REINFORCEMENT OF FOUNDATION IN CRAMPED SETTINGS

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According to the analysis, deformations haven’t stopped in most buildings even after repairs or strengthening of above-ground structures, leading to partial or complete destruction [1].

When buildings and structures are erected in cramped settings, attention is not always paid to the features of the territory on which they are located.

Negative factors such as cracks in load-bearing walls, foundations, ceilings, deformation of bases and foundations next to located structures, rise in the level of groundwater, etc. may arise due to insufficient practical experience in the construction of buildings in cramped settings. Additional settlement (sometimes cracks, tilting and distortions) appear more strongly in the part of the existing house that is near the new one.

The lack of established technologies for the construction of buildings in the conditions of dense urban development, insufficient practical experience of construction organizations which have to carry out a complex of difficult works are the causes of deformation of buildings, and in some cases lead to destruction, causing considerable damage.

During construction in dense conditions, it is necessary to ensure not only the preservation of buildings, structures, monuments of architecture and history located nearby, but also to ensure normal living and working conditions for residents in nearby buildings.

Areas with historical dense buildings and complex engineering and geological conditions deserve special attention. More than 80% of the territory of Ukraine, where the construction and operation of facilities takes place, is prone to difficult engineering and geological conditions. These are houses and structures, the foundations of which are made up of weak and sinking soils, located on alluvial areas, slopes with a risk of landslides, karst formations, areas above mining operations, etc. [2]

The choice of technology for strengthening the bases and foundations depends on the category of the building’s condition, as well as the risk category of the intended conservation, restoration or reconstruction works. Reconstruction may be associated with increased loads on existing foundations due to additions, replacement of wooden floors with reinforced concrete, changes in technology, etc.
The main factors when choosing a strengthen technology are factors related to the structural features of the building, the condition of the soil and the capabilities of the organizations that fume the work. Using equipment developed today, it is possible to fume work on strengthening foundations and foundations technologically quickly, reliably, with minimal use of manual labor [3].

Analysis of the experience of building houses in cramped settings in Ukraine makes it possible to single out the main reasons that lead to deformations of foundations and foundations witch located next to buildings, namely [4]:

- dynamic effects on neighboring houses during the driving of piles, sheet piles or other mechanized works;
- realization of drainage works;
- construction of buildings and extensions without appropriate technical measures;
- implementation of inefficient methods of strengthening foundations and bases.

The substantiation of rational decisions regarding the erection of structures of the underground part should be based on a comprehensive analysis of the features of the construction site, volume-planning and constructive decision of nearby buildings. On the basis of the conducted research, the following group of factors can be singled out, which must be taken into account during the design and construction of the houses located next to them:

1) the presence of weak and unevenly compacted soils on the site;
2) the presence of a high level of groundwater;
3) soils on the site may be in a water-saturated and plastic state;
4) old houses located next to each other usually have foundations of shallow laying on a natural basis - bulk highly compressible water-saturated soils that can compact or lose stability under dynamic influences;
5) the deepening of the foundations for new houses is mostly greater than in existing houses, which can lead to the development of suffusion from under the soles of the foundations of adjacent houses;
6) new buildings, mainly of high storeys, significantly load neighboring areas - significant joint settlement of the base and foundations of adjacent buildings is possible.

Nowadays it is important to take into account a number of factors that can cause damage to buildings that are located nearby when building is carrying out in cramped settings. Special attention should be paid to the foundations of these structures and to strengthen and reinforce them, if it’s necessary, to avoid deformations and destruction.

References: