MAGISTRAL YO‘LLARDA AVARIYA HOLATIDA SUV TA’MINOTI TARMOG‘INING GIDRAVLIK PARAMETRLARINI ANIQLASH

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ANNOTATSIYA

Bugungi kundagi suv ta’minoti tizimining asosiy muommolaridan bo‘lgan, tarmoqning uzoq muddat davomida xizmat qilishida har-xil muommolar yuzaga kelishi, ushbu muommolardan kelib chiqib, quvurlarni tez eskirishini hisobga olsak, tizimni hisoblashni va ushbu tizimni eng optimal tizim bilan loyihalashdagi muomolarni yechishga qaratilgan.

Kalit so‘zlar: Avariya, rezervar, gidravlika.

Avariyalar maksimal suv iste'mol qilish soatlarida va quvurlar shikastlangan, yorilib ketgan, uyning kirish joylari bilan bog‘langan joylarda bosim kuchayganda sodir bo‘ladi. Hozirgi vaqtda shaharlarda barcha turar-joy va jamoat binolari markazlashtirilgan suv ta’minoti tizimidagi sarf va suv bosimining yetarli emasligi sababli zarur suv ta’minotini to‘plash uchun o‘z suv rezervarlari va suv omborlariga ega.

Natijada, asosiy quvurlarga parallel ravishda kichikroq diametrli qo‘shimcha quvurlarni yotqizish va asosiy boshi berk qismlarini halqalash orqali suv ta’minoti tarmog‘ini modernizatsiya qilish kerak .

Gidravlika qonunlariga ko‘ra, ketma-ket ulangan suv ta’minoti tarmog‘ining quvur qismlari uchun bosim yo‘qotishlari umumlashtiriladi va parallel ulangan ikkita [82–86]:

$$h = \frac{KL}{D^{4.87}} \left(\frac{Q}{C} \right)^{1.85}$$

bu yerda h - bosim yo‘qolishi, m; C – g‘adir-budurlik koeffitsienti; D - quvur diametri, m; L - quvur uzunligi, m; K doimiy kattalik .

ketma-ket ulangan quyma temir va po‘lat quvurlar tarmog‘ining oxirgi qismi uchun g‘adir-budurlik koeffitsienti va diametri formulalar bo‘yicha aniqlanadi.

$$C_r = \frac{\frac{L_r^{0.54}}{D_r^{2.63}}}{\left(\sum \frac{L_i}{D_i^{4.87} C_i^{1.85}}\right)^{0.54}}$$

$$D_r = \frac{\frac{L_r^{0.205}}{C_r^{0.38}}}{\left(\sum \frac{L_i}{D_i^{4.87} C_i^{1.85}}\right)^{0.205}}$$

Parallel ulangan quvurlar tarmog‘ining oxirgi qismi uchun g‘adir-budurlik koeffitsienti va diametri formulalar bilan aniqlanadi.:

$$C_r = \frac{L_r^{0.54}}{D_r^{2.63}} \sum \frac{C_i D_i^{2.63}}{L_i^{0.54}}$$

$$D_r = \left(\frac{L_r^{0.54}}{D_r} \sum \frac{C_i D_i^{2.63}}{L_i^{0.54}}\right)^{0.38}$$

Temir va kasting temir quvurlari devorlarining yemirilishi ularning ishlash vaqtiga qarab ortadi, Nazen- Vilyamsning yemirilish koeffitsienti esa kamayadi (2.3-jadval) [30, 35].

Yangi va eski quvurlarning g‘adur-budurlik koeffitsientlari (Nazen-Villiyams)

2.3-jadval

Temir quvurlar (ishlatilgan muddati)	Nazen-Villiyams koeffitsienti
Yangi quvur	130
10 yil	107-113
20 yil	89-100
30 yosh	75-90
40 yosh	64-83

Keling, 2000 mm diametrli tranzit liniyasining qanday shikastlanishi tarmoqdagi oqim taqsimotiga o‘zgartirishlar kiritishini ko‘rib chiqaylik. Magistral quvur liniyasida avariya sodir bo‘lgan taqdirda tarmoqni gidravlik hisoblash natijasi shuni ko‘rsatdiki, suv ta’minoti tarmog‘i tomonidan kerakli oqim va bosimni ta’minlash muammoli va jiddiy oqibatlarga olib keladi . Tarmoqning ishdan chiqishiga yo‘l qo‘ymaslik uchun ,

suv oqimi tezligi 3 dan ortiq bo‘lgan Y-18, Y-19, Y-22, Y-23, Y-105, Y-46 va boshqalar bo‘limlarida . m/s , nasos stantsiyasida nasoslarning bosimini kamaytirish kerak, ammo bu iste'molchilar uchun bosimning pasayishiga olib keladi .

