Spectrum Journal of Innovation, Reforms and Development
Volume 34, December - 2024 | ISSN (E): 2751-1731
WEBSITE: WWW.SJIRD.JOURNALSPARK.ORG

ENSURING THE EFFICIENT OPERATION OF SHORT DRIVEN PILES FOR AGRICULTURAL BUILDINGS IN AGGRESSIVE SOIL CONDITIONS

Makhsimov Kasimkhan Ibaevich
Zaxidov Nodir Dilshod ogli
Fergana Polytechnic Institute
e-mail: maxsimov55@bk.ru

Abstract
A method is given for determining the bearing capacity of driven piles in aggressive soil conditions. The shear resistance f0 of concrete corrosion products and the resistance of piles Фk in the area of possible corrosion damage to concrete were determined. Taking into account the influencing factor of the corrosion process on the bearing capacity of piles in medium, highly aggressive environments, primary and secondary protection of piles have been proposed.

Keywords: Saline soils, soil resistance along the lateral surface of the pile, concrete corrosion, predicted corrosion depth, impregnating compositions, sulfate-resistant portland cement.

Introduction

Soils and groundwater in many areas of Central Fergana are characterized by the content of water-soluble salts that have an aggressive effect on the foundation material. For the construction of above-ground structures in conditions of salinization of the surface layer of soils, an important task is to impart resistance and protect against corrosion of the structures of the foundations of buildings and structures [1,2,3,5]. Recently, pile foundations have been used for agricultural buildings in aggressive soil conditions [7]. The effectiveness of various methods for increasing the resistance and anti-corrosion protection of reinforced concrete elements in saline soils is largely determined by the reliability of the assessment of the type and degree of aggressiveness of the environment and the forecast of changes in aggressiveness during operation. It has been established that corrosion of the surface of the pile material affects their bearing capacity [8,9,10]. In this case, the influence of the factor depends on the degree of stress-strain state of the near-pile space, the pile material, the aggressiveness and temperature of the environment, as well as the filtration rate of ground or surface water. The work indicates [5] that in the process of interaction between an aggressive environment and cement stone, calcium oxide, which makes up 60...70% of cement stone, is neutralized, as well as oxides (silica, alumina and iron oxide), which provide a significant effect on the shear resistance of corrosion products. Based on this, it should be expected that the sought values of shear resistance of concrete corrosion can be conveniently determined in laboratory conditions by testing corrosion products on a single-plane shear device GGP-30, taking into account the methodology [4].

The studies were conducted in an aggressive environment typical for the soils and groundwater of Central Fergana. The composition and content of aggressive ions in the solution are as follows:

SO^{11}_4=3520mgr/l; cl^1=105mgr/l;HCO^1_3=10 mgr/l;Ca^{11}=230 mgr/l; Mg^{11}=30 mgr/l;Na^1 +K^1= 3485 mgr/l.

Below are the results of the tests of corrosion products of the foundation material.

№ Exper-ience	Shear strength $\tau(f_0)$ at σ MPa			
	0	0,1	0,2	0,3
1	0,064	0,13	0,17	0,17
2	0,060	0,102	0,200	0,200
3	0,073	0,120	0,143	0,250
4	0,080	0,102	0,175	0,220

Based on the obtained data, the values of shear resistance f_0 of concrete corrosion products within the normal pressure $\sigma = 0 \div 0.3MPa$ can be represented in the following form:

1. $$f_0 = 0,05\sigma + 7 \quad (1)$$

From expression (1) it can be seen that with increasing compressive stresses the influence of concrete corrosion products on the bearing capacity of the pile decreases. If we take into account that the most active corrosion processes occur in the aeration zone (zones of alternating wetting and drying), then the influence of the above factor occurs within certain limits along the length of the piles. It is obvious that the predicted area of active corrosion along the length of the piles should be assigned according to the lithological structure of the soil, the groundwater level (including the predicted one) and the aggressiveness of the environment. Based on this, the determination of the resistance along the lateral surface of the piles f_0 in the area of active concrete corrosion in accordance with the lateral soil pressure at the contact of the piles with the soil at the depth under consideration. The pile resistances in the area of possible corrosion damage to concrete F_k, taking into account (1), can be written as:

