Ppasuxi
110 kvt eleqtrogadamcemi xazis skopingis SeniSvnebze

Sps „saerTaSoriso energo korporacia", qveynis eleqtrosistemaSi CarTvis mizniT, ambrolaurisa da onis municipalitetebSi axorcielebs 20,18 km-is sigrZis 110 kvt Zabvis miwiszeda eleqtrogadamcemi xazis gayvanas. aRniSnuli maRali Zabvis xazi 17 mgvt-iani „luxuni 2" hesidan unda miuerTdes 110 kvt Zabvis qvesadgurs „oni-110". maRali Zabvis eleqtrogadamcem xazze ewyoba 75 erTeuli sayrdeni anZa, romelTa garkveuli raodenobis ganTavseba dagegemilia mdinareTa kalapotebis siaxloves, ris gamo skopingis #33 daskvnaSi mocemulia SeniSnebi. aRniSnuli SeniSvnebis mixedviT saWiroa mdinareTa gadasasvlelebze garkveuli hidrologiuri informaciis wardgena.

1:25000 masStabis topografiul rukaze datanili 110 kvt Zabvis miwiszeda eleqtrogadamcemi xazis trasidan naTlad Cans, rom md. sarTaulas kalapotis siaxloves mosawyobi D-25 da D-26 anZebi Sesabamisad 20 da 30 metriT maRlaa mdinaris kalapotidan. Aaseve 5 metriT maRlaa D-17 anZa md. sarTaulas marjvena usaxelo Senakadis kalapotidan. sxva monakveTebze anZebis mowyoba gaTvaliswinebulia wyalgamyofebze, rac aseve gamoricxavs anZebis datborvas da maT mdgradobaze wylis negatiur zemoqmedebas, ris gamo maT kveTebSi hidrologiuri maxasiaTebelebis dadgena miuReblad iqna miCneuli.

Aamitom, mizanSewonilad iqna miCneuli wylis maqsimaluri xarjebisa da maTi Sesabamisi doneebis dadgena did mdinareTa (md. luxuni, md. rioni, md.jejora) kalapotebis uSualo siaxloves an maT kalapotebSi mosawyobi sayrdeni anZebis kveTebSi. kerZod, SerCeuli iqna md. luxunze mSenebare hesis saagregato Senobis uSualo siaxloves mosawyobi D-1 anZa, md. rionis kalapotis uSualo siaxloves mosawyobi D-45, D-46, D-54, D-55, D-56, D-61, D-71 da md. jejoras SesarTavis siaxloves mosawyobi D-73 anZa.

aRsaniSnavia, rom calkeuli anZebis mowyoba gaTvaliswinebulia mdinare rionis kalapotidan maRal niSnulebze. magaliTad, md. rionis kalapotis siaxloves mosawyobi D-45, D-46, D-54 da D-71 anZebis mowyoba gaTvaliswinebulia Sesabamisad 12,1 m-iT, 12,55 m-iT, 15,75 m-iT da 42,03 metriT maRla mdinaris kalapotidan, rac gamoricxavs maT datborvas da maT mdgradobaze wylis negatiur zemoqmedebas 200 wliani ganmeorebadobis wyalmovardnebis gavlis procesSi.

sxva, md. luxunis, md. rionis da md. jejoras kalapotebis siaxloves mosawyobi DD-1,D D-55, D-56, D-61 da D-73 anZebis kveTebSi wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebis dadgenis mizniT, gadaRebuli iqna mdinareTa kalapotebis ganivi kveTebi, romelTa mixedviT ganisazRvra mdinareTa hidravlikuri elementebi. aRniSnuli hidravlikuri elementebis mixedviT agebuli iqna wylis maqsimalur xarjebsa da doneebs Soris $Q = f(H)$ damokidebulebis mrudebi da dadgenili iqna sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebi.

qvemoT mocemulia md. luxunis, md. rionis da md. jejoras mokle hidrografiuli daxasiaTeba, maTi maqsimaluri xarjebi, wylis maqsimaluri doneebi da kalapotis garecxvis siRrmeebi saproeqto anZebis SesaZlo datborvis SemTxvevaSi.

