

## FEATURES FASTENING OF PIT SLOPES DEPENDING ON SOIL CONDITIONS

**Sverdlenko A.L.**, *student of gr. PCB-619M(s)*

**Bondarenko Yu.Yu.**, *student of gr. PCB-266*

*Scientific adviser – Karpiuk I.A., PhD, Associate Professor (Chair of Bases and Foundations, Odessa State Academy of Civil Engineering and Architecture)*

**Abstract.** In this article, we will consider the features of the use of the method of anchoring the slopes of the pit, their effectiveness, as well as the relevance of this method for constructing the pit.

Anchor systems are a progressive and effective way to increase the bearing capacity of weak subsoil and to strengthen large earth and building structures. The advanced technology of anchor installation allows using modern drilling equipment and, in the shortest possible time, creating reliable reinforcing structures that can serve for decades. Anchors (micro piles of the drill-injection type) were introduced in Europe after the end of World War II and were widely used to restore the foundations of old buildings and transport facilities damaged during the hostilities. At the end of the 20th century, the versatility of anchor systems made them one of the most popular solutions in a wide variety of construction areas.

The main task of anchor fasteners is to transfer the pulling force from the construction site to the soil layer. An additional "side effect" of using the anchor system is the reliable reinforcement of the soil base. The main areas of application of anchor elements: restoration of foundations and supporting structures; fixing the support of masts, towers, lighthouses, power transmission line supports, fences; strengthening of slopes, walls of pits and tunnels; fixation of gas and oil pipelines; let's dwell in more detail on the anchoring of the pit slopes.

The stability of the pit slopes is the main safety criterion during construction work. If the slopes of the pits experience movement, the structure may collapse, which will result in additional costs. Qualitatively carried out work to strengthen the slopes provides protection from groundwater, ground movements and other influences. Strengthening can be performed in various ways, using structures of any complexity.

Anchoring is a reliable way to strengthen the pit slopes, which is used instead of the spacer system. Loads are transferred to the bearing layers of the soil, which ensures the stability of the structures.

The depth of installation of anchors and their number is determined by the characteristics of the soil, the presence of groundwater and their level, as well as the method of fastening. The fastening process takes place with the help of grooved walls, anchor plates, in some cases, fastening is carried out for injection anchors. The use of anchoring makes it possible to carry out work in the pit without restrictions. The development of the pit can be carried out along its entire perimeter, while the sequence of construction of various monolithic structures during new construction is excluded. An anchorage is a ground anchor that includes three main elements: a head, an anchor rod and a root. The head transmits the load from the soil or the fastened element to the anchor rod, which, in turn, transfers the load from the head to the root or embedment, and this part of the anchor transmits the load from the rod to the ground.

According to the method of the device, anchors are: boring, screwed, crushed, driven and combined. Usually, drill anchors are used to enclose the pit. So that the anchorage, which has already been installed, could not interfere with subsequent work, it can be made removable. Currently, there are a sufficient number of developments of different types of such structures. For example, it can be anchoring with breakable ropes, fastenings using a reinforcing bar of a wine profile, unscrewed from the root part. Anchoring, as a system for transferring loads from the structure to be anchored to the bearing layers of soil, refers to the fencing of excavations and is used as an alternative to the spacer system. This method of fastening is allowed to be used in different soils, with the exception of only swelling soils, subsiding and highly compressible rocks: peat, silt, clay, as well as soils that have a fluid consistency.

The **ground anchor** has a long service life, ease of use and affordable cost. These fasteners are used in large and deep pits.

**Strengthening the walls of the pit with sheet piles with anchors** or dowels is much more reliable (Fig. 1). In this case, the pulling load from the soil mass is taken over by steel rods (anchors or pins). Fastening the pit with dowels is a little more laborious and only slightly more complicated than arranging spacers. When using it: operational space is provided; labor and material resources are saved; labor productivity increases; the construction period is reduced.

**The bolt-on fastening of the pit walls is made in this way:** wells are drilled in the walls of the excavation; deepening of anchor anchors; traction is fixed and fixed on the tongue (Fig. 2).



Fig. 1. Reinforcement of the pit walls with sheet piles with anchors.

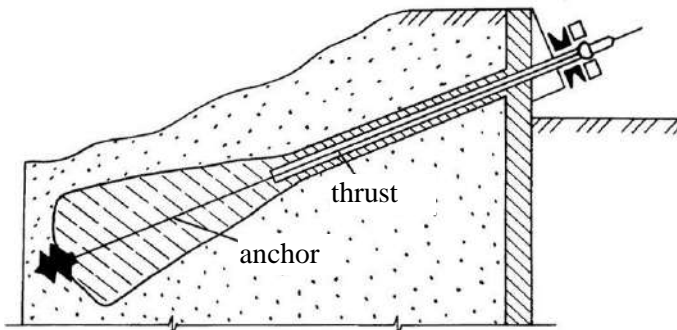


Fig. 2. Dowel fastening of the pit walls.

**Conclusions.** The method of anchoring the pit slopes is one of the most progressive and effective methods for constructing foundation pits. This method of the device allows you to provide operational space, saves labor and material resources, increases labor productivity, reduces the construction period, and also has a long service life and affordable cost.