2. $$F_\kappa = m_\kappa u_k (0,05\sigma + 7) l_k \quad (2)$$

3. m_κ – safety factor equal to 1.2;
4. u_k – pile perimeter taking into account the predicted concrete corrosion, m;
5. σ – normal pressure acting on the lateral surface of the pile shaft at the considered layer depth;
6. lk – thickness of the soil layer in which active concrete corrosion is expected, *m*.
7. Taking into account the influencing factor of the corrosion process on the bearing capacity of piles in medium, highly aggressive environments, methods of their protection are used. Primary protection of concrete and reinforced concrete in aggressive soil environments consists of increasing the ability of concrete, reinforcement and reinforced concrete to resist the effects of a corrosive environment by changing the composition and structure of concrete before or during the manufacture of structures [1,7]. This is achieved by choosing resistant source materials, concrete compositions, additives, types of reinforcement and concrete, methods of manufacturing and calculating structural elements. Secondary protection consists of increasing the corrosion resistance of concrete after its manufacture by partially or completely filling the pore structure with various chemically resistant materials (surface or complete impregnation), installing surface protective coatings or artificially lowering the level of aggressive groundwater. Currently, impregnating compositions based on styrene-indene resin, pyroplast and polyisocyanate K*, urea-formaldehyde

resin, penetrating hydrocem, bitumen, etc. are widely used for anti-corrosion protection of reinforced concrete piles, foundations and other underground structures in natural highly aggressive soil environments [3]. Depending on the type of groundwater aggressiveness, Portland cement is usually used as a binder for concrete intended for subsequent impregnation. In areas with saline soils and highly mineralized groundwater, sulfate-resistant Portland cements should be used for the manufacture of concrete.

Reinforced concrete piles exposed to dynamic impact loads during driving must be made of dense concrete with a water resistance grade of at least B-6, since a decrease in the initial density of concrete leads to a sharp decrease in the number of impacts before destruction and an increase in micro-violations in the concrete of piles after driving.

When impregnating in areas with a hot climate, it is necessary to provide measures to protect impregnation baths from direct heating by sunlight, since under these conditions the possibility of solvent evaporation increases and, as a consequence, the viscosity of the impregnation composition increases. Before impregnation, the surface of reinforced concrete products is pre-cleaned and dust-free with compressed air.

Before impregnating products in baths, a laboratory test of the impregnation mode is carried out on cube samples with an edge of 10 cm. If after impregnation for 8 hours, when splitting control samples, the depth of the impregnated layer is at least 10 mm, then impregnation of the products is carried out.

The effect of impregnation on the resistance along the lateral surface of piles is determined by the results of pile tests [1]. It is known that when testing reinforced concrete piles with various anti-corrosion coatings after driving, the protective properties of the anti-corrosion coatings are reduced. In turn, the protective coatings will have a different effect on the process of driving piles into the ground, and for "hanging" piles on the value of the bearing capacity of the structure as a result of changing the friction of the soil along the lateral surface of the pile. It is known that hanging piles protected with bitumen mastics in clay soils reduce the bearing capacity compared to piles without protection by more than 30%, and when coating piles with urea-formaldehyde resin up to 20% [3]. Based on the data obtained, the parameters taking into account the effect of impregnation of sandy and clayey saline soils are proposed to be taken within 0.8-0.9. Here the lower limit of the parameter corresponds to saline sands.

Literature:

1. Abobakirova Z. A., Bobofozilov O. Ispolzovanie shlakovых vyajuщix v konstruktsionnых solestoykix betonax //international conferences on learning and teaching. – 2022. – T. 1. – №. 6..
2. Abobakirova Z. A., Bobofozilov O. Remont betonnogo pola–vidы povrejdeniy i meгы po ix ustraneniyu //international conferences on learning and teaching. – 2022. – t. 1. – №. 10. – s. 32-38.
3. Abobakirova, Z. A. (2021). Regulation Of The Resistance Of Cement Concrete With Polymer Additive And Activated Liquid Medium. The American Journal of Applied sciences, 3(04), 172-177.
4. Asrorovna A. Z. Effects Of A Dry Hot Climate And Salt Aggression On The Permeability Of Concrete //The American Journal of Engineering and Technology. – 2021. – T. 3. – №. 06. –

