

## THE CORRELATION BETWEEN STATIC PILE CAPACITY AND DYNAMIC PILE CAPACITY IN DIFFERENT SITES IN BASRA CITY, CASE STUDY

\*Jaffar A. Kadim<sup>1</sup>, Ihsan Al-aboodi<sup>2,3</sup>, Osamah Salim Al-Salih<sup>4</sup>, and Oday A. Abdulrazzaq<sup>5</sup>

<sup>1,2,4,5</sup>Department of Civil Engineering, University of Basrah, Iraq

<sup>3</sup>Department of Civil Engineering, Shatt Al-Arab University College, Iraq

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**ABSTRACT:** The present research concerns the correlation between the static pile test and the dynamic pile test of driven piles in Basra city by using two types of pile, which are the precast reinforced concrete piles and steel tube closed-end piles. 100 pile tests in the Majnoon oil field, which is located in the north of Basra City, Southern Iraq, are considered in this paper, which focuses on the ultimate pile capacity as the criterion in establishing the correlation between the two test types. The CAPWAP program was used in determining the dynamic pile capacity, while Davisson's method was applied as a criterion in estimating the ultimate pile capacity. The Results have shown that a very strong correlation between the two types of pile tests and the dynamic pile tests, which gave higher values of the pile capacity than the static pile capacity and the case method. Also, the results indicate that the damping factor of soils in dynamic tests showed some variation larger than the quake value from the values of the case method.

**Keywords:** *Static load test, Dynamic load test, Case method, CAPWAP analysis, Damping factor, Quake value.*

### 1. INTRODUCTION

In the compression pile engineering problems, the researchers are interested in many subjects. The first one is related to the pile capacity regardless of its state (ultimate or working state), while the second subject is interested in the load transfer mechanism for both the shaft (side friction) and the end bearing (tip point bearing). The third subject focuses on the pile settlement either during construction or within the service lift. The last subject is associated with the influence of time on the pile capacity and soil properties. Here, establishing the pile capacity (ultimate and/or working) state represents one of the most important aspects in the pile engineering field. The story of the pile foundation starts from the soil investigation, leading to the specific analysis or design method employed in the project. There are many techniques available to satisfy this goal, such as the analytical methods, the in situ method, the dynamic formula, the static pile test, and the dynamic pile test. The application of above techniques gave a different results and the variation of these results make amore confuse in the analysis accuracy, design integrity, and the adequate construction of deep or pile foundation. But, one of major problem of the piling foundation design is the variation of the pile capacity with time which reflected by two effects that are well known as the setup effect (the increasing pile capacity value in cohesive soils) effect and relaxation effect (the decreasing pile capacity value in granular soils).

From above five techniques, the static pile test SLT and the dynamic load test DLT that conducted

to determine the pile capacity are considered the more accurate techniques other than the others (Static design equations, in situ test methods, Dynamic formula) but due to many the factors such as the cost and time of SLT caused to searching to and leading to more economical and rapid test required and these matter are satisfied by employing the dynamic pile test DLT. Below are some researches and studies which conducted at last year's related to the both pile type tests. Numerous authors have established relations between static and dynamic load tests on piles since the 1980s keeping in the mind this processes required an adequate load tests (SLT, DLT) execution for a satisfactory correlation. Moreover, further analyze of dynamic test output data can be improvement to determine the distribution of soil shaft resistance (skin resistance), toe resistance (tip point resistance), quakes (shaft and toe), and damping ratio (shaft and toe) so that the best possible match between a computed pile top variable, such as the pile top force, and its measured equivalent serves as the basis for results [1]. For more information, below are some studies and researches about the paper subject.

Micheal A. [2] studied and compared the results of a static load test which conducted first then followed with dynamic load test. The ultimate capacity was gotten using the Davisson's method which gave the lowest value compared to other methods. The test results showed that a good agreement had been achieved between both the test with plus minus 2mm at working load in terms of settlement. Also, the settlement predicted in the dynamic load test was lesser compare to static load