Chapter 3 Current Issues of the Water Supply System

D 3.1.4 Existing Booster Pump Station

Table D 3.1.4.1 lists the existing booster pump stations with address, capacity and inlet/outlet water pressure.

Table D 3.1.4.1 (1) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
(Yakkasaray District)								
1	Massiv Bashlik between houses 4 & 5	1000	No.1	320	38	55	14-20	42-48
			No.2	320	50	55		
			No.3	320	50	55		
			No.4	320	38	55		
			No.5	320	50	55		
2	Bobur str. In front of Bobur park	600	No.1	320	50	75	12-16	42-46
			No.2	320	50	75		
			No.3	320	50	55		
3	Bobur str. Close to Tash. Heat-electric central	600	No.1	200	36	30	12-16	48-50
			No.2	320	50	55		
			No.3	200	36	30		
			No.4	200	36	30		
4	Samarkandskaya str., 14	400	No.1	100	65	30	4-15	38-44
			No.2	100	65	30		
			No.3	100	65	30		
			No.4	100	65	30		
5	Baranova str., behind "Rossia" hotel	1000	No.1	320	50	75	6-14	46-52
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
6	Kahhar str., in front of 16-floor stories building	50	No1	80	50	18	16-22	55-65
			No2	80	50	18		
7	Anhor, near White House	1000	No.1	320	50	75		
			No.2	320	38	55		
			No.3	320	38	55		
8	Abdullaeva str., 11	500	No.1	80	50	15	8-12	34-38
			No.2	45	55	17		
			No.3	45	30	17		
			No.4	100	80	15		
9	U. Nosir str., near "Ocean" supermarket	200	No.1	100	32	30		
			No.2	100	32	30		
10	50 anniversary of RU, S. Barak str., 68	1000	No.1	320	50	75	16-25	48-56
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	38	55		
11	Ts - 7, close to Telephone stattion (56)	600	No.1	320	50	75	10-18	50-54
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
12	m. Ippondrom, in front of "Himfarm" plant	1000	No.1	320	50	75	11-18	40-44
			No.2	320	38	55		
			No.3	320	50	55		
			No.4	320	38	55		
			No.5	320	50	75		
13	Fitrat 1, Fitrat str., 4a	1000	No.1	320	50	75	12-18	30-32\40-42
			No.2	320	50	75		
			No.3	320	38	55		
			No.4	320	50	55		
			No.5	320	50	45		
14	Kafanov str., 5	150	No.1	90	35	15	16-20	48-54
			No.2	160	20	11		
			No.3	90	35	15		
			No.4	30	45	7.5		
15	Jukovskaya str., 83a	150	No.1	90	35	15	18-25	46-50
			No.2	90	35	15		
			No.3	90	35	15		
			No.4	100	65	15		
16	Alibekova str., 3a	90	No.1	45	40	11	10-20	22-30
			No.2	45	30	7.5		
17	Fitrat 11, Fitrat 4	600	No.1	320	38			
			No.2	320	38	55		
18	Staradubtseva str., behind institute of transport	45	No.1	45	30	11	8-12	18-24
			No.2	45	30	11		
			No.3	45	30	11		

Table D 3.1.4.1 (2) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
19	massiv Kuyluk - 2	800	No.1	800	57	200		
			No.2	800	57	200		
20	massiv Kuyluk - 4, 49	20	No.1	-	-	16		
21	Munis str., 9 (cellar)	20	No.1	-	-	16		
22	Kuyluk 2 (TACIS)	60	No.1	170	15.2	5.5	6-10	24-28
			No.2	170	15.2	5.5		
			No.3	170	15.2	5.5		
(Akmal - Ikramov District)								
23	m. Chilanzar-30, school 203	3000	No.1	800	50	200		
			No.2	800	50	200		
			No.3	800	50	200		
			No.4	800	50	200		
			No.5	800	50	200		
			No.6	800	50	200		
24	m. Chilanzar - 25 (car park)	1000	No.1	320	50	75		
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
			No.6	320	50	75		
25	Uygur str. - G. Uzakova str.	1000	No.1	320	50	75		
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
26	Ziyo Said str., near Post office	600	No.1	320	50	75	4-10	32-36
			No.2	320	50	75		
			No.3	320	50	75		
27	M. Hondamir, Ziyo Said str.	600	No.1	320	50	55	2-8	28-30
			No.2	320	50	55		
			No.3	320	50	55		
28	at the territory of Uz. State Univer. Of Lang.	160	No.1	160	30	30		
			No.2	160	30	30		
			No.3	160	30	30		
29	Rahimbabaeva str., 2 (cellar)	90	No.1	320	50	30		
30	M. Chilanzar 26, terr. Tashmoloko (Tashmilk)	1000	No.1	320	38	55	14-18	44-48
			No.2	320	50	75		
			No.3	320	38	55		
			No.4	320	38	55		
31	B-14 block	1000	No.1	320	50	75		
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
32	M. Chilanzar 12(cellar)	20	No.1	-	-	16		
33	Attoyi mahallya	40	No.1	45	30	11	3-5	20-28
			No.2	45	30	11		
34	1 block, build. - 50, 51, 52a	20	No.1	-	-	11		
35	Avangard 7	20	No.1	-	-	16		
(Chilanzar District)								
36	m. Chilanzar - "E"	1000	No.1	320	50	75		
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
37	m. Chilanzar - 11, Bulvarnaya	1000	No.1	315	71	90	10-16	56-60
			No.2	320	50	75		
			No.3	315	71	75		
			No.4	200	90	75		
			No.5	320	50	75		
38	Chilanzar, 16	1000	No.1	320	50	75		
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
39	m. Chilanzar, 20a	1000	No.1	320	50	55		
			No.2	320	50	55		
			No.3	320	50	75		
			No.4	320	50	55		
			No.5	320	50	75		

Table D 3.1.4.1 (3) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
40	m. Al - Horezmiy, 27	1000	No.1	320	50	75	2-12	48-56
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
41	Turab Tula str.	40	No.1	20	30	5.5	6-10	30-36
			No.2	20	30	5.5		
42	Hamza metro	40	No.1	20	30	5.5	12-18	50-52
			No.2	20	30	5.5		
43	Pionerskaya str.	1000	No.1	320	50	75	28-34	60-64
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
44	National security Service - Zavki str.	40	No.1	20	30	5.5	18-22	54-58
45	m. Chilanzar 7	20	No.1	20	30	5.5	16-24	54-60
46	Nakkoshlik str., near custom service	20	No.1	20	30	5.5		
47	Yoshlik metro	7200	No.1	320	90	90		
			No.2	320	90	90		
			No.3	320	90	90		
48	m. Chilanzar 7-33	20	No.1	20	30	5.5		
49	m. Chilanzar - 19	20	No.1	20	30	5.5		
50	m. Chilanzar - 1	20	No.1	20	30	5.5		
(Shayhantahur District)								
51	Ibn Sino, 17	-	No.1	200	90	250	4-10	66-70
			No.2	200	90	200		
			No.3	800	56	200		
			No.4	200	90	200		
			No.5	200	90	200		
			No.6	200	90	200		
52	m. Almazar	1000	No.1	320	55	75	8-12	48-50
			No.2	320	55	75		
			No.3	320	55	75		
			No.4	320	55	75		
			No.5	320	55	75		
53	m. Ts - 13, build.26	800	No.1	320	50	75	8-18	48-50
			No.2	320	50	75		
			No.3	320	50	75		
54	Ts - 14, behind "Ganga"	120	No.1	320	38	55	16-24	44-48
			No.2	320	38	55		
55	Ipakchi str.	200	No.1	320	38	55	10-16	44-46
			No.1	320	50	75		
56	Kukcha, Uygur str.	500	No.1	320	38	55	1-10	24-30
			No.2	320	38	55		
57	huvaydo str., 2a	200	No.1	160	30	17	4-12	18-24\30-34
			No.2	160	30	17		
			No.3	90	35	17		
58	Ts - 27, near school	500	No.1	320	38	55		
			No.2	320	38	55		
59	Gulhani str.	1000	No.1	320	38	55		
			No.2	320	38	55		
			No.3	320	38	55		
60	chorsu, Samarkand-Darbaza str, 5	400	No.1	90	55	30		
			No.2	100	65	45		
			No.3	90	50	22		
			No.4	90	50	22		
			No.5	90	50	22		
61	Gulhani str.	20	No.1	50	50	15	16-20	34-38
			No.2	50	50	15		
62	chorsu, Samarkand-Darbaza str, 6	60	No.1	90	35	18	40-45	48-52
			No.2	90	35	18		
63	1 st hospital	20	No.1	320	70	-77	8-12	28-34

Table D 3.1.4.1 (4) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
Mirzo - Ulugbek District								
64	Shastri str., m. G. Petrov	1000	No.1	320	50	75	18-22	46-50
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	38	55		
			No.5	320	38	55		
65	m. Feruza, 3	1000	No.1	320	50	75	20-24	58-62
			No.2	320	38	55		
			No.3	320	50	75		
			No.4	320	38	55		
			No.5	320	38	55		
66	m. TTZ - 4, build.1	1000	No.1	320	50	75	2-6	46-48
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
67	m Cherdansev, 20	40	No.1	90	35	15	18-22	40-42
			No.2	90	35	15		
68	Karasu - 6	90	No.1	100	80	15		
69	Humayun str.	1000	No.1	320	38	55	12-16	38-42
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	38	55		
			No.5	320	38	55		
70	Pushkin str., Salar - river side	1000	No.1	320	38	55	20-22	66-77
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	38	55		
			No.5	320	38	55		
71	H. Olimjon. Pushkin str (under the bridge)						16-20	78-84
	No.1 group	600	No.1	90	85	45		
			No.2	90	85	45		
			No.3	90	85	45		
			No.4	100	85	55		
			No.5	90	85	55		
	No.2 group		No.1	320	38	55		
			No.2	90	35	15		
			No.3	100	65	30		
			No.4	85	45	45		
			No.5	90	55	30		
72	Lafarga str. 109	800	No.1	200	32	30	24-28	58-62
			No.2	200	32	30		
			No.3	320	50	75		
			No.4	200	32	30		
73	Karasu - 3, build.13	600	No.1	320	50	75	12-16	48-52
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	38	75		
			No.5	-	-	-		
74	Ts-1B, Gogol str, 9	60	No.1	90	85	45	16-24	38-44
			No.2	90	85	45		
			No.3	200	36	45		
			No.4	45	55	45		
			No.5	45	55	15		
75	Cherdaesev str.	30000	No.1	6200	51	1000		
			No.2	6200	51	1000		
			No.3	6200	51	1000		
			No.4	6200	51	1000		
			No.5	6200	51	1000		
			No.6	6200	51	1000		
			No.7	6200	51	1000		
			No.8	5200	51	800		
76	m. Karasu - 6 (cellar)	90	No.1	320	35	22	18-22	40-44

Table D 3.1.4.1 (5) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
(S. Rahimov District)								
77	B - 1, m. Beruniy, Guncha	3000	No.1	300	40	160	5-16	56-60
			No.2	800	56	200		
			No.3	800	56	200		
			No.4	800	56	200		
			No.5	800	56	200		
			No.6	800	56	200		
78	Farobiy str., - Candidates house (students)	1000	No.1	320	50	75	2-6	38-40
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
79	Karasayskaya 2	1000	No.1	320	50	75	4-12	35-40
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	55		
			No.5	320	50	75		
80	Taksinbaeva, 11	1000	No.1	320	38	55	6-20	38-42
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
81	Ts 17-18. m. Sebzar, 20	1000	No.1	320	50	55	14-22	54-62
			No.2	320	50	55		
			No.3	320	50	55		
			No.4	320	50	55		
			No.5	320	50	55		
82	Vuzgorodok	1000	No.1	500	50	75	1-10	30-32
			No.2	500	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
83	TashMI, Medgorodok, 12	1000	No.1	320	38	55	10-24	48-50
			No.2	320	38	55		
			No.3	320	50	55		
			No.4	320	50	55		
			No.5	320	38	55		
84	m. K. Karamish 1/2 -6	1000	No.1	320	50	75	2-12	48-50
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	90		
85	K. Kamish 2/4 -32	400	No.1	320	38	55	12-16	46-48
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	38	55		
86	Niyazova str. Beruniy str.	90	No.1	80	50	37		
			No.2	80	35	37		
87	Beruniy str.	20	No.1	20	80	4	1-12	30-34
88	sagban str., 3,4,5	80	No.1	65	150	-	12-16	22-24
89	Ts - 22 -103 (cellar)	20	No.1	-	-	16	10-20	40-44
90	shumilovo (hospital territory)	160	No.1	160	30	30	2-10	25-30
			No.2	160	30	30		
91	Kalinin - Mavzukter / Promenergo	60	No.1	20	30	2		
92	Sagban 1, Doka Hleb	20	No.1	20	30	5.5	6-10	18-20
			No.2	20	30	5.5		

Table D 3.1.4.1 (6) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
93	Sagban 2, Huriyat str.	20	No.1	90	35	20		
	(Yunus Abad)							
94	Boundary college	90	No.1	90	35	30		
			No.2	90	35	30		
			No.3	90	35	30		
			No.4	90	35	30		
			No.5	90	35	30		
95	SB-4 Y. Abad - 12 circle of bus - 72	1000	No.1	320	50	75	12-24	42-50
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
96	SD-2, A. Danish 2 -60	1000	No.1	320	38	55	18-24	50-54
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	38	55		
97	SB-4б Y. Abad - 14	3000	No.1	800	57	200	15-18	50-55
			No.2	800	57	200		
			No.3	800	57	200		
			No.4	800	57	200		
			No.5	800	57	200		
			No.6	800	57	200		
98	Ts - 4	300	No.1	290	30	40	16-22	44-48
			No.2	290	30	40		
			No.3	290	30	40		
99	Ts - 5	600	No.1	320	38	55	20-28	46-54
			No.2	290	30	40		
			No.3	320	38	55		
100	Murtazaeva str., 4	20	No.1	20	30	40		
			No.2	20	30	40		
			No.3	20	30	40		
101	Dj. Abidov str.	100	No.1	100	50	30	12-16	48-52
			No.2	100	50	30		
			No.3	100	50	30		
102	Badamzar 8	90	No.1	90	53	15	6-10	42-48
			No.2	90	53	15		
103	SB-5 Y. Abad 9, circle of bus	1000	No.1	320	38	55	25-30	58-64
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	38	55		
			No.5	320	38	55		
104	Block-8	20	No.1	-	-	16		
105	Hasanboy - Circle, near gas-filling works	1000	No.1	315	71	90	24-28	48-52
			No.2	315	71	90		
			No.3	315	71	90		
			No.4	315	71	90		
			No.5	315	71	90		
106	Yunus Abad - 4	20	No.1	20	30	5.5		
			No.2	20	30	5.5		
107	Amir Timur str., 1	30	No.1	100	32	15	15-18	44-46
			No.2	100	32	15		
			No.3	90	35	15		
108	Zakirov str. (behind mosque)	1000	No.1	325	71	90	16-22	76-82
			No.2	325	71	90		
			No.3	325	71	90		
			No.4	325	71	90		
			No.5	325	71	90		
109	Turgunboev str.	320	No.1	320	38	15	4-8	20-22
			No.2	320	38	15		
110	Krasnoprenenskaya str., 37	90	No.1	90	35	15	4-8	32-40
			No.2	90	35	15		
111	Sohibkor - circle // anhor river side	20	No.1	20	30	4		
			No.2	20	30	4		
112	Block 18	20	No.1	-	-	16		
113	20 - block - 5	20	No.1	-	-	16		
114	21 Housing stock of "Yulduz" Factory	20	No.1	-	-	16		
115	Ts - 5	20	No.1	-	-	16		

