

Analysing lateral movement with Alp

Analysing lateral movement in large diameter piles

Dr Naveen's work uses Oasys Alp software to address the gap in codes when seeking an understanding of how larger diameter piles (over 1m) will perform, and lays the foundations for building a knowledge bank of their limitations. The paper uses field data from an existing flyover in his home country of India: the bifurcated HSR flyover in Bangalore, India.

At present, IS (Indian Standard) Codes, voluntary international ASTM codes and Eurocodes only relate to small diameter piles (less than 1.0m diameter). It is Dr Naveen's hope that his research will act as a catalyst for the development of new codes for larger diameter piles.

Field tests were carried out. The bored cast-in situ pile considered in this study is 1m diameter (D), 17m length and M35 grade concrete. The site soil was composed of layers of sandy clay and soft-weathered rock. A hydraulic jack, fixed horizontally between a rigid wall and the top of the pile, was used to apply lateral loads (Pz), in stages, up to 120kN. A displacement of 4.12 mm was observed as against the permissible settlement of 12mm as per IS 2911 – Part – IV.

In the Alp model, the soil is composed of 2 layers namely sandy clay and soft-weathered rock (Figure 1 & 2). The curve obtained using Alp simulations is reasonably close to field test results, as shown in Figure 3.

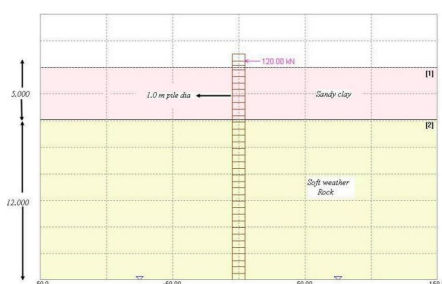


Figure 1

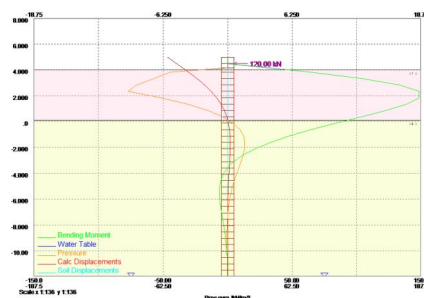


Figure 2

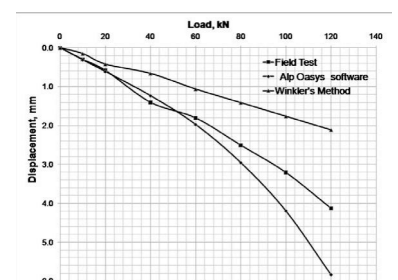


Figure 3

For comparison purposes, a calculation using an analytical solution (Winkler's method) is also shown. Due to the difficulty of carrying out large scale pile tests, understanding of local displacement relationships in large diameter piles is limited, Dr Naveen's study shows that Oasys Alp can achieve a reasonable estimate of potential pile displacement in the challenging circumstances.



Highly commended submission in the Geotechnical Academic category in the 2016 edition of the Oasys Project of the Year Competition.

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