Spectrum Journal of Innovation, Reforms and Development
Volume 22, December, 2023 | ISSN (E): 2751-1731
Website: www.sjird.journalspark.org

STRENGTHENING OF FOUNDATIONS AND FOUNDATIONS

Akhmedov Tolqin,
Mirzababaeva Saxiba Mirzaakbarovna,
Fergana Polytechnic Institute
s.mirzaboboeva@ferpi.uz (ORCID 0000-0002-6183-4688)

Abstract
The article analyzes the fact that the choice of method for strengthening foundations and foundations, the organization and technology of strengthening work largely depend on technology. Construction practice has proven that the service life of buildings and structures with sufficient maintenance during operation increases significantly and in many cases serves to prevent dangerous breakdowns and accidents. Cases of violation of the integrity of soils under existing foundations are discussed, as well as processes for stopping deformations of buildings and structures that are rapidly increasing over time.

Keywords: foundation, foundation, reconstruction, operation, reliability, technical inspection, strengthening, chemical hardening, physico-chemical hardening, thermal hardening, soil compactor, replacement of weakened soil.

Introduction

During the technical inspection of the constructions of buildings and structures, the actual dimensions, strength and amount of decay of the constructions are determined. In turn, this information is necessary for drawing up a project of strengthening, restoration and reconstruction of the building, and for determining the reasons for the collapse and breakdown of building structures. In the study of research works on the topic, scientific research works of several scientists were established [1-20].

The building and the equipment and communications located in it are under the influence of the external environment. In this case, the soil is affected by the load from the building and its thermal field. Breakdown of technological equipment in many cases causes changes and moistening of the hydrogeological environment of the construction site. If the level of underground water rises due to the uncontrolled flow of water, the strength and deformation characteristics of the soil will change. In this case, it is observed that depressions appear in the sinking soils, and bulges appear in the swelling soils. The process of withdrawing groundwater, which is carried out to ensure the operation of water supply or underground building floors, leads to their decrease. This can cause cracks to appear in the soil massif. In recent years, the number of karst cavities and pits has been increasing. These should be taken into account when designing works to increase the load-bearing capacity of the floors and reconstruct the foundations.

Methods:

The main purpose of strengthening foundations of buildings is to increase their load-bearing capacity by artificially strengthening them. For this, in construction practice, methods of silicification and electrosilication, thermal burning, laying of sand-gravel cushions under new foundations are used.

The need to increase the strength of the foundations of existing buildings and structures may arise for various reasons, which include:

- decrease in foundation strength during use;
- incorrect consideration of the properties of the foundation soil in the design;
- increased load on the foundation during reconstruction, construction and mining works near the building;
- the impact of dynamic effects, various emergency situations and other reasons.

The choice of the method of strengthening the foundation and foundations depends largely on the organization and the technology of the strengthening work**.**

The main reasons for strengthening the foundation and foundations:

1. Reconstruction of buildings and structures is often associated with an increase in loads affecting buildings. An increase in the impact load on the foundations and foundation soil occurs as a result of changes in the technological loads of the foundations, during the construction of superstructures, changes in structural solutions, and in a number of other cases that occur during reconstruction. As a result of the increase in soil pressure, the pressure at the bottom of the foundation exceeds the calculated resistance of the foundation, as well as the load-bearing capacity. Strengthening of the foundations is carried out if there is no reserve of the load-bearing capacity of the foundation soil or the strength of the foundation material.

2. Existence of high physical wear and tear in foundations as a result. The main causes of foundation damage are:

- corrosion of the foundation material under the influence of an aggressive environment;
- violation of the operating mode of technological equipment;
- dynamic effect of equipment,
- overloading of foundations,
- low-quality execution of the foundation.

During the wetting of the foundations under the influence of underground water, especially aggressive, active corrosion processes occur, and as a result, cracks, fractures, crushing, migration of the mixture at the seams, opening of the reinforcement and rapid corrosion appear in the foundation material. Also, it has a negative effect on the destruction of the foundations, the lack of ventilation and the entry of atmospheric rain water into the foundation, freezing and melting, respectively. Among all the disadvantages and damages, the most common is the low strength of the foundation concrete.

3. Decreasing the properties of the base soil due to moisture, dynamic and seismic effects, karst-suffusion events, leads to the formation of unacceptable subsidence and deformations in structures.