Table D 3.1.4.1 (7) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
(Hamzin District)								
116	Lisunova str., 4	90	No.1	100	50	30		
117	Lisunova str.	1000	No.1	320	50	75	10-18	46-50
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
118	Ahangaran - 40 let	1000	No.1	320	38	55		
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	38	55		
			No.5	320	38	55		
119	Chezelnaya str., 1a	1000	No.1	320	50	75	10-18	52-56
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
			No.6-1	100	65	30		
			No.6-2	100	65	30		
120	district of REVS	300	No.1	320	50	75		
			No.2	320	50	75		
121	Kuyluk 1, Fergana Yuli str.	1000	No.1	-	-	-	12-20	46-50
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
			No.6	-	-	-		
122	Fergana Yuli, 15	40	No.1	45	30	7.5	3-6	36-40
123	Z. Shamutdinov str.	200	No.1	90	35	18	6-15	26-28
			No.2	90	35	18		
			No.3	90	35	18		
124	Havastskaya str.	45	No.1	90	45	8	8-12	30-36
			No.2	45	30	5		
125	Tabibiy str.	20	No.1	45	30	5.5	10-12	40-42
			No.2	45	30	5.5		
126	Panelnaya str.	600	No.1	320	50	55	8-12	30-36
			No.2	320	50	55		
127	Zangori	600	No.1	320	50	55	8--12	34-40
			No.2	320	50	55		
			No.3	320	50	55		
128	Slonima	45	No.1	45	30	15	10-18	30-35
			No.2	45	30	15		
129	Karimova	20	No.1	45	30	10	8-12	36-40
			No.2	45	30	10		

Table D 3.1.4.1 (8) List of Booster Pump Station and Inlet/Outlet Water Pressure

No.	Location of Pump Station	Capacity	Pump Number	Pump Specifications			Water Pressure(2002 Summer)	
							Inlet	Outlet
		m^3/h		m^3/h	m	kW	m	m
(Sergeli District)								
130	Sergeli 2	1000	No.1	320	38	55	7-10	42-44
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	38	55		
131	Sergeli 3 - 5	3000	No.1	320	50	75	8-10	65-70
			No.2	320	50	75		
			No.3	320	50	75		
			No.4	800	56	200		
			No.5	1250	63	315		
			No.6	300	90	315		
			No.7	1250	63	315		
			No.8	1250	63	315		
132	Kuyluk 5	1000	No.1	320	50	75	8-12	50-52
			No.2	320	38	55		
			No.3	320	38	55		
			No.4	320	50	75		
			No.5	320	38	55		
133	Sergeli 8	1000	No.1-1	90	30	7.5	10-15	45-50
			No.1-2	45	30	18		
			No.2	90	85	55		
			No.3	320	50	75		
			No.4	320	50	75		
			No.5	320	50	75		
			No.6	320	50	75		
			No.7	320	50	75		
			No.1	320	35	18		
134	Stroitel'	1000	No.1	320	50	55	15-20	50-54
			No.2	320	50	55		
			No.3	320	50	55		
			No.4	320	50	55		
			No.5	320	50	55		

Chapter 5 Long Term Development Plan

D 5.2.3 Replacement of Pipeline

Vodokanal selected 420km of pipelines to be replaced urgently, which had frequently taken place leakages. The total length of each diameter for selected pipes by district is calculated in Table D 5.2.3.1, and the number of sections and total length by district are shown in Table D 5.2.3.2.

Table D 5.2.3.3(1) to (11) lists each section of pipeline to be replaced under Vodokanal Plan with address, diameter and length.

Table D 5.2.3.1 Selected Pipelines Length of each Diameter to be Replaced

District Name	Total	Pipe length of each diameter														
		50	80	100	150	200	250	300	400	500	600	700	800	900	1,000	1,200
Mirzo Ulugbek	67,265		2,080	14,130	13,220	3,450		14,155	2,600	2,400	3,230	4,200		7,300	500	
Sabir Rahimov	28,242	1,340	750	8,175	3,987	3,780		2,060	960	750	6,440					
Akmal Ikramov	52,700			36,100	8,160	2,200		6,240								
Hamza	34,317	3,420	3,270	17,641	6,886	2,560	70	470								
Yunusabad	30,162	540		6,166	8,470	1,240		5,328	1,078		4,850		1,740			750
Sergeli	51,520	15,845	230	28,610	2,855	1,000		1,880			1,100					
Bektemir	8,420			2,123	3,173	824		2,300								
Chilanzar	33,248	230		28,458	370	460		1,030	2,700							
Shayhantahur	47,996	490		17,205	12,194	1,754	3,660	7,230	2,420		3,043					
Yakkasaray	31,066		622	7,116	6,138	1,200	1,460	7,200	980		6,350					
Mirabad	35,145	900	1,670	13,835	8,810	2,190	2,060	5,040			640					
Total	420,081	22,765	8,622	179,559	74,263	20,658	7,250	52,933	10,738	3,150	25,653	4,200	1,740	7,300	500	750

Table D 5.2.3.2 Selected Pipeline Section and Total Length

District name	Length (m)	Selected
Mirzo Ulugbek	67,265	46
Sabir Rahimov	28,242	4
Akmal Ikramov	52,700	94
Hamza	34,317	39
Yunusabad	30,162	24
Sergeli	51,520	39
Bektemir	8,420	54
Chilanzar	33,248	67
Shayhantahur	47,996	65
Yakkasaray	31,066	63
Mirabad	35,145	33
Total	420,081	528

Table D 5.2.3.3 (1) Mirzo Ulugbek District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Molodyojnaya str.	150	320	
	Lyapunova str.	100	640	
	Progressivnaya str.	150	560	
	Progressivniy proezd	100	140	
	Fontannaya str.	100	610	
	Festivalnaya str.	100	200	
2.	H.Abdullaev str. appt. houseNo.71,73,75.	200	780	
3.	Abdalin str. from T.Malik str.to appt.houseNo.9	600	2000	
4.	Dilrabo str. from BIY to Husanbaev str.	100	470	
	T.Okshomi str. from BIY to Husanbaev str.	100	480	
	Husanboev str. from Dilrabo to T.Okshomi str-s.	100	90	
5.	Yashna str.	100	300	
	Kalinin (Nishapuri) str.	100	350	
	Tsentralnaya str.	100	270	
	Korhona str.	100	170	
	Jdanov str.	100	300	
	Kirov str. from BIY houseNo.426 to Jdanov str.	100	280	
	Danko str.	100	160	
6.	Geologicheskaya str.	200	450	
	Leskova str.	150	700	
	Golitsina str.	100	220	
	Kropotkina str.	100	300	
	R.Korsakov str.	100	300	
	R.Korsakov proezd	100	80	
	Prejevalskiy str.	100	140	
7.	Izmailov str.	200 150	470 310	
	Izmaylov massiv	150 100	640 640	
	Korolenko str.	100	600	
	Kramskiy str.	100	500	
8.	Tsiolkovskiy str. from Zulayho to Nevskaya str-s.	300	4300	
9.	Pushkin str. NBU	100	120	
10.	F.Hodjaev str. from Muminov str. to Salar river	300	820	
11.	Kibray tr. pipe from RDC to 3-cam.	900	7300	
12.	Kibray tr. pipe from BIY to	700	4200	
13.	Dagestanskaya str.	300	1200	
14.	Asaka str.from Pushkina str.to Factory	150	1000	
15.	Semashka str. from Gete to Avaihon str.	100	820	
16.	Saodaf str.	150 100	450 300	
17.	1 proezd Saodaf	100	180	
	2 proezd Saodaf	100	200	
	3 proezd Saodaf	100	180	
	4 proezd Saodaf	100	140	
	5 proezd Saodaf	80	140	
	Pispekskaya str.	76	120	
18.	1 tupik Pispekskaya	80	130	
	Pushkin str. from “Darhan” café to Salar river	600	350	
19.	1st Tokarnaya	80	120	
20.	2nd Tokarnaya	80	220	
	1 tupik Irrigatsionniy	80	120	
	2 tupik Irrigatsionniy	80	120	
	Bahodir, Hush-havo str-s.	100	420	

No.	Address	Diameter(mm)	Length(m)	Note
21.	Vladivostokskaya str. From Natsionalnaya to Klubnoy str-s.	150	900	
22.	M.Gandi str.from Ya.Kolosa to Asoka str-s.	150	510	
23.	Ya.Kolosa str. from Pushkin str. to Salar.	300	900	
24.	M.Djalil str. from Dagestan to Natsionalnaya str-s.	150	1300	
25.	Somatov (Frunze) str.	100	290	
26.	Ikramov str.	100	490	
	H.Abdullaev str.from appt.houseNo.52 to Lafarga str. (routeNo.1)	300	680	
27.	Lafanga str.from MO museum to	600	530	
28.	Navnihol str.from Morozova to Rahmatulina str-s.	200	510	
29.	Litovskaya str.	100	410	
30.	Latviyskaya str.	100	260	
	Morskaya str.from Dagestanskaya to Nikitina str-s.	150	680	
31.	Karelskaya str.from Sevastopolskaya to Dagestanskaya str-s.	150	1210	
32.	Gogol str. from Tolstoy to Hamza str-s.	300	1540	
33.	Uzbekiston ovozi str. from Gogol to Shastri str-s.	150	500	
	1 proezd M.Gandi	150	380	
34.	1 tupik M.Gandi	80	220	
	2 proezd M.Gandi	150 100	240 100	
	2 M.Gandi	80	80	
	Salar str.	100	280	
	1 tupik Salar	80	100	
	2 tupik Salar	80	120	
	1 tupik Salar	80	380	
	H.Abdullaev str.from BIY to Parallelnoya str.	500 300	1100 1010	
35.	Pasoka str.to gen.Petrova-2 str. appt.house 2/1	300	280	
36.	Incomplete tr.pipe through Sakura park, Hamza str.from Sakura park to Azimov str.	1000	500	
37.	Troitskaya highway from BIY to T.Malik str.	150	1440	
38.	Krasnoznamennaya str.	100	1360	
39.	Nikitina str.from BIY to Tsiolkovskiy str.	300	1300	
40.	Volodarskiy str.from Muminov to Sayram str-s.	300	900	
41.	Entrance in Tash GRES	400	1000	
42.	Ustabaev str.	300 200	825 640	
43.	Tolstoy str.	200	300	
44.	Sadovaya str.	100	820	
45.	Vahshskaya str.	150	460	
46.	Jasorat (factory)	200	300	
47.	Kosaryova str.from Ustaboeva str.toBIY	100	310	
48.	H.Alimjan square (eastern side)	150	1200	
49.	H Alimjan str.from M.Gandi to Pushkin str-s.	600	350	
50.	V.Beregovaya str.from Parkentskaya to Morskaya str-s.	150 80	180 210	
51.	Golovina str.from Beregovaya to Dagestanskaya str-s.	150	240	
52.	BIY from Lafanga to Zulayho str-s.	400	1600	
53.	Rahmatullina str. H.Abdulaev to Transportnaya str-s.	500	1300	
54.	Horezmskaya str.from Hamza to Uzb.ovozi str-s.	300	400	
	TOTAL:		***67,265***	

Table D 5.2.3.3 (2) Sabir Rahimov District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Sarik-su with	200 100 76 50	1380 630 280 660	
2.	A.Акramov str., T.Rasulov str. (Ahunbabaev kolhoz)	220 100	800 700	
3.	I. Rahimov str. (Ahunbabaev kolhoz)	100	860	
4.	Hujalik str. with tupiks	150 100 50	660 220 680	
5.	E.Jumanbulbul	76	290	
6.	29 tupik Sagban	100	235	
7.	Mahalla “Gulhona”	150	350	
8.	Kichkirik, H.Rahmonov str-s.	100	1180	
9.	Tr.pipe along Farobi str, from TKAD to RUV-2	600	3600	
10.	Gen.Azimov str.	100	710	
11.	1 proezd Chukursay	100	280	
12.	2 tupik Usta Olim	100	360	
13.	2 tupik Usta Olim	100	230	
14.	2 tupik S.Rahimov	100	160	
15.	6 proezd Nozimahonum	100	360	
16.	7 proezd Nozimahonum	100	520	
17.	1 proezd Dadabaev	100	430	
18.	Jahon str.	100	200	
19.	A.Yunusova str.from Urazbaev to K.Gofurov str-s.	400	960	
20.	Muhokama str.	150	680	
21.	Langar str.with proezds	150 100	597 270	
22.	Ibragim-Ota,Shirok str-s.from RUV-5 territory	600	920	
23.	Shirok str.	300	710	
24.	S Rahimov	300	480	
25.	Rasulobo	100	450	
26.	Dadabaeva, General. K.Govurov	600 300	1920 470	
27.	Begoyim (Beshkurgan)	100	200	
28.	Makola	150	400	
29.	General K.Gofurov	200 300 100	1600 400 180	
30.	11 proezd Sagban	150	1080	
31.	1 proezd. Kalinin-Mavzuk	150	220	
32.	Tevosyan	80	180	
33.	Suction network to «Sebzar»	500	750	
	TOTAL		***28,242***	

Table D 5.2.3.3 (3) Akmal Ikramov District

No.	Address	Diameter(mm)	Length(m)	Note
1.	G-9a, appt.house. № 1,17	100	320	
2.	Block 11, appt.house.12,13,14,15,17,18	100	420	
3.	Block 11, appt.house. 41,42,43,44,46,47	100	440	
4.	Block 11, appt.house.62,63	100	120	
5.	Block 12, appt.house.36-39,41-45,47-51,59-62	100	1270	
6.	Block 12, appt.house.1,3,4,7,8,9,12,15-21	100	950	
7.	Block 13, appt.house.9,10,14,15,2	100	340	
8.	Block 14, appt.house.3-9,10,11	100 150	150 490	
9.	Block 14, appt.house. 12-24, 26-31	150 100	820 460	
10.	Block 15, appt.house. 16,17,21,22,23	100	210	
11.	Block 15, appt.house.28a-g,39a-v	100	530	
12.	Block 21, appt.house.5,32,12,4; 16,15,14,6,13	100	600	
	Block 21, appt.house.3,11,30,24,31,26,27,7,8,17,28	150	970	
	Block 21, appt.house. 23,22,21,10,20,2,13,18,9,29	200	790	
13.	Block 22, appt.house. 12,11,9	100	280	
14.	Block 22, appt.house. 24,23	100	260	
15.	Block 23, appt.house. 33,57,35,36,14	100	380	
16.	Block 23, appt.house.52,53,54,55,69	150	340	
17.	Block 24, appt.house. 10,11,18,23,20,21,22,19	100	420	
18.	Block 25, appt.house. 6,7	100	80	
19.	Block 25, appt.house. 12,13,14-17	100	380	
20.	Block 26, appt.house. 29,30,31,32,33	100	340	
21.	Block 26, appt.house.12-15;4-6;9-10;17,20,21,18,19	150 100	290 780	
22.	Kosmosnaya from VK 9963 to VK 9968	100	270	
23.	Kosmosnaya from VK 1963 to VK 13001	100	210	
24.	7 proezd Mirhund from 6 proezd. to Mirhund	100	110	
25.	Farovon, Ali Koshchi, Yu. Sakkokiy	300	1800	
26.	Zufarova from proezd K.Nuri to B.Nosirova	150	480	
27.	Hamkor from 5 proezd Dadil to Tadjieva	100	410	
28.	Hamkor from Z.Saida to 5 proezd dadil	150	490	
29.	Z.Saida from Nashriyot to Tokimachi	100	340	
30.	Mahalla «Sakkokiy» Tashkandiy str. with proezds	100	1240	
		150	1380	
31.	Segizbaeva from Farhadskiy to Ya. Kupala	300	2790	
32.	S.Huja	200 150	350 690	
	Dadil	100	200	
33.	Uygur str. from Dilkash to 4 proezd.	300	300	
34.	H.Gafurova from G.Uzakova to 6 proezd Shodlik	300	1350	
35.	2 proezd. Shoir	100	335	
36.	2 proezd. Shoir	100	240	
37.	Nokzor from Mehmondost to Bekobod	100	380	
38.	2 proezd. Zulfizor from Nashriyot to Zulfizor	100	220	
39.	Tojieva from Shifokor to Dilkash	200	840	
40.	Tupik Ibrat	100	160	
41.	1 proezd Tukimachi	150	200	
	Ibrat str.	150	220	
42.	Tashabusskor	100	300	
43.	B.Nosirova from Ulugbek to Reshetova	100	320	
44.	Bayot from 1 proezd. Bayot to 2 proezd. Navo	100	140	
45.	4 proezd. Bosithon from to Karvon	100	440	

