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Structural Analysis and Design of RCC and Steel Plate Shear Wall for Multistoried Building

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ABSTRACT:-Tall Structures are most influenced by lateral forces in seismic prone areas. The most significant basis to be considered in the design of the tall structures is to oppose lateral forces which can cause instability and sudden failure of the structure. In this manner it is necessitated that structure ought to have enough lateral stability to oppose lateral forces and to control the lateral displacement of the building. The shear wall is one of the most generally utilized lateral loads opposing System in elevated structures Shear wall has high in-plane stiffness and quality which can be utilized to all the while opposing enormous horizontal loads and support gravity loads. The incorporation of the Shear wall has turned out to be inescapable in multi-storeys working to oppose lateral forces. It is exceptionally important to decide the successful, effective and ideal location of the shear wall. In this paper, seismic analysis has been done on Multi-storey building in Zone IV. The analysis has been done considering shear wall of RCC and steel plate. Parameters like axial load, displacement, overturning moment, stiffness etc. are determined for different location of shear wall.

Keywords – Shear wall, Seismic loading, lateral loading

In this paper the different method and same material of the shear wall has been analyzed which is RCC shear wall and Steel plate shear wall.

I. INTRODUCTION

Shear walls provide large strength and stiffness to buildings in the direction of their orientation, which significantly reduces lateral sway of the building and thereby reduces damage to structure and its contents. Since shear wall carry large horizontal earthquake forces, the overturning effects on them are large.

In building construction, a rigid vertical diaphragm capable of transferring lateral forces from exterior walls, floors and roofs to the ground foundation in a direction parallel to their planes. When shear walls are designed and constructed properly, they will have the strength and stiffness to resist the horizontal force.

For that reason, many renovations call for the removal of a wall, be it shear or load-bearing. No question, shear walls are a lot easier to knock down. Provided you take the necessary safety precautions and follow local building regulations, you might even be able to do it yourself.

In the present study, various researches were discussed on performance of shear wall based on its location, orientation and materials used for construction.

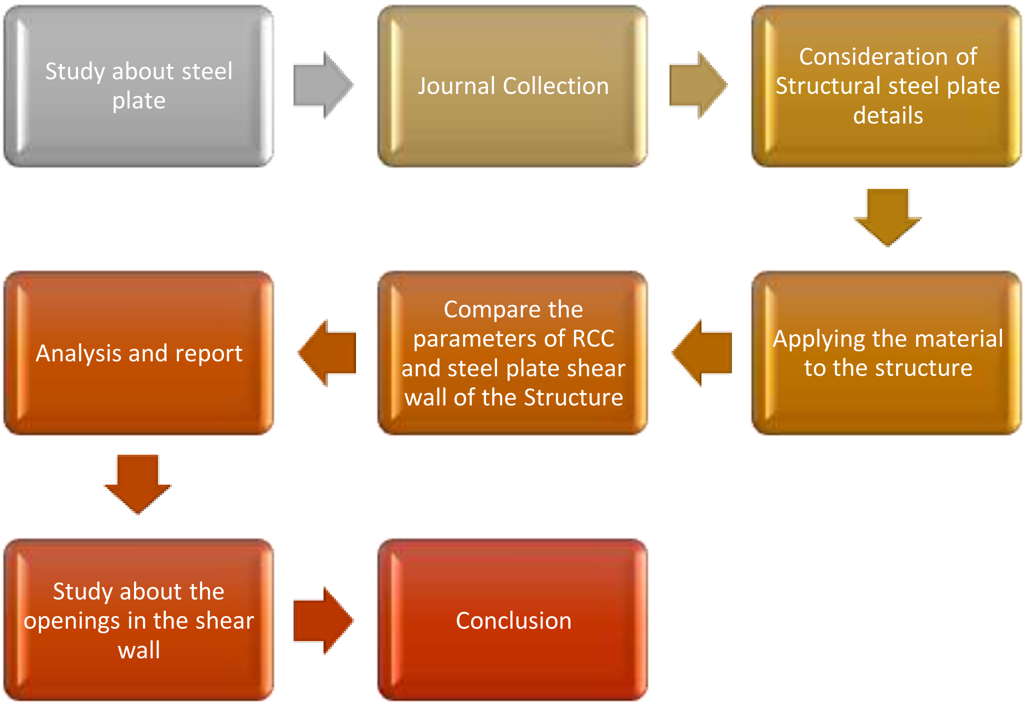
II. OBJECTIVES

- Planning the construction area.
- Designing of super structure.
- Analyzing the shear wall in high rise building subjected to lateral wind and seismic forces.
- Compare and find the strength and stability of the building in the presence of RCC Shear wall and Steel Plate Shear wall.
- Compare and find strength of the building by providing with and without opening in the shear wall.

III. METHODOLOGY

- Study about the project through journals and literatures. Study about the analysis of the building through ETABS.
- Study the basic consideration like location and area of the building. Determination of lateral forces according to seismic effect.
- Design the project building by using Auto CAD. Design the shear wall for the high rise building in different method as RCC and as Steel Plate.

- Determination of lateral and seismic forces according to the selected zone. Analysis will be done by providing with and without opening in the shear wall and the safest method of the shear wall will be reported.



IV. STRUCTURAL DETAILS AND PARAMETERS

4.1 Earthquake

Time history analysis was performed in ETABS v.15.1.0 software. In the analysis time history function and a targetresponse spectrum function are defined. The time historyfunction is matched with the defined target response spectrum function. For this purpose a software named Seismo Matchhas been used.For the purpose of analysis, ground motion data are required.In the present study, four different earthquakes that have beenoccurred at different locations across East Asian region withdifferent intensities have been considered.

A. Chamoli Earthquake:

The Chamoli earthquake was occurred in 1999 in India. Theearthquake was the strongest to hit the foothills of TheHimalayas in more than ninety years. The magnitude of theearthquake was 6.6 on the Ritcher scale. The maximumintensity was VIII (Severe)

B. Bhuj Earthquake:

The Bhuj earthquake is also known as the Gujarat earthquakeand was occurred in 2001 in India. The intra-plate earthquakereached 7 on the moment magnitude scale and had amaximum felt intensity of X (extreme) on the Mercalli intensity scale.

C. Kobe Earthquake:

The Kobe or Great Hanshin earthquake was occurred in 1995in Japan. It measured 6.9 on the moment magnitude scale andhad a maximum intensity of 7 on the JMA Seismic intensityScale, which is the highest of the level.

D. Chi Chi Earthquake:

The Chi Chi earthquake which is locally known as the 921earthquake, was occurred in 1999 in Taiwan. It was thesecond deadliest quake in the recorded history in Taiwan. Themagnitude recorded on the Ritcher scale was 6.3.

Earthquake Name	Region	Magnitude
Chamoli	India	6.6
Bhuj	India	**7**
Kobe	Japan	6.9
Chi Chi	Taiwan	6.3

Table 1.Earthquake Data

4.2 Shear wall

Shear walls provide large strength and stiffness to buildings in the direction of their orientation, which significantly reduces lateral sway of the building and thereby reduces damage to structure and its contents. Since shear wall carry large horizontal earthquake forces, the overturning effects on them are large.

Shear wall is a structural member positioned at different places in a building from foundation level to top parapet level, used to resist lateral forces i.e parallel to the plane of the wall. There are different materials by which shear wall can be constructed but reinforced concrete buildings often have vertical plate-like reinforced concrete walls in addition to slabs, beams and columns. Their thickness can be as low as 150mm or as high as 400mm in high rise buildings. Shear walls are usually provided along both length and width of buildings.

Shear wall resist horizontal lateral force and provide earthquake resistance. It possesses very large in-plane stiffness which resist lateral load. Shear walls are easy to construct and reinforcement detailing. It minimizes earthquake damage to structural damage and non-structural damage.

