WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 4, Issue 4, April., 2023

EXPERIENCE OF COMPACTION OF THE BASES OF LARGE BUILDINGS AND CORES OF EARTHEN DAMS OF WATERWORKS IN SEISMIC AREAS WITH OPTIMAL HUMIDITY OF LOESS SOIL

Khakimov G. A.
g. m.f.n., Dos.

Samiyeva Sh.Kh.
Doctoral Student (PhD)

Muminov A. A.
Senior Teacher.

Berdimurodov A. E.
Assistant

Muminov J.A.
Assistant
(Uzbekistan, Tashkent Institute of Architecture and Construction)

Abstract
In this scientific study, the issues of compaction of the foundations of large buildings built in seismic areas and the rods of underground hydraulic dams with optimal moisture content in liosimal soils were considered.The results of an experiment conducted in the field and laboratory conditions on compaction of the foundations of large buildings and walls of a waterproof screen-partition, which are erected in the central part (core) of hydraulic dams with soils, at optimal soil moisture liosimon. Recommendations are given for compacting the floors of large buildings built in earthquake-prone areas and the cores of underground hydraulic dams with vibration shocks at optimal humidity of liosim soils.

Keywords: liosimon soil; loam; sandy loam; earthquake zone; humidity; optimal humidity; vibration; vibration roller; number of soil plasticity; density; dynamic force.

1.Introduction

Lyosine boars, which are part of the group of sedimentary mountain gins, are very common on mountain slopes, in deserts and valleys. The famous American geologist K. According to Keiglgak, in Eurasia and America, lyosite rocks occupy an area of 13 million km2, with an average thickness of 10 m, a volume of 130 thousand km3. From the liosimal soils on the globe, it is possible to build a mountain with a length of 1300 km, a width of 100 km and a height of 1000 m. Liossilon mountainjins is considered one of the most widespread layers on the Earth's surface in the Quaternary period, it is found on all continents, but has a wider distribution on the continents of Europe, Asia, North and South America. These mountain gins are distributed mainly in Siberia, Mongolia, China and some lands of Central Asia. In Central Asia, the Liossimon mountain ranges are very common on the slopes of the Karjants, Chotkol, Kurama, Turkestan, Zarafshan, Baliktov, Oktov, Mirzachol, Tashkent, Oldi, Zarafshan, Chirchik, Kashkadarya, Surkhandarya, Kofirnihon, Vakhsh mountains, the Panj River valleys. Most of the buildings and structures under construction in Uzbekistan are located under these mountain ranges. In addition, considering that the main part of the ground dams being built in our republic, especially the waterproof partitions (core) located in the center of the ground dams being built in mountainous areas, are made of lyosin soil, which is a local raw material, we see that the study of the construction properties, physical and mechanical characteristics of these mesh walls, located in the central part of the ground dams (in the core), they are built by compaction at the required level from local building materials that do not pass water well (with very little filtration), including alkali-like gratings that serve to reduce water leakage.

2. Literature Review

In the countries of Central Asia, including Uzbekistan, most of the facilities, industrial and civil buildings and structures, passenger cars and railways, small and large dams are built over liosim soil. Therefore, the study of the composition, density, strength and various other building properties of these soils occupies an important place in determining the strength, fluidity and usefulness of buildings and structures constructed from them, as well as their durability.

When studying the composition, distribution, and construction properties of lyosimon soils in Uzbekistan, Mavlonov G.A., Rasulov H.Z., Islamov A.M., Khudoiberganov A.M., Shermatov M.Sh ., Stilov K.P., Ergashev Yu., Kadyrov E., Nazarov M.Z. and other scientists have made significant contributions.

The strength and usefulness of any soil base largely depends on its density. The denser the base primer, the stronger the base, the heavier it will be, and it will withstand any external influences, high pressures.

To ensure the strength, priming of Lysimon soil bases, it is necessary to increase the density of the soil in various ways.N. Maslov, Abelev Yu.M., Abelev M.Yu., Kharkhuta

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 4, Issue 4, April., 2023

N.Ya., Shves V.B., Krutov V.I., Ananyev I.V., Nikolaev V.M., Kovalenko V.I., Cherny G.I., Rasulov H.Z., Pesikov E.S. and other scientists conducted research.

This is a very difficult, problematic and extremely thorough process of compacting the liosimal floors of large buildings and structures and waterproof protective walls erected in the central part (core) of soil dams from liosimal soil to the required level. The structure of lyosimal soils changes rapidly from various influences and has very complex properties, and not fully studied, not giving adequate estimates and not taking into account some of its construction properties, can have very bad consequences for constructed buildings and structures, especially in earthquake areas.