4. Construction of new buildings next to existing buildings and structures. Here's what happens:
- additional compaction of the base soil;
- the development of friction that adversely affects the piles;
- freezing of the ground under the foundation;
- washing of the soil from under the foundation;
- displacement of the dowel towards the trench;
- the rise of the soil towards the dug trench;
- from the dynamic effects of unbound soil.
sheet piling, crushing frozen soil or old foundations).
The heavier the building is and the closer it is to the existing building, the greater the compressibility of the soil, the greater the subsidence.

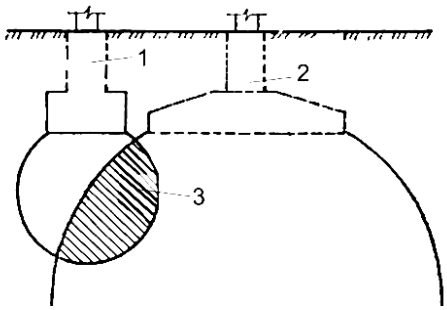


Figure 1 Additional compaction of the base soil. 1-existing foundation; 2 - new foundation; 3 - boundaries of the zones of compaction deformations of the foundation soil.

5. Mistakes made in engineering-geological research, design, construction and use of buildings.
Errors related to physico-mechanical and determination uncertainties during engineering-geological studies. Sometimes, engineering-geological studies are carried out long before the start of construction, and during this period, conditions can change significantly due to a number of reasons.
Errors in design occur due to improperly performed engineering-geological studies, non-observance of project rules in special construction conditions, and failure to fully take into account the influence of operational factors.
Errors during construction include various violations in the construction of the foundation:
- long-term non-operation of open trenches and as a result they are exposed to various effects (freezing, thawing, swelling, softening, etc.), which deteriorates the properties of soils;
- use of low grade concrete compared to the project;
- Arbitrary replacement of construction and materials;
- poor performance of joints and seams.
One of the main reasons for the appearance and development of impermissible deformations in the foundations is the change of the foundation and its properties, insufficient load-bearing capacity.
Strengthening the foundations of existing buildings is carried out in the following ways:
- chemical strengthening;
- physical and chemical strengthening;
- thermal strengthening;
- soil thickener;

- replacement of weakened soil;
- introduction of elements that are unique to the base.

Strengthening the foundation of an existing building or structure during reconstruction allows to transfer loads to the foundation, in some cases, without replacing or strengthening the foundations and without carrying out excavation work.

The essence of chemical methods is that the liquid mixture is injected into the soil through perforated pipes (injectors). The mixture sent to the soil enters into a chemical reaction with the soil and improves the chemical properties of the base.

Chemical methods are divided into two groups, the first includes silicate compounds and their derivatives, and the second includes methods using organic polymers (acrylic, urea, resorcin-formaldehyde, furan resins, etc.).

The most common is the silicification method. As a silicification material, liquid glass is a colloidal solution of sodium silicate.

In one-way silicification, the soil is injected with a gel mixture consisting of two or three components: sodium silicate solutions and a reagent (acids, solutions of organic compounds). As a result of the reaction, the soil is cemented using silicic acid gel.

In double silicification, the strengthening process is carried out by alternately pouring sodium silicate solution and calcium chloride solution into the soil. During the interaction of the solutions, a hydrogel of silicic acid is formed. After injection, the sand acquires waterproofing properties.

Other chemical methods include gas-assisted silicification, ammonification, and resinization.

In order to silicify the base soils, injectors - steel pipes with a diameter of 19-38 mm are lowered under the base of the foundations and the mixture is injected through them under a pressure of 0.3-0.6 MPa. Injectors are placed under strip foundations from both sides, and in cases where the width of the foundation base is wide, the injectors are placed in an inclined position.

During electrosilication, a constant electric current is sent to the strengthening soil, as a result, it accelerates the movement of the mixture that is absorbed into the soil, allowing to increase its amount up to 20%.

The thermal method is used to strengthen loess-like sedimentary soils, in which air flow heated to 600-8000C is sent to the soil through heat-resistant pipes.

Methods such as cementation, restoration of concrete and reinforced concrete flanges, expansion of the base, strengthening with piles are used to strengthen the foundations of buildings and structures.

