Structural Analysis of a Multi-Storeyed Building (G+15) using Staad Pro for Different Plan Configurations

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Abstract— In order to compete in the ever-growing competent market, it is very important for a structural engineer to save time. as a sequel to this an attempt is made to analyse and design a Multistore building by using a staad pro software. In this project focuses on the structural behaviour of multi-story building for different plan configuration such as regular building along with T- shape and E- shape in accordance with the seismic provisions suggested in IS: 1893-2002 to analyse the performance of existing buildings if exposed to seismic loads. In this modelling of G+15 store's RCC framed building is studied for earthquake load using STAAD- PRO V8i. Assuming that material property is linear static and dynamic analysis is performed. These analyses are carried out by considering different seismic zones (IV and V) and for each zone the behaviour is assessed by taking three different types of soils namely Hard, Medium and Soft. Post analysis of the structure, lateral displacements, story drift, and base shear, maximum bending moment results are computed and compared for all the cases.

Keywords: Structural Analysis, High Rise Building, Response Spectrum, Plan Irregularity, STAAD-Pro V8i

I. INTRODUCTION

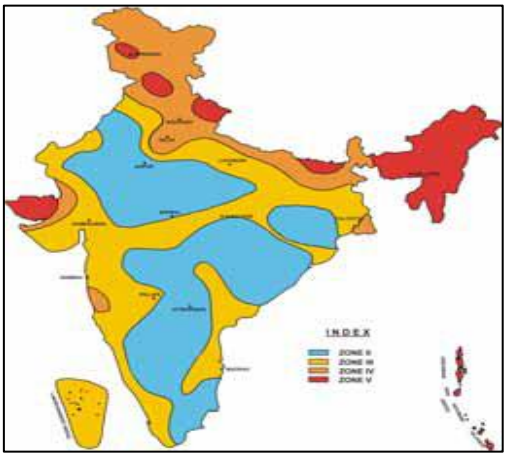
Earthquakes are natural hazards under which disasters are mainly caused by damage to or collapse of buildings and other man-made structures. Experience has shown that for new constructions, establishing earthquake resistant regulation sand their implementation is the critical safeguard against earthquake-induced damage. As regards existing structures, it is necessary to evaluate and strengthen them based on evaluation criteria before an earthquake.

Earthquake damage depends on many parameters, including intensity, duration and frequency content of ground motion, geologic and soil condition, quality of construction, etc. Building design must be such as to ensure that the building has adequate strength, high ductility, and will remain as one unit, even while subjected to very large deformation. Sociologic factors are also important, such as density of population, time of day of the earthquake occurrence and community preparedness for the possibility of such an event. Up to now we can do little to diminish direct earthquake effects. However, we can do much to reduce risks and thereby reduce disasters provided we design and build or strengthen the buildings so as to minimize the losses based on the knowledge of the earthquake performance of different building types during an earthquake. Observation of structural performance of buildings during an earthquake can clearly identify the strong and weak aspects of the design, as well as the desirable qualities of materials and techniques of construction, and site selection. The study of damage therefore provides an important step in the evolution of strengthening measures for different types of buildings.

Fig. 1.1: Failure of Buildings Due to Earthquakes

II. SEISMIC ZONES OF INDIA

The varying geology at different locations in the country implies that the likelihood of damaging earthquakes taking place at different locations is different. Thus, a seismic zone map is required to identify these regions. Based on the levels of intensities sustained during damaging past earthquakes, the 1970 version of the zone map subdivided India into five zones – I, II, III, IV and V (Figure 3). The maximum Modified Mercalli (MM) intensity of seismic shaking expected in these zones were V or less, VI, VII, VIII, and IX and higher, respectively. Parts of Himalayan boundary in the north and northeast, and the Kachchh area in the west were classified as zone V.



Indian Seismic Zone Map as per IS:1893(Part 1)-2002

The seismic zone maps are revised from time to time as more understanding is gained on the geology, the seism tectonics and the seismic activity in the country. The Indian Standards provided the first seismic zone map in 1962, which was later revised in 1967 and again in 1970. The map has been revised again in 2002 (Figure 4), and it now has only four seismic zones – II, III, IV and V. The areas falling in seismic zone I in the 1970 version of the map are merged with those of seismic zone II. Also, the seismic zone map in the peninsular region has been modified. Madras now comes in seismic zone III as against in zone II in the 1970 version of the map. This 2002 seismic zone map is not the final word on the seismic hazard of the country, and hence there can be no sense of complacency in this regard. The national Seismic Zone Map presents a large-scale view of the seismic zones in the country. Local variations in soil type and geology cannot be represented at that scale. Therefore, for important projects, such as a major dam or a nuclear power plant, the seismic hazard is evaluated specifically for that site. Also, for the purposes of urban planning, metropolitan areas are micro zoned. Seismic micro zonation accounts for local variations in geology, local soil profile, etc,

