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Seismic Resistance Building Using Eccentric Braces in Infill Structure at Soft Story Level: A Review

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Review Article

ABSTRACT

A soft story or a weak story is one in which the lateral stiffness is less than 70 percent of that in the story above or it can be less than 80 percent of the average lateral stiffness of the three stories above. For the reduction of lateral deflection of a structure, a bracing system is provided. In seismic design of structure and in high rise structure, the provision of bracing system has become more effective. So, this paper aims to find out the effect of bracing on soft story of steel building. In this paper, G+7 steel frames are modeled with different type of bracing pattern and different combination of soft story using software STAAD Pro. Effect of these different bracings on soft story is studied for different parameter like column displacement, maximum deflection, story drift, maximum bending moment, maximum axial force and maximum shear force. From the observed result best type of bracing will be selected.

Key Words*:* G+7 Buildings; Soft Story; Bracing System; Story Drift; STAAD Pro V8i, Seismic Analysis.

1. INTRODUCTION

The majority of the constructions in India are classified as low-rise buildings. As a result, reinforced concrete members are extensively employed in these structures since the construction is very simple and cost-effective [1]. However, because the population of cities is rising exponentially and land is limited, vertical construction of structures is required in many places. As a result, great number of medium- and high-rise buildings are being built to accommodate this need. Steel-concrete composite construction has achieved widespread recognition as a viable alternative to pure steel and concrete building around the world. This technique is still considered as a relatively new concept in construction business. Higher deflections and flexible nature attract its applications compared to concrete structures [2, 3]. It has been observed that using composite members in the construction of high-rise buildings is more effective and cost-efficient than using reinforced concrete members [4-6]. In medium to high-rise buildings, a steel-concrete composite frame system can provide an effective and cost-effective solution to most of these issues [7].

Pre-engineered buildings are mainly prepared using predesigning and prefabrication process. The advancement in the pre-engineered building construction approach involves time limitation, cost-effectiveness, improved structural behavior and advanced architectural view. Pre-engineered buildings are becoming an effective replacement of conventional steel buildings in every aspect. It shows more advanced results in case of cost comparison, construction time, quality parameters and architectural point of view. The review is focus on comparison pre-engineered steel buildings and conventional steel building in every aspect. A pre-engineered building can be designed and then comparative analysis can be done concerning a conventional building with the same configuration with the help of the software Bentley STAAD PRO which is mainly used for the entire designing and analysis. It is observed that the Pre-engineered building gives more sustainable results as compared to conventional steel buildings. Also, if th construction process is according to conventional methods, it will be more time consuming and more budget consuming at every aspect. Therefore, a pre-engineered buildings usage should be implemented as the construction as well as the maintenance cost of pre-engineered buildings is very less as that of conventional steel buildings. One more aspect is taken into consideration, the materials used for the construction of the pre-engineered buildings are pre-fabricated and then assembled in such a way that the materials are both reusable and recyclable for future usage. So, concerning this aspect, the whole structural components, as well as the structure, can be moulded and shifted to any of the other locations also and that will fulfil the major aspect of sustainable construction. The present review aims to acquire information and knowledge keeping the two major objectives. First, for large civil projects such as high-rise buildings and bridges, composite sections made of steel encased in concrete are an economical, cost-effective, and time-effective alternative. Secondly, to compare the analytical results of all three building models, such as Story Drift, Story displacement, nodal displacement, maximum axial force, maximum shear force, and bending moments. This paper provides distinct comparison of RCC and Steel with Composite Story Buildings. Story Drift, Displacement, Story Stiffness, Axial Force in Column, Shear Force in Column, Bending Moment, and Twisting Moments in Composite are compared to RCC and Steel Sections.

1.1 Infill wall

The infill wall is the supportive wall that closes the perimeter of a building constructed with a three-dimensional

Framework structure (generally made of steel or reinforced concrete). The latter performs the same functions of the infill wall, but performs static functions too.

1.2 Weak story and Soft-story

Weak storey is defined as one in which the storey's lateral strength is less than 80 percent of that in the storey above. A soft story or a weak story is one in which the lateral stiffness is less than 70 percent of that in the story above or it can be less than 80 percent of the average lateral stiffness of the three stories above.