No.	Address	Diameter(mm)	Length(m)	Note
46.	Karvon	100	360	
	6 proezd. Uygur	100	410	
47.	proezd. Uygur	100	240	
	proezd. K.Nuri	100	185	
	Kurash str.	100	430	
	from proezd Uygur to Kurash str.	100	75	
48.	2 proezd Kurkam	100	130	
49.	2 proezd Botu	100	90	
	3 proezd Botu	100	590	
	Botu str.	150	130	
50.	6, 7 proezds Sharaf	100	750	
51.	4 proezd Mirhund	100	530	
	5 proezd Mirhund	100	380	
	6 proezd Mirhund	100	210	
52	Muzamhon from VK 30692 to VK 30692, Magzuna proezd	100	360	
53	1 proezd Z.Roziy	100	310	
	3 proezd Zamahshariy	100	290	
54	Zafariy	100	560	
55	Proezd Oktepa from Uygur to kosmosniy	100	440	
56.	Kuruvchi from Shifokor to Dilkash	150	900	
57	1 proezd Kuruvchi	100	320	
58	1,2 proezds	100	420	
59	Z. Maruf from Kuruvchi to Tadjieva	100	320	
60.	5 Hondamir, from VK 17737 to VK 9603	100	210	
61.	tupik. Durbekova	100	160	
62	Durbekova from Z. Saida to Uygur	100	1080	
63	5 proezd .Z.Maruf	100	250	
64.	2,3,4,5 proezds Rahimbabaeva	100	720	
65.	5 proezd Attoiy	100	180	
66.	Ihtiro	100	455	
67.	Chevar	100	115	
68.	2,3 proezd Mergancha	100	460	
69.	Tarbiya	100	480	
70.	Mars	100	1000	
71.	Dongdor , Mehribon	100	1440	
72.	1 Urikzor, Navruz str.	100	380	
73.	Kashgariy with proezds	100	880	
74.	N. Ganiev	100	700	
75.	3 proezd Jamshid	100	280	
76.	Tokzor, proezd Tokzor	100	680	
77.	Hursantiy with proezds, 1 proezd Kashgariy, Tuya Tartor	100	300	
		150	490	
78.	Istirohat	100	1020	
	Shamsiya	100	340	
79.	3 tupik. Dilkash, 1 proezd. Hamkor	100	350	
80.	Shodlik	100	110	
81.	3 proezd Hondamir from Vijdon to Z. Maruf	100	400	
82.	2 proezd Nashriyot	100	150	
	Atoiy from Nashriyot to Zulfizor	100	140	
	1 proezd Atoiy	100	170	
83.	H. Abdullaev from Tokimachi to Jurjoniy	150	270	
84	Karimova, 1 proezd Karimova	100	405	
	1.2,3 proezds Alvon	100	440	
85.	2 proezd Hijum	100	170	
86.	Proezd Kuvnok	100	240	

No.	Address	Diameter(mm)	Length(m)	Note
87.	2 proezd Yakdil	100	230	
88.	Fazilat from VK 9867 to VK9872	100	190	
89.	7 proezd. Bosithon	100	440	
90.	Proezd S.Mirzaeva from Peshkadam to Sadokat	200	220	
91.	5 proezd. DAdil from Dilkash to 2 proed Ibragimova	100	90	
92.	Uygur from Dilkash to 4 proed Tadjieva	300	300	
93.	H/ Gafurova from G.Uzakova to 6 proezd Shodlik	300	1350	
94.	Farovon, Ali Kushchi, Yu. Sakkokiy	300	1800	
	TOTAL:		***52,700***	

Table D 5.2.3.3 (4) Hamza District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Ikramova from Balimanova to Bastakor	100	210	
2.	2 proezd. Sechenova	100	400	
3.	Zvezdnaya	100	600	
4.	1 tupik Ohangrabo	80	285	
5.	Zahidon	100	400	
6.	Alatskaya	100	200	
7.	1 tupik Zarkentskiy	50	150	
8.	Parkova	50	140	
	Ispanskaya	76	300	
	Riyoziy	76	300	
9.	Mashadiy	50	150	
	Nevskaya	76	80	
	1 tupik Mashadiy	50	120	
	Novobaszarnaya	100	600	
	Ispanskaya	76	180	
10.	Sulola	76	85	
	1 proezd Mashadiy	50	140	
	2 pereulok Riyoziy	50	40	
11.	Tupik Botkina	76	140	
	4 pereulok Botkina	100	110	
12.	Massiv Riyoziy (Chizelniy)	200 100	100 35	
13	Kamskaya	76	180	
	Kronshtadskaya	76	180	
	Murmanskaya	76	240	
	Baykalskaya	76	280	
	Habarovskaya	76	120	
	Ankara	100	340	
14.	Saodat	50	300	
15.	Charos	50	300	
16.	Tabarruk	50	300	
17.	1 proezd Bakinskiy	100	400	
18.	Krasnovostochnaya	100	500	
19.	1 tupik Obisher	50	300	
20.	3 tupik Bakinskiy	50	400	
21.	3 block, 40 let Pobedi , behind appt.house.14.	150	300	
22.	Furkat	76	300	
23.	3 block,40 let Pobedi, appt.house 29.30.	125	20	
24.	1 block,40 let Pobedi, appt.house.9,10	300	60	
25.	1 block,40 let Pobedi, near Doka -hleb	300	410	
26.	1 block,40 let Pobedi, д.7,8	200	780	
27.	1 block,40 let Pobedi, appt.house.4,6	250	70	
28	1 block,40 let Pobedi, near dormitory 26	100	100	
29.	Izzat	100	180	
30.	1 proezd Hosiyat	100	100	
	1 proezd Yangilik	100	300	
31.	2 proezd Yangilik	100	260	
32.	Nigora with proezds	100	230	
33.	Chigil	100	460	
34.	1 tupik Akdayinskiy	76	100	
35.	1 tupik Kashkadarinskiy	50	100	
36.	1 tupik M. Ashrafi	50	200	
37.	2 proezd Havastskiy	50	300	

No.	Address	Diameter(mm)	Length(m)	Note
38.	Toyona	100	240	
39.	Ikramova	100	240	
40.	3 tupik M. Ashrafi	100	230	
41.	Fergona Yoli str. to 2 tupik Ak-uy	100	300	
42.	Zamondosh	150	210	
43.	1 proezd Zamondosh	100	240	
	Yangilik	150	1520	
44.	3 proezd Yangilik	100	380	
	4 proezd Yangilik	100	350	
	Lenichi	150	836	
	Ayrieva /Chilol Ota/	200	960	
45.	Musaffo	100	326	
	Bunyodkor	150	180	
46.	1 proezd Bunoyodkor	150 50	90 160	
	3 proezd Bunyodkor	100	200	
	Latofat	50	190	
	2 proezd Latofat	150	220	
	Murabbiy	200	580	
47.	1 proezd Murabbiy	100	390	
	2 proezd Murabbiy	100	320	
	Hosiyat	150	840	
48.	Zamarina	100 50	720 130	
	Havaskor	100	870	
	Iltifot	100	880	
	Muruvvat	100	880	
	Dinamo	100	550	
	1 block Lisunova, between 237 and 141	200	140	
49.	1 block Lisuniova from Sholohiova to appt.house 11	100	70	
50.	Ismailova	100	300	
51.	Gliera	100	480	
52.	1 proezd Sholohova	100	650	
53.	Mahzuna	100	500	
54.	Popova	100	310	
55.	Riskulova	100	1200	
56.	Iltifot	150	630	
	Muruvvat	100	620	
57.	Proezd Z.Shamsutdinova	150	600	
58.	Z. Shamsutdinova str., new constructions	100	600	
59.	Z Shamsutdinova str. 17/1.2.3	150	210	
60.	4 proezd Muynakskiy	100	300	
61.	1 proezd Kashshov	80	180	
62.	3 proezd Muynakskiy	150	630	
63.	Kustanskaya	100	70	
64.	Besh-bola from Zahidova to Jarkurgan	150	600	
65.	1 tupik Musahanova	76	320	
	TOTAL:		***34,317***	

Table D 5.2.3.3 (5) Yunusabad District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Hoshimova	100	850	
2.	Mahalla"Bobo-dehkon", Muhamedova, T. Mirzaeva, Nosirova	150	5738	
3.	Avaz utar ugli str.	150	100	
4.	Rileeva str.	50	300	
5.	Matbuotchilar from Ota-turk to Rashidova	200	280	
6.	Rashidova from Navoiy to Khurshid	600	1050	
7.	D.Abidova terr. MU-8	1200	250	
8.	Kanibadamskaya	150	364	
9.	Muradova block 13	150	380	
10.	Block 11	200	460	
11.	Block 16	150	230	
12.	Gayrati	150	828	
13.	Mustakillik square	300	440	
14.	Gvardeyskaya from A.Temur to Muradova	300	1980	
15.	Shorz, from A.Temur to Shuhrat	300	150	
16.	Gulbog str.	150	500	
17.	Block 10 school 265	100	380	
18.	Block 19 school 44 school 257 between school. 253	300	770	
19.	Yemceva to Sh. Rashidova	400	428	
20.	Block 10	300	110	
21.	Gadoyboeva from block 8 to chimkent trakt	50	240	
22.	Block 19 between appt. house.28, 31	300	250	
23.	Block 4 school 220	200	260	
24.	Badamzar	150	80	
25.	2 proezd Barnaul, 100	100	540	
26.	Mikhail An str.	100	300	
27.	Proezd Sharistanskiy school 63	100	300	
28.	Atchapar	100	800	
29.	U. Shirin from Hodjaeva to S.Rahimova	300	836	
30.	Abad str.	100	436	
31.	A. Temur str., mahalla "Yunusabad"	100	500	
32.	Mahalla kulol-Kutgan	100	2060	
33.	Tr. pipe in Tashkent-Moskow railway zone	1200	500	
34.	Block 8. Mirzamuhamedova str., school. 260	200	240	
35.	No. 5 Boz-su tr.pipe along D.Abidova str. D-1200mm to 500mm	500	900	
36.	Construction of tr.pipe D-800mm along D.Abidova 3 Boz-su tr.pipe D-800mm along G.Mavlyanova str. D-600mm	800	1740	
37.	Tr.pipe D-600mm along D.Abidova from G.Mavlyanova to A.Temur D-400mm.	400	650	
38.	2 Boz-su tr.pipe: G. Mavlyanov, Uritskiy, Sheralieva, Kablukova str-s., from D.Abidov to A/ Temur str.	600	3800	
39.	A. Temur from D. Abidov to Hotel Reline method	300 300 150	720 72 150	
	TOTAL		***30,162***	

Table D 5.2.3.3 (6) Sergeli District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Baht	80	230	
	Arslankulova	100	535	
	A. Ikramova	100	430	
	H. Alimjan	100	400	
	Oybek	100	390	
	Furkat	100	260	
2.	Masson	300	1420	
3.	Nigmat Kahhor, S. Hujanov	100	880	
4.	Mahalla Kash Kurgan Tal-Arik str.	100	460	
5.	Sergeli-2 ROVD	300	190	
6.	Sergeli-2 appt.house. 15	300	170	
7.	Sergeli-2 appt.house.34	300	100	
8.	Sergeli-5, tennis court	50	40	
9.	Chartak from Germany shop to YUNZ inside park	600 150	1100 465	
10	Uzgarish, Olchazor	150/100	3980	
11	Saadi from fur column No.18 to leather plant	200	1000	
12	Sputnik, block 2	100 50	2870 800	
13	Sputnik, block . 13	100 50	870 720	
14	Sputnik, block . 12	100 50	1460 1500	
15	Sputnik, block. 14	100 50	1820 2060	
16	Sputnik, block. 1	100 50	3220 760	
17	Sputnik, block. 5, C-2	100 50	2800 400	
18	Sputnik, block. 6	100 50	1560 1150	
19	Sputnik, block. 7, 10	100 50	2050 450	
20	Sputnik, block. 8	100 50	1850 2400	
21	Sputnik, block. 11	100 50	915 830	
22	Sputnik, block. 15	100	200	
23	Sputnik, block. 9	100 50	1800 2180	
	Sputnik, block. C-3	100 50	190 145	
1	2	3	4	5
24.	Sputnik, block. 3	100 50	1220 1780	
	Sputnik, block. 4	100 50	840 630	
	TOTAL		***51,520***	

Table D 5.2.3.3 (7) Bektemir District

No.	Address	Diameter(mm)	Length(m)	Note
1.	J. Tashkendi Str.	150	2100	
2.	Huseyn Baykaro Str.	300	2300	
3.	K. Atabaev, Billur Streets	100 150 200	2470	
4.	B. Nozim Str.	100 150	1300 250	
	TOTAL:		***8,420***	

Table D 5.2.3.3 (8) Chilanzar District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Block – 2	100	528	
2.	Block – 3	100	2100	
3.	Block – 3, 4 network	300	580	
4.	Block – 4, № 1-6, 7, 8 appt. houses	100 150	220 370	
5.	Block – 5, № 36-39 appt. houses	100	140	
6.	Block – 5, № 29,30 appt. houses	100	240	
7.	Block – 6	100	300	
8.	Block – 6	100	400	
9.	Block – 6, № 34,35 appt. houses	100	180	
10.	Block – 6, № 39,42 appt. houses	50	100	
11.	Block – 7	100	2670	
12.	Block – 8	100	720	
13.	Block – 9, № 44,45,46 appt. houses	100	400	
14.	Block – 9, № 17,18,19 appt. houses	100	340	
15.	Block – 9	100	880	
16.	Block – 16, № 16-21 appt. houses	100	510	
17.	Block – 10, № 32-35 appt. houses	100	340	
18.	Block – 10, № 1,2 appt. houses	100	210	
19.	Block – 16, № 14,15,16 appt. houses	100	490	
20.	Block – 16, № 42,46,48 appt. houses	100	290	
21.	Block – 16, № 5,4 appt. houses	100	220	
22.	Block – 17, № 38,39,40 appt. houses	100	260	
23.	Block – 19, № 20,23,24 appt. houses	100	450	
24.	Nakkashlik Str.	400	1700	
25.	Katta-Kani Str.	400	1000	
26.	1, 3d Iqtisod proezd	100	800	
27.	1, 2nd Guliston proezd and Yashnar Str.	100	710	
28.	Sh.Tongi Str., № 1-11 houses	100	360	
29.	2nd Hosilot proezd	100	520	
30.	1st A.Tukay proezd, A.Tukay Str.	50	130	
31.	1,2,3,4,5th I.Usmanov proezd and Sugali ota Str.	100	1800	
32.	Almazar Str. № 165,167,169 houses	100	260	
33.	Turab Tula Str.	300	450	
34.	I.Ikramov, Parvoz Streets	100	270	
35.	3d Sanoat proezd	100	520	
36.	3d Dilhush proezd, 1,2nd Gavhar proezd	100	540	
37.	2nd Dilhush proezd, Guzal Str.	100	460	
38.	Domrabad, Dilhush, Gavhar Streets	100	1810	
39.	Sh.Gulyamov Str.	100	860	
40.	Mahalla named after U.Yusupov, Karavan-saray proezd	100	3500	
41.	2nd Tirsakobad proezd, Shoshdan Astrabad Str.	100	370	
1	2	3	4	5
42.	Maysazar Str.	100	380	
43.	3d Gulistan proezd	100	150	
44.	Nurhon and Jalilov, Azizbekov, Rudakiy Streets	100 200	650 460	
45.	Afshona Str., from Chilanzar to Lenin uchkuni Str.	100	640	
46.	Berdah, 2nd F.Hodjaev proezd	100	1970	
	TOTAL:		***33,248***	

Table D 5.2.3.3 (9) Sheyhantahur District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Hurshid Str.	150	1000	
2.	Almazar Str. Penkov tupik	100	470	
3.	S.Kosimov tupik	50	70	
4.	Navoi Str.: from «Hamza» theatre to Chorsu	600	1220	
5.	Navoi Str.: from U.Yusupov to Almazar Streets	250	1500	
6.	Navoi Str.: from Anhor canal to «Hamza» theatre	600	1823	
7.	U.Yusupov Str.: from Navoi to Hurshid Streets	250	1080	
8.	Aviatsionniy proezd	100	400	
9.	Mahtumkuli Str.: from 6th Mahtumkuli proezd to Kolhoznaya Str.	100	680	
10.	Jizzah proezd from S.Drabaza Str.	100	560	
11.	S.Drabaza Str.: from Katta-bog to Gulhani Streets	100, 300	2160	
12.	Uygur Str.: from 1st Ayni proezd to Kukcha Str.	300	600	
13.	Almazar Str.: from Navoi Str. to «Uzbekistan» building	300	1140	
14.	Almazar Str. Malyarniy tupik	100	160	
15.	Soy buyi Str.: from Koh-ota to Faol Streets	100	480	
16.	Poligraficheskaya Str.: from Faol to U.Yusupov and Koh-ota Streets	150	960	
17.	2nd Aksay, 4th Kurgoncha proezds: from Sohibaev to Shomahmudov Streets	150	760	
18.	1,3,4th Aksay proezds	100	1220	
19.	O.Sharafutdinov Str.: from Uygur to 5th Ranniy Str.	150	600	
20.	A.Kadiri: from G.Gulyama to the Republican GAI (Municipal Automobile Inspection)	300	2150	
21.	Aminov Str.: from 2nd Aksay proezd to Beruni Str.	150	1300	
22.	Kurgancha Str.: from General Uzokov to Aksay Str.	300	920	
23.	Tinchlik proezd: from Ainov to Tinchlik Streets	100	280	
24.	Katta-bog, Chukur kuprik Str.: from S.Darbaza to Gulirano Streets	150/50	980	
25.	Darhan Str.: from Beshagach massiv to Habibiy Str.	150	400	
26.	Darhan Str. Ipak tupik	100	320	
27.	Z.Kabulov Str.: from Arhitektorov Str. to S.Rahimov movie theatre	150	560	
28.	A.Rahmat Str.: from Sofiyskaya to Arhitektorov Streets	200	800	
29.	Arhitektorov Str.	100	420	
30.	Tahskenbaeva Str.	250	440	
31.	Batumskaya Str. with proezds	150	240	
32.	Abay Str.: from Zulfiyahanum to A.Kadiri Streets	400	460	
33.	C-15: from Abay Str. to № 3 appt. house	250	640	
34.	Gulobod Str.	100	160	
35.	Bahmal Str.	100	410	
36.	Butakuz, Charhnoza Str.: from S.Darbaza to Ak-tepa canal	100	610	
37.	Furkat Str.	200	600	
38.	Kazirabad, 2nd Kazirabad Sreets	150	2060	
39.	T.Rasulov Str.	100	430	
40.	3d Eshanbabahanov proezd	100	260	
41.	4th Huvaydo proezd	100	320	
42.	Hromiy Str.	100	390	
43.	Shomahmudov Str.	150	1060	
44.	K.Yokubov Str.: from Tinchlik to K.Kori Streets	100	710	
45.	Temirtau Str.: from Beruni to J.Rumiy Streets	100	720	
46.	Kolhoznaya Str.: from General Uzokov to Tinchlik Streets	100	420	
47.	C-26: from B.Zakirov to № 85 appt. house	300	500	
48.	Hakikat Str., Bildirish proezd from Zarkaynar Str. to the Mosque named after H.Ahror	150,100	420	
49.	Gulhani Str. № 37, 38 appt. houses	100	110	
50.	Koh-ota Str.: from the Mosque to the Technical school	100	205	

No.	Address	Diameter(mm)	Length(m)	Note
51.	Sobhodjaev Str.: from Ozyornaya to Kalkauz aryk	100	140	
52.	Gulhani Str.: from Ak-Tepe to Uvaysiy Streets	150	394	
53.	Sultan Jura Str.	100	840	
54.	TV Centre: from Abay to Pahtakorskaya Streets	300	400	
55.	Hizmatchi Str.	150	480	
56.	Begzod Str.: from Uygur Str. to 4th Kizil-guncha proezd	150	1360	
57.	Uzgarish Str.: from Kirki to Tutzar Streets	100	260	
58.	S.Darbaza Str. Yashin tupik	50	140	
59.	A.Halikov, Termez Streets	100	480	
60.	Ak-Tepe massiv Esenin Str.	100	3140	
61.	Gulhani Str.: from S.Darbaza to Uvaysi Streets	200	354	
62.	4th O.Sharafutdinov tupik	100	180	
63.	J.Inoyatov Str.	100	310	
64.	Mashkhur Str.: from Uzgarish to Kirki Streets	100	220	
65.	Uygur Str.: from the bath house to № 85 appt. house	400	440	
66.	Berui Str.: from Matlyuba to Huvaydo Streets	400	1520	
67.	Ulugbek, Shofaiz Str.: from Uygur to 4th Kizil-guncha proezd	300	1160	
	TOTAL:		***47,996***	

Table D 5.2.3.3 (10) Yakkasaray District

No.	Address	Diameter(mm)	Length(m)	Note
1.	Bobur Str.: from Nukus Str. to TashTETs	400	900	
2.	Bobur Str.: from U.Nosir to Nizomiy square	300	860	
3.	Bobur Str.: from VK №19610 to №1 house	300	600	
4.	Bobur Str. the corner of Yusuf Hos Hojib Str.	300	170	
5.	The pipeline along H.Umarov Str. from Bashlik PS to the pipeline going along Chulponota Str. (Volgogradskaya Str.)	600	1300	
6.	Shohjahon Str.: from Askiya Str. to the Textile Institute	150	410	
7.	2nd Shoshiy proezd	150	320	
8.	Samarkandskiy Massiv	100 150 200 300	620 290 200 540	
9.	The pipeline going Chulponata Str. (Volgogradskaya Str.): from Mirahmedov (Salomatin Str.) to Burdjar aryk	600	540	
10.	Kushbegi Massiv	100 150 300	686 1100 1690	
11.	Bashlik Massiv	100 150 200 300 400	640 190 640 2600 80	
12.	ITR Str.	100 150	870 380	
13.	U.Nosir Str.: from Kunaev to Bobur Streets	250	1460	
14.	Artelliriyskaya Str.: from Kunaev to Yusuf Hos Hojib Streets	100	270	
15.	Beshchinor Str. (Levanevskogo Str.): from U.Nosir Str. to № 7Fac.	150	674	
16.	A.Askarov Str.	100	406	
17.	2nd Karimov proezd	100	284	
18.	U.Nosir Str.: from № 20 house to Pogranichnaya Str.	150	294	
19.	2-Kunaev Str.	100	230	
20.	3d Djambul proezd	100	290	
21.	S.Eshonkulov) Str.: from Mirahmedov to Yakkasaray Streets	100	200	
22.	Nurmuhamedov Str.: from Mukimi to S.Eshankulov Streets	150	1200	
23.	Kizilkumskaya Str.: from Shohjahon Str. to Hodjinov through Belarik Streets	100	510	
24.	Spitamen Str.: from Yakkasaray to Chulponota Streets	100	550	
25.	2nd Kunaev proezd	100	540	
26.	Yu.Radjabiy (Lopatin) Str.2-storeyed appt.houses	100	260	
27.	Haziniy (Osipenko) Str.	100	320	
28.	Karakumskaya Str.: from M.Tolibjanov to Gertsen Streets	100	380	
29.	Sh.Rashidov Str.: from Uzbekistanskaya to Yusuf Hos Hojib Str.	300	740	
30.	The pipeline along Mirahmedov (Salomatin) Str.	600	1560	
31.	The pipeline along Yu.Radjabi Str. through Shelkovichnaya Str. by Shpilkov proezd from Afrosiyob proezd to Bobur Str.	600	2950	
32.	U.Nosir Str. (cross connection of Farhadskiy -Volgogradskiy pipe)	150	490	
33.	Imam At-Termeziy Str.: from Avloni to Babaev Str.	80	310	
34.	Shohjahon Str.: from Imama At-Termezi to общ-я	150	500	
35.	Bobur Str. № 69 appt. house	200	220	
36.	3d B.Hiloliy proezd, 1st Taneev proezd	150	290	
37.	Abdullaev Str.	200	140	
38.	Hodjinskaya Str.	110	60	
39.	At-Termezi Str.: from Abdullaev to Avloniy Streets	100	312	
	TOTAL:		***31,066***	

Table D 5.2.3.3 (11) Mirabad District

No.	Address	Diameter(mm)	Length(m)	Note
1.	B.Mirobadskaya Str.	100	600	
2.	Michurin Str. and 4th Michurin tupik from Ok Yul Str.	100	505	
3.	KECh city	150	2000	
4.	Malogospitalnaya Str.	50	150	
5.	Ok Yul Str.: from Temiryulchilar to G.Aliev Str.	100	900	
6.	Pirmuhamedov Str.: from 4th B.Mirabad proezd, from B.Mirabad to Nukus Streets	100	440	
7.	T.Shevchenko Str.: from Chehov to S.Baraka Streets	150	250	
8.	1st Ok Yul tupik	100	300	
9.	2nd Eski Otchopar tupik	100	300	
10.	3d Kizil Arvatskiy tupik	100 50	20 30	
11.	2nd Fayziobad tupik	100	300	
12.	Fetisov Str.	300	600	
13.	Eski Otchopar Str.	80	460	
14.	Fidoilar (Lazo) Str.	100	200	
15.	1st Hamol tupik	100	200	
16.	1,2,3d Hamol proezd	100	430	
17.	Odilhodjaev Str. with tupiks	150 50	300 460	
18.	1st Solijonov tupik	80	160	
19.	Amirobod (Omskaya) Str.	100	400	
20.	Hamroz Str.	100	300	
21.	1st Sarbon tupik	100	320	
22.	Munis Str.: from Parvona to Frgona yuli Streets	100	250	
23.	P.Rjevskiy Str., 1st Rjevskiy tupik	150 100	370 120	
24.	6th Mironshoh proezd	100	320	
25.	1st Temiryulchilar proezd (Kardub)	100	260	
26.	1st Nukus proezd	100	420	
27.	Yakka Chinor Str. school № 110	300	220	
28.	Fitrat Str.	100	580	
29.	Se Selim Str.	100 50	270 200	
30.	Inokobod Str. with 2,3,4th proezds	150	810	
31.	Rinochniy tupik, Pirmuhamedova Str. with proezds	80 100	250 250	
32.	3d Fayziobod pereulok Fayziobod Str.	100 100	140 280	
33.	1,2,3d Istikbol tupik	80 50	240 60	
34.	Yorkin Str.	100	330	
35.	5th Fitrat proezd Parda Tursun Str. 4th Fitrat proezd	100 100 150	300 280 150	
36.	1,2,3d Vodil proezd 2nd Fargona yuli tupik	100 100	460 230	
37.	Vodil Str. Narhodjaev Str.	100 100	230 480	
38.	Movarounnahr Str., near cashier's iffice and № 49 house	200	50	
39.	1st of May Str.	200	100	

No.	Address	Diameter(mm)	Length(m)	Note
40.	Fayziobod Str.: from Fargona yuli to 7th Fayziobod proezd 2nd Fayziobod tupik Fayziobod Str. from № 34 house to GAI Fayziobod Str. (cottages)	80 100 100 100	190 270 310 150	
41.	The pipeline along Ahunbabaev Str. from S.Azimov to Shahrizyabskaya Streets	600	640	
42.	1,2,3d Chambil tupik	80 80 80	90 140 140	
	Chavondoz Str.	100	250	
	2nd Mirsalihov tupik	100	350	
43.	Ok uy Str. from Eski Otchopar to Fargona yuli Streets	100	550	
44.	3d Kuylyuk proezd	100	540	
45.	8th of March Str. from Mehrjon to Fargona yuli Streets	150	1600	
46.	Ok yul (Pershin) Str.	150	1200	
47.	Behterev Str. from children's PND to Banakotiy Str.	150	460	
48.	Fayziobod Str. from the 6th Fayziobod proezd to 4th Fayziobod pereulok	100	300	
49.	Beshkentskaya Str.: from Eski Otchopar Str. to Ippodromnaya well	150	490	
50.	Beshkentskaya Str.: from Ippodromnaya well to 2nd Fayziobod pereulok	150	490	
51.	1st Fayziobod proezd	100	400	
52.	Inlet and distribution lines to Ts-7 PS from Lahuti to Yakka Chinor Streets	300	960	
53.	Sarakulskaya Str.: from Gaydar to Chavandoz Streets	300	1420	
54.	Yakka Chinor Str.: from T.Shevchenko to Movarounnahr Streets	200	220	
55.	Kunaev Str.: from Buyuk Turon to Lahuti Streets	250	640	
56.	Mironshoh Str.: from Pershin to Starodubtsev Streets	300	1260	
57.	Movaraunnahr Str.: from Chehov Str. to Salar aryk	250	760	
58.	Chehov Str.: from Movaraunnahr to Oybek Streets	250	660	
59.	S.Azimov Str.: from Ahunbabaev to Movaraunnahr Str.	300	580	
60.	4th Fayziobod pereulok	100	300	
61.	Kudduz Str.	150	690	
62.	Hamol Str.: from Fargona Yuli to Banakotiy Streets Banakotiy Str.: from Narhodjaev to Sarakulskaya Str.	200	1320	
63.	Kafanov Str.: from Nukus Str. to MKAD	200	500	
	TOTAL:		***35,145***	

Attachment

A.1 Explanation Materials for Work Shop

The schedule and contents of workshop for the technical portion are shown in Table A.1.1

Materials for explanation of workshops are described as follows:

Table A.1.1 Schedule and Contents of Work Shop

No.	Date	Theme	Contents	Attendants Number	Person in charge
1	3th Sep.	Introduction of technology	Design and plan for water supply system (1)	8	Mr. K. Matsuoka
2	15th Oct.	Introduction of technology	1) Design and plan for water supply system (2), 2) Video: Japanese water supply system, Tokyo water supply system	31	Mr. K. Matsuoka,
3	22th Oct.	Evaluation of current facilities	1) Evaluation of Tashkent City water supply system, 2) Video & Power point: Yokohama water supply system	15	Mr. K. Matsuoka, Mr. N. Abe
4	29th Oct.	Introduction of technology	1) Introduction of "water CAD", which is a software to hydraulic calculation, 2) Design and plan for ground water intake, 3) Video: A example of Replacement of WTP	10	Mr. N. Abe, Mr. T. Wada
5	5th Nov.	Introduction of technology	1) Pumps and volume control, 2) Control and monitoring for system, 3) Discussion	10	Mr. A. Yamaguchi, Mr. A. Natsui
6	10th Dec.	Formulation of Mater Plan	1) Introduction of Master Plan for facilities in first step by the Team, 2) Discussion (1)	9	Mr. K. Matsuoka, Mr. N. Abe
7	17th Dec.	Formulation of Mater Plan	Discussion to formulate the Mater Plan	15	Mr. K. Matsuoka, Mr. N. Abe
8	30th Jan.	Decision of Master Plan	1) Introduction of Mater Plan by the Team, 2) Discussion	13	Mr.K. Matsuoka, Mr.N. Abe

(1) 3rd September- Designing and Planning of Water Supply Systems (Part.1)

1. Design Water Volume

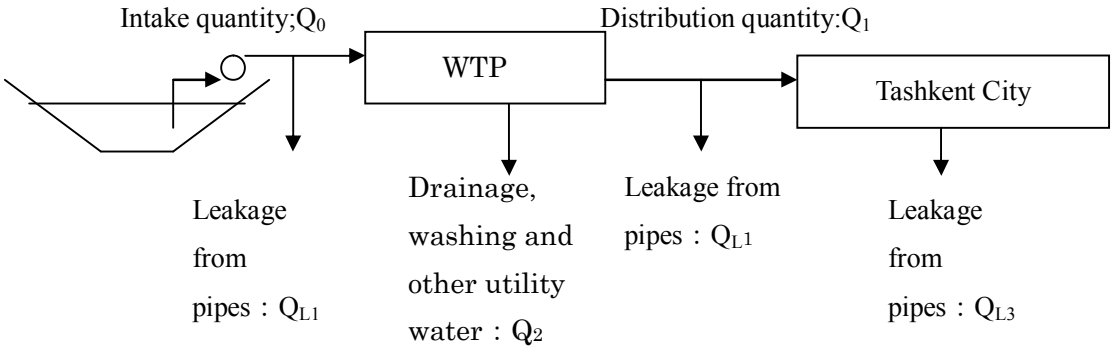


Fig1-1 Water Balance of Tashkent Water Supply System

WTP: Water Treatment Plant

(1) Decision of Design Distribution water Quantity（Q_1）

The distribution water quantity is real water consumption plus wasting quantity, leakage in house of consumer and leakage from outside distribution pipes and service pipes. Water consumption per capita will increase year-by-year, and wasting, leakage in housing and leakage from outside pipes will be decreased.

Since the decreased quantity will exceed to increasing quantity of real consumption, total distribution quantity to the city will reduce as Fig 1-2

Calculation of distribution water quantity is conducted as Fig 1-3.

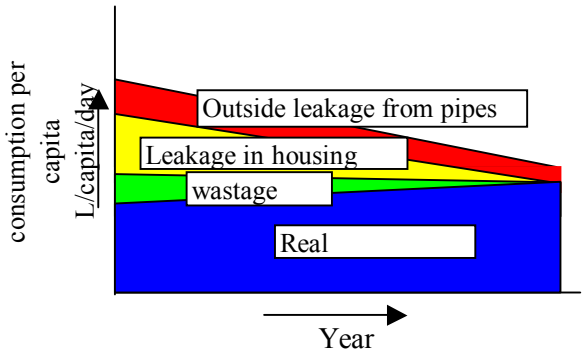


Fig.1-2 Water Reduction Pattern of Distribution Water

(2) Calculation of Design Intake Quantity（Q_0）

The Intake quantity is the distribution water quantity (Q_0) plus the utility water quantity (Q_2) for WTP including the drainage water from sedimentation tanks and filters, washing water and others.

$Qo = Q_1 + Q_{L2} + Q_2$

$Q_2 = (5 \text{ to } 10\%) \times Q_0$

Population Projection

To evaluate Population projection of the city estimated by the city government, and if necessary the projection will be corrected considering latest economical and social tendency in the city.

Estimation of per capita Water Consumption（q_0）

1) Per capita consumption of individual (q_{00}) will be decided based on the results of current consumption survey considering future increasing of demand;
2) To estimate the reduction rate of wastage (q_{x1}) and leakage in house (q_{x2}) accompanied with valuable countermeasures to save water;
3) To calculate the per capita water consumption of individual as $q_{01} = q_{00} + q_{x1} + q_{x2}$;
4) Water consumption per capita for large consumers is calculated as future distribution for large consumers/ projected population, and future distribution for large consumers is estimated based on past tendency of demands and assumption of socioeconomic situation.
5) $q_0 = q_{01} + q_{02}$

Total Distribution Water Quantity in the City

1) Distribution water quantity of individual (q_1)and large consumer(q_2)：
   $q_1 + q_2 =$ （$q_{01} + q_{02}$） ×projected population
2) Leakage quantity from outside pipes is estimated considering current leakage quantity, future change of water pressure and improvement of pipelines; Q_{L3}
3) $Q_1 = q_1 + q_2 + Q_{L3} + Q_{L1}$

Fig.1-2 Assumption of Water　Distribution Quantity

(3) Estimation of Outside Leakage Quantity from Pipes（Q_3）

Outside Leakage Quantity from pipes = Q1 – Water quantity consumers received (total of measured quantity of water meter + error of meters + stolen water)

2. Planning and Designing of Water supply Facilities

(1) Water source

Water sources that can meet the design intake quantity (intake quantity of design year) need to find and acquire the water intake right.

Variations of water sources are following;

1) Groundwater divided into storage water and flowing water under ground

Water quality of groundwater in an area with plenty of rainfall is generally so good for drinking that the water can be distributed as drinking water only with disinfection.

However concentrations of dissolved material such as salinity, iron (Fe) and manganese (Mn) are sometimes high, and the groundwater cannot be used for y or needs to treat for removing some materials.

Groundwater can be withdrawn from an aquifer, which water is stored in a gap of sand or gravel, or river-bed, which water is flowing under ground.

Water intake capacity of drought period need to be investigated and the water intake quantity must be determined below the capacity.

Wells are used to withdraw the groundwater and the arrangement of wells, and the withdraw capacity of each well should be determined based on site investigation.

2) Flowing water in rivers

This kind of water becomes muddy by rainfall, and additionally is influenced by discharged wastewater in upper stream, therefore the water treatment is necessary to use for water supply.

The water flow is so sharply fluctuated in response to the rainfall amount that the intake quantity should be planned to design the flow of most drought period. In Japan's case, the third minimum quantity in 30 years is adopted.

3) Water of pond and lake

Water storage volumes of ponds and lakes are fluctuated in response to the rainfall as well as the flowing water, however the fluctuation is relatively small compared with the flowing water.

The design intake quantity is determined the intake capacity in draught period considering other water intake right.

Generally, these water qualities are better than the flowing water, but when many cities and factories are located in the basin, nutritional materials such as phosphorus and nitrogen are inflowing into ponds and lakes, and such materials sometime cause the eutrophication phenomenon, which generate a huge amount of algae and water pollution.

4) Dam storage water

If water intake quantity of flow water from rivers cannot meet the water demand, the dam reservoir needs to plan. The reservoir can utilize more effectively, since it can storage the water in wet period.

Water quality can be caused same phenomenon as ponds and lakes, but dams are constructed at upstream points of the river so many case that water pollution in the dam reservoir doesn't happen easily compared with ordinal ponds and lakes.

(2) Intake Facilities

Omitted

(3) Water Treatment Plant(WTP)

1) Layout Plan

The design water quantity of influent is Q_0 and effluent is Q_1.

The basic flow of WTP for surface water is shown in fig. 2-1.

The layout plans of the biggest two Japanese WTP are following; Fig.2-2(1)and Fig.2-2(2) shows the plan of Misato WTP (1.20million m^3/day) in Tokyo and the hydraulic profile; Fig. 2-3 shows the plan and the hydraulic profile of Murano WTP(1.83million m^3/day) in Osaka. Murano WTP has two water treatment facilities which is five stories cubic and the capacity of one facility is 300,000m3/day.

