

Construction of Sub structure Of a Multi storey Building: A Case Study

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Abstract - The design process of structural planning and design requires not only imagination and conceptual thinking but also sound knowledge of science of structural engineering besides the knowledge of practical aspects, such as recent design codes, bye laws, backed up by ample experience, intuition and judgment. In the present study 2cellars+G+14 building at Yen dada, Visakhapatnam, India is considered for the study. The study involves the construction of substructure of building, which includes site selection, soil test, leveling, earth work, foundation, retaining wall, columns, beams & slab .In order to design them, it is important to first obtain the plan of the foundation& retaining wall that is, positioning of the particular type of foundation, columns, beams etc. Thereby depending on the suitability; plan layout of beams and the position of columns are fixed. The reinforcement provided is HYSD BARS Fe500 as per IS: 1786-1985. Safe bearing capacity of soil is calculated. Retaining wall is constructed to retain the excavated soil. Footings are designed based on the safe bearing capacity of soil. Isolated, combined footings & raft foundation are constructed in the site.

Key Words: Cellar, Foundation, Retaining wall, Reinforcement, Concrete.

1. INTRODUCTION

The details and description of the project is shown in table1.

Table1. Details of Project

DETAILS	DESCRIPTION
Cost of project	400 cr.
Area	4.6ACRES
No. of Flats	555
Construction period	3½ - 4 years
No. of storeys	2 cellars + G + 14
No. of blocks	3 blocks

2. METHODOLOGY

The methodology adopted in the present project work is shown in figure 1.

The methodology of the construction, first of all soil sample of the site is to be tested to obtain safe bearing capacity (17N/mm²). Next the leveling points are taken for excavation work to an average depth of 27' 6". After excavation work, marking is given by using total station to lay the P.C.C. with 6" thick. Laying of retaining wall up to the ground level. Marking of columns & footings are given by using total station on the layed P.C.C. providing steel of HYSD bars Fe500 with the codal provisions of IS:1786-1985. For every horizontal bar have lapping. The lap length of the bar should be of minimum 50 times of diameter of the bar and hooks are provided for stirrups with 6 times of diameter of the bar. For columns threading & coupling process is used. After steel provided, laying of concrete from RMC.

3.1 Study Area:

The study area is shown in figure 2.



Fig-2: Study area

3.2 Soil test:

Soil is tested by using plate load test to find out the soil bearing capacity value as shown in figure 3.

Plate Load Test is a field test for determining the ultimate bearing capacity of soil and the likely settlement under a given load. The Plate Load Test basically consists of loading a steel plate placed at the foundation level and recording the settlements corresponding to each load

increment. The test load is gradually increased till the plate starts to sink at a rapid rate. The total value of load on the plate in such a stage divided by the area of the steel plate gives the value of the ultimate bearing capacity of soil. The ultimate bearing capacity of soil is divided by suitable factor of safety (which varies from 2 to 3) to arrive at the value of safe bearing capacity of soil.



Fig-3: Plate Load Test

3.3 Total station

(For leveling & marking):

It is an electronic theodolite integrated with an electronic distance meter as shown in figure 4. It is also integrated with microprocessor, electronic data collector and storage system. Accuracy of measurement is high.



Fig-4: Total Station

3.4 Earth work:

The removal of earth, usually to allow the construction of a foundation or basement. Excavation is carried out up to the hard strata. Excavation is done by using JCB, tippers etc. as shown in figure 5.



Fig-5: Excavation

3.5 Retaining wall:

The retaining wall which can bear the soil coming from the sides of excavation is shown in figure 6.



Fig-6: Retaining Wall

3.6 Foundation – shallow:

Isolated footing:

It is the simple and common type of footing which is used when the load of the building is carried by a column. Isolated footing is as shown in figure 7.



Fig-7: Isolated Footing

Combined footing:

The footing is combined with two columns which have less space between the columns. They would even touch each other like L shape

column. Combined footing is as shown in figure 8.



Fig-8: Combined Footing

Raft foundation:

Raft is the entire basement floor slab acts as the foundation. The weight of the building is spread evenly over the entire footprint of foundation. Raft is as shown in figure 9.



Fig-9: Raft Foundation

4. CONCLUSIONS

- 1] Soil bearing capacity – 17N/mm².
- 2] The average depth of excavation is 27' 6".
- 3] Number of columns in retaining wall are 43.
- 4] Number of isolated footings are used in site are 22.
- 5] Number of combined footings are used in site are 8.
- 6] Number of columns marked on the raft foundation is 61.

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