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COMPARISON STUDY OF FLAT SLAB AND CONVENTIONAL SLAB

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Abstract: – The flat slab system has been adopted n many building construction taking advantage of the reduced floor height to meet the profitable and architectural trade. Buildings are overall geometry, structural system, and load part. Those parameters are behaving a different way in flat slab structures and conventional slab structures. In case the client plans to changes the interior and wants to use the conventionality to suit the need Research on the design of the structure has started not only in India but in other developed countries also. The building still damages due to some or other reasons due to the earthquake. Despite all the weakness in the structure either code imperfection or error in analysis and design, the structure configuration system has played a vital role in Calamity. In general normal frame construction utilize column, slab, and beam .however it may be possible to undertake construction without providing beams, in such a case the frame system would consist of a slab and column without beam. In our study, it has been planned to analyze a building having a flat slab and conventional slab under the effect of various loading conditions.

The focus of our project is to compare the performance of buildings having flat slabs and having conventional slabs using software aid.

Key Words: - Keyword- Building, flat-slab, Conventional slab, Period Time, STAAD PRO

1. INTRODUCTION:-

The current work is converging on the Comparison Study of the flat slab and conventional slab. The configuration involves the conventional slab structures which acting on different loading position. The conventional R.C.slab and flat slab having different conditions in a framework so, they are performing different ways on different loading position. The mass of flat slab structure is less compared to conventional slab structure. Components of the flat slab and conventional slab are dissimilar so the performance was studied in terms of, lateral displacement, period time, base shear, story drift, base shear, the complete modelling, analysis, and design is done with STAAD PRO V8i software.

The advantages of flat-slab reinforced concrete structures are widely known but there are also known disadvantages concerning their earthquake resistance. Remarkably, both Greek codes, Reinforced Concrete Code and Seismic Code do not forbid the use of such structural systems however both Codes provide specific compliance criteria in order for such structures to be acceptable.

The advantages of these systems are:

1) The ease of the construction of formwork.

2) The ease of placing of flexural reinforcement.

3) The ease of casting concrete.

4) The free space for water, air pipes, etc. Between slab and a possible ceiling.

5) The clear placing of walls in the ground plan.

7) The minimization of building height in multi-story structures by saving one story height.

Methodology: - The buildings are modelled in STAAD PRO V8i software the buildings consist of stories G+3 is unique moment resisting frame assumed subjected to gravity and dynamic loads are analyzed by equivalent static analysis, response spectrum analysis, time history analysis is carried out taking data. Beams and column members have been defined as concrete area elements. Conventional Slabs are defined as area elements having the properties of concrete area elements and plate elements, Flat slabs having the properties of plate element, Buildings having grade of concrete for beam, column, and slab is M25 with unit weight of concrete being 25kN/m3. Column size for building up to 4th floor is 0.3 mx0.3m, while the beam size is 0.30mx0.175m.The Building models having each storey height of 3m.

2. Details of parameter for Design

Description for Loading:-

The loading on the buildings is considered as per following calculations

1) Dead Loads

a) Wall load of 200mm thickness on all beams =20x2.85x0.20 = 11.40 KN/m

b) Load of 100mm thickness on all beams =20x2.85x0.10 = 5.70 KN/m

c) Dead load of Floor finish on slab = 1 KN/m2

d) Slab Dead load =0.150x25x1=3.75 KN/m2

e) Slab Dead load =0.125x25x1=3.125 KN/m2

d) Self-weight of building is automatically considered by the STAAD PRO V8i software.

3) Live load on slab = 2 KN/m2

c) Earthquake zone and soil type has been changed as per requirement.

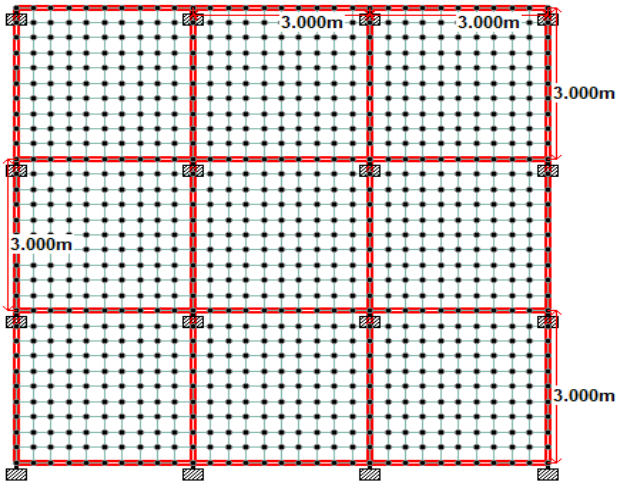
4) Loading Combinations

The different loading combinations for the analysis of the building have been taken by STAAD PRO V8i software