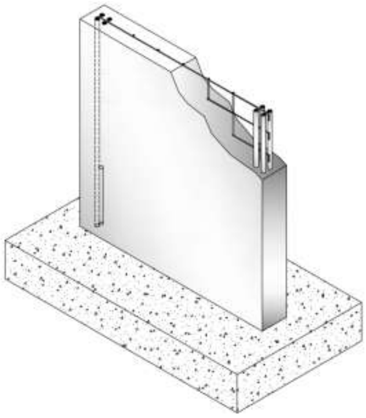


Fig.1 RCC Shear wall

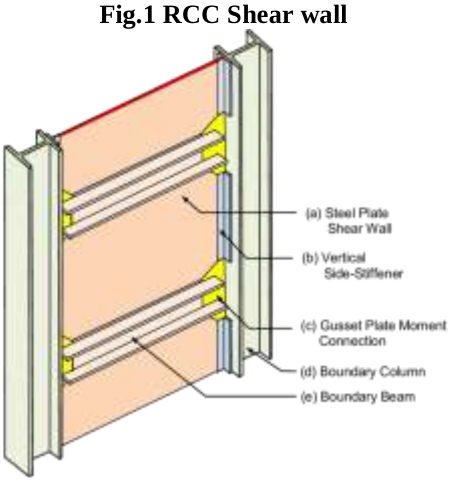


Fig.2 Steel plate Shear wall

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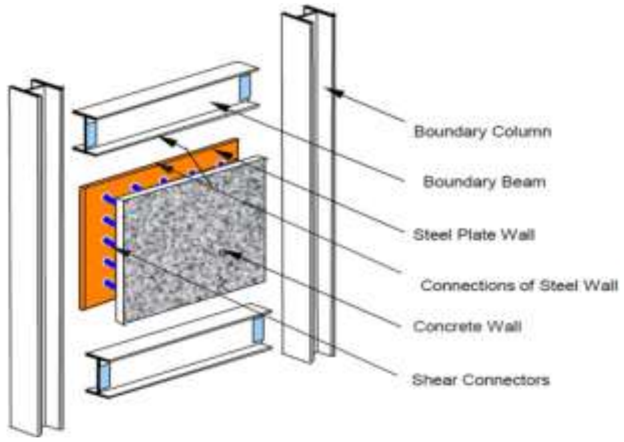

Fig.3 Composite Shear wall

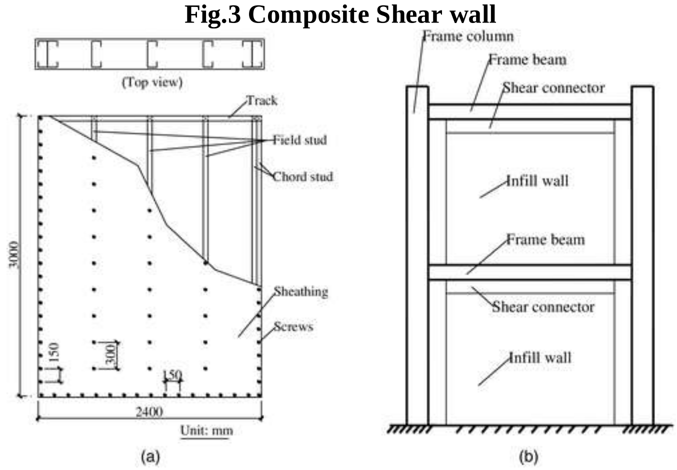

Fig.4(i) Shear wall fixing manner

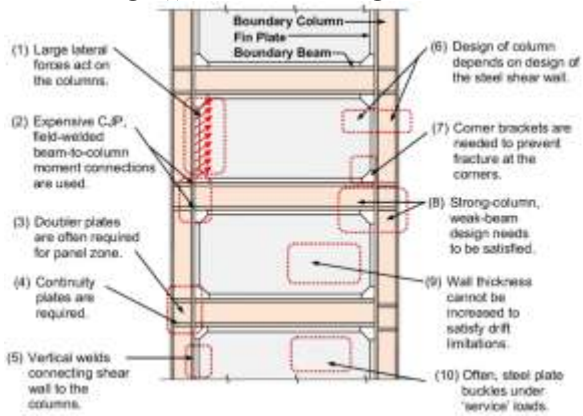

Fig.4(ii) Shear wall fixing manner

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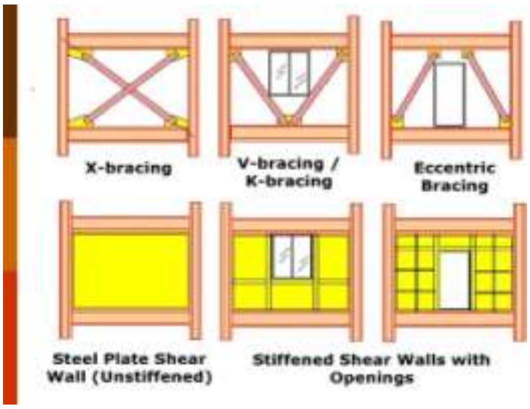

Fig.4(iii) Shear wall fixing manner (Infill type)

A 40-storey building is considered for the analysis. Provided floor height as 3.6m. four models have been considered for he analysis. Shear walls are positioned at different locations in these models.

Table 2.Structural Parameters of Building G+40 Floor

Material	Elastic modulus (Mpa)	Yield Stress (Mpa)	Poisson's ratio
Infill steel plate	2.04×10^5	280	0.3
Beam, Column	2.10×10^5	240	0.3
Frame	2.07×10^5	400	0.3

4.3 Loading Consideration
Gravity Loads

The gravity loads on the structure considered in this analysis include dead loads and live loads. The Self-weight of the structural elements are calculated automatically by the ETABs program itself. The wall loads are assigned as uniform area loads on slab elements. Live loads are assigned as uniform area loads as per the Egyptian Code for Loads (ECL 201/2012).

A. Earthquake Load

In recent years, earthquake loads of the high-rise buildings have been a significant concern for designers owing to the development and the construction. The lateral load of the earthquake load is calculated according to the Egyptian Code for Loads (ECL 201/2012).

B. Load Combinations

When calculating the loads on the building, the loading cases shall be considered to give maximum effect on the structural elements. Egyptian Code (ECP 203/2017) states that there are numbers of load combinations which are used in the structural analysis.

C. Analysis of the Structure

For determining seismic design lateral forces, evaluating (ECL 201/2012) and the effect of the change in the building rigidity on seismic actions, the Egyptian code recommended using different types of earthquake analysis methods.

Dynamic Analysis

The Response Spectrum Analysis (Linear Dynamic) Time History Analysis (Non-Linear Dynamic) In this present study, the Equivalent Static Load analysis and the Response Spectrum Analysis are carried out for the determination of seismic parameters of the building. All designs against earthquake effects must take the dynamic nature of the load into consideration. However, Equivalent static analysis cannot be used if the structure is irregular in terms of mass distribution, stiffness, strength, and elements with large ductility or the lateral force resisting system is non-

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orthogonal. The Egyptian code for loads (ECL201/2012) recommends that detailed dynamic analysis should be carried out depending on the importance of the problems. Also, it recommends the use of model analysis using the Equivalent Static Load method and the Response Spectrum Analysis method for building of height less than 60m in all seismic zones as safe. In (ESL) procedure, the distribution of seismic lateral force on the building depends on the fundamental period of the structure with some modifiers. The base shear shall be computed, and then be distributed along the height of the buildings based on simple formulas for buildings with regular distribution of stiffness and mass. However, the distribution of seismic lateral force on the building in the (RSA) is based on the deformed shapes of natural modes of vibration, which are obtained from the distribution of mass and stiffness of the structure.

In the present study, various researches were discussed on performance of shear wall based on its location, orientation and materials used for construction.

In this paper the different method and same material of the steel plate has been analyzed which is Steel plate shear wall.

Seismic zone	IV
Zone factor	0.24
Importance factor of the building	1.5
Response reduction factor	5
Damping of structure	5%

Table 4.Factors considered for seismic analysis

V. ANALYSIS

A 40- storey building is considered for the analysis. Provided8 bays along x- axis and 8 bays along y-axis. The spacingbetween the frames in given as 3.5m along x-axis and 4.5malong y-axis. Floor height is taken as 3.6m.