Most of the land of the Central Asian countries is located in earthquake areas.Earthquakes of magnitude 7.8-9 on the international seismic scale MSK-64 occurred in the districts. Examples of this are the 9-point earthquake in Almaty (Kazakhstan) on January 3, 1911, the 9-point earthquake in Ashgabat (Turkmenistan) on October 6, 1948, the 10-point earthquake in Khaita (Tajikistan) on July 10, 1949, the 9-point earthquake in Gaza (Uzbekistan) on May 17, 1976, the earthquake in Jurma and Badakhshan (Afghanistan) with a magnitude of 9 on October 26, 2015 and several other devastating earthquakes.These earthquakes have brought huge sacrifices to humanity, claimed the lives of thousands of people, destroyed tens of thousands of buildings and structures, many sectors of the national economy were out of business.

3. Materials and Methods

Some construction properties of deciduous soils in different areas differ from each other. That is why, during the construction of each dam or large building and structure, it would be advisable to fully study the various properties of liossilic soils in this area, including their construction properties. After careful study of various properties of loess-like soils, the right choice of optimal humidity (the most favorable humidity)for compaction of soils gives a very high effect.

Optimal humidity is the humidity at which the highest density is achieved with the least effort for this particular soil. Each soil, regardless of what type of soil it belongs to, reaches its maximum density at optimal humidity. In some cases, when constructing large buildings and structures, humidity is taken to be 1-3% less than the soil moisture within the rounding (trim) as the optimal humidity for a given soil without experimentally determining its amount, more precisely, the optimal humidity is determined using the expression:

$$W_{опт.} = W_p - (1\text{-}3)\ \%$$

here, Wопт. - optimal (most comfortable) humidity;

Wp - power within the limits of rolling (spreading) of the soil.

Given the rapid variability of the physico-mechanical properties of lyophilizate under the influence of various external forces, obtaining optimal humidity in this way will be impractical.

With the help of the machines and mechanisms specified in the project to select the optimal humidity in the experimental field, the alkaline mass is compacted at different humidity, tables are filled in according to their results, graphs are drawn. With the help of machines, it is also determined how many times the machine will pass from one route to another in order to achieve the density specified in the project when compacting lanceolate soils.

The search and use of liosimal soil with optimal humidity is of paramount importance for the construction of soil dams. Soaking soils with a low moisture content, preparing them for construction, takes a lot of time and requires a lot of money.

Various machines and mechanisms can be used for layer-by-layer compaction of liosimal floors of large buildings and structures and the core of soil dams from liosimal soils. The soil can be compacted using machines with different loads, cathodes that give different static and dynamic strength.

Considering that large buildings and structures in Central Asian countries and most of the ground dams are built in earthquake-prone zones, it would be advisable to compact the soils using vibration, including vibration shocks.It was also found that the mechanical characteristics of compacted soils by vibration are higher than those of compacted soils using static forces.

A group of scientists from the Tashkent Institute of Irrigation and Mechanization of Agriculture, prof. E.S.Pesikov, led by Pesikov, conducted several experiments in laboratory and field conditions to determine the optimal humidity for compaction of soil in order to manufacture the rods of soil dams under construction in Uzbekistan from liosimik grumbles. As a result of applying the results of the experiment to the construction of dams (during the construction of the Heysorak reservoir dam, Topolong in Uzbekistan), the construction time was significantly reduced, and a great economic benefit was obtained. But in the experiments of these scientists, when compacting liosimal soils, the factors affecting their seismic resistance, the issues of changing the strength indicators of chunonchi soils were not taken into account. There were no problems with changing the strength characteristics of compacted soils under the influence of dynamic forces.

4. Results and Discussion

In order to make recommendations on the construction of large buildings in earthquake zones with lyosimal bases and the core of grunt dams from lyosimal grunt, experiments were carried out to determine their optimal humidity when compacting lyosimal grunt in laboratory and field conditions. In an experiment carried out in field conditions, the compaction of grunts used a German-made vibrocatok of the SWAW-12.This vibrocatoc has a speed of 1.5-5 km / h, a width of 2 m, a diameter of 2 m, a weight of 12 t (up to 36 t at vibration time), the vibration frequency can be changed to 25 Hz. The vibrocatoc is connected to the tractor as a prisep.

