

A REVIEW PAPER ON ANALYSIS AND DESIGN OF MULTISTORY BUILDING WITH DIFFERENT SLAB ARRANGEMENTS USING ETABS

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Abstract – In the prevailing era, earthquakes play a maximum probably position within side the evaluation and designing of systems. Therefore, it is essential to research behavior of buildings. In modern-day construction, RC systems are generally used for construction. Here evaluation And layout of a Conventional Slab, Flat Slab, Waffle Slab, Grid Slab, and Load bearing wall is finished the usage of ETABS. The assessment is the method of identifying the behavior of the form underneath focused load combinations. design is the method, which requires the correct specification of the structure. Using software program application assessment and format method is achieved easily. A business constructing is one wherein as a minimum greater area is used for business activities. Mostly, a beam helps the slab with a massive beam depth, after which load transfers to the column through a beam. A flat slab gives many advantages as in comparison to in phrases of use of area, architectural flexibility, shorter production time, and less complicated formwork. The impact of seismic pressure on different sloping floor and exceptional slab preparations had been analyzed via way of means of ETABS software program. Load combos are taken from IS 875 code. Some structural parameter have an effect on the overall performance of the structure. which affected the demeanor of the structure towards the wind and seismic masses. The consequences of shear pressure, Bending Moment, story shear, story displacement, story drift and amount of concrete and steel indicates that the general end result values makes flat slab an appropriate in comparison to different slab arrangement.

Key Words: Slab Arrangement, Symmetric Asymmetric, Plain and Sloping Ground Seismic analysis, ETAB.

1. INTRODUCTION

Due to the shortage of space, vertical construction has developed in urban areas, such as low-rise, medium-rise, and high-rise buildings. These types of buildings utilize frame structures as various slab. A conventional slab is used for the construction that accomplishes a system where a beam supports the slab and the beam is supported by a column. This may be called the Beam-Slab Load Transfer method, a technique that is common practice all over the world. The other form of frame structure is called a "flat slab," where the slab directly rests on the column. This is also called a beam without slab, as there would be no beams in this frame structure. In multistory shopping malls, offices, warehouses, and public and community halls, the aesthetic view is

improved by using flat slabs in place of conventional slabs. The use of flat slabs for residential buildings is also common in practice, provided the span is not more than 6 m all slab frame structures are subjected to vertical in addition to lateral loads. Lateral masses have an impact on structure. As the peak of the constructing increases, the impact of lateral load additionally increases. The impact of lateral masses is an awful lot more potent than vertical masses. These lateral masses encompass wind-loads and seismic-loads. Lateral forces have a tendency to sway the constructing body. In many seismically inclined areas, structures are at risk of disintegrate if production is not abided via way of means of right measures. All those research make reading the outcomes of earthquake masses very important. An exceptional earthquake happens with exceptional intensities and magnitudes at exceptional places. It is critical to have a look at numerous seismic aspects, including storey displacement, base shear, etc. Seismic evaluation is, therefore, important to have a look at the seismic reaction of a constructing; the layout of a constructing with out seismic evaluation is not preferred, specifically in earthquake.

1. Flat slab

The flat slab is a bolstered concrete slab supported right now to the columns or caps. Flat slab does now no longer have beams so it has also referred to as a beam-less slab. They are supported on columns itself. Loads are immediately transferred to columns.

Flat Slabs are used to offer simple ceiling floor giving higher diffusion. Larger headroom or shorter storey height & captivating appearance. Flat slabs are normally utilized in parking decks, business buildings, resorts or locations in which beam projections are not desired.



Fig -1: Flat Slab

2. Conventional Slab

The slab that is supported on Beams and columns is known as a traditional slab. The thickness of the slab is small while the intensity of the beam is massive and load is transferred to beams after which to columns. It calls for greater formwork while in use of comparison with the flat slab.

