078.13
Storey 10	5352.18	6131.67	4772.11	5207.5
Storey1	5500.63	6302.03	4905.95	5353.32

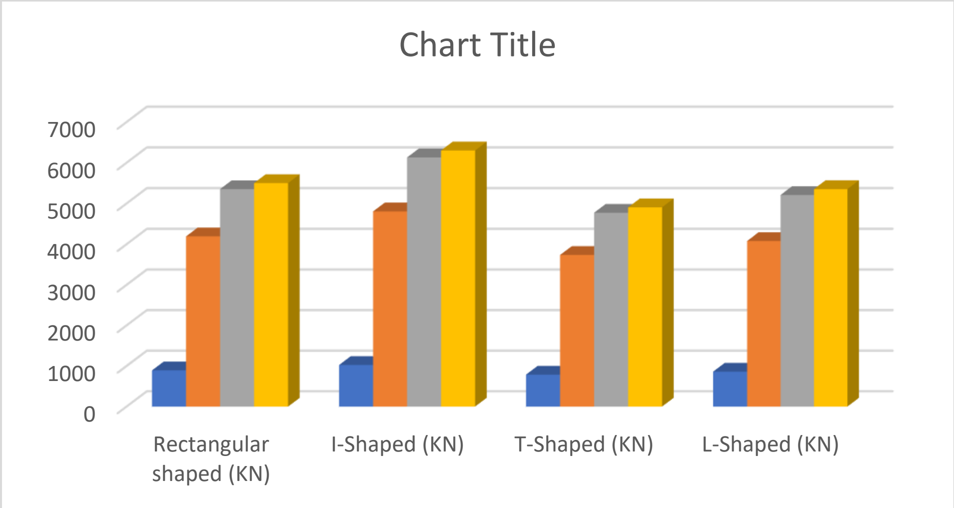

Fig 1: Storey Shear

5.2 Storey Stiffness

Storey stiffness is calculated as the ratio of storey shear to storey drift. For the rectangular-shaped building, the stiffness starts at 0.9 N/m at the 15th storey and increases to 3.2 N/m at the 10th storey, while for the I-shaped structure, it remains at 0.9 N/m at the 15th storey and slightly lower at 3.1 N/m at the 10th storey. The T-shaped building has lower stiffness, starting at 0.8 N/m at the 15th storey and rising to 2.8 N/m at the 10th storey. The L-shaped building has a similar pattern to the rectangular structure with 0.9 N/m at the 15th storey and 3.2 N/m at the 10th storey. The T-shaped structure exhibits about 9% less stiffness compared to the rectangular structure, while the other shapes show similar stiffness values.

Table 2: Storey Stiffness

Storey	Rectangular shaped (N/m)	I-Shaped (N/m)	T-Shaped (N/m)	L-Shaped (N/m)
Storey15	0.9	0.9	0.8	0.9
Storey14	1.4	1.4	1.3	1.5
Storey13	2	2	1.8	2
Storey12	2.4	2.4	2.2	2.5
Storey11	2.8	2.8	2.5	2.9
Storey10	3.2	3.1	2.8	3.2
Storey9	3.4	3.4	3	3.5
Storey8	3.6	3.6	3.2	3.7
Storey7	3.8	3.8	3.3	3.8
Storey 6	3.9	3.9	3.4	3.9
Storey5	3.3	3.3	3	3.4
Storey4	3.3	3.3	3	3.4
Storey3	3.2	3.1	3.2	3.2
Storey2	2.7	2.7	2.8	2.7
Storey1	1.3	1.3	1.4	1.3

