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REVIEW ON: PILE RAFT FOUNDATION SOIL STRUCTURE INTERSECTION EFFECT ON MULTISTOREY RC SHEAR WALL BUILDING.

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Abstract*— A pile raft foundation is the combined action of the raft and piles. The design of a piled-raft foundation allows the load to be shared between the raft and piles. In which the total load coming from the superstructure is partly shared by the raft through contact with soil and the remaining load is shared by piles through skin friction. For most piled raft foundation the purpose of the raft can increase the bearing capacity & pile can reduce settlement, handle large eccentric loading. For the literature study we concluded that piled raft foundation concept has significant advantages in comparison to conventional foundation for the available soil strata. It is observed that stiffer the soil more will be the load shared by the raft. In under lying soft sub soil profile to minimize the differential and overall settlement in piled raft foundation due consideration must be given consolidation characteristics of the founding stratum .With the increase in raft thickness the positive and negative bending moment of raft increases. It can be concluded that pile dimension, raft dimension, different suitable method of pile group arrangement could be incorporated in tentative design to make a most cost effective and efficient foundation system for a prototype foundation system. Increasing number of piles decreases the total and ultimate settlement and increases the total load carrying capacity up to certain limit that depend upon loading condition As the position of shear wall changes the effect of shear force, bending moment and settlement changes.

Keywords*— Pile Raft foundation, Vertical settlement, Different pile length & diameter.

I. INTRODUCTION

In the past few years, there has been an increasing recognition that the use of piles to reduce raft settlements and differential settlements can lead to considerable economy without compromising the safety and performance of the foundation [1]. Such a foundation makes use of both the raft and the piles, and is referred to here as a pile-enhanced raft or a piled raft. The process in which independent response of the soil and structure influences each other is referred to as Soil-Structure Interaction (SSI) [4]. Piled raft foundations provide an economical foundation option for circumstances where the performance of the raft alone does not satisfy the design requirements[1].A shear walls resting on piled raft against earthquake forces[4]. A pile raft foundation is the combined action of the raft and piles. The design of a piled-raft foundation allows the load to be shared between the raft and piles. In which the total load coming from the superstructure is partly shared by the raft through contact with soil and the remaining load is shared by piles through skin friction[5]. For most piled raft foundation the purpose of the raft can increase the bearing capacity & pile can reduce settlement, handle large eccentric loading. Piled raft foundations are most suitable for foundations of high rise buildings in weak soil also. The present research aims to analyze the piled raft foundation with raft of different dimension, piles of different dimensions, length, group of pile& size of pile by finite element method using software[3]. Under these situations, the addition of a limited number of piles may improve the ultimate load capacity, the settlement and differential settlement performance, and the required thickness of the raft. An approximate method of analysis has been performed to estimate the settlement and load distribution of large piled raft foundation.[7]

II. LITERATURE REVIEW

A. Naveen kumar D. , "Numerical Anyalisis of Pile raft Foundation using Fem with Interaction Effect", International Journal of Technohem Research (IJTR), Mtech Structural Engineering SASTRA University,india. [1]

In study when pile spacing alters then the load carrying capacity also varies. for the 3x3 pile group the ultimate load increased by 4% when the spacing between the piles increased to 4d and 5d, when d is diameter of pile. For 4x4 piles group the ultimate load is increased by 10% when the spacing in increased 4d but decreased by 12% when the spacing increased to 5d .for 5x5 pile group the ultimate load decreased by 2% when the spacing

reased to 4d and 5d. Regarding settlement when we changes. The spacing there is much changes in the settlement also.if we alters the spacing to 4d and 5dthere is nearly 40% increased in settlement.

Fig. 1.-Ultimate Load Vs Spacing Between Piles for 3x3 Pile [1]