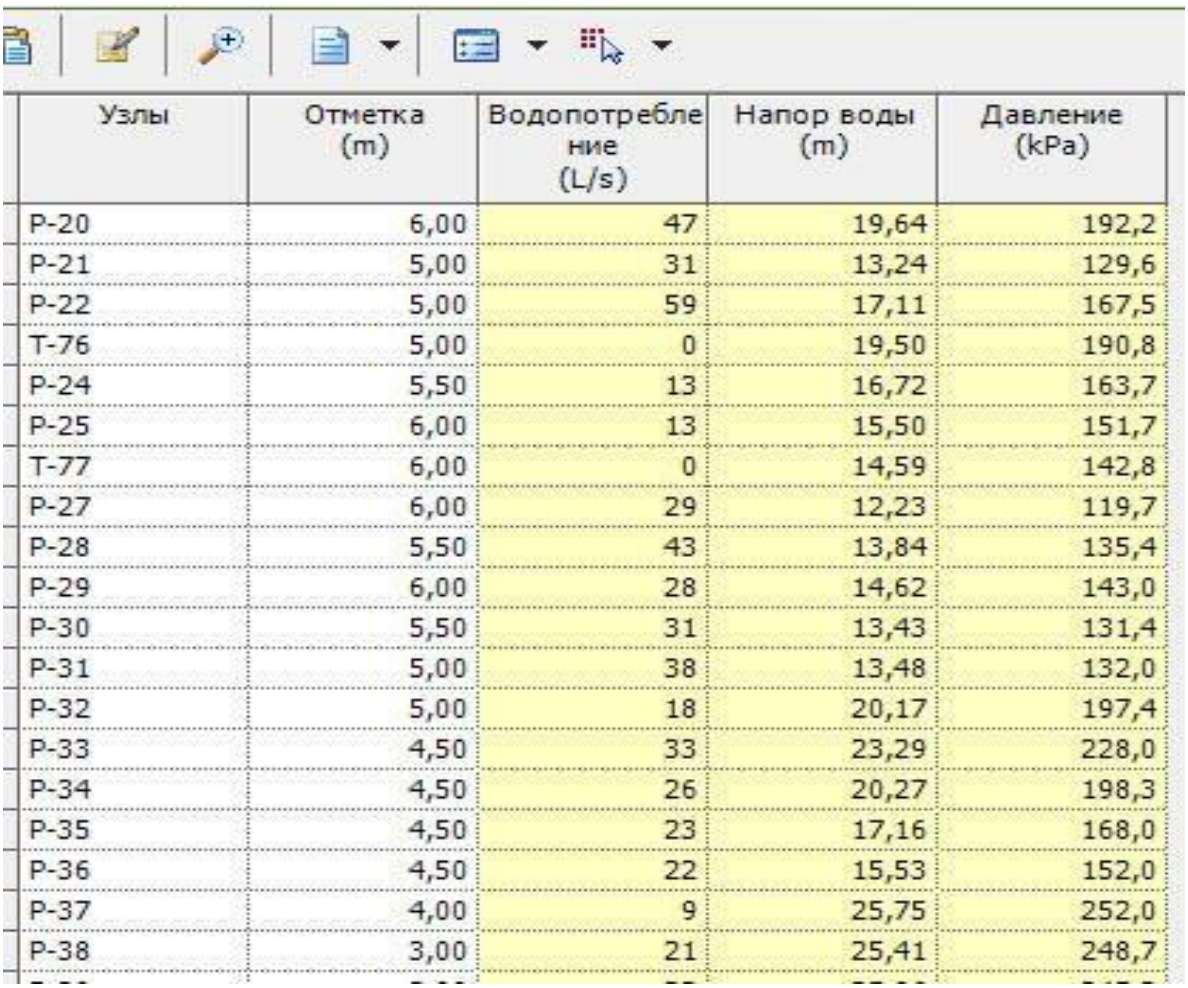
Участок	Диаметр (mm)	Material	Hazen-Williams C	Скорость (m/s)	Потери напора (m)	Расход (L/s)
Y-15	2.000,0	Steel	140,0	0,64	0,06	1.995
Y-18	300,0	Ductile I...	130,0	11,46	167,39	810
Y-19	250,0	Ductile I...	130,0	16,29	522,15	800
Y-20	350,0	Ductile I...	130,0	5,95	74,37	-573
Y-21	300,0	Ductile I...	130,0	8,49	125,94	-600
Y-22	250,0	Ductile I...	130,0	11,75	308,15	-577
Y-23	300,0	Ductile I...	130,0	9,36	237,77	-661
Y-24	300,0	Ductile I...	130,0	0,50	1,04	35
Y-25	150,0	Ductile I...	130,0	1,20	9,91	-21
Y-26	100,0	Ductile I...	130,0	6,62	376,93	-52
Y-29	350,0	Ductile I...	130,0	0,80	1,45	77
Y-32	100,0	Ductile I...	130,0	0,52	3,80	4
Y-33	300,0	Ductile I...	130,0	0,56	1,81	-39
Y-34	600,0	Ductile I...	130,0	1,37	7,75	-387
Y-35	600,0	Ductile I...	130,0	2,04	9,03	578
Y-36	250,0	Ductile I...	130,0	0,19	0,16	9
Y-37	250,0	Ductile I...	130,0	0,39	0,64	-19
Y-38	100,0	Ductile I...	130,0	6,31	357,14	-50
Y-39	100,0	Ductile I...	130,0	7,18	239,52	-56
Y-40	100,0	Ductile I...	130,0	9,46	448,62	-74
Y-41	350,0	Ductile I...	130,0	1,56	5,64	150

