International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 3 Issue 5, August 2019 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

A Review Paper Study on Tall Structure for Hilly and Plane Surface under Seismic & Wind Load Conditions

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How to cite this paper: Akanksha Deshmukh | Pratiksha Malviya "A Review Paper Study on Tall Structure for Hilly and Plane Surface under Seismic & Wind Load Conditions" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-3 | Issue-5, August 2019, pp.226-228, **https://doi.org/10.31142/ijtsrd25287**

IJTSRD25287

INTRODUCTION

- Earthquakes occur when energy stored in elastically strained rocks is suddenly released. This release of energy causes severe ground shaking in the areas near the source of the earthquake and sends wave of elastic energy called seismic waves throughout the earth.
- When an earthquake occurs, the elastic energy is released and it sends the vibration that travels throughout the earth. These vibrations are also called seismic waves.
- Multi-storey building frames on sloping ground will be coming up in large number in future times. Thus realistic analysis of these building frames on sloping ground is of paramount importance.
- Due to site conditions, buildings on hill-slopes have unequal column heights which results in variation of column stiffness.

Plastic Fibre Reinforced Concrete

- Tall buildings throughout the world are becoming popular day by day. With the advent of modern day construction technology and computers, the basic aim has been to construct safer buildings keeping in view the overall economics of the project. A high-rise building, apartment tower, office tower, apartment block, or block of flats, is a tall buildingor structure used as a residential and or office use. In some areas they may be referred to as "Multi Dwelling Unit" or "Vertical cities". They have the potential to decongest the urban sprawl on the ground level, and increase the urban density, housing higher number of families in lesser space
- Although there is no precise definition that is universally accepted, various bodies have tried to define what 'high-rise' means:

- The International Conference on Fire Safety in high-rise Buildings defined a high-rise as "any structure where the height can have a serious impact on evacuation"
- Massachusetts, United States General Laws define a high-rise as being higher than 70 feet (21 m).
- Most building engineers, inspectors, architects and similar professions define a high-rise as a building that is at least 75 feet (23 m) tall.

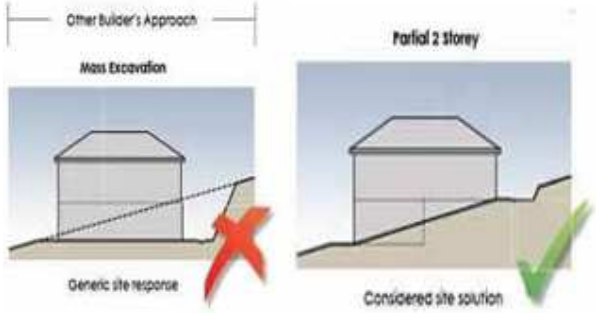

Figure Shows solution for res

Literature Survey

General

Keyvan Ramin (2015) examined the exploratory demonstrating and numerical displaying for a four-story strengthened solid building that the examination of basic 3-D casings of changing floor statures and shifting number of straights with various incline edges utilizing an extremely mainstream programming instrument STAAD Professional on both a slanting and a level part. Additionally Sap2000 programming had been utilized to demonstrate that the uprooting of floors is more prominent for a level part working than a slanting parcel building. Be that as it may, the expansion in shear was observed to be very more noteworthy in short segments contrasted with normal ones and a gigantic minute ought to be endured by slanting part structures. The more prominent firmness of the structure was likewise uncovered by non-straight static (Push-Over) investigation. As indicated by the outcomes, short segment are required to have more safe areas and are proposed to be strengthened with more bars. Likewise, more steel ought to be utilized as stirrups than as longitudinal bars. Likewise to exist structures, shear limit of short segments ought to be retrofitted by FRP, Steel Coat or different materials.

Zaid Mohammada (2016) Confined structures built on slope inclines indicate unexpected basic conduct in comparison to that on the plain ground. Since these structures are unsymmetrical in nature, subsequently draw in huge measure of shear powers and torsional minutes, and show unequal circulation because of changing segment lengths. In present investigation, two unique setups of slope

structures have been displayed and broke down utilizing ETABS v 9.0 limited component codes. A parametric report has been completed, in which slope structures are geometrically differed in stature and length. Taking all things together.

Rupali Kavilkar and Shweta Patil (2016) High-rise structures are also called "vertical cities", having the potential to decongest urban sprawl. Indian cities are witnessing immense demographic expansion due to migration from surrounding villages, leading to urban sprawl, housing demand, rise in cost of land. Housing has developed into an economy generating industry. Given this demand, while high-rise residential structures have become a solution in the metropolitan cities, they remain eluded in tier II cities in India. Low-rise or mid-rise high-density dwelling types have developed in these cities. A study of Pune city's housing needs, demands, market, and type of structures being built, reveal that tall buildings of 11 floors are being developed on the city's urban fringe. Most of the high-rise projects remain as proposals. An investigation in this case study reveal that high rise structures are not preferred due to user perception of insecurity in case of fire and high cost of the building. The paper aims at studying the availability and use of fly ash in various proportions, which can be used in Indian high-rise residential buildings. The research paper indicates that fly ash concrete can be used to reduce the cost of construction and has the potential to minimize the damage caused due to high temperature.

Roser J. Robert and Ranjana M. Ghate (2016) made a comparison between the behaviour of G+4 storey building rested on sloped surface and on flat surface with same intensity of seismic load on both the buildings. They are mainly focused on storey displacement and base shear of buildings have been evaluated in +X and –X direction as well as in +Z and –Z direction. They conclude that i). The story displacement is 10% more in Flat surface in X direction and 30% more in sloped surface in Z direction. ii). Base shear is 7.45% more in Flat surface than sloped surface. iii). number of storey increases storey displacement decreases in both buildings iv) building rested on sloped surface is more vulnerable than building rested on flat surface during seismic effect.

