



Numerical Analysis of Piled Raft Foundations in Alluvial soil

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Abstract

In this age of rapid urbanization, population is rapidly increasing in urban area, therefore a new concept of vertical cities has been introduced in form of high-rise building, and there are many conventional methods for design of foundation systems for high rise buildings. In most of the conventional methods pile foundations have been given preference for high rise buildings, all the loads of the building are transferred to the soil by piles. Some of the pressure of the building can also be transfer by raft directly to the soil by contact pressure which is neglected in most of the conventional designs of pile raft foundation system. But from last decades, optimised way of designing of pile raft foundation system have been started by engineers, in which raft foundation is allowed to transfer some of the total load directly to the ground by contact pressure. So, in this paper, we are going to use one of the numerical methods for numerical analysis of pile raft foundation system. There are various factors that influence the behaviour of pile raft foundation, some of the important factor that we are going to see in this paper are raft thickness, pile length, pile spacing and number of piles. From the result obtain, with variation in raft thickness the differential settlement can be reduced to certain extent. All these factors are very important for optimize and economical design of pile raft foundation system. In this paper, numerical analysis has been done by using finite element software that is GEOTECH 3D Foundation to find out the influence of above factors on pile raft foundation system in alluvial soil.

Keywords

Raft, Piled raft foundation, Numerical Analysis, Alluvial soil, GEOTECH 3D Foundation



Numerical Analysis Of Piled Raft Foundation Using Ijotr

Helen Sze Wai Chow



Numerical Analysis Of Piled Raft Foundation Using Ijotr:

Numerical Analysis of Piled Raft Foundations in Multi-layered Soils Kaiyu Lin,2001 **Numerical Analysis of the Reuse of Piled Raft Foundations** Konstantinos Giannopoulos,2011 Numerical Analysis Fo Piled Raft Foundations Patrick Clancy,1993 *Numerical Analysis of Piled Raft Foundations* Patrick Clancy,1993 **Numerical Analysis of the Reuse of Piled Raft Foundations** Konstantinos Giannopoulos,2011 *Design and Analysis of Piled Raft Foundations - 2017* Der-Wen Chang, Tatsunori Matsumoto, Deepankar Choudhury editor,2017-09-01 19 11 7 *Combined Pile-Raft Foundations* Oliver Reul,Mark Randolph,2024-12-16 This book presents the fundamental features of the design and performance of combined pile raft foundations CPRFs Whereas in a traditional foundation the loads are carried either by the raft or by the piles the capacity of CPRFs is assessed for the foundation as a whole reducing total and differential settlements economically The five chapters provide an overview of the historical development of piled rafts in practice and research and of the design concepts developed for piled rafts over the last decades Fundamental aspects of their bearing behaviour are presented as well as an overview of the framework of the design process for CPRFs including the safety concept the design approach summarised in the ISSMGE Combined Pile Raft Foundation Guideline ISSMGE TC 212 2013 and the interaction between structural and geotechnical engineering For numerical analysis based on the finite element method guidance is given on creating the model and performing the calculations before providing basic information on the requirements for the site investigation supervision of the construction process and monitoring of the foundation performance Detailed case studies illustrate the design and performance of CPRFs and a design example for the foundation of a multi storey office building founded in non cohesive soil is investigated carrying out 3D finite element analysis to estimate deformations and design parameters for structural engineering Based on the combined experience of the authors obtained in the last decades working in the industry and research the book particularly suits consulting engineers engaged in foundation engineering as well as graduate students and researchers interested in the bearing behaviour of piled rafts and pile groups **Practical Methods for the Analysis of Piled Raft Foundations** Volkan Kaltakci,2009-09 The use of piled raft foundations has significantly increased over the last few decades since taking into account the contribution of the raft to the overall bearing capacity enabled the engineers to design much more efficient piled foundations which perform as well as the conventionally designed ones with significantly lower number of piles However although many researchers have been studying on this subject a user friendly design procedure is still not available in the literature This book therefore offers two different simple methods to estimate the settlements of the piled raft foundations Utilizing the charts provided in this book the settlement of a piled raft foundation can be obtained by simple hand calculations in the first method while it can be calculated by computerized analysis in the second one This book should be especially useful for the geotechnical experts and or engineers looking for a simplified method for the analysis of piled rafts and academicians who are interested in the subject **Piled Raft**

Foundation Design P. T. Brown, H. G. Poulos, T. J. Wiesner, 1976 **Design Applications of Raft Foundations** J. A. Hemsley, 2000 This book examines alternative design procedures for plain and piled raft foundations It explores the assumptions that are made in the analysis of soil structure interaction together with the associated calculation methods The book gives many examples of project applications covering a wide range of structural forms and ground conditions