It is advisable to strengthen foundations made of stone and brick by cementing. In this case, holes with a diameter of 25 mm are opened in the body of the foundation, through which a cement mixture with a composition of 1:1 (cement-water) is absorbed under a pressure of 0.3-0.5 MPa. In cases where cementing is not possible, the foundation concrete and reinforced concrete flanges are reinforced. In this case, the minimum width of the concrete flange should not be less than 15 cm. Reinforced concrete flanges can be restored on one

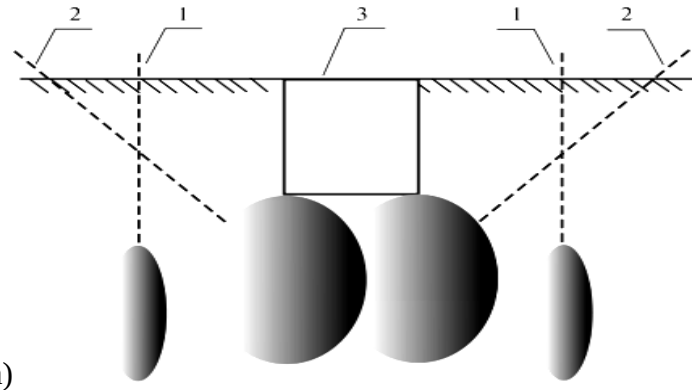
side or on both sides. Their minimum width is 10 cm, and they are connected to each other with anchors with a diameter of 20 mm.

By increasing the width of the base of the foundation, one- or two-way adjustable banquettes are formed. The width of the banquette should not be less than 30 cm at the bottom and 20 cm at the top. In this method of strengthening, rolled profile steel is also used as various frames, rafters, and load-distributing beams.

The load-carrying capacity of reinforced and reinforcing parts of foundations is reinforced as a result of calculations and based on requirements.

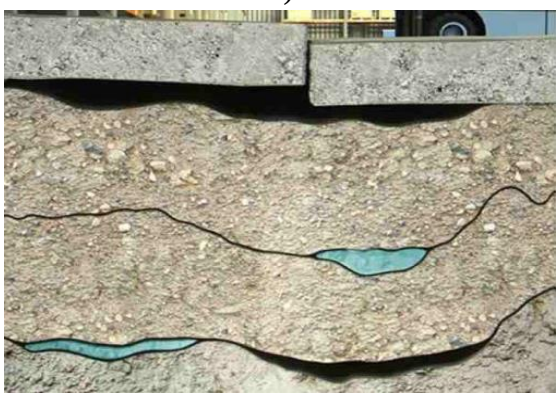
Conclusion:

The method of restoration of new foundations is used in cases where the integrity of the soil at lower levels than the existing foundations is disturbed, as well as to stop the deformations of buildings and structures that increase intensively over time. At present, the methods of creating column pile foundations and placing them under the existing foundations are also being implemented. When strengthening damaged foundations of existing buildings and structures, special importance should be paid to protecting their structures from the effects of underground water. For this purpose, effective waterproofing works are required.



a)

b)



v)

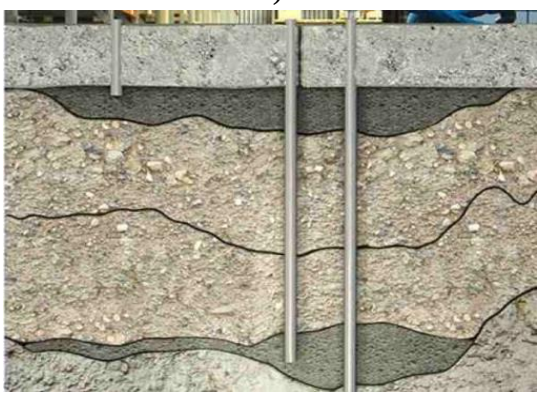


Figure 2. A) step-by-step strengthening of the base soil of the foundation; b) appearance of the foundation until the base soil is strengthened; c) appearance of the foundation after strengthening the base soil: 1 - condition of the injectors; 2 - the main position of the

injectors for strengthening the soil under the foundation; 3 – foundation of building and structure

References

[1]. Ogli, X. A. M., Tolqin, A., Abdukhalimjohnovna, M. U., & Gayradjonovich, G. S. (2021). Engineering Training Of Territories In Planning And Reconstruction Of Large Cities. The American Journal of Engineering and Technology, 3(12), 20-25.

[2]. Gayradjonovich, G. S., Tolqin, A., Abdukhalimjohnovna, M. U., & Ogli, X. A. M. (2021). Primary Protection Of Structures. The American Journal of Engineering and Technology, 3(12), 34-42.