The plan view of the models are shown below:

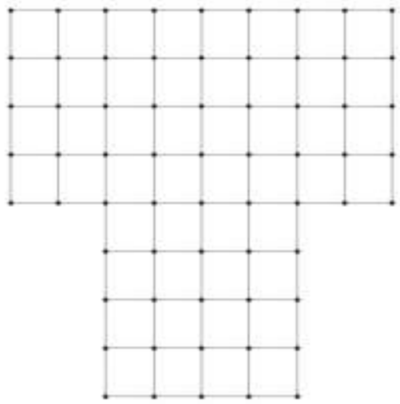

Fig.5.1 Plan view of the model

Four models have been considered for the analysis. Shearwalls are positioned at different locations in these models.

Model 1 - When shear walls are placed along all the corners of the building

Model 2- When shear walls are provided as inner walls

Model 3- When shear walls are provided as outer walls

Model 4- When shear walls are provided in the core of the building

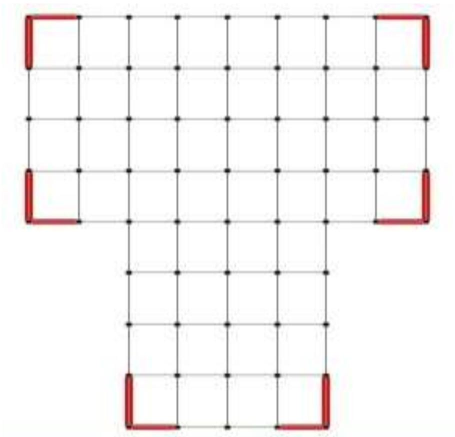

Fig.5.2 Model I

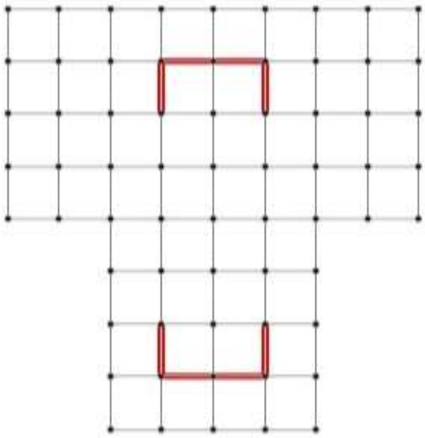

Fig.5.3 Model II

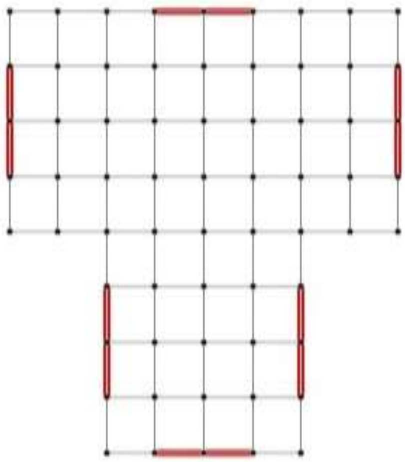

Fig.5.4 Model III

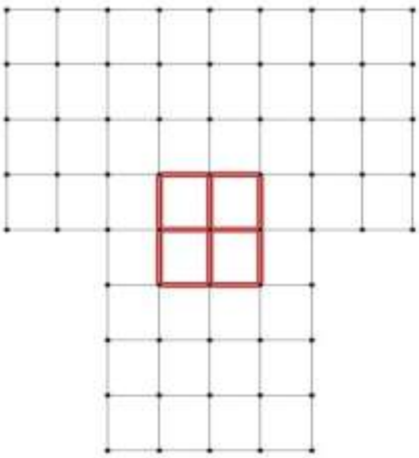

Fig.5.5 Model IV

VI. COMPARISON BETWEEN THE SHEAR WALLS

The results obtained from time history analysis performed inall the models of infill type shear wall for different earthquakes are tabulated below.

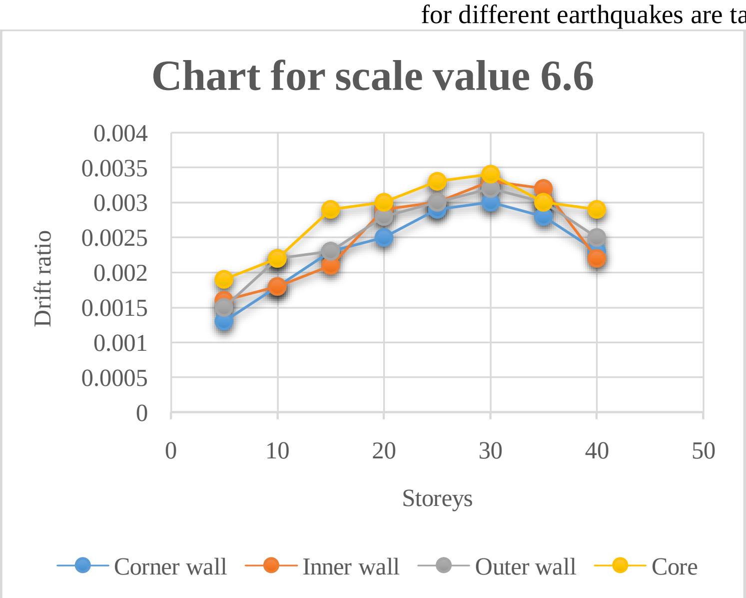

Fig.6.1 for value 6.6

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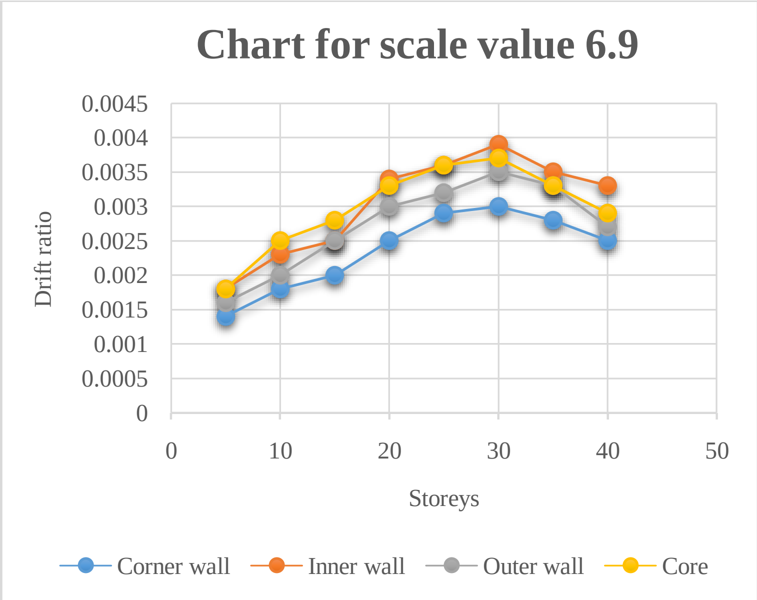

