# Analysis of Raft Foundation for A Multi-Storey Building Having Soft Storey with Different Location of Shear Walls

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**Abstract : Shear wall is a structural element which provides stability to structure from lateral loads like wind load and seismic loads. These walls are more important in seismically active zones when shear forces on the structure increases due to earthquakes. They have high plane stiffness and strength which can be used to simultaneously resist large horizontal loads while also supporting gravity loads. Shear walls are generally constructed from reinforced concrete, plywood/timber, unreinforced masonry. The shape and plan position of the shear wall influences the behavior of the structure considerably. Various research studies have been conducted on the design of shear wall and its performance to seismic forces. In this paper we have aimed to study the comparison between the effects of earthquake on G+5 storey building with and without shear wall at Zone III in medium soil conditions using STAAD.PRO v8i software.**

***Keywords — ETABS Plan of regular building, ETABS Plan of Irregular building plan, 3D Model of Irregular building ,Staad Proi,,Autocad,,Etabs***

## I. INTRODUCTION

When fragile rock ruptures, it releases tension in form of waves, which is what causes an earthquake. When it comes to natural calamities, earthquakes are notoriously hard to forecast. Due to increase in population, high-rise structures now represent a modernised level of life. Injuries and deaths caused by collapsing buildings are only tip of iceberg when it comes to seismic catastrophes. The foundation is the subterranean portion of a building that makes direct touch with the earth. Typically, raft, pile, or piled-raft foundations are used for the bases of such tall buildings. Raft is going to be put aside for practical reasons. In order to support several columns with a single, inflexible body, a raft foundation may span the whole footprint of the building.

## II. OBJECTIVES

In order to investigate and contrast responses of RCC raft footings in various seismic zones.In order to investigate and contrast actions of RCC Raft footing in various soil types. With the goal of contrasting raft analysis for regular and irregular structures in light of the aforementioned seismic zones and various soil conditions.

## III. METHODOLOGY

STEP 1: PREPARATION OF PLAN

As a prerequisite to developing an analysis strategy, it is essential to meet the specified criteria. Both regular and irregular structures may have their plans made using Auto Cad software

STEP 2: LOAD CALCULATIONS AND LOAD COMBINATIONS

1. Load calculations are as per various Indian Standards such as IS: 875(Part – 1)-1987 for Dead loads (Unit weight of Building materials and Stored materials), IS: 875(Part – 2)-1987 for Imposed loads and IS: 1893(Part 1)- 2002 for Seismic loads. Loads mentioned above are considered to be Primary load cases. Further Load combinations are considered based on IS: 456-2000 for the limit state design under two conditions such as limit state of collapse and limit state of serviceability.

STEP 3: CREATION OF MODEL IN ETABS

With the reference of prepared plan, model of structure can be created in the ETABS software.

*1)* STEP 4: ANALYSIS USING ETABS

The created model in the ETABS has to be analyzed after the assignment of properties of members. Load cases

 DOI : 10.35291/2454-9150.2024.0370 

details and definition of loads should be defined carefully based on the calculation of loads as per IS codes. Load cases details were in the order of Dead load, Live load, material load, Seismic +x & +y and other load combinations for the analysis. Assigned loads on the members can be viewed separately to understand the location of loading on the Structure. Finally, model should be analyzed by run analysis menu to get the output. Based on the output achieved further design can be performed.

## IV. MODELING AND ANALYSIS OF STRUCTURE

In this study regular and irregular structure modeling and analysis is performed with 3 soil types i.e. Soft Medium and Hard and for Zone-4 and Zone-5. Response spectrum method is utilised for earthquake analysis.