All experiments were carried out at a humidity of 10-22% of lyosimal grunts. In laboratory conditions, it was found that our grunt, which is being experimented with, belongs mainly to light, medium and partially heavy lyosimal suglinok, and their plasticity (softness) number changed from 8 to 17. The number of plasticity of a grunt consists of the difference between the upper and lower limit of plasticity, which was determined using the following formula:

$$I\,p = Wt - Wp$$

here, Ip - plasticity number;

Wt – upper limit of plasticity;

Wp - lower limit of plasticity.

Soils are divided into types depending on the degree of plasticity:

$Ip < 1$ sandy soil;

$1 < Ip < 7$ supers;

$7 < Ip < 17$ loam;

$Ip > 17$ clay.

Liosimon loam in its natural state was excavated by an excavator (after the upper part of the soil was demolished by a bulldozer), delivered to the experimental site with the help of samasvalov and poured, leveling with different thicknesses (10-100 cm). The density of loams at a depth of 30-35 cm increased to Pd = 1.75 t/m3 (the density of the soil in a dry state) when the vibrating roller passed 5-6 times in one pass. The fact that the vibrating roller passed more than 6 times on one track did not work, loosening the upper part of the soil, also did not affect the density of the soil with a depth of more than 35 cm. The highest density, the deepest compaction, the smallest transition of the vibro-crystal from one layer to another occurs at a certain moisture content in the lyosimal loam. With a natural moisture content of 10-12%, the loam was poorly compacted under the influence of dynamic forces, and the upper layers of the soil weakened.After the soil moisture exceeded 12%, it began to condense, and this situation continued until the humidity reached 14-16%. Then the density of the soil gradually decreased to kamaya until the humidity reached 18%, and when it increased from 19-20%, the vibrating roller formed cracks, wave-like height differences on the surface of the flattened, compacted soil. In some cases, there were cases of slipping of the soil under the vibrating roller.

As you can see from the experiment, lemon loam is most concentrated at a humidity of 14-16%.

5. Conclusions

An increase in the amount of plasticity (softness) of lyosmic grunt leads to both an increase in optimal humidity and a decrease in optimal humidity.In short, there is a proper proportional relationship between optimal soil moisture and its plasticity. It is recommended to seal light, medium and heavy loams at a humidity of 14%, 15%, 16%, respectively.

Based on the results of the experiment conducted in the field and laboratory conditions, we can conclude that the optimal humidity is lower in liozny soups (11-13%), higher in liozny loams (14-16%) and very high in liozny clays (17-19%). The optimal humidity can also vary up to 1-3%, depending on the location of the slit-like cartilages, their age, and causes of origin.

Thus, it turns out that it is important to determine the optimal moisture content of soils located in this area during the construction of floors of large buildings and waterproof screens-walls of soil dams, cores of liosim soils. When compacting the lyosimal mass at optimal humidity, labor efficiency increases, the time for performing a specific job decreases, the amount spent on performing the work increases, the mass density increases and mechanical performance increases. Compaction of the soil to the level of the density index provided for by the project is achieved at optimal humidity with low costs for short periods of time.

The density of the soil increases to the highest level (maximum) when the lyosimal soils are compacted with vibration removals at optimal humidity, so that their strength characteristics (angle of internal friction, adhesion strength) are much higher than with static methods. That is why sealing the floors of large buildings and the cores of ground dams in earthquake zones with the help of vibration shocks at optimal humidity of liosim soils is also important from the point of view of increasing the seismic strength of objects and has a great effect.