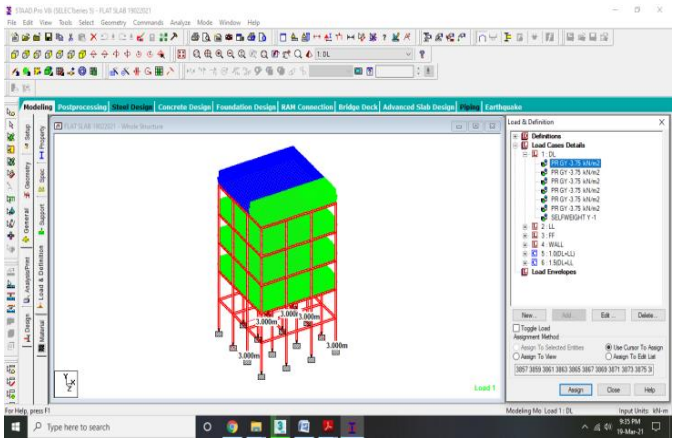
BUILDING DESCRIPTION:-

Building Details		
	Flat Slab	**Conventional Slab**
Column Size	300 mm X 300 mm	300 mm X 300 mm
Beam Size	300 mm X 175 mm(Hidden beam)	200 mm X 400 mm
Slab Size	150 mm thick	125 mm thick
No. of Bays	3No.	3No.
C/c Span length	3.0 mt	3.0 mt

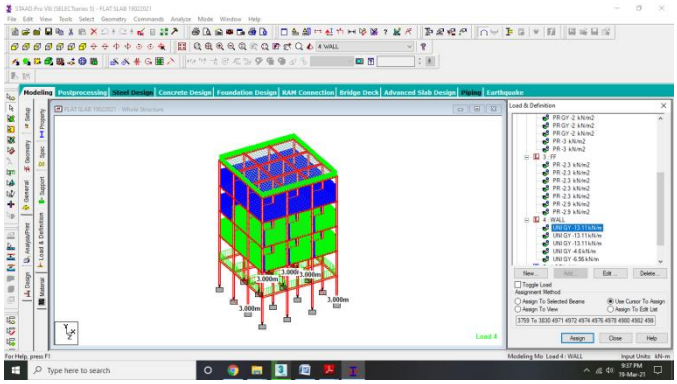
3. Section Details:



Plan of a Slab Structure



Load apply on Structure

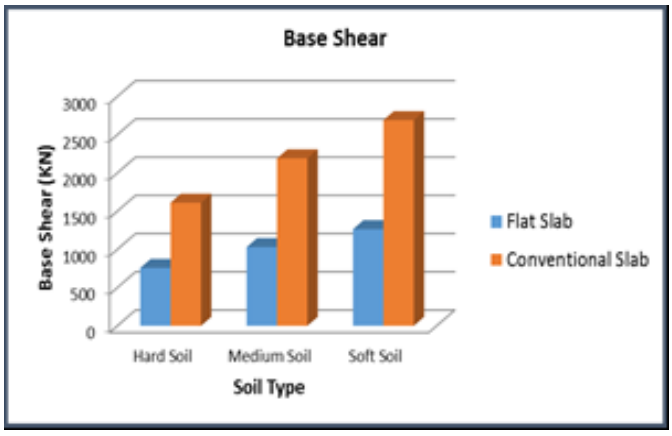


Plan of wall load on Structure

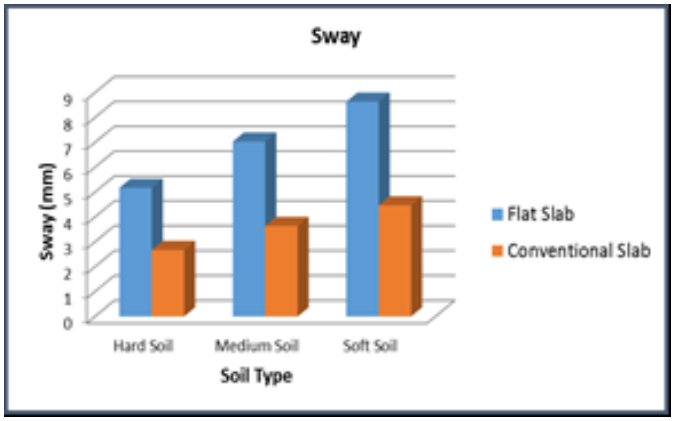
4. RESULTS AND DISCUSSIONS

The study of results has been divided into the following points:

