

Analysis of Support Settlement of G+5 Building (Conventional and Flat Plate) Subjected to a Lateral Load

G K Shankarlinge Gowda

Professor,

Department of Civil Engineering, BGSIT,
Bellur cross, Karnataka

Praveen D Y

M tech student, BGSIT,
Bellur cross, Karnataka

Abstract— In this paper, the analysis of G+5 commercial building has been analyzed. The building is subjected to an earthquake loading. G+5 models has been modelled using the software ETAB 13.1.2 for a conventional building and building with flat plate and settlement is provided to the columns of the building and it has been analyzed, the results of axial load has been taken and Axial load is then compared for the conventional building and building with flat plate for both no settlement on column and for the settlement of column.

Keywords— Axial load, Conventional building, earthquake, flat plate.

INTRODUCTION

Conventional structure includes the columns, beams and slab but in case of flat plate, the slab is that in which slab is directly supported on columns without column capital, drop panel or beams. The settlement is nothing but, during the construction the load from the super structure as well as the sub structures are transferred into underlying soil profile as a result of this stress increases with in the soil mass and the structure undergoes a time dependent vertical settlement.



Figure 1.1 Conventional frame building

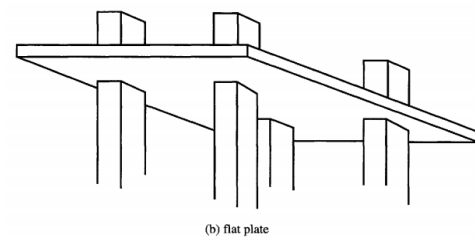


Figure 1.2 Building with flat plate

MODELING AND ANALYSIS

The modelling of both G+6 conventional building and building with flat plate has been done using the ETAB13.1.2. For the earthquake analysis, the input values have been taken for the zone 5 from the IS 1893-2002. Analysis also been done for the response spectrum case.

A. Building details

From the below table 1.1 and 1.2 gives the details of the building for both conventional and building with flat plate has been tabulated.

Table 1.1 Details of conventional building

Conventional building	
Building	G+5
Total height of building	24m
Height of each story	3m
Column size	300x650mm
Beam size	300x450mm
Slab thickness	150mm
Grade of concrete	M30
Grade of steel	550

Table 1.2 Details building with flat plate

Building with flat plate	
Building	G+5
Total height of building	24m
Height of each story	3m
Column size	300x650mm
Slab thickness	150mm
Grade of concrete	M30
Grade of steel	550

B. Loading details for both conventional and building with flat plate

The loading details for these buildings have been taken from the IS 875 part 2 and are tabulated in the below table 1.3

Table 1.3 Loading details

Dead load	Program calculated
Live load	2kN
Floor finish	1.5kN

C Results

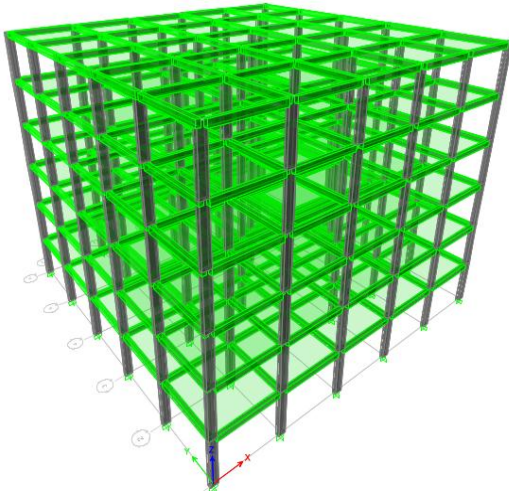


Figure 1.3 3D view of G+5 conventional building

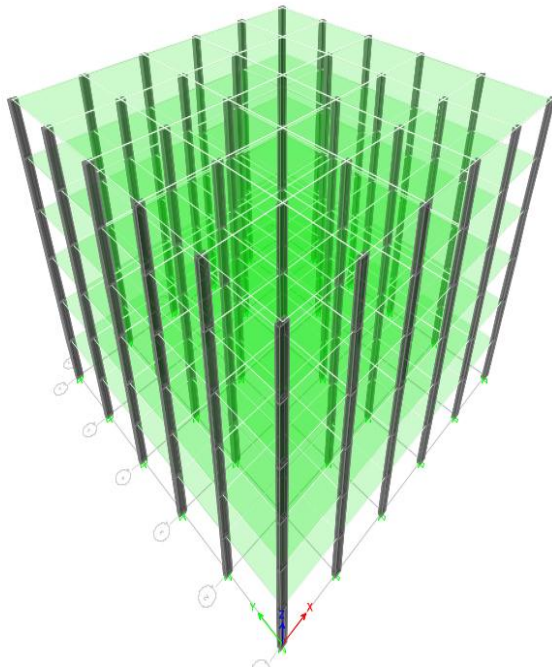


Figure 1.4 3D view of G+5 building with flat plate

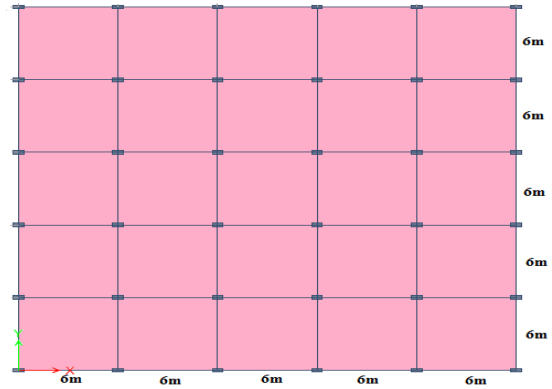


Figure 1.5 Plan of the building for zero settlement

From the above figure 1.5 shows the plan and location of the column for zero settlement of columns.

