COMPARATIVE STUDY ON SEISMIC BEHAVIOUR OF IRREGULAR SHAPE BUILDING WITH SHEAR WALL AT RE-ENTRANT CORNER

A Thesis Submitted
In Partial Fulfillment of the
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Of

MASTER OF TECHNOLOGY

In

Structural Engineering

By

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JULY 2020

CERTIFICATE

Certified that **RAVI KUMAR VERMA (1180444008)** has carried out the research work in this thesis entitled **"COMPARATIVE STUDY ON SEISMIC BEHAVIOUR OF IRREGULAR SHPE BUILDING WITH SHEAR WALL AT RE-ENTRANT CORNER"**for the award of **MASTER OF TECHNOLOGY(Structural Engineering)**from BABU BANARASI DAS UNIVERSITY, LUCKNOW under my supervision. The Thesis embodies results of original work, and studies are carried out by the student himself and the contents of the Thesis do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

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DECLARATION

I hereby declare that the Thesis entitled **"COMPARATIVE STUDY ON SEISMIC BEHAVIOUR OF IRREGULAR SHAPE BUILDING WITH SHEAR WALL AT RE-ENTRANT CORNER**" in the partial fulfilment of the requirements for the award of the degree of **Master of Technology (Structural Engineering) of BABU BANARASI DAS UNIVERSITY**, is record of the own work carried under the supervision and guidance of **Mr. BILAL SIDDIQUI** to the best of my knowledge this Thesis has not been submitted to **BABU BANARASI DAS UNIVERSITY** or any other University or Institute for the award of any degree.

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ABSTRACT

In the past, numerous primary earthquakes have exposed the shortcomings in buildings that had triggered them to wreck or damage. In the multistoried buildings damages because of earthquake are typically at the weak points. The weakness is due to various discontinuities in the structure. Discontinuities like variation in mass, stiffness, strength, geometry etc. creates the point of weakness and thus the structures having these discontinuities are said to be Irregular structures. It has been found that the structures having no irregularity or regular structures perform well during earthquake.Modern residential structure are going higher and higher these days. The impact of lateral loads in the form of wind/Earthquakes affects the performance of these structures dramatically. It is often a common practice among structural engineers to use shear walls in place of columns.

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Finally, I would like to dedicate this research work to my family and friends whose continuous love and support guided me through difficult times.

Ravi Kumar Verma

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INTRODUCTION

1.1 General

Behavior of a structure during an earthquake basically depends upon its geometry and building configuration. Structures with basic and ordinary arrangement perform much better in case of a earthquake contrasted with structures with irregular designs. Sudden changes in structural stiffness are not alluring for seismic safe structures. Many construction standards identified with seismic examination and plan of structures recognizes the different types and measure of irregularities and prescribes them to be stayed away from or to adopt advance technique for investigation so as to neutralize the impact of such irregularities on the worldwide conduct of the structure .Presence of re-entrant corners is one such irregularity which adversely influences the seismic behaviour of the structures. Be that as it may, building frameworks withre-entrant corners, (for example, structures with L or U shape setup in plan) can't be avoided they provide function superiority. They offer many rooms adjusted along the edge of structures with great access to air light and proper ventilation. Thus, re-entrant cornered structures are generally utilized for school and hotel buildings. Different configurations of structures with re-entrant corners are as shown in Fig-1. These types of structures are more sensitive damage during a earthquake. Confirmations of terrible showing of structures with re-entrant corners can be seen in lot of the past seismic earthquakePreviously, various essential seismic earthquake have uncovered the weaknesses in structures that had activated them to wreck or harm. In the multistoried structures harms due to seismic earthquake are regularly at the frail focuses. The shortcoming is because of different discontinuities in the structure. Discontinuities like variety in mass, stiffness, strength, geometry and so on makes the purpose of shortcoming and therefore the structures having these discontinuities are supposed to be Irregular structures. It has been discovered that the structures having no anomaly or standard structures perform well during earthquake. The irregularity in the structures can be classified for the most part in two kinds:

1. Plane Irregularity
2. Vertical Irregularity

1.2 Plan Irregularity:

A structure can be arranged in Plan Irregularity if there is irregular variation of mass, strength and stiffness along plan. Following are the different types of plan irregular structures according to IS 1893(Part 1):2016.

1.2.1 Torsion Irregularity:

Torsional irregularity is to be estimated when the maximum storey drift toward one side of the structure determined with plan eccentricity opposite to axis is more prominent than 1.2 time the normal of the storey drift the two different ends of the structure.

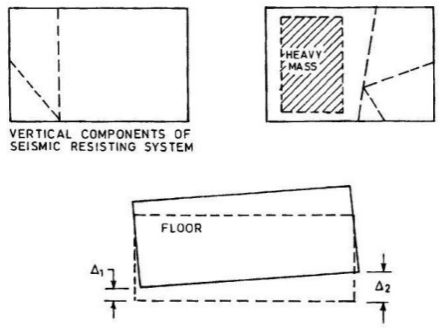


Fig 1.1 Torsional Irregularity

1.2.2 Re-entrant corner:

Re-entrant corner anomaly in the structure is there if the two projections or outcrops of the structure past the reentrant corner are bigger than 15 % of its arrangement measurement toward that direction

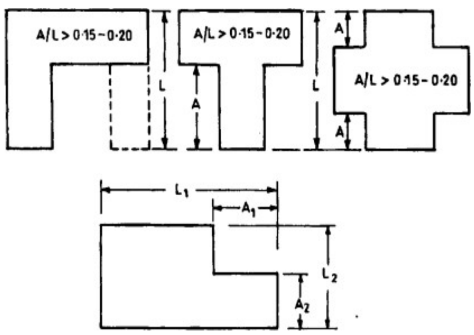


Fig:1.2 Re-entrant corner Irregularity

Figure 1.3 Damage to Reentrant corner and Upper stories of the Ministry of Telecommunications Building in Mexico City after the 1985 earthquake.

1.2.3 Diaphragm Irregularity:

Diaphragm Irregularity is there in the structure when there is removed or open territories are bigger than 50% of gross diaphragm region or when there is powerful diaphragm stiffness change between two adjacent stories are over half.

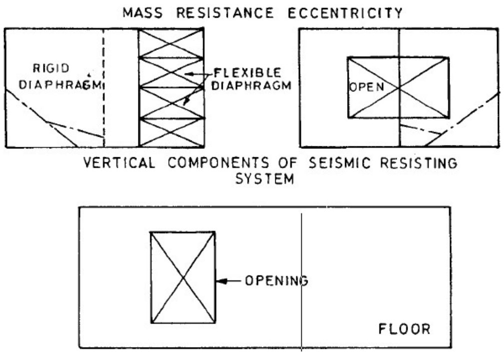


Fig: 1.3 Diaphragm Irregularity

1.2.4 Out of plane offset Irregularity:

This kind of irregularity is there when discontinuity in parallel power opposition system like out of plane counterbalances of Shear wall in differnet stories.

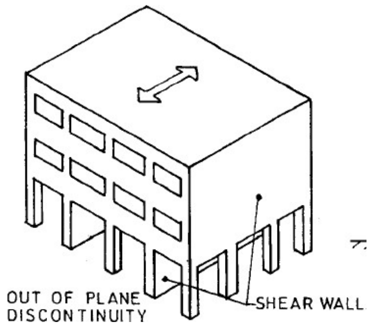


Fig: 1.4 Out of plane offset Irregularity

1.2.5 Non parallel Systems:

This type of irregularity is there in the structure when lateral force resisting system are not parallel to the major orthogonal axis.

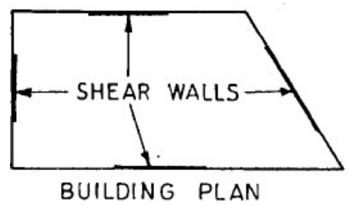


Fig:1.5 Non-Parallel System Irregularity

1.3 Vertical Irregularity

A structure can be classified in Vertical Irregularity if there is irregularity variety of strength, mass, solidness along the hieght of the structure. Following are the different kinds of Vertical irregularity structures according to IS 1893(Part 1):2016

1.3.1 Stiffness Irregularity-Soft storey

A story is supposed to be stiffness irregular or soft storey story if lateral stiffness of a story is under 70 % of the parallel stiffness of story above or 80% of the avg. stiffness of over 3 stories.

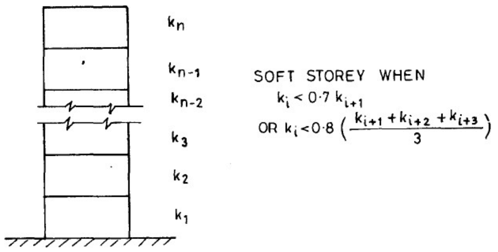


Fig: 1.6 Stiffness Irregularity

1.3.2 Mass Irregularity: A building is said to be mass irregular if any storey exceeds the mass by 200 % of its adjacent storey.

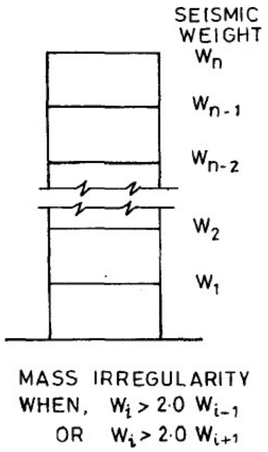


Fig: 1.7 Mass Irregularity

1.3.3 Vertical Geometry Irregularity

A structure is esteemed to be Vertical geometric irregular if the even dimension of the lateral force opposing framework of any story is more prominent than 150 % of the adjoining story.

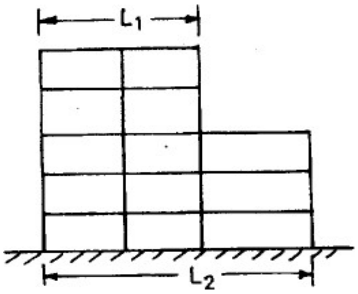


Fig: 1.8 Vertical Geometric Irregularity when L_2>1.5 L_1

1.3.4 In plane offset Irregularity

This type of irregularity is there when the length of offset elements is less than the lateral force resisting element.

Fig: 1.9 In-Plane Discontinuity when b > a

1.3.5 Discontinuity in Capacity or Weak storey

A storey is said to be weak if the storey lateral strength is less than 80 % of above storey.

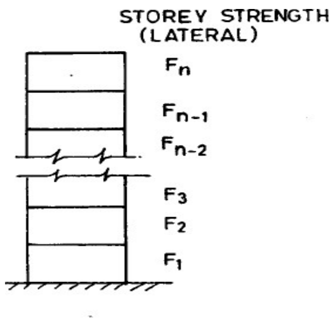
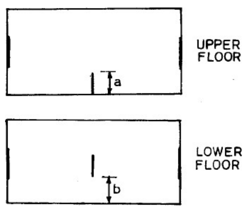


Fig : 1.10 Weak Storey $F_i < F_{i+1}$

1.4Shear wall

In multi-story structures, shear walls are basic, in light of the fact that notwithstanding forestalling the disappointment of outside walls, they likewise bolster the numerous floors of the structure, guaranteeing that they don't crumple because of parallel development in a seismic tremor. At the point when a structure has a story without shear walls, or with inadequately positioned shear walls, it is known as a delicate story building, referencing the possibility that the story without fortification will be delicate and helpless in an emergency. Since shear walls are auxiliary in nature, they can't be moved or cut open. This is a significant issue to consider when assembling a structure from the beginning; it's a smart thought to consider how employments of the space may change, to guarantee that a shear wall doesn't turn into a disturbance later.



1.5 ADVANTAGES OF SHEAR WALLS IN RC BUILDINGS

Appropriately planned and point by point structures with shear walls have indicated awesome execution in past seismic tremors. Shear walls in high seismic districts require extraordinary specifying. In any case, in past tremors, even structures with adequate measure of walls that were not extraordinarily point by point for seismic execution (however had enough all around disseminated support) were spared from breakdown. Shear walls are anything but difficult to build, on the grounds that support specifying of walls is generally straight-forward and along these lines effectively actualized at site. Shear walls are proficient, both as far as development cost and viability in limiting seismic tremor harm in basic and non basic components. Shear walls building have high quality at further extent of twisting when contrasted with customary RC encircled structure as appeared in haze 2.5 underneath. RC Shear wall likewise have following favorable circumstances:

1. Large strength
2. High stiffness
3. Ductility

1.6 OBJECTIVE

The objective of this research is focused on various techniques used to study the seismic behaviour of Irregular R.C buildings with seismic zone v of India using Shear Wall at Re-entrant Corner. The whole design was carried out in ETABs which covers all aspects of structural engineering. More specifically, the salient objectives of this research are:

1) To perform a comparative study of the various seismic parameters.

2) Comparison among building with H Shape,+ Shape and L shape with and without shear wall at Re-entrant corner of story displacement, storey drift, Storey Stiffness & fundamental time period etc.

3) To propose the best suitable technique for seismic analysis.

In this report, a multi-storey residential building is studied for earthquake and wind load using Time history method and ETABs. This analysis is carried out by considering seismic zone V, and for this zone, the behaviour assesses by taking the medium soil. A different response for displacements, storey drift, storey stiffness and fundamental time period is plotted for zone V for medium type of soil.

1.7 SCOPE OF THE PRESENT STUDY

In the present study, modeling of the RCC frame under the time history analysis by taking Eight models i.e. H,+,L Shape building With and without shear wall using ETABs software and the results so obtained are compared.

CHAPTER-2

LITRATURE REVIEW

M.R.Wakchaure (2012) carried seismic and wind examination of35 and 39 celebrated structures having double frameworks and plan irregular shapes like T and oval shape by utilizing ETABS programming and IS:1893(Part-1)- 2002. The examination has been finished by considering the boundaries, for example, timeframe, recurrence modular mass taking an interest proportions &displacement. It has been reasoned that double framework is better answer for defeat the impacts produced by plan inconsistencies.

Jalal Mushina Obeed (2013) carried out the seismic analysis & wind analysis of 50 storey T shaped irregular building located in zone V and by using E-tabs software. Wind load analysis was done by gust factor method and seismic analysis was done by response spectrum method. The comparison has been done by considering the parameters such as shear force, base shear, torsion, bending moment & displacement. It has been concluded that shear force and torsional moment are higher in case of irregular building compared to regular building and bending moments in regular buildings are higher compared to irregular building. The displacement of irregular building is more as compared to regular building under wind loads. The displacement in irregular is less compared to regular building under seismic loads.

Ramesh Konakalla (2014) carried out the seismic and wind examination of 20 story working with various arrangement shapes like square, L, upset U and T shape by utilizing direct static investigation &STAAD Pro programming. For straight static investigation IS 1893 (section 1):2002 was utilized and for wind examination ASCE-7: 02 code was utilized. The correlation has been done as far as story float and parallel removal. It has been inferred that in the normal casing, there is no torsional impact in the edge on account of balance. If there should be an occurrence of sporadic structure reactions are diverse for the sections situated in the plane opposite to the power activity. For U plan shape the reactions in the corner segments of two appendages are same in the earthquake stacks however extraordinary in wind loads.

Anupam Rajmani (2015) carried out seismic investigation and wind examination of15, 30 and 45 story working with round, rectangular, square and triangle plan shape utilizing STAAD-Pro programming. The correlation has been finished by considering the boundaries, for example, wind load, earthquake load, and hub dislodging. It has been inferred that round shape

and triangular shape is generally steady for most extreme tremor and greatest breeze load for 15 story structure individually. In the event of 30 celebrated structure, rectangular shape is generally steady for greatest seismic tremor and wind load. If there should be an occurrence of 45 celebrated structure roundabout shape and rectangular shape is generally steady for most extreme earthquake and wind load individually.

Md. Mahmud Sazzad (2015) in this study the seismic and wind investigation of 6 story working with three distinctive arrangement shapes for example rectangular with hallow space, adjusted cross shaped& L-formed by utilizing computer aided analysis investigation and Bangladesh National Building Code (BNBC), 2006. The correlation has been finished by considering the boundaries, for example, base shear, displacement and story drift. It has been reasoned that rectangular with empty space model is most secure considering all the conditions &shape of building has recognizable impact in limiting the drift of building.

Veena S. Ravi (2016) done the seismic examination of G+11 story working for zone II and V having seven distinctive arrangement shapes with one standard arrangement and staying irregular arrangement for example C, E, H, L, T, PLUS shapes with the assistance of STAAD-Pro programming and IS-1893-2002-Part-1. Reaction range examination technique was utilized for investigation. The examination has been finished by considering the boundaries, for example, structure lateral shear, time period, joint displacement. It has been reasoned that normal square arrangement building have most extreme base shear esteem while L shape building have the least worth zone II and V. Recurrence and uprooting is greatest in L modelled structure. Unpredictable modelled structures experience most extreme relocation than normal structures during earthquake.

Alhamd Farqaleet (2016) done the dynamic investigation of ten story RCC building outline rectangular in plan utilizing nonlinear time history examination technique in SAP 2000.The correlation has been finished by considering the parameter, for example, base shear, story drift, and story displacements. It has been inferred that story drift increments from base to highest level. The most maximum drift acquired for a ten story building was inside the permissible limits.