References

1. Khakimov, G. A. "Changes in the Strength Characteristics of Glinistx Soils under the Influence of Dynamic Forces International Journal of Engineering and Advanced Technology, IJEAT." Exploring innovation (2020): 639-643.
2. Khakimov, Gayrat Akramovich. "The nature of the change in the connectivity of moistened loess soils during vibration." American Journal of Applied Science and Technology 2.06 (2022): 26-41.
3. Khakimov, G. A., and M. A. Muminov. "CONSTRUCTION OF BUILDINGS ON WEAK MOIST CLAY SOILS IN SEISMICALLY ACTIVE ZONES OF UZBEKISTAN." Web of Scientist: International Scientific Research Journal 3.12 (2022): 755-760
4. GMFN, Dos, Samiyeva Sh Kh, and Master MA Muminov. "DEFORMATION OF MOISTENED LOESS FOUNDATIONS OF BUILDINGS UNDER STATIC AND DYNAMIC LOADS." (2022).
5. Miralimov, Mirrakhim Mirmakhmutovich. "Principles of Regulation of Thermal Protection of Enclosing Structures and Their Impact on the Energy Efficiency Of Buildings." Design Engineering (2021): 496-510.
6. Хакимов, Ғайрат, et al. "ЭНЕРГИЯТЕЖАМКОР ВА ПАСТ ЭНЕРГИЯ ЭҲТИЁЖЛИ ЗАМОНАВИЙ БИНОЛАР ҚУРИЛИШИНИНГ ЖАҲОН АМАЛИЁТИ ВА УНДАН ЎЗБЕКИСТОН ШАРОИТИДА ФОЙДАЛАНИШ ИСТИҚБОЛЛАРИ." Talqin va tadqiqotlar 1.19 (2023).
7. Khakimov, Gayrat Akramovich. "CHANGES IN PLASTIC ZONES IN LESS BASES UNDER SEISMIC VIBRATIONS."
8. Khakimov.G.A. JabborovB.M. Designing and Construction of Buldings in Complex Ground Conditions of Central Asia. International Journal of Advanced Research in Science, Engineering and Technology, ISSN: 2350-0328, vol.6, Issue7, July 2019, page10266-10269.
9. Khakimov Gayrat Akramovich. (2023). CONSTRUCTION OF BUILDINGS AND STRUCTURES IN DIFFICULT GROUND CONDITIONS AND SEISMIC AREAS. INTERNATIONAL BULLETIN OF APPLIED SCIENCE AND TECHNOLOGY, 3(2), 203–209.
10. Khakimov Gayrat Akramovich. (2023). NEW GENERATION BUILDINGS THAT EFFECTIVELY USE ENERGY AND THEIR UZBEK EXPERIENCE. INTERNATIONAL BULLETIN OF ENGINEERING AND TECHNOLOGY, 3(2), 74–78.
11. Khakimov Gayrat Akramovich. (2023). CONSTRUCTION OF BUILDINGS AND STRUCTURES IN DIFFICULT GROUND CONDITIONS AND SEISMIC AREAS.

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 4, Issue 4, April., 2023

INTERNATIONAL BULLETIN OF ENGINEERING AND TECHNOLOGY, 3(3), 74–80.

12. Khajiev, N. M. "CHANGE IN THE CONSISTENCY CHARACTERISTICS OF THE WETTED LUSSIC BASES (GRUNTS) OF BUILDINGS UNDER THE INFLUENCE OF SEISMIC FORCES." Академические исследования в современной науке 1.13 (2022): 261-267.
13. GMFN, Dos, Samiyeva Sh Kh, and Master MA Muminov. "DEFORMATION OF MOISTENED LOESS FOUNDATIONS OF BUILDINGS UNDER STATIC AND DYNAMIC LOADS." (2022).
14. Хасанов, Б. Б. "ПРОЧНОСТЬ, ПЛОТНОСТЬ, МОРОЗОСТОЙКОСТЬ И ДОЛГОВЕЧНОСТЬ, ГАЗОБЕТОННЫХ БЛОКОВ." RESEARCH AND EDUCATION 1.7 (2022): 68-73.
15. Makhmudovich, Makhmudov Said. "Research Of The Work Of The System" Base-Foundation With A Damping Layer-Building" On An Inhomogene Soil Base." Turkish Journal of Computer and Mathematics Education (TURCOMAT) 12.7 (2021): 2006-2015.
16. Rakhmankulovna, A. K. H., and M. S. Makhmudovich. "Innovative designs and technologies in foundation engineering and geotechnics." International Journal of Scientific and Technology Research 9.1 (2020): 3803-3807.
17. Machmudov, S. M., and Sh Kh Samieva. "QUANTITATIVE ASSESSMENT OF THE RELIABILITY OF THE SYSTEM" FOUNDATION-SEISMIC ISOLATION FOUNDATION-BUILDING"." Central Asian Journal of STEM 2.2 (2021): 445-452.
18. Махмудов, С. М., and Ш. Х. Самиева. "КОНСТРУКТИВНЫЕ РЕШЕНИЯ СЕЙСМОИЗОЛИРУЮЩИХ ФУНДАМЕНТОВ ЗДАНИЙ." НАУЧНЫЕ РЕВОЛЮЦИИ КАК КЛЮЧЕВОЙ ФАКТОР РАЗВИТИЯ НАУКИ И ТЕХНИКИ (2021): 36-38.
19. Махмудов, С. М., and Ш. Х. Самиева. "КОНСТРУКТИВНЫЕ РЕШЕНИЯ СЕЙСМОИЗОЛИРУЮЩИХ ФУНДАМЕНТОВ ЗДАНИЙ." НАУЧНЫЕ РЕВОЛЮЦИИ КАК КЛЮЧЕВОЙ ФАКТОР РАЗВИТИЯ НАУКИ И ТЕХНИКИ (2021): 36-38.