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CONTENT

SECTION: ARCHITECTURE AND CONSTRUCTION

CONSTRUCTION OF A BOMB STORAGE ON THE TERRITORY OF THE SCHOOL UNDER DIFFICULT CONDITIONS IN THE CONDITIONS OF WAR

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Relevance of the construction: In the modern conditions of Russian aggression, bomb shelters are important elements of civil defense, especially in educational institutions where children are located. The creation of an underground shelter on the school territory will ensure the safety of students and staff in case of air attacks.

For the construction of an underground bomb shelter, there was a need to lower the level of groundwater, since its high level could interfere with construction work and create a risk for the stability of the structure.

а) б)

Figure 1. pumping station (a) and equipped needle filters along the construction perimeter (b).

Figure 2. Construction of a bomb shelter in the Dnipropetrovsk region

The horizontal level of the river is at a height of 52 meters, the bottom of the pit is 51 meters above the level of the Baltic Sea.

Drilling wells around the perimeter of the pit made it possible to effectively equip a system for pumping out groundwater using needle filters. Needle filters with a length of 7 meters were used, which provided a local decrease in the water level by 6 meters (Fig. 3).

Figure 3. Part of the needle filter.

Vertical drainage ensures lowering of the groundwater level with the help of water-reducing wells, pumping with pumps.

The most widespread method of water reduction is a system of needle filters made of thin metal pipes, which are immersed around the pit or along a line perpendicular to the flow of groundwater. The lower ends of the pipes are equipped with filters, and the upper ends are connected to the suction manifold. A light needle filter device lowers the groundwater level by 4.5 - 5 m [1-2].

If the distance between the wells is less than two depression radii, then such wells interact when water is pumped out simultaneously. This leads to the closing of the depression curves, the formation of a general zone of lowering of the groundwater level (Fig. 4).

The total flow rate of interacting wells at the same level of decline is always less than the sum of the flow rates of individual wells. The decrease in the flow rate of interacting wells is caused by the fact that in each of them, when water is pumped out simultaneously, the general level of groundwater decreases.

The intensity of the interaction of water intake wells depends on the distance between them, the parameters of the aquifer, the flow rate of an individual well, etc. The closer the wells are located, the greater the interaction effect, that is, the more the groundwater level decreases.

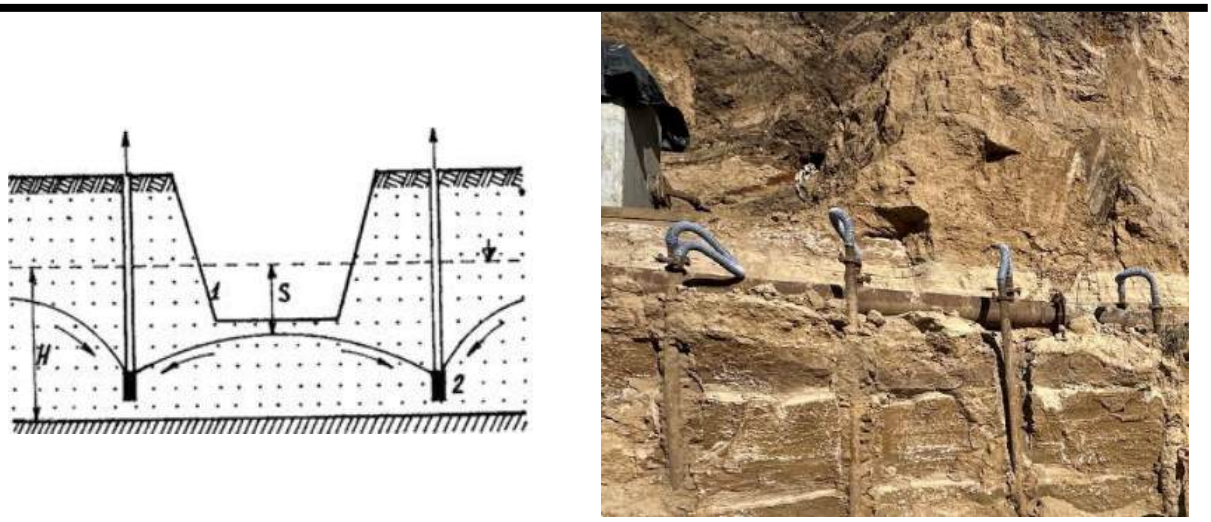

Figure 4. Drainage of the construction pit with needle filters:
1 – construction pit; 2 - needle filters.

Vacuum pumping stations, which work around the clock, have been installed to maintain a stable water level and prevent soil flooding, which allows maintaining optimal conditions for construction.

The local lowering of the groundwater level was carried out by 6 meters. Needle filters with a top at a height of 53 meters and a depth of 7 meters, which were installed to pump out water.

It is important to constantly monitor the level of groundwater and maintain the dryness of the soil in order to prevent subsidence or destruction of the foundation of the structure.

The horizontal level of the river was 52 meters, while the bottom of the pit was at a height of 51 m above the level of the Baltic Sea.

Lowering the groundwater level has become a key task for preparing the construction site and will ensure the reliability of the future bomb shelter.

The drainage system is critical to ensure soil dryness during construction. Without proper groundwater pumping, construction could be significantly more complicated due to the risks of flooding.

To protect the foundation from moisture, a Sweetondale waterproofing film was applied to the bottom of the pit.

The foundation is insulated with a bitumen-rubber primer from the Sferaizol company, which provides long-term protection of the building from moisture (Fig. 5).

Conclusions: An effective solution to the problem of groundwater made it possible to create a reliable foundation for the bomb shelter.

The use of modern waterproofing materials and pumping equipment provided a reliable basis for construction in conditions of high groundwater.

The project serves as an example of how technical solutions can improve the safety of buildings even in difficult hydrogeological conditions.

The construction of a bomb shelter will not only contribute to the protection of students, but can also become an important part of the security infrastructure for all residents of the district. Ensuring the safety of students during wartime is a priority.

The construction of a bomb shelter not only protects life, but also allows the educational process to continue under martial law.

Figure 5. Bitumen-rubber primer and waterproofing film.

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