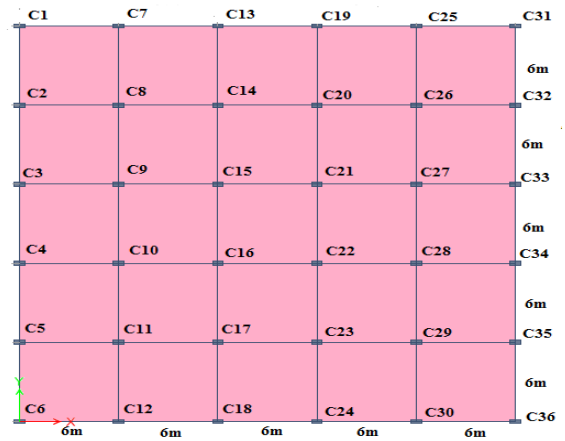


Figure 1.6 Plan of the building for 5mm settlement

From the figure 1.6, the settlement of 5mm is provided to the columns from C1 to C18 and rest of the columns have zero settlement.

Table 1.4 Axial loads for 0 settlement and 5mm settlement for conventional building

Column no	Conventional building with 0 settlement	Conventional building with 5mm settlement
C1	426.53	408.93
C2	719.46	699.06
C3	703.85	683.59
C4	703.85	683.59
C5	719.46	699.06
C6	426.53	408.93
C7	678.27	673.17
C8	1193.06	1184.56
C9	1168.25	1159.78
C10	1168.25	1159.78
C11	1193.06	1184.56
C12	678.27	673.17
C13	678.49	787.54
C14	1197.05	1330.73
C15	1170.65	1303.45
C16	1170.65	1303.45
C17	1197.05	1330.73
C18	678.49	787.54
C19	678.49	569.44
C20	1197.05	1063.36
C21	1170.65	1037.85
C22	1170.65	1037.85
C23	1197.05	1063.36
C24	678.49	569.44
C25	678.27	683.37
C26	1193.06	1201.57
C27	1168.25	1176.73
C28	1168.25	1176.73
C29	1193.06	1201.57
C30	678.27	683.37
C31	426.53	444.13
C32	719.46	739.87
C33	703.85	724.12
C34	703.85	724.12
C35	719.46	739.87
C36	426.53	444.13

Table 1.5 Axial loads for 0 settlement and 5mm settlement for building with flat plate

Column no	Building with flat plate with 0 settlement	Building with flat plate with 5mm settlement
C1	282.10	281.36
C2	505.27	503.34
C3	481.98	480.20
C4	481.98	480.20
C5	505.27	503.34
C6	282.10	281.36
C7	501.07	495.18
C8	1012.20	999.69
C9	963.84	951.38
C10	963.84	951.38
C11	1012.20	999.69
C12	501.07	495.18
C13	479.56	502.57
C14	968.16	1019.88
C15	919.48	969.98
C16	919.48	969.98
C17	968.16	1019.88
C18	479.56	502.57
C19	479.56	456.55
C20	968.16	916.43
C21	919.48	868.97
C22	919.48	868.97
C23	968.16	916.43
C24	479.56	456.55
C25	501.07	506.95
C26	1012.2	1024.72
C27	963.84	976.29
C28	963.84	976.29
C29	1012.20	1024.72
C30	501.07	506.95
C31	282.10	282.85
C32	505.27	507.19
C33	481.98	483.77
C34	481.98	483.77
C35	505.27	507.19
C36	282.10	282.85

From the table 1.4 it has been observed that the axial load for the conventional G+5 building is gradually increases at a rate of 100kN the column C13 to C18

From the table 1.5 it has been observed that the axial load increases at the rate of 50kN from the column C13 to C18, and it has been noted that from the table 1.4 and table 1.5 the axial load is more as compare to the building with flat plate. Due to settlement the axial load is increased gradually on the columns.

REFERENCES

- [1] Navyashree K, Sahana T S 2012. Use of flat slabs in multi story commercial building situated in high seismic zone. IJRET
- [2] S S Patil, Rupali A Sigi 2014. Flat slab construction in India. IJEIT
- [3] Prof K S Sable, Er. V A Ghodechor, Prof S B Kandekar 2012. Comparative study of seismic behavior of multi story flat slab and conventional reinforced concrete frame structure.
- [4] Figure 1.1 and 1.2 were taken from the Google images