International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 03 | Mar-2018 www.irjet.net p-ISSN: 2395-0072

Techno – Economic Study of Different Type of Slab

A.V. Pawar[1], A. C. Patil[2], K. B. Ghutukade[3], S. S. Sherkar[4], Mr. M. M. Gidd[5]

[1,2,3,4] *Department of Civil Engineering, Vishveshwarya Technology Campus, Patgaon, India.*
[5] *Professor, Department of Civil Engineering, Vishveshwarya Technical Campus, Patgaon, India.*

Abstract: *This paper describes the analysis of commercial building with different types of slab design. The behavior of building was investigated using ETABS software. For modeling and analysis of old Traditional slab & flat slab structural, ETABS 2016 software is used. The dead load, live load & wind load or consider as per Indian codes IS 456 : 2000 & IS 875 : 1987. The investigation shows that, the weight of flat slab structure is more compared to old traditional slab structure. The cost of flat slab structure is more by 0.82 % as compared to old traditional slab.*

Keywords: **Old Traditional Slab, Flat Slab, Multi Storey Building, *ETABS, Cost Comparison.***

INTRODUCTION

The current work is focused on the Comparative Study of flat slab and Old Traditional slab. The configuration involves the conventional frame structures which acting on different loading circumstances. The Old Traditional R.C. and flat slab having different conditions in framework so, they are performing different way on different loading circumstances.

With rapid growth in population along with development of industrial and commercial activities rapid urbanization has taken place which has resulted into continues influx of rural people to metro cities. So obviously the horizontal space constraint is reaching an alarming situation for metros. To cope with the situation maximum utilization of space vertically calls for the construction of multi-storey buildings in large numbers but the question of affordability of the target customers mainly the middle income group of our country necessitates efficient and cost effect design of such buildings.

A. Old Traditional:

Slabs supported on walls or on beams are classified as conventional slab. Old Traditional slab are generally rectangle in shape, but it can be of any shape such as triangular, circular, trapezoidal, etc. Loads are transferred by the slab by flexural; shear and torsion to the supports such slabs supported on two parallel sides carry loads by bending in the direction perpendicular to the supports. Slabs supported on four sides also behave as one way slab if the length is very large as compared to the width of the slab.

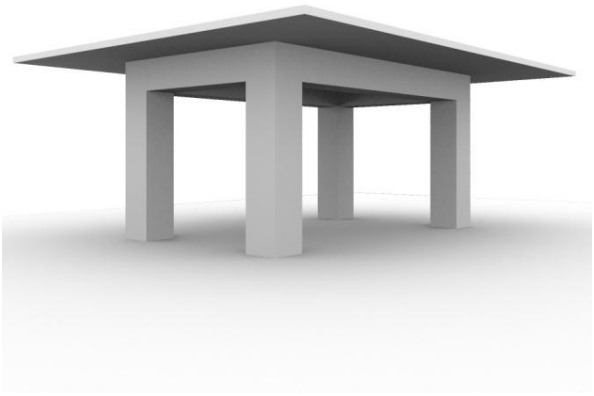

Fig. 01

B. Flat Slab :

Common practice of design and construction is to support the slabs by beams and support the beams by columns. This may be called as beam-slab construction. These types of construction are aesthetically appealing also. Flat slabs which are directly supported by columns.

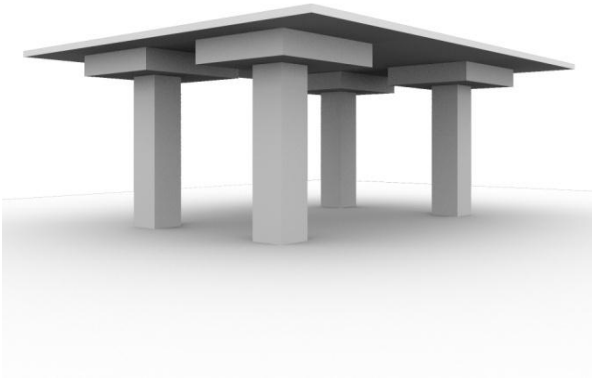

Fig. 02

METHODOLGY

We are taken Commercial Building G + 1 of different slab analysis & design base of ETABS Software and Cost Compare for slab. Floor height taken as 3.65 m. Properties are defined as per IS. 456 :2000.

MATERIAL PROPERTY

The properties of material used given in Table 1.

Table No. 01 : Material Properties

Grade Of Concrete	M - 25
Density Of Concrete	25 KN/M^3
Modulus of Elasticity of Concrete	2 x 10 ^{5} N/MM^2
Grade Of Steel	Fe – 500 (HYSD)

MODEL DISCRIPATION

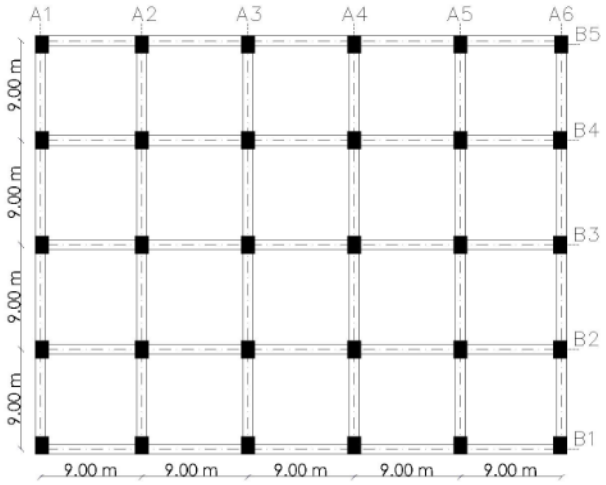

Fig. 03 : Floor plan Of (G + 1) Building

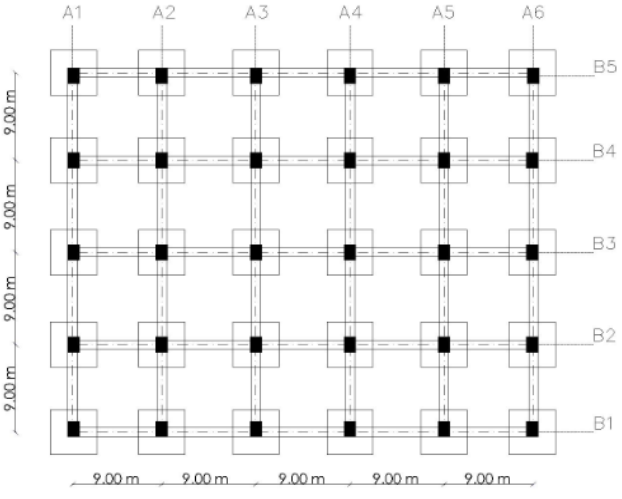

Fig. 04 : Floor plan Of (G + 1) Building

Table No. 02: Structure Plan Details

Number of stories	G +1
Height of each storey	3.65 m
Total height of building	7.3 m
Number of bay's along X	5 Nos.
Number of bay's along Y	4 Nos.

Table No. 03: Structure Element Details

Columns	300 x 380, 300 x 600 mm
Beams	230 x 457 mm
Flat slab	150 mm
Flat Drop	300 mm
Conventional Slab	150 mm

LOAD CALCULATION

The Load considered for the following study is mentioned below which are in accordance with IS 456-2000.

1. Dead load

The self weight of the structural members is calculated according to the wt. Of slab and taken care in the software

Dead oad on floor finishing : 1 KN / m^2

2. Live load : 3 KN / m^2

STEP IN ETAB SOFTWARE FOR DESIGNING OF FLAT OR OLD TRADITIONAL SLAB

The analysis of flat and Old Traditional slab structure has been done by using ETABS software package. Before analysis all the required elements of the structure needs to be defined earlier like material properties, loads, load combinations, size of members, response spectrum etc. once the analysis has been done we can extract the results like displacement, storey shear, bending moment, drift ratio, axial forces for comparing the performance of flat and Old Traditional slab building. The following flow chart shows the steps involved in the analysis by ETABS.

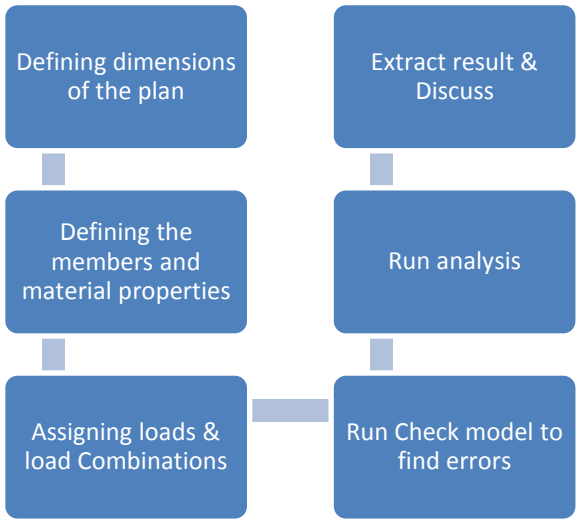

Fig. 05: steps for design

RESULT AND DISCUSSION

Table No. 04: Result of Displacement of Building in mm

Type of Slab / Story	Old Traditional slab	Flat slab
Story 1	0.015	0.016
Story 2	0.030	0.033
Base	0	0