In high rise building frame consists of number of bays and storey. A multi-storey, multi-panelled frame is a complicated statically intermediate structure. A design of R.C building of G+15 storey frame work is taken up. most of the structures are delineated by irregular in both plan and vertical configurations. Moreover, to analyse or design such irregular structures high level of effort is needed. In other words, damages or loss in those structures with irregular options are over those with regular one. Thus, irregular structures would like careful structural analysis to succeed in an acceptable behaviour throughout a devastating earthquake. In most of the situations the shape of the plot for the construction of a structure may not be a regular one. Thus, the shape of the structure may be influenced by the plot configurations. Further it will be interesting to study the stability of buildings with different geometry of shape and their behavior against seismic and other forces. No any structural engineer can design 100% earthquake proof structure, only its resistance to earthquake can be increased. Proper design or maintenance to be given depends on the zone in which structure is situated. It is necessary to check or think right from the planning stage to the completion of the structure to avoid failure of structure or to overcome loss of property.

III. STAAD PRO SOFTWARE

Staad pro happens to be a structural analysis software that accompanies an adaptable modelling environment, advanced features, and smooth data collaboration. It is the world's numeri Uno structural analysis and design software that backs Indian and every single global code. It gives options to structural engineers to dissect and design for all intents and any sort of structures. Departments in construction companies, proprietor/administrators, structural engineering firms and government offices etc .and offshore platform designers' make use of this software broadly.

Usually, the following features are covered as a part of this project:

1) Interaction based menu-driven model creation with concurrent 3D display 2Dand 3D graphics creation utilizing rectangular or polar coordinate frameworks Segments of redundant geometry used to produce complex structural models.
2) On screen 3D/2D drawings and in addition to plotter/printer Full 3D shapes for outlines, components Isometric or any rotations for a full 3D view.
3) Limited component capacities, concrete design, steel design and timber design. Displacements and forces at portions between nodes. Minimum and maximum force envelopes.
4) Static Analysis: The 2d/3d analysis in view of state-of-the-art Matrix strategy to deal with a substantial degree of the job. Linear, analysis of p-delta, non-linear examination with automatic load and stiffness amendment.
5) Seismic/Dynamic Analysis: Mass modelling, extraction of recurrence and mode shapes Response spectrum, time history examination Modal damping proportion for individual models.
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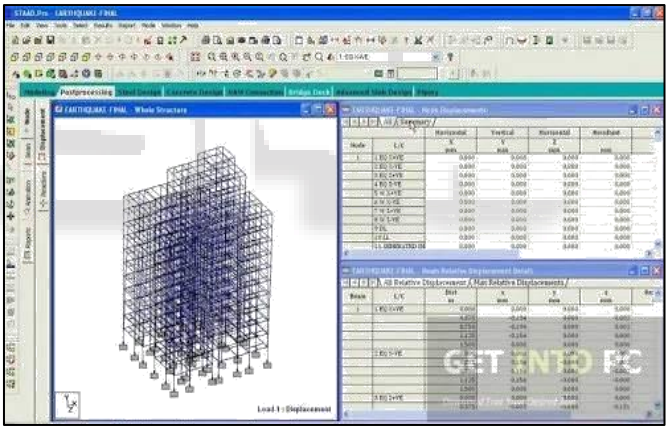


Fig. 2: Sample model on Staad pro

IV. LITERATURE REVIEW

A. Comparative Study of Dynamic Response of Multi storey Building using Response

Spectrum and Time History Methods SiddelaJony, D AdityaSairam et.al 2017

Multi storied structures, when designed, are made to fulfil basic aspects and serviceability. All the challenges faced by structural engineers were taken as opportunities to develop software such as STAAD PRO, ETABS, SAP etc. The design results using STAAD PRO and ETABS of a rectangular RCC building, for regular plan configuration, are obtained and compared. The main purpose of this study is to carry out a detailed analysis on simulation tools ETABS and STAAD PRO, which have been used for analysis and design of rectangular Plan with vertical regular and rectangular Plan multi-storey building In this paper the earthquake resistance of a G+11 multi-storey building is

analysed using Dynamic analysis methods with the help of E-TABS 9.7.4 software and STAAD PRO.

The building is analysed in Zone 2, Zone 3, Zone 4, and Zone 5 with medium soils in Dynamic Analysis by using TABS and STAAD PRO. The parameters studied were storey drift, storey shears and support reactions.