Mmdinare luxuni (luxuniswyali) saTaves iRebs leCxumis qedis samxreT ferdobze, mTa luxunis-wveris (3179,6 m) samxreT-aRmosavleTiT 1,3 km-Si 2650 metris simaRleze mdebare wyarodan da erTvis md. rions marjvena mxridan sofel wesTan. mdinaris sigrZe 39 km, saerTo vardna 2038 m, saSualo qanobi 52,2 ‰. mdinaris wyalSemkrebi auzis farTobi 293 km², auzis saSualo simaRle ki 1750 metria.

mdinaris wylianobis reJimi xasiaTdeba gazafxulis xangrZlivi wyaldidobiT, Semodgomis wyalmovardnebiT da zamTris aramdgradi wyalmcirobiT. sezonuri Tovlis dnobiT gamowveuli wyaldidoba Cveulebriv iwyeba martSi da grZeldeba agvistos bolomde an seqtembris dasawyisamde, rasac mosdevs Semodgomis wvimebiT gamowveuli wyalmovardnebi. Semodgomis wvimebiT gamowveuli wyalmovardnebi calkeul wlebSi katastroful xasiaTs iZens.

saproeqto elgadamceemi xazis DD-1 anZis kveTSi wylis maqsimaluri xarjebi dadgenilia rogorc analogis, aseve saqarTveloSi kargad aprobirebuli empiriuli meTodiT. Aanalogis meTodiT miRebuli xarjebi ararealurad dabali da miuRebelia. Aamitom, wylis maqsimaluri xarjebis saangariSo sidideebi dadgenilia meTodiT, romelic mocemulia „kavkasiis pirobebSi mdinareTa maqsimaluri Camonadenis saangariSo teqnikur miTiTebaSi" da gamoiyeneba im SemTxvevaSi, rodesac mdinaris wyalSemkrebi auzis farTobi

saangariSo kveTSi ar aRemateba 400 km²-s. aRniSnuli meTodis Tanaxmad, wylis maqsimaluri xarjebis sxvadasxva ganmeorebadobis sidideebi iangariSeba formuliT, romelsac Semdegi saxe gaaCnia

$$Q = R \cdot \left[\frac{F^{2/3} \cdot K^{1,35} \cdot \tau^{0,38} \cdot \bar{i}^{0,125}}{(L+10)^{0,44}} \right] \cdot \Pi \cdot \lambda \ \delta \ \text{m}^3/\text{wm}$$

zemoT warmodgenili empiriuli formuliT dadgenili wylis maqsimaluri xarjebi, romlebic mocemulia #1 cxrilSi, miRebulia saangariSo sidideebad elgadamcemi xazis DD-1 anZis kveTSi.

mdinare luxunis morfometriuli elementebi da sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebi m³/wm-Si

cxrili #1

kveTi	F km²	L km	i kal	Π	K	λ	δ	maqsimaluri xarjebi				
								$\tau=$ 200 wels	$\tau=$ 100 wels	$\tau=$ 50 wels	$\tau=$ 20 wels	$\tau=$ 10 wels
DD-1 anZa	180	21.9	0.073	1.00	6.00	0.88	1.00	435	375	290	205	155

mdinaris hidravlikuri elementebi, romelTa mixedviT aigo wylis maqsimalur xarjebsa da doneebs Soris $Q = f(H)$ damokidebulebis mrudi da dadgenili iqna sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebi, mocemulia #2 cxrilSi

mdinare luxunis hidravlikuri elementebi,

cxrili #2

niSnulebi m.abs.	kveTis elementebi	kveTis farTobi ωMm²	nakadis sigane B m	saSualo siRrme h m	nakadis qanobi i	saSualo siCqare Mv m/wm	wylis xarji Q m³/wm
anZa DD-1		n **=0,065**	**anZis ganTavsebis niSnuli 887,94 m. abs.**				
881.73	kalapoti	5.53	12.7	0.43	0.0306	1.53	8.46
883.00	kalapoti	23.1	15.0	1.54	0.0306	3.59	82.9
883.00	mSr.Kkalap.	11.3	6.10	1.85	0.0306	4.06	45.9
	∑	34.4	21.1				129
884.00	kalapoti	39.1	17.0	2.30	0.0306	4.70	184
884.00	mSr.Kkalap.	19.3	10.0	1.93	0.0306	4.18	80.7
884.00	arxi	44.6	9.50	4.69	0.0306	7.58	338
	∑	103	36.5				603

#2 cxrilSi mocemuli hidravlikuri elementebis cxriliT agebuli $Q = f(H)$ damokidebulebis mrudiT dadgenili sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebi, mocemulia #3 cxrilSi

mdinare luxunis maqsimaluri doneebi
DD-1 anZis kveTSi

cxrili #3

$\tau=$ weli	200	100	50	20	10
Q m³/wm	435	375	290	205	155
H m.abs	**883.80**	**883.70**	**883.50**	**883.30**	**883.10**

DD-1 anZis mowyoba dagegmilia 887,94 metr niSnulze, rac maRalia 100 wliani ganmeorebadobis wylis maqsimaluri xarjis Sesabamis doneze 4,24 metriT, ris gamo gamoricxulia anZis datborva.

