



HYDRAULIC PARAMETERS OF CLOSED HORIZONTAL DRAINS

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Abstract

The article provides a detailed analysis of the importance of the transition of open collectors to closed collectors on the basis of statistical data, its role in improving the reclamation of our lands and the technological module for the construction of closed collectors.

Keywords: collector, irrigation, water, hydraulic

Despite the use of modern innovative means, the existence of shortcomings in the use of water, such as the deterioration of land reclamation, the lack of water for agricultural and drinking purposes, the reduction of electricity and other energy consumption in water resources. and, of course, we can see cases of arbitrary appropriation of collector protection zones. Not to mention the fact that some of our farmers do not know the culture of water use, flooding and dumping this water into existing collectors, and the farmer does not have enough water to settle at the end of the irrigation network. Such cases lead to the violation of the working parameters of open collectors, the collapse of the edges, and the deterioration of hydraulics leads to the growth of vegetation inside the collector. Every year billions of dollars are spent in our country to clean the collectors. If they are transferred to closed collectors, these costs will be reduced. Because the places where this collector is located are considered fertile land. If you use these lands, you will have a good harvest and a good income. The purpose of the closed horizontal collector is to save public funds. The introduction of closed horizontal drainage will reduce the cost of improving the water-air-salt exchange regime of irrigated lands. Its use is economically cheaper than other types of drainage. The world practice of using closed drains shows that when used properly, they last for 50 years or more. When constructing a closed drain, the land use





coefficient (CFC) of the crop area is significantly higher than open drains, which does not interfere with the operation of high-capacity machines. Their introduction into production in the Republic of Uzbekistan began mainly in the 1960s, and now closed horizontal drains have been built on more than 600,000 hectares. The average length of the drainage network is 26 pog.m / ha. Closed drainage construction can form a complete network (primary drains, collector drains and collectors) and a separate part of the network.

Open drains are being underutilized due to a number of serious shortcomings (deterioration of the technical condition of drains and ditches, long drainage period, high water consumption in salt washing, etc.). Closed drainage networks in Uzbekistan were built in 1930-1940 at the experimental land reclamation station in Mirzachol. Due to its many advantages (long-term use, rapid and short-term irrigation, water saving, etc.), such drains were widely introduced in the 1960s in the development of protected areas in Mirzachol. Currently, we are developing lands by transferring the existing open collectors to the closed collector, as we can see if we look at the parameters of the collector.

Tubining eni b,m	ctg a1	Depth h, m	Permanent width b, m	Protection zone L, m
2.5	1.5	3	13.5	35

Existing reclamation facilities

Total: length of collector-drainage networks - 140.1 thousand km.

Also:

- open collectors - 103.0 thousand km;
- closed drainage networks - 37.1 thousand km;

So $35 + 13.5 = 48.5$ m if we calculate the total area of open collectors as 60,000 km, we get $60000 \times 48.5 = 2910$ ha.

It is advisable to use these lands for agriculture.

Activities implemented under the program in 2016-2017

Construction and reconstruction:

- 1445.0 km of open collector networks;
- 500.0 km of horizontal drainage networks;
- 12 reclamation pumping stations;
- 410 vertical drainage wells;

Rehabilitation (195.0 billion soums):

- 32.0 thousand km of open collector networks;
- 2.5 thousand km of closed drainage networks;



- 48 reclamation pumping units;
- 1600 vertical drainage wells;

There are the following technologies for the construction of closed collectors in water management:

- trench method with a trench width of 600 mm and a height of 4000 mm;
- narrowed trench width 300mm, height 4000mm;
- Method of forming a shelf in the excavation.



Figure 2. Closed inter-farm drainage technology

Semi-mechanized methodology is also used in the construction of closed drainage when the groundwater level is higher than the design depth of drainage. At the same time, the collector is opened with single-bucket excavators with strong side slopes, which do not collapse, and can work against the project from 0.3 to 0.5 meters to reduce the level of groundwater relative to the bottom mark. On one of the sides of the drain is formed a shelf 0.8-1.2 meters wide, on which the pipe is laid, the filter material is woven (Fig.). The soil is woven and the sides are strengthened. Drainage networks are laid by a mechanized brigade of 13-14 people. Finally, the drainage trenches are re-buried with bulldozers; Re-burying is carried out first on the unused side, and then on the opposite side. The method of re-burial in this sequence prevents the closed drain, which is laid, from shifting in the direction of the drying ditch. Nowadays it is becoming more and more limited. However, in the reconstruction of the irrigation system, there is a need to partially deepen the old open drains (collectors) and to create a closed horizontal drainage (Closed collector), so that the "shelving" method will be used again. Therefore, at Research Institute of Irrigation and Water Problems under "TIAME" NRU developed a system of machines for the complex mechanization of soil carving, filters and pipes, as well as reburial.

Construction of a closed collector (excluding relocation of the project) includes:

- Preparation and delivery of pipes and other materials required for the facility;
- Creation of a platform for laying pipes, placing pipes in trenches, laying them, connecting, processing of joints;



- Primary burial of laid pipes, quality control of works;
- Re-burying the trench and compacting the soil;
- Construction of primary structures, wells and other structures, connection of collectors to them;
- Quality control of construction works, re-excavation of trenches.

Technological module for the construction of closed drainage in irrigation systems

Operations	Technological parameters	Technical means	Indicators: W- yield, m ³ / s; Q- labor consumption, man s / m ³ , T- fuel consumption, kG / m ³ ; M- material demand KG / m ³ , hourly productivity
Preparation of drainage trajectory	Removal and transportation of vegetation, route planning	Bulldozers DZ-117.3, DZ-126 V-2; scrapers DZ-77A; DZ -11 P.	W = 100; Q = 0,01; T = 0,25; M =100
Delivery of drainage pipes and filter materials to the construction site	Transportation of project storage materials at a distance of 2 ... 3 km	MAN type dump trucks, KS-2571A; KS-2561 K-1 crane car	W = 17; Q = 0,07; T = 0,17; M =500
Drainage laying	Simultaneous opening of the trench to a depth of 1.5-4.5 meters with the delivery of drainage pipes and filter, closing the trench	DU-3502; DU-4003 drainage bed; PFP- 13; PP-4 filter loader	W = 200; Q = 0,02 T = 0,12;M =100

Conclusion

Today, the best solution is to transfer open collectors in the drainage system to closed collectors in order to improve the reclamation of lands and at the same time increase the number (hectares) of fertile lands. As a result, the area of fertile lands has expanded, it is possible to keep the groundwater level at a constant level (3.5-4 m), resulting in a 1.5-3.5-fold increase in productivity.



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