European Journal of Pedagogical Initiatives and Educational Practices
**ISSN (E): 2938-3625**
Volume 2, Issue 6, June - 2024

# ANALYSIS OF METHODS AND TECHNOLOGIES FOR STRENGTHENING THE SLOPES OF THE RAILWAY ROADBED

Yakhyayeva Muslimakhon Tokhirboyevna
Master of Technical Sciences,
Tashkent State Transport University, Uzbekistan, Tashkent city.
E-mail: kuvandikl@mail.ru.

Lesov Kuvandyk Saginovich,
Scientific Supervisor, Candidate of Technical Sciences, Professor,
Tashkent State Transport University, Uzbekistan, Tashkent city.
E-mail: muslimakhon_yakhyayeva@mail.ru

**Abstract**
This article examines how, under the influence of unfavorable climatic, hydrological, man-made and other factors, destabilizing processes occur in the soils of the body of the roadbed, which cause residual deformations of the main site and slopes of the roadbed.

**Keywords**: roadbed, sandy soil, geosynthetic material, reinforcement work, resource conservation, deformation, bearing capacity, strength, stability, slope, vibration dynamic load.

## Introduction

In modern conditions of construction and operation of railways in Uzbekistan, the introduction of resource-saving technologies that ensure the extension of the effective service life of technical means is becoming increasingly relevant. To the greatest extent, this applies to the track economy, which is the main element of the railway infrastructure, in which more than 50% of the value of fixed assets is concentrated.

The development and improvement of railway transport, increasing its efficiency can be ensured with a high level of reliability of the railway track, operational stability of its bearing base – an earthen bed, which is a complex technical structure erected and erected from sandy soils of complex origin.

An analysis of existing works shows that the stress state of the roadbed has not been widely studied, and little attention has been paid to studies of the deformability of geosynthetic reinforced soil structures. There is no developed methodology for calculating the stress-strain state of the earth bed reinforced with geosynthetic materials, which will not make it possible to reasonably recommend certain structures for strengthening the slopes of the earthbed using geosynthetic materials in the construction and reconstruction of railways [1-5]. The relevance of developing such a methodology is increasing due to the tightening of the resource-saving policy carried out on railways [1, 2].

Over time, under the influence of unfavorable climatic, hydrological, man-made and other factors, destabilizing processes occur in the soils of the body of the roadbed, which cause residual deformations of the main site and slopes of the roadbed. [1, 5, 6]

To solve the tasks set, the results of research by domestic and foreign scientists in the field of soil mechanics and the roadbed of railways and highways were used. Patterns of changes in the deformability of soil massifs during reinforcement with geosynthetic materials have been revealed [7-11].

Calculations of the stress-strain state of a roadbed reinforced with geosynthetic materials can be used by design organizations when choosing and justifying a method for strengthening an earthbed with insufficient bearing capacity and increased deformability on reconstructed railway lines. Calculation of changes in the stress state of the roadbed of railways under construction and under reconstruction when reinforced with geosynthetic materials, which can be used to assess the possibility of using the considered reinforcement method in terms of providing load-bearing capacity calculated within the framework of the classical theory of marginal equilibrium [9, 12]

In areas with difficult natural and soil conditions, the construction of earthworks is becoming increasingly difficult. Geosynthetic materials (geotextiles, expanded polystyrene, reinforcing nets) are widely used to ensure the strength and stability of embankments) [1, 2, 13, 14].

Recommendations on the choice of parameters of technological schemes are the results of the experimental stage. However, the introduction of any and even more optimal technological schemes in difficult natural conditions is due to the fact that both the initially adopted technological solutions and their constructive implementation are not constant, change over time and are probabilistic in nature. For continuous monitoring and control of technological process parameters, devices for continuous and simultaneous measurement of several soil characteristics of the poured mounds (humidity, density, etc.) are useful.

– To strengthen the roadbed, they are currently used as traditional anti-deformation structures using proven technologies [1, 2, 9, 10], so are new design solutions and technologies for their implementation.

– So, when strengthening the roadbed, the following measures are provided:

– – installation of vertical sand drains and slots;

– – filling the embankment to a value determined by calculation, strengthening the base to prevent sediment (usually more than 5 mm) of the embankment on a weak base, causing overvoltage in the elements of the upper structure of the path;

– – filling of retaining berms and counterbanks, anchoring of the slope part, sequential cutting of ledges on the main core of the embankment to prevent the sliding of sand plumes along the core of the embankments;

– – strengthening works, drainage to prevent erosion of poorly protected slopes of embankments and recesses;

– – side powders to embankments, widening due to strengthening works (retaining walls, stone fillings, etc.) of the main site for the placement of a ballast prism, constructed according to new standards, and creating conditions for repair work;

– ensuring normal drainage from the ballast prism and roadsides, sealing cracks;

– laying the slopes of recesses, filling embankments to eliminate snow-bearing places (recesses up to 2 m deep and embankments less than the height of the snow cover).