M **mdinare rioni** saTaves iRebs kavkasionis qedis samxreT ferdobze fasis mTasTan, zRvis donidan 2620 metrze da erTvis Sav zRvas qalaq foTTan. mdinaris sigrZe 327 km, saSualo qanobi 7,2 ‰, wyalSemkrebi auzis farTobi, romlis saSualo simaRlea 1084 m, 13 400 km²-is tolia.

mdinare ikvebeba myinvarebis, Tovlis, wvimisa da gruntis wylebiT, magram ZiriTadad sazrdoobs Tovlisa da wvimis wyliT. misi wylianobis reJimi xasiaTdeba gazafxul-zafxulis wyaldidobiT da

wyalmovardnebiT mTeli wlis ganmavlobaSi. mdinareze maqsimaluri Camonadeni aRiniSneba gazafxulze (IV-VI), rodesac Camoedineba wliuri Camonadenis 38,8%. Semodgomaze Camoedineba wliuri Camonadenis 18%, xolo zamTarSi 19,7%. wliuri Camonadenis ganawileba Tveebs Soris metad araTanabaria. maqsimaluri Camonadeni Cveulebriv maisis TveSi aRiniSneba da wliuri Camonadenis 13,9% Seadgens, minimaluri Camonadeni ki ianvarSi fiqsirdeba da wliuri Camonadenis mxolod 5%-s utoldeba.

saproeqto elgadamcemi xazis D-55, D-56 da D-61 anZebis kveTebSi wylis maqsimaluri xarjebi dadgenilia rogorc analogis, aseve saqarTveloSi kargad aprobirebuli regionaluri empiriuli formuliT. Aanalogis meTodiT miRebuli xarjebi dabali da miuRebelia. Aamitom, wylis maqsimaluri xarjebis saangariSo sidideebi dadgenilia regionaluri empiriuli formuliT, romelic gamoiyeneba im SemTxvevaSi, rodesac mdinaris wyalSemkrebi auzis farTobi saangariSo kveTSi aRemateba 400 km²-s. aRniSnuli regionaluri empiriuli formula mocemulia hidrologiur cnobarSi ,,ssr kavSiris zedapiruli wylis resursebi, tomi 9, gamoSveba I, dasavleT kavkasia,, da mas Semdegi saxe gaaCnia

$$Q_{5\%} = \left[\frac{6.6}{(F+1)^{0,44}}\right] \cdot F \ \text{m}^3/\text{wm}$$

sadac F -mdinaris wyalSemkrebi auzis farTobia saproeqto anZebis kveTebSi. wyalSemkrebi auzis farTobis SeyvaniT regionalur-empiriul formulaSi miiReba md. rionis 5%-iani uzrunvelyofis wylis maqsimaluri xarji. gadasvla 5%-iani uzrunvelyofidan sxva uzrunvelyofebze ganxorcielebulia imave hidrologiur cnobarSi moyvanili specialuri koeficientebis meSveobiT.

aRsaniSnavia, rom D-55 da D-56 anZebi mdebareoben erTmaneTis sialoves md. xeuris SesarTavis qvemoT, sadac md. rionis wyalSemkrebi auzis farTobi 1617 km²-ia, xolo D-61 anZa, md. xeuris SesarTavis zemoT, sadac md. rionis wyalSemkrebi auzis farTobi 1535 km²-is.

zemoT moyvanili formuliT dadgenili md. rionis sxvadasxva uzrunvelyofis wylis maqsimaluri xarjebi saproeqto anZebis kveTebSi, mocemulia #4 cxrilSi.

mdinare rionis wylis maqsimaluri xarjebi

cxrili #4

anZis #	F km²	uzrunvelyofa P %				
		0.5	1	2	5	10
anZa D-55	1617	700	620	540	415	350
anZa D-56	1617	700	620	540	415	350
anZa D-61	1535	685	605	520	400	340

mdinaris hidravlikuri elementebi, romelTa mixedviT aigo wylis maqsimalur xarjebsa da doneebs Soris $Q = f(H)$ damokidebulebis mrudebi da dadgenili iqna sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebi, mocemulia #5 cxrilSi