Analysis of Piled Raft Foundations Sebahat Gök, İnşaat Fakültesi, 1998 3-D Modeling of Piled Raft Foundation Anup Sinha, 2013 *Load Sharing Mechanism of Piled-Raft Foundation in Sand* Rouzbeh Vakili, 2015 The application of piled raft foundations for supporting high rise buildings has significantly increased over the last few years The economic benefits of piled raft foundations in comparison with alternative approaches have encouraged this popularity but this comes with additional complexity for load sharing calculations in a multi parameter problem These parameters are but not limited to soil density pile length pile spacing raft geometry and pile installation technique The complexity of piled raft foundation design demands further research in a range of different engineering aspects In this study the load sharing mechanism of a piled raft foundation in sandy soil was investigated through small scale tests and three dimensional numerical analyses The effects of density in homogeneous and layered soil sand particle size distribution pile installation method and raft width were studied through experimental analyses Experimental tests were performed on a shallow footing single pile and single piled raft unit in clean Silica sand The results of small scale tests reveal that soil density changes the load sharing mechanism of a displacement piled raft the pile share increases in denser soil However this result does not hold in non displacement piled rafts where load sharing is independent of soil density Furthermore it is observed that particle size distribution has inconsiderable effects on piled raft behavior One of the experimental tests on non displacement piled rafts was employed to calibrate the 3D numerical model which was further expanded into 2x2 and 3x3 piled raft foundations The load sharing outputs of the aforementioned models were compared for a given settlement ratio This comparison reveals that the number of piles has an inconsiderable impact on the load sharing of non displacement piled raft given that the piles are identical in size and a minimum spacing among them is respected The numerical analysis confirms that the conducted experimental tests on non displacement piled rafts are applicable to predict the load sharing in practical cases Therefore an empirical model was developed to achieve this goal under various settlement ratio and pile spacing The proposed empirical models were validated against the available centrifuge and field test results in the literature A widely accepted analytical model in the literature was modified based on the previously conducted experimental results The proposed model calculates the load sharing as a function of settlement and pile spacing ratio in homogeneous and layers soils

Analysis of Piled-raft Foundations with Piles of Different Lengths and Diameters Helen Sze Wai Chow, 2007 *A Study of the Piled Raft Foundation Behaviour* Mohamed Mansour, Adel Akl, 2013 In the recent decades a new concept has evolved for the analysis and design of piled foundation which is the piled raft concept This concept takes into consideration the proportion of load

transmitted directly by the raft contact pressure in the piled raft foundation system In the current work a nonlinear three dimensional finite difference analysis was carried out to model several piled raft problems Firstly a back analysis was made for two case studies to check the validity of the numerical modelling procedure performed by the author Afterwards a comprehensive parametric study was performed on a hypothetical square piled raft over three clay soil profiles with different degrees of stiffness The variation was made in number of piles length of piles and distribution of piles over the raft area The variables were studied in terms of their effect upon the average settlement differential settlement load sharing between piles and raft and the piled raft working stress The concluded observations from the parametric study can help the engineers in taking a logical path in an iterative design process for a piled raft foundation

Finite Layer Method for Analysis of Piled Raft Foundations Honghua Zhang,2000 *Raft Foundation Design And Analysis With A Practical Approach* Sharat Chandra Gupta,2007 Available Textbooks Handbooks Various Publications And Papers Give Widely Different Approaches For Design Of Raft Foundations These Approaches Make Their Own Assumptions And Deal With Ideal Raft Symmetrical In Shape And Loading In Actual Practice Rafts Are Rarely So A Structural Designer Engaged In The Design Of Raft Foundations Finds It Hard To Select The Method That Can Be Carried Out Within The Time And Cost Available For Design And Give Adequate Safety And Economy This Book Covers Complete Design Of Raft Foundations Including Piled Rafts Starting From Their Need Type All The Approaches Suggested So Far In Published Literature Effect Of Assumptions Made And Values Of Variables Selected On The Design Values Of Stresses And Brings Out The Limitations Of These Approaches Using Actually Constructed Rafts Results Of Studies Carried Out By The Author Are Summarised And Final Recommendations Given Solved Examples Are Included For Each Of The Methods Recommended Comprehensive Treatment Of The Subject Makes The Book Helpful To The Design Engineers Engineering Teachers Students And Even Those Who Are Engaged In Further Research

Numerical Analysis of Vertically-loaded and Laterally-loaded Raft Foundations Enhanced by Deep Foundation Elements Widjojo Adi Prakoso,1999 **Finite Difference Analysis for Piled Raft Foundation Under Vertical Dynamic Loading** Tricia John,2019 Piled rafts Yasser el- Mossallamy,Eberhard Franke,1997

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