HBRP PUBLICATION

Journal of Environmental Engineering and its Scope
Volume 1 Issue 2

Seismic Reaction Investigation of Tall Structure Utilizing STAAD Genius Programming

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ABSTRACT

The fundamental target of this entire venture is to Seismic Reaction Examination Of Tall Structure Utilizing Staad Genius Programming Burden computations are done physically and investigation of entire design by STAAD Star Programming. Limit State Configuration adjusting to Indian Standard Code of Training is technique utilized in STAAD-Star examination for planning. STAADPro is expert's preferred product. I had done the examination of edges and physically checked the exactness of the product with our outcomes acquired. The outcomes ended up being exceptionally exact and precise. Ihad examined and planned a G+4, G+9, G+14, and G+19 story fabricating and really look at it for all conceivable burden mixes (Dead, live, wind and seismic burdens). STAAD.Pro has an extremely easy to use and intuitive UI, which permits the clients to just draw the casing and order the heap values and aspects. Then, at that point, according to the predefined rules alloted, it examinations the entire construction and it additionally dissect the design in various seismic Zone given by our code. The materials was picked and mathematical cross-segments of the bar and section individuals has doled out. Fixed help has been fixed for entire investigation. Codal arrangement to be followed has additionally been determined for configuration reason with other significant subtleties. Then, at that point, STAAD.Pro has been utilized to investigate the design. It can without much of a stretch decide the boundary like Sidelong powers, twisting second, Shear force, and hub force.

Keywords:-*Lateral forces, bending moment, Shear force, axial force, seismic response.*

INTRODUCTION

The recent earthquakes in India has shown increase in the seismic zoning factor over various parts of the country [13,14,15]. In addition to this, ductility has become an significant issue for all those buildings that has designed and detailed using earlier versions of the IS codes [16]. Various concrete structures have collapsed or severely damaged during these earthquakes[1,2,17,18]. This shows the importance for evaluating the seismic adequacy of buildings already constructed [19,20]. India's 60% of land constitute these four zones [10,11,12]. Under such conditions, seismic qualification of existing buildings under revised IS codes has become extremely important concern[21,22,23]. In particular, the seismic rehabilitation of old RCC structures in high seismicity areas is a matter of growing concern, since structures.In earthquake design, the building has to go through regular and repetitive motion at its base, which induce to inertia force in the building that consecutively causes stresses[24,25,26]

OBJECTIVES

The objective of the study are as follows:

1) Evolution of performance of RC frame building under seismic zone.

2) Compare the performance of structure in different seismic zone and soil condition.

3) To compare the seismic response of multistoried buildings without shear wall in terms of Storey drift and Average

displacement.

Fig.1:-*Earhtquake In Nepal*

RELATED WORK

Kuldeep dubey & Rakesh patel (2018) - floating column then the cost of building is increases due to increase in reinforcement & concrete but building gives satisfactory results and the with floating column. [3]

Anes B et al. (2017) - deal with effect of steel bracings on RC framed structures. Reinforced concrete building (G+9) was shaped and analysed in three parts comprising model sans steel bracing and shear wall, with dissimilar bracing systems, with shear wall. Bracings and shear wall were positioned at the middle bays and all these simulations were analysed for seismic forces at seismic zones II, III, IV and V using ETABS 2015. As per conclusion chevron category of steel bracing was originate to be more effectual in zones II and III, X type bracing was originate to be more effective in zones IV and V. Steel braced building significantly decreases the lateral drift when associated with shear wall building. [4]

Rakshith (2017) - examined effect of bracings on Multi-Storied RCC building under dynamic loading. RCC building (vertical regular and vertical irregular) having (G+9) stories with different bracing systems were analysed by response spectrum method using ETABS. Outcomes corresponded to displacement, storey drift and storey shear was compared. In this research , researchers concluded that both regular and irregular RCC frame structures X- bracing gives less displacement, storey drift and base shear. Regular frame bears more stiffness than irregular frame. Steel bracing were used to strengthen and retrofit existing structures. [5]

Mohammad A. et al. (2016) - donea numerical approach to show dissimilarity between shear wall and steel bracing systems. The new methodology of this research was to strengthened lateral force resisting system via steel bracing. A measured has been done step by step to show understandable contrasts between systems. The overall investigation has been carried out by response spectrum using ETABS 9.7 that is of six case studies. It is coherent that model 1 (shear wall at core) is the safest among six models assessed in the research tenacity. Positioning of shear wall is a principal point. Besides, the orientation in floor bracing is of less significant dissecting with the vertically oriented bracing systems. Further modification in floor bracing will escort good formulation as seismic force resisting system. [6]

