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Studies of culverts on the high-speed section of the Tashkent-Sirdarya Railway Line

Abdualiyev Elyorbek Begaliyevich, Maxamadjonov Shuxrat Shavkatovich,

Uralov Akmal Shakarovich.

Tashkent State Transport University(Tashkent,Uzbekistan)

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Abstract: *This article shows the study of culverts, which are the most common type of artificial structures in roads and railways. For the passage of water at the intersections of watercourses with the roadbed, culverts are arranged, which, depending on the topographic, hydrological, geological and other conditions, can be of various types.*

Key words: *Culverts, bridges, pipes, chutes, duckers, earthen bed.*

Introduction

The role of railways in the development of the country's economy, increasing the export potential and supplying goods to consumers is of great importance. It is not surprising that railways are called the blood vessels of the country's economy. Therefore, great importance is attached to the development of railway networks and the maintenance of railways in operation and the maintenance of load capacity at the required level[1]. Pipes under the embankment on railways make up half of all artificial structures, and these are the most common artificial structures.

Material and Methods

Culverts are designed to pass the maximum estimated costs of a certain probability of exceeding. The probability of exceeding is determined depending on the type of road (railway, automobile), the type of structure (bridge, pipe), the category of road (I, II...V). As a result of hydraulic calculations, culverts are the fundamental works of Russian scientists: V. A. Gritsenko, N. A. Krasin, L. I. Drugov, A. S. Alexandrov, O. N. Chernykh, L. I. Vysotsky, E. N. Petrov[2,3,4,5,6,7,8].

Results

By hydraulic operation, culverts are classified:

1. According to the conditions of the flow entrance, flat and sloping pipes are distinguished.
2. By the nature of the roughness of the inner surface of the pipe:

- technical, smooth (concrete, reinforced concrete, cast iron, etc.);
- corrugated (metal, plastic, etc.).

3. By the effect of length on throughput:

- short, in which the length does not affect the throughput;
- long, in which the length affects the throughput (Figure 1).

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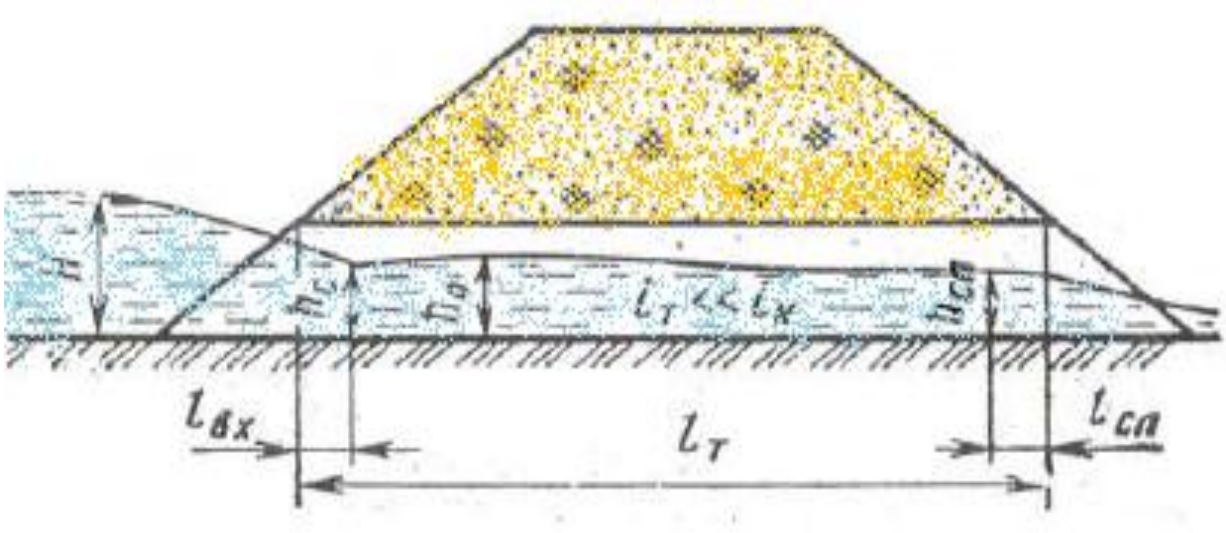

Fig. 1. Flow diagram of water in the pipe:

H – head in front of the pipe; h_c – flow depth in the compressed section; h_0-normal water depth; h_{sl} – water depth at the beginning of the drain section; l_{xx} – length of the inlet section; L_T-pipe length; l_{sl} – length of the drain section; i_T-pipe slope; i_k-critical slope[9].