In accordance with the norms, checks should be carried out on the stability of embankment slopes and the stability of the foundation soils, and the intensity of the base sediment should be determined. If these checks are not provided, anti-reformation measures are designed. To strengthen a weak foundation, considerable experience has been accumulated in the implementation of structural and technological solutions, including cutting and replacing weak soils, sand, crushed stone, cement-sand piles, loading berms, etc. [1, 2, 14].

The conducted research and design experience show that all facilities that were built using geosynthetic materials are successfully operated.

An analysis of the state of the research issue allows us to draw the following conclusions:

1. Modern railway operating conditions are characterized by an increase in vibro-dynamic loads on the roadbed, an increase in train speeds, and the introduction of new structures of the upper structure of the track.
2. Increased loads on the railway roadbed contributes to the intensive accumulation of residual deformations that worsen its operation and cause a decrease in load-bearing capacity.
3. In recent years, the use of various types of geosynthetic materials has become one of the most promising and widely used methods in transport construction to strengthen the slopes of the roadbed.

**REFERENCES:**

1. Lesov K.S., Mirakhmedov M.M., Tajibaev Sh.A. World experience in the use of geosynthetic materials in earthwork structures. Architecture. Construction. Design. Scientific and practical journal. №2, 2019. Tashkent. TASI. S. 194-197.
2. Report on the research work on the topic "Resource–saving structures and organizational and technological solutions for strengthening the roadbed of high–speed and high-speed railways". 2020 Tashkent. Tashiit. p.130
3. Ashpiz E.S., Hasanov A.I., Gluzberg B.E. Railway track. Textbook./edited by E.S.Ashpiz – M:FGBOU "Educational and methodological Center for education in railway transport", 2013 – 554 p.
4. Omarov A.D., Zakirov R.S., Lesov K.S. Design, construction and maintenance of a railway track in Kazakhstan. A study guide. Almaty: Bastau Publishing House, KazATK, 2000. - 212 p.
5. Abdukamilov Sh.Sh.The bearing capacity of the roadbed, filled with sand dunes, perceiving the vibrodynamic load Abstract diss. on soik. Candidate of Technical Sciences. C-P.: 2011.
6. Lesov K.S., Elmuratov I.Ya. Calendar planning of the construction of the Bukhara – Misken railway line. Innovative approaches in modern science. Collection of articles based on the materials of the VIII International Scientific and Practical Conference- No. 11 (23). Part 1 – M., Publishing House "Internauka", 2018. -12-16s.
7. Dyba P.V. Increasing the bearing capacity of loaded soil massifs by reinforcement with geosynthetic materials Abstract diss. on soik. Candidate of Technical Sciences. C-P.: 2011.
8. Serebryakov I. V. On strengthening the roadbed // Path and track management. --2006. -No. 1. From 34-36.

9. Fazilov T.I. Organo-mineral anti-deflationary coatings obtained by impregnation of mobile sands. Abstract of the dissertation. at the soic. doc.tech.Sciences - Kharkiv, KHISI, 1991.-350 p.
10. Zakirov R. S., Omarov A.D. Anti-deformation strengthening of the sandy soil roadbed in Kazakhstan. Almaty: "Gylym", 1999. - 164 p.
11.Lesov K.S., Tadjibayev Sh. Calculation of the reserve coefficient of local stability of the slopes of the roadbed reinforced with a volumetric geogrid. // ACADEMICIA: An International Multidisciplinary Research Journal. Том 11, Номер 11, С. 115-120.
12.Chelobitchenko S.A. Calculation methods and structural and technological solutions of the earthwork reinforced with volumetric geogrids on permafrost soils Abstract diss. on soik. Candidate of Technical Sciences. C-P.: 2007.
13.Dolgov D. V. The choice of intensive technological modes for the construction of reinforced earthworks in difficult engineering conditions aftoreferat dis. candidate of Technical Sciences - M.: 2006.
14.Lutsky S.Ya., Kezhkovsky T., Ponamorev A.V. Intensive technology of reinforced earthworks construction. //The Underground space of the World, 2001, No. 4, pp. 40-46.