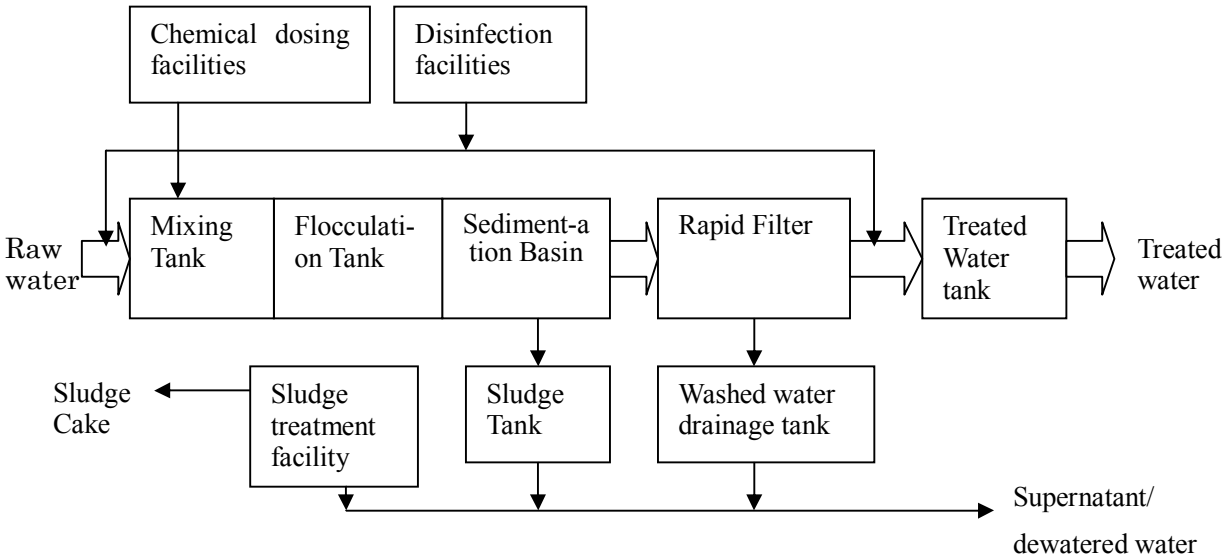


Fig.2-1 Basic Flow Sheet of WTP

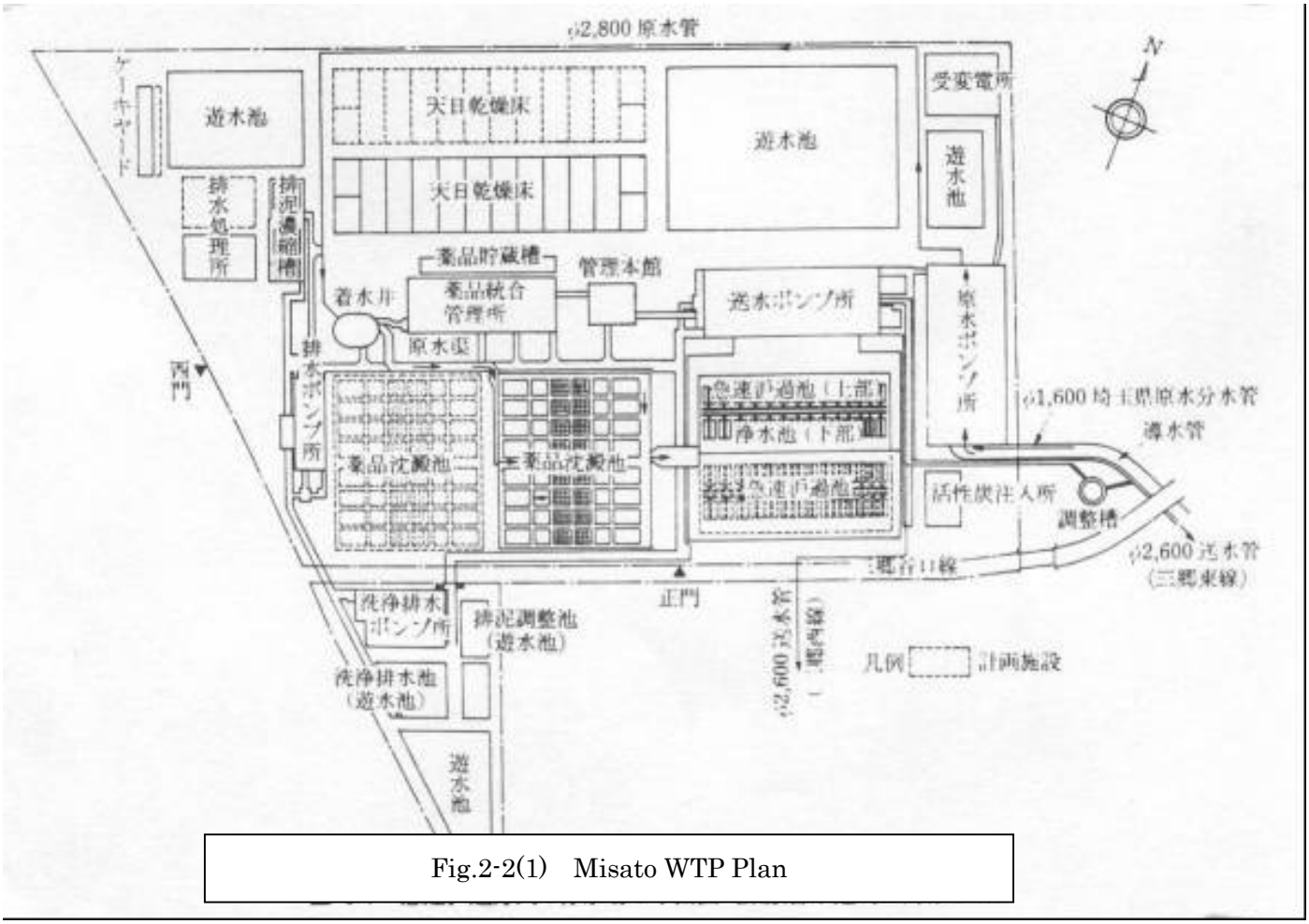


Fig.2-2(1) Misato WTP Plan

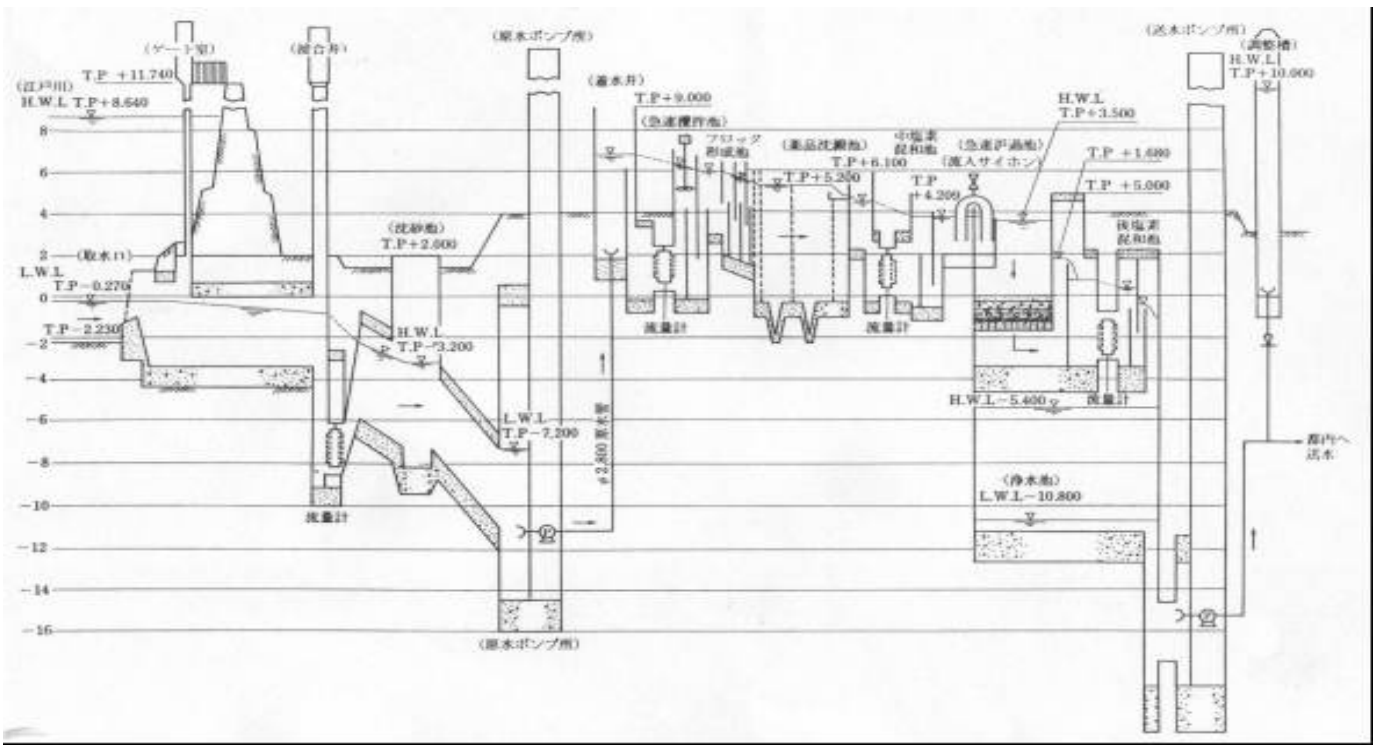


Fig2-2(2) Misato WTP Hydraulic Profile

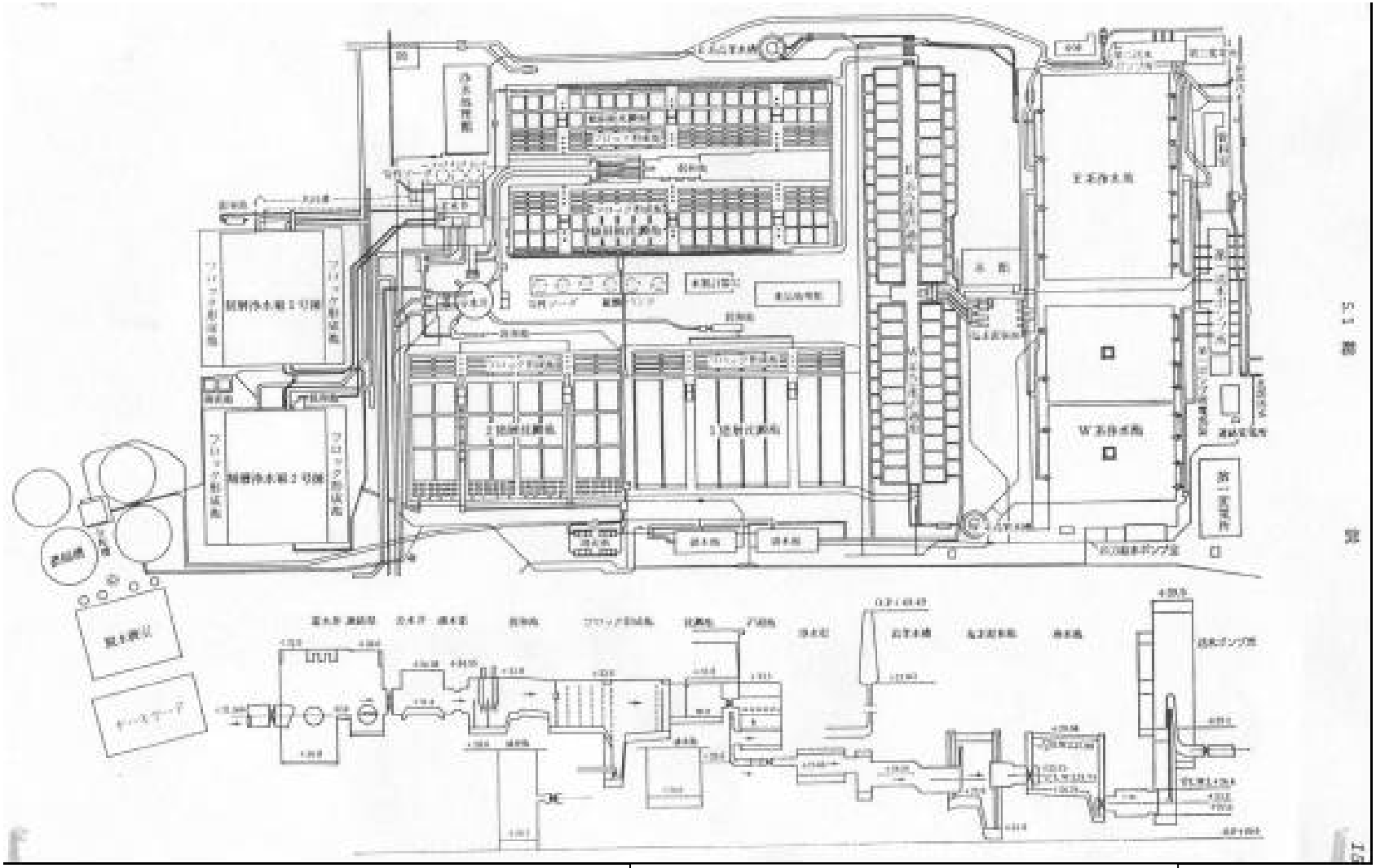


Fig.2-3 Murano WTP Plan and hydraulic Profile

The criteria of retention time and surface load of the facilities for WTP is various in many countries. Japanese and SINP's criteria are compared in Table 2-1.

There is not big deference, however it may be problem that a standard of weir load is not included in SNIP because if weir load is too high, settled sludge should be wounded and raised. However if sedimentation basin has enough retention time such as eight hours, it is not deficit of the system.

Table 2-1 Design criteria of water treatment plant

Name	Item	Unit	Japanese	SNIP
Rapid mixing tank	Retention time	Min	1 to 5	6 to 10
Flocculation tank	Retention time	Min	20 to 40	<20
Sedimentation basin	Retention time	Hr	---	1 to 3 *2
	Surface load	mm/min	15 to 30	---
	Section velocity	mm/sec	6.7>	0.45-0.5
	Weir load	M^3/mday	500	---
Rapid filter	Filtration velocity	M/hr	5-10*1	8 to 12
	Back wash velocity	L/sec/m^2	10-15	14
	Surface wash velocity	L/sec/m^2	2.5-3.3	(Air Wash)

*1: Stand-by filters are necessary. If the filtration velocity exceeds 150m/day, the filter layer needs to be double.

*2: Settling velocity particles are 0.45mm/sec ; 0. 9 hr、0.15mm/sec ; 2.6hr

2) Coagulation Sedimentation Process

In Coagulation Sedimentation Process, the coagulation and flocculation shown in Fig 2-4 are the most important. Since the diameters of floating particles in raw water are very small, e.g.1 micro-m, and they are charged with plus as electricity and repel each other, they don't sediment easily. Therefore coagulant, which major composition is sulfuric acid aluminum ($Al_2(SO_4)_3$), is injected into raw water and generates neutralization of particles by Al^+, and additionally the particles are made $Al_2(OH)_3$ to stick, which has a power of coagulation.

For coagulation, the dosed raw water should be stirred strongly by stirring machines and water flow, and particles are made coagulant to stick. However the diameter of the stuck particles, named micro-floc, are only around 20 μm and the settling velocities of micro-flocs are small. Therefore the water including these micro-flocs should be stirred slowly and these micro-flocs are made each other to stick to become larger flocs such as 0.2 to 0.5 mm of diameter in flocculation tanks.

This process is named "flocculation" and stirring for flocculation should be relatively strongly beginning of stage and gradually weaken at late stages.

These grown flocs can settle in the sedimentation basin easily.

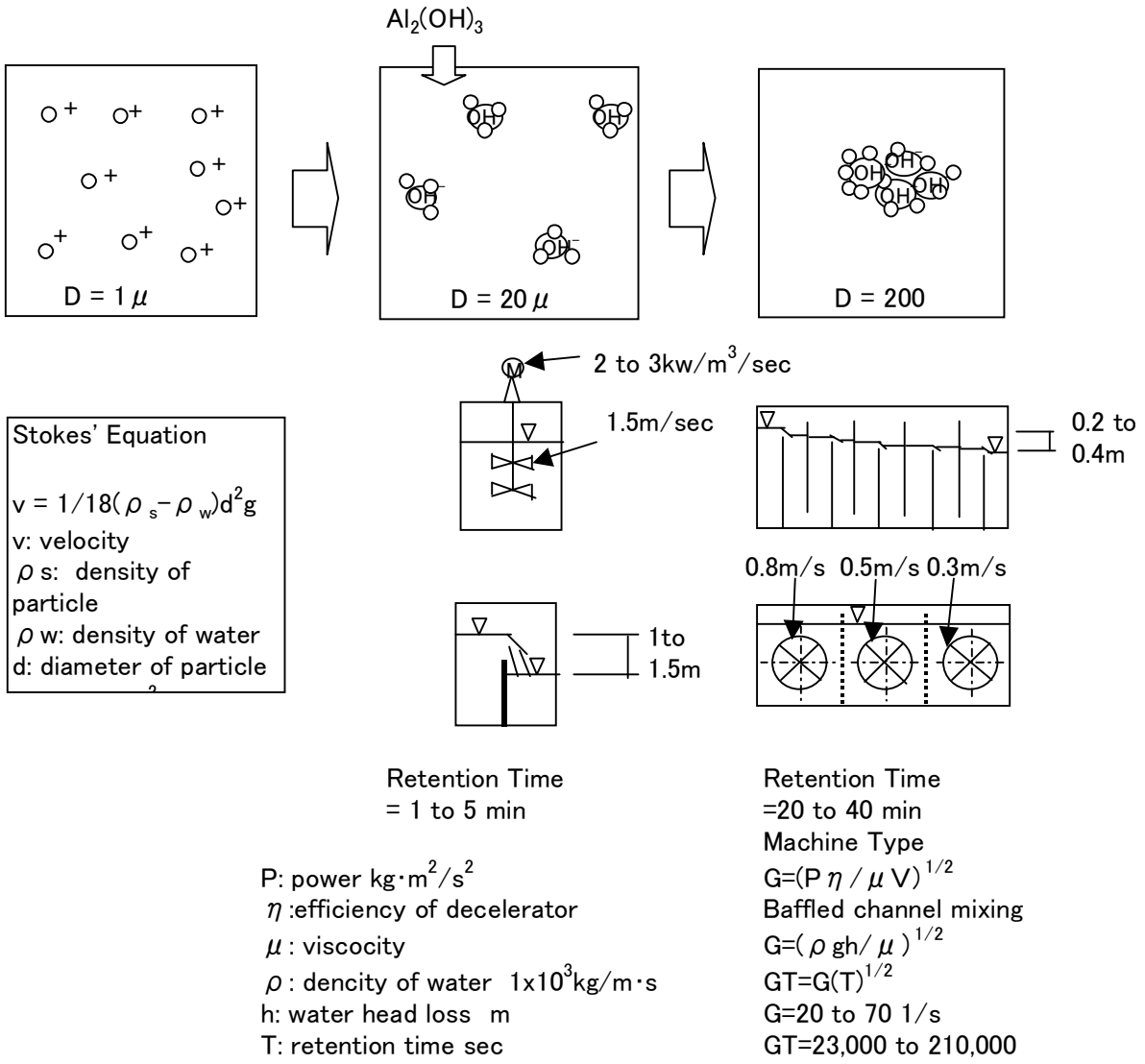
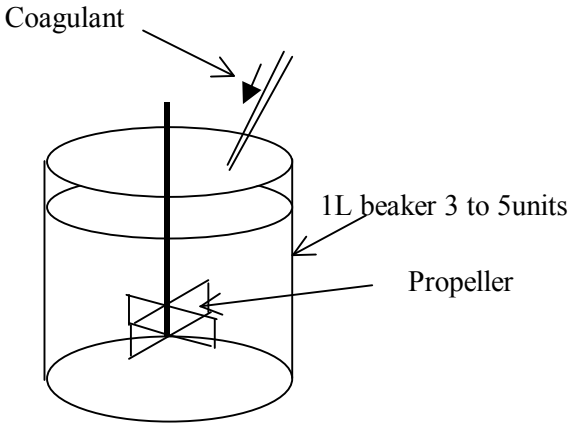


Fig.2-4 Coagulation and flocculation

The " Jar test" is to conduct this process in laboratory as shown in Fig 2-5. It is very important to determine the dosing rate of coagulant and " Jar tester" is essential for WTP.

Methods for flocculation are utilizing energy of water flow shown as Fig.2-6 or rotating paddles in water by mechanical power shown as Fig 2-7(1) and 2-7(2). The cost of utilizing water flow is much smaller than mechanical mixers. However, because the



Jar Test

1.To dose coagulant at several rate(maximum 6)
2.To revolute for 1 to 2minutes rapidly
3 To revolute for 10 to 20mitutes slowly
4 To observe and compare with condition of flocculation
5.To determine ideal coagulant injection rate

total difference of water revel and mixing strength of the former method fluctuate widely according to the change of flow volumes (Changes of the difference and the strength are in proportion with water flow velocity), this method has difficulty coping with change of flow.

Fig.2-5 Jar Tester and Jar Test

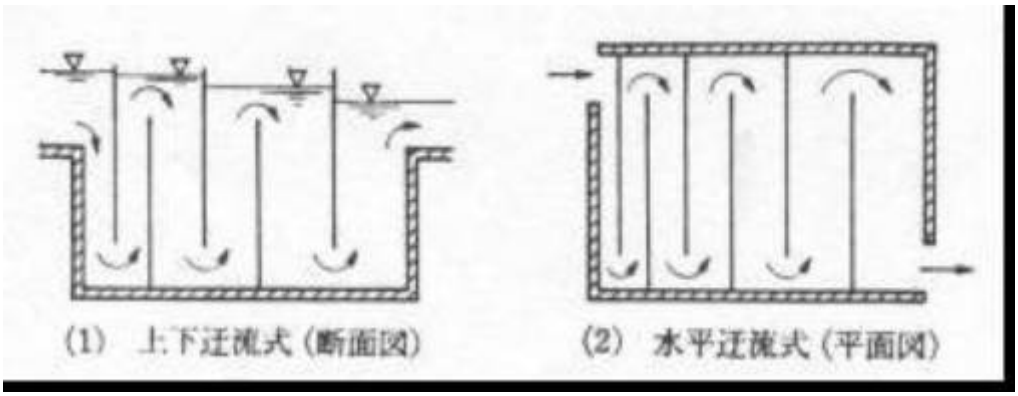


Fig.2-6 Flocculation Tank utilizing Water Flow

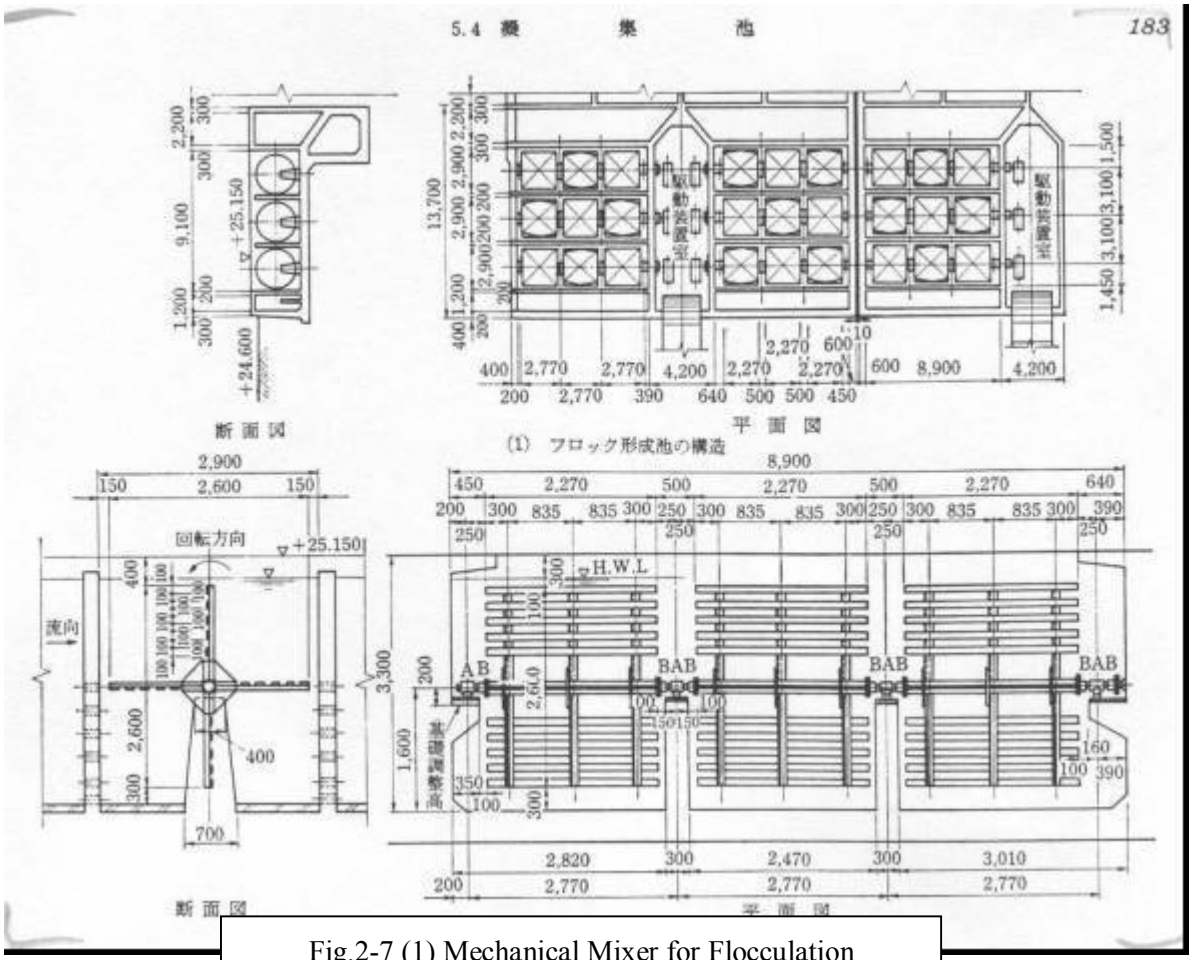


Fig.2-7 (1) Mechanical Mixer for Flocculation

There are many types of coagulation sedimentation basin. The most ordinal type is separated from sedimentation basin to rapid mixer and flocculation basin as shown in Fig. 2-8.