Anirudh Gottala, Kintali Sai Nanda et al (2015) - has done comparative study of static and dynamic seismic analysis of a tall building. A multi-storied framed structure of (G+9) pattern has been selected. Seismic analysis linearlyhas been done for the tall building by static method (Seismic Coefficient Method) and dynamic method (Response Spectrum Method) using STAAD-Pro as per the IS-1893-2002-Part-1. A comparison has been done between the static and dynamic analysis and the results such as Bending moment, Nodal Displacements, Mode shapes are computed, compared and summarized for Beams, Columns and Structure as a whole during both the analysis.[7]

METHODOLOGY AND DISCUSSION

MODELLING OF FRAME

All the preliminary modelling has done in STAAD Pro. V8i by using staad modelling tools, A 5,10,15 & 20 storey frame was modeled in STAAD Pro. Along with the above frame. The main aim is to compare storey drift, storey deflection, bending moment & shear forces [27,28].

- All the beam is the frame for 5, 10, 15 &20 storey were size to (0.23x0.35)mm when we go more than G+9 storey building then we used this value of column.
- All the beam is the frame for 5, 10, 15 & 20 storey were size to(0.23x.30)mm
- All the column is the frame for 5, 10, 15 & 20 storey were size to (0.23x0.46)mm

MEMBER LOADING

All the members has assigned the following loading

- Self-weight
- Live load
- Earthquake load as per IS-code:1983:2002/2005
- It was assumed that the wind force was not governing the frame efficiency

LOAD COMBINATION

In this project we will generated load combination during analysis process. The generate load combination is the combination of the load obtained as per code in this project we are following Indian standard code design criteria so the load generated by the STAAD Pro. V8i has based on concrete design type using IS1893:2002/2005. Load combination generated as follows: [12]

Table 1:-*Load cases details*

Load case no.	Load cases
1	D.L
2	L.L
3	EQ_X +VE
4	EQ_X -VE
5	EQ_Z +VE
6	EQ_Z -VE
7	1.5(D.L+L.L)
8	1.2(D.L+L.L+EQ_X) +VE
9	1.2(D.L+L.L+EQ_X) -VE
10	1.2(D.L+L.L+EQ_Z) +VE
11	1.2(D.L+L.L+EQ_Z) -VE

RESULT

This chapter present the results on RCC frame of 5, 10, 15 & 20 storey without shear wall. The analysis of 5, 10, 15 & 20 storey RC frame has performed under the statics load by using STAAD PRO Software [28,29]. Subsequently these results are obtained as deflected shape, drift shape, shear force and bending moment. The top displacement with respect to base reaction have obtained by load deflection and the result for this analysis have concluded [30].