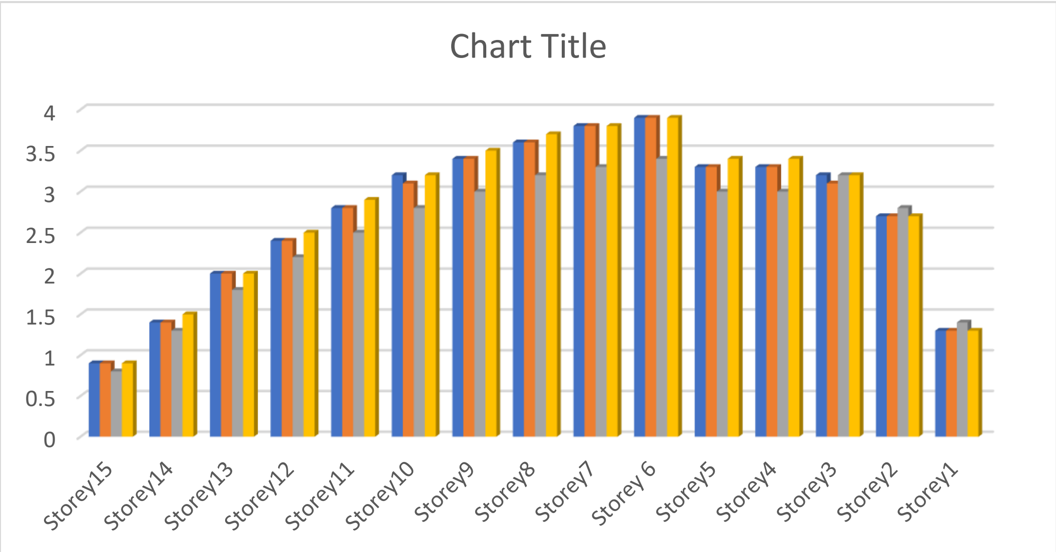

Fig 2: Storey Stiffness

5.3 Joint Displacement

Joint displacement measures the movement of joints under wind or seismic loads. For the rectangular-shaped building, the displacement at the 15th storey is 13.8 mm, whereas for the I-shaped building, it is 14.9 mm. The T-shaped and L-shaped buildings show displacements of 24.8 mm each. At the 10th storey, the displacements are 11.6 mm for the rectangular, 12.6 mm for the I-shaped, 21.5 mm for the T-shaped, and 23.7 mm for the L-shaped buildings. The L-shaped structure demonstrates joint displacements 105% greater than those of the rectangular-shaped building.

Table 3 Joint Displacement

Storey	**Rectangular shaped (mm)**	**I-Shaped (mm)**	**T-Shaped (mm)**	**L-Shaped (mm)**
Storey15	13.8	14.9	24.8	24.8
Storey14	13.6	14.7	24.5	28
Storey13	13.4	14.4	24.1	27.4
Storey12	12.9	14	23.4	26.4
Storey11	12.4	13.4	22.6	25.2
Storey10	11.6	12.6	21.5	23.7
Storey9	10.8	11.7	20.2	21.9
Storey8	9.8	10.6	18.7	19.8
Storey7	8.6	9.3	17	17.5
Storey 6	7.3	7.9	15.1	14.8
Storey5	5.9	6.4	13	12
Storey4	4.6	5	11.1	9.3
Storey3	3.3	3.5	8.9	6.5
Storey2	1.9	2	6.5	3.7
Storey1	0.6	0.7	3.7	1.3
Base	0	0	0	0

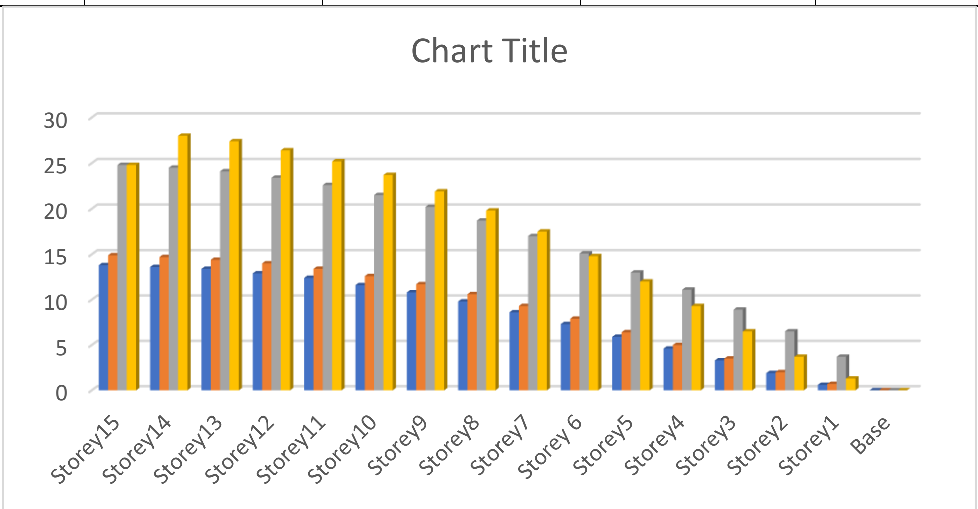

Fig 3: Joint Displacement

5.4 Centre of Mass Displacement

Centre of Mass Displacement indicates the movement of the building's center of mass due to dynamic forces. At the 15th storey, the rectangular building has a displacement of 17.7 mm, the I-shaped building 24.8 mm, the T-shaped building 25.1 mm, and the L-shaped building 17 mm. The displacement decreases with height for all shapes, with the T-shaped structure showing the highest displacement at 25.1 mm and the rectangular and L-shaped structures exhibiting lower values at 17.7 mm and 17 mm, respectively. The T-shaped structure experiences a 43% greater centre of mass displacement compared to the rectangular shape, while the I-shaped structure shows intermediate values.