B. Seismic Evaluation of Irregular Structures Prof.Suchita Hirde, Rahul Aher et.al 2016

Pushover analysis is a static, nonlinear procedure using simplified nonlinear technique to Estimate seismic structural deformations. It is an incremental static analysis used to determine the Force-displacement relationship, or the capacity curve, for a structure or structural element. Many buildings in the present scenario have irregular configuration both in plan and elevation. This in future may subject to devastating earthquake. In order to identify the most vulnerable among the models considered, pushover analysis is carried out. The analysis involves applying horizontal loads, in a prescribed pattern, to the structure incrementally, i.e. pushing the structure and plotting the total applied shear force and associated lateral displacement at each increment, until collapse condition. The intensity of the lateral load is slowly increased and the sequence of cracks, yielding, plastic hinge formation, and failure of various structural components is recorded. In this paper an attempt is made to study the seismic response of RC building with plan irregularities in terms of performance point and the effect of earthquake forces on multi story building frame with the help of pushover analysis. In the present study reinforced concrete framed buildings of irregular plan (according to IS 1893-2002) such as L shapes are analysed and compared with regular plan (rectangular) with G+5 , G+10 and G+15 storied. The pushover analysis of the building frame is carried out by using software SAP 2000.

C. Analysis of Multi-Storey RCC Frames of Regular and Irregular Plan Configuration using Response Spectrum Method Dhananjay Shrivastava , Dr. Sudhir Singh Bhaduria et.al 2017

This research paper focuses on the structural behaviour of multi-storey building for different plan configuration such as regular building along with L- shape and I- shape in accordance with the seismic provisions suggested in IS: 1893-2002 to analyse the performance of existing buildings if exposed to seismic loads. In this modelling of G+25 storeys RCC framed building is studied for earthquake load using STAAD- PRO V8i. Assuming that material property is linear static and dynamic analysis is performed. These analyses are carried out by considering different seismic zones (IV and V) and for each zone the behaviour is assessed by taking three different types of soils namely Hard, Medium and Soft. Post analysis of the structure, lateral displacements, story drift, base shear, maximum bending moment and design results are also computed and compared for all the cases.

D. Comparative Study of Different Plan Configuration Buildings using Wind Analysis Potnuru Avinash prof. Shaik Yajdani et.al 2017

The present study describes the effect of wind on multi-storied building. It deals with the analysis of G+15 multi-storied framed structure for different plan configuration i.e. Rectangular, I-shape, C-shape and L-shape building plan configuration are considered. The basic wind speed considered is 50m/s. For the analysis the software tool is used i.e. E-TABS. Different load combinations considered and compared the results of Lateral Displacement, Base shear, Over-turning moment, Torsion etc.., for all four models and concluded that which one is the best configuration among them. Compared only lateral displacement parameter with and without shear wall. In analysis for gravity, live and wind loads used codes are IS: 875 part-1, IS: 875 part-2, IS: 875 part-3, for load combinations used IS: 456, Compiled all the results and tabulated. All the results are studied thoroughly and concluded.

E. Influence of Aspect Ratio & Plan Configurations on Seismic Performance of Multistoreyed Regular R.C.C. Buildings: An Evaluation by Response Spectrum Analysis. Sanjay Kumar Sadh , Dr. Umesh Pendharkar et.al 2016

The behaviour of a building during earthquakes depends critically on its overall shape, size and geometry. Earthquake resistant design of buildings depends upon providing the building with strength, stiffness and inelastic deformation capacity which are great enough to withstand a given level of earthquake-generated force. This is generally accomplished through the selection of an appropriate building configuration and the careful detailing of structural members. Configuration is critical to good seismic performance of buildings. The important aspects affecting seismic configuration of buildings are overall geometry, structural systems, and load paths. The building slenderness ratio and the building core size are the key drivers for the efficient structural design.

This paper focuses on the effect of both Vertical Aspect Ratio (H/B ratio i.e. Slenderness Ratio) and Horizontal or Plan Aspect Ratio (L/B ratio), where H is the total Height of the building frame, B is the Base width and L is the Length of the building frame with different Plan Configurations on the Seismic Analysis of Multistore Regular R.C.C. Buildings.

The test structures are kept regular in elevation and in plan. Here, height and the base dimension of the buildings are varied according to the Aspect Ratios. The values of Aspect Ratios are so assigned that it provides different configurations for Low, Medium and High-rise building models.