The term “soft-story” refers to one level of a building that is significantly more flexible or weak in lateral load resistance than the stories above it and the floors or the foundation below it.

1.3 Braces

Braced frames are used for trussing to resist sideway forces on structure. Trussing or triangulation, is formed by inserting corner to corner (diagonal) structural members into rectangular zones of a structural frame. It helps to stabilize the frame against sideway forces resulted from earthquakes and strong winds. In a braced frame, bracing is usually provided in each story of the structure to resist the forces. Beams, columns and braces arranged in such a way to form a truss. It resists lateral seismic forces by truss action and develops flexibility through inelastic action in braces. There are several types of bracing system-

A braced frame is a really strong structural system commonly used in structures subject to lateral loads such as wind and seismic pressure. The members in a braced frame are generally made of structural steel, which can work effectively both in tension and compression.

The beams and columns that form the fram e carry vertical loads, and the bracing system carries the lateral loads. The positioning of braces, however, can be problematic as they can interfere with the design of the façade and the position of openings. Buildings adopting high-tech or post-modernist styles have responded to this by expressing bracing as an internal or external design feature.

1.3.1 Bracing System

The resistance to horizontal forces is provided by two bracing systems called:

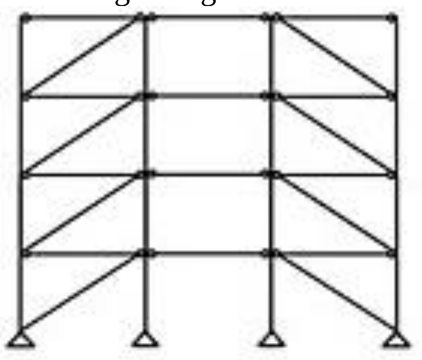
a) Vertical bracing

Bracing between column lines (in vertical planes) provides load paths for the transference of horizontal forces to ground level. Framed buildings require at least three planes of vertical bracing to brace both directions in plan and to resist torsion about a vertical axis.

b) Horizontal bracing

The bracing at each floor (in horizontal planes) provides load paths for the transference of horizontal forces to the planes of vertical bracing. Horizontal bracing is needed at each floor level, however, the floor system itself may provide sufficient resistance. Roofs may require bracing.

i. Single diagonals



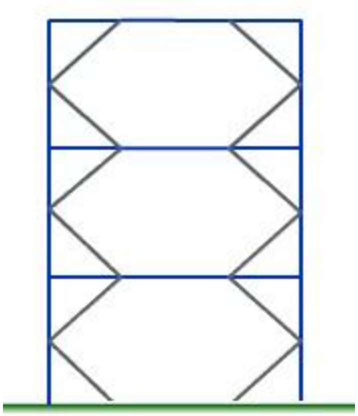
Trussing, or triangulation, is formed by inserting diagonal structural members into rectangular areas of a structural frame, helping to stabilise the frame. If a single brace is used, it must be sufficiently resistant to tension and compression.

c) Cross-bracing

Cross-bracing (or X-bracing) uses two diagonal members crossing each other. These only need to be resistant to tension, one brace at a time acting to resist sideways forces, depending on the direction of loading. As a result, steel cables can also be used for cross-bracing.

However, cross bracing on the outside face of a building can interfere with the positioning and functioning of window openings. It also results in greater bending in floor beams.

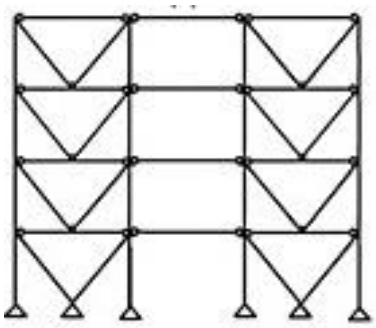
d) K-bracing



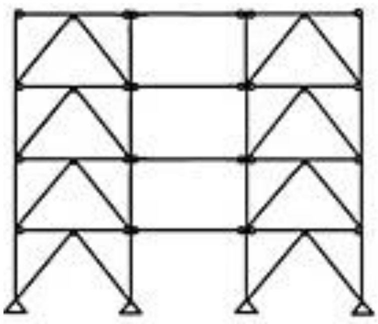
K-braces connect to the columns at mid-height. This frame has more flexibility for the provision of openings in the facade and results in the least bending in floor beams. K-bracing is generally discouraged in seismic regions because of the potential for column failure if the compression brace buckles.

e) V-bracing

Two diagonal members forming a V-shape extend downwards from the top two corners of a horizontal member and meet at a centre point on the lower horizontal member (a). Inverted V-bracing (also known as chevron bracing) involves the two members meeting at a centre point on the upper horizontal member.



a)



b)

Both types of V bracing are efficient in the reduction of buckling capacity generated from the compression brace so that it is less than the tension yield capacity of the tension brace. Therefore, it helps in maintaining resistance capacity when load must instead be resisted in the bending of the horizontal member.

2 LITERATURE REVIEW

The Multi-story RCC and Composite Buildings under Seismic Effect is the theme subject of this literature review. A few specific studies conducted are analysed here. For the seismic investigation, the authors, *Kumar, and Rajasekhar* [8] has chosen a residential structure in zone II with a G+ 15-story structure. STAAD.PRO software was used to evaluate the entire structure on the computer. The methodologies utilized in structural seismic analysis are equivalent static analysis and response spectrum analysis. The major goal of this research was to look at structural seismic analysis for static and dynamic analysis in both ordinary and special moment resistant frames. Using deflection diagrams in static and dynamic analysis, they observed the response decrease of cases conventional moment resisting frame and special moment resisting frame values and recommended that the resistant frame structure's unique moment is beneficial in resisting earthquake loads.

Suthar and Butala [9] considered a three-dimensional G+15-story high-rise skyscraper with RCC, steel, and composite structure in India's earthquake zone IV. They favored the analogous static method and the response spectrum method in E-tabs software 2017. They compared several parameters and found that composite frames are the best choice for medium to high-rise structures in terms of increased stiffness and base shear among RCC and steel construction.

Rathod, and Gupta [10] considered G+10 Storey RCC Building for seismic analysis. They used E-Tabs Software to undertake a Non-Linear Time History Analysis of the El-centro Earthquake of 1940. The load carrying capacity, ductility, stiffness, damping, and mass of structures are the main parameters of seismic analysis. Base shear, storey drift, storey displacements, and other response characteristics were determined. The computed storey drift was compared to the IS 1893:2002 minimum storey drift standard.

Pasha and Tetsuo [11] studied strength and ductility type retrofit of soft-first-Story RC frames through the steel-jacketed non-reinforced thick hybrid wall. This method has the potential of significant reduction in construction costs of retrofitting Existing buildings increases strength, stiffness and also improves ductility.

Emre Akin [12] studied open ground story in properly designed reinforced concrete frame. Buildings with shear walls. Existence of shear wall may not only change structural behavior but also contribution of masonry infill walls to lateral response results that Shear walls reduces the risks.

Vedha [13] explored a framed multi-story construction made of RCC, Steel, and Composite and contrasted considering a

G+18 storey building located in India's Earthquake Zone IV. They performed Equivalent lateral force method and Response spectrum approaches using E-tabs Software and compared composite and steel structures with Storey Drift, Storey over Turning Moments, Base Shear, and Roof Displacements. In this research, the comparison of various construction models reveals that composite structures are more cost-effective than all other structure.

Mazza et al. [14] reported base-isolation systems for the Seismic retrofitting of R.C. framed buildings with soft-story subjected to near-fault Earthquakes. Effectiveness of base-isolation systems for the seismic retrofitting in near- Fault area was evaluated with nonlinear modelling of masonry infills (MIs).

Mashhadiali and Kheyroddin [15] analysed seismic performance of concentrically Braced frame with hexagonal pattern of braces to mitigate soft story behavior. The hexa -braced frames system improves the damages concentration in CBFs. This system helps to achieve uniform drift distribution along the height of a building and to prevent Soft-story mechanism.

Khan and Rawat [16] examined nonlinear Seismic analysis of Masonry Infill RC Building with Eccentric Bracings at Soft Story Level. Eccentric bracing serves as lateral Loads resisting system, Stiffness, results in lesser story drift, collapse is reduced in comparison to soft story frames.

For seismic analysis, the *Kapgate, and Budhlani* [17] worked on a high-rise G+15 frame with and without Shear wall using E-Tabs 2016 Software. They used a Non-linear elcentro Time History Analysis for a unique Moment Resisting Frame that was subjected to earthquake loading.

