

Analysis of Combined Pile Raft Foundation based on a static load test

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Forum topics	<input type="checkbox"/> Energy in 21st Century	<input type="checkbox"/> Cultural Heritage in Digital World
	<input checked="" type="checkbox"/> Engineering Capacity Building	<input type="checkbox"/> Disaster Risk Management & Governance for Resilient Communities
	<input checked="" type="checkbox"/> Construction 4.0	<input type="checkbox"/> BIM Lifecycle, Facility & Asset Management

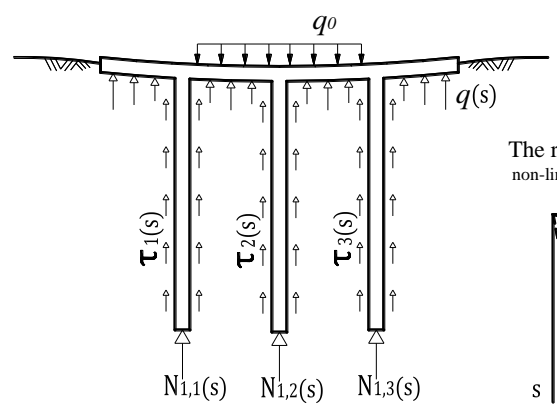
Abstract: (250 to 500 words: for each heading use the bullet points or narrative- the submission including graphics should not exceed one page)

Problems - Issues / Challenges-Needs	<ul style="list-style-type: none"> It is common practice to verify the correctness of the assumptions made for the calculation of a given pile foundation, by performing a static load test of piles. The test piles also enable the correction of the basic piling design assumptions in order to optimize the costs and time of its execution. When analysing the settlement of a construction object, it should be taken into account that the results of measurements of the single pile behaviour obtained during the static test do not correspond to the behaviour of the pile occurring in the group of piles under the raft. This is mainly due to the formation of stresses zones in the soil from the individual piles forming the foundation. In connection with the above, a method was developed that uses the results of a static pile test to analyse the load-settlement curve of a pile occurring in the pile group under raft. An additional advantage was the use of a curve extrapolating the results of the test to the limit load corresponding to the vertical asymptote on the load-settlement curve. This makes it possible to determine the safety factors of the foundation and, if necessary, to optimize the plan of piling or thickness and reinforcement of the raft.
Solutions - Methods / Results - Findings	<p>The proposed method of calculating piled raft foundations take into account the interaction of the raft, piles and soil. The mathematical model used research on the range of active stress zones in the determination of foundation settlements and a curve approximating the results of static tests of piles. They enable taking into account the actual load-settlement relations of the raft and piles, which makes the discussed model closer to the physical description.</p> <p>The developed mathematical model allows to determine the contact stresses under the foundation raft and the reaction of piles in the form of skin friction and base resistance.</p>
Novelty - Value / Relevance to ...	<p>Numerous methods used to analyse piled raft foundations have not taken into account the pile reaction under the raft in accordance with the curve approximating the results of the test static pile load and extrapolating them to the limit load capacity. The proposed mathematical model gains significant practical significance, in combination with the method of designing piles included in Eurocode 7 on the basis of results of static load tests and the observation method recommended during the realization of piled raft foundations.</p>
Forum statement	<p>It is possible to use the load-settlement curve from the static load test of the pile in the full range for practical purposes, to analyse the load-settlement curve of the pile occurring in the group of piles under the raft.</p>

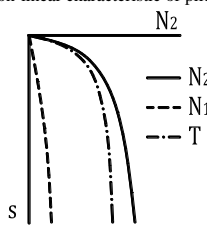
Keywords: (up to 5 keywords)

piled raft foundation, settlement, numerical model

Graphics: (please use the gray area bellow for representative graphics or graphical summary: select the gray area bellow and paste your graphics)



The result of the static pile test
non-linear characteristic of pile support



Symbols:

- q_0 - vertical foundation load
- q - raft-soil contact stresses
- N_2, \dots - force in the pile head
- N_1, \dots - pile base resistance / force in the pile base
- τ, \dots - pile skin friction / shear stresses at the pile shaft
- T, \dots - total pile skin friction
- s - settlement