Construction of the cast-in-place piles by means of the UVG-I installation is carried out in conformity with the technical scheme shown in Fig. 1.

The UVG-I installation underwent factory tests, during which techniques were improved and the operations to be performed were subjected to time studies.

The method proposed by the writers for development of a cast-in-place pile construction technique and the technical scheme presented in this article, which is based on use of the UVG-I installation, were successfully introduced for construction of the projects of the Karaganda Metallurgic Combine. The results attest the high effectiveness of the proposed method for construction on weak saturated soils, which permits recommending its large-scale application.

LITERATURE CITED

FROM THE EXPERIENCE OF CONSTRUCTION ORGANIZATIONS
DEFORMATIONS OF BASES OF ANNULAR FOUNDATIONS

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The Fundamentproekt Institute, the Scientific-Research Institute of Bases and Underground Structures, and the Teploproekt Institute carried out under the direction of K. E. Egorov observations on settlements of various structures built on annular foundations, from which it was found that for low-compressibility soils the design settlements differ little from the measured settlements. For medium- and high-compressibility soils having a modulus of deformation E < 10 MPa, the difference increases to 150-180% [1-4]. To improve the methods of analysis of settlement of annular foundations on heavily compressible soils under complex engineering-geologic conditions it is necessary to gather further results of observations on the process of development of deformations in their bases. In this connection, the writers carried out experimental investigations on the development of deformations in the bases of test foundations having equal underside areas — one of them being circular and three being annular. The geometric parameters of the foundations are presented in Table 1.

The tests were performed on a 1.4-m-deep trench below whose bottom there were a 0.8-m-thick loesslike loam layer, a 2-m-thick loess layer (first horizon), a 2-m-thick loesslike loam layer, and below them a second loess horizon (Table 2). From the exploration results, the loess mass was classed under Type I collapsibility.

The soil layer deformations were determined from the displacements of deep marks placed in the circular foundation base along the central vertical axis, and in the annular foundation bases along the central vertical axis or along the annular strip axis. In the tests, use was made of deep magnetic marks [5] placed in a hole at 10-20-cm spacings to a depth of 1.8-2.5 m. The mark displacements and foundation settlements were measured by an instrument equipped with a flexible measuring band having a gercon gauge, from datum marks placed to a depth exceeding the deformation zone depth [6, 7]. The readings were accurate to 0.1 mm. During the measurements, the instrument was secured to a mounting table rigidly fixed to the test foundation. The method applied made it possible to eliminate external mark systems. For processing of the observation results, the final values of the displacements of the deep marks and the settlements of the test foundations were taken with an accuracy of ± 0.5 mm, considering the errors caused by small settlement unevenness.

The lower limit of the deformation zone was determined by extrapolation of a portion of the graph from the results of the displacements of the two lower marks undergoing movement. In all the tests, below the deformation zone 3-5 marks were not moved.

The investigations were carried out by the method of long-term statistical tests under continuous wetting of the soil base.

During the tests, the degree of saturation to a depth of 1.5 m varied in the range 0.75-0.78. The load was applied in 40 kN increments by means of 20 kN cast-iron weights. Each loading increment was maintained until stabilization occurred, the conditional stabilization value being assumed to correspond to a settlement increase of 0.1 mm per day. The pressure on the circular foundation underside has brought up to 0.266 MPa, and in the annular foundations it was brought up to 0.306 MPa.

Other conditions being equal (test foundation underside area, loads, site lithologic morphology), the deformation zone depth and the settlement depend on the geometric parameters of the annular foundations. As the diameter increases, the ring width decreases, and the ratio of the internal radius $r_1$ to the external $r_2$ increases accordingly (see Table 1). The coefficient of continuity of the foundation load transmission, which is the ratio of the foundation underside area to the total area occupied by the foundation (area of foundation underside plus area of internal unloaded part of the soil base), is reduced (see Table 1). The above-mentioned factors affect the development of deformations in the soil bases of the foundations.

Figures 1 and 2 present diagrams of soil layer displacements along axes of the foundations (section I) and of the ring strips (section II). The maximum values of the deformation zone depth and of the settlement are obtained in the soil base of the circular solid foundation, and the minimum are obtained in the annular foundation with a radius ratio equal to 0.66 and an unloaded portion diameter of 1 m (Figs. 1 and 3). In this test, with a pressure of 0.306 MPa, the layer displacements increased beneath the ring strip underside (Fig. 1b).

![Diagram](image)

Fig. 1. Arrangement of deep magnetic marks and diagrams of soil layer displacements along axes in soil bases of foundations. a) Circular foundation (test No. 1); b) annular foundation (test No. 4), for indicated pressures: 1) 0.126 MPa; 2) 0.166; 3) 0.206; 4) 0.266; 5) 0.303 MPa; 6) deep marks.