Fig.6.2 for value 6.9

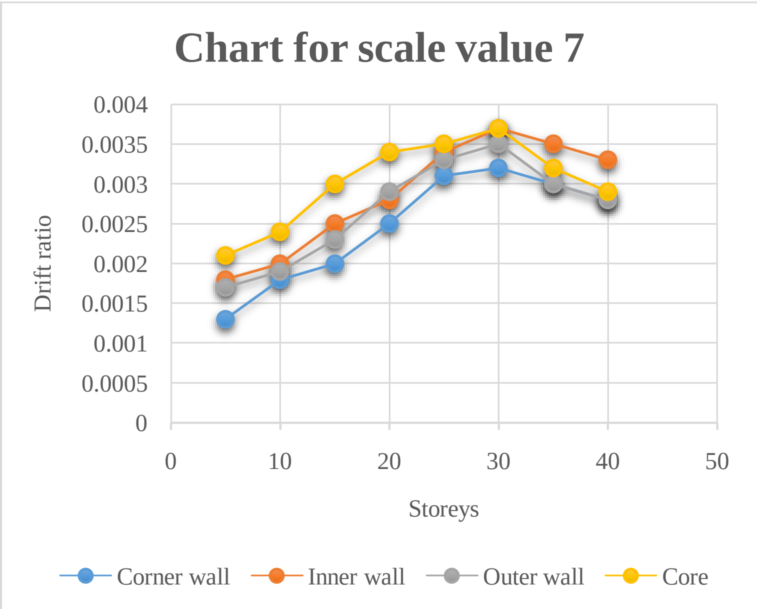

Fig.6.3 for scale 7

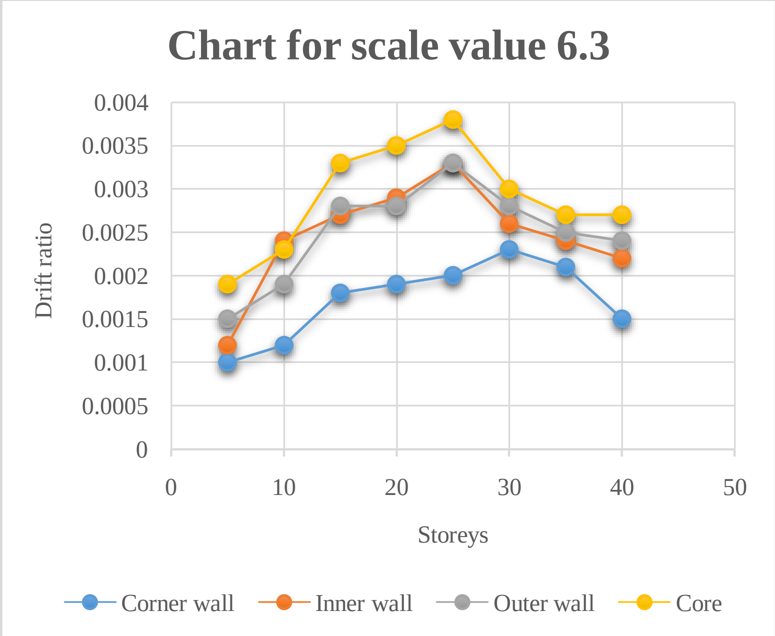

Fig.6.4 for scale 6.3

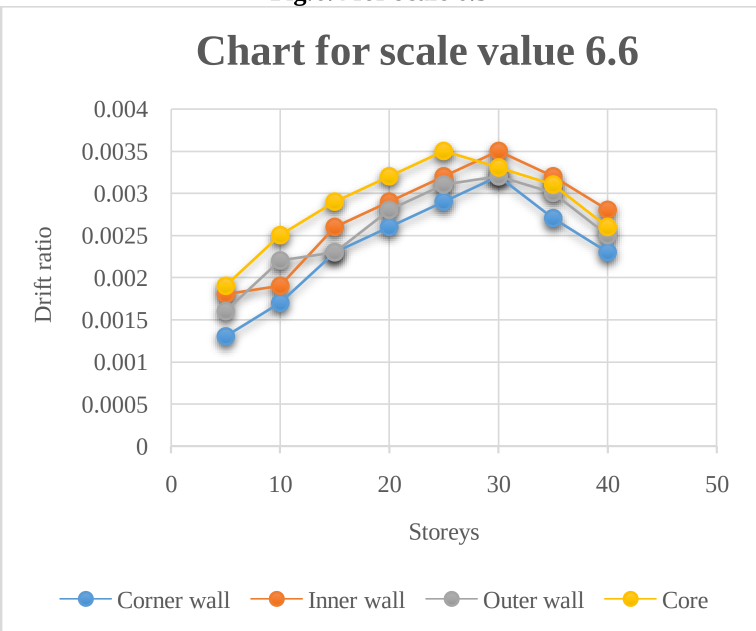

Fig.6.5 for scale 6.6

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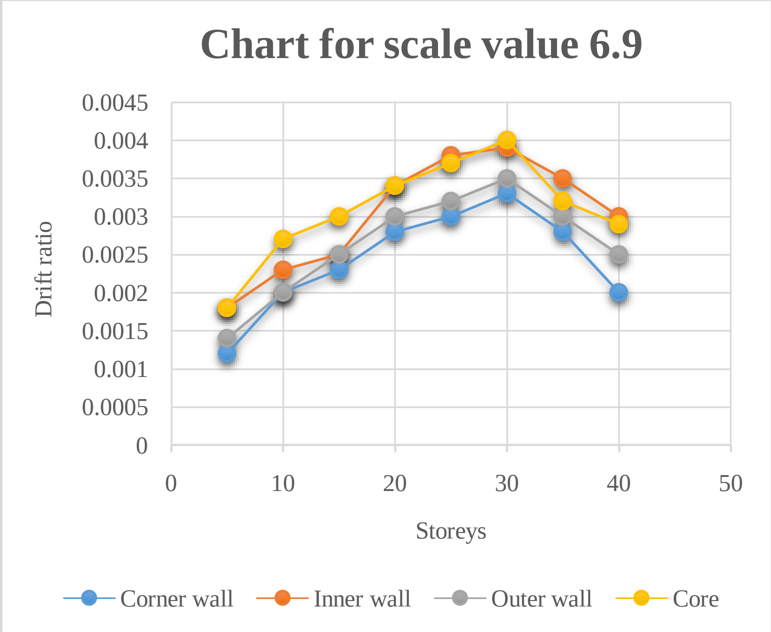

Fig.6.6 for scale 6.9

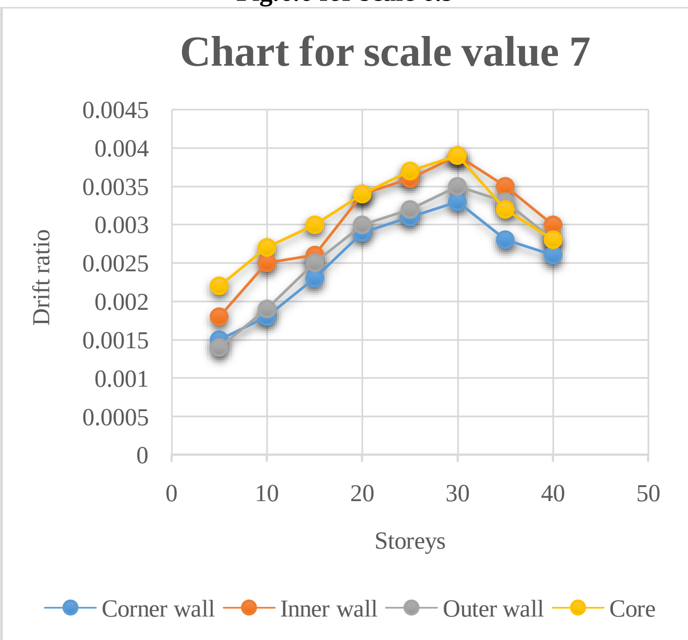

Fig.6.7 for scale 7

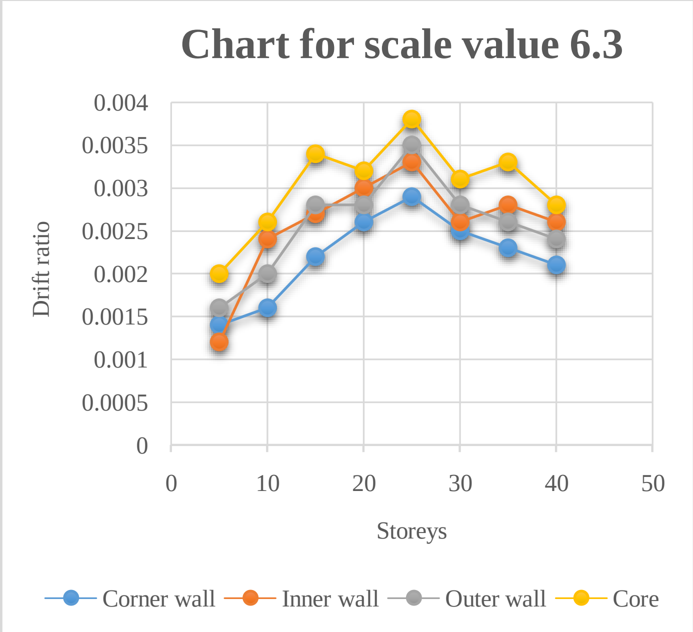

Fig.6.8 for scale 6.3

Storeys	RCC	Infill	Composite
5	0.0014	0.001	0.0014
10	0.0016	0.0012	0.0016
15	0.002	0.0018	0.0022
20	0.0026	0.0019	0.0026
25	0.003	0.002	0.0029
30	0.0025	0.0023	0.0025
35	0.0023	0.002	0.0023
40	0.0018	0.0015	0.0021