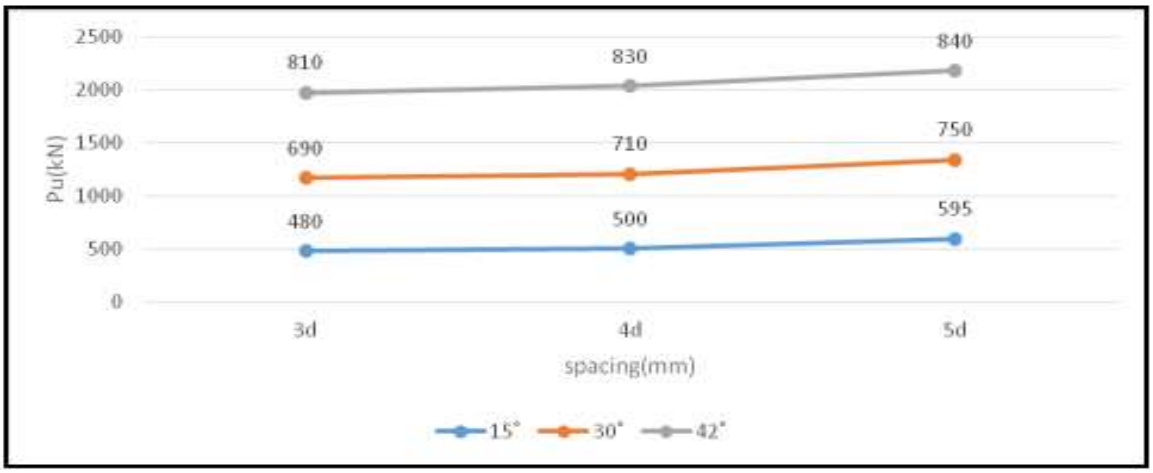
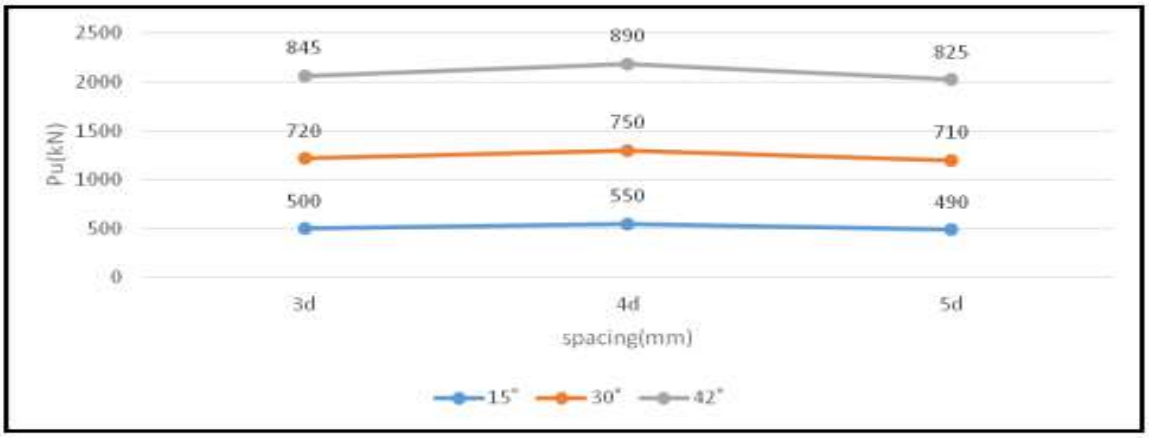


Fig. 2.-Ultimate Load Vs Spacing Between Piles for 4x4 Piles [1]



B. Nirmal John Joy, Hashifa Hassan, "Study on Settlement Characteristics of Combined Pile Raft Foundation Founded on Sand with Various Arrangements of Piles using Plaxis-3D". International Journal of Emerging Technology and Advanced Engineering. Department of Civil Engineering, Saintgits College of Engineering, Kottayam, Kerala, India[2]

In observed the settlement analysis on Software, it became clear that load of about 11000 kN is causing excess settlement to raft . the software analysis, we needed to fix the dimensions of elements of CPRF. Length of Pile in CPRF was limited to 25 m. Thickness of pile was 1.5 m. different diameter piles 0.6 m 0.8 m and 1.0 m were adopted. Spacing of pile less than 6 times diameter of pile. From all the possible diameters, it is best to provide larger diameter piles in the interior region to reduce the maximum settlement and the differential settlement.

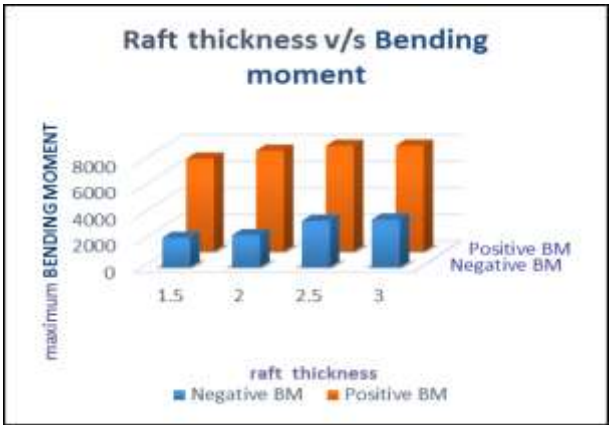
TABLE I. CPRF System Settlement Result [2]