The other types are named as “suspended solid contact sedimentation or high speed sedimentation ” which combine these tanks and make these volume smaller than ordinal type. These types show Fig. 2-9(1) to 2-9(3).

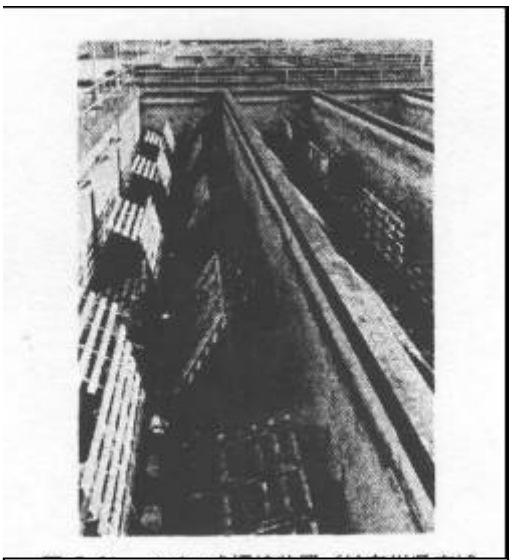


Fig.2-7 (2) Mechanical Mixer for Flocculation

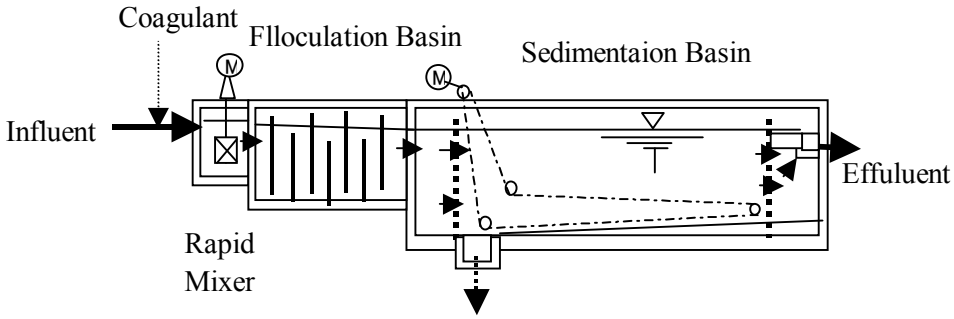


Fig 2-8 Ordinal Type of Sedimentation Basin

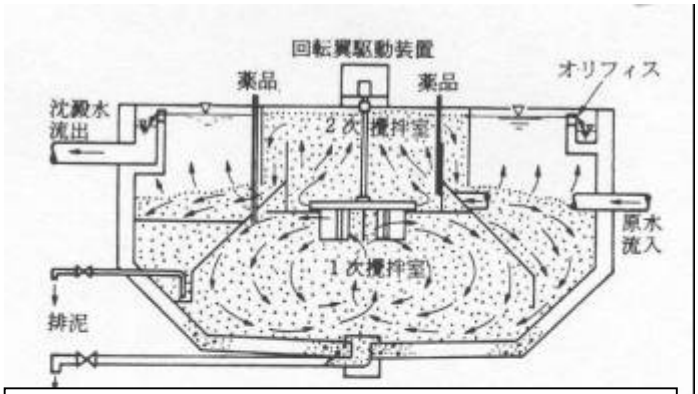


図 2-9(1)　High speed sedimentation Basin(1)

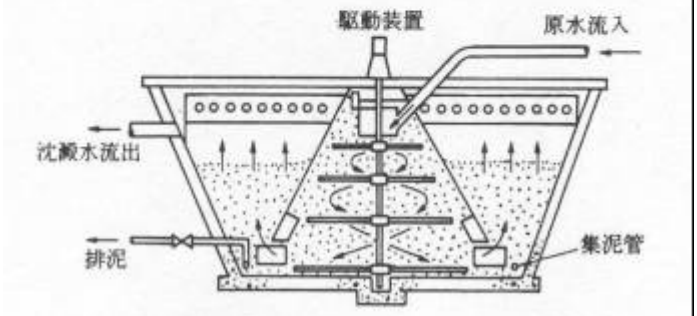


図 2-9(2)　High speed sedimentation Basin(2)

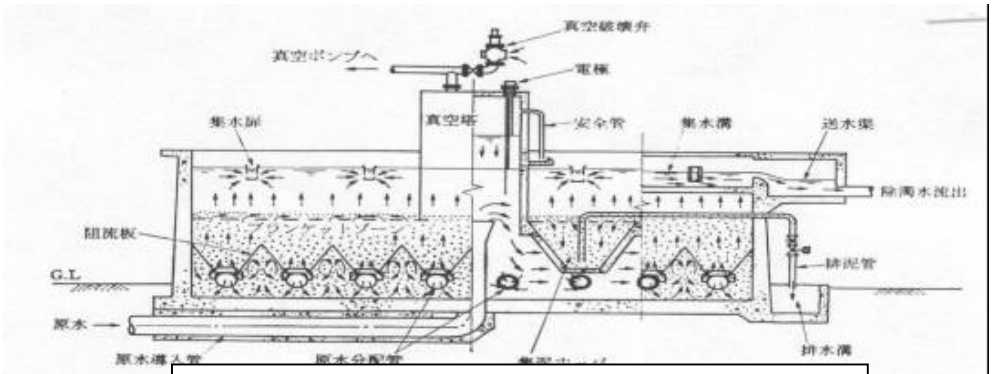
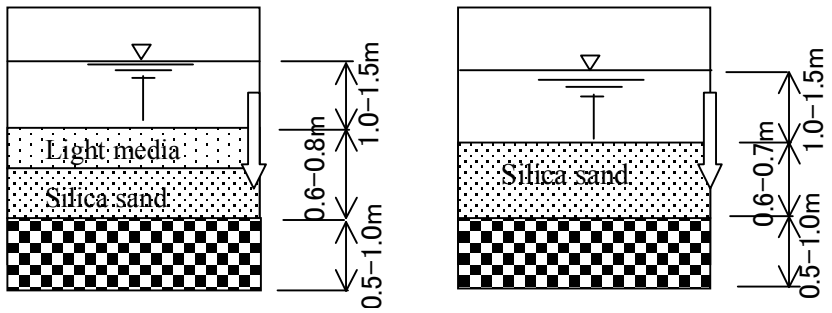


図 2-9(3)　High speed sedimentation Basin(3)

3) Facilities for Rapid Filter

The rapid filter accepts treated water from sedimentation basin and conduct filtration by the sand layer. There is single and double (or triple) sand layer type and the filtration speed of double layer type can be adopted higher than single type as shown Fig. 2-10.

Silica sand is used for filtration as filter media, which is sieved from raw material sand as shown in Fig 2-11. Light media is artificial material and the diameter of these is 1.5 to 2 times larger than silica sand and the real specific gravity is around 1.5g/cm^3, smaller than that of silica sand (2.65g/cm^3).



Double Layer — Filtration speed: below 240m/day

Single layer — Filtration speed: 120 to 150m/day

Fig.2-10 Composition of Filters

The filer can wash the sand layer by treated water or air when the sand is polluted and blocked by filtrated particles. For washing, back-washing which water is spouted from bottom of layer, and surface washing which water is spouted from surface of sand layer are usually used in Japan.

The filtration speed is desirable to be constant as stable as possible that various method to regulate the filtering speed is introduced for filtration systems.

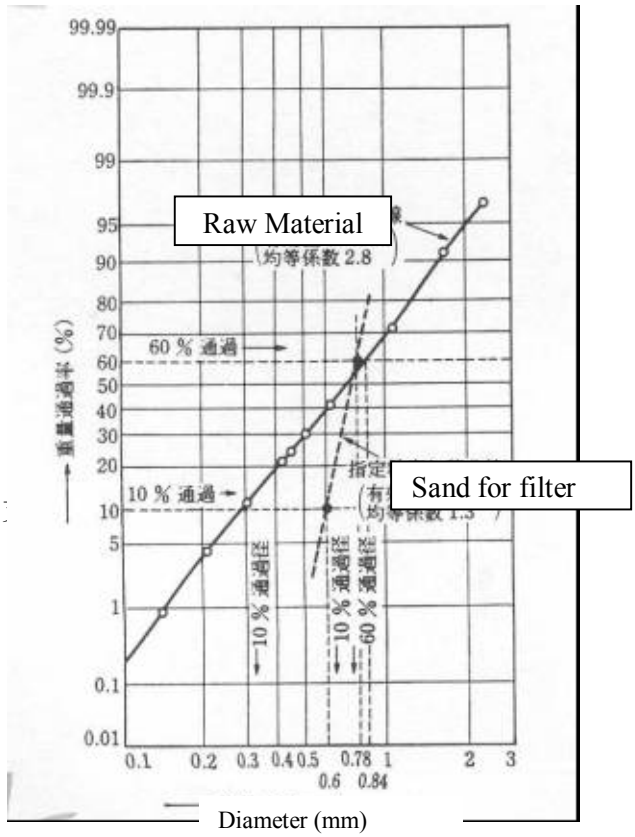


Fig.2-11 Diameter Range of Sand

Table2-2 Valuation of Filter Control Method

Control method		Influent	Effluent: Not drop type	Effluent: Drop Type
Constant filtration method	Flow control type	Drop Type		
		Not drop type		
		Control type		
	Water level control type	Drop Type		
		Not drop type		
		Control type		
	Natural balanced type	Drop Type		
Declining filtration method		Not drop type		
		Control type		

注）カスケード方式とは落下方式のことで，流入又は流出側水面と縁が切られている方式をいう。

As the filter layer is blocking by pollutant of layer, the head loss in the filter layer is increasing and a negative pressure zone is formulated within filter layer as shown in Fig2-12.

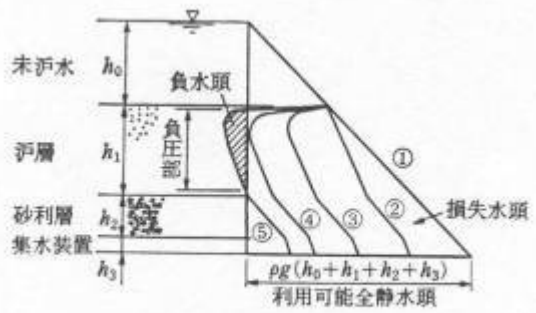


Fig.2-12 Increase of Head Loss of Filter Layer

Formulation of these zone is very dangerous because it cause to break the filtering layer and stored waste particle flow into filtered water, therefore the filter should be washed before its head loss has reached around 70% of total head which is difference from inlet water head to outlet water head

An example of filter section is shown in Fig.2-13. An example of filter using fixed surface washing equipment shown in Fig.2-14(1) and a detail of the equipment shown in Fig.2-14(2). An example of filter using rotating surface washing equipment shown in Fig.2-15(1), and a detail of the washing equipment shown in Fig. 2-15(2).