Conventional Slab is classified into two types:

1. One-Way Slab
2. Two-Way Slab

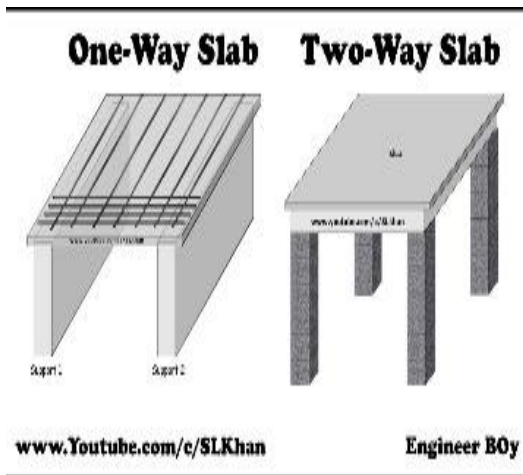


Fig -2: One way & two way slab

3. Waffle Slab

Waffle slab is a strengthened concrete roof or ground containing rectangular grids with deep facets and its miles referred to as grid slabs. This type of slab is majorly used for hotels, Restaurants Malls, for right pictorial view. It is normally used in which massive spans are required (e.g. auditorium, cinema halls) to keep away from many columns interfering with space.



Fig -3: Waffle slab

1.2 OBJECTIVE

1. The important goal of study is the analyze, design, layout of a constructing with one of a kind slab preparations like as Conventional slab, Flat slab and Grid/Waffle slab etc.
2. To calculate the gravity loads and lateral masses, Seismic and Wind with one in all a type load combinations as in step with Indian standards.
3. To calculate the layout lateral forces for constructing through the usage of ETABS.
4. To observe the behavior of building in several seismic zones.
5. To examine the Story Displacement, Story drift, Shear force and bending moment for constructing through the usage of ETABS.
6. Review of various slab outcomes evaluate with one of a kind slab preparations in a graphs and tables.

2. Literature Review

CH. Lokesh Nishanth, Y. Sai Swaroop, Durga Chaitanya Kumar Jagarapu, Pavan Kumar Jogi [1] The number one reason of this portray is to assessment and format an business constructing with one-of-a-kind slab preparations. A commercial enterprise constructing is one wherein at the least 50 percentage of its ground place is used for commercial enterprise activities. The impact of seismic and wind forces on homes with one-of-a-kind slab preparations had been analyzed with the useful resource of using the use of ETABS software. Analysis and layout are finished as in line with IS 456-2000 code. Load combinations are taken as in line with IS 875 code. Live hundreds are taken as in line with IS 875.

After their studies and evaluation paintings, they forestall a top-degree view on Storey displacement is most for Conventional slab and minimal for Load bearing wall kind & will increase with increase in storey height. Base shear is minimal for Flat slab and most for Load bearing wall kind in each the load combinations. Base shear for Load bearing wall type is 44.5% greater than the flat slab kind. R.C conventional slab is 92.6% greater than the load-bearing wall. It is maximum at fourth storey of constructing.

Latha M.S, Pratibha K [2] Grid slab includes ribs spaced at ordinary c language in perpendicular directions, which might be monolithic with slab. These grid slabs are typically used for architectural reason for huge spans. The rectangular voided sample is utilized in gift observe. In the prevailing, observe 12 memories shape of symmetric and uneven for ordinary, plan abnormal and vertical abnormal shape for each traditional slab and grid slab is considered.

After their studies and evaluation work, they finish Deflection of slab of ordinary shape is most in traditional. In addition, in abnormal systems grid slab is having most deflection. Story displacement is most in grid slab device and least in conventional slab for each ordinary & abnormal shape. Story shear is most in conventional slab device and least in grid slab device for each ordinary & abnormal shape. Finally concluded that, grid slab is higher than conventional slab due to the fact grid slab is greater financial than conventional slab.

P. Manjunath and Yogeendra R. Holebsgilu [3]

The buildings are found in sloping floor are very distinct from the ones in undeniable floor, in sloping floor the Buildings are very abnormal and unsymmetrical in horizontal and vertical planes. The homes in sloping floor reasons extra harm all through earthquake, due to the fact in sloping floor the shape is built with distinct column heights. In this look at 3-d analytical version of 10-storied constructing, the plan of every configuration consists of four bays in Y path and 6 bays in X path, that is stored identical for all configurations of constructing frame, the slope selected in among zero to 30 degrees. The constructing is placed on seismic sector V, with distinct soil type; the fashions are analyzed and designed via way of means of ETABS 2015 software.