Yadav, and Reddy [18] investigated the wind and earthquake forces on a G+20 multi-story building in the most severe zone. A 3D model for a G+20 multi-story structure was developed in ETABS. On structural systems, the effects of lateral loads on moments, axial forces, shear force, base shear, maximum storey drift, and tensile forces are explored, and the results from zones 2 and 3 are compared.

i. The table clearly indicates that in zone 2 soils, storey drift x and y are higher in earthquake than spectrum.

ii. When comparing zone2 and zone5, storey drift in zone5 is larger than in zone2.

iii. E-Tabs will be in charge of designing each and every member.

iv. Using software improves accuracy.

Panchal, and Dwivedi (2017) [19] Analyzing Seismicity and design a G+6 existing RCC framed structure in this project using STAAD. Pro V8i software. The structure is built to withstand earthquake stresses in a variety of seismic zones, according to IS 1893(Part 1):2002. The paper's major goals are to compare seismic zone differences in steel %, maximum shear force, maximum bending moment, and maximum deflection. From zone II to zone V, the variances are significantly bigger. From zone II to zone V, steel percent, maximum shear force, maximum bending moment, and maximum deflection all rise.

Reddy, and Kumar (2017) [20] In this work, the behavior of high-rise structures is investigated for both schemes. The results of a mathematical model for models were presented in this work. The graph depicts the story's drift, shear, and support reactions. It's also worth noting that the conclusions of static analysis are more conservative than those of dynamic analysis, resulting in uneconomical structures in both zones 4 and 5.

i. In both zone 4 and zone 5, the storey drift increases from top to bottom storey, with the maximum drift at storey 31 when compared to other stories.

ii. When comparing the drift values in zones 4 and 5, zone 5 shows a larger value of drift.

iii. When we compare the forces in all tales for zone 4 and zone 5, the storey shear is maximal for the moments. When compared to zone 4, zone 5 has a higher shear value.

iv. For forces and moments in support reactions, the greatest value occurs in zone5 rather than zone4.

v. When creating with software like ETABS saves you a lot of time when it comes to design work.
vi. ETABS will acquire information on each and every member.

Gupta et al. (2017) [21] analyzed the Nonlinear dynamic Time History analysis of a 23-story RCC residential building is undertaken in this study, with various seismic/earthquake intensities considered, and the response of such a building to earthquake is explored. To model the building under investigation, SAP2000V.14.00 software is employed. Five different time histories were utilized to develop the link between seismic intensities and seismic reactions, with seismic intensities V, VI, VII, VIII, IX, and X on the Modified Mercalli's Intensity scale (MMI). The data show that seismic reactions, such as base shear and storey displacements, have a similar pattern of variance with intensities ranging from V to X. According to the findings, utilizing the Time History technique to analysis multi-storey RCC buildings is now essential to ensure seismic safety.

Sharma, and Mohammad [22] compared other characteristics such as building displacements, column forces, and moments created in the structure, as well as simulating a multi-story building under seismic and wind forces. The effects of seismic and wind stresses on the various structural parameters of these different types of construction approaches on symmetrical G+10, G+15, and G+20 multi-story buildings. It includes the analysis and design procedure for symmetrical high-rise multi-story buildings subjected to wind and seismic forces, such as G+10, G+15, and G+20. When seismic loading is applied to steel composite structures, they find that node displacement is lower than in RCC structures.

Kumar and Rao [23] worked on a high-rise 5, 10, and 15-story skyscraper in India's earthquake zone V analyzing Seismicity of Steel Concrete Composite System followed by comparison to RCC Structures. The researchers performed Response Spectrum Method and nonlinear Time History Analysis using E-tabs software for matching different parameters, and concluded that composite structures are suitable for high-rise structures.

Sharma, et al [24] performed Seismic analysis of Multi-Story Steel Concrete Composite System considering G+20 story building utilizing RCC and Composite systems and compared to RCC Structures located in India's Earthquake Zone IV. They used the Equivalent Static Technique in E-Tabs and matched different criteria such as Deflection, Stiffness, Story Drift, and Less Dead Weight before concluding that steel-concrete composite structures are the optimal method of construction for high structures.