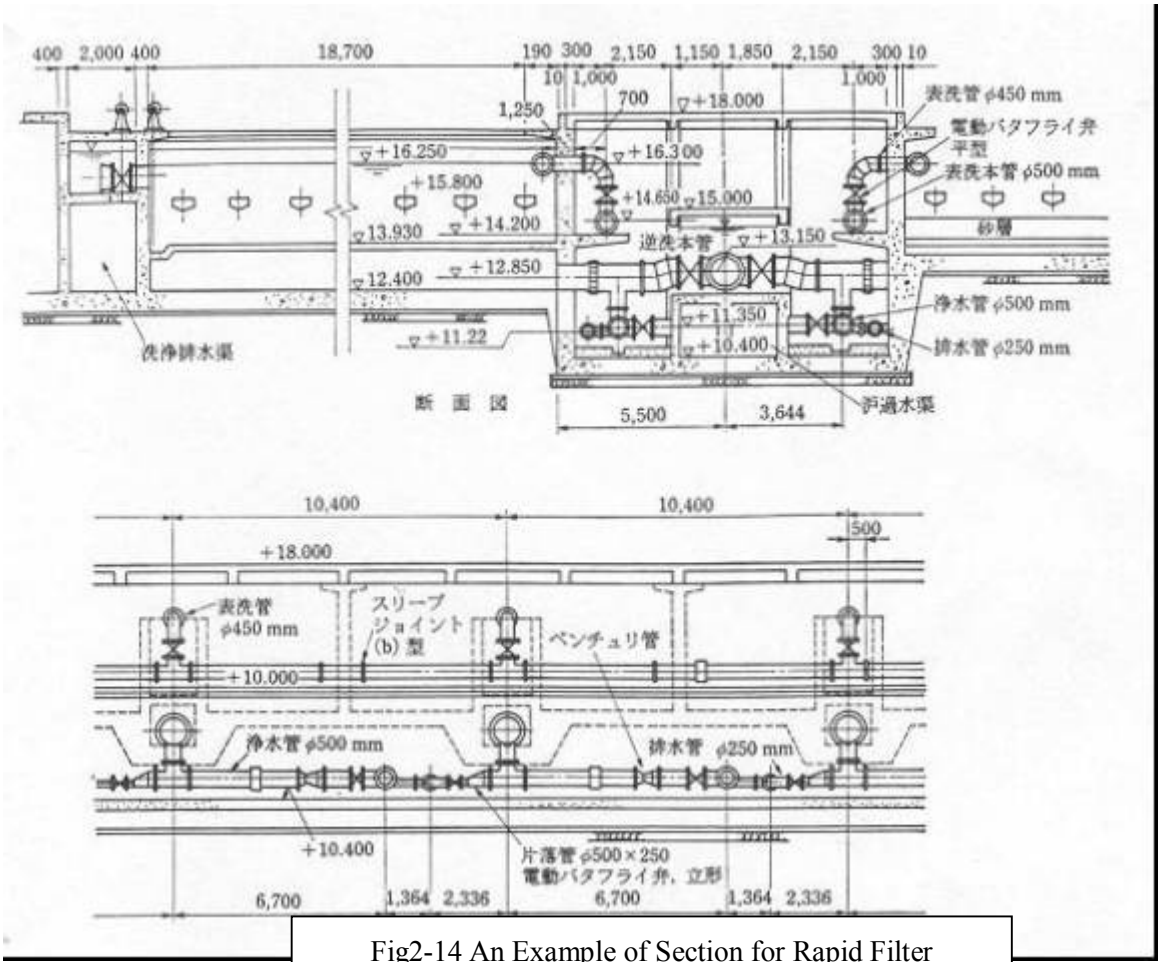


Fig2-14 An Example of Section for Rapid Filter

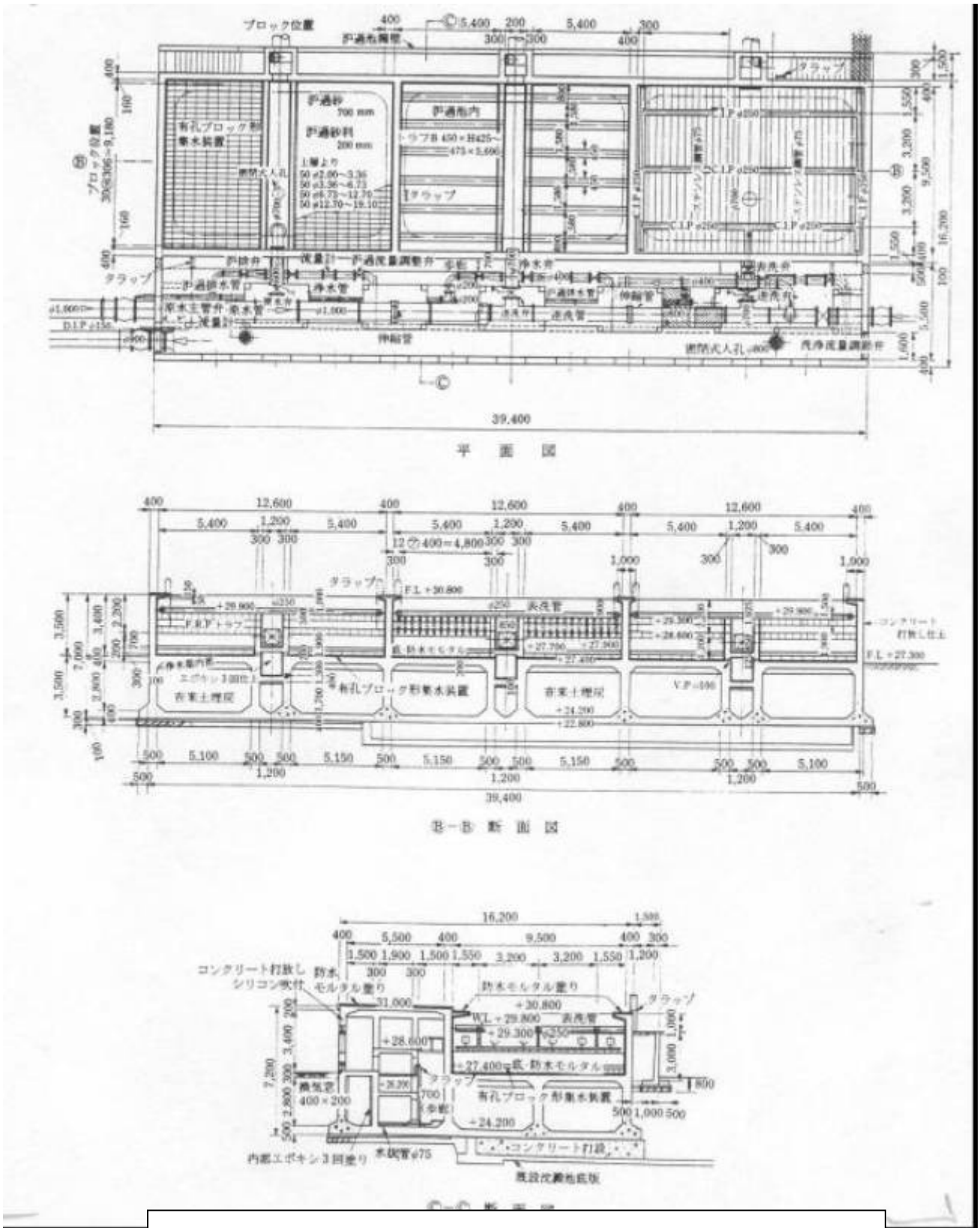
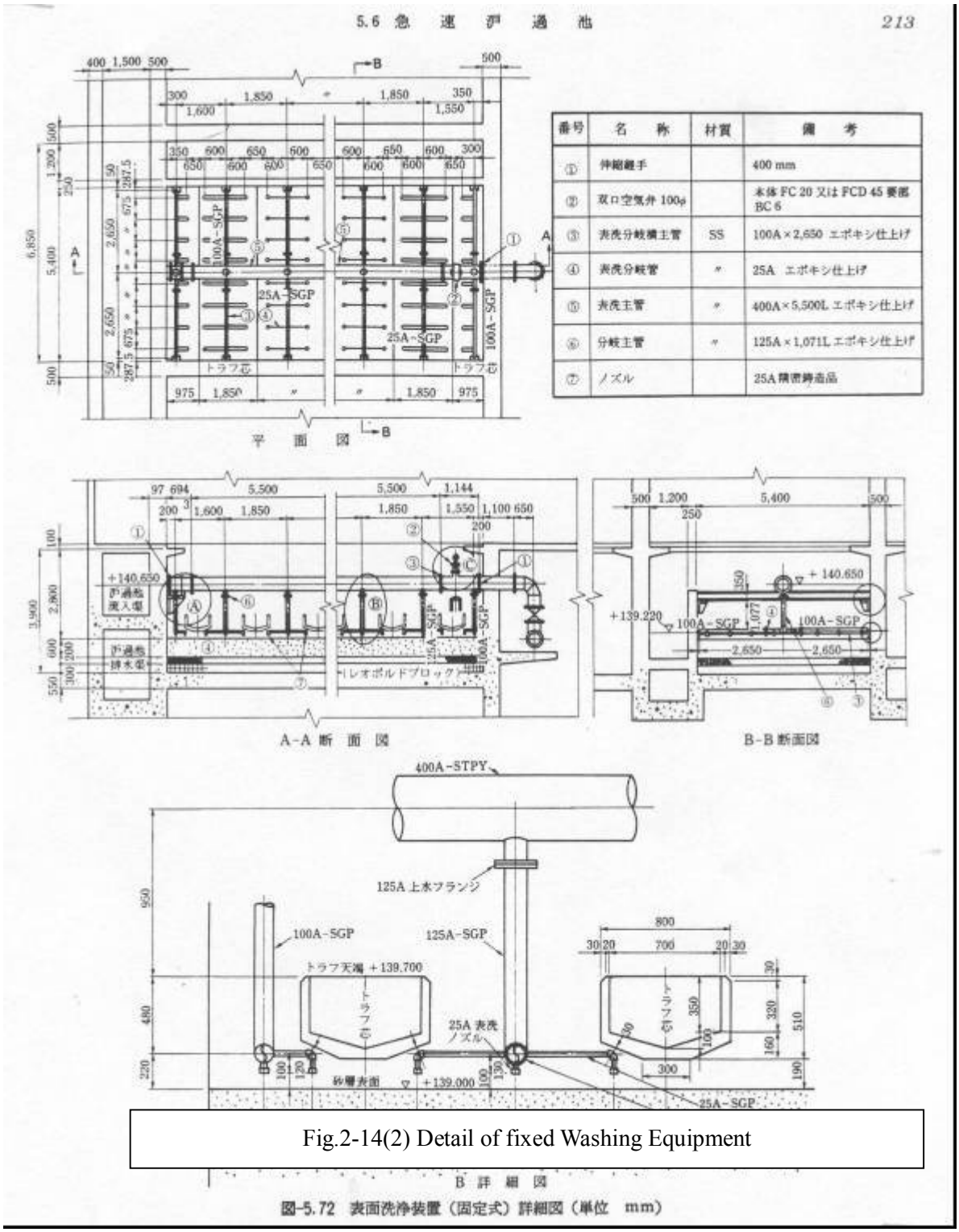


Fig.2-14(1) Rapid Filter using fixed Washing Equipment



番号	名 称	材質	備 考
①	伸縮継手		400 mm
②	双口空気弁 100φ		本体 FC 20 又は FCD 45 要部 BC 6
③	表洗分岐横主管	SS	100A×2,650 エポキシ仕上げ
④	表洗分岐管	〃	25A エポキシ仕上げ
⑤	表洗主管	〃	400A×5,500L エポキシ仕上げ
⑥	分岐主管	〃	125A×1,071L エポキシ仕上げ
⑦	ノズル		25A 精密鋳造品

図-5.72 表面洗浄装置（固定式）詳細図（単位 mm）

Fig.2-14(2) Detail of fixed Washing Equipment

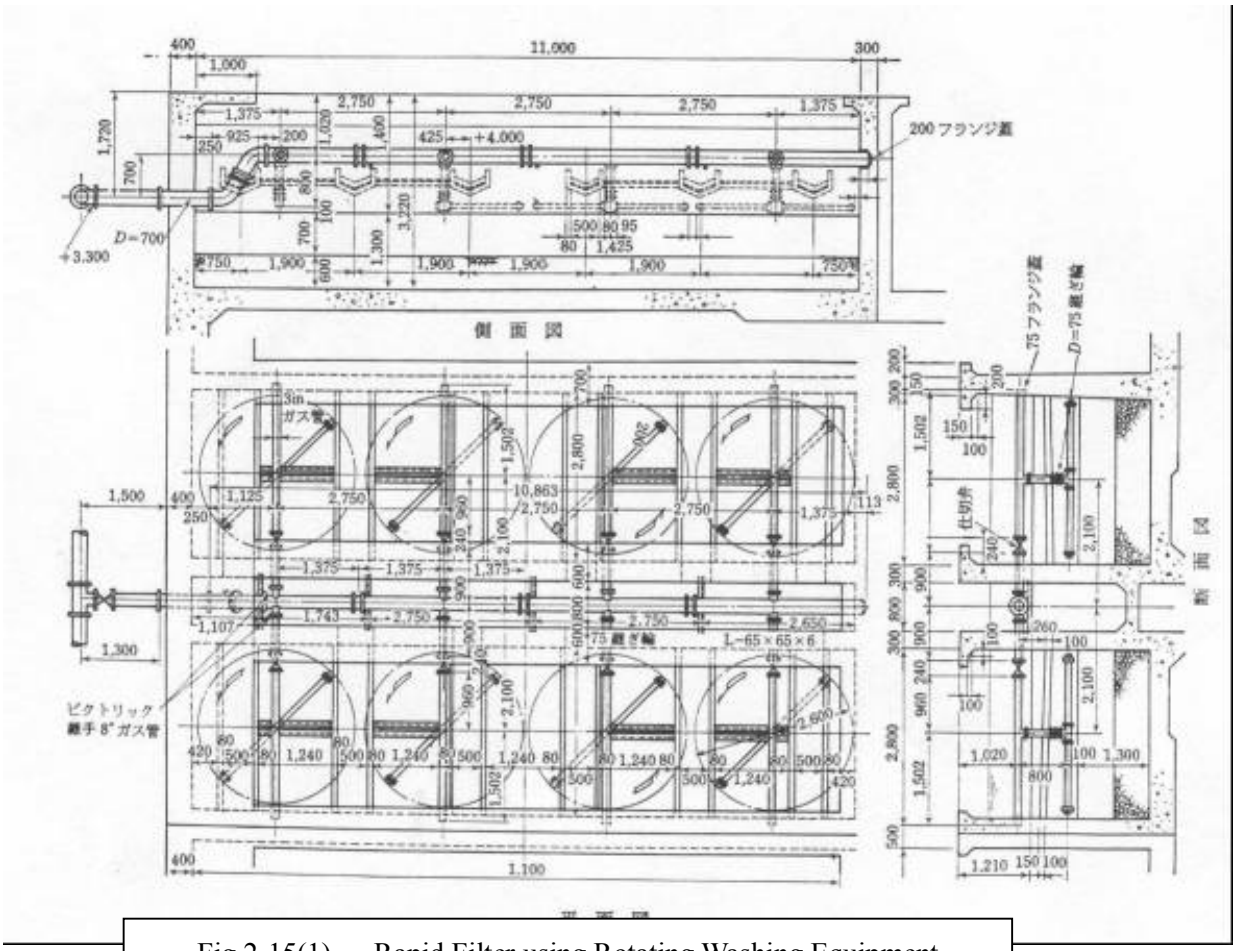
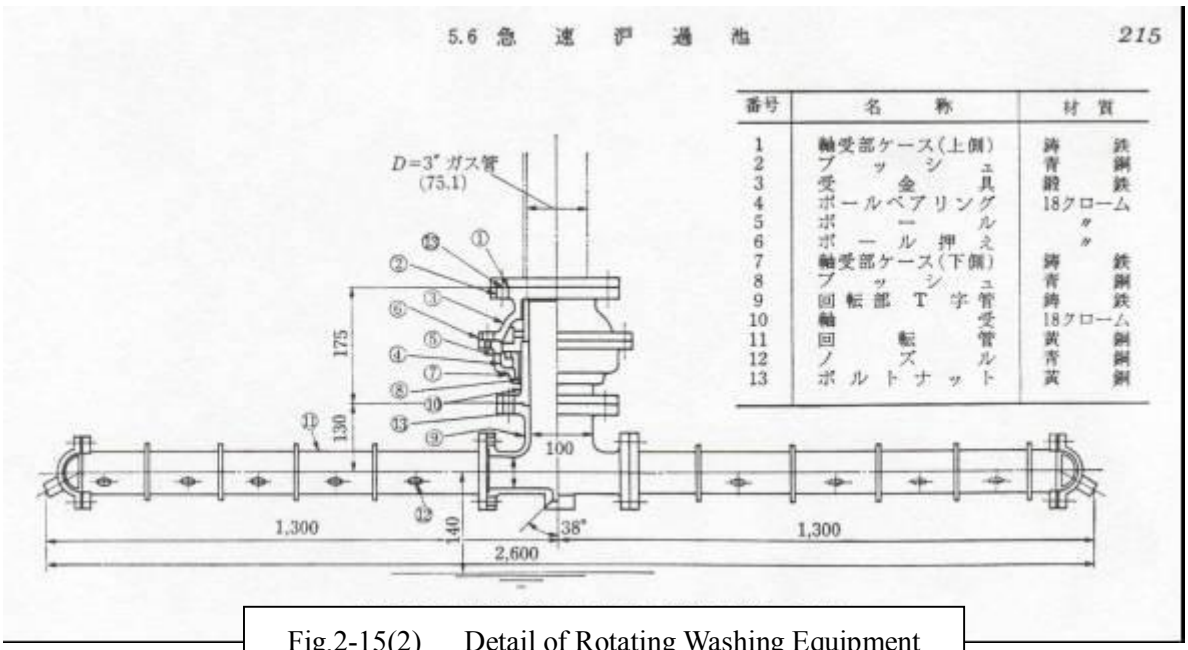


Fig.2-15(1) Rapid Filter using Rotating Washing Equipment



番号	名称	材質
1	軸受部ケース(上側)	鋳鉄
2	ブッシュ	青銅
3	受金具	鍛鉄
4	ボールベアリング	18クローム
5	ボール	〃
6	ボール押え	〃
7	軸受部ケース(下側)	鋳鉄
8	ブッシュ	青銅
9	回転部T字管	鋳鉄
10	軸受	18クローム
11	回転管	黄銅
12	ノズル	青銅
13	ボルトナット	黄銅

Fig.2-15(2) Detail of Rotating Washing Equipment

Several methods for back washing is utilized; these are (1) using pumps(Fig2-16(1)), (2) utilizing water head of elevated tank(Fig.2-16(2)), (3) utilizing filtered water generated by another filters (Fig.2-16(3)) and (4) utilizing water tank holding in filter facility(Fig.2-16(4)). Methods (1) and (2) is commonly used. Method (3) doesn't need pumps and are utilizing siphon without large diameter of auto valves to reduce construction cost, it need to be one set by 8 filter basin because the other 7 filters' filtering water need to wash for a filter. A necessary pump capacity for method (4) is small and siphons are used for this method, therefore the construction cost of the filter introduced this method is small.

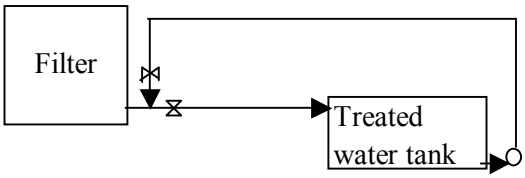


Fig.16(1) Method(1)

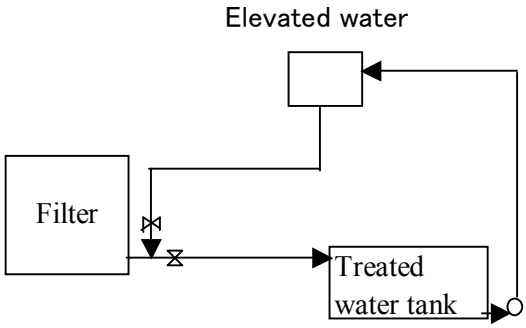


Fig.16(2) Method(2)

