DESIGN PARAMETERS AND TECHNICAL CONDITION OF HYDROTECHNICAL STRUCTURES IN THE ZOMIN WATER RESERVOIR

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Abstract. Zomin water reservoir is a seasonally controlled reservoir built on a river bed. It was built on the Zominsoy river, located 8 kilometers from the center of the district, in the Zomin district of the Jizzakh region. The reservoir is designed to irrigate 7,820 hectares of land in Zomin district. In order to study the current technical condition of hydrotechnical facilities in the Zomin water reservoir, natural observation-measurement works were carried out. After checking the technical condition of hydrotechnical structures in the reservoir, it was found that there are the following defects: on the upper slope of the dam, from the scythe to the berm, at the mark 916.0 m., no deformation and damage was detected, at the mark 916.0 m, the subsidence of the berm from PK4-00 to PK5÷16 is visible, the covering plates are cracked, at the bottom there are gaps. When built according to the project, they will be 600m. At the 902 m mark, the entire berm was repaired and part of the lower slope was repaired with an area of 1566 m^2. In the area of marks 902-909 m, between the marks PK 5÷16-PK 6-00, the slope is broken, the total area reaches 200 m^2, on the berm at the mark 888.5 m. there are old concrete fragments of the upper berm and the slope of the dam. The water reservoir and other related and adjacent hydrotechnical facilities were monitored. Based on the results of natural observation-measurement works conducted in order to study the current technical condition of the hydrotechnical structures in the Zomin water reservoir, the technical condition of the hydrotechnical structures in the reservoir was assessed as being in a dangerous state.

Keywords. *Zomin water reservoir, dam, spillway, destructive spillway, natural observation-measurement works.*

Introduction. Water reservoirs are artificial reservoirs built for collecting and storing water with the help of dams and are intended for complex use in several sectors of the national economy (irrigation, water supply, electricity, shipping, fishing, flood control, etc.). Reservoir channel flow, etc. along with water transfer facilities, it provides an opportunity for redistribution across regions. Since the reservoir has great economic importance (irrigation and energy), until the end of the last century, Europe,

Asia, Africa, the West. and Jean. More than 130 very large reservoirs have been built in America, Australia and Oceania.

In the territory of Central Asia, reservoirs are built mainly to irrigate crops, improve energy and water supply. The total volume of reservoirs in Central Asia is about 50 bln. m3. In the Amudarya and Syrdarya basins, large reservoirs (Tokhtagul, Kairokkum, Chordara, Chorvok, Norak, Tuyamuyin, etc.) were built. As a result of the construction of reservoirs in Uzbekistan, 4.3 mln. hectares irrigated agriculture on more than ha of land, opportunities for wider use of water resources for hydropower and fisheries purposes have been created.

Construction of one of such reservoirs - Zomin water reservoir was carried out in 1975-1987. It was commissioned in 1987. The Zomin water reservoir is a seasonally managed water reservoir built in the river bed, located on the Zominsoy River, located 8 kilometers from the district center, in the Zomin district of the Jizzakh region. The reservoir is designed to irrigate 7,820 hectares of land in Zomin district. The main design parameters of the reservoir are as follows: normal rest water level (NDS) of the reservoir - 917.0 m, emergency (maximum) rest water level MDS 924.75 m, useless volume satx FXS -873.0 m, full volume at the NDS mark 34,52 mln.m^3, full volume in MDS is 51.00 mln.m3, useless volume is 1.1 mln.m3, the deepest part of the reservoir is 73.0m, the surface of the reservoir in NDS is 1.4 km, the largest water carrying capacity : 60 m3/s for water outlet, 250 m3/s for catastrophic water discharge facility. The water reservoir includes the following structures: a dam, a water outlet, a catastrophic (emergency) water discharge facility, a water-carrying channel, a water-carrying trough.

Figure 1. Zomin Reservoir (Google Earth)

Methodology. The research used in-kind observation and measurement works, as well as previously obtained statistical data. Reservoir dam consists of gravel - small stone lift, screened from healthy soil. The length of the dam (upper part) is 408.0m, the highest point is 73.5m, the mark of the dam is 928.7 m, the width of the upper part is

10m, the upper slope coefficient m_1= 2.5-3.0 m, the lower slope coefficient is m_2=2.0. The upper slope of the dam is covered with a 20 cm thick reinforced concrete cover from the upper slope of 888.5 meters to the sickle. From the 888.5 m mark to the 8760.0 mark, it is sealed with crushed stone, the diameter of the stones is up to 30 cm. 14.0 wide at the top slope; 18.0; 6.0; and 4 berms of 4.0 meters 876.0; 888.5; 902.0; and at the 916.0 meter mark, the berm at the 888.5 mark was constructed to restore the base of the dam and make additional injections. The width of the alluvial base of the dam is 15.0 meters (from 3 meters between the wells), the depth of 5 rows of injection barriers reaches the top of the bedrock, and the depth of the remaining 2 rows reaches 5 meters from the top of the bedrock, 1 row of cement barriers on the sides with an interval of 1.5 meters installed between concrete slabs, concrete slab thickness 0.8 m, filtration coefficient K_f=0.2 m/day, calculated filtration consumption of the barrier Q = 20-25 m^3/s.

Control measuring instruments. The project envisages the installation of 10 piezometers in order to check the condition of underground water in the Zomin Reservoir. In 1980, 10 piezometers of 5 were built at 2 gates, 2 piezometers were built on the upper slope and failed in the first year of use. In 2000, 4 pezometers were built, now there are 12 pezometers at 4 gates in Orkach and Lower Bef. In order to monitor dam defects, geodetic control-measuring devices are also provided for in the project. Until 1996, these instruments were not built and observations were made. In October 1996, the production association "Water Project" installed 2 branches of fundamental rappers, 12 surface marks and 11 plan height marks. The facility has 5 fundamental elevation markers, 38 surface markers, and 8 goalpost markers. Drainage is not provided for in the project.

