Activity

The main activity of Foundation Division focus on problems of deep foundation works for road structure, bridges and industrial structures, especially on piling foundation, deep excavation protection as well as using of specialised technique.

The range of activity consist of:
- development and implementation works in the field of deep foundation concerning technology and design,
- elaboration of technical approval technical specifications and quality certificate,
- the study and design works concerning foundation of big structures and high level of unit loads in complicated soil conditions,
- opinion, expert's report, consulting.

One of the technique developed in the section is pile base grouting method based on simple and inexpensive solution. The base grouting causes that the pile base resistance is mobilised at small settlement, almost simultaneously with the shaft resistance. The difference in behaviour of piles with grouted and none grouted base is shown in fig.1.

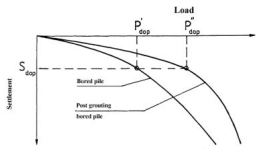

Fig. 1. Performance of bored piles with and without grouted base

The change in pile behaviour due to pregrouting enables use of higher design loads. The grouting installations, shown in fig. 2, without a cell proved to be simple and it does not complicate a pile construction. The vertical grouting tubes are assembled with the reinforcement

cage. The horizontal section of the tube is covered by a plastic membrane, fastened at the end of cage. Than it separates the tube with sleeves from the concrete. The grouting may be done any time after concreting of the pile. It can be repeated up to obtain given pressure of grouting.

That method now is widely used in Poland. Over 4000 piles ware executed with the installation. More significant structures are following: Świętokrzyski Bridge in Warsaw,

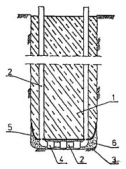

Fig. 2. Scheme of base grouting installation: 1 - pile concrete, 2 - grouting tube, 3 - hole bottom, 4 - rubber sleeve, 5 - plastic membrane, 6 - grout

Warsaw Trade Tower, Siekierkowski Bridge in Warsaw, Tunnel under Railway in Białystok, Hotel Hyatt in Warsaw, 40-stories building in Warsaw – unique sample of use of the barrette piles base grouting – fig. 3.

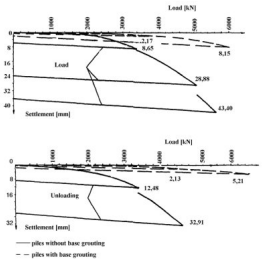

Fig. 3. The installation for grouting the barrette of rectangular cross-section 2.5x0,.8m

More than 100 pregrouted piles have been tested. Their results have shown that pile settlements at higher loads are reduced by 30 to 50% and even more. En example of pile test

result without and with post grouting is shown fig. 4.

Fig. 4. Results of loading tests of base grouted and non-grouted piles 1.5m dia. in a bridge foundation

Based in test results and analyse of pile behaviour the proposition of calculations method of pile capacity was in elaborated. The proposition gives the values of technological coefficients which are enable to calculate the pile capacity according to Polish Code PN-83/B-02482.

The study and design foundation works for big structure settled in complicated soil conditions are important part of activity. An alternative design of piling was elaborated for Świętokrzyski Bridge the foundation of pylon pier 90 m high. It is an example of economic and technical advantages causes by use of grouted base for 44 piles 1500 mm dia enabling redaction length of each pile from 39 to 31 m.

Another unique solution is a geotechnical study and static calculations for Pątnów II Power Plant. The piled raft foundation were elaborated for main building of huge boiler of 1160 MN vertical load. The 148 CFA piles were installed of min. capacity 3800 kN. The piled raft foundation is very unique solution. In another case the 8-stories building in Warsaw were settled on piled raft foundation. The upper layer of soil up to 6 m b.g.l. is consist of sand and fine sand but beneath to 25 m b.g.l. there is a very soft soil – gyytia and peat. It were design piled raft

foundation with CFA pile 600 mm dia length – 27 m. The settlement observation during 3 years after building completion gives the satisfactory results.

Staff ** **

Structure of Division

Pile Testing Field Laboratory
Foundation Section