After their studies and evaluation work, they finish the slope of the bottom increases. It outcomes in lower in seismic weight. Base shear may be very much less in sloping floor as compared to that on degree floor. Storey flow is extra in on the apparent floor as compared to that at the sloping floor that is because of boom in fixity and decreases in variety of stories. Effect of soil is extra essential at the earthquake overall performance of shape. The look at additionally possesses that during static linear technique and reaction spectrum evaluation the overall performance of the constructing on sloping floor has extra threat to earthquake than that of constructing found in undeniable floor.

Shivnarayan Malviya and Mr. Vipin Kumar Tiwari [4]

Recent earthquakes in which many concrete structures had been seriously broken or collapsed Have indicated they want for comparing the seismic adequacy of current homes. In order to Strengthen and face up to the homes for destiny earthquakes, a few processes need to be adopted. The use of various sort of slabs is evolving as a brand new fashion and is turning into a massive task for structural engineers. Therefore, its miles vital to look at approximately its structural conduct. This paper offers with the conduct of various sort of slabs together with flat slab, waffle slab, ribbed slab and slab with secondary beam. We have modelled a G+5 & G+nine storey constructing in ETAB Software having a plinth location of 1600 m2. The reaction spectrum evaluation has been achieved for the seismic, region III. It has been located that for massive span slabs the shape having secondary beams have to be prevented for higher seismic performance.

After their studies and evaluation work, they finish Building having secondary beams shape indicates maximum fee of most storey displacement. The lowest fee of storey Building having waffle slab with admire to others instances of models.

Navyashree K, Sahana T.S [5] The shortage of area in city regions has caused the improvement of vertical boom which include low-upward push, medium-upward push and tall homes. Generally, framed systems are used for those homes. They are subjected to each vertical and lateral masses. Lateral masses because of wind and earthquake governs the layout in preference to the vertical masses. The homes designed for vertical load will not have the ability to face up to the lateral masses. Pure inflexible body device or body motion received through the interplay of slabs, beam and column is not adequate. The body by myself fails to offer the specified lateral stiffness for homes taller than 15 to 20 (50m to 60m) stories.

After their studies and evaluation work, they finish the second is most at plinth, first and 2nd level. After second level. Base shear of flat plate constructing is much less than the traditional R.C.C constructing. The distinction among the two varies from 8 - 13percentage. The earthquake forces are extra important than others load.

3. CONCLUSIONS

1. From the studies paper, its miles concluded that flat slab plays better as compared to different slab. Base shear of flat plate constructing is much less than the traditional slab. The distinction among the slabs varies from 8 - 13 percentage.
2. Grid slab is higher than conventional slab due to the fact grid slab is extra monetary than conventional slab.
3. Base shear might be very much less in sloping floor as compared to that on degree floor.

REFERENCES

- [1] CH. Lokesh Nishanth, Y. Sai Swaroop, Durga Chaitanya Kumar Jagarapu, Pavan Kumar Jogi "Analysis and design of commercial building with different slab arrangements using ETABS" Journal: Materials Today: Proceedings.
- [2] Latha M.S, Pratibha K "Analysis and comparison of conventional slab and grid slab for symmetric and asymmetric structures" Journal: Materials Today: Proceedings.
- [3] P. Manjunath and Yogeendra R. Holebsgilu "Seismic analysis of multi storey building with flat slab resting on plain and sloping ground" Journal: Bonfring International Journal of Man Machine Interface, Vol. 4, Special Issue, July 2016.

- [4] Shivnarayan Malviya and Mr. Vipin Kumar Tiwari
“Comparative study of seismic behavior of multi – storey buildings with flat slab, waffle slab, ribbed slab & slab with secondary beam” Journal of Xi'an University of Architecture & Technology.
- [5] Navyashree K, Sahana T.S “Use of flat slabs in multistory commercial building situated in High seismic zone” International Journal of Research in Engineering and Technology.

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