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Mini Review

Approach to Increasing the Carrying Capacity of the Pile Base

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Introduction

The problem of increasing a foundation bearing capacity is always an urgent problem in geotechnical construction. With increased loads on the base, the use of traditional technologies is not always justified. It is necessary to use non-traditional bases strengthening methods. Most often, the situation is aggravated by the presence of weak underlying layers with unstable physical and mechanical characteristics in the engineering-geological sections. When reinforcing such bases with the help of traditional piles, they can get negative friction, reducing their bearing capacity by the ground. This article presents a developed algorithm for the construction of combined soil-concrete bored piles with simultaneous fixing of weak engineering and geological elements. At the same time, in areas with weak layers along the length of the piles, the developed geotechnical technology makes it possible to arrange broadenings obtained from the joint use of get-technology for the construction of soil-cement piles and the electric-discharge technology of bored electric discharge piles. The final result of the new technology is a soil-concrete pile with multi-seat broadenings, and which has an increased bearing capacity by the soil. In addition, in addition to the construction of deep reinforced concrete structures, in the presence of layers with reduced values of strength and increased deformation characteristics requires a special approach. Modern geotechnical construction in its arsenal has the methods and technologies to solve these complex problems. The use of advanced computer programs allows the development of geotechnical objects of any complexity. In order to identify the most acceptable geotechnical technology, the interactive design method must be used. This is "a developed project - an experimental site - a real project." At the same time, this type of design should be multivariate using various geotechnical technologies and deep geotechnical reinforced concrete structures. Any stage in design must be economically sound and technically feasible. Often you have to deal with the geological conditions of construction sites, in the engineering and geological incisions of which there are overlapping layers with weak physical and mechanical indicators. The presence of such IEEs significantly reduces the carrying capacity of any piles on the ground, and sometimes leads to negative (negative) friction due to the overhang of the ground on the piles. It is known that foundations using drill-injecting piles have a number of competitive technical advantages over other foundations using other types of drilling piles. One of the distinctive parameters of some drilling piles from others is the technological possibility of including them in joint work with the surrounding soil. 1.1÷1.3 (see table 7.6 pose 8 JV 24.13330.2011. Updated edition of SNIP 2.02.03-85 "Pile Foundations"). Thanks to the above, the increase in carrier capacity under the lower end of the piles can be 1.3 times or more, and on the side surface - exceed 1.1/0.5 ÷ 1.3/0.5 q 2.2÷2.6 times. In the event of a certain incomparability of Fdburrmule (7.11) CE 24.13330-2011, on 14.13330-2011, on 1999, the definition of R and f are determined on the basis of 7.3 and 7.8 CE 24.13330-2011. In the table. 7.3 CE 24.13330-2011 for the presentation of inland populations for railing of populations I LL and IL f, ba in table. 7.8 CE 24.13330 2011 - then it is for R. For clarity, Veliing R / f = f (h) 1. Analyzing the table. 1 (see columns 4, 7, 13, 16) immediately catches the eye that the values of the R/f ratio change significantly. 13,553,2. This suggests that, with the help of special geotechnical

measures, areas with weak layers can be replaced with a denser ground-cement structure called an intermediate support or a back-to-air. At the same time, the size of the replacements expansions under the proposed geotechnical technology far exceeds the geometric dimensions of the expansions, In this case, in these areas with weak physicality co-mechanical indicators, the carrying capacity of the pile on the ground increases many Rd times. The author of this article has a lot of experience in the device of drills with intermediate supports. These are piles made by electrical discharge technology. With the help of electrohydraulic treatment of the ground of the walls of wells, it is possible to seal the sealed walls of drilling wells in the environment of fine-grained concrete over the river. As a result of this process, piles of ERT piles in the cross section in addition to the reinforced concrete section of the pile image are covered:

1) cement zone.

2) Seal area.

(Table 1)

Table 1: Dependencies R / f = f (h) for various values of IL.