[3]. Tolqin, A., Abdukhalimjohnovna, M. U., Ogli, X. A. M., & Gayradjonovich, G. S. (2021). Style" Gotika And Roman" In Architecture. Quality Changes In European Architecture In X-XII Centuries. The American Journal of Engineering and Technology, 3(12), 61-68.

[4]. qizi Rustamova, D. Q., & Axmedov, T. O. (2022). SOVET DAVRIDA ARXITEKTURA VA SHAHARSOZLIK. INTERNATIONAL CONFERENCE ON LEARNING AND TEACHING, 1(8), 222-227.

[5]. To'lqin, A. (2022). ARCHITECTURE AND URBAN PLANNING DURING SOVIET UNION. Spectrum Journal of Innovation, Reforms and Development, 9, 302-307.

[6]. Akhmedov, T. O. (2022). Renaissance Architecture in Central Asia. Miasto Przyszłości, 29, 380-382.

[7]. Obidovich, A. T. (2022). ROMAN STYLE QUALITY CHANGES IN EUROPEAN ARCHITECTURE IN X-XII CENTURIES. Spectrum Journal of Innovation, Reforms and Development, 10, 121-126.

[8]. Ахмедов, Т. О. (2021). Архитектурада Готика Услуби. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 26-31.

[9]. Abdullayev, I. N., Marupov, A. A., & Ahmedov, T. (2020). Analysis of land in protected areas of gas pipelines of different pressure on the example of the ferghana region. EPRA International Journal of Multidisciplinary Research+ (IJMR+)-Peer Reviewed Journal, 6(5), 311-314.

[10]. Obidovich, A. T. (2022). Architecture And Urban Planning In Uzbekistan. Texas Journal of Engineering and Technology, 9, 62-64.

[11]. Axmedov, T. (2021). Gotika uslubining arxitekturadagi ahamiyati. Scientific progress, 2(6), 1305-1310.

[12]. Tolqin, A. (2021). Ancient greek and ancient rome architecture and urban planning. The American Journal of Engineering and Technology, 3(06), 82-87.

[13]. Tolkin, A. (2020). Reconstruction of 5-storey large panel buildings, use of atmospheric precipitation water for technical purposes in the building. The American Journal of Applied sciences, 2(12), 86-89.

[14]. Қодиров, Ғ. М., & Мирзабабаева, С. М. (2022). Бетон ва темирбетон конструкциялар бузилишининг турлари ва уларнинг олдини олиш. international conference on learning and teaching, 1(6), 91-95.

[15].Mahkamov, Y. M., & Mirzababaeva, S. M. (2020). Design Model Of Bending Reinforced Concrete Elements Under Action Of Transverse Forces Under Conditions Of Increased And High Temperatures. The American Journal of Applied sciences, 2(10), 17-24.
[16].Makhkamov, Y. M., & Mirzababayeva, S. M. (2021). Deformation of reinforcement and concrete of bended concrete structures with fiberglass reinforcement. Asian Journal of Multidimensional Research, 10(9), 529-537.
[17].Mirzababayeva, S. M. (2022). Binolarning yuk ko ‘taruvchi konstruktsiyalarini ekspluatatsiyaviy ishonchliligi. International conference on learning and teaching, 1(6), 110-115.
[15].Mirzaakbarovna, M. S., & Asrorovna, A. Z. (2022). Development of effective methods of strengthening damaged walls of buildings to be reconstructed. Spectrum Journal of Innovation, Reforms and Development, 8, 325-331.
[16].Asrorovna, A. Z., Abdugofurovich, U. S., & Mirzaakbarovna, M. S. (2022). Optimization of corrosion-resistant concrete with chemical additives. Spectrum Journal of Innovation, Reforms and Development, 8, 296-303.
[17]. Karimov, Y., Musaev, I., Mirzababayeva, S., Abobakirova, Z., Umarov, S., & Mirzaeva, Z. (2023). Land use and land cover change dynamics of Uzbekistan: a review. In E3S Web of Conferences (Vol. 421, p. 03007). EDP Sciences.
[18]. Mirzaakbarovna, M. S. (2021). Wood Drying In Construction. The American Journal of Applied sciences, 3(05), 229-233.
[19]. Mirzaakbarovna, M. S., & Sultanbayevich, T. N. (2021). Wood Processing For Construction. The American Journal of Applied sciences, 3(05), 186-189.
[20]. Мирзабабева, С. М. (2021). Определение Величины Усушки Древесины Хвойных Пород Используемых В Условиях Сухого Жаркого Климата. CENTRAL ASIAN JOURNAL OF ARTS AND DESIGN, 2(11), 40-47.
[21].Мирзажонович ҚҒ, М. С. (2022). Биноларни ўровчи конструкцияларини тузлар таъсиридаги сорбцион хусусиятини яхшилаш. RESEARCH AND EDUCATION, 86.
[22]. Mamazhonovich, M. Y., Abdugofurovich, U. S., & Mirzaakbarovna, M. S. (2021). The Development of Deformation in Concrete and Reinforcement in Concrete Beams Reinforced with Fiberglass Reinforcement. Middle European Scientific Bulletin, 18, 384-391.
[23]. Мирзабабаева, С. М., Мирзаахмедова, Ў. А., & ДРЕВЕСИНЫ, И. СТРОИТЕЛЬСТВОv//INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING.–2022. Т, 1, 96-101.
[24]. Турсунов, С., Рахмонов, Б. К., Мирзабабаева, С. М., & Игнатова, О. А. (2018). Исследование физико-механических свойств термообработанной древесины тополя. Труды Новосибирского государственного архитектурно-строительного университета (Сибстрин), 21(2), 127-139.
[25]. Махкамов, Й. М., & Мирзабабаева, С. М. (2019). Образование и развитие трещин в изгибаемых железобетонных элементах при высоких температурах, их деформации и жесткость. Научно-технический журнал ФерПИ, (3), 160.