Jereen Ann Thomas (2016) completed the seismic investigation of 12 storied structure with E, H, in addition to and swastika shape plan utilizing ETABS v9 programming and IS 1893(part

1):2002. Similar investigation of structure with unbending and semi rigid diaphragm was thought of. The correlation has been finished by considering the parameter, for example, base shear, displacement and story drift, torsional buckling. It has been inferred that arrangement design of the structure influences the displacement and story drift. The swastika shape design demonstrated great execution contrasted with different models. For the structures with plan abnormality semi rigid diaphragm must be thought of.

Naveen. G.M (2016) carried out seismic investigation of 10 story RC outline working with normal and irregular arrangement shape by reaction range technique utilizing ETABS 2015 and IS Code 1893:2002 (section 1). Three models with one normal and two irregular were considered for study. All models have diverse shape however having same region. The correlation has been finished by considering the parameter, for example, maximum storey displacement, story drift, story stiffness, periods and frequencies of modes during seismic tremor. It has been reasoned that irregular shape building have the higher recurrence. Story drift is most extreme fit as a fiddle working when contrasted with irregular structures. In the event that the structures is having more noteworthy length toward tremor movement at that point are influenced more. Story shear in the irregular structure is higher when contrasted with regular structure.

Megha Kalra (2016) in this paper wind investigation of 50 storied structure having distinctive arrangement shapes, for example, rectangular, L, U, T, I, Plus and non-uniform shape by utilizing STAAD Pro programming &IS 875-Part III. The correlation has been finished by considering the parameter, for example, story drift, joint displacement, and intensity and bending moment. It has been presumed that L-shape and U-shape.

Akash S. Waghmode (2016) completed the wind examination of G+15 shear wall structure with J shape and rectangular shape utilizing Etabs 2015 programming &IS 875:1987 (section 3). Shear walls were given at all corners in L shape. The examination has been finished by considering the parameter, for example, story displacement and story drift. It has been reasoned that relocation and drift in J shape the more so should be minimize the wind load and rectangular structure in wind inclined zone is liked.

Narla Mohan (2017) performed seismic investigation and wind examination on G+20 story RC constructing square in shape with four distinct zones II, III, IV and V. The examination was done by embracing utilizing ETAB programming receiving reaction range investigation method& wind investigation according to IS 875-1987 section III utilizing ETABS programming. Four models were utilized to break down with various bay lengths. Various estimations of seismic zone factor were taken and their comparing impacts were deciphered in the outcomes. The examination has been finished by considering the parameters, for example, story drift, story shear, torsional force and displacement. It has been inferred that the base shear& uprooting of structure increments as we go to higher seismic zones. The story drift because of wind load is essentially happened at the center of the structure. Story Shear is diminished as tallness of the structure expanded and decreased at highest level in all the structure models. Least steady of the considerable number of shapes. Plus shape and Non uniform are the most steady.

T. Prasanthi (2017) performed seismic investigation of G+20 storied RC building to examine the structural conduct of working for various arrangement designs like rectangular and C-shape. Seismic examination has been conveyed by static and response spectrum investigation by utilizing ETABS computer program. The examination has been finished by considering the parameters, for example, structural displacement, drifts, story shear, overturning moment and stiffness. It has been reasoned that rectangular shape building have more stiffness than C shape building. The estimations of base shear and top storey displacement are response spectrum examination than in static investigation.

Albert Philip (2017) carried out seismic investigation of G+12 storied reinforced concrete structure with regular and irregular arrangement shape utilizing CSI ETABS programming for earthquake zone III in India. The investigation was completed by receiving reaction response spectrum technique. The correlation has been finished by considering the parameters, for example, story displacement, story drifts, story shear and stiffness. It has been inferred that story displacement increments straight with tallness of building. Maximum story drift ground floor and second floor for regular structure &at fourth floor for irregular structure. Most extreme story shear force was seen between ground floor and second floor for standard structure and at ground floor for irregular structure. Story stiffness changes non - straight for both the structures.

Mangesh S. Suravase (2017) performed seismic examination on G+10 storied R.C frame structures with various arrangement shapes, for example, square, H-shape, L-shape& square shape with centre. Plan area and tallness of all structure models were kept same. Seismic examination was done by pushover investigation strategy in ETABS programming. The correlation has been finished by considering the parameters, for example, base force and displacement. It has been presumed that the normal structure oppose earthquake powers longer

time and withstand for longer time. Irregular structure model shape-H and L is having less protection from earthquake forces. Irregular structure model shape-O is having more protection from earthquake than H and L shape building.

Aniket A. Kale (2017) done the wind and seismic investigation 15, 30 and 45 celebrated structures of four distinct shape of same zone by utilizing advance programming CSI ETABS. Response spectrum method was utilized to locate the dynamic impacts. The correlation has been finished by considering the parameters, for example, story displacement, story drift, base shear, overturning moment Mz. , acceleration and time period. It has been presumed that for greatest tremor structure of 15-story is most steady structure &for greatest wind impact triangular structure of 15-story is generally steady. For 45-story circular and rectangular shape building is generally steady for greatest seismic tremor and wind impact individually. Wind impact is basic for 45 story building and then again seismic is basic at 15 story and 30 story building. Wind impact is more basic than earthquake.

Pradeep Pujar (2017) investigated G+9 celebrated irregular structures to locate their seismic presentation with and without shear walls. States of building plan considered for the examination were I, L and C. Three models of exposed casing &three models with shear walls were considered for the examination. The models has been analysed by Equivalent static method with the help of E-tabs V 15.0.0 programming. The correlation has been finished by considering the paramters, for example, story displacement, story drift and base shear. It has been inferred that L-shape, C-shape structures with Shear dividers are having extraordinary results in base shear, story float and displacement. In all shapes the I-shape working with shear wall is having expanded base shear both in X and Y bearing and the L-shape is having less expanded base shear. The structure with shear wall gives better execution against the seismic tremor when contrasted and bare frame building

Athulya Ullas (2017) performed wind examination of structures having different shapes, for example, Y, Plus and V. Structures of plan shapes Y, Plus and V are modelled in ETABS 2016 and analysed. It is seen that the story force is same for all the structures, for example the story power doesn't change with the shape. The lateral displacement is discovered maximum for V shape building. The story drift is watched greatest for Y shape when contrasted with that of different shapes and the parallel dislodging and the story float are watched least for Plus shape building when contrasted with Y and V shape structures and thus it is the most structurally stable shape among.

Guruprasad (2017) carried out a dynamic investigation of G+15 storied RC building with L, C and rectangular shape in plan with the assistance of ETABS programming. comparison has been finished by considering the parameters, for example, story drift, story shear, support reaction, building mode, and area cut force. It has been presumed that maximum value of story shear was watched for L-shape plan than rectangular structure and C-shape building. The storied drift value in X direction and Y direction increments for through and through story in every one of the three cases. At the point when seismic tremor load is applied in Y direction, it was discovered that sporadic arrangement structure can oppose more base shear than rectangular arrangement structure. Normal structure and L-shape structures are gave acceptable outcomes than C-modelled structures in all perspective

CHAPTER 3

WORK METHODOLOGY

3.1 General

Determination of seismic tremor demands on the structure is one of the difficult employments in the field of basic designing. Lot of research is carried out in this area to propose simplified methods that will predict results with reasonable accuracy. It was found that except detailed non-linear time history analysis, the available methods have limited areas of the application and cannot be used for all type of buildings**.** Despite the fact that the seismic activity is dynamic in nature, construction regulations frequently suggest equivalent static analysis investigation for structure of earthquake safe structures because of its simplicity. Despite the aforementioned concerns over the use of dynamic analysis in seismic design, it is used in practice to carry out special studies of tall buildings and irregular structures because of its superiority in reflecting seismic response more accurately, when used properly. With the approach of Personal computers and the ensuing development in data innovation, combined with broad exploration in nonlinear material modelling, more reliable computational tools have become available for use in design of buildings.

3.2 Description of building plan

Table 3.1 Description of building plan

1	Building type	Residential building
2	No. Of story	G+10
3	Floor height	3m
4	Total Height	33m
5	Size of column	300mm*300mm
6	Size of beam	300mm*450mm
7	Thickness of slab	120mm
8	Seismic zone	5
9	Response reduction factor	5
10	Important factor	1
11	Grade of steel	Fe250
12	Grade of concrete	M30
13	Damping	5%
14	IS Code of concrete	IS456:2000
15	IS Code of earthquake	IS1893 Part-1 2016
16	Self-weight factor	1

3.3 Load combination-

Building is analyzed on the basis of Various load combinations in the limit state of design for reinforced concrete structures as per IS 1893:2016(part1).these all are given below:

1) 1.5(DL+IL)

2) 1.2 (DL+IL+ELx)

3) 1.2 (DL+LL+ELY)

4) 1.2(DL+IL-ELX)

5) 1.2(DL+IL-ELY)

6) 1.5(DL+ELX)

7) 1.5(DL+ELY)

8) 1.5(DL-ELX)

9) 1.5(DL-ELY)

10) 0.9DL+1.5EL X

11) 0.9DL+1.5ELY

12) 0.9DL-1.5EL X

13) 0.9DL-1.5ELY

As we know that 1.5(DL+IL) is not the Earthquake load combo. It is purely the gravity load combination. But when we are designing a structure, we need to consider all the different load combinations as specified by the respective design code.

3.4 Problem Formulation

The study of noticed on comparative study irregular shape building with re-entrant corner at shear wall under seismic action. And it is known that from last studies that multi storied building is unstable for seismic forces the analysis was done as per IS Code provision using ETABs software. In this comparison is done for G+10 multi storey residential building.

The seismic data is chosen according to IS 1893:2016(part1) which is as follows:

3.5Method of Analysis

The seismic analysis methods so far used in estimating the demand on the structure can be classified in the following four groups**:**

1) Linear Static Analysis

2) Linear Dynamic Analysis

3) Nonlinear Static Analysis

4) Nonlinear Dynamic Analysis

3.6 Linear Static Analysis

The linear static method otherwise called Equivalent Static Method is utilized to estimate the demand for the structures whose response is especially dominated by the principal mode and expected to act in elastic range. In this method the lateral load are determined based on the fundamental time period of the structure and applied on the structure centre of mass at each floor level and the demands are evaluated. The magnitude of these pseudo lateral loads has been chosen with the aim that when applied to the linearly elastic model of the structure, it will result in design displacement expected during the design earthquake.

3.6.1Linear Static Analysis Steps

3.6.1.1 Load Factors The load factors for the design of the reinforced concrete structures as recommended by the code are:

I. 1.5 (D.L. + L.L)

II. 1.7 (D.L. + I.L. ± E.L.)

III. 1.5 (D.L. ± E.L.)

IV. 0.9 D.L. ± 1.5 E.L

3.6.1.2 Design Horizontal Seismic Coefficient (Ah)

The design horizontal seismic coefficient Ah ha to be determined by the following expression

$$Vb=Ah*W$$

Where, A_h= Design horizontal seismic coefficient for structure W=

Seismic weight of the building

3.6.1.3 Fundamental Natural Period

The approximate fundamental natural period of vibration in seconds of every other structure including second resisting frame building with infill panels, might be evaluated by the expression.

$$T = \frac{0.09h}{\sqrt{d}}$$

$T = 0.075h^{0.75}$ ……… for RC frame building

$T = 0.085h^{0.75}$ …….. for steel frame building

3.6.1.4 Seismic Weight

The seismic load of each floor is taken as its full dead load and appropriate amount of imposed load as given below. The seismic load of each floor is worked out by distributed similarly the loads walls and columns in any story to the floors above and below that storey. Seismic load of building is the total of seismic loads of the al of floors.

3.6.1.5 Importance Factor

The structures are allocated a significance depending on the utilization of the structure, characterized by hazardous consequences of its failure and its post-earthquake need etc.

3.6.1.6Response Reduction Factor

Depending upon the perceived seismic damage performance the structure can give based on the ductile or brittle the components called as response reduction factor is defined.

3.6.1.7Distribution of Design Force

The design base shear (Vb) computed by the above equation shall be distributed along the height of the building as per the expression given

$$Q_i = \left(\frac{W_i h_i^2}{\sum_{j=1}^{n} W_j h_j^2} \right) V_B$$

Where,

Qi = Design lateral force at floor i

Wi = Seismic weight of floor i

hi = Height of floor I measured from base

n = Number of storey's in the building

3.7 Linear dynamic method

The equivalent static force methodology is allowed for working in low seismic areas, regular structure under a certain height limit, and short structure with certain irregularities. It might be preferred by designers due to its simplicity when dynamic analysis is not mandatory.

(1) Regular buildings that are 60 m or taller have fundamental period greater than or equal to 2.0 sec and are located in areas of high seismicity with I F S (0.2)> 0.35, where I is the moment of inertia, f is an acceleration –based site coefficient, and 0.20 sec is the spectral response acceleration for a period of 0.2 sec;

(2) Irregular buildings that are 20 m or taller or have a fundamental period of 0.5 sec or longer and are located in areas of high seismicity with I f s (0.2). 0.35; and

(3) All buildings that have rigid diaphragms are torsional sensitive.

Dynamic analysis is conducted to obtain either a linear (elastic) or a nonlinear (inelastic) structural response. When elastic analysis is conducted, an empirical assessment of inelastic response is made, since the design philosophy is based on nonlinear behaviour of building under strong earthquakes. This does not, however, engineering from preferring elastic dynamic analysis because of its simplicity and direct correspondence to the design response spectra provided in building codes.

3.7.1 RESPONSE SPECTRUM METHOD

In this method the load vectors are determined relating to predefined number of modes. These load vectors are applied at the structure centre of mass to compute the respective modal responses. These model responses are then combined by SRSS or CQC rule to get the absolute response. From the fundamentals of dynamics, it is quite clear that modal response of the structure subjected to particular ground motion, is estimated by the combination of the results of static analysis of the structures subjected to corresponding modal load vector and dynamic analysis of the corresponding single degree of freedom system subjected to same ground motion. Static response of MDOF system is then multiplied with the spectral ordinate obtained from dynamic analysis of SDOF system to get that modal response. Same procedure is carried out for other modes and the results are obtained through SRSS or CQC rule.

In response spectrum analysis the spectral values are read from the design spectrum which are directly multiplied with the modal load vector and the static analysis is performed to determine the corresponding modal peak responses.

3.8 Nonlinear static method

This can be defined as the technique where in the structure (considering the material nonlinearity) is pushed till collapse to produce the pushover curve, which is then used to evaluate the objective displacement at which the reaction amount is removed from the deformed model. Nonlinear static examination, or Pushover investigation, has been created in the over the past 20 years and has become the favoured examination strategy for structure and seismic execution assessment purposes as the method is moderately straightforward and considers post-elastic behaviour. Be that as it may, the system includes certain approximations and rearrangements that some measure of variety is constantly expected to exist in seismic demand prediction of pushover analysis. Pushover investigation is a static, nonlinear methodology utilizing simplified nonlinear procedure to estimate seismic structural deformation. It is an incremental static investigation used to determine the force-displacement relationship, or the capacity curve, for a structure or structural component. The examination includes applying horizontal loads, in a prescribed pattern, to the structure steadily, for example pushing the structure and plotting the all-out applied shear force and related lateral displacement at every addition, until the structure or collapse condition. . In nonlinear static investigation methods, request is spoken to by an estimation of the displacements or deformations that the structure is relied upon to experience.

3.8.1 Non-linear dynamic analysis

This is the most precise technique to determine the seismic responses of structures. In this method the structure is subjected to actual ground movement which is the presentation of the ground acceleration versus time. The ground increasing speed is resolved at small time step to give the record. At that point the structure reaction is determined at each time moment, to know its time history and the peak value an incentive from this time history is chosen to be the plan demand. Thus "a Mathematical model straightforwardly fusing the nonlinear characteristic of individual segment and component of the structure will be exposed to tremor shaking represented by ground by ground movement time history to calculated forces and the displacement"(FEMA 356). Since numerical model legitimately represents the impact of material nonlinearity, inelastic reactions and determined internal forces will be reasonably approximate to those normal during the design earthquake. There are two techniques by which the time history examination is completed:

3.8.2 Non-linear modal time history analysis

It is known as Time history analysis. It is an important technique for structural seismic analysis especially when the evaluated structural response is nonlinear. Time history analysis is a step-by- step analysis of the dynamic response of a structure to a specified loading that may vary with time. A full time history will give the response of a structure over time during and after the application of a load. To find the full time history of a structure's response A linear time history analysis overcomes all the disadvantages of a modal response spectrum analysis provided nonlinear behavior is not involving. This method requires greater computational efforts for calculating the response at discrete times.
It is used to determine the dynamic response of a structure to arbitrary loading

3.9 Method chosen for analysis “Time History Analysis Method”Reason- Time history analysis is the study of the dynamic response of the structure at every addition of time, when its base is exposed to a particular ground motion. Static techniques are applicable when higher mode effects are not important. This is for the most part valid for short, regular structures. Thus, for tall structures, structures with torsional asymmetries, or no orthogonal frameworks, a dynamic method is needed. In linear dynamic method, the structures is modeled as a multi degree of freedom (MDOF) system with a linear elastic stiffness matrix and an equivalent viscous damping matrix. The seismic input is modeled utilizing time history analysis, the displacements and internal forces are found using linear elastic analysis. The playing point of linear dynamic procedure as for linear static procedure is that higher modes could be taken into account.

3.10 Parameters considered for analysis

1. Storey displacement
2. Storey drift
3. Storey stiffness
4. Fundamental time period

5. Base shear

3.10.1 Storey Displacement It is the displacement of each storey with respect to ground level. According to IS 1893 (part1) :2002 the max value of displacement is 1/250 times of storey height with respect to ground.

3.10.2 Storey Drift Storey drift can be defined as the lateral displacement of one level above or below it's IS 1893:2002,the storey drift in any storey due to specified design lateral force with partial factor of 1.0 shall not exceed 0,004 time the storey height

3.10.3Storey stiffness As per IS 1893(Part 1):2002 the lateral stiffness is less than 70 percent of that in the storey above or less than 80 percent of average lateral stiffness of the three storey above.

3.10.4Time period According to IS 1893 (Part 1):2002 it is the first (longest) modal time period of vibration

3.10.5Base shear Base shear is the maximum excepted lateral force that will occur due to seismic.

3.11 Structure modelling

The analysis is completely software based is entirely done on ETABS.A G+10 irregular shape building consider like + shape ,H shape and L-shape which lie in zone 5.method adopted is time history analysis. Slab thickness, column size and beam size is taken as 150mm, 300*300mmand 300*450mm respectively. The soil type considered is type 2 soil. This study is conducted to understand the structural comparative study on irregular shape building with and without shear wall. So total 6 model are made.in first and second model + shape without and with shear wall ,in third and fourth model H shape without and with shear wall and in Fifth and sixth model L shape with and without shear wall. The parameter for research are time period, lateral displacement, base shear and storey drift. Indian standard code IS1893part 1:2016is considered for study. The various model and graphs for study are illustrated below.

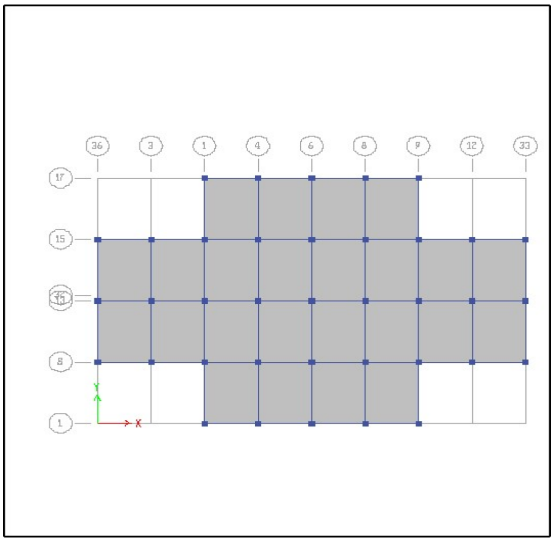


Fig.3.1Plan of plus shape structure

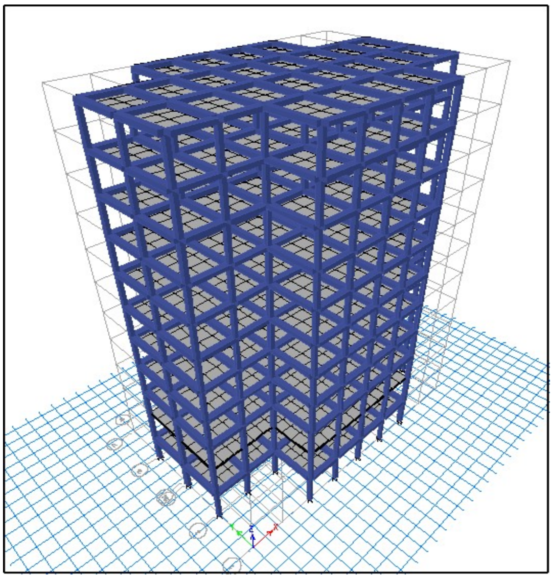


Fig.3.2 plus shape model without shear wall

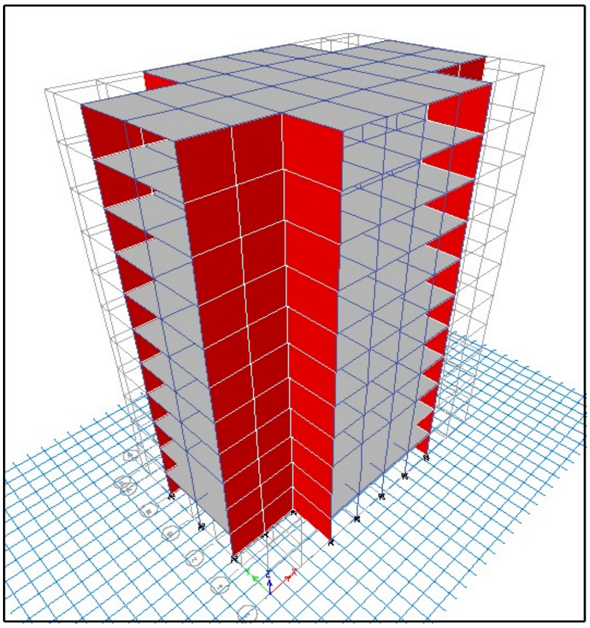


Fig.3.3 Plus shape model with shear wall

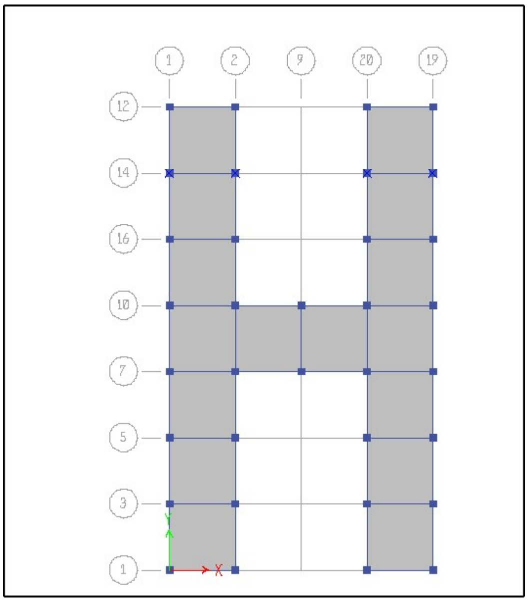


Fig.3.4 Plan of H shape structure

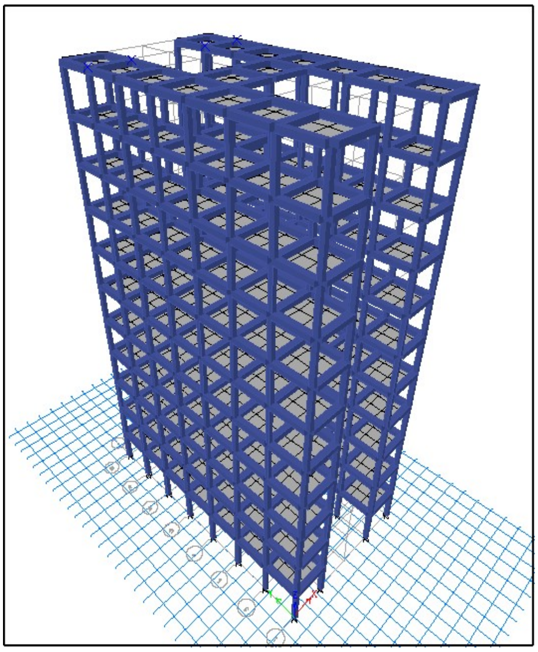


Fig.3.5 H shape model without shear wall

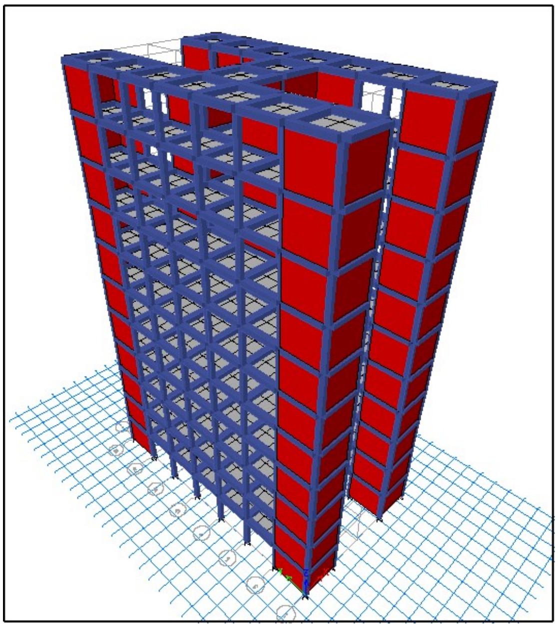


Fig.3.6 H shape model with Shear wall

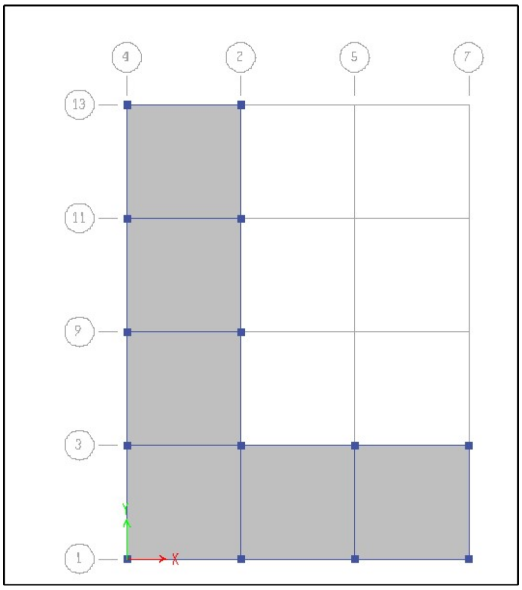


Fig.3.7Plan of L shape structure

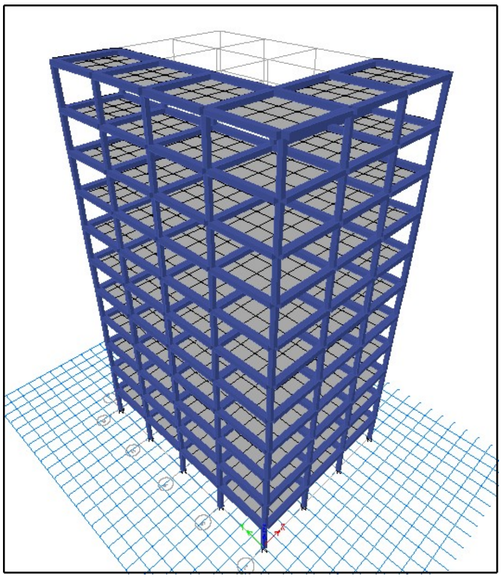


Fig.3.8 L shape model without shear wall

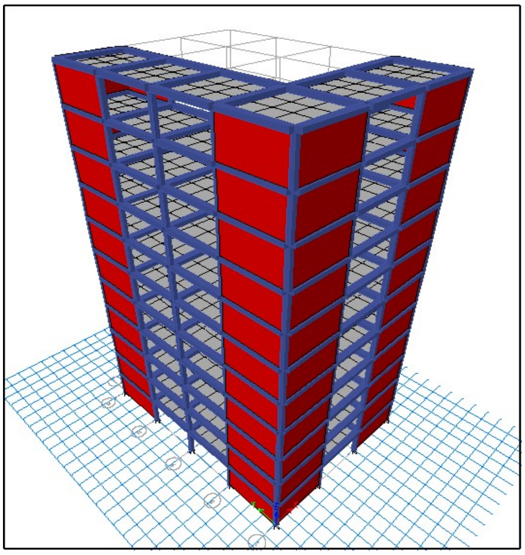


Fig.3.9L shape model with shear wall

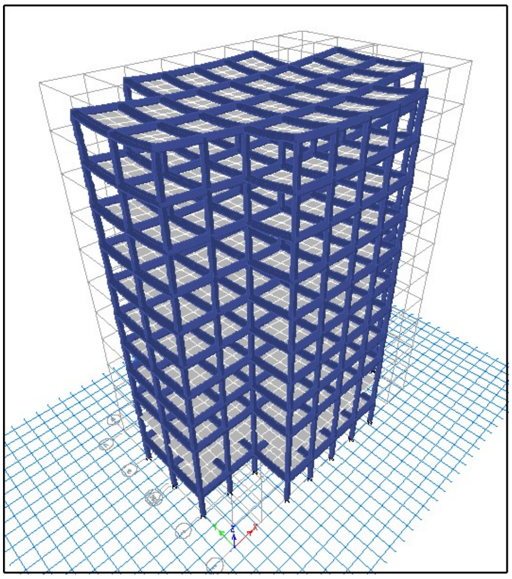


Fig.3.10View of displacement of + shape building without shear wall

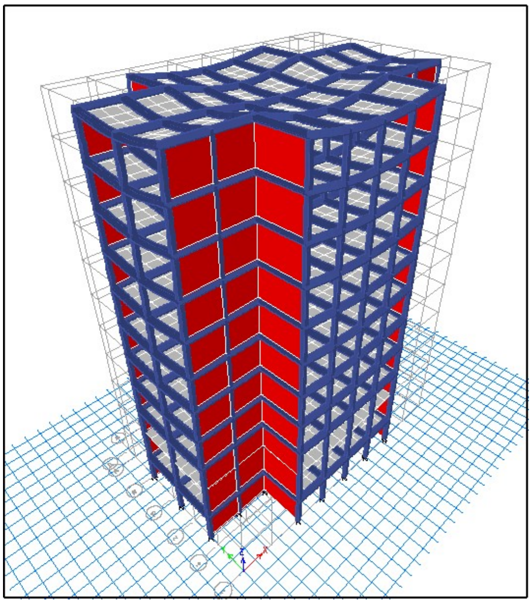


Fig.3.11 view of displacement of + shape building with shear wall

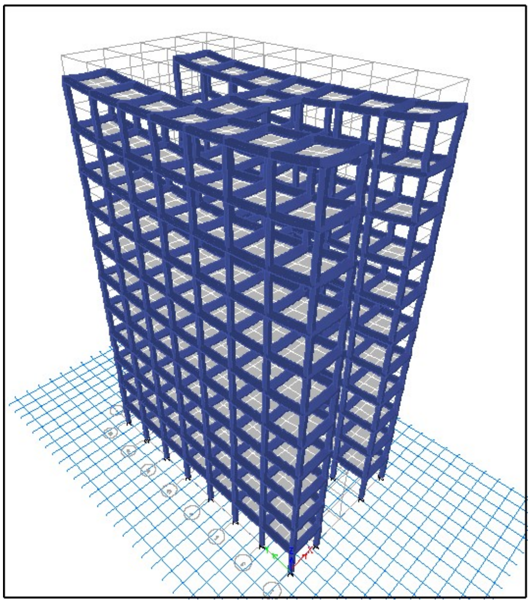


Fig.3.12 view of displacement H shape building without shear wall

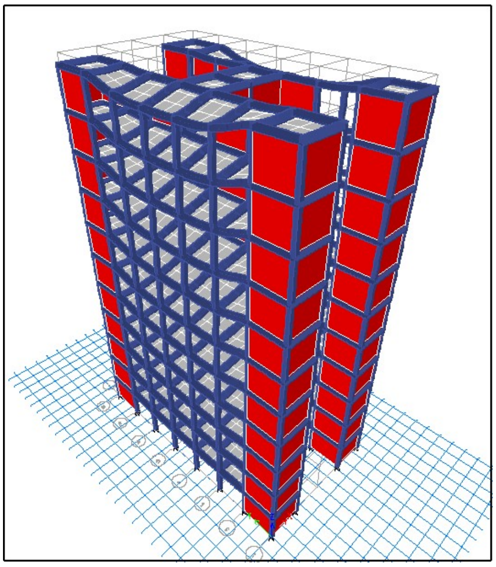


Fig.3.13 view of displacement H shape building with shear wall

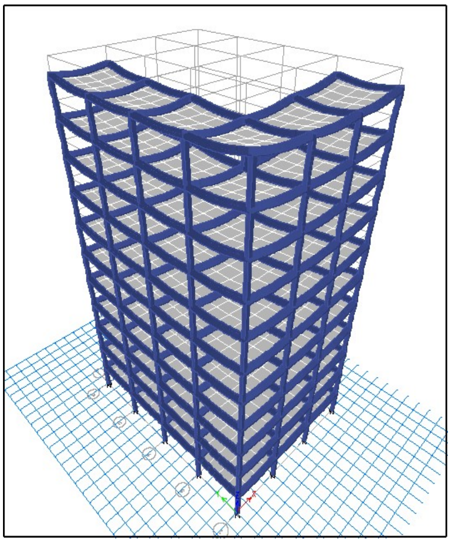


Fig.3.14view of displacement L shape building without shear wall

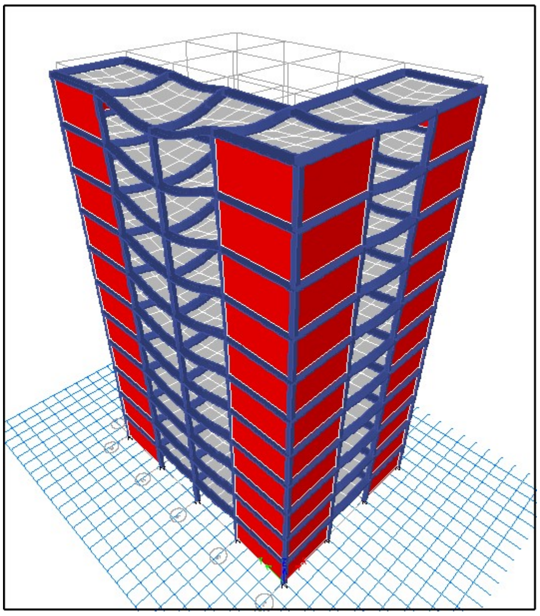


Fig.3.15view of displacement L shape building with shear wall

CHAPTER-4

RESULT

4.1 Storey Displacement It is the displacement of each storey with respect to ground level. According to IS 1893 (part1) :2002 the max value of displacement is 1/250 times of storey height with respect to ground.

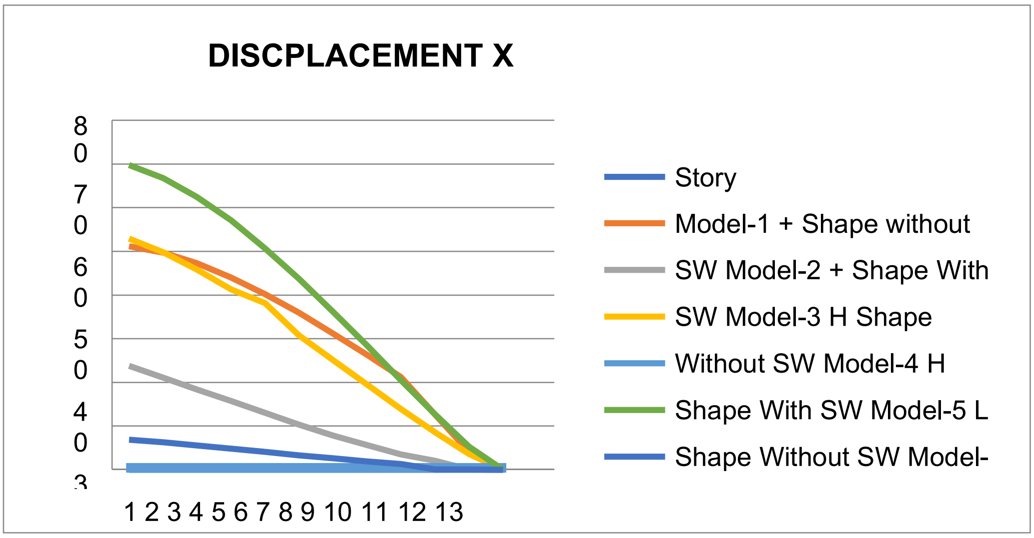
4.1.1Max. Storey displacement (mm) comparison in X direction The table 4.1 and the graph4.1 below shows the comparison of various of various shape of irregular building with and without shear wall in terms of storey drift in X direction

Table4.1 Comparative storey displacement (mm) in X-direction

Story	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	51.2	23.8	52.906	0.859	69.8	6.9
Story10	49.7	21.1	49.756	0.661	66.8	6.3
Story9	47.3	18.4	45.851	0.497	62.5	5.6
Story8	44	15.7	41.257	0.367	57.1	4.8
Story7	40.2	13	38.151	0.288	50.7	4.1
Story6	35.9	10.3	30.704	0.194	43.7	3.3
Story5	31.2	7.8	25.078	0.139	36.2	2.6
Story4	26.3	5.6	19.416	0.127	28.4	1.9
Story3	21.2	3.5	13.859	0.133	20.5	1.3
Story2	12.6	2	8.532	0.12	12.7	0.08
Story1	4.1	0,7	3.58	0.1	5.3	0.04
Base	0	0	0	0	0	0

Disp

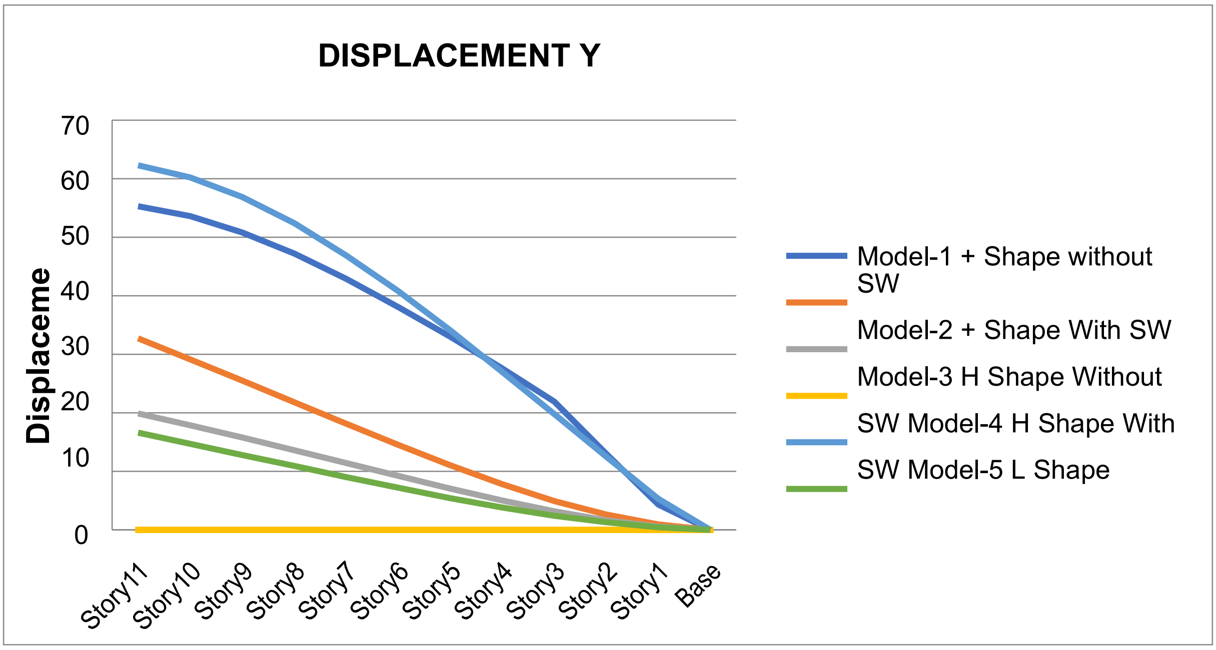
Graph4.1 Comparative storey Displacement in X-direction



4.1.2 Max. Storey displacement (mm) comparison in Y direction- The table 4.2and graph below shows the comparison of various shape of irregular building with and without shear wall in terms of storey displacement in Y direction.

Table4.2 Comparative Displacement (mm) in Y- direction

Story	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	55.3	32.7	19.862	0.048	62.3	16.6
Story10	53.6	29.1	17.828	0.01	60.2	14.7
Story9	50.8	25.5	15.763	0.005	56.9	12.8
Story8	47.2	21.8	13.622	0.005	52.4	10.9
Story7	42.9	18.1	11.432	0.005	46.9	9
Story6	38.1	14.5	9.228	0.005	40.8	7.2
Story5	33	11	7.063	0.005	34.1	5.4
Story4	27.6	7.8	5.013	0.006	27	3.8
Story3	21.9	4.9	3.171	0.007	19.8	2.4
Story2	13	2.6	1.642	0.008	12.5	1.3
Story1	4.3	0.9	0.55	0.016	5.3	0.4
Base	0	0	0	0	0	0

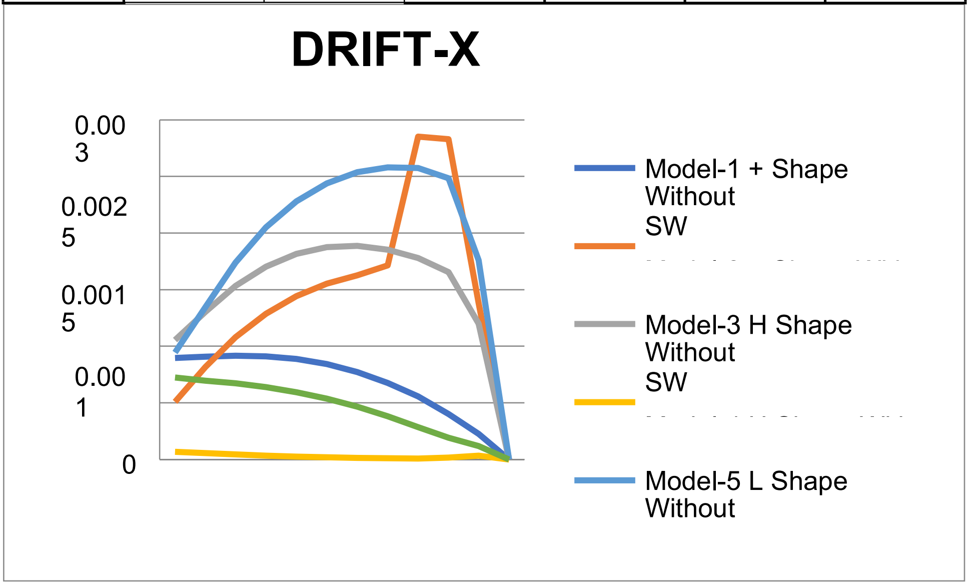


4.2 Storey Drift Storey drift can be defined as the lateral displacement of one level above or below it's IS 1893:2002,the storey drift in any storey due to specified design lateral force with partial factor of 1.0 shall not exceed 0,004 time the storey height.

4.2.1Max. Storey drift (mm) comparison in X direction- The table 4.3 and the graph4.3 below shows the comparison of various shape of irregular building with and without shear wall in terms of storey drift in X direction.

Table4.3Comparative Drift in X-direction

Story	Model-1 + Shape Without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	0.000898	0.000511	0.001056	0.000067	0.000944	0.000724
Story10	0.00091	0.000817	0.001303	0.000057	0.001347	0.000696
Story9	0.000916	0.00108	0.001532	0.000045	0.001739	0.000673
Story8	0.000911	0.001287	0.001702	0.000034	0.002049	0.000639
Story7	0.000889	0.001443	0.001816	0.000025	0.00228	0.000595
Story6	0.000844	0.001553	0.001876	0.000019	0.002439	0.000538
Story5	0.000774	0.001626	0.001887	0.000013	0.002536	0.000467
Story4	0.000677	0.001716	0.001853	0.00001	0.002579	0.000383
Story3	0.000558	0.002852	0.001778	0.000008	0.002573	0.000286
Story2	0.000402	0.002829	0.001653	0.000017	0.002485	0.000192
Story1	0.000228	0.001382	0.0012	0.000033	0.001758	0.000119
Base	0	0	0	0	0	0

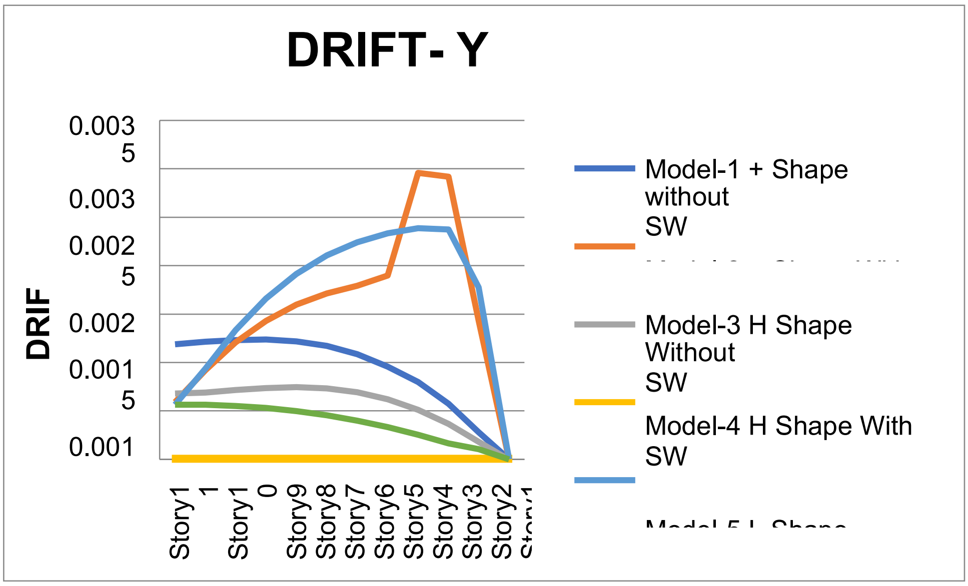


Graph4.3 Comparative Drift in X-direction

4.2.2 Max. Storey drift (mm) comparison in Y direction- The table 4.3 and graph 4.3 below shows the comparison of different shape of irregular building with and without shear wall in terms of storey drift in Y direction .

Table4.4Comparative Drift in Y- direction

Story	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	0.001188	0.000589	0.00068	0.000019	0.000565	0.000565
Story10	0.001215	0.000922	0.00069	0.000002	0.000939	0.000564
Story9	0.001232	0.001207	0.000716	4.53E-07	0.001334	0.000553
Story8	0.001239	0.00143	0.000738	2.00E-07	0.00166	0.00053
Story7	0.00122	0.001597	0.000746	1.64E-07	0.001915	0.000498
Story6	0.001171	0.001714	0.000733	1.44E-07	0.002106	0.000454
Story5	0.001085	0.001792	0.000694	1.97E-07	0.002243	0.0004
Story4	0.000958	0.001897	0.000623	2.68E-07	0.002334	0.000333
Story3	0.000797	0.002957	0.000514	4.43E-07	0.002386	0.000255
Story2	0.000573	0.002919	0.000366	0.000003	0.002372	0.000166
Story1	0.00028	0.001434	0.000183	0.000005	0.001777	0.000107
Base	0	0	0	0	0	0



Graph4.4 Comparative storeyDrift in Y-direction

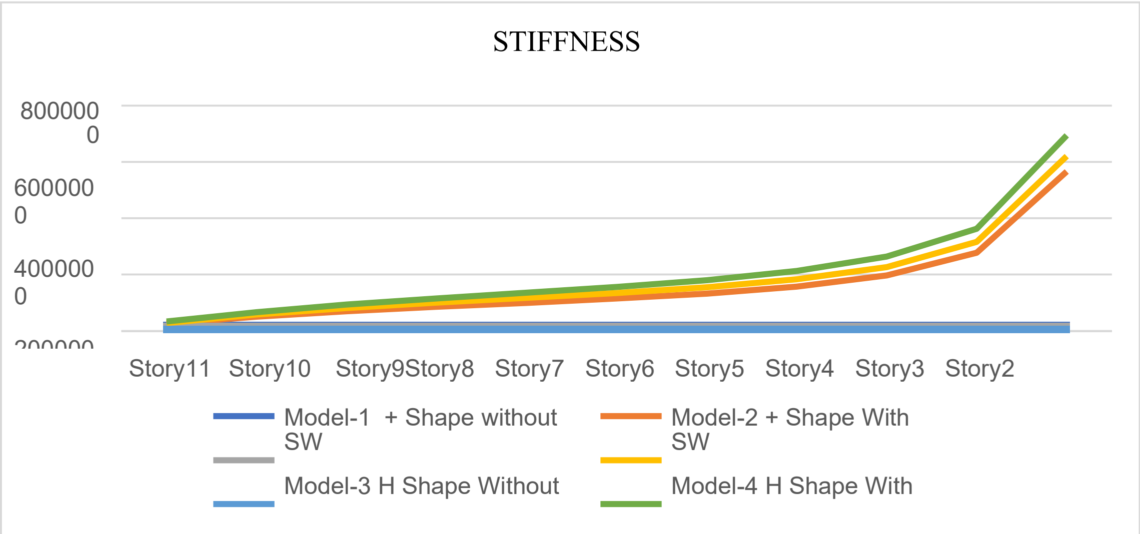
4.3 Storey Stiffness

As per IS 1893:2002 the lateral stiffness is less than 70 percent of that in the storey above or less than 80 percent of average lateral stiffness of the three storey above.

4.3.1 Max.Storey stifness (kN/m) comparison in x direction-The table 8 and graph 6 below shows the comparison of different shape of irregular building with and without shear wall in terms of storey stiffness in X direction

Table4.5Comparative stiffness in x direction

Case	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	139892.87	265713.29	47849.896	289713.47	31825.498	332052.3
Story10	160768.82	504363.98	72109.873	586232.08	39778.243	665896.71
Story9	167587.71	697508.56	85008.468	818342.56	42821.57	930388.58
Story8	171227.25	858096.95	93328.82	1009023.9	44536.586	1151617.8
Story7	173643.86	1004040.7	99562.847	1180106.2	45721.333	1352880.7
Story6	175554.78	1153789.8	104952.33	1353628.3	46682.31	1558616.8
Story5	177148.04	1331059.9	110280.35	1556935.3	47576.42	1799130.9
Story4	173797.46	1579536.9	116193.9	1834101	48508.015	2123841.5
Story3	106396.6	1974713.5	123420.66	2277871.4	49619.996	2638888.4
Story2	107884.2	2776404.4	134099.93	3168356.1	51834.345	3626152.2
Story1	221293.97	5669923.2	186028.03	6208915.7	72725.91	6946141.6

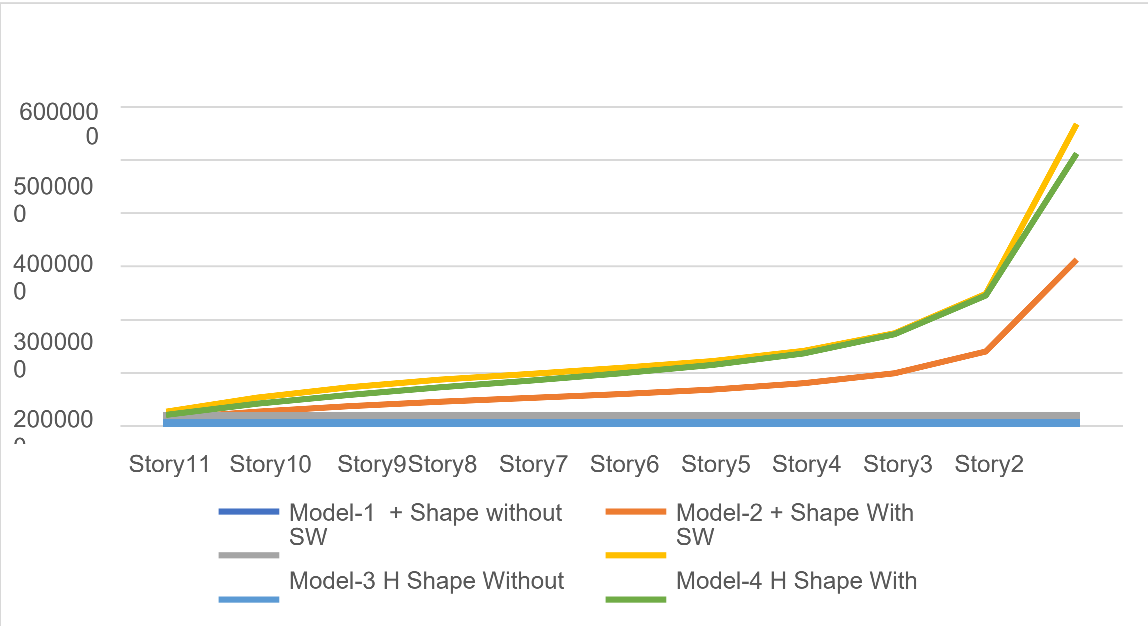


Graph4.5Storey stiffness in X direction

4.3.2 Max.Storey stifness (kN/m) comparison in Y direction-the table and graph below shows the comparison of different shape of irregular building with and without shear wal in terms of storey stiffness in Y direction.

Table4.6 Storey Stiffness in Y-direction

Case	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	113906.93	144897.87	119429.74	275136.2	37009.967	209634.04
Story10	134406.27	272683.17	139899.93	539272.2	44391.156	420736.51
Story9	141379.81	373925.17	146497.9	730312.24	46848.516	588804.97
Story8	145169.57	455385.18	150000.92	870182.87	48186.661	729901.92
Story7	147719.44	527126.48	152316.43	983622.72	49094.078	858976.17
Story6	149733.26	599266.83	154157.32	1093164.7	49821.599	992221.64
Story5	151342.63	684520.2	155871.56	1223255.4	50493.529	1150771.2
Story4	148009.37	806438.96	157679.33	1411843.9	51190.193	1370296.4
Story3	96575.304	992456.98	159821.27	1742148.2	52029.2	1729493.2
Story2	98389.685	1402009	163616.46	2487187.4	53879.735	2457645.1
Story1	200872.18	3124916	206275.5	5679423.3	74438.4	5127759.3



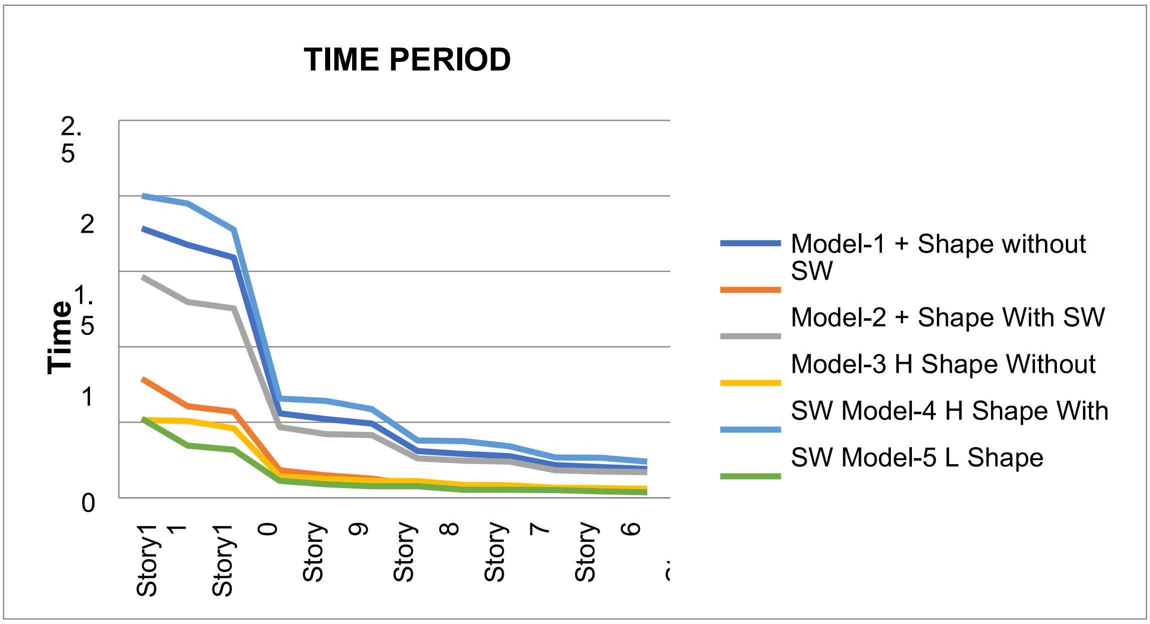
Graph4.6 storey stiffness in Y direction

4.4Time period

According to IS 1893 (Part 1):2002 it is the first (longest) modal time period of vibration.

Table4.7 Comparative time period

Case	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	1.784	0.789	1.465	0.514	2	0.522
Story10	1.677	0.606	1.298	0.507	1.949	0.344
Story9	1.592	0.569	1.256	0.458	1.775	0.317
Story8	0.559	0.182	0.469	0.14	0.656	0.112
Story7	0.522	0.147	0.422	0.124	0.642	0.089
Story6	0.491	0.127	0.416	0.112	0.585	0.076
Story5	0.309	0.081	0.26	0.108	0.379	0.076
Story4	0.291	0.07	0.245	0.084	0.374	0.052
Story3	0.274	0.058	0.239	0.082	0.34	0.051
Story2	0.216	0.052	0.182	0.065	0.266	0.049
Story1	0.204	0.047	0.174	0.063	0.263	0.041
Base	0.191	0.04	0.168	0.059	0.239	0.036



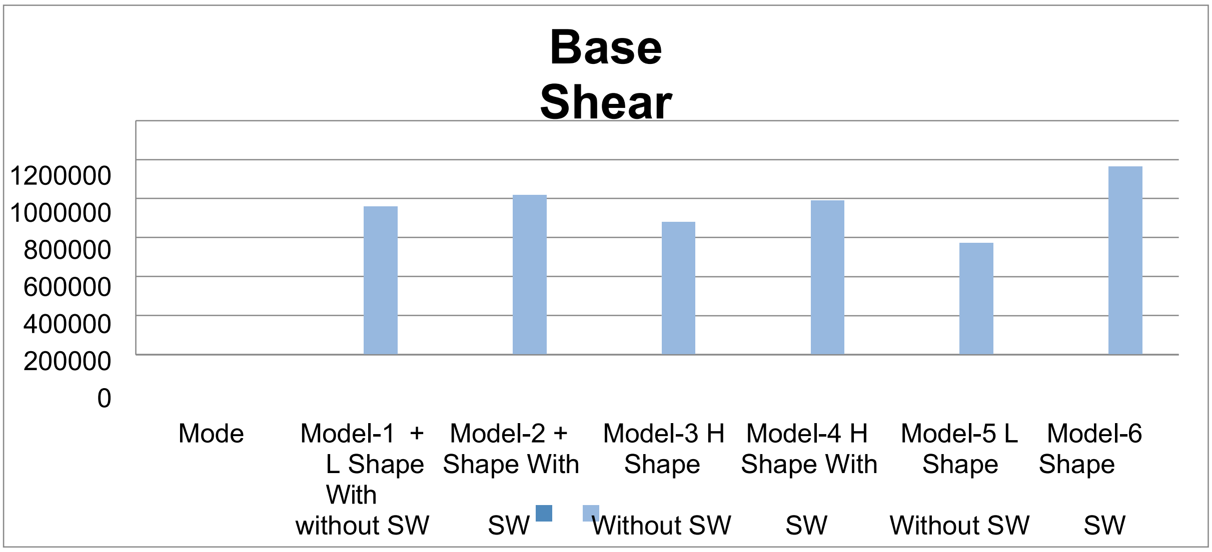
Graph4.7Comparative time period

4.5 Base shear

Base shear is the maximum excepted lateral force that will occur due to seismic.

Table 4.8Comparative base shear

Case	Mode	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Model	1	760740.22	816726.19	679946.21	790168.6	570676.61	962610.08



Graph4.8Comparative base shear

CHAPTER -5
CONCLUSION

5. Conclusion

In the present study, an attempt is made to study the improvements in seismic performance of the different shape of building with re-entrant corners by the introduction of shear wall and to compare to their relative efficiency. The modelling is totally done by ETABs software, which complete the overall parameter of engineering aspect. In these six model, we compared the storey displacement, storey drift, time period and base shear which result are as follows:

1) The maximum storey displacement in X-direction of top storey for +, H, L shape building with shear wall structures gets lessened when compared with the maximum displacement of +, H, L shape building without shear wall.
2) The maximum storey displacement in Y-direction of top storey for +, H, L shape building with shear wall structures gets lessened when compared with the maximum displacement of +, H, L shape building without shear wall.
3) In comparing these model we found that the storey drift of the structure is shown good result in the type of building H shape in X-direction.
4) In comparing these model we found that the storey drift of the structure is shown good result in the type of building H shape in Y-direction.
5) In the comparing of time period of these structures we got that the structure of H-shape building shows less time period compare to other shape of building. Hence it is efficient and good for population.
6) As above shown off base shear of table we get that the maximum base shear occurred in L-shape of building comparing to other type of structure.
7) It is conclude that buildings with shear wall has performed very well than the buildings without shear wall. These shear walls reduces the storey displacement and storey drift for all the models
.

Ultimately in comparing the parameter of storey displacement, storey drift, time period and base shear of these six models, plus shape, H-shape and L-shape with and without shear wall we found that plus(+) shape and H-shape structure shows perfect result in storey displacement, storey drift and time period while the L-shape of structure shows efficient result in base shear.

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APPENDIX

URKUND

Document Information

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COMPARATIVE STUDY ON SEISMIC BEHAVIOUR OF IRREGULAR SHAPE BUILDING WITH SHEAR WALL AT RE-ENTRANT CORNER

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Abstract

Earthquakes are generally unpredictable and more trouble of every all natural disasters event. Among all techniques applied for earthquake safe multi-storeyed structures shear wall are the most adopted methods. Shear wall is a basic part situated at better places in a structure from foundation level to top parapet level, used to defend against lateral forces i.e corresponding to the plane of the wall. Shear walls are structural members which are used to resist lateral forces due to earthquake and wind. In India, most adopted kind of quake safe structures is with shear wall. These structural walls may contrast dependent on their structure and utility and their situation in any structure assumes a significant role for opposing resisting forces. Presence of irregularities is considered as a significant lack in the seismic conduct of structures. One such types of irregularity is the presence of re-entrant corners which causes stress fixation because of sudden changes in stiffness and torsion in the structures because of plan asymmetry. Strengthening the notch of the re-entrant cornered structures is very essential to ensure a best seismic performance such structures. Presentation of stiff shear walls are the famous strategies for reinforcing the structures against their poor seismic exhibition.

Keywords... *Re-entrant corner, time history method, base share, storey drift, storey displacement, time period E. TABS.*

1. INTRODUCTION

Behavior of a structure during an earthquake basically depends upon its geometry and building configuration. Structures with basic and ordinary arrangement perform much better in case of a earthquake contrasted with structures with irregular designs. Sudden changes in structural stiffness are not alluring for seismic safe structures. Many construction standards identified with seismic examination and plan of structures recognizes the different types and measure of irregularities and prescribes them to be stayed away from or to adopt advance technique for investigation so as to neutralize the impact of such irregularities on the worldwide conduct of the structure .Presence of re-entrant corners is one such irregularity which adversely influences the seismic behavior of the structures. Be that as it may, building frameworks with re-entrant corners, (for example, structures with L or U shape setup in plan) can't be avoided they provide function superiority. They offer many rooms adjusted along the edge of structures with great access to air light and proper ventilation. Thus, re-entrant cornered structures are generally utilized for school and hotel buildings. Different configurations of structures with re-entrant corners are as shown in Fig-1. These types of structures are more sensitive damage during a earthquake. Confirmations of terrible showing of structures with re-entrant corners can be seen in lot of the past seismic earthquake (Fig-2).Additionally, a few investigation have been done which is as follows: M.R.Wakchaure (2012) completed seismic and wind investigation of35 and 39 storied structures having double frameworks and plan irregular shapes like T and oval shape by utilizing ETABS programming and IS: 1893Part-1)- 2002. The compression has been finished by considering the parameter, for example, time period, recurrence modular mass &displacement. It has been conclude that double framework is better solution effects produce by plan irregularities.Athulya Ullas (2017) performed wind analysis of buildings having different shapes such as Y, Plus and V. Buildings of plan shapes Y, Plus and V are modelled in ETABS 2016 and analyzed. It is observed that the storey force is same for all the buildings, i.e. the storey force does not change with the shape. The lateral displacement is found maximum for V shape building. The storey drift is observed maximum for Y shape as compared to that of other shapes and the lateral displacement and the storey drift are observed minimum for Plus shape building as compared to Y and V shape buildings and hence it is the most structurally stable shape among the selected shapes'. Guru Prasad (2017) performed out a dynamic analysis of G+15 storied RC building with L, C and rectangular shape in plan with the help of ETABS. Comparison has been finished by considering the parameter, for example, story drift, story shear, building mode, and sec cut force. It has been inferred that most extreme estimation of story shear was observed for L-shape plan than rectangular structure and C-shape building. The storey drift value in X direction and Y direction increments for top to bottom story in each of the three cases. At the point when earthquake load is applied in Y direction, it was discovered that irregular plan structure can oppose more base shear than rectangular plan structure. Regular structure and L-shape structures are gave acceptable outcomes than C-model structures in all angle. Veena S. Ravi [14] carried out the seismic analysis of G+11 storey building for zone II & V having seven different irregular shapes with one regular plan and remaining irregular plan i.e. C, E, H, L, T, PLUS shapes with the help of STAAD-Pro software and IS-1893- 2002-Part-1. Response spectrum analysis method was used for analysis. The comparison has been done by considering the parameters such as design lateral shear, time period. It has been concluded that regular square plan building have maximum base shear value whereas L shape building have the least value zone II & V. Frequency & displacement is maximum in L shaped building. Irregular shaped buildings undergo maximum displacement than regular buildings during earthquake.Ramesh Konakalla (2014) carried out the seismic & wind analysis of 20 storey building with different irregular shapes like square, L, inverted U & T shape by using linear static analysis &STAAD Pro software. For linear static analysis IS 1893 (part-1):2002 was used & for wind analysis ASCE-7: 02 code was used. The comparison has been done in terms of storey drift & lateral displacement. It has been concluded that in the regular frame, there is no torsional effect in the frame because of symmetry. In case of irregular structure responses are different for the columns located in the plane perpendicular to the force action. For U plan shape the responses in the corner columns of two limbs are same in the earthquake loads but different in wind loads.