Water outlet - the water outlet in the form of a tunnel is located on the left bank and is intended for irrigation and water supply. During floods, it can discharge up to 60 m/s and normally has a capacity of 20 m/s.

The length of the pressure tunnel is 354.0 meters, its diameter is 3 m, it is covered with reinforced concrete with a thickness of 45 cm, the end of the tunnel is covered with metal with a thickness of 20 mm. At the exit, the tunnel is divided into 2 aqueducts. Each of them is equipped with a flat emergency-repair valve and a working conical valve. Control and control of shutters at the outlet is carried out in the service building located above the control chamber. An electric crane with a bridge is installed in the Zatvorlar building, its load capacity is 15 tons, and the span is 10.5 meters.

At the last part of the structure, after the conical gate, a water impact well is placed, which extinguishes the excess kinetic energy of the water, and the water from it passes through the tubular water outlet on the right side to the conveying channel. The water outlet pipe is 2x2x15 meters in rectangular section. The water outlet is equipped with a flat, water-bottom immersion valve and an electric lift mechanism. After the well, a wide threshold, over which a road passes, begins. The width of the highway section is 9 m. In the water receiver there is a grid that catches liquids. The grid size b x h = 4.0x10.0m, the distance between the bars is 10 cm. During the silting of the reservoir, the lower part of the liquid bodies is blocked with reinforced concrete. Repair gate size b x h = 2.0x2.5m, installed on the water intake, lifting mechanism is

placed on the water intake tower. Designed for inspection and repair of the pressurized part of the water dispenser.

Emergency spillway - automatic emergency spillway located on the right bank, designed to divert flood waters, the largest calculated water consumption Q = 250m3/s. The water discharge is of a mixed type, with 3 sections, and consists of the following sections: the part with the extinguishing well, the frontal head, passes into the 4-meter wide section with a right-angled section; the length of the non-pressurized tunnel is 95 meters, the width of the bottom is 4 meters, the height is 4.5 m with a circular section. The slope of the tunnel is i = 0.12; 4 meters wide open rectangular novo khiri divided into parts with hinged dividers.

The length of the water-carrying channel is 11.0 km, the water carrying capacity is Q=8m3/s, it is covered with concrete, the width of the bottom is 2 meters, it has a right-angled section. Drainage channel - the drainage channel of Zominsoy is designed to drain floods. Calculated water consumption Q = 250 m3/s, slope i=0.14. Riverbad is surrounded by embankment strengthening embankment and reinforced concrete covers (thickness 0.25 meters). In order to prevent the embankments from being washed away by water, the reinforced concrete cover was lowered to a depth of 2-3 meters and covered with stones larger than 30 cm.

Results and conclusions. In order to study the current technical condition of hydrotechnical facilities in the Zomin reservoir, natural observation-measurement works were carried out. After checking the technical condition of hydrotechnical structures in the reservoir, it was found that there are the following defects: no deformations and damage were detected at the mark 916.0 m from the scree to the berm on the upper slope of the dam, subsidence of the berm from PK4-00 to PK5÷16 is visible at the mark 916.0 m, the covering plates are cracked, there are gaps at the bottom . When built according to the project, they will be 600m. At the 902 m mark, the entire berm was repaired and part of the lower slope was repaired with an area of 1566 m^2. In the area of marks 902-909 m, between marks PK 5÷16-PK 6-00, the slope is broken, the total area reaches 200 m^2, on the berm at mark 888.5 m. there are old concrete fragments of the upper berm and the slope of the dam. The water level in the upper reservoir has risen from the mark of 916.0 m, and the consumption of filtered water in the lower reservoir has increased. The reason for this is the presence of seepage paths on the sidewalls of the dam, indicating that the cement barrier on the base of the side dam is poorly made

Control measuring devices 8 out of 12 existing pressure gauges are not fully drilled or filled. Observation of depression curve is carried out only in 4 pezometers, observations are carried out every 15 days. The hood does not conform to the norm.

Water dispenser. The condition of the above-ground parts of the concrete structures of the working and emergency repair sluice building water outlet is satisfactory. The prison building has not been repaired since it was put into use, the plaster has moved in some places, and the windows are broken.

Hydromechanical equipment has been in use since 1979: maintenance was not carried out because the sluice was under water; emergency repair gates and elevators; for the repair of the conical valve, the left valve is closed, the rubber seals of the valve are water-permeable; 2 of the shutter position sensors are connected by one load screw,

according to the rules of use, each of them should be separate; lifting mechanisms do not have load rails; oil transfer hoses of both lifting mechanisms must be replaced; the rules for the use of hydrotechnical equipment are not followed. It is strictly forbidden to control the water consumption with emergency-repair valves, they must be in the fully opened or closed position. In the fall, the prison is partially closed, working instead of the prison; working valve and risers, because the left working valve is working due to the failure of the gearbox, only the right valve is discharging water: there are no shutter position sensors in both valves, there are no switches at the end; there is no oil lubrication in the steering hammer and screws, the mechanical equipment is damaged by corrosion, water is leaking from the valve seals.

Project documentation is partially saved Operating rules are out of date. It was developed in 1990. The road leading to the reservoir is in good condition. There are 2 guarded police posts, they are located at the prison building and on top of the dam. 21 people work across the state in the use of the reservoir. Based on the results of natural observation-measurement works conducted in order to study the current technical condition of the hydrotechnical structures in the Zomin reservoir, the technical condition of the hydrotechnical structures in the reservoir was assessed as being in a dangerous state.

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