Table 4: Centre of Mass Displacement

Storey	**Rectangular shaped (mm)**	**I-Shaped (mm)**	**T-Shaped (mm)**	**L-Shaped (mm)**
Storey15	17.7	24.8	25.1	17
Storey14	17.5	24.4	24.9	16.8
Storey13	17.1	23.8	24.4	16.5
Storey12	16.6	23	23.8	15.9
Storey11	15.8	21.9	22.9	15.2
Storey10	14.9	20.5	21.8	14.3
Storey9	13.8	18.9	20.5	13.2
Storey8	12.5	17.1	19	12
Storey7	11	15	17.2	10.6
Storey 6	9.4	12.8	15.3	9
Storey5	7.6	10.3	13.2	7.3
Storey4	5.9	7.9	11.2	5.7
Storey3	4.1	5.5	9	4
Storey2	2.4	3.1	3.1	2.3
Storey1	0.8	1.1	3.8	0.8

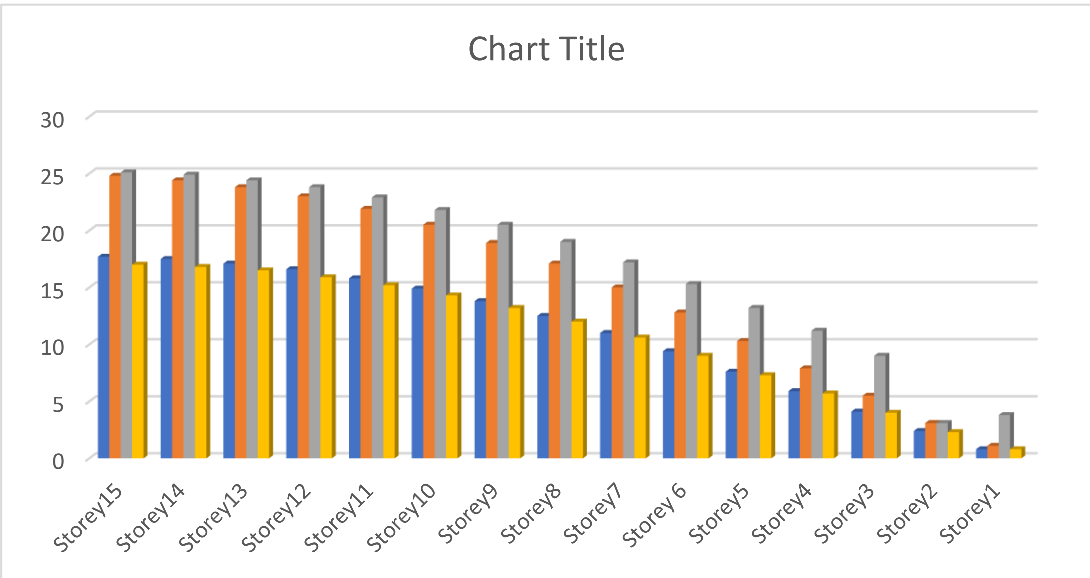

Fig 4: Centre of Mass Displacement

6. Conclusion

1. Storey Shear: Inversely varies with the number of storeys. Shear decreases as storey height increases.

2. Storey Stiffness: Increases with storey height up to the 6th storey, beyond which it decreases. Maximum stiffness is observed for all shapes up to the 6th storey.

3. Base Parameters: Rectangular buildings have lower base shear, base moments, storey drift, and displacements compared to irregular buildings.

4. Joint Displacement: Directly proportional to storey levels. Maximum for L-shaped structures, and lowest for rectangular structures due to structural uniformity.

5. Centre of Mass Displacement: Increases with the number of storeys. T-shaped structures have the highest displacement, followed by I-shaped and L-shaped structures.

REFERENCES

[1] Rizawan Sultan, M.GousepeeraD.(2015).Dynamic Analysis of Multi-storey Building for Different shapes,8(2),85-91.

[2] Suravase, M. S. and Pawar, P. M. (2017), "Effect of Geometrical plan irregularities on RCC multi-framed structure". Int. J. Research in Eng. Trends and Tech., 47, 314-317.

[3] Ullas, A. and Nimisha, P. (2017), "Response of buildings of different plan shapes subjected to wind vibrations". Int. Research J. Eng. and Tech., 4(5), 1625-1628.

[4] Ravi, V. and Lekshmi, S. (2016), "Effect of Shape and Plan Configuration on Seismic Response of Structure (ZONE II & V)". Int. J. Sciences and Research., 5(7), 1135-1139.

[5] Md Shehzad Choudhary, Syed Arfath, Md Mansoor Ahmed and Nadeem Pasha, "Comparative Atudy on Seismic Analysis of Multi Storey Building Having Diaphragm Discontinuity Using Etabs" Khaja Banda Nawaz College of Engineering, Gulbargs| International Journal of Research in Advent Technology, Vol.6, No.5, May 2018

[6] J. Sreenath, Dr. H. Sudharsana Rao and Dr. Vaishali G. Ghorpade, "Effect of Diaphragm Discontinuity in the Seismic Response of multi-storey building" International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES) | e-ISSN:2455-2585, Volume 4, Issue 01, January-2018