S. 6-10.

5. Abobakirova Z. A. Regulation Of The Resistance Of Cement Concrete With Polymer Additive And Activated Liquid Medium //The American Journal of Applied sciences. – 2021. – T. 3. – №. 04. – S. 172-177.
6. Akhrarovich A. X., Mamajonovich M. Y., Abdugofurovich U. S. Development Of Deformations In The Reinforcement Of Beams With Composite Reinforcement //The American Journal of Applied sciences. – 2021. – T. 3. – №. 5. – S. 196-202.
7. Goncharova N. I., Abobakirova Z. A., Kimsanov Z. Technological Features of Magnetic Activation of Cement Paste" Advanced Research in Science //Engineering and Technology. – 2019. – T. 6. – №. 5.
8. Kimsanov Z. O., Goncharova N. I., Abobakirova Z. A. Izuchenie texnologicheskix faktorov magnitnoy aktivatsii sementnogo testa //Molodoy uchenыy. – 2019. – №. 23. – S. 105-106.
9. Goncharova N. I., Abobakirova Z. A. RECEPTION MIXED KNITTING WITH MICROADDITIVE AND GELPOLIMER THE ADDITIVE //Scientific-technical journal. – 2021. – T. 4. – №. 2. – S. 87-91
10. Goncharova N. I., Abobakirova Z. A., Mukhamedzanov A. R. Capillary permeability of concrete in salt media in dry hot climate //AIP Conference Proceedings. – AIP Publishing LLC, 2020. – T. 2281. – №. 1. – S. 020028.
11. Umarov, S. A. (2021). Development of deformations in the reinforcement of beams with composite reinforcement. Asian Journal of Multidimensional Research, 10(9), 511-517.
12. Умаров, Ш. А. (2021). Исследование Деформационного Состояния Композиционных Арматурных Балок. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 60-64.
13. Abdugofurovich, U. S. (2022). BONDING OF POLYMER COMPOSITE REINFORCEMENT WITH CEMENT CONCRETE. Gospodarka i Innowacje., 24, 457-464.
14. Абдуллаев, И. Н., Умирзаков, З. А., & Умаров, Ш. А. (2021). Анализ Тканей В Фильтрах Систем Пылегазоочистки Цементного Производства. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 16-22.
15. Davlyatov, S. M., & Kimsanov, B. I. U. (2021). Prospects For Application Of Non-Metal Composite Valves As Working Without Stress In Compressed Elements. The American Journal of Interdisciplinary Innovations Research, 3(09), 16-23.
16. 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.
17. Тошпулатов, С. У., & Умаров, Ш. А. (2021). ИНСТРУМЕНТАЛЬНО-УЧЕБНО-ДИНАМИЧЕСКИЕ ХАРАКТЕРИСТИКИ СРЕДНЕЙ ШКОЛЫ И КОНСТРУКТИВНЫЕ РЕШЕНИЯ СРЕДНЕЙ ШКОЛЫ№ 2 Г. ФЕРГАНЫ. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 10-15.
18. 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.

19. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние Водорастворимых Солей На Эксплуатационные Свойства Наружные Стен. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 44-47.
20. Hasanboy o'g'li, A. A. (2022). Stress Deformation of Flexible Beams with Composite Reinforcement under Load. American Journal of Social and Humanitarian Research, 3(6), 247-254.
21. угли Ахмадалиев, А. Х., & угли Халимов, А. О. (2022, May). КОМПОЗИТНОЕ УСИЛЕНИЕ ИЗГИБАЮЩИЙ БАЛК ПОД НАГРУЗКОЙ. In INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING (Vol. 1, No. 7, pp. 409-415).
22. Сон, Д. О., & Халимов, А. О. (2021). УПРАВЛЕНИЕ МЕТРОЛОГИЧЕСКИМИ РИСКАМИ КАК ОСНОВА ДЛЯ УВЕЛИЧЕНИЯ КАЧЕСТВА ПРОДУКЦИИ. Экономика и социум, (2-2), 202-210.
23. Бахромов, М. М. (2020). Исследование сил негативного трения оттаивающих грунтов в полевых условиях. Молодой ученый, (38), 24-34.
24. Бахромов, М. М., & Раҳманов, У. Ж. (2020). Проблемы строительства на просадочных лессовых и слабых грунтах и их решение. Интернаука, (37-1), 5-7.
25. Mirzaeva, Z. A. (2021). Improvement of technology technology manufacturing wood, wood with sulfur solution. Asian Journal of Multidimensional Research, 10(9), 549-555.
26. Мирзаева, З. А. К., & Рахмонов, У. Ж. (2018). Пути развития инженерного образования в Узбекистане. Достижения науки и образования, 2(8 (30)), 18-19.
27. Абобакирова, З. А., & кизи Мирзаева, З. А. (2022, April). СЕЙСМИК ҲУДУДЛАРДА БИНОЛАРНИ ЭКСПЛУАТАЦИЯ ҚИЛИШНИНГ ЎЗИГА ХОС ХУСУСИЯТЛАРИ. In INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING (Vol. 1, No. 6, pp. 147-151).d social sciences, 2(5-2), 999-1009.