Table-1

№	Pipe states	Quantity KM3367-3436 pieces	%
1)	gravity	12	15
2)	semi-pressure	45	49
3)	pressure level	43	46

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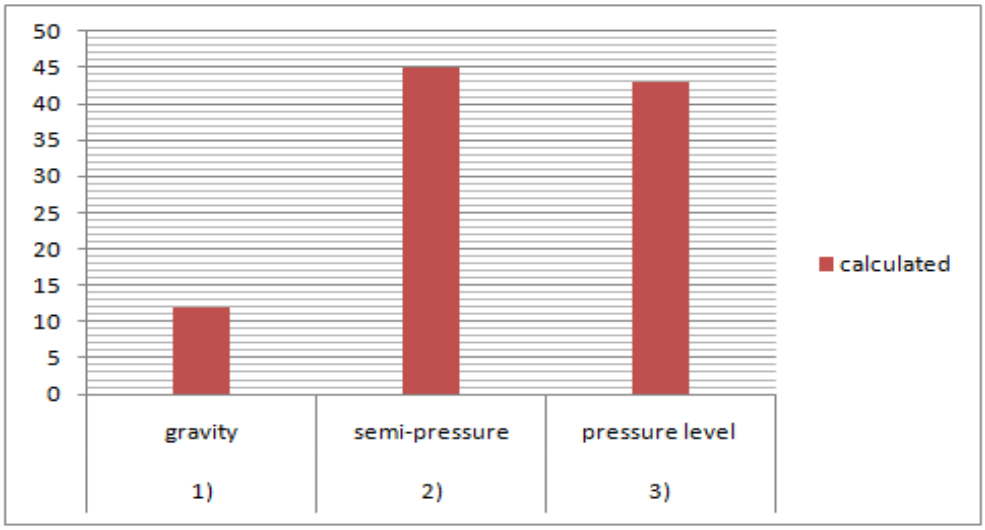

On the Tashkent-Syrdarya section, the design and condition of culverts are shown in 2-tables.

Table-2

№	Pipe states	Quantity KM3367-3436 pieces	%
1)	gravity	36	59
2)	semi-pressure	2	3
3)	pressure level	23	38