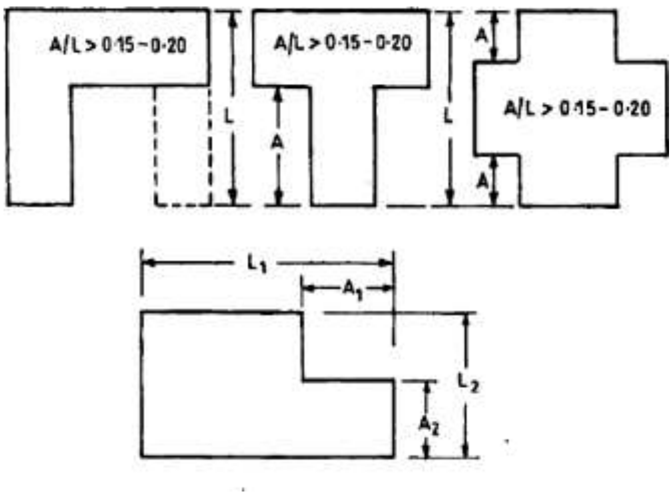


FIG-1: Re-entrant corners as Defined by IS1893:2016

Fig-2: Damages caused to the Roof Diaphragam at the Re-entrant Corner of West Anchorage High School,Alaska.during the 1964 eatquake

Objective

The objective of the research paper is to find the seismic analysis of RC irregular building with and without shear wall at re-entrant corner in seismic zone 5. All modelling and analysis carried out on E. TABS which cover all aspect of structural engineering.

The specification and feature of the research is following…..

(1) Modelling G+10 RC irregular building with and without shear wall at re-entrant corner.

(2) Three type of irregular building + shape, H shape and Lshape with and without shear wall at re-entrant corner.

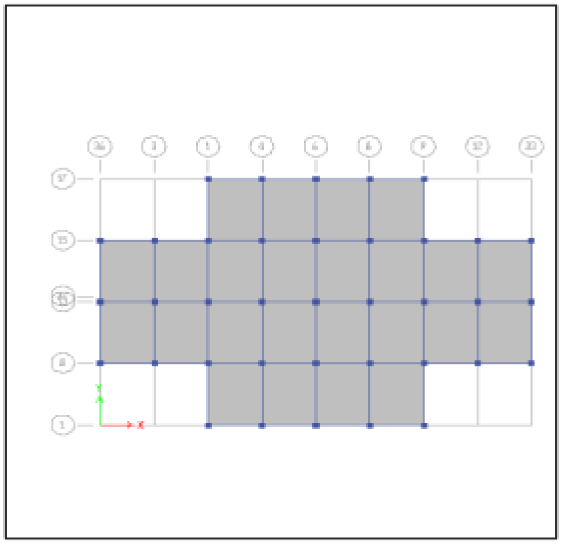
(3) Analysis all model with the parameter storey drift, maximum story displacement, base

Shear, story stiffness.

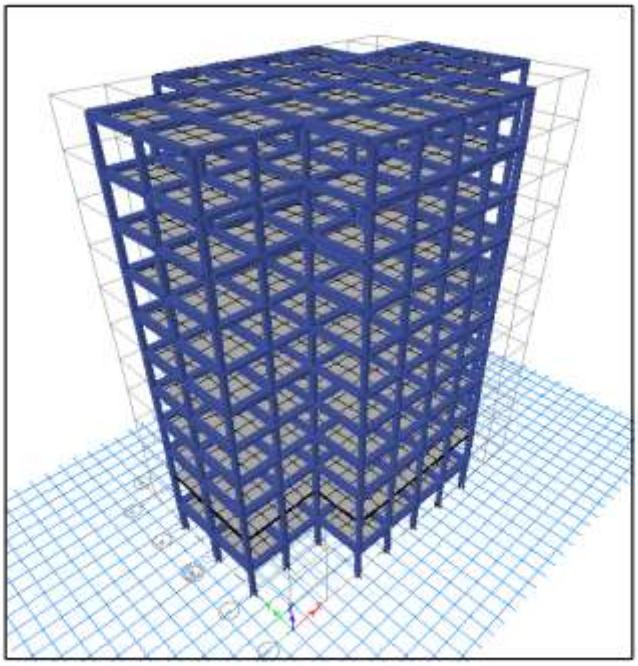
(4) RC multi-storey building is study for earthquake using Time History method in the ETABS.

2. Structural modelling

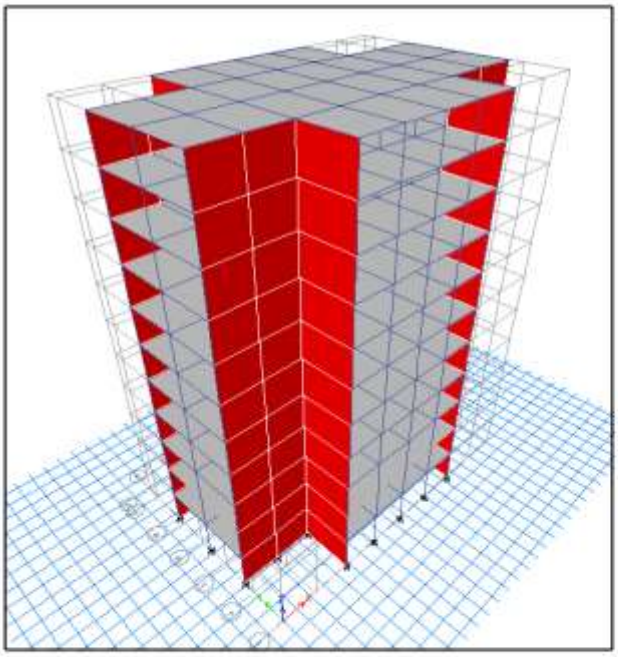
The analysis is completely software based is entirely done on ETABS.A G+10 irregular shape building consider like + shape ,H shape and L-shape which lie in zone 5.method adopted is time history analysis. Slab thickness, column size and beam size is taken as 150mm, 300*300mmand 300*450mm respectively. The soil type considered is type 2 soil. This study is conducted to understand the structural comparative study on irregular shape building with and without shear wall. So total 6 model are made.in first and second model + shape without and with shear wall ,in third and fourth model H shape without and with shear wall and in Fifth and sixth model L shape with and without shear wall. The parameter for research are time period, lateral displacement, base shear and storey drift. Indian standard code IS1893part 1:2016is considered for study. The various model and graphs for study are illustrated below.



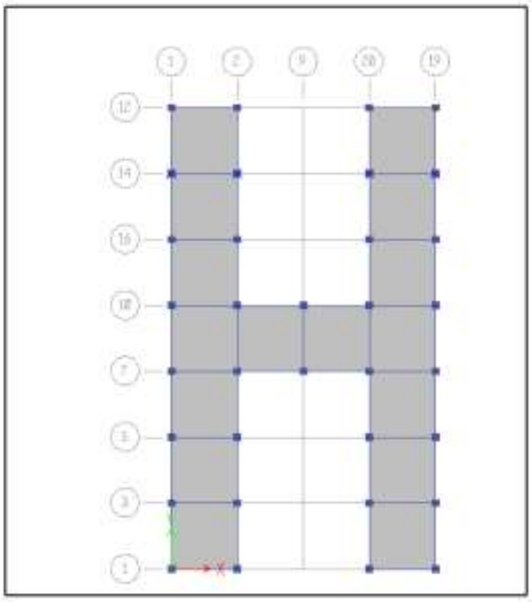
Plan of PLUS-shape structure



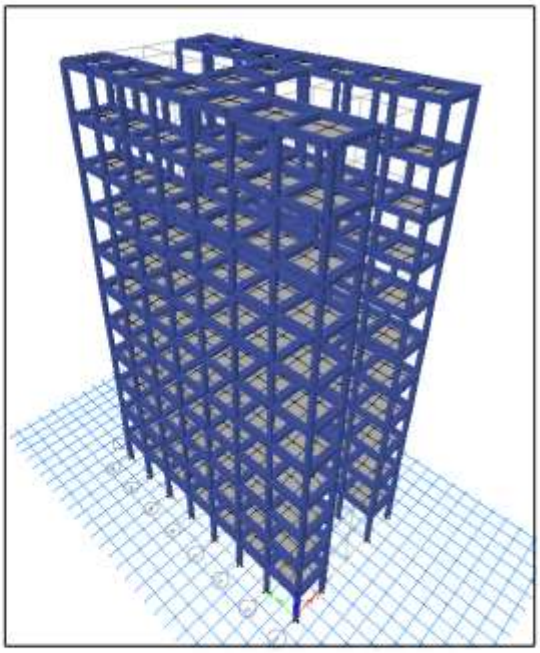
Model 1. PLUS –shape model without shear wall



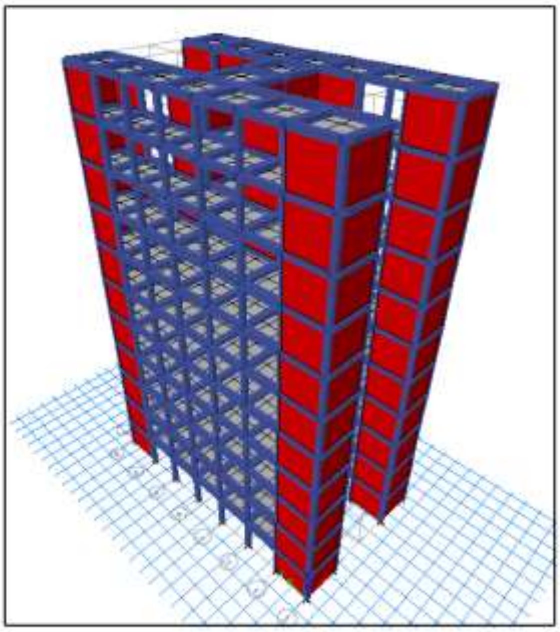
Model 2. PLUS –shape model with shear wall



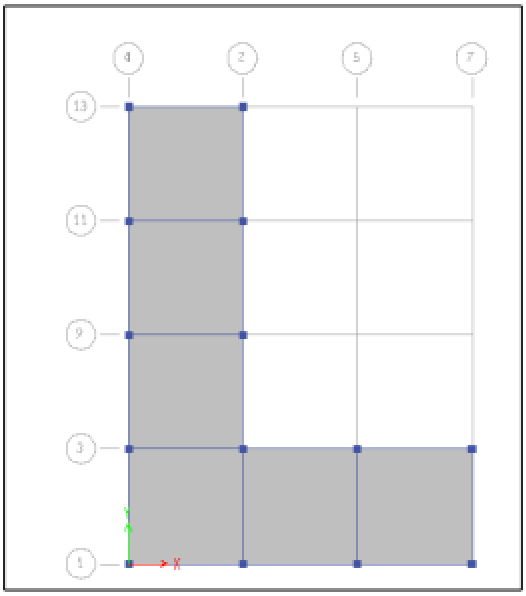
Plan of H shape structure



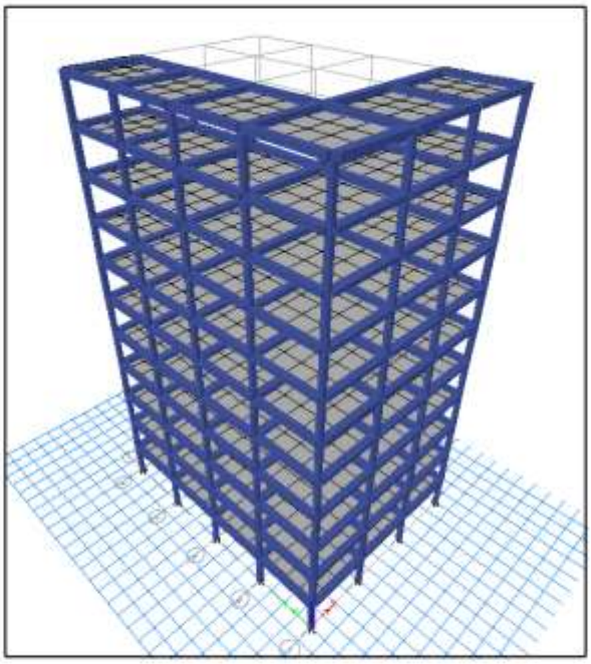
Model 3. H-shape model without shear wall



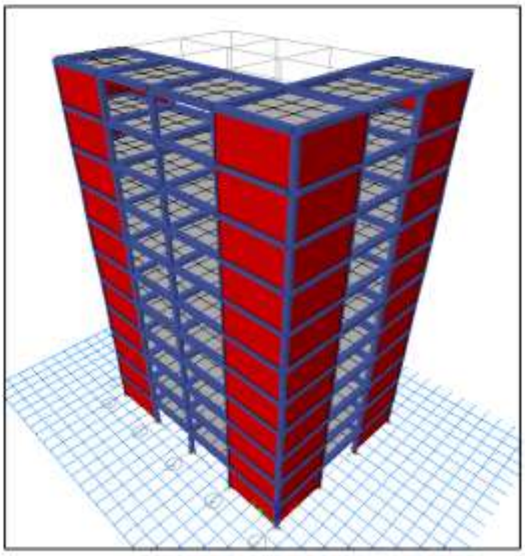
Model 4. H-shape model with shear wall



Plan of L-shape Structure



Model 5. L-shape model without shear wall



Model 6. L-shape model with shear wall

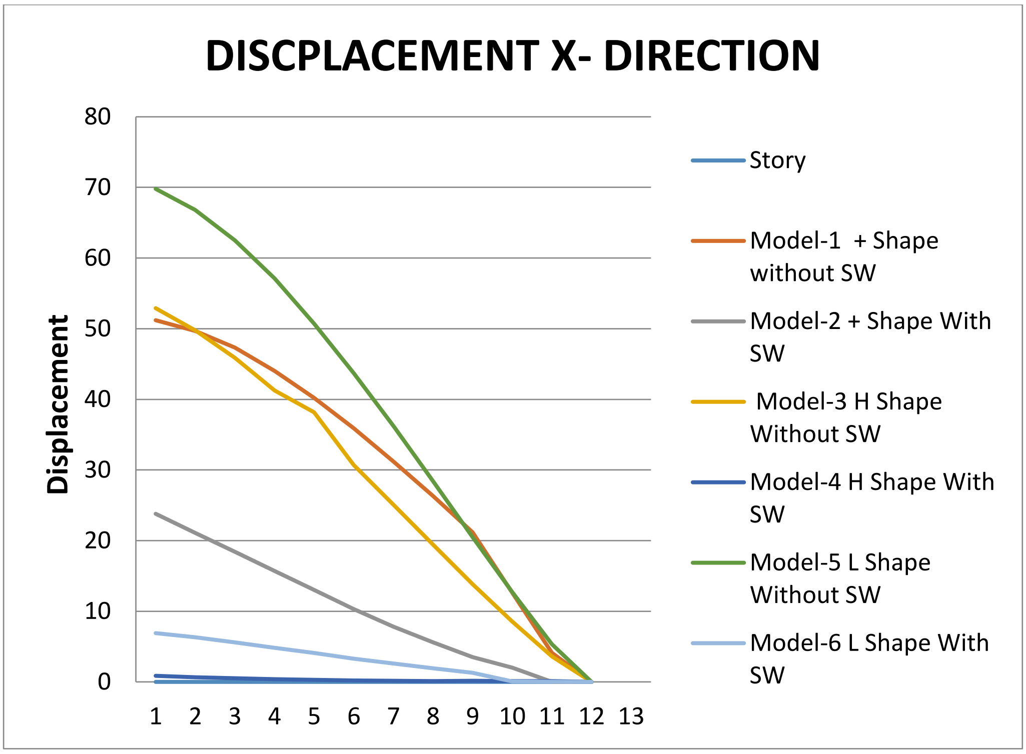
3. Results and discussions

3.1Storey Displacement

It is the displacement of each storey with respect to ground level. According to IS 1893 (part1) :2002 the max value of displacement is 1/250 times of storey height with respect to ground.

Story	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	51.2	23.8	52.906	0.859	69.8	6.9
Story10	49.7	21.1	49.756	0.661	66.8	6.3
Story9	47.3	18.4	45.851	0.497	62.5	5.6
Story8	44	15.7	41.257	0.367	57.1	4.8
Story7	40.2	13	38.151	0.288	50.7	4.1
Story6	35.9	10.3	30.704	0.194	43.7	3.3
Story5	31.2	7.8	25.078	0.139	36.2	2.6
Story4	26.3	5.6	19.416	0.127	28.4	1.9
Story3	21.2	3.5	13.859	0.133	20.5	1.3
Story2	12.6	2	8.532	0.12	12.7	0.08
Story1	4.1	0,7	3.58	0.1	5.3	0.04
Base	0	0	0	0	0	0

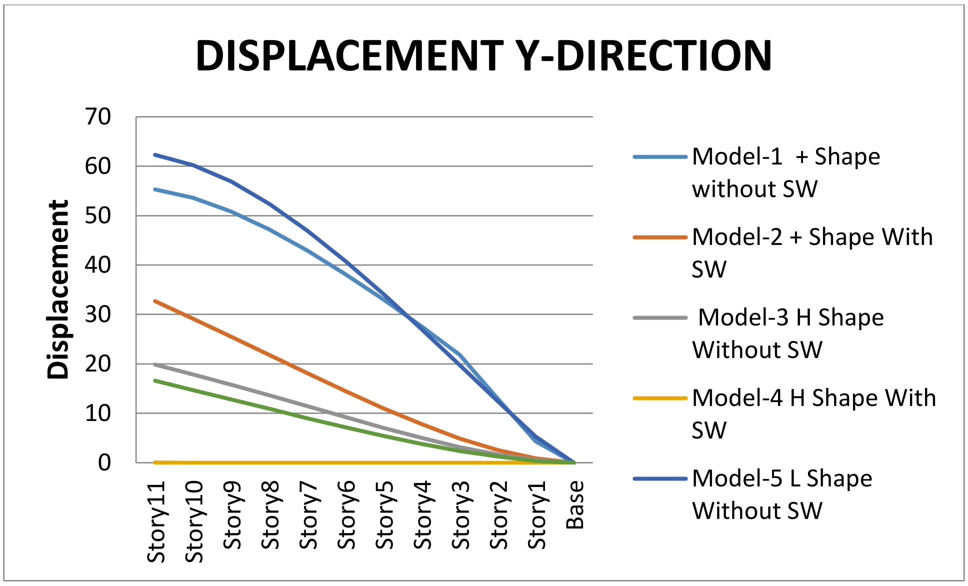
Table1.1 Comparative storey displacement (mm) in X-direction



Graph1.1 Comparative storey Displacement in X-direction

Story	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	55.3	32.7	19.862	0.048	62.3	16.6
Story10	53.6	29.1	17.828	0.01	60.2	14.7
Story9	50.8	25.5	15.763	0.005	56.9	12.8
Story8	47.2	21.8	13.622	0.005	52.4	10.9
Story7	42.9	18.1	11.432	0.005	46.9	9
Story6	38.1	14.5	9.228	0.005	40.8	7.2
Story5	33	11	7.063	0.005	34.1	5.4
Story4	27.6	7.8	5.013	0.006	27	3.8
Story3	21.9	4.9	3.171	0.007	19.8	2.4
Story2	13	2.6	1.642	0.008	12.5	1.3
Story1	4.3	0.9	0.55	0.016	5.3	0.4
Base	0	0	0	0	0	0

Table1.2 Comparative Displacement (mm) in Y- direction



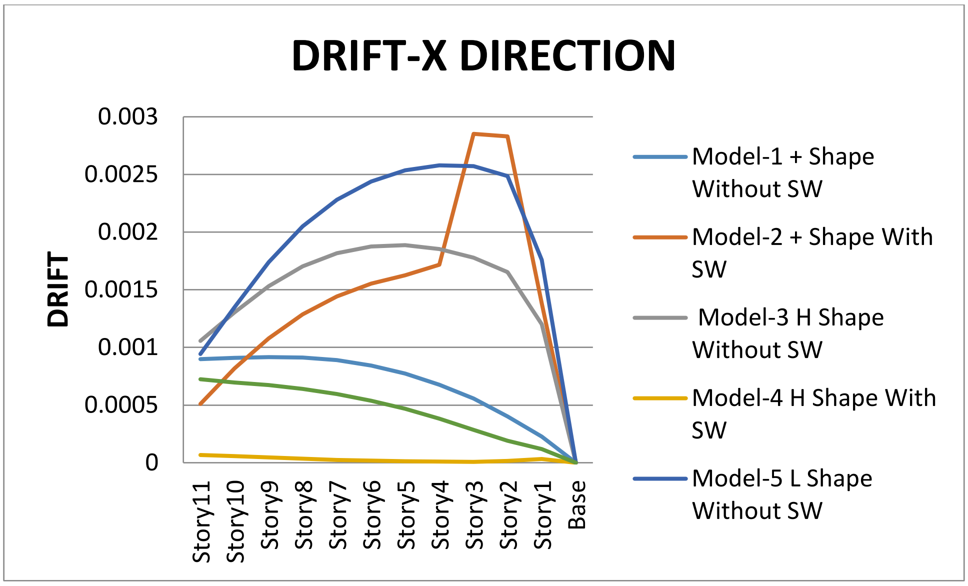
Graph1.2 Comparative Displacement (mm) in Y-direction

3.2Storey Drift

Storey drift can be defined as the lateral displacement of one level above or below it's IS 1893:2002,the storey drift in any storey due to specified design lateral force with partial factor of 1.0 shall not exceed 0,004 time the storey height.

Story	Model-1 + Shape Without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	0.000898	0.000511	0.001056	0.000067	0.000944	0.000724
Story10	0.00091	0.000817	0.001303	0.000057	0.001347	0.000696
Story9	0.000916	0.00108	0.001532	0.000045	0.001739	0.000673
Story8	0.000911	0.001287	0.001702	0.000034	0.002049	0.000639
Story7	0.000889	0.001443	0.001816	0.000025	0.00228	0.000595
Story6	0.000844	0.001553	0.001876	0.000019	0.002439	0.000538
Story5	0.000774	0.001626	0.001887	0.000013	0.002536	0.000467
Story4	0.000677	0.001716	0.001853	0.00001	0.002579	0.000383
Story3	0.000558	0.002852	0.001778	0.000008	0.002573	0.000286
Story2	0.000402	0.002829	0.001653	0.000017	0.002485	0.000192
Story1	0.000228	0.001382	0.0012	0.000033	0.001758	0.000119
Base	0	0	0	0	0	0

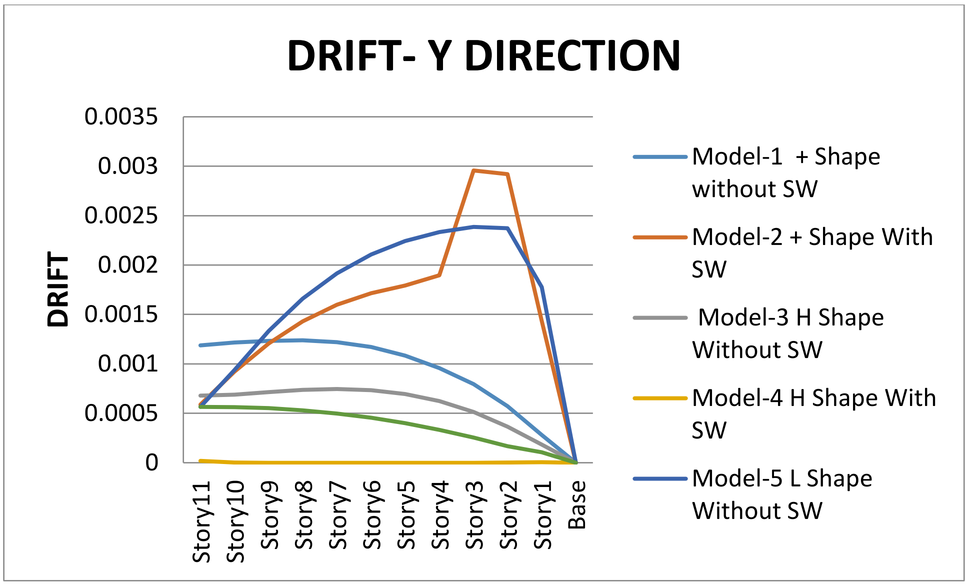
Table2.1Comparative Drift in X-direction



Graph2.1 Comparative Drift in X-direction

Story	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	0.001188	0.000589	0.00068	0.000019	0.000565	0.000565
Story10	0.001215	0.000922	0.00069	0.000002	0.000939	0.000564
Story9	0.001232	0.001207	0.000716	4.53E-07	0.001334	0.000553
Story8	0.001239	0.00143	0.000738	2.00E-07	0.00166	0.00053
Story7	0.00122	0.001597	0.000746	1.64E-07	0.001915	0.000498
Story6	0.001171	0.001714	0.000733	1.44E-07	0.002106	0.000454
Story5	0.001085	0.001792	0.000694	1.97E-07	0.002243	0.0004
Story4	0.000958	0.001897	0.000623	2.68E-07	0.002334	0.000333
Story3	0.000797	0.002957	0.000514	4.43E-07	0.002386	0.000255
Story2	0.000573	0.002919	0.000366	0.000003	0.002372	0.000166
Story1	0.00028	0.001434	0.000183	0.000005	0.001777	0.000107
Base	0	0	0	0	0	0

Table2.2 Comparative Drift in Y- direction



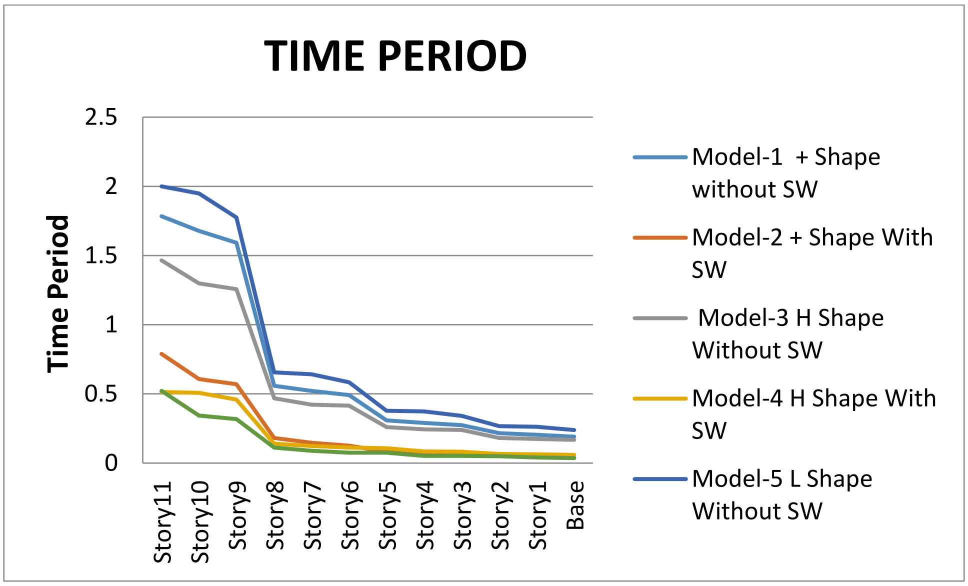
Graph2.2 Comparative storeyDrift in Y-direction

3.3 Time period

According to IS 1893 (Part 1):2002 it is the first (longest) modal time period of vibration.

Case	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Story11	1.784	0.789	1.465	0.514	2	0.522
Story10	1.677	0.606	1.298	0.507	1.949	0.344
Story9	1.592	0.569	1.256	0.458	1.775	0.317
Story8	0.559	0.182	0.469	0.14	0.656	0.112
Story7	0.522	0.147	0.422	0.124	0.642	0.089
Story6	0.491	0.127	0.416	0.112	0.585	0.076
Story5	0.309	0.081	0.26	0.108	0.379	0.076
Story4	0.291	0.07	0.245	0.084	0.374	0.052
Story3	0.274	0.058	0.239	0.082	0.34	0.051
Story2	0.216	0.052	0.182	0.065	0.266	0.049
Story1	0.204	0.047	0.174	0.063	0.263	0.041
Base	0.191	0.04	0.168	0.059	0.239	0.036

Table3.1 Comparative time period



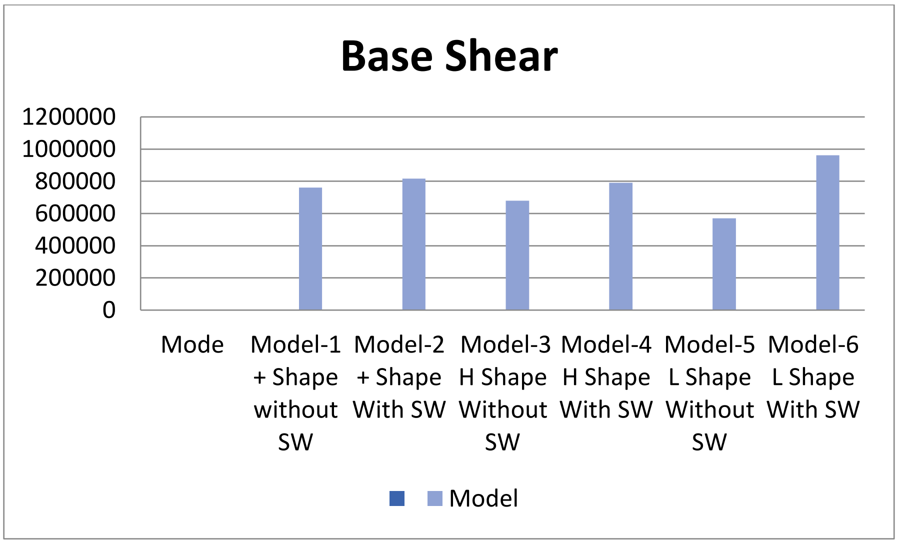
Graph3.1 Comparative time period

3.4Base shear

Base shear is the maximum excepted lateral force that will occur due to seismic

Case	Mode	Model-1 + Shape without SW	Model-2 + Shape With SW	Model-3 H Shape Without SW	Model-4 H Shape With SW	Model-5 L Shape Without SW	Model-6 L Shape With SW
Model	1	760740.22	816726.19	679946.21	790168.6	570676.61	962610.08

Table4.1 Comparative base shear



Graph4.1 Comparative base shear

5. Conclusion

In the present study, an attempt is made to study the improvements in seismic performance of the different shape of building with re-entrant corners by the introduction of shear wall and to compare to their relative efficiency. The modelling is totally done by ETABs software, which complete the overall parameter of engineering aspect. In these six model, we compared the storey displacement, storey drift, time period and base shear which result are as follows:

1) The maximum storey displacement in X-direction of top storey for +, H, L shape building with shear wall structures gets lessened when compared with the maximum displacement of +, H, L shape building without shear wall.
2) The maximum storey displacement in Y-direction of top storey for +, H, L shape building with shear wall structures gets lessened when compared with the maximum displacement of +, H, L shape building without shear wall.
3) In comparing these model we found that the storey drift of the structure is shown good result in the type of building H shape in X-direction.
4) In comparing these model we found that the storey drift of the structure is shown good result in the type of building H shape in Y-direction.
5) In the comparing of time period of these structures we got that the structure of H-shape building shows less time period compare to other shape of building. Hence it is efficient and good for population.
6) As above shown off base shear of table we get that the maximum base shear occurred in L-shape of building comparing to other type of structure.
7) It is conclude that buildings with shear wall has performed very well than the buildings without shear wall. These shear walls reduces the storey displacement and storey drift for all the models

.

Ultimately in comparing the parameter of storey displacement, storey drift, time period and base shear of these six models, plus shape, H-shape and L-shape with and without shear wall we found that plus(+) shape and H-shape structure shows perfect result in storey displacement, storey drift and time period while the L-shape of structure shows efficient result in base shear.

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Comparative Study On Seismic Behaviour of Irregular Shape Building With Shear Wall At Re-Entrant Corner: A Review

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Abstract

The convenience of shear walls in the basic arranging of multistory structures has for quite some time been recognized. At the point when walls are arranged in profitable situations in a structure, they can be exceptionally effective in opposing sidelong loads starting from wind or seismic earthquakes. Strengthened cement confined structures are sufficient for opposing both vertical and flat loads following up on them. Broad research has been done in the plan and investigation of shear wall high rise structures. A private structure of G+ 15 sporadic structures is considered for the investigation. To assess the seismic reaction of the structures and examination was performed by utilizing reaction range technique utilizing Finite component based programming ETABS. The properties of these seismic shear walls rule the reaction of the structures, and in this manner, it is imperative to assess the seismic reaction of the walls suitably. An investigation on a sporadic high rise structure with shear wall and without shear wall was concentrated to comprehend the horizontal loads, story floats and torsion impacts. From the outcomes it is derived that shear walls are progressively impervious to lateral loads in an unpredictable structure.

Keywords: *Shear Walls, Lateral Loads, Irregular, Re-entrant, Torsion, Time period, Strength ETABS.*

1. Introduction

Shear walls are uncommonly planned structural wall remembered for the structures to oppose horizontal forces that are actuated in the plane of the wall because of wind, earthquake and different forces. They are essentially flexural members and as a rule gave in high rise building to maintain a strategic distance from the complete breakdown of the elevated structures under seismic forces. Shear walls has high in-plane stiffness and strength which can be utilized to at the same time oppose large horizontal loads and support gravity loads. In any case, when the structures are tall, state in excess of twelve story or somewhere in the vicinity, beam and column sizes exercise huge and support at the pillar and segment intersection turns out very substantial, so that, there is a ton of clog at these joints and it is hard to put and vibrate concrete at these spots, which doesn't add to the security of structures. These down to earth challenges call for presentation of shear walls in elevated structures. Profound straight walls or angular, U formed and box molded shear walls were utilized dependent on practical and engineering prerequisite of the elevated structure. The segment 7 of IS 1893(part1):2002 the inconsistency in structures are not developed with care and subsequently at long last reason to failure.