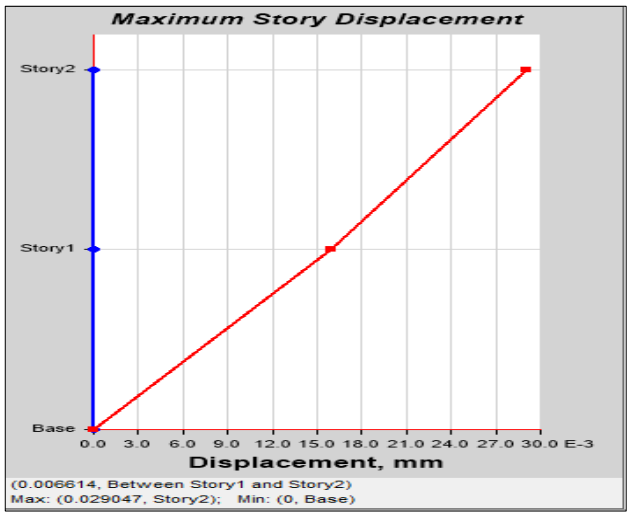

Fig. 06 Old Traditional Slab

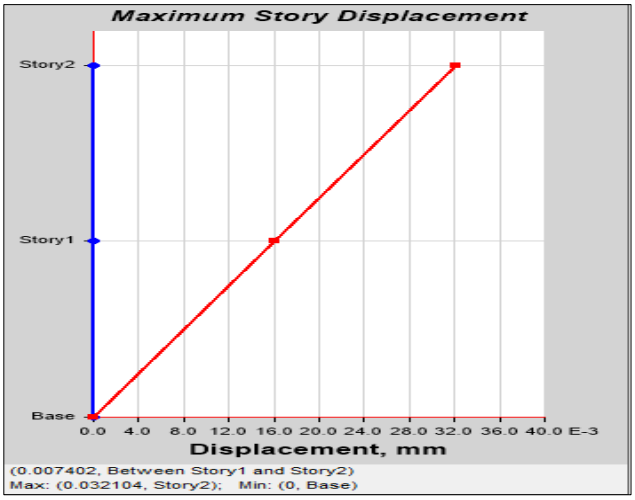

Fig. 07 Flat Slab

The result shows that the Old Traditional slab is get 6.25 % less displacement than Flat slab at story 1 & 9.09 % less displacement at story.

Table No. 05: Result of story Drift of building in mm

Type of Slab / Story	Old Traditional slab	Flat slab
Story 1	4×10^{-5}	4×10^{-5}
Story 2	4×10^{-5}	4×10^{-5}
Base	4×10^{-5}	4×10^{-5}

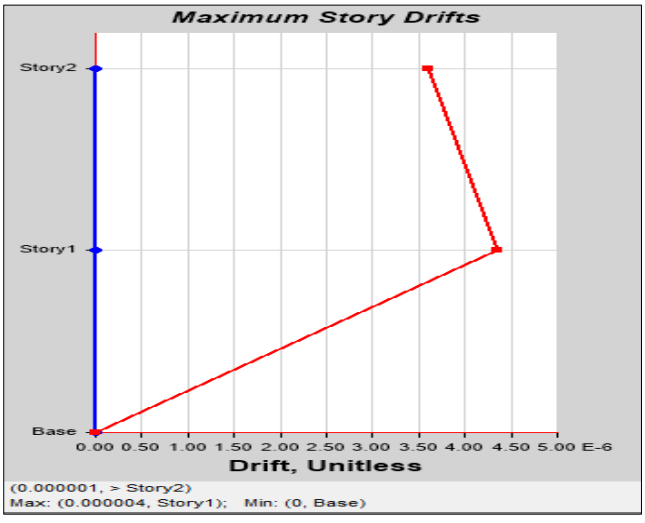

Fig. 08 Old Traditional Slab

CONCLUSIONS

Following are the conclusion of project work:

- The displacement result shows that the Old Traditional slab is get 6.25 % less displacement than Flat slab at story one & 9.09 % less displacement at story two Therefore old Traditional slab is safer than Flat slab.

- The story drift result shows that the Old Traditional slab & Flat slab get same result at both story for. because of same story drift of both slab, old Traditional slab &Flat slab are react same

- The result shows that the Old Traditional slab is get 38.86 % less shear displacement than Flat slab at story one & story two & 37.37 % less shear displacement than Flat Slab at Base. therefore old Traditional slab is safer than Flat slab

- The result shows that the Old Traditional slab is get 0.82 % less steel than Flat slab. therefore old Traditional slab is more economical than Flat slab

The result shows that the Old Traditional slab is get 0.82 % less concrete than Flat slab. therefore old Traditional slab is more economical than Flat slab

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BIOGRAPHIES

Mr. Patil Akshay, pursuing B.E. in civil Engineering at Vishveshwarya Technical Campus, Patgaon, Miraj.

Mr. Pawar Akash, pursuing B.E. in civil Engineering at Vishveshwarya Technical Campus, Patgaon, Miraj.

Mr. Ghutukade Kiran, pursuing B.E. in civil Engineering at Vishveshwarya Technical Campus, Patgaon, Miraj.

Mr. Sherkar Sohel, pursuing B.E. in civil Engineering at Vishveshwarya Technical Campus, Patgaon, Miraj.

Professer, M.M.Gidd Department of Civil Engineering, Vishveshwarya Technical Campus, Patgaon