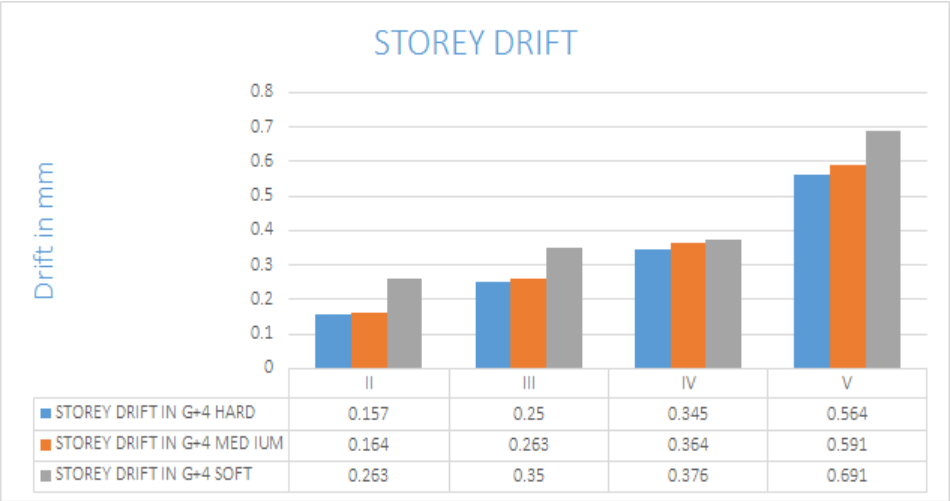

Fig.2:-*Storey Frift Of G+4*

Fig.3:-*Storey Drift For G+9*

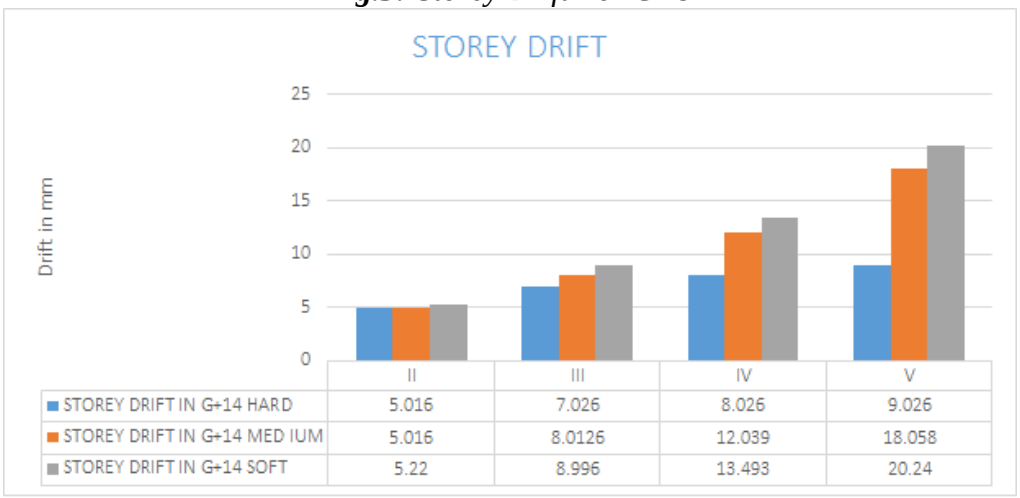

Fig.4:-*Storey Drift In G+14*

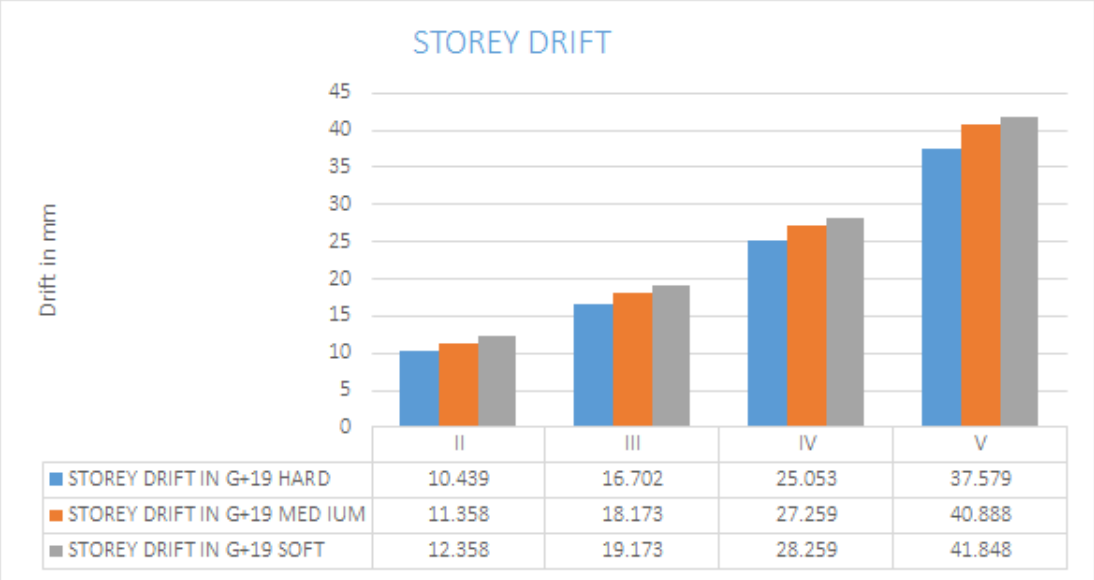

Fig.5:-*For G+19 Storey Rc Frame Zone Wise*

CONCLUSION

The outcomes for G+4, G+9, G+14 and G+19 story building are talk about in results segment for the conversation it is presumed that

- In case of G+4 RC frame it can be seen that maximum storey drift is 37.74% in soft soil ongoing from zone-II to zone-III.
- In case of G+9 RC frame it can be seen that maximum storey drift is 37.44% in medium soil ongoing from zone-II to zone-III.
- In case of G+14 RC frame it can be seen that maximum storey drift is 41.97% in hard soil ongoing from zone-II to zone-III
- In case of G+19 RC frame it can be seen that maximum storey drift is 47.29% in medium soil ongoing from zone-II to zone-III.
- In case of G+4 RC frame it can be seen that maximum deflection is 37.478% in medium soil ongoing from zone-II to zone-III.
- In case of G+9 RC frame it can be seen that maximum deflection is 37.49% is same in medium soil ongoing from zone-II to zone-III.
- In case of G+14 RC frame it can be seen that maximum deflection is 37.95% in medium soil ongoing from zone-II to zone-III.
- In case of G+19 RC frame it can be seen that maximum deflection is 39.60% is same in medium soil ongoing from zone-II to zone-III.

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