VIIa 17

MOVEMENTS OF A DRIVEN-IN PILE WHEN NEW PILES ARE BEING DRIVEN IN.

(WORKING OF PILE-GROUPS)

DR. L. BENDEL - ING.
Privatdozent, Ecole Polytechnique de l'université de Lausanne

1) The kind of pile

The observations were carried out on concrete piles, 14 metres long. The diameter of the piles amounted to 50 cm.

2) Geological formation of the ground

The geoligical formation of the ground is shown by Fig. 1. x)

3) Measurement of the movement of the driven - in pile

The movements of the driven - in piles were determined by a measuring-drum (cylinder). The increase amounted to 1 : 10. The measuring-curves are shown on Figure 2. From Fig.2 it appears:

When, at a distance of 2 to 5 metres from the former driven- in concrete pile Nr. "A" new concrete corner piles Nr. "B.C.D." (Cf. Fig. 2) were driven in, the old concrete pile (A) raised itself at first. Afterwards it relatively firmly settled.

All values moved round a pile - sinking curve s_1 -----s_2. The curve S_1-----S_2 means a time - settling curve with a constant weight P of P = 80 ton.

4) Theoretical calculation of pile-settling

The equation for the time settling curve is as follows:

$$s = T_o \log\left(\frac{t_o + t}{t_o}\right) = 16{,}0 \log\left(\frac{t + 0{,}75}{0{,}75}\right) \qquad (1)$$

s = settling in mm after t days with a pile weight of P = 80 ton.

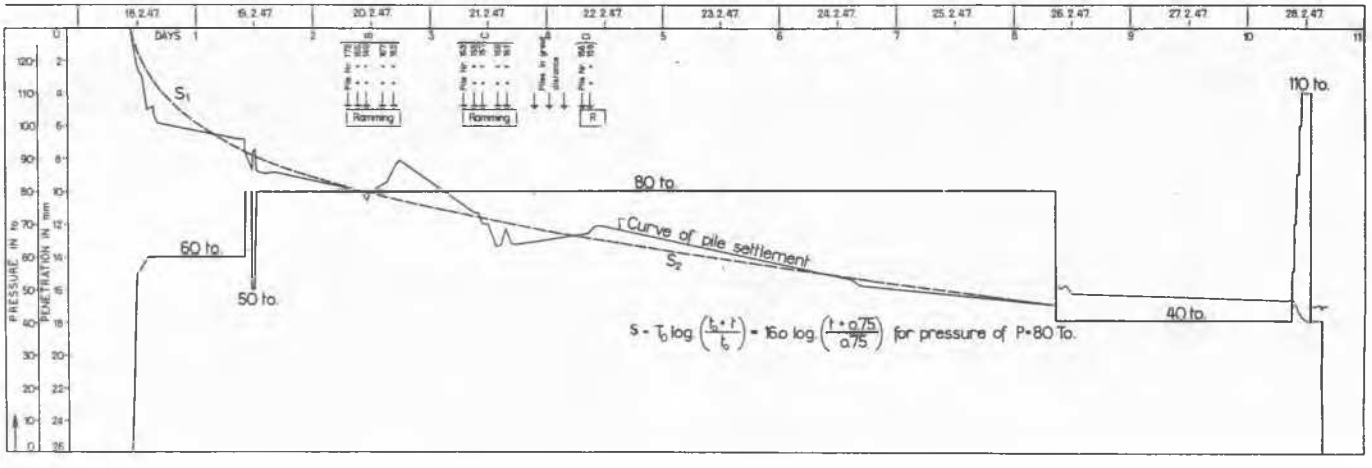
$$\log \frac{t_o + t}{t_o}$$

5) Comparison between the theoretically calculated pile settling and the measured settling.

Days	Calculated settling s from Formula $s = T_o \log\left(\frac{t_o + t}{t_o}\right)$	Settling with trial arrangement
1	5,8 mm	5,8 mm
2	9,2 mm	9,2 mm
3	10,2 mm	11,1 mm
4	12,8 mm	12,5 mm
5	13,9 mm	13,7 mm
6	15,1 mm	14,8 mm
7	16,2 mm	15,8 mm
8	17,0 mm	16,8 mm
9	17,8 mm	17,6 mm

6) Inference

a) The theoretically calculated settling agrees quite well with amount settling measured at the trial.



Movements of a driven - in pile, when new piles are being driven in.

FIG. 2

b) The formula (1) is identical with the time settling curve deduced by the author (page 688 and page 486 in Bendel: Engineering - Geology; Vol. I, 1944)

$$\text{for } s = T' + T \log\left(\frac{t_o + t}{t_o}\right) = T_o \log \frac{t_o + t}{t_o}$$

x) in comparison between the penetration-curve of the sounding-needle before and after the placing into position a pile.

-o-o-o-o-o-o-