In the present study, four building models having different Horizontal Aspect ratios viz. 1, 4, 6 & 8 ranging from 12m.to 96m.length of different Vertical Aspect ratios (slenderness ratios) viz. 1, 4, 6 & 8 of varying 4, 16, 24 & 32 storeys have been considered and their influence on the behaviour of the RCC Multi-storeyed buildings is demonstrated, using the parameters for the design as per the IS-1893- 2002-Part-1 for the seismic zone- 3. In this way total 16 building models are analysed for different load

combinations by Linear Elastic Dynamic Analysis (Response Spectrum analysis) with the help of ETABS-2015 software and the results obtained on seismic response of buildings have been summarized.

F. Seismic Analysis of Multi-Storied Building with Shear Walls using ETABS B.Jaswanth, Surendra Y.L and M.Ravi Kumar et.al 2018*

Shear walls are structural members used to elongate the strength of R.C.C. structures. These shear walls will be construct in each level of the structure, to form an effective box structure. Equal length shear walls are placed symmetrically on opposite sides of outer walls of the building. Shear walls are added to the building interior to provide more strength and stiffness to the building when the exterior walls cannot provide sufficient strength and stiffness. It is necessary to provide these shear walls when the tolerable span- width ratio for the floor or roof diaphragm is exceeded. The present work deals with a study on the improvement location of shear walls in symmetrical high-rise building. Position of shear walls in symmetrical buildings has due considerations. In symmetrical buildings, the centre of gravity and centre of rigidity coincide, so that the shear walls are placed symmetrically over the outer edges or inner edges (like box shape). So, it is very necessary to find the efficient and ideal location of shear walls in symmetrical buildings to minimize the torsion effect. In this work a high rise building with different places of shear walls is considered for analysis. The multi storey building with 8 storeys' is analysed for its displacement, strength and stability using ETABS-2015 software. For the analysis of the building for seismic loading with Zone-III is considered with soil III. The analysis of the building is done by using equivalent static method and dynamic method.

G. Seismic Analysis of Multistory Buildings Using ETABS-A Review Mayur R. Rethaliya1, Nirav S. Patel, Dr.R.P.Rethaliya et.al 2017

India is prone to strong earthquake shaking, and hence earthquake resistant design is essential. The Engineers do not attempt to make earthquake proof buildings that will not get damaged even during the rare but strong earthquake. Such buildings will be too robust and also too expensive. Practically no building can be made earthquake proof. The engineering intention is to make buildings earthquake resistant, such buildings resist the effects of ground shaking, although they may get damaged severely but would not collapse during the strong earthquake. Thus, the safety of people and contents is assured in earthquake resistant design of buildings and thereby a disaster is avoided. This is a major objective of seismic design codes throughout the world in recent times. The sixth revision of IS 1893 (Part 1): 2016, "Criteria for Earthquake Resistant Design of Structures" have been published by Bureau of Indian Standards recently in December 2016. In this new code many changes have been included considering standards and practices prevailing in different countries and in India.

H. Structural Analysis of a Multi-Storeyed Building using ETABS for different Plan Configurations Prof.Abhay Guleria et.al 2014

ETABS stands for Extended Three-dimensional Analysis of Building Systems. ETABS is commonly used to analyse: Skyscrapers, parking garages, steel & concrete structures, low- and high-rise buildings, and portal frame structures. The case study in this paper mainly emphasizes on structural behaviour of multi-storey building for different plan configurations like rectangular, C, L and I-shape. Modelling of 15- storeys R.C.C. framed building is done on the ETABS software for analysis. Post analysis of the structure, maximum shear forces, bending moments, and maximum storey displacement are computed and then compared for all the analysed cases.

I. comparative study on design results of a multi-storied building using staad pro and etabs for regular and irregular plan configuration k venu manikanta , dr. dumpa venkateswarlu. et.al 2016

Structural Analysis and design are predominant in finding out significant threats to integrity and stability of a structure. Multi storied structures, when designed, are made to fulfil basic aspects and serviceability. Since Robustness of structure depends on loads imposed, it requires attention. All the challenges faced by structural engineers were taken as opportunities to develop software's such as STAAD PRO, ETABS & SAFE, SAP etc., with ease of use. Software's such as ETABS and STAAD-pro are leading commercial software's worldwide for structural analysis. The design results using STAAD PRO and ETABS of a rectangular RCC building, for both regular and irregular plan configuration, are obtained and compared.

Objectives of study: The main purpose of this study is to carry out a detailed analysis on simulation tools ETABS and STAAD PRO, which have been used for analysis and design of rectangular Plan with vertical regular and rectangular Plan with Vertical geometrically irregular multi-storey building. This study is focused on bringing out advantages of using ETABS over current practices of STAAD PRO versions to light. It was observed that ETABS is more user friendly, accurate, compatible for analysing design results and many more advantages to be discussed in this study over STAADPRO. Pros and cons of using these software's will also be mentioned in this study.