[26].Determining the Value of Coniferous Wood Drying MS Mirzaakbarovna Miasto Przyszłości, 2022/6/23, 104-107
[27].Mahkamov, Y. M., & Mirzababaeva, S. M. (2020). Design Model Of Bending Reinforced Concrete Elements Under Action Of Transverse Forces Under Conditions Of Increased And High Temperatures. The American Journal of Applied sciences, 2(10), 17-24.
[28]. Умаров, Ш. А., Мирзабабаева, С. М., & Абобакирова, З. А. (2021). Бетон Тўсинларда Шиша Толали Арматураларни Қўллаш Орқали Мустаҳкамлик Ва Бузилиш Ҳолатлари Аниқлаш. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 56-59.
[29]. Mamazhonovich, M. Y., Abdugofurovich, U. S., & Mirzaakbarovna, M. S. (2021). The Development of Deformation in Concrete and Reinforcement in Concrete Beams Reinforced with Fiberglass Reinforcement. Middle European Scientific Bulletin, 18, 384-391.
[30]. Ахмадалиев, А. Х., & Мирзабабаева, С. М. (2022). КОМПОЗИТ АРМАТУРАЛИ ЭГИЛУВЧИ ТЎСИНЛАРНИНГ ЮК ОСТИДА КУЧЛАНИБ ДЕФОРМАТЦИЯЛАНИШИ. Eurasian Journal of Academic Research, 2(6), 416-423.
[31]. Мирзабабаева, С. М., & Ахмадалиев, А. Х. (2022). ПРОВЕРКА ХАРАКТЕРИСТИК ПРОЧНОСТИ И УСТОЙЧИВОСТИ РЕКЛАМНОЙ КОНСТРУКЦИИ ЩИТА. Eurasian Journal of Academic Research, 2(6), 361-370.
[32]. Crack resistance of bent concrete structures with fiberglass reinforcement Saxiba Mirzababayeva, Zebuniso Abobakirova and Shodiljon Umarov E3S Web of Conf., 452 (2023) 06023 DOI: https://doi.org/10.1051/e3sconf/202345206023
[33]. Saxiba Mirzababaeva. (2023). THE ESSENCE OF THE COEFFICIENT OF VARIATION IN THE PROBABILITY APPROACH IN CHECKING THE STRENGTH OF CONCRETE AND REINFORCED CONCRETE STRUCTURES. Spectrum Journal of Innovation, Reforms and Development, 21, 260–266. Retrieved from https://sjird.journalspark.org/index.php/sjird/article/view/847
[34]. Saxiba Mirzababaeva. (2023). OPERATIONAL RELIABILITY OF RECONSTRUCTED BUILDINGS-STRUCTURES. Spectrum Journal of Innovation, Reforms and Development, 21, 235–239. Retrieved from https://sjird.journalspark.org/index.php/sjird/article/view/843.