	I_L-0.2			I_L-0.3			I_L-0.4			I_L-0.5			I_L-0.6		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
h,	R, kPa	f, kPa	R/f	R, kPa	f, kPa	R/f	R, kPa	f, kPa	R/f	R, kPa	f, kPa	R/f	R, kPa	f, kPa	R/f
3	650	48	13,5	500	35	14,2	400	25	16,0	300	20	15,0	250	14	17,9
5	750	56	13,7	650	40	16,3	500	29	17,2	400	24	16,7	350	17	20,6
7	850	60	14,2	750	43	17,4	600	32	18,8	500	25	20,0	450	19	23,7
10	1050	65	16,2	950	46	20,7	800	34	23,5	700	27	25,9	600	19	31,6
12	1250	68	18,4	1100	48	22,9	950	36	26,4	800	28	28,6	700	19	36,5
15	1500	72	20,8	1300	51	25,5	1100	38	28,9	1000	28	35,7	800	20	40
18	1700	76	22,4	1500	53	28,3	1300	40	32,5	1150	29	39,7	950	20	47,5
20	1900	79	24,1	1650	56	29,5	1450	41	25,4	1250	30	41,7	1050	20	52,5
30	2600	81	32,0	2300	61	37,7	2000	44	44,0	-	-	-	-	-	-
≥40	3500	93	37,6	3000	66	45,4	2500	47	53,2	-	-	-	-	-	-

We have also proposed strengthening the weak bases on the technology proposed in the "14" which is a synthesis of 3 geotechnical technologies:

1. Get-technology - the device of primer piles according to "JV 291.1325800.2017 Designs primed reinforced. Design rules. Moscow. 2017».

2. SFA technology is a device of drill-injecting piles with the help of continuous passing screws (NPS) in the body of a primer array along its axis of symmetry.

3. The discharge-pulse technology of the driller pile device. The electro-hydraulic effect, which occurs when processing fine-grained concrete, contributes to the introduction of it into the soiling array. This creates a more complete grip on these two design elements. 1 is a diagram of the device of the combined ground-concrete piles (Figure 1).

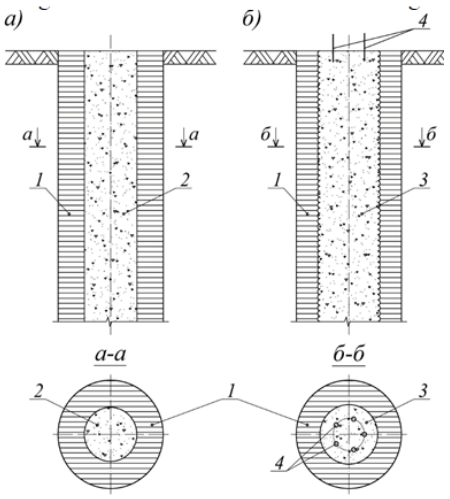

Figure 1: Combined soil-concrete pile.
1-prime pile, 2-finelygrainy concrete in the body of the primer cement pile, 3-armerannaya brown-injectable pile ERT, and - cross-section of primer cement pile; b-b - cross-section of ground-concrete piles.

Deep reinforced concrete structure - ground-concrete pile (GWS) brought on rice. 1 b unlike other types has a complex cross-section design. The carrier is an electro hydraulically processed and reinforced SFA pile (POS) (pos. 3). The algorithm of the GBS device can easily be applied to the device of a dirt concrete piles with multi-local ears, as in a case of iron 2. (Figure 2).

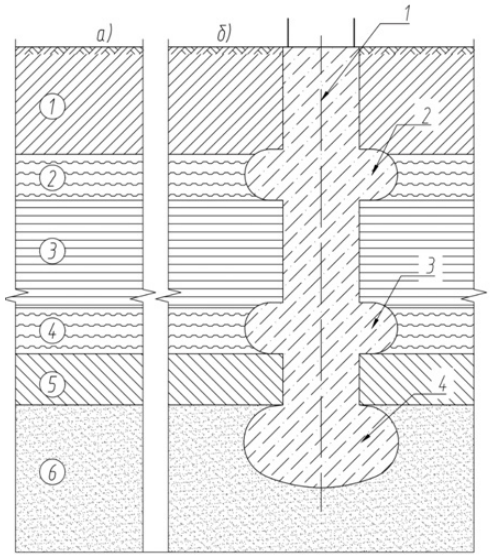

Figure 2: Inset in the engineerno-geological incision of the drilling ground-concrete piles with multi-local ears. (1) - (6) - engineering-geological elements (IGE); (2), (4) - weak IHE; 1 - reinforced concrete trunk piles; 2, 3, 4 - broadening (glides).

In this Figure 2, the sinking's (under-heels) are arranged in IGE with weak physical and mechanical characteristics. Thus, we get a completely new geotechnical deep concrete structure, derived from the synthesis of two geotechnical technologies:

1. get-technology device cement piles;

2. Electro-discharge technology of the device of drill-injecting piles ERT.

At the same time, the newly created construction structure contributes to the achievement of increased values of the carrier capacity of the ground base.

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Conflict of Interest

No conflict of interest.

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