J. Parameters comparison for different structural system Mayur N. Prajapati1, Prof. Vishal V. Patel 2,Prof. Bhavik R. Patel 3

Tall building developed have been rapidly increase worldwide because of rapid growth of the population. For lateral load consideration there is different structural system to be used for tall structure like Rigid frame structure, Shear wall structure, and braced structure. which give more ductility and energy dissipation capacity In this paper gives economical study of structural system with different parameters.

*K. DYNAMIC ANALYSIS OF MULTI-STOREY BUILDING FOR DIFFERENT SHAPES Mohammed Rizwan Sultan**

Background: Extinct earthquakes events demonstrate that, buildings with irregularity is vulnerable to earthquake damages. So, as it's essential to spot the seismic response of the structure even in high seismic zones to cut back the seismic damages in buildings. Objective: The most important objective of this study is to grasp the behaviour of the structure in high seismic zone and also to evaluate Storey overturning moment, Storey Drift, Displacement, Design lateral forces. During this purpose a 15 storey-high building on four totally different shapes like Rectangular, L-shape, H-shape, and C-shape are used as a comparison. The complete models were analysed with the assistance of ETABS 9.7.1 version. In the present study, Comparative Dynamic Analysis for all four cases have been investigated to evaluate the deformation of the structure. Results & Conclusion: The results indicates that, building with severe irregularity produces more deformation than those with less irregularity particularly in high seismic zones. And conjointly the storey overturning moment varies inversely with height of the storey. The storey base shear for regular building is highest compare to irregular shape buildings

L. ANALYSIS OF DIFFERENT SHAPE OF BUILDING WITH SAME AREA Dr. SHRIRAM. H. MAHURE1, KHAN MD. MUHATESHEM AZHAR2

Earthquake play an important rolein designing structures. Lot of work has been done by many researchers who worked to study the effect of earthquake on different shape. Being inspired from the work contributed in the study on effects of earthquake on different shaped building in plan, this paper presents effects of four shape configuration i.e., RECTANGULAR, SQUARE, TRIANGULAR, CIRCULAR with same area. Buildings with different shape geometry react differently against earthquake. The effect of different shape of structure have been carried out by using SAP2000 software. SAP 2000 software is a software for designing a mathematical model of and mechanically analysing civil structure like everything ranging from cable-stayed bridges to concrete walls. There are several factors which affect the behaviour of building from which base shear and lateral displacement play an important role in understanding the behaviour of structure. Results are expressed in form of tables, bar charts. It has been observed from the result that Triangular shapes best for base shears compared to rectangular, square, circular shape.
Key Word: RECTANGULAR, SQUARE, TRIANGULAR, CIRCULAR shape, SAP2000

M. Seismic Analysis of Irregular L-Shape Building in Various Zones Imranullahkhan 1, Shri Satya Eswar Sanyasi Rao 2

P.G. Student, Department of Civil Engineering, Gitam University, Vishakapatnam, India1 Assistant Professor, Department of Civil Engineering, Gitam University, Vishakapatnam, India2 Irregular structures pose particular design challenges for structural engineers, especially if situated in seismically active regions. it depends on mass, stiffness of structure. from the previous earthquake data, it is observed that buildings having certain vertical configuration are more prone to damage in earthquake than others. it does not depend on which construction material or material systems used. the main intension of this study is to understand irregularity and to analyse l-shape building under earthquake forces. the irregular high-rise buildings which the plan is l-shape are carried on response spectrum through the e-tabs analysis software. in the present study it is proposed to study a thirty-two-meter height storey reinforced concrete building using response spectrum method for different zones and there by comparing results. KEYWORDS: Storey drift, displacement, Response spectrum

N. Analysis and design of multi-storey building by using STAAD ProAman1, Manjunath Nalwadgi 2, Vishal T3, Gajendra4

The main aim of structural engineer is to design the structures for a safe technology in the computing field; the structural engineer can dare to tackle much more large and complex structure subjected to various type of loading condition. Earlier the loads acting on the structure are considered as static, but strictly speaking, with the exception of the self-weight (dead load) no structure load is static one Now a day large number of application software's are available in the civil engineering field. All these software's are developed as the basis of advanced. Finite element analysis which include the effect of dynamic load such as wind effect, earth quake effect bets etc. in the present work, an attempt has been made to study the efficiency of certain civil engineering application software's For this purpose an on-going project has been selected. This project belongs to the unity builders to be executed in the Gulbarga City. The name of the project is Bharat pride. Key Words: Analysis, Design, STAAD PRO, Residential building, gravity load, shear force, bending moment and axial