A Joshua Daniel and S Sivakamasundari (2016) made a comparative study of three setback buildings of Type A building is stepping back at every floor level on the slope, up to 4 storeys and has two storeys above road level. The Type B building is stepping and setting back at every floor level. The Type C buildings is stepping back at fourth floor level only and has two storeys above road level having weight and plan same as with the regular building resting on flat ground. He concluded that, i). From the cumulative modal mass participation ratio, the energy dissipation of regular building on flat ground is higher than the respective hill building. ii). Flexibility of regular building endures larger displacement than building resting on hill.

Akhil R (2017) made a comparative study to better understand of regular and irregular structure response to incoherent ground motion. The modeling of regular and irregular building for zone V of G+10 is analyzed .The main aim of his work is comparative study about the stiffness of the regular and irregular configuration. A geometric irregularity introduces discontinuities in distribution of mass, stiffness and strength along vertical direction needs to work in these regarding area. Author made an attempt to reach on more accurate conclusion to reduce their effect on structure. Among these regular and irregular, he identifies the best configuration from his analysis. It was concluded that response spectrum analysis allows clear understanding of contributions of different modes of vibration. Comparing the results, it was concluded that base shear and displacement are maximum in regular building.

Esther (2018) generated different types of analytical models using STTAD. He made an attempt on vertical geometrical irregularities of 6 storeys, 8 storeys and 10 storeys with a range of 0 to 75 % irregularities with interval of 25%. For each case he studied member forces such as bending moment, shear force, displacement, and drift. From his study he concluded that i). Shear force and bending moment is maximum in 75% irregularity i.e., irregularity increases **Sharon** bending moment and shear force increases. ii). Drift also increases with irregularity of building increased if it exceeds 0.10 it leads to collapse. iii). The maximum displacement of 75 % increased by 75% irregularity and 65% with plus shape without irregularity.

In this thesis, seismic analysis of building is done at two different grounds plane and hilly (i.e., 0^o, and 15^0). Comparison of footings in terms of horizontal reaction, vertical reaction and bending moment is carried out at above mentioned sloping ground. Also axial force and bending moment in columns, shear force and bending moment in beams is compared, Lateral displacement and drift is also compared.

Problem identification

Review of different papers related to the subject was done. Some problems were identified such as:-

- In past, researchers have studied the shear behavior of multi storey buildings for different seismic zones.
- Design of earthquake resistant multi storey RCC building on sloping ground with varying of floor height and number of bays was done.

Objectives

The objectives of the research are outlined below:

- To analyses problems of Tall RCC building considering earthquake Zone III in different geometries using Staad Pro V8i software.

CONCLUSION

Analysis results indicate the effect of sloping ground on performance of structure. This study may be useful to improved design and construction practice for structures resting on sloping ground.

REFERENCES

[1] Bozorgnia Y, Bertero V, "Earthquake Engineering: From Engineering Seismology to Performance-Based Engineering", CRC Press,2004.

[2] ChandwaniVinay, AgrawalVinay, Gupta and Naveen Kumar (2012), "Role of Conceptual Design in High Rise Buildings.", Vol. 2, Issue 4, July-August 2012, pp.556-560.

[3] Emraherduran (2008), "Assessment of current nonlinear static procedures on the estimation of torsional effects in low-rise frame buildings in sloping

ground", Engineering Structures 30 (2008):2548-2558.

[4] Gourabi, A. and Yamani, M. (2011) Active Faulting and Quaternary Landforms Deformation Related to the Nain Fault on sloping ground. American Journal of Environmental Sciences, 7,441-447.

[5] Guan Y.H., et al. (2011) Studied on the Earthquake Disaster Reduction Information Management System and Its Application. International Journal of Intelligent Systems and Applications, Vol-1, pp51-57.

[6] Hajra B and Godbole P.N. (2006). "Along Seismic Load on Tall Buildings Indian Codal Provisions." 3NCWE06 Kolkata, pp285-292.

[7] IS 1893 (Part-I) 2002: Criteria for Earthquake Resistant Design of Structures, Part-I General Provisions and Buildings, Fifth Revision, Bureau of Indian Standards, New Delhi.

[8] IS 875(1987), Indian Standard Code of practice for Design loads for buildings and structures, Bureau of Indian Standards, New Delhi. Ashraf Habibullah, Stephen Pyle, Practical three-dimensional non-linear static and dynamic analysis, Structure Magazine, winter, 1998 FEMA-356(2000), Pre standard and Commentary for the seismic Rehabilitation of buildings, American Society of Civil Engineers,USA.

[9] K. Al-Kodmany and M. Ali "Skyscrapers and place making supporting local culture and identity," Archnet IJAR International Journal of Architectural Research, vol. 16, issue 2 , July 2012.

[10] K. Rangawala "Contextual tall buildings in India," CTBUH 2010 World Conference – India, Remaking Sustainable cities in the vertical age, Feb. 3rd-5th 2010.

[11] KazemShakeri (2018),"An adaptive modal pushover procedure for asymmetric-plan buildings", Engineering Structures 36 (2012), pp.160-172.

[12] Kumar, S., and Paul, D.K. (1998). A Simplified Method for Elastic Seismic Analysis of Hill Buildings. Journal of Earthquake Engineering 2 :(2),241-266.

[13] Lee Han Seon ,Dong Woo Kee, 2007, Seismic response characteristics of high-rise RC wall buildings having different irregularities in lower stories with sloping ground, Engineering Structures 29(2007):3149–3167.