Mahajan, and Kalurkar [25] explored the effect of Fully Encased Composite (FEC) on the construction of a G+20 storey building. In the event of a seismic occurrence, the ETAB software was utilized to analyze the structure. In seismic analysis, non-linear static analysis, such as Pushover Analysis, and linear static analysis are also utilized. The findings are compared for Base Shear, Modal Time Period, Storey Displacement, and Storey Drift.

Inchara, and Ashwini [26] analyzed seismicity in multi-stories RCC and composite structure. Five (G+4) models were investigated in the study. For gravity loads and earthquake forces in diverse seismic zones, all four models were created and analyzed using the ETABS software. The study's major goals were to look at how R.C. framed irregular buildings performed under gravity loads and in different seismic zones, as well as changes in steel % and concrete volumes. In addition, to understand the differences in steel reinforcing percentages and concrete volumes between structures built to IS 456:2000 for gravity loads and buildings planned to IS 1893(Part 1):2002 for gravity loads. Support reactions tended to develop when the zone migrated from II to V, resulting in bigger concrete volume and steel reinforcement weight in footings and a higher fraction of steel reinforcement in beams, according to their findings.

Panchal and Daman, [27] analyzed seismicity of RCC and composite system for a G+15 multistory building in earthquake zone four and compared the steel concrete composite structure with the RCC construction, according to IS:1893-2002, and for different earthquake loads. Despite the fact that the composite structure had more narrative deflection than the RCC structure, the deflection was still within acceptable limits. In comparison to composite structures, RCC structures have higher axial and shear forces. According to studies, the maximum bending moment in composite structures is slightly higher than in RCC structures in some stories.

Kumar et al, [28] for Seismic analysis with RCC and composite system, the researchers worked on a high-rise 3D (G+5) storey building in India's Zone IV earthquake zone. They used E-tabs 2015 software to run the Equivalent Static technique and reported that composite frames are the best choice for medium to high-rise structures in terms of material and weight, as well as improved seismic performance, when compared to RCC and steel construction.

Aniket and Suryawanshi [29] modelled G+9, G+12, G+15, and G+18 as four multi-storey constructions with a 3.0 m floor height and a plan dimension of 15m*9m for seismic analysis. STAAD Pro software was used to analyze various load combinations according to IS-code. The study confirms that a steel composite structure's total dead weight is lower than that of an RCC structure, meaning that seismic pressures are less damaging to steel composite structures. Because the section of the steel element is less than in RCC structures, the cost is effective.

Fredrick et al. [30] conducted assessment of seismic vulnerability assessment of soft story irregular buildings using pushover analysis. A static pushover analysis was utilized to determine the performance of the building under different irregularity conditions. The study may be used to improve existing level 1 risk assessment.

Sangave, and Madur, [31] In Indian seismic zone 5, the authors looked at the bare and infill frames of four G+6 and G+10 RCC and steel concrete composite structures. Due to the lower seismic weight of steel composite structures, they discovered that the base shear is smaller than in RCC structures. In a steel concrete composite structure with an RCC framework, storey-drift and displacement are considerable. According to the conclusions of this study, the shear force in RCC structures is more than in steel composite structures, and the bending moment in RCC beams and columns is greater than in composite structures.

Mujawar, and Sangave [32] compared reinforced concrete, steel, and composite structures, static and dynamic loads. ETABS software was used to compare three constructions using the response spectrum technique. According to this study, composite constructions, are better ideal for high-rise buildings than reinforced concrete structures. The displacement of the composite structure is 48 percent larger than that of the RCC construction. Because no formwork is necessary, composite structures take less time to build than R.C structures.

Joshi, and Deulkar [33] studied how steel concrete composite constructions are formed by using shear connectors to connect steel beams to concrete slabs or profiled deck slabs, allowing the structure to function as a single unit. When modeling and appraising a B+G+11-story commercial building in Kolhapur, they evaluated the results of both steel concrete composite and RCC buildings using the ETABS software. The authors considered ETABS with applications of the Equivalent Linear Static Method. Roof deflections, foundation shear, and storey drifts for the building, as well as axial forces and bending moments for columns and beams at various levels. Steel-concrete composite buildings have been demonstrated to be both safer and more cost-effective, demonstrating their superiority.