V. CLASSIFICATION OF IRREGULARITY

The irregularity in the building structures may be due to irregular distributions in their mass, strength and stiffness along the height of the building. When such buildings are constructed in high seismic zones, the analysis and design become more complicated. There are two types of irregularities;

1) Plan Irregularity
2) Vertical Irregularity

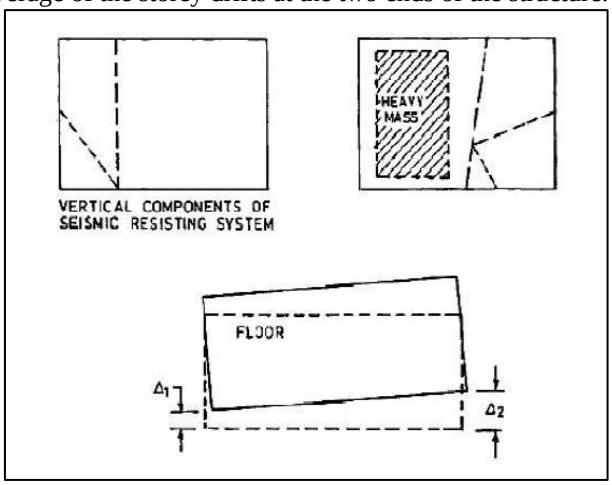
A. Plan Irregularities

Asymmetric or plan irregular structures are those in which seismic response is not only translational but also tensional, and is a result of stiffness and/or mass eccentricity in the structure. Asymmetry may in fact exist in a nominally symmetric structure because of uncertainty in the evaluation of centre of mass and stiffness, inaccuracy in the measurement of the dimensions of structural elements

B. Torsion Irregularity:

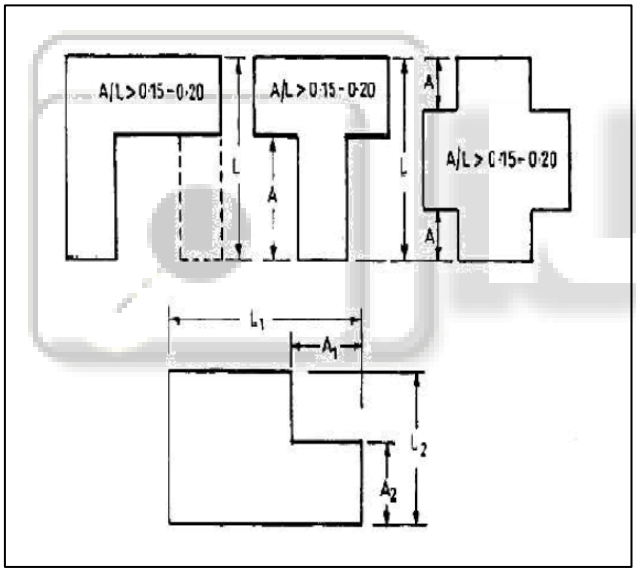
To be considered when floor diaphragms are rigid in their own plan in relation to the vertical structural elements that resist the lateral forces. Tensional irregularity to be considered to exist when the maximum storey drift, computed with design eccentricity, at one end of the

structures transverse to an axis is more than 1.2 times the average of the storey drifts at the two ends of the structure.



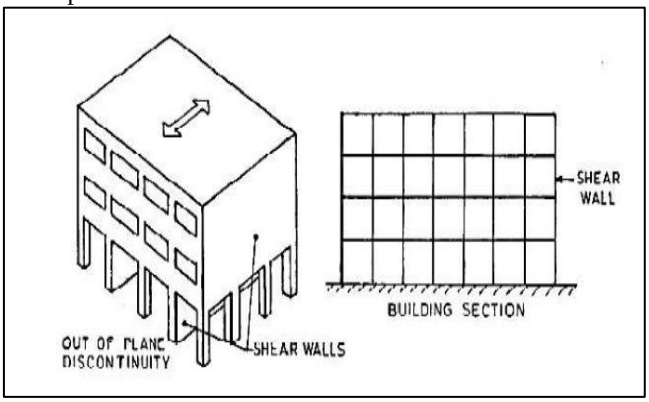
C. Re-entrant Corners:

Plan configurations of a structure and its lateral force resisting system contain re-entrant corners, where both projections of the structure beyond the re-entrant corner are greater than 15 % of its plan dimension in the given direction.



