

immersed by driving is larger than the compaction zone of piles immersed by indentation, moreover, this pattern is better seen in soils with higher humidity, and in those experiments where cohesive soils served as the basis.

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STABILITY OF PROTECTIVE WALLS

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Abstract: The article discusses the design options for retaining walls that are used to strengthen the soil mass.

Relevance. In the process of their activity, builders often encounter a situation when the soil mass cannot be kept in equilibrium by itself. At this point, there is a need to create soil reinforcements.

This problem arises during construction in areas with a natural or artificial slope, with a complex and diverse relief, if necessary, the construction of buildings and structures towering above the terrain, as well

as during the construction of transport structures both in excavations and in embankments, and strengthening the walls of excavations. The problem is solved using retaining walls and sheet piling of various designs. Recently, new types of retaining walls have appeared, are distinguished by significantly lower material consumption, as well as the use of new synthetic materials. For this reason, the expansion and improvement of the existing classification of retaining walls is an important task.

Materials and methods.

A retaining wall is a structure that keeps the soil from collapsing in the slopes of embankments and excavations.

The face of the wall facing the backfill is called the back, and the face facing the opposite side is called the front.

The following forms of the free surface of the soil behind the retaining wall are distinguished: horizontal; the slope that rises; falling slope; broken, not planned.

The classification of retaining walls can be carried out according to various criteria.

By appointment. According to this classification, it is very difficult to separate, since retaining walls are currently finding extremely large and varied applications in construction. However, retaining walls can still be divided into walls supporting the embankment and walls protecting the notches.

By the nature of the work, retaining walls are distinguished: stand-alone and associated with adjacent structures. In addition, it is necessary to distinguish retaining walls that are not amenable to water pressure, and hydraulic.

The height of the retaining walls is divided into low – up to 10 m high, medium – from 10 to 20 m high and high – more than 20 m high.

Based on the materials, retaining walls can be made of reinforced concrete, concrete, rubble concrete, rubble or brickwork, various wooden or metal structures. Recently, especially in foreign construction practice, retaining walls with the use of modern synthetic materials are increasingly being used.

According to the principle of operation, the following types of retaining walls are distinguished:

Gravity retaining walls, which in turn can be divided into massive, semi-massive, fine-grained and soil filling.

Massive retaining walls, the stability of which is ensured mainly by their own weight and the material (concrete, rubble or masonry) experiences mainly compressive forces. Depending on the inclination of the rear face, it is possible to divide the retaining walls into steep, gentle and recumbent.

Depending on the cross-sectional shape, they are rectangular, trapezoidal with an inclined rear and / or front edge, inclined towards the backfill, with a stepped rear edge, with an unloading platform, etc.

Semi-massive retaining walls, the stability of which is ensured by both the own weight of the wall and the weight of the soil lying on the foundation plate. Such walls are usually a reinforced concrete structure in which tensile forces are absorbed by steel reinforcement.

Ground filling retaining walls consist of various types of structures filled with soil. These can be hollow structures that are installed in one, two or more tiers and are filled with soil. This should also include through structures made of prefabricated reinforced concrete blocks or metal profiled sheets. A widespread option of soil-retaining retaining walls are gabion walls of various designs.

Thin elements (angular type) retaining walls, usually consist of front and base plates rigidly connected to each other. The stability of this type of wall is ensured mainly by the weight of the soil above the foundation slab and only to a small extent by its own weight. They are most widely used in construction. Such walls can be made with unloading platforms, foundation slabs can be made horizontal, to increase shear resistance - inclined and with a spike.

By design, angular retaining walls can be made monolithic, precast-monolithic, as well as prefabricated. Prefabricated corner retaining walls can be manufactured in the factory – in serial and high quality. Prefabricated corner retaining walls save construction time, improve product quality and control. Their advantages are: low material consumption; high resistance to loads; corrosion resistance from exposure to water and soil, weathering, sediment; permeability and porosity of structures, which provides drainage backfill; the flexibility that allows this structure to absorb sediment without destroying the structure.

It is advisable to carry out soil-filled retaining walls Biopositive, fill their front surface with plant soil, followed by planting and planting. The stability of the structure is ensured by: a) its own weight; b) own weight and anchoring to reinforced soil backfill.

The buttress retaining walls consist of foundation and front structures, to increase the stiffness between which buttresses or transverse ribs are arranged.

Retaining walls on a pile foundation, in contrast to walls on a natural base, are built on piles. They are mainly used for insufficient soil strength under the sole of the retaining wall. Loads are transferred by piles to deep, durable soil layers. There are various options for the construction of pile

foundations, differing in the type of piles used, their relative position and construction technologies.

Retaining walls from piles is retaining structures made of piles of various types and technologies of construction, which can be located in one or more rows. It is advisable to combine the rows of piles with a common grillage.

Retaining walls made of reinforced soil. These are retaining walls with front elements in the form of small prefabricated slabs or shells made of metal, reinforced concrete, concrete, plastics and anchored into bulk soil with layer-by-layer compaction using flexible strip anchors, nets or solid membranes. Although they received the name of reinforced soil structures, it would be more correct to say that they are walls using reinforced soil and prefabricated personal slabs.

Thin (cantilever) retaining walls, the stability of which is ensured by pinching them into the base. This type includes sheet piling retaining walls, as well as composite ones using the “wall in soil” method. To reduce the depth of such walls, the dimensions of their intersection, as well as to increase their rigidity, soil anchors of various designs or reinforcement of backfill soil are used, which reduces the lateral pressure of the soil on the wall.

Pile and anchor construction. The structure is formed of vertical reinforced concrete bored piles, which consist of at least two parallel rows of piles on the side of the mountains and staggered in plan.

The grillages of the lower row of piles are obliquely connected by means of anchor rods with piles of the upper row; as a result, a complex structure is formed with rigid piles and flexible reinforced concrete anchor rods.

Conclusions:

The proposed options for the type and design of retaining walls can be used to strengthen soil massifs, depending on the actual conditions of construction and operation of artificial structures for various purposes.

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