Ali and Bhalchandra [34] analyzed seismicity of Steel Concrete Composite System. RCC and composite buildings were modeled and analysis using the finite element-based program ETABS 2015, and the buildings were also classed by the number of floors. They also compared the costs of RCC and composite constructions under varied support situations. Composite structures, they feel, are more cost-effective than RCC structures, and that composite structures are a better solution for multi-story buildings that must handle seismic stresses.

Patil, and Suryanarayan [35] examined the seismic performance of a G+15 storey building made up of RCC and composite structures using ETAB 2013 software, as well as a structure located in earthquake zone three on medium soil. For the building's analysis, the response spectrum and static approach are utilized. The proposed work when compared to RCC structures, composite structures have less storey drift. This work's outcome demonstrates that as composite structures have less dead weight than RCC structures, the total cost of construction is lower. The framework of the study also shows that composite structures are more ductile and resistant to damage. In comparison to RCC structures, the lateral load is lower.

Wagh and Waghe [36] examined a 25-story building using composite and RCC systems in Nagpur, India. Nagpur is located in earthquake zone II. The analysis included STAAD PRO to perform a similar static analysis and calculate the material prices of both systems, ultimately finding that employing a composite system for high-rise buildings would save money.

Charantimath, et al. [37] worked on 10-story, 20-story, and 30-story high-rise building constructions and examined using the composite system and the RCC system. The researcher used the Equivalent Static approach and Response Spectrum analysis, and computed all of the structural parameters of Composite and RCC building elements using E-Tabs software. According to the findings of this study, the composite option for high-rise buildings is the best alternate.

Kumawat [38] performed Seismic Analysis of Steel Concrete Composite System and RCC structure, for a comparative examination of a (G+9) storey commercial structure located in earthquake zone III and for earthquake loading, the provisions of IS: 1893 (Part1)-2002 are used. The structure is three-dimensionally modelled and analysed using SAP 2000 software. The Equivalent Static Approach of Analysis and the Response Spectrum Analysis approach are used to analyses both composite and RCC structures. When the data was compared, the composite structure shown to be more cost effective.

Mahesh, and Rao [39] The author evaluated a residential G+11 multi-story structure for earth quake and wind load using ETABS and STAAD PRO V8i software. The linearity of the material's properties is assumed in both static and dynamic analyses. Many seismic zones are considered in these analyses, and the behavior of each zone is evaluated using three different types of soils: hard, medium, and soft. For various zones and soil types, various responses such as tale drift, displacements, and base shear are plotted.

Koppad, and Itti [40] In India, RCC and composite systems were utilized on a 15-story skyscraper in earthquake zone III. They analysis the composite and RCC systems' material costs and discovered that the composite system has lower material costs than the RCC system.

Panchal and Prajapati [41] explored a model G+30 storey structure made of Steel and Composite. They conducted seismic analysis of the Steel Concrete Composite System and RCC structure. The researchers performed Equivalent Static Method using E-Tabs software. The analysis and design approach used for the valuation of symmetric high rises is discussed in this study. Wind and Seismic forces on a multi-story building, Shear walls were used in these types of structures to counteract lateral forces. When the analytical results are compared, it was found that steel concrete composite construction is the superior alternative.

Sahoo and Rai [42] Design and evaluation of seismic strengthening techniques for reinforced concrete frames with soft ground story The RC frame with strengthened ground-story columns cannot survive all earthquakes. The strengthened frames can be designed using performance-based design method. The soft story response of RC frame can be controlled using aluminum shear links.

Patil and Kumbhar [43] The author worked on the RCC for the High Rice G+10 storey. Different Seismic Intensities were considered when designing the structure. SAP2000-15 software is used to model the building under evaluation. For the purpose of establishing a relationship between seismic intensities and seismic reactions, five distinct time histories were employed, with seismic intensities V, VI, VII, VIII, IX, and X on the Modified Mercalli's Intensity scale (MMI). The study's findings reveal a similar pattern of variance in seismic reactions such as base shear and storey displacements with intensities ranging from V to X.

Plumier, et al [44] Mitigation of soft story failures of R.C. structures under earthquake by encased steel profiles A test program is realized on cruciform (shape of cross) beam-to-column nodes with a column inserted between infills. The results is it consists in localization of buildings seismic deformations and rupture in bottom story.