2.4-rasm. Qo‘shimcha bo‘limlar bilan tarmoqning gidravlik hisobi

Bunday vaziyatni oldini olish uchun diametri 2000 mm bo‘lgan ikkita tranzit liniyasi o‘rtasida ikkita jumperni yotqizish kerak. Birinchi jumperni 1-sonli nasos stantsiyasi yaqinida, ikkinchisini mintaqasi bilan chegaraga yaqin joylashtiring [47, 44]. WaterGEMS dasturidan foydalangan holda gidravlik hisob (2.5-rasm) 12 dan 22 metrgacha bosimga ega bo‘lgan ko‘pchilik birliklarda bosim etarlicha barqaror ekanligini ko‘rsatdi . Bunday holatni oldini olish uchun ikkita jumperni qo‘yish kerak

Hisoblashning keyingi qadami suv o‘lchamlari ruxsat etilgan maksimal darajadan oshadigan joylardagi diametrlarni sozlashdir, bu esa bosim yo‘qotishlarni minimallashtiradi . Suv bosimini oshirish uchun nasoslarning ishlash rejimini parallel tarzda sozlash mumkin .

Y-104, Y-23, Y-24 uchastkalaridagi diametrlarni 300 mm dan 400 mm gacha oshirish ba’zi tugunlar umuman suv olmasligini ko‘rsatadi. Shu bilan birga, 13 dan ortiq tugunlar 12 m dan past (maksimal tushirish soatiga) suvning boshiga ega. Tarmoqdagi kerakli miqdordagi suvni va kerakli bosimni ta’minlash uchun oqim taqsimotini kunning istalgan vaqtida, har qanday avariyadan qat'inazar, 12 m dan ortiq suv bosimi ta’minlanmaguncha sozlashni davom ettirish kerak.



Узлы	Отметка (m)	Водопотребление (L/s)	Напор воды (m)	Давление (kPa)
P-20	6,00	47	19,64	192,2
P-21	5,00	31	13,24	129,6
P-22	5,00	59	17,11	167,5
T-76	5,00	0	19,50	190,8
P-24	5,50	13	16,72	163,7
P-25	6,00	13	15,50	151,7
T-77	6,00	0	14,59	142,8
P-27	6,00	29	12,23	119,7
P-28	5,50	43	13,84	135,4
P-29	6,00	28	14,62	143,0
P-30	5,50	31	13,43	131,4
P-31	5,00	38	13,48	132,0
P-32	5,00	18	20,17	197,4
P-33	4,50	33	23,29	228,0
P-34	4,50	26	20,27	198,3
P-35	4,50	23	17,16	168,0
P-36	4,50	22	15,53	152,0
P-37	4,00	9	25,75	252,0
P-38	3,00	21	25,41	248,7

2.7-rasm. Avariya holatida tarmoqni gidravlik hisoblash

Y-98, Y-132, Y-34, Y-23, U-104, U-165, Y-92 uchastkalarida quvur diametrlarini oshirgandan so‘ng, hisoblash natijalari ertalab soat 8 da (maksimal) ko‘rsatdi. suv iste'moli), suv bosimi faqat ikkita R-70 va R-65 tugunlarida 11,9 va 11,8 m ni tashkil etdi, tarmoqning boshqa tugunlarida bosim 12 m dan oshdi

Gidravlik hisoblash natijalariga ko‘ra, tarmoq tugunlaridagi bosimlarning piezometrik chiziq qurilgan, bu balandligi 12 m dan kam bo‘lgan uylarning tomlarida joylashgan ko‘plab alohida suv omborlarini yo‘q qilishga imkon beradi

Rasmda magistral quvur liniyasining ikkita uchastkasida maksimal suv iste'moli soatida (8 soat) oqim tezligi, suv sarfi va bosimning yo‘qolishi ko‘rsatilgan. Grafikdan ko‘rinib turibdiki, Y-4 kesimida suv sarfi q = 5758 l/s va suv tezligi v = 1,83 m/s Y-3 kesimidagi bir xil ko‘rsatkichlardan deyarli 2 barabar yuqori. (2-nasos stantsiyasi) . Avariyani bartaraf etishda suv harakati tezligini bunday oshirishga ruxsat beriladi .

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