Load	KN	10190.1	10190.1	10190.1
Diameter	m	0.6	0.8	1
Length	m	25	25	25
SBC	KN	1283.51	1283.51	1283.51
Settlement	mm	**8.523**	**2.670**	**1.710**
Number of Pile	--	8	8	8

C. Rameez Gahlot, Roshni J John "APPROXIMATE ANALYSIS OF PILED RAFT" International Journal of Scientific & Engineering Research. Head of Civil Engineering Department, Saraswati College of Engineering, Kharghar India.[3]

In observed, increasing the raft thickness settlement reduces up to certain extent and beyond which further increase in raft thickness doesn't affect the settlement at all but with the increase in raft thickness 1m, 2m 2.5m& 3m the differential settlement reduces considerably. It is also observed that with increase in raft thickness the dead load increase which results in increase in maximum bending moment& negative bending moment. However increase in raft thickness is advantageous for punching shear.

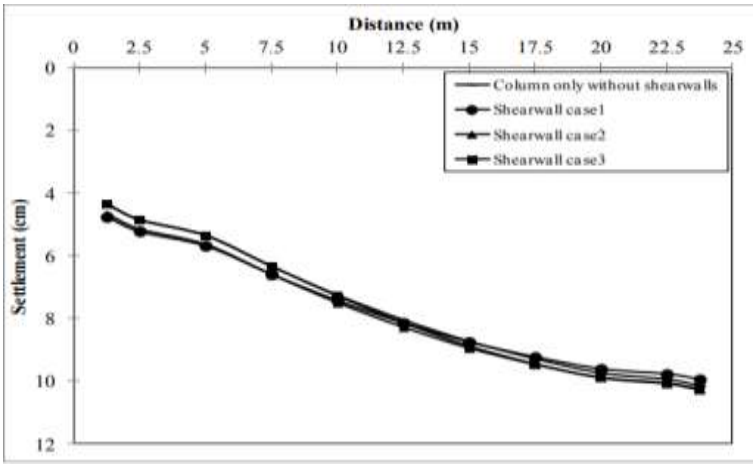
Fig.3 Raft thickness v/s bending moment[3]



D. W. H. El Kamash, M. M. El Gendy , R. W. Salib , M. A. Kandil"Studying of Shear Walls with Piled Raft over Soft Soil against Seismic Loads" PORT SAID ENGINEERING RESEARCH JOURNAL Faculty of Engineering - Port Said University. [4]

A study was analyzed as shear walls structure with piled raft resting on Port-Said soil medium under gravity and earthquake loads. In observed, for different cases of position of shear wall. Lateral forces produced by the earthquake affected on settlement profile. Those forces increased settlement beneath the raft in the opposite side of the seismic forces. in shows in case-1 shear wall located at corner of building, case-2 shear wall located at mid portion of building, case-3 shear wall located at center of building. Results were focused on deformations, vertical stresses and moments in the soil beneath the foundation. the position of shear walls to the interior position increased the maximum moments by 42%.

Fig.4 Diffrent cases of shear wall position [4]



III. CONCLUSIONS

From the study of above research papers it can be concluded that,

- Pile spacing affects greatly the maximum settlement, the ultimate settlement and the load carrying capacity of the piles. The spacing between the piles should be within the permissible range that depend upon the loading conditions also. If the load acts at the centre of the mat structure then we have to provide lesser pile spacing.[1]
- The number of piles also depend upon the loading conditions. But the cost of construction will increase if the number of piles increased, So the optimum number of piles should be used.[5]

- From all the possible diameters, it is best to provide larger diameter piles in the interior region to reduce the maximum settlement and the differential settlement.[2]
- The increase in Raft Thickness the positive and negative bending moment of raft increases.[3]
- The soil type is also one of the major factor that affect load settlement behaviour. Dense sand produces better results when compared to the loose and medium sand.[6]
- By changing positions of shear walls, it is found that the position of exterior shear walls is the best case to control lateral displacements, contact pressures and moments in the soil beneath the piled raft foundation compared to other cases shear walls' positions.[4]
- The position of shear walls to the interior position increased the maximum moments.[4]

IV. SCOPE OF WORK

In this Review paper, it is concluded Piles of different diameter sizes & length are considerably used in order to reduce the total and differential settlement. [5] Different arrangements of piles along with raft can be used in order to get the best combination of less pile with high bearing capacity and ultimately reduces the costing of piling.[2] By providing pile system at a critical location the differential settlement and overall settlement can be reduced [3]

V. REFERENCES

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