mdinare rionis hidravlikuri elementebi

cxrili#5

niSnulebi m.abs.	kveTis elementebi	kveTis farTobi ωMm²	nakadis sigane B m	saSualo siRrme h m	nakadis qanobi i	saSualo siCqare Mv m/wm	wylis xarji Q m³/wm
anZa DD-55 n=0,045 **anZis ganTavsebis niSnuli 728.41 m. abs.**							
725.07	Mmarcx.kalap.	10.5	16.1	0.65	0.0075	1.44	15.1
725.07	Mmarjv.kalap	25.3	23.6	1.07	0.0075	2.01	50.8
	Σ	35.8	39.7				65.9
726.00	ZiriT.kalap	85.5	73.5	1.16	0.0075	2.12	181
726.00	mSr.Kkalap	4.82	10.0	0.48	0.0075	1.18	5.69
	Σ	90.3	83.5				187
727.00	Kkalapoti	206	156	1.32	0.0075	2.32	478
728.00	kalapoti	371	174	2.13	0.0075	3.19	1183
anZa DD-56 n=0,049 **anZis ganTavsebis niSnuli 732.20 m. abs.**							
729.44	Kkalapoti	28.0	39.4	0.71	0.0105	1.66	46.5

730.50	kalapoti	71.8	43.2	1.66	0.0105	2.94	211
730.50	mSr.Kkalap	7.08	15.0	0.47	0.0105	1.26	8.92
	∑	78.9	58.2				220
731.50	Mmarcx.kalap.	159	88.5	1.80	0.0105	3.10	493
731.50	Mmarjv.kalap	15.5	38.0	0.41	0.0105	1.16	18.0
	∑	174	126				511
732.50	Mmarcx.kalap.	261	147	1.78	0.0105	3.08	804
732.50	Mmarjv.kalap	112	133	0.84	0.0105	1.86	208
	∑	373	280				1012
anZa DD-61 n **=0,054 anZis ganTavsebis niSnuli 741.86 m. abs.**							
738.87	Kkalapoti	24.1	29.9	0.81	0.0154	1.99	48.0
740.00	kalapoti	69.8	51.0	1.37	0.0154	2.84	198
741.00	Kkalapoti	135	79.0	1.71	0.0154	3.29	444
742.00	kalapoti	215	81.0	2.65	0.0154	4.41	948

#5 cxrilSi mocemuli hidravlikuri elementebis cxriliT agebuli $Q = f(H)$ damokidebulebis mrudiT dadgenili sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebi, mocemulia #6 cxrilSi

<div align="center">mdinare rionis maqsimaluri doneebi</div>

<div align="right">cxrili #6</div>

DD-55 anZa; **anZis ganTavsebis niSnuli 728.,1 m. abs.**					
τ =weli	200	100	50	20	10
Q m³/wm	700	620	540	415	350
H m.abs	**727.30**	**727.20**	**727.10**	**726.90**	**726.70**
DD-56 anZa; **anZis ganTavsebis niSnuli 732,20 m. abs**					
τ =weli	200	100	50	20	10
Q m³/wm	700	620	540	415	350
H m.abs	**731.90**	**731.80**	**731.60**	**731.20**	**731.00**
DD-61 anZa; **anZis ganTavsebis niSnuli 741,80 m. abs**					
τ =weli	200	100	50	20	10
Q m³/wm	685	605	520	400	340
H m.abs	**741.50**	**741.30**	**741.20**	**740.90**	**740.70**

rogorc warmodgenili #6 cxrilidan Cans, md. rionis kalapotis uSualo siaxloves mosawyobi DD-55, DD-56 da D-61 anZebi ar itboreba 100 wliani ganmeorebadobis wylis maqsimaluri xarjis Sesabamis doniT, rac gamoricxavs maTze wylis negatiur zemoqmedebas.

Mmdinare jejora saTaves iRebs raWisa da dvaleTis qedebis SeuRlebaze arsebuli myinvaridan 3170 metris simaRleze da erTvis md. rions marcxena mxridan q. onTan 768 metris siamRleze. mdinaris sigrZe 50 km, saerTo vardna 2402 m, saSualo qanobi 48,0‰, wyalSemkrebi auzis farTobi 438 km², auzis saSualo simaRle ki 1865 metria. mdinaris ZiriTadi Senakadebia Rramula (sigrZiT 16 km) da xvedrula (19 km). maT garda mdinares erTvis 87 Senakadi jamuri sigrZiT 147 km.

mdinare sazrdoobs myinvarebis, Tovlisa da wvimis wylebiT. gruntis wylebis roli mdinaris sazrdoobaSi meorexarisxovania. misi wylianobis reJimi xasiaTdeba gazafxul-zafxulis xangrZlivi wyaldidobiT, romelsac xSirad emTxveva wvimebiT gamowveuli wyalmovardnebi da zamTris SedarebiT mdgradi wyalmcirobiT. gazafxul-zafxulis periodSi Camoedineba wliuri Camonadenis 65-70%, zamTarSi 13-14%, danarCeni ki Semodgomaze. mdinare gamoiyeneba soflis wisqvilebis samuSaod.