3 RESEARCH PERSPECTIVE

The literature review presented above shows that there are a number of published works on RCC, Steel and composite structure. Theoretical studies are presented on the behavior of seismic forces acting on multi stories building structure. Seismic Behavior is different for different Zones. An analytical examination of the structural behaviour of RCC and composite high-rise buildings is being explored. Displacements, axial forces, base shear, and natural period are all taken parameters are considered exact seismic analysis of the structure is highly complex and to tackle this complexity, numbers of researches have been done with an aim to counter the complex dynamic effect of seismic Induced forces in structures, for the design of earthquake resistant structures in a refined and easy Manner. Various approaches to seismic analysis have been developed to determine the lateral Forces, ranging from purely linear elastic to non-linear inelastic analysis. Many of the analysis Techniques are being used in design and incorporated in codes of practices of many countries. Structural design of buildings for seismic loads is primarily concerned with structural safety During major ground motions, but serviceability and the potential for economic loss are also of Concern. Seismic loading requires an understanding of the structural performance under large Inelastic deformations STAAD is a structural analysis and design software application by Research Engineers International in 1997. STAAD Pro.is one of the most widely used structural analysis and design software products worldwide.

STAAD pro. Is an advanced software, yet easy to use, special purpose to analysis and design program developed individually for building systems? STAAD pro. Features an intuitive and powerful graphical interface coupled with unmatched modelling, analytical, and design procedures, all integrated using a common database. Although quick and easy for simple structures STAAD pro. Can also handle the largest and most complex building models, including a wide range of nonlinear behaviours, making it the tool of choice for structural engineers in the building industry. The basic approach for using the program is very genuine. The user establishes grid lines, places structural objects relative to the grid lines using points, lines and areas, and assigns loads and structural properties to those structural objects (for example, a line object can be as-signed section properties; a point object can be assigned spring properties; an area object can be assigned slab or deck properties). Analysis and design are then performed based on the structural objects and their assignments.

i. There should be a healthy market for composite constructions that use precast concrete and, in some cases, pre-stressed concrete, as well as steel.
ii. Different soil conditions, different zones, the impact of fire, different column orientations, and various building functions all need composite structure study.
iii. Non-linear joint response research can be undertaken by treating the joints as rigid joints and accounting for rotational stiffness, moment of resistance, and rotational capacity.
iv. For better system selection suggestions, different geometries of high-rise constructions can be compared for R.C.C., Steel, and Composite alternatives.
v. Although there are no suggestions for the design of composite columns in the Indian standard, such recommendations can be inferred and used to establish a good design process for various types of composite column

- To study the performance of Soft Storey building in various loadings.
- To find out the Methods of analysis in soft storey
- To apply different methods for creating seismic resistant soft storey structure like eccentric bracings etc.
- Nonlinear dynamic analysis can be carried out to predict the real time behaviour of the structure by analysing the hinge failure pattern.
- Finally, using record of actual major earthquakes of Indian subcontinent that occurred in the past, time history analysis of these models can be carried out to predict their behaviour more accurately.

3. CONCLUSION

In seismic design of structure and in high rise structure, the provision of bracing system has become more effective. So, this study aims to find out the effect of bracing on soft storey of building. In this study, G+7 frame is modelled with different type of bracing pattern and different combination of soft story using software STAAD Pro. Effect of these different bracings on soft storey is studied for different parameter like column displacement, maximum deflection, maximum bending moment, maximum axial force and maximum shear force. From the observed result best type of bracing will be selected to resists earthquake in the structure for further studies. Seismic performance of concentrically braced frame with hexagonal pattern of braces to mitigate soft story behaviour. The hexa -braced frames system improves the damages concentration in CBFs. This system aims to achieve uniform drift distribution along the height of a building and to prevent soft-story mechanism. Nonlinear Seismic Analysis of Masonary Infill RC Building with Eccentric Bracings at Soft Storey Level Eccentric bracing serves as lateral loads resisting system, Stiffness, results in lesser storey drift, collapse is reduced in comparison to soft storey frames. They were done time history analysis.

After study about all eccentric bracing, the pushover analysis is will take place in the structure for the varying soft story severity which may be used for preliminary risk assessment tools

Conflict of Interest

The author declares no **Collaboration** of interest.

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