Table.6.1 Comparison Drift ratio for scale value 6.3

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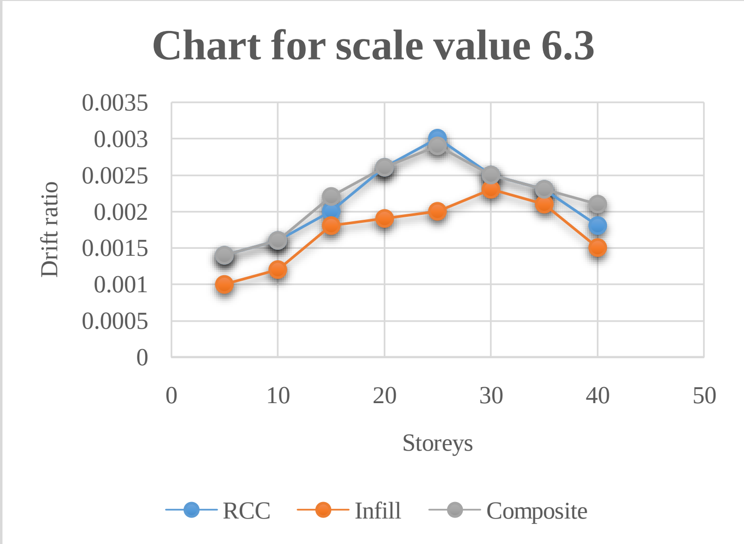

Fig.6.9 comparison between Rcc and Steel plate shear wall for scale value 6.3

Storeys	RCC	Infill	Composite
5	0.001	0.0013	0.0013
10	0.0017	0.0018	0.0017
15	0.0023	0.0023	0.0023
20	0.0026	0.0025	0.0026
25	0.0029	0.0029	0.0029
30	0.003	0.003	0.0032
35	0.0027	0.0025	0.0027
40	0.0023	0.002	0.0023

Table.6.2 Comparison Drift ratio for scale value 6.6

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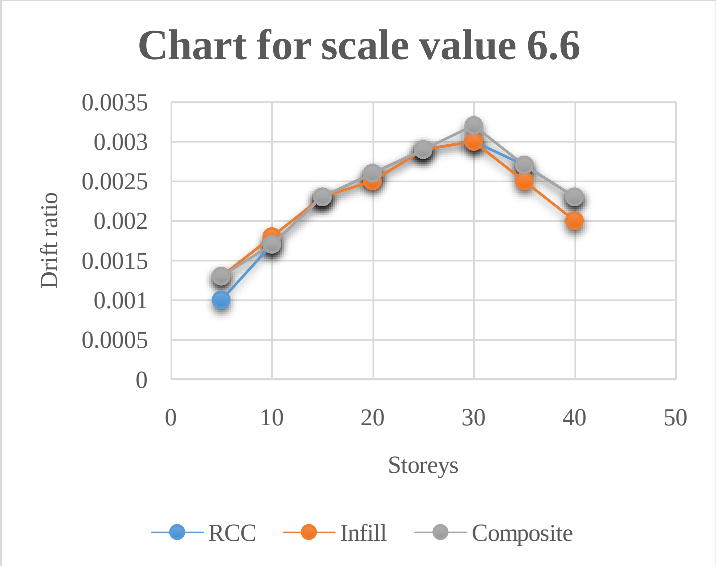

Fig.6.10 comparison between Rcc and Steel plate shear wall for scale value 6.6

Storeys	RCC	Infill	Composite
5	0.0012	0.0014	0.0012
10	0.002	0.0018	0.002
15	0.0023	0.002	0.0023
20	0.0028	0.0025	0.0028
25	0.003	0.0029	0.003
30	0.0033	0.003	0.0033
35	0.0028	0.0028	0.0028
40	0.002	0.0025	0.002

Table.6.3 Comparison Drift ratio for scale value 6.9

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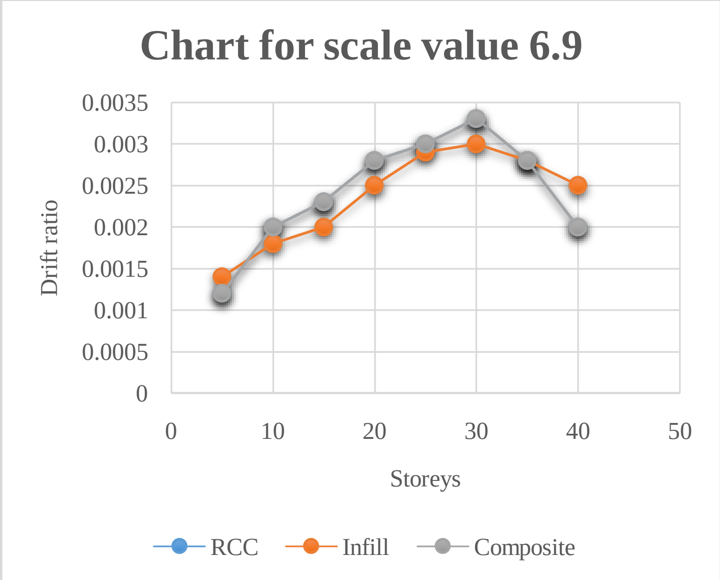

Fig.6.11 comparison between Rcc and Steel plate shear wall for scale value 6.8

Storeys	RCC	Infill	Composite
5	0.0015	0.0013	0.0015
10	0.0018	0.0018	0.0018
15	0.0023	0.002	0.0023
20	0.0028	0.0025	0.0029
25	0.0031	0.0031	0.0031
30	0.0033	0.003	0.0033
35	0.0028	0.0026	0.0028
40	0.0025	0.0022	0.0026

Table.6.4 Comparison Drift ratio for scale value 7

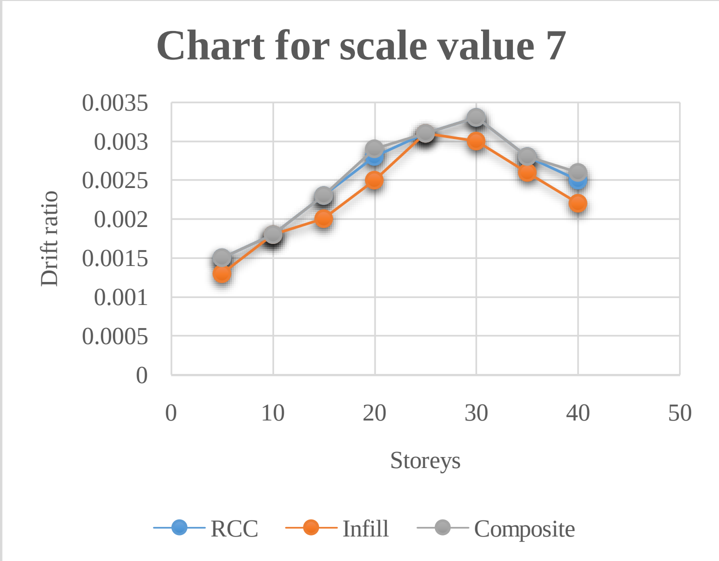

Fig.6.12 comparison between Rcc and Steel plate shear wall for scale value 7

VII. COMPARISON BETWEEN WITH AND WITHOUT OPENING IN THE SHEAR WALLS

7.1 Effects of openings in shear wall

Framed structures with shear walls are frequently adopted as the structural system for high rise buildings, the openings may be window, door types openings. The behavior of wall will change, these change will occur in deflection, bending moment, shear force and the stress in walls. Openings may be small or large depending on the function of the building. In residential building, opening like window. Door and corridor are sufficient whereas for special building like cinema theaters, function hall, hotels, community halls, it requires larger openings to meet the requirement.

