UDC 626.3

Hikmatov F. U.

Assistant of the Department of "HB and PS"

Zayniddinov O. O.

Student

Bukhara institute of natural resources management of the National research university of TIIAME

Uzbekistan

EVALUATION OF THE WATER CARRYING CAPACITY OF THE MAIN WATER INTAKE FACILITY OF THE "DOSTLIK" CANAL

Annotation: In this article, the water carrying capacity of the Dostlik canal main intake is evaluated. Hydraulic calculations of the canal and calculations of the water discharge structure are carried out. Recommendations are given to improve the technical condition of the hydraulic structure.

Keywords: Hydraulic structure, water capacity, hydraulic calculation, water discharge.

Хикматов Ф.У.

Ассистент кафедры «ГТИ и НС»

Зайниддинов О. О.

Студент

Бухарский институты управления природными ресурсами НИУ «ТИИИМСХ»

Узбекистан

ОЦЕНКА ВОДОПРОПУСКНОЙ СПОСОБНОСТИ ГЛАВНОГО ВОДОЗАБОРА КАНАЛА «ДОСТЛИК»

Аннотация: В данной статье оценена водопропускная способность главного водозабора канала Достлик. Выполнены гидравлические расчеты

канала и расчеты водосбросного сооружения. Даны рекомендации по улучшению технического состояния гидротехнического сооружения.

Ключевые слова: Гидротехническое сооружение, водопропускная способность, гидравлический расчет, водоотведение.

Data on the water supply channel:

1. Maximum water flow Q_{max} = 470 m^3/s;
2. Maximum depth h_{max} = 6.06 m;
3. Width of the bottom b = 80 m;
4. Shore slope coefficient m = 2.0;
5. Slope i = 0.00004;
6. Height - roughness coefficient n = 0.025;
7. Channel bottom mark before the spillway Δ c.b = 282.10;
8. Normal water level mark in the upper reaches Δ NWL = 286.73 m;
9. Maximum water level mark in the upper reaches Δ MWL = 288.16 m;
10. Dam mark in the upper reaches Δ Dam = 288.70 m;

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To construct a graph of the operating characteristics of the channel supplying water to the hydraulic unit $Q_i=f(h_i)$ (the relationship between water depth and water flow), we give several values for the channel depth and determine the corresponding water flow according to the Schezi expression Q = ωV. We perform the calculation using a table method and construct a graph $Qi = f(h_i)$ based on the calculated values.

Table 1.

№	h_i м	b м	m	ω_i $м^2$	χ_i м	R_i м	$R_i^{1/6}$	n	C_i	i	$\sqrt{R\,i}$	V_i	Q_i $м^3/с$
1	0,0	80	2,0	0	0	0	0	0,025	0	0,00005	0	0	0
2	1,0	80		82	84,48	0,97	0,995		39,8		0,007	0,28	22,7

3	2,0	80		168	88,96	1,89	1,11		44,47		0,01	0,43	72,6
4	3,0	80		258	93,44	2,76	1,184		47,38		0,012	0,55	143,6
5	4,0	80		352	97,92	3,59	1,24		49,51		0,013	0,66	232
6	5,0	80		450	102,4	4,39	1,28		51,19		0,0148	0,76	341,3
7	6,6	80		558	107,2	5,21	1,32		52,66		0,0161	0,85	474,3

Here: hi–water depth in the channel, m;

b– width of the channel bottom, m;

m– slope coefficient of the channel bank;

i– slope of the channel bed;

ωi– channel live surface, m2;

χi– wetted perimeter, m;

Ri– channel hydraulic radius, m;

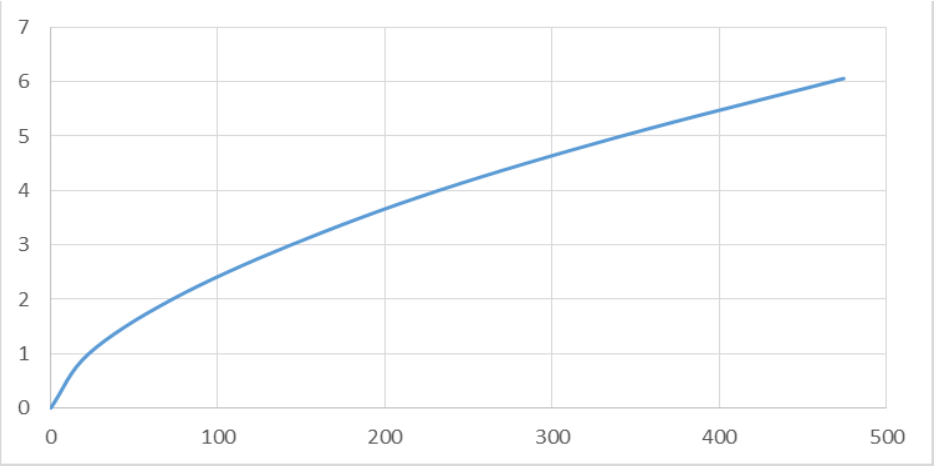
Ci– Shezi coefficient;

n– channel roughness coefficient.

Since the channel cross-section is trapezoidal, we use the following formulas to calculate ωi, χ_i, R_i, C_i:

$$\omega_i=(b+mh_i)h_i,\ \chi_i=b+2h_i(m^2+1)^{0,5},\ R_i=\omega_i/\chi_i$$

$$C_i=(R_i^{1/6})/n,\ V_i=\omega_i C_i(R_i i)^{0,5},\ Q_i=\omega_i V_i$$



Picture 2. Operating characteristics of the water supply channel

The correctness of the calculations is checked according to the constructed graph. That is, at the maximum value of the water depth h_{max}=6.06m, the maximum water flow rate determined on the abscissa axis of the graph should be Q_{max} = 470 m^3/s.

Conclusion. The technical condition of the hydraulic node located at the head of the "Dostlik" canal was examined and assessed as "satisfactory".

To ensure its reliable operation, the following measures are recommended:

Operate the locks in the hydraulic node in accordance with the established procedure;

Install piezometric and control measuring instruments to monitor the filtration regime and deformation of structures at the base of the hydraulic node structures;

Restore the design documentation for the hydraulic node;

Develop the rules for the operation of the hydraulic node based on new modern requirements;

Create a reserve of necessary materials, taking into account possible accidents at the hydraulic node;

Asphalt the road passing over the hydraulic node, install speed limit signs on it;

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