### Modelling of structure

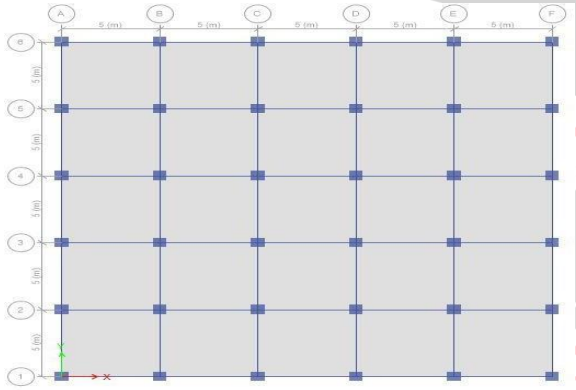

Fig 9: ETABS Plan of regular building

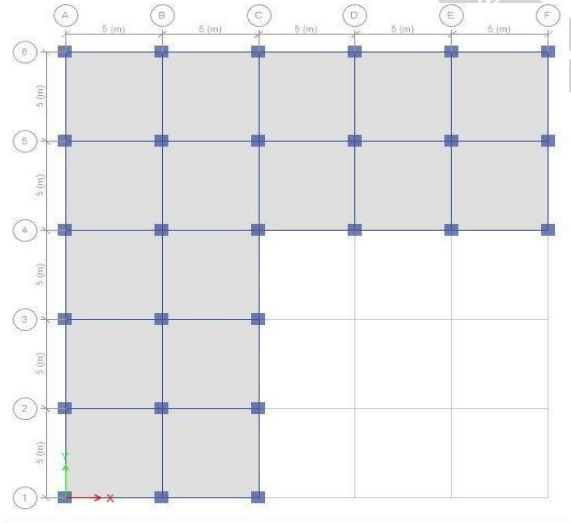

Fig 10:3D model of regular building

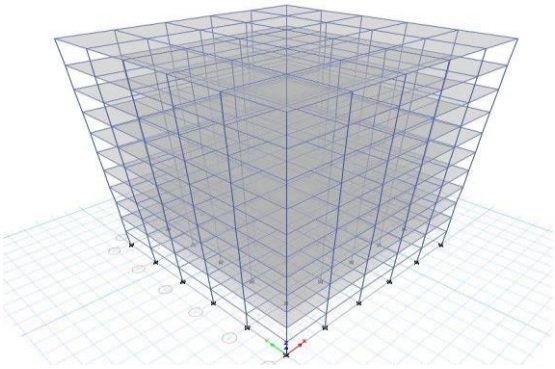

Fig 11: ETABS Plan of Irregular building plan

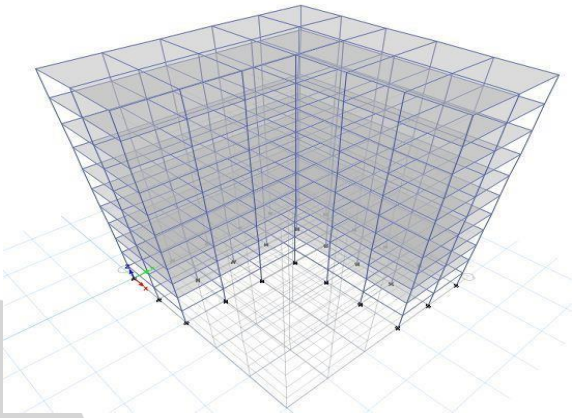

Fig 12:3D Model of Irregular building

## V. RESULT

From the analyzed results, the parameters such as settlement, uplift check, soil intensity, moments and punching shear of the raft have been tabulated for soft medium and hard soil condition and for zone-4 and zone-5.

From the results obtained it is seen that for zone-4 and zone-5, Settlement of raft comparing amongst 3 kinds of soil conditions, settlement is highest in soft soil condition than medium and hard soils.From the fig-50, its seen as settlement in zone-5 for soft soil is 28.6% & 50.53% more than medium and hard soil resp.From the fig-50, its seen as settlement in zone-5 for medium soil is 17.2% more than hard soil.From the fig-51, its seen as settlement in zone-4 for soft soil is 22.61% & 54.19% more than medium and hard soil resp.From the fig-51, its seen as settlement in zone-4 for medium soil is 23.52% more than hard soil.From the fig-52, its seen as settlement in zone-5 in all the soil conditions is more than zone-4From the fig-52, its seen as increase in settlement in zone-5 than zone-4 for soft, medium and hard soil are 9.9%, 4.78% & 12.57% resp.All the settlement values are within the limits according to IS 2950.It is clear that the settlement increases for higher seismic zone and weak soil conditions.

 DOI : 10.35291/2454-9150.2024.0370 

## VI. CONCLUSION

1.It is found that with decrease in Soil subgrade modulus, the settlement and soil pressure intensity of raft increases.

2.It is found that with increase in seismic zone, settlement, soil pressure intensity and moments in raft increases.

3.It is found that in both irregular and regular structure, the settlement of raft is more along the edge of raft, and settlement decreases as we move towards center of raft.

4.It is found that the soil pressure intensity as well as settlement value is more at the edges and it decrease as we move towards center of raft.

5.From the above analysis and results it is found that, the soil pressure intensity value exceeds soil bearing capacity value in soft soil condition. As there is no relaxation for soil bearing capacity value is recommended for raft in soft soil condition. Therefore, in the above cases Piled raft foundation should be considered for soft soil in higher seismic zones.

6.As seen Regular and Irregular structures, it's observed as Settlement and Soil pressure intensity is more in Irregular structure than regular structure & Moments is higher in Regular structure than Irregular structure.

7.It is found that within the raft the moment is highest below the column position and decreases in-between the columns.

8.Depth of raft increase for higher seismic zone.

9.Raft foundation is safe against punching shear or two-way shear i.e. the punching shear ratio is less than 1.

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 DOI : 10.35291/2454-9150.2024.0370 