In building construction, the opening size is 0.8 X 0.6 m of window and in core type model shear wall the opening size is 0.8 X 2.2 m of door opening was applied.

Increase in the number of opening which means the percentage increase in the area of shear wall also decrease the strength of shear wall, as like the size of the opening also play the same manner in the shear wall.

The displacement of the building with opening was reported as graph as following below.

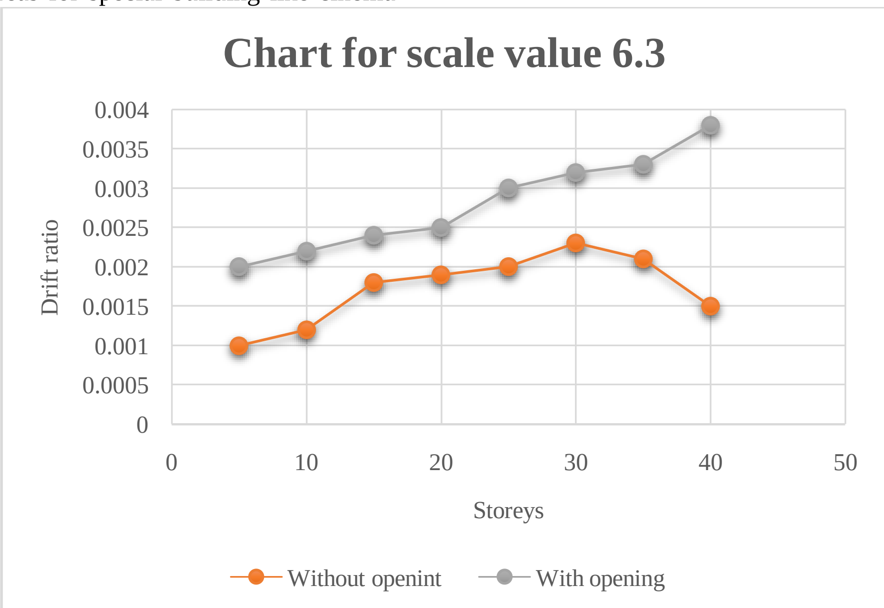

Fig.7.1 Comparison between with and without opening of infill type shear wall

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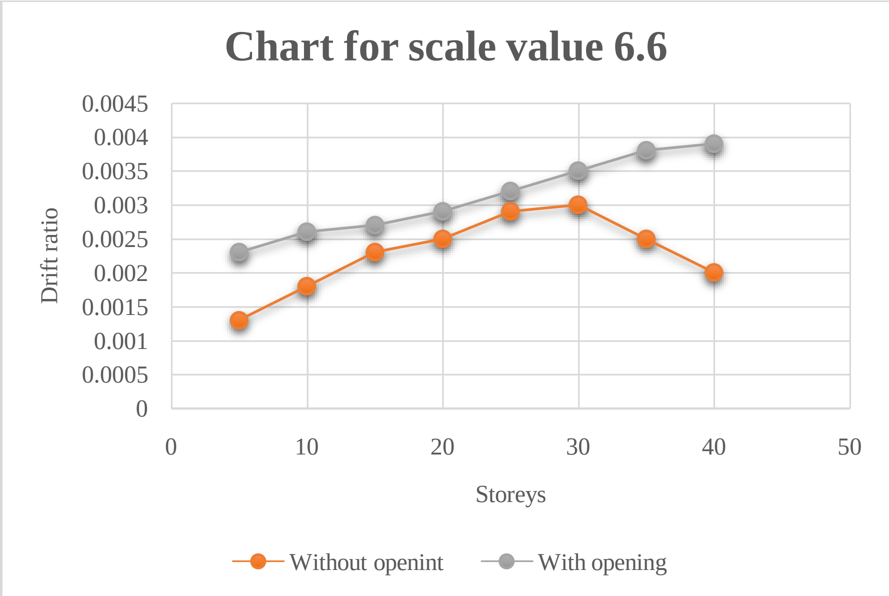

Fig.7.2 Comparison between with and without opening of infill type shear wall

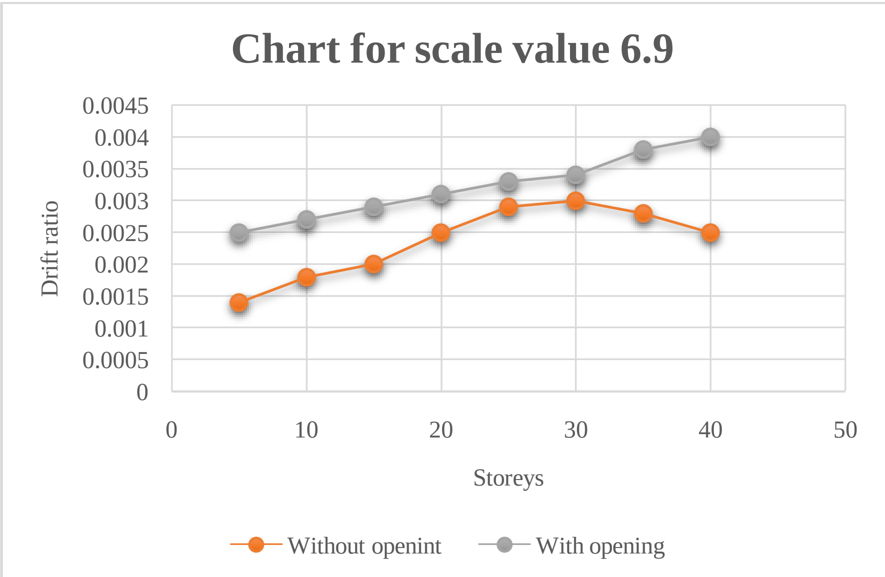

Fig.7.3 Comparison between with and without opening of infill type shear wall

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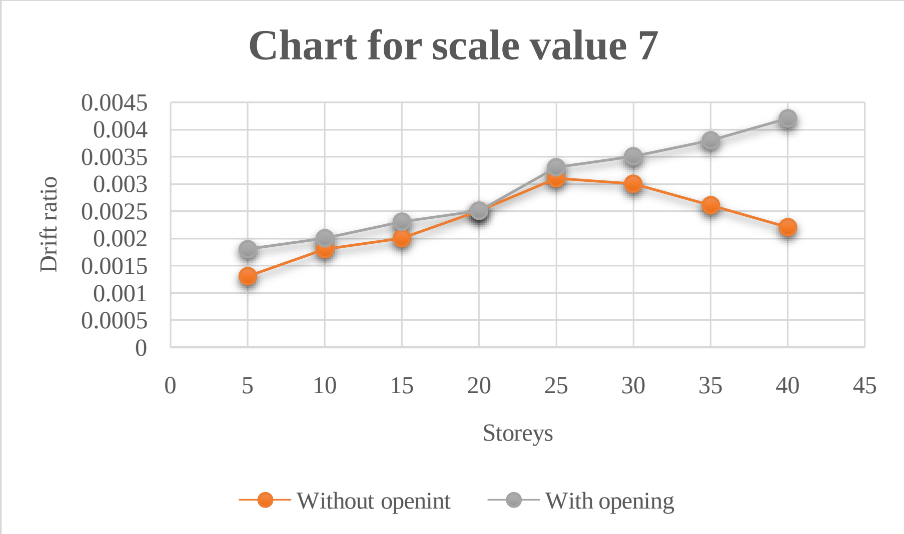

Fig.7.4 Comparison between with and without opening of infill type shear wall

The consideration factors are done and studied for analysis. The different model and parameter of the building was applied and analyzed with openings for Infill Type Steel plate shear wall building.