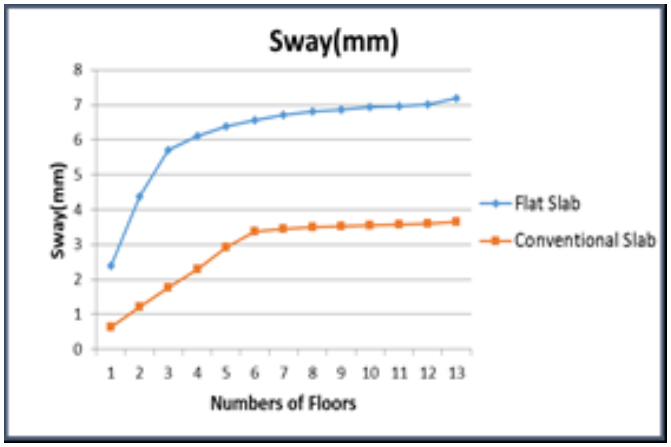
1. Comparison Base shear force and maximum top storey displacement (Sway) for Flat slab building and Conventional R.C. framed building of 4 floors for different soil condition.



2. Comparison of Floor Sway for different Soil Type for Flat slab and Conventional RC slab structure.



3. Graph Sowing Column axial force due to load combinations for change in numbers of floor of Flat slab and Conventional RC slab structure



5. CONCLUSIONS

Based on comparison study of flat slab and conventional slab the following conclusions are drawn:

1. Base shear of conventional R.C. framed building is more than the flat slab building.

2. Base shear in flat slab is increases constantly up to 3 floors and then it increases very slowly. And in conventional R.C. framed it increases up to 2 floors and then it decreases slowly.

3. Sway increment as the numbers of floors increment.

4. Sway at terrace level is record for both types of building.

5. Story drift (Sway) in buildings with flat slab construction is significantly more as compared to conventional R.C.C building. As a result of this, additional moments are developed. Therefore, the columns of such buildings should be designed by considering increased moment caused by the drift.

6. Axial force on column due to all load combination is almost same in both building but shear force and bending moment is similarly more in conventional slab building.

7. The column reinforcement changes as building height increment.

6. FUTURE SCOPE

1) This study was done between flat slab and conventional slab in future flat slab with Perimeter beams comparison with drop and without drop can also be studied for all seismic zones.

2) This analysis was done using STAAD PRO V8i software.

3) In future, analysis of flat slab structure with perimeter Beams can be done while considering different load condition

4) In this study, fixed supports are considered for the analysis of the structure. In the future, it can be extended for different support conditions.

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REFERENCES

1. 1] Dr Ramakrishna Hegde,Chethana, Nanditha Vinod Kumar "Comparative study on seismic analysis of Conventional slab, Flat slab and Grid slab system for a R.C. framed structures" International Research Journal of Engineering and Technology (IRJET) Vol.5, Issue 9, Sept- 2018. [11]
2. **Prof. P. S. Lande [2015]** discussed about flat slab structure is most vulnerable to the seismic excitation therefore the careful analysis of flat slab is important. In this paper the seismic analysis on flat slab is performed and compared it with the conventional RC building. To improve the performance of flat slab system shear wall and beam at periphery is applied and the seismic response of the same is determined and compared it with the flat slab building.
3. **(STAAD.Pro)** is a structural analysis and design software application originally developed by

Research Engineers International in 1997. In late 2005, Research Engineers International was bought by Bentley Systems.[1][2]

4. Bhavikatti S.S, "Advance R.C.C. Design" , New Age International (p) Limited, Publishers, New Delhi, India.

5. IS 456:2000 - Plain and reinforced concrete – Code of Practice, BIS, New Delhi.

6. K.S.Sable [2012] analyzed seismic behavior of building for different heights to see what changes are going to occur if the height of conventional building and flat slab building changes. It was concluded that story drift in buildings with flat slab construction is significantly more as compared to conventional R.C.C building. As a result of this, additional moments are developed. Therefore, the columns of such buildings should be designed by considering additional moment caused by the drift. [8]

7. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2003), "Soil Mechanics and Foundations", Published by Laxmi Publications (P) Ltd.

8. A.A.Sathawane [2012] studied about the most economical slab between flat slab with drop, flat slab without drop and grid slab.