1) Out-of-Plane Offsets:

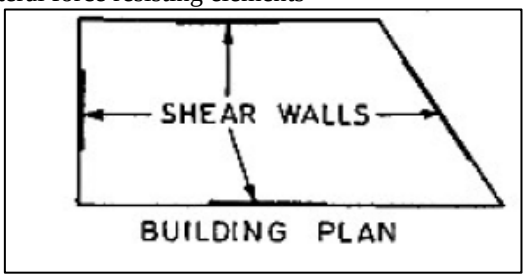
Discontinuities in a lateral force resistance path, such as ut-of-plane offsets of vertical elements.



Out-of-Plane Offsets

2) Non-parallel Systems:

The vertical elements resisting the lateral force are not parallel to or symmetric about the major orthogonal axes or the lateral force resisting elements



D. Vertical Irregularities

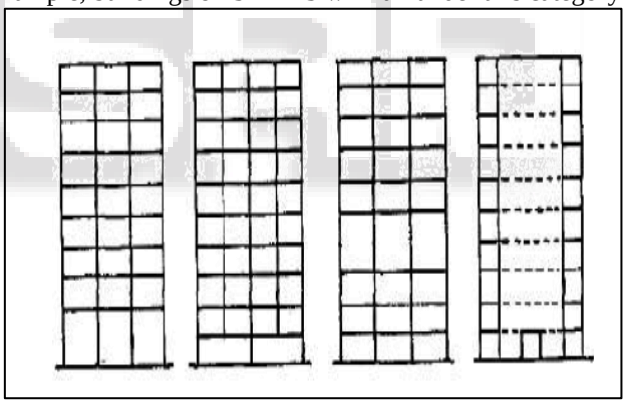
Vertical irregularity results from the uneven distribution of mass, strength or stiffness along the elevation of a building structure. Mass and Stiffness irregularity results from a sudden change in mass and stiffness between adjacent floors respectively.

1) Stiffness Irregularity —Soft Storey

A soft storey is one in which the lateral stiffness is less than 70 % of that in the storey above or less than 80 % of the average lateral stiffness of the three storeys' above.

2) Stiffness Irregularity —Extreme Soft Storey

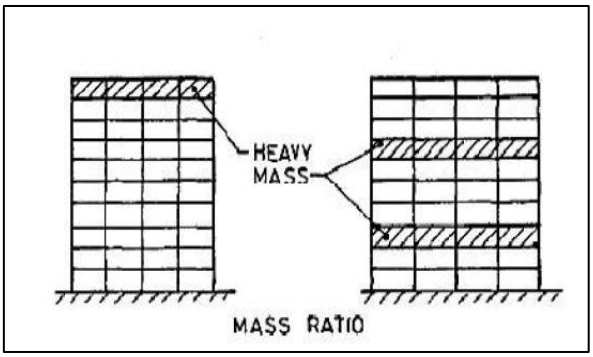
An extreme soft storey is one in which the lateral stiffness is less than 60 % of that in the storey above or less than 70 % of the average stiffness of the three storeys' above. For example, buildings on STILTS will fall under this category



Stiffness Irregularity

3) Mass Irregularity

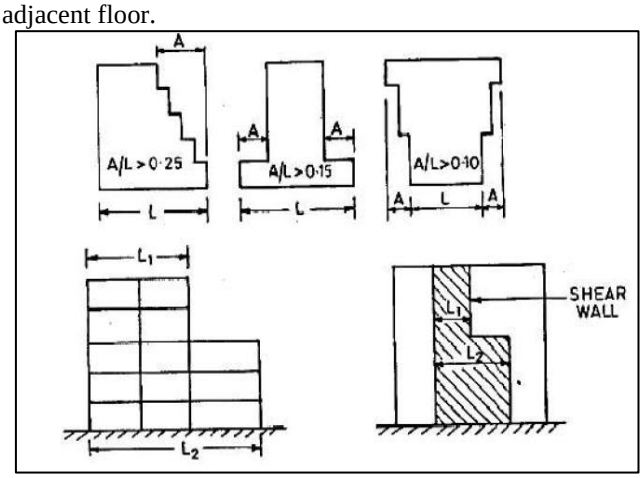
Mass irregularity shall be considered to exist where the seismic weight of any floor is more than 200 % of that of its adjacent storey. The irregularity need not be considered in case of roofs.



Mass Irregularity

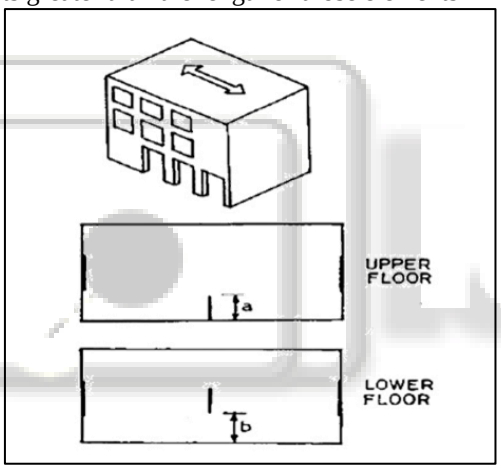
4) Vertical Geometric Irregularity

Vertical geometric irregularity shall be considered to exist where the horizontal dimension of the lateral force resisting system in any storey is more than 150 % of that in its adjacent floor.