7.2 Discussion

Openings in shear walls have a major effect on the fundamental period and on the lateral stiffness of the structures. The case of always neglecting these openings in the modeling phase can lead to unreal design against earthquake load.

The effect of wall openings on the fundamental period of shear wall structures depend on the height of the building. The opening ratio which can be neglected in the modeling phase is in the range below 26.6% to the height of the building.

In the present study the percentage of opening is 25% which means the number of openings are 30.

The corner as well as external wall reduces column moment and axial force as compared to core and internal shear walls

The frames with shear wall is affected by the size of openings than their locations in the shear walls on the stiffness and response of structure with opening is considerably affected by the opening location in shear walls with opening area >15% of solid wall area.

VIII. CONCLUSION

Time History analysis by using four different earthquakes iscarried out for the four models considered, which are havingshear walls at different locations. Based on the analysesperformed, the following conclusions can be drawn.

1. Providing shear walls at adequate locations substantially reduces the inter-storey drift due to earthquakes.
2. By performing time history analysis by consideringdifferent earthquakes, it has been found that model 1 shows lesser displacement as compared to the othermodels.
3. The presence of shear wall can affect the seismicbehaviour of frame structure to a large extent, andthe shear wall increases the strength and stiffness ofthe structure.
5. It has been found that the model 1, in which shearwalls provided as the corner walls is the better location of shear wall.
6. As like the analysis was done for steel plate shear wall which is infill type and composite type.
7. From that the infill type was the better than other two type of shear wall according to the displacement due to earthquake loading.
8. Finally the opening of the shear wall also applied and analysed, from that the openings affect the strength of the building was found. Avoiding of more number of openings in the shear wall gives better strength during seismic period was found.
9. Due to opening of Door and Window the percentage was 15.43% in model I, 18.82% in model II, 17.45% in model III, 16.68% in model IV. Form this the infill type of shear wall with adequate opening the Model I gives good strength and low displacement according to openings and seismic loading.

This study has investigated the performance of reinforced concrete multi-story building with forty stories influenced by RCC shear walls. The parametric study was carried out for four models for the various arrangement of the shear wall in the plan configuration. In this study, the analysis of models was carried out using ETABs v.16.2 software. Shear walls were provided for lateral stability of the reinforced concrete structures. The seismic behavior also evaluated for the various seismic parameters such as story displacement, story drift, and base shear for RCC shear wall.

IX. LITERATURE REVIEW

Comparative study on RCC structure with and without shear wall

Now days tall buildings are provided with shear walls to improve the lateral load resistance in the present paper e are study the solution for shear all location and type of shear all in seismic prone areas. The effectiveness of RCC shear all building is studied with help of four different models. Model one is bare frame stem and remaining tree types ae different shear wall buildings. An earthquake load is applied to 8 tore building located in different zones. The performance of building is evaluated in terms of lateral displacements of each storey.

Study of shear walls in different locations of multistoried building with uniform thickness in seismic zone III

In the seismic design of buildings, reinforced concrete structure walls or shear walls act as a major earthquake resisting members. Structural walls provide a resistance against the lateral loads system. The properties of these seismic shear walls dominate the response of the building, it is important to evaluate the seismic response of the walls appropriately. An earthquake load is applied to a building of 15 stories located in zone III. The building act as a vertical cantilever in the front of separate planner walls.

Experimental investigation and analysis on shear wall

During earthquakes large amount of buildings are getting collapsed due to the course of lateral forces and increasing of load carrying capacity in structural element and its caused by winds, earthquake and uneven settlement of loads. Least damage and wellbeing healthy level of a structure is the necessary requirement of tall buildings. For reducing the effect of damage on all tall structures, it may consist of base isolation techniques to limit the damage of a building hear walls are used.On tall buildings to prevent earthquake loads reinforced concrete walls used as supporting elements. Reinforced concrete structures are mainly implemented in engineering practices in different situations and various applications.

Comparative Study for Different Types of Shear Walls in Buildings Subjected to Earthquake Loading:

Shear walls are effective structural elements used mainly in multi-story buildings to provide resistance against lateral loadings such as earthquake and wind loadings. There are several types and shapes of shear walls depending mainly on geometry and height f the building. Both type and shape of the shear wall affect the efficiency of resisting lateral loading. In this study, fifty six building models have been analyzed using the finite element method by using the SAP2000 V14 computer program. Each model have ten stories, subjected to earthquake loadings, with various number of bays, and with three type of shear walls, namely: side shear walls, middle shear core, and double shear cores, provided that each type of the shear walls(or core)has the same material volume. The analysis output have been investigated to select the appropriate type and location of the shear walls (or core) for the multi-story buildings subjected to earthquake loadings. Specified conclusion have been presented to obtain the optimum behavior for the multi-story buildings under the effects of earthquake loadings.

Calculating Design Loads for Residential structures

Loads are the primary consideration in any building design. They define the nature and magnitude of hazards or external forces that a building must resist to provide reasonable performance (i.e., safety and serviceability) throughout the useful life of the structure. The anticipated loads are influenced by a building's occupancy and function , size and shape, and climate and site conditions. The type and magnitude of design loads affect critical decisions such as material selection, construction details, and architectural configuration. In optimizing the value(i.e., performance versus economy) of the residential building, it is essential to apply design loads realistically.

While the buildings considered in this course are single-family detached and attached dwellings, the principles and concepts related to building loads apply to other similar type of construction as well, such as low-rise apartment building. The design loads recommended here are based on applicable provisions of the ASCE 7 standard-Minimum Design Loads for Buildings and Other Structures. The ASCE standard represents an acceptable practice for building loads in the United States and is recognized in virtually every building code. It is important for the engineer to become familiar with the provision, commentary, and technical references contained in the ASCE standard.

Shear walls - A review

Shear walls are structural systems which provide stability to structures from lateral loads like wind, seismic loads. These structural systems are constructed by reinforced concrete, plywood/timber unreinforced masonry, reinforced masonry at which these systems are sub divided into coupled shear walls, shear wall frames, shear panels and staggered walls. The presents paper work was made in the interest of studying various research work involved in enhancement of shear walls and their behavior towards lateral load. As shear walls resists major portions of lateral loads in the lower portion of the buildings and the frame supports the lateral loads in the upper portions of building which is suited for soft high rise building which are similar in nature constructed in India, As in India base floor are used for parking and garages or officers and upper floors are used for residential purposes.

Basic wind speed map of India with long-terms hourly with data

Long-term data on hourly wind speed from 70 meteoro-logical centers of India Meteorological Department have been collected. The daily gust wind data have been processed for annual maximum wind speed (in kmph) for each site. Usingthe Gumbel probability paper approach the extreme value quantiles have been derived. A design basis wind speed for each site for a return period of 50 years has also been evaluated. The site-specific changes in the design wind speed in the con-temporary wind zone map for the design of building/ structures are highlighted and revision to the map is suggested.

Steel Plate Shear Walls

Steel plate shear walls (SPSW) have been used, to a limited extent, as the primary lateral force resisting system in buildings for more than three decades. There have been numerous SPSW research programs in this time-frame in the United States, Canada and Japan to help foster a better understanding of the system's behavior, particularly as it relates to earthquake-resistant design. Some major building project that utilized SPSW as the primary lateral force.