saproeqto elgadamcemi xazis D-73 anZis kveTSi wylis maqsimaluri xarjebi dadgenilia rogorc analogis, aseve regionaluri empiriuli formuliT. analogis meTodiT miRebuli xarjebi dabali da miuRebelia. Aamitom, wylis maqsimaluri xarjebis saangariSo sidideebis dadgenilia imave regionaluri empiriuli formuliT, romelic gamoyenebulia md. rionis SemTxvevaSi. D-73 anZis, anu mdinaris SesarTavis kveTSi, md. jejoras wyalSemkrebi auzis farTobi 438 km²-ia. Mmisi SeyvaniT zemoT moyvanil regionalur empiriul formulaSi miiReba 5%-iani uzrunvelyofis wylis maqsimaluri xarji. gadasvla 5%-iani uzrunvelyofidan sxva uzrunvelyofebze ganxorcielebulia specialuri koeficientebis meSveobiT.

mdinare jejoras sxvadasxva uzrunvelyofis wylis maqsimaluri xarjebi D-73 anZis kveTSi, dadgenili regionaluri empiriuli formuliT, mocemulia #7 cxrilSi.

mdinare jejoras wylis maqsimaluri xarjebi

cxrili #7

anZis #	F km²	uzrunvelyofa P %				
		0.5	1	2	5	10
anZa D-73	438	365	300	260	200	170

mdinaris hidravlikuri elementebi, romelTa mixedviT aigo wylis maqsimalur xarjebsa da doneebs Soris $Q = f(H)$ damokidebulebis mrudi da dadgenili iqna sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebi, mocemulia #8 cxrilSi

mdinare jejoras hidravlikuri elementebi

cxrili #8

niSnulebi m.abs.	kveTis elementebi	kveTis farTobi ωMm²	nakadis sigane B m	saSualo siRrme h m	nakadis qanobi i	saSualo siCqare Mv m/wm	wylis xarji Q m³/wm
anZa DD-73 n=0,054 anZis ganTavsebis niSnuli 777.20 m. abs.							
774.68	kalapoti	10.8	27.2	0.49	0.0150	1.41	15.2
776.00	kalapoti	43.9	28.0	1.57	0.0150	3.07	135
777.00	kalapoti	73.9	32.0	2.31	0.0150	3.97	293
777.00	Wala	<u>24.7</u>	<u>56.0</u>	0.44	0.0150	1.31	<u>32.3</u>
	∑	98.6	88.0				325
778.00	kalapoti	202	120	1.68	0.0150	3.21	648

Mmdinare jejoras sxvadasxva ganmeorebadobis wylis maqsimaluri xarjebis Sesabamisi doneebis niSnulebi, mocemulia #9 cxrilSi

mdinare jejoras maqsimaluri doneebi
DD-73 anZis kveTSi

cxrili #9

τ =weli	200	100	50	20	10
Q m³/wm	365	300	260	200	170
H m.abs	**777.10**	**776.90**	**776.70**	**776.40**	**776.20**

rogorc warmodgenili #9 cxrilidan Cans, md. jejoras kalapotis uSualo siaxloves mosawyobi D-73 anZa ar itboreba 100 wliani ganmeorebadobis wylis maqsimaluri xarjis Sesabamis doniT.

vinaidan mdinareTa Wala-kalapotebSi mosawyobi, zeviT ganxiluli anZebi ar itborebian da maT mdgradobaze wylis nakadi ver moaxdens uaryofiT gavlenas, kalapotebis garecxvis siRrmis angariSi ar aris Catarebuli.

A   aqve aRsaniSnavia, rom msgavsi proeqtebis hidrologiuri dasabuTebis Sedgenisas ar aris miRebuli saSualo wliuri xarjebis sxvadasxva uzrunvelyofis sidideebisa da maTi Sidawliuri ganawilebis dadgena, vinaidan sainJinro nagebobebi, maT Soris maRali Zabvis elgadamcemi xazebis anZebi, maTi usafrTxo da xangrZlivi funqcionirebis misniT, yovelTvis gegmardeba wylis maqsimalur xarjebze da ara saSualo wliur an minimalur xarjebze, romlebic ver axdenen uaryofiT gavlenas mdinareTa kalpotebSi an maT siaxloves arsebul infrastruqturul obieqtebze.