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A REVIEW ON ANALYSIS OF PILED RAFT FOUNDTION FOR BUILDING

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Abstract—*.The Piled raft foundation has gained popularity in the field of construction. Construction of raft at shallow depth on soil having low bearing capacity to get uniform settlement is very well known. In the situations where the raft foundation alone does not satisfy the design requirements, and then it may be possible to enhance the performance of the raft by addition of piles. The use of a strategically located limited number of piles, may improve both the ultimate load capacity and settlement performance of raft. The analysis of Piled raft is a complex problem, even more complex than that of a soil supported raft, as too many parameters influence the behaviour of the system. There are various parameters which influence the sharing of load between piles and raft, between piles themselves and between piles and soil and as such the exact behaviour is unpredictable for Piled raft system.*

Keywords- : *piled raft foundation, pile configuration, settlement*

I. INTRODUCTION

Rafts are being increasingly used for buildings, with or without basement, even in subsoil conditions even with a high water table. If the soil shear strength is very low, long load-bearing piles are necessary to transfer the entire load to deeper and stiffer soil layers. If the shear strength is adequate for giving the required bearing capacity of only a raft foundation, the settlement may be very large. For such situations, a piled raft foundation can be opted to reduce settlements. The most effective application occurs when the raft can provide adequate load capacity, but the total or differential settlements of the raft alone exceed the allowable values. In cases where the soil conditions allow the raft to develop adequate capacity and stiffness, this foundation system will be very suitable. It is not an effective option if soft clays or loose sands exist near the surface. The applicability of this foundation concept is also limited in cases of stratified subsoil with large differences in the stiffness of particular layers. The piled raft foundation consists of three load-bearing elements: piles, raft and subsoil. According to their stiffness, the raft distributes the total load transferred from the structure as contact pressure below the raft and load over each of the piles. In conventional foundation design, it has to be shown that either the raft or the piles will support the building load with adequate safety against bearing capacity failure and against loss of overall stability. In piled raft foundation, the contributions of the raft and piles are taken into consideration to verify the ultimate bearing capacity and the serviceability of the overall system. Several studies of analyzing piled rafts have been reported in the literature. The approaches can be divided into simplified analytical methods and numerical methods such as finite element methods, boundary element methods or hybrid methods, all with various assumptions and constitutive laws.

II. LITERATURE REVIEW

A. R. R. Chaudhary, Dr K. N. Kadam. Effect of Piled Raft Design on High-Rise Building Considering Soil Structure Interaction. :-

R. R. Chaudhary, Dr K. N. Kadam Piled-raft foundations for important high-rise buildings have proved to be a valuable alternative to conventional pile foundations or mat foundations. The concept of using piled raft foundation is that the combined foundation is able to support the applied axial loading with an appropriate factor of safety and that the settlement of the combined foundation at working load is tolerable. Pile raft foundation behavior is evaluated with many researches and the effect of pile length; pile distance, pile arrangement and cap thickness are determined under vertical or horizontal static and dynamic loading. In the present paper the influence of pile length configurations on behavior of multi-storied are evaluated under vertical loading. In practice, the foundation loads from structural analysis are obtained without allowance for soil settlements and the foundation settlements are estimated assuming a perfectly flexible structure. However, the stiffness of the structure can restrain the displacements of the foundations and even tiny differential settlements of the foundations will also alter forces of the structural members. Hence, the interaction among structures, their foundations and the soil medium below the foundations alter the actual behaviour of the structure

considerably than what is obtained from the consideration of the structure alone. In this work, analysis of pile soil structure interaction has been studied by finite element software ANSYS 11.

B. Anuj Chandiwala. Fem Modelling For Piled Raft Foundation in Sand

Anuj Chandiwala. In recent years, there have been an increasing number of structures using piled rafts as the foundation to reduce the overall and differential settlements. For cases where a piled raft is subjected to a non-uniform loading, the use of piles with different sizes can improve the performance of the foundation. Extensive research work has been performed in the past to examine the behaviour of piled rafts. However, most of the research was focused on piled rafts supported by identical piles, and the use of non-identical piles has not received much attention. In this paper, the behaviour of piled raft is examined by the use of a computer program MIDAS GTS based on the finite layer and finite element methods. The finite layer method is used for the analysis of the layered soil system. The finite element method is used for the analysis of the raft and piles. Full interaction between raft, piles and soil which is of major importance in the behaviour of piled rafts is considered in the analysis. Among the four different types of interaction present in the piled raft foundation. The interaction between piles plays an important role. Two dimensional (2D) finite element analyses of un-piled and piled raft foundations with sandy soil. For the un-piled raft, the normalized settlement parameter (IR) for the raft sizes of 8mx8m and 15mx15m ranged as 1.03-1.17mm and 0.66- 0.83mm respectively. In the case of the piled raft with raft thickness of 0.25, 0.40, 0.80, 1.50, 3.0m, the corresponding maximum settlements are 66, 64, 63.7, 63mm. The results of these analyses are summarized into a series of design charts, which can be used in engineering practice

C. Poulos, H. G. (2001). "Piled Raft Foundations: Design and Applications"

H.G.Poulos. This paper describes the philosophy of using piles as settlement reducers and the condition under which such an approach may be useful. Some of the characteristics of Piled raft behaviour are also described. The design process of Piled raft is explained in three stages. The first is preliminary stage in which the effect of number of piles on the capacity and the settlement are assessed via an approximate analysis. The second is a more detail study to asses to find out where piles are required. The third is detailed design phase in which a more refined analysis is employed to confirm optimum number and locations of piles.

III. CONCLUSION

After reviewing above paper we can concluded that.

1. Due to the material discontinuity at the interface of the two different surfaces, the structure has to be modelled using the interface element.
2. The maximum settlements are less affected by soil types.
3. Moment carrying capacity of soil pile structure system is a function of-
    a) Soil type
    b) Pile diameter
    c) Pile configuration
    d) Quantity of concrete
4. It is also observed that the optimum configuration of pile is soil dependent. The best configuration varies from soil-to-soil.

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