Study on Steel Plate Shear Wall (SPSW) with Cutout During Seismic Excitations

Steel plate shear wall is rapidly gaining popularity as a very effective lateral load resisting system in highly seismic areas. This system consists of steel infill plate surrounded by boundary beam and columns. Steel plate shear wall has high initial stiffness and very effective in reducing the lateral displacement of structures. In some situations existence of cutouts are unavoidable due to architectural reasons structural reasons and or installed heating and cooling systems on the walls. Cutouts in the steel infill plate lead too a decrease in lateral lad resisting capacity and improper functioning of the systems and also results in an intense variation in tress distribution. In this paper, the effect of variation in cutout size and cutout shape in steel plate shear wall has been studied y performing time history analysis. The effect of these variables on displacement and stress distribution was analysed and discussed.

Effect of Shear wall on Performance of Multistorey Building

Seismic force, predominantly being an inertia force depends on the mass of the structure. This introduces the concept of ductility. The structures are made ductile allowing it yield in order to dissipate the seismic forces. A framed structure can be easily made ductile b properly detailing of the reinforcement. Here an attempt has been made to study the behavior of different structures of reinforced concrete with different heights with and withoour shear walls. Coupled hear walls have also been studied to understand the comparative merit or demerit of framed structures with shear wall structures. The results have been tabulated and plotted to study their comparative behavior and interaction with each other. The findings of the study have been summarized and discussed.

Design of Composite Shear Wall Encased with Vertical Steel Profiles

The concept of steel-concrete composite shear wall is introduced due to the benefits achieved by integrating both the materials. These are structural walls, where steel profiles are encased at the boundary elements. Due to their higher lateral strength and stiffness, they offer a good alternative to improve earthquake resistance over conventional reinforced concrete hear walls in medium and high-rise buildings. Hence, a design of steel-concrete composite shear wall is proposed in the present paper on the basis of exiting theory and with the help of standard codes. The web portion of shear wall ha to be designed as per provisions of Eurocoode 8. for the design of composite boundary element, design norm of composite column are followed. Also hedesign of shear stud connectors is adopted according to Eurocode 4.

Performance of Steel-Concrete Shear Walls with Two-Sided Reinforced Concrete

This paper deals with the performance of Steel-Concrete Shear Walls (SCSWs) which have reinforced concrete on both sides of the steel plate subjected to cyclic loads. Finite element software ABAQUS is applied to analyze the SCSWs. Accuracy of the finite element modeling is verified by comparison of the theoretical results with those obtained experimentally. Then, various variables are studied in order to evaluate their effects on the performance of the SCSWs. These variables include thickness of concrete, steel plate thickness, number of bolts, gap size between reinforced concrete and steel frame, the percentage of reinforcement in reinforced concrete, and beam and column profiles of the steel frame. It is concluded that the change of the variables influences the ultimate load capacity, ductility, and energy dissipation of the SCSWs. Moreover, buckling of the walls is discussed.

Effects of Openings in Shear Wall

In high rise building shear wall is used to resisting the lateral loads that may be induced by the effect of wind and earthquakes. In high rise building increases sizes of structural element. As a result consumption of conventional construction materials like concrete and steel goes on increasing day by day in the structures. On the other hand time delay is the key factor that will affect overall growth of such pprojects. Hence inn order to overcome these constrains economical construction methodology and optimization techniques should be used. Finite element modeling now a days is an essential approach in analyzing and simulating civil engineering problem numerically. In this paper at attempt is made to apply the finite element modelling in analyzing and exploring the behavior of shear wall with opening under seismic load action on member forces. Hence the aim of present study is to compare seismic performance of 15-storey with openings in shear wall situated in earthquake zone V. seismic coefficient method and response spectrum method are used for seismic analysis. SAP software is used and the results are compared. Position of shear wall by changing the sizes and shape of openings in shear wall for all buildings models is determined. Finite element analysis of opening in shear wall is also studied. Comparative study concludes that changing the position of shear wall of reinforced concrete structures with various opening sizes in buildings opening are economical.

A Review on Shear wall in High Rise Buildings

Shear walls are structural elements especially important in high rise buildings subjected to lateral wind and seismic forces. They provide adequate strength and stiffness to the whole lateral displacement. And can be external walls or internal walls around lift shafts & stairwells or sometimes booth are provided. The shape and plan position of the shear wall influences the behavior of the structure considerably. Shear walls are generally constructed from reinforced concrete, plywood/timber, unreinforced masonry. In this paper we have aimed to study the various research works done for improving the performance of shear wall and locating its best position in a building. Shear walls has proved to be very successful in resisting strong earthquake so far.

Seismic Analysis of RCC Building with and Without Shear Wall

In the seismic design of buildings, reinforced concrete structural walls, or shear walls, act as major earthquake resisting members. Structural walls provide an efficient bracing system and offer great potential for lateral load resistance. The properties of these seismic shear walls dominate the response of the buildings, and therefore, it is important to evaluate the seismic response of the walls appropriately. In this present study, main focus is to determine the solution for shear wall location in multi-storey building. Effectiveness of shear wall has been studied with the help of four different models. Model lone is bare frame structural system and other three models are dual type structural system. And earthquake load is applied to a building of ten stories located in zone II, zone III, zone IV and zone V. parameters like lateral displacement, story drift and total cost required for ground floor are calculated in both the cases replacing column with shear wall.

Comparative Study of Strength of RC Shear Wall at Different Location on Multi-storied Residential Building

Shear wall systems are one of the most commonly used lateral load resisting systems in high-rise buildings. Shear walls have very high in plane stiffness and strength, which can be used to simultaneously resist large horizontal load and support gravity loads, making them quite advantageous in many structural engineering applications, there are lots of literatures available to design and analyze the shear wall. However, the decision about the location of shear wall in multistory building is not much discussed in any literatures. In this paper, therefore, main focus is to determine the solution for shear wall location in multistory building. A RCC building of six storey placed in NAGPUR subjected to earthquake loading in zone II is considered. An earthquake load is calculated by seismic coefficient method using IS 1893 (PART-I):2002. These analyses were performed using STAAD Pro. A study has been carried out to determine the strength of RC shear wall of a multistoried building by changing hear wall location. There different cases of shear wall position or a 6 storey building have been analyzed. Incorporation of shear wall has become inevitable in multi-storey building to resist lateral forces.

Analysis and Design of Shear Wall for an Earthquake Resistant Building using ETABS

Shear walls generally used in high earth quake prone areas, as they are highly efficient in taking the loads. Not only the earthquake loads but also wind loads which are quite high in some zones can be taken by these shear walls efficiently and effectively. To determine the solution for shear wall location in multi-storey building based on its both elastic and elasto-plastic behaviors. The earthquake load is to be calculated and applied to a multi-storied building of plan 26mx26m and 10 no. of (G+9) floors with 40 meters height. For this model, results are calculated and analyzed for the effective location of shear wall. The design above is verified for this same structure using extended three dimensional analysis of buildings (ETABS) software. The results are compared.

A Review On Multi Storied Building By Changing Different Shapes of Shear wall for Zone IV & V Under Plain And Sloping Ground Condition

In the seismic design of buildings, reinforced concrete structural walls, or shear walls, act as major earthquake resisting members. Structural walls provide an efficient bracing system and offer great potential for lateral load resistance. The properties of these seismic shear walls dominate the response of the buildings, and therefore, it is important to evaluate the seismic response of the walls appropriately. In this present study, main focus is to determine the solution for shear wall location in multi-storey building. Effectiveness of shear wall has been studied with the help of four different models. Model one is bare frame structural system and other three models are dual type structural system.

Coupled Shear Wall: A Review

In medium too high rise buildings located in seismically active regions coupled shear walls are one of the systems commonly used to resist lateral forces. Building configuration and degree of coupling will effects the behavior coupled shear wall. To ensure satisfactory performance of coupled shear all systems under earthquake loading wall systems must be provided with sufficient deformation capacity as well as adequate strength. These systems should not collapse or be induced severe damage during earthquake actions. For this reason, coupled shear walls must have high strength, high ductility, high energy absorption capacity and high shear stiffness to limit lateral deformations.

Seismic Behavior of Buildings with Shear Wall

In analysis based on software result was being comparison between top stores of building discuss about display displacement top storey. What the effect of shear wall a building and better location of shear wall.

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