Vertical Geometric Irregularity when L2 > 1.5 L1

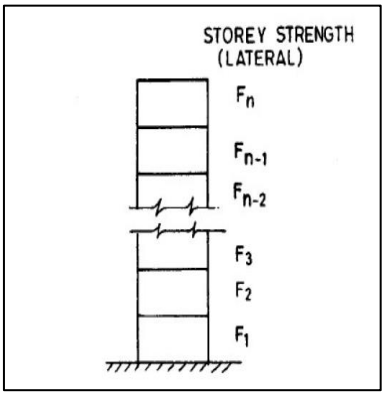
In-Plane Discontinuity in Vertical Elements Resisting Lateral Force A in-plane offset of the lateral force resisting elements greater than the length of those elements



In-Plane Discontinuity in Vertical Elements Resisting Lateral Force when b > a

5) Discontinuity in Capacity — Weak Storey

A weak storey is one in which the storey lateral strength is less than 80 % of that in the storey above, the storey lateral strength is the total strength of all seismic force resisting elements sharing the storey shear in the considered direction.



Weak Storey when Fi < 0.8 Fi + 1

E. Dynamic Analysis

Though static elastic analysis is considered sufficient for smaller building, dynamic analyses shall be performed to determine the seismic force and its distribution to different levels for regular and irregular structures, as defined in clause 7.1 of IS 1893 (Part-1): 2002, following the recommendations of clause 7.8 of the same code.

1) Regular Buildings

Those building greater than 20m in height in zones IV and V and those greater than 45 m in height in zone II and III.

2) Irregular Buildings

All framed buildings higher than 12 m in zones IV and V and those higher than 40 m in zone II and III. Though not mandatory, the code also recommended dynamic analysis for buildings lesser than 40 m in height for irregular building in zone II and III. The dynamic analysis may be carried out either by Time History Method or by Response Spectrum Method.

VI. Objective of the Study

- The objective of this project is to study the effect of plan irregularity on the seismic behavior of the building.
- To study various effects of plan irregularity in the structures various parameters such as lateral displacement, storey drift, base shear etc. are studied.
- To carry out Time History Analysis and Response Spectrum Analysis for both regular and irregular plan configurations.
- To study the behavior of regular building and plan irregular building in terms of response spectrum analysis (RSA).
- To Compare the Staad pro results for the following parameters such as base shear, storey drift, Maximum bending moment and mode shape etc.

VII. Scope of the Study

- The present Study is limited to High rise multy- storied building by using Response Spectrum method.
- Total weight of building is considered in this analysis.
- All building of G+15 storey with same aspect ratio are considered.
- Y – Direction indicates height of structure whereas plan of building lies in XZ plane.
- Three model will be generated in Staad pro Software. Model I of Regular building (rectangular), Model II of 'T' Shape, Model III of 'E' Shape.
- These three models will analysis for different zone.

VIII. Methodology

- In this project following step will performed and to achieve the mentioned objective.
- Carry out literature review, to establish the objectives of the research work.
- On the basis of shapes three model of building (G+15) are selected such as Rectangular, T and E.

- Three model will be generated in Staad-pro Software as per Shape of building with constant dimension in different zone.
- Perform Seismic analysis for all three models.
- Analyze and compare the result obtained from seismic analysis by using RSM which are storey drift, maximum bending moment and base shear.

IX. CONCLUSION

Irregularity offers vast amount of enhancement in structural engineering field. It has helped to improve the design of structure and solved many issues with building design such as shape and distribution of forces. The employ of irregular has also helped create more efficient and sustainable structures such as C- shaped building and L shaped building. The use of different shaped building helps to reduces bending moment and shear forces and other countless applications. Irregularity in building shapes can even help to pick up the efficient and economical structures. As possible future civil engineering, this type of structures is of utmost importance to me as we will have to work with irregular structures i.e T & E shaped building in our future. When looking at all of these innovations and improvements upon construction and environmental areas, it can be clearly observing that irregular structures is if vital importance to field of civil engineering and need to be brought into the engineering curriculum at schools. Irregularity in structures is essential to future and advancement of civil engineering; however, it cannot contribute to the field if it is not taught on wider level and to every aspiring civil engineering

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