Synergy: Cross-Disciplinary Journal of Digital Investigation
(ISSN 2995-4827) VOLUME 02 ISSUE 6, 2024

DEVELOPMENT OF NEW DESIGN SOLUTIONS TO IMPROVE THE OPERATIONAL CONDITION OF REINFORCED CONCRETE ROAD BRIDGES IN THE REPUBLIC OF KARAKALPAKSTAN

Alimbaev Aybek Bayramovich
Teacher, Karakalpak State University named after Berdakh (Nukus, Republic of Karakalpakstan)

Abstract:

This article provides information on the development of new design solutions to improve the operational condition of road reinforced concrete bridges in the Republic of Karakalpakstan.

Keywords: *transport, bridges, concrete, modern efficient materials.*

Resolution of the President of the Republic of Uzbekistan dated October 4, 2017 No. PP-3309 "on improving the system of organizing the construction and operation of automobile bridges, overpasses and other artificial structures", "on the construction of automobile bridges, overpasses and other artificial structures in the Republic of Karakalpakstan, regions and the city of Tashkent for 2018-2022, reconstruction and overhaul dated 29 March 2018 No. PP-3632 " On Approval of the State Capital Repair Program, "on measures to further improve the road management system" On December 9, 2019, Resolutions No. PK - 4545 were adopted.

Currently, in our republic, in the practice of increasing the load capacity of operated bridge structures, the replacement of head beams of intermediate devices with beams manufactured at factories or landfills according to new regulatory load classes is used, i.e. the operated intermediate devices have been completely removed and replaced with beams designed for load class a-14, NK-100 according to the latest version of the SNK 2.05.03-12, and replacement for the prepared intermediate devices. The design of the roadway remains unchanged, i.e. a leveling layer 2-3 cm thick, waterproofing 1-2 cm thick, and a protective layer 4-5 cm thick are laid on the headboards of the intermediate devices.

On our part, in order to increase the bearing capacity of the intermediate device and adapt it to modern loads, it was proposed in the proposed way to increase their bearing capacity by laying a layer of self-supporting concrete on top of the head beams of the bridge intermediate device in operation.

The use of self-supporting concrete in the construction of transport structures, in particular the roadway of automobile bridges, began in Ukraine in 1975. At the same time, the layer of the bridge bed formed by reinforced concrete, on which the tension cement is applied, simultaneously performs the functions of a leveling layer, a waterproofing and a protective layer. When using self-supporting concrete webs on bridges, it will be possible to achieve a significant level of labor cost efficiency. In addition, when the bridge bed made of this self-supporting concrete works together with the head beams of the intermediate devices, i.e., when ensuring the joint use of the linen layer and the concrete of the head beams, it becomes possible to reduce the amount of metal consumed on the main supporting structures of the intermediate device.

It will be necessary to conduct research aimed at exploring the possibility of a joint work of a layer of self-supporting concrete pavement with the main load-bearing elements. The main condition for waterproofing a layer of reinforced concrete pavement, on which tension cement is applied, is the occurrence and maintenance of a certain amount of compressive stresses in the concrete of this layer. When using self-supporting concrete for waterproofing, it is required that the minimum stress created in its sections is 0.5 MPa.

The condition for the joint operation of the bridge bed layer of self-supporting concrete with the main load-bearing elements is the strength of the contact between the load-bearing concrete and the head beams of the intermediate devices.

Recently, modern efficient materials have been used in transport construction and, in particular, in the design and construction of railways – durable concretes, reinforcement, materials obtained by combining various polymers with ordinary concrete, as well as composite materials.

The reliability and durability of railway and automobile bridges largely depends on the reliability and durability of individual structural elements of the structure, including parts of the bridge bed.

The main function of the traditional bridge structure is the leveling, waterproofing and protective layer, as well as the protection of the main load-bearing elements of the intermediate device. However, this design does not work together due to the lack of communication between the main supporting elements. Therefore, the own weight of this " pie " is an additional load and requires additional reinforcement costs in order to perceive stresses arising in the cross sections of the main beam.

The rationality of the bridge web design can be achieved by using a ten-centimeter reinforced layer of self-supporting concrete, working together with the main beams of the intermediate device and simultaneously acting as a leveling, waterproofing and protective layer.