2.Research Investigation

Providing shear wall in these days is very essential for building because it provides strength to the building against the seismic waves which is caused by earthquake there are various studies are done on providing the optimum positioning of shear wall in regular and irregular building this studies are as follow

[1] O. EsmailiEpackachi(2008) In this paper study the the tallest RC structures, situated in the high seismic zone, with 56 stories. Right now, wall framework with irregular openings are used under both lateral and gravity loads, and may result some particular issues in the conduct of basic components, for example, shear walls, coupling beams and so on. A level of ductility for seismic bracing system, reasonably, should be accommodated energy ingestion yet axial loads adversy affect their satisfactory exhibition Utilizing shear walls for both gravity and supporting framework is inadmissible neither theoretically nor economically. Coupling beams are assumed to be cracked rashly in earthquake, it happens under permanent gravity load because of concrete time reliance. By considering both time depend of cement and development succession bracing all the while in examinations, the basic requests happen in the center tallness of the structure.

[2]Dr. S.K. Dubey(2011) The main objective of this study is to understand different irregularity and torsional reaction because of plan and vertical irregularity, and to analyze ―T‖-shaped structure while earthquake forces acts and to calculate extra shear because of torsion in the sections. Extra shear due to torsional moments should be considered in light of the fact that; this expansion in shear forces makes segments breakdown Irregularity lead to building structures with irregular distribution in their mass, firmness and quality along the height of building. Structures with irregulartiesare inclined to earthquake harm, as saw in numerous seismic events. It was assumed that critical to develop a straight forward symptomatic technique subject to exhaustive estimations and assessments on the seismic response of irregular structuresNecessary that irregular structures ought to be carefully examined for torsion. soft story- enormous reduction in stiffness and additionally quality in any story; it is perfect to assemble wall in the ground story moreover.

[3]Sharmin Reza Chowdhury(2012) In this paper at attempt is made to apply the limited component modelling in examining and investigating the conduct of shear wall with opening under seismic load activities. This examination is done on 6-story outline shear wall structures, utilizing straight flexible investigation with the assistance of limited component programming, ETABS under seismic load in equal static investigation. Here and there it is inescapable to have openings, for example, entryways, windows, and different kinds of openings in shear wall. The size and area of openings may change contingent upon reasons for the openings. Investigation is isolated into two primary parts; Analysis with respect to shear wall put in-plane of loading and examination in regards to shear wall put at out of plane of loading. As we realize that auxiliary conduct with respect to in plane of loading is substantially more significant than that of out of plane of loading. Opening in shear wall put in plane of loading is more basic than that of opening in shear wall set out wall of plane of loading since there is a noteworthy change in dislodging saw in the wake of having opening in shear wall put in plane of loading. Solidness just as seismic reactions of structures is influenced by the size of the openings just as their areas in shear wall.

[**4] AnujChandiwala (2012)**In the present paper the specialist, had attempted to get minute happen at a specific segment including the seismic load, by taking different lateral load opposing basic frameworks, different number of floors, with different places of shear wall for earthquake zone III in India has been found. The auxiliary framework intended to convey vertical burden might not have the ability to oppose horizontal load or regardless of whether it has, the plan for sidelong load will expand the basic expense considerably with increment in number of story. Minute Resistant Frames, Braced Frames, Shear Wall Structures, Tube Structures, Multi-Tube Structures are the framework used to oppose horizontal load in economy. The shear wall can be either planar, open segments, or shut segments around lifts and stair centers. Dynamic examination of structure includes free vibration investigation to deciding the mode shapes and frequencies of the structure. The

structure can be brake down for seismic stacking in type of reaction Spectrum or increasing speed/power time history. After the investigation of the distinctive situation of shear wall in the structure design following is the correlation in most extreme base shear in X and Y-directions. Among various area of shear Wall (F-shear Wall at end of L segment) gives best outcome.

[5] BahadorBagheri(2012) In this paper auther research, multi storey irregular structures with 20 stories have been displayed utilizing programming ETABS and SAP 2000 v.15 for seismic zone V in India and furthermore manages the impact of the variety of the structure tallness on the basic reaction of the shear wall building. It features the precision and precision of Time History examination in correlation with the most usually received Response Spectrum Analysis and Equivalent Static Analysis. Chosen ground movements reaction range around major time of structure can be not the same as target reaction range decided from seismic danger examination. Accordingly, records are scaled by single-factor scales It's certain that the static examination gives higher qualities for most extreme uprooting of the accounts in both X and Y directions as opposed to different strategies for investigation, particularly in higher stories. It is seen that the relocation acquired by static examination are higher than dynamic investigation including reaction range and time history examination.

[6] P. P.Chandurkar(2013) In this paper one model for uncovered edge type resedential structure and three models for double kind basic framework are created with the assistance of ETAB and viability has been checked. The segments of basic components are square and rectangular and their measurements are changed for various structure. Story statures of structures are thought to be steady including the ground story. From results it is seen that the removal of all models in zone II, III, IV is decreased up to 40% as contrasted and zone V. Developing structure with shear wall in limited ability to focus corner (model) is conservative as contrasted and different models. Likewise saw that Changing the situation of shear wall will influence the fascination of powers, with the goal that wall must be in appropriate position. On the off chance that the elements of shear wall are enormous, at that point significant measure of level powers are taken by shear wall. Giving shear dividers at sufficient areas significantly lessens the relocations because of earthquake.

[7]Pravin Ashok Shirule(2013) In this paper parametric investigation on Reinforced Concrete structure walls and moment opposing edges building illustrative of basic sorts utilizing reaction range technique is completed. To assess the seismic reaction of the structures, flexible investigation was performed by utilizing reaction range technique utilizing the PC program SAP2000. Reaction range of any structure gives us a plot of top or relentless state reaction of a progression of oscillators of a fluctuating regular recurrence, that are constrained into movement by a similar base vibration or stun. The strategy includes the computation of just the greatest estimations of the removals and part powers in every mode utilizing smooth structure spectra that are the normal of a few seismic tremor movements. While investigation this awry structure by utilizing SAP2000, it was seen that thisstructure is bombed in first mode as it were. It implies building isn't protected in seismic territory. So it is a need to give a shear divider to the structure then just the odds of disappointment of the structure can be limited. It is seen that diversion is decreases in X course than that in Y bearing which is about 15%. After the all investigation of the lopsided structure, it is smarter to give shear wall to the unbalanced structure. From the parametric investigation on Reinforced Concrete structures the accompanying ends are drawn as: - IS code portray the higher estimations of base shear for comparative ground types characterized in different codes which may prompt overestimate the upsetting minute and could brings about heavier basic individuals in the structure. For the structures, UBC code gives the greatest and IS gives the base relocation esteems.

[8]Shaikh Abdul Aijaj Abdul Rahman(2013) The present paper attempts to examine the corresponding appropriation of horizontal powers advanced through seismic activity in every story level because of changes in solidness of casing on vertically unpredictable casing. To reaction parameters like story float, story avoidance and story shear of structure under seismic power under the straight static and dynamic examination is considered. In the present paper, reaction of a G+ 10-storeyed vertically sporadic casing to horizontal burdens is read for stiffness inconsistency at fourth floor in the rise. Solidness abnormalities incorporate the tallness of the section expanded on the fourth floor which is applied on vertically unpredictable casing. Inconsistencies are isolated into two groups—plan and vertical abnormalities. The base model having the shape unpredictable to know the impact of solidness inconsistency on the shape (vertical geometric) sporadic structure the overabundance tallness of section at fourth floor according to the IS 1893:2002 (part-1).It is evident that the casing having firmness anomaly on vertically sporadic casing is helpless to harm in earthquake inclined zone. Two casings having various abnormalities yet with same measurements have been broke down to contemplate their conduct when exposed to sidelong loads. Presently a day, complex formed structures are getting famous, yet they convey a danger of supporting harms during tremors. Along these lines, such structures ought to be planned appropriately dealing with their dynamic conduct.

[9]C.M. Ravi Kumar(2013) The investigation incorporates seismic powerlessness evaluation of RC structures without shear wall, with shear wall at focus, shear wall at slanting corners, shear wall at mid along X-direction, and shear wall at mid along Y direction, in conclusion shear wall at mid along X&Y-direction. Developing the shear wall in tall, medium and even short structures will impact and understudy fortify the essentially and either more conservative than the twisting casings. It is essential and imperative to know and explore systematically/tentatively, what ought to be the area of the shear divider that can initiate least worries in all the basic individuals from the multistoried structures. The minute opposing casings are intended to autonomously oppose at any rate 25% of plan seismic base shear. The examination and structure of multistoried structure with shear wall by hand estimation is dull and tedious procedure. So the issue articulation is done with the assistance of basic examination programming ―ETABS‖. Timespan will be less when shear wall is built in focus yet with the thought of first mode will make torsion; consequently that type development ought to be kept away from. Scale-up factor X and Y heading will be high when no shear divider is given, further it will diminish somewhat in the wake of giving wall at various area and less when wall is given at the X-course. Greatest story dislodging will be less when shear wall is at X course. Greatest story float will increment somewhat when shear wall is given at various areas.

[**10]Mr. S. Mahesh(2014)**In this paper G+11 multistorey structure is perused for earthquake and wind load using ETABS and STAAS PRO V8i.A building will be considered as unpredictable for the inspirations driving this standard, if at any rate one of the conditions are important as per IS 1893(part1):2002 as per IS-1893:2002, Methods Adopted Are Equivalent Static Lateral Force (or) Seismic Coefficient Method and Response Spectrum Method Time history methodology. To design the earthquakeloads to calculate the internal forces will be reasonable estimated of expected during to arrangement earthquake. Base shear regard is more in the zone 5 and that in the sensitive soil in irregular and ordinary arrangement. At the point when broke down the both the typical and eccentric game plan and the base shear regard is more in the conventional arrangement. Considering the structure have dynamically even estimations. Story glide regard is more in the story 12 and 13 in the sporadic and ordinary plan independently. When taken a gander at the both the typical and eccentric plan and the story drift regard is more in the normal course of action. Considering the structure has more estimations. Finally when contemplated the both programming's the STAAD PROV8i has

progressively worth. The region of the steel is 5 to 10%. Right now private of G+11 multistorey structure is read for earth shudder and wind load utilizing ETABS and STAAS PRO V8i.A building will be considered as sporadic for the motivations behind this standard, if at any rate one of the conditions are material according to IS 1893(part1):2002 according to IS-1893:2002, Methods Adopted Are Equivalent Static Lateral Force (or) Seismic Coefficient Method and Response Spectrum Method Time history strategy. To structure the earth shudder burdens to compute the inside powers will be sensible rough of expected during to configuration earth tremor. Base shear esteem is more in the zone 5 and that in the delicate soil in sporadic and normal arrangement. When looked at the both the ordinary and sporadic arrangement and the base shear esteem is more in the customary setup. As a result of the structure have progressively balanced measurements. Story float esteem is more in the story 12 and 13 in the regular and irregular customary arrangement separately. When thought about the both the standard and sporadic arrangement and the story float esteem is more in the normal setup. On account of the structure has more measurements. At last when looked at the both programming's the STAAD PROV8i has more worth. The territory of the steel is 5 to 10%.

[11] Le Yee Mon (2014) In this study, 14 story building is given some examination which is broke down by changing different area of shear wall for deciding parameters like story float, story shear and story moment.A reaction range is the realistic portrayal of most extreme reaction for example relocations, speed and increasing speed of a damped single-level of-opportunity framework to a predetermined ground movement, plotted against the recurrence or modular periods. The model must be built as a flexible framework and a solitary benefit of damping is utilized for each model reaction. Results acquired from the examination are recorded for the four instances of the structure independently for correlation of story float, story shear and story minute. The story minute is relying upon the seismic burden. In this way, the story minute is the biggest at base. Structure without shear wall has the least story minute and structure with center shear wall and planar shear wall has the best story minute. Story shears are most prominent at the base and bit by bit decline from base to top story for four models. The choice of particularly the area and measure of shear walls is of the most elevated significance in reinforcing. Fortifying shear wall may change in different situations as per their situations in the arrangement

[12] Lakshmi K.O.(2014) This investigation targets contrasting different parameters, for example, story float, story shear deflection, reinforcement necessity in sections and so on of a structure under horizontal loads dependent on vital situating of shear walls and programming utilized is ETABS 9.5 and SAP 2000.V.14.1.Shear walls in structures must be evenly situated in plan to lessen sick impacts of bend in structures. Loads is applied steadily to structures until a breakdown component is come to. It empowers assurance of breakdown load and flexibility limit on a structure outline. Base shear is the greatest expected horizontal power that will happen because of seismic ground movement at the base of structure.

[13]RavikanthChittiprolu(2014)A resedential structure of G+15 irregular structure having the base component of plan 24.38m x 25.98m with a stilt floor of tallness 4m and run of the mill floor of stature 3m is considered for the examination. Dynamic straight investigation utilizing reaction range technique is performed by taking zone factor Z=0.1, significance factor I=1 and reaction decrease factor R=3.Lateral powers are conveyed to outlines along X bearing for structure without shear wall and with shear wall. Focal point of mass (CM) of structure without shear wall and with shear wall is separated from examination results. Greatest story float is removed from examination results and looked at for structure without shear divider and with shear wall. Story float is decreased in the event of structure with shear wall. Dynamic direct examination utilizing reaction range technique is performed and parallel forces investigation is accomplished for structure without shear wall and structure with shear wall. Results are looked at for the edge parallel powers and story floats of both the cases. It is likewise seen that sidelong powers are decreasing when the shear wall are included at the proper areas of casings having least parallel powers. In this way, it is induced that shear walls are progressively impervious to parallel loads in an unpredictable structure. Likewise they can be utilized to diminish the impacts of torsion.

[14] M. S. Aainawala(2014)A earthquake load is applied to a structure for G+12, G+25, G+38 situated in zone II, zone III, zone IV and zone V for various instances of shear wall position, investigation utilizing ETAB v 9.0.7 programming. It was seen that Multistoried R.C.C. Structures with shear wall is prudent when contrasted with without shear wall. A reaction range might be imagined as a graphical portrayal of the dynamic reaction of a progression of dynamically longer cantilever pendulums with expanding regular periods exposed to a typical horizontal seismic movement of the base. Dynamic investigation is performed by Response Spectrum Method. Size of individuals like segment can be decreased financially if there should arise an occurrence of structure with shear wall when contrasted with a similar structure without shear wall. More rug territory will be accessible in the structure as the spans of sections are decreased when shear wall is given

[**15]HemaMukundan(2015)**The arrangement of shear wall in building has been discovered powerful and affordable. Right now, 10 story working in Zone IV is exhibited to lessen the impact of seismic tremor utilizing strengthened solid shear wall confined structures in the structure. The outcomes were organized by performing Response range examination utilizing ETABS variant 9.7.4 as greatest story relocations, base shear responses, mode shapes and story floats. Right now, was done on a standard Multi-story building (G+9) with/without shear wall understanding parameters like story floats, horizontal loads, mode shape designs, timespan, base shear, and story redirections. To improve the comprehension of the seismic conduct of building structures with vertical abnormalities. Seismic investigation is a significant apparatus in quake designing used to comprehend the reaction of structures because of seismic excitations in a less difficult way. Shear walls are speedy in development, in light of the fact that cementing of the individuals is finished utilizing formwork. Since Shear walls give such an elevated level of accuracy. Utilizing Response Spectrum Analysis, it is discovered that out of all the mode shapes, mode Shape 2 has the most extreme base response power for the structure with/without shear wall.

[16] Mohammad Abdul Imran Khan (2015) Because of the changed designs of structures in slanting zones, these structures become exceptionally unpredictable and unsymmetrical, because of variety in mass and solidness appropriations on various vertical hub at each floor. The basic examination programming ETABS V9.7.4 is utilized to consider the impact of slanting ground on building execution during seismic tremor. Seismic Analysis is finished by Equivalent static strategy and Response range technique. Shear power, twisting minute, pivotal powers are basically examined to consider the impact on different slanting ground.

3. CONCLUSION OF THE LITERATURE REVIEW

- Lateral forces are lessening when the shear walls are included at the suitable locations(centre and edge) of frames having least horizontal forces
- Shear walls are increasingly impervious to horizontal loads in an irregular structure. Additionally they can be utilized to reduce the impacts of torsion.
- If the components of shear wall are enormous, at that point significant measure of level forces are taken by shear walls.
- UBC code gives the most extreme and IS gives the base displacement values.
- Static investigation not adequate for high rise structures and it is necessery to give dynamic examination.
- The result of equivalent static analysis are approximately uneconomical because values of displacement are higher than dynamic analysis.

 When compared both the regular and irregular configuration, the base shear and the story drift value is more in the regular configuration. Because of the structure have more symmetrical dimensions.

 Response spectrum analysis can be seen that the displacement values in both X and Y directions are least in model with shear wall in core and corners when compared to all other models.

 Size of members like column can be reduced economically in case of structure with shear wall as compared to the same structure without shear wall.

 Displacement at different level in multistoried building with shear wall is comparatively lesser as compared to R.C.C. building Without Shear Wall.

 The inter storey drift was observed to be maximum in vertically irregular structure when compared with that of regular structure .(not exceed 0.015h)

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