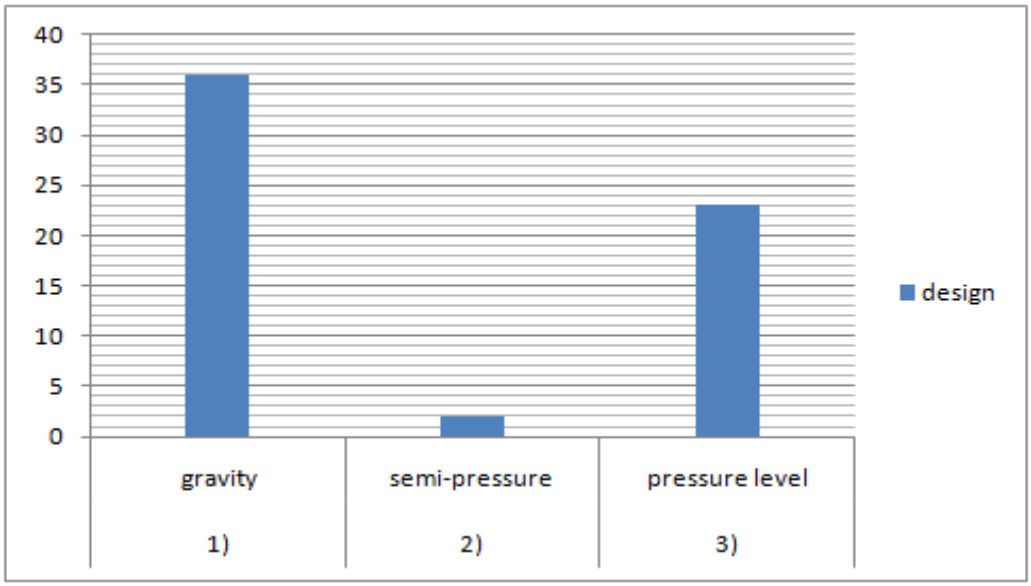

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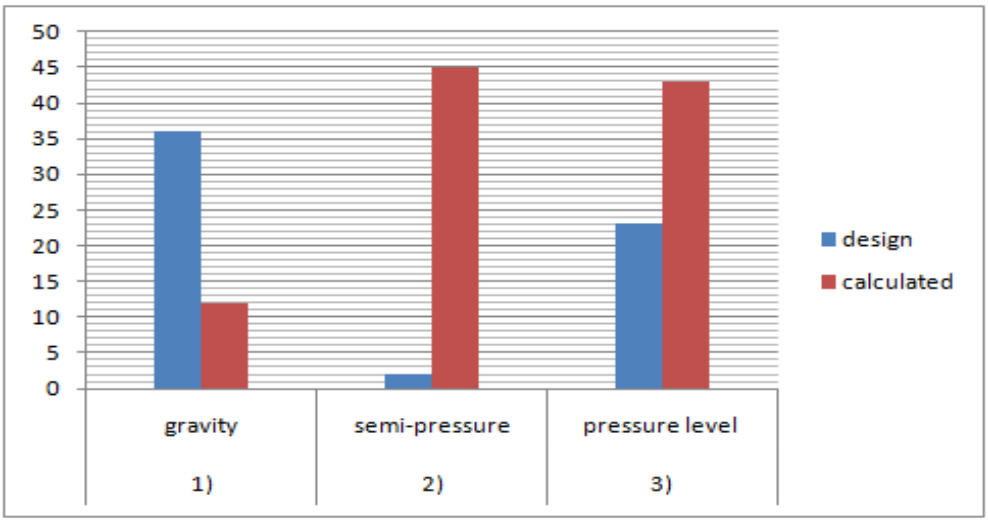
Table-3

№	Pipe states	Quantity KM3367-3436 pieces	
		Calculeted	Design
1)	gravity	36	12
2)	semi-pressure	2	45
3)	pressure level	23	43



Discussion. According to the results of the study, the following drawing was made (Fig. 2) for the culvert structure under the railway track[10].

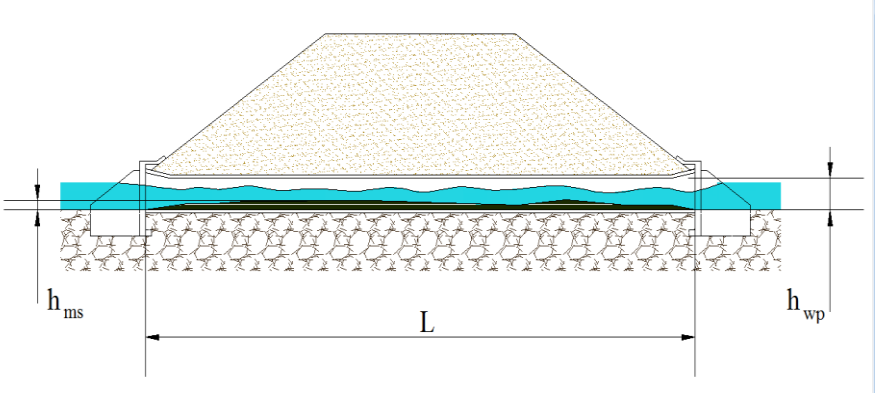


Figure-2. Conditions of culverts under railway tracks: h_{ms}-mud sediment h_{wp}-water condition in the pipe L-pipe length

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Conclusions from the results of the culvert studies can be made as follows: when we have studied the condition of water pipes located on high-speed and high-speed lines, and its detailed surveys, since pipe failures negatively affect the condition of the track structure and rolling stock.

A survey of culverts located on the 3367-3436 km of the Tashkent-Syrdarya railway line was conducted. Data on the water flow mode of the designed culverts are given in Table 2. Pipes that are supposed to work in the non-pressure mode according to the project, work in the semi-pressure or pressure mode. The reason for this was the accumulation of silt in the pipe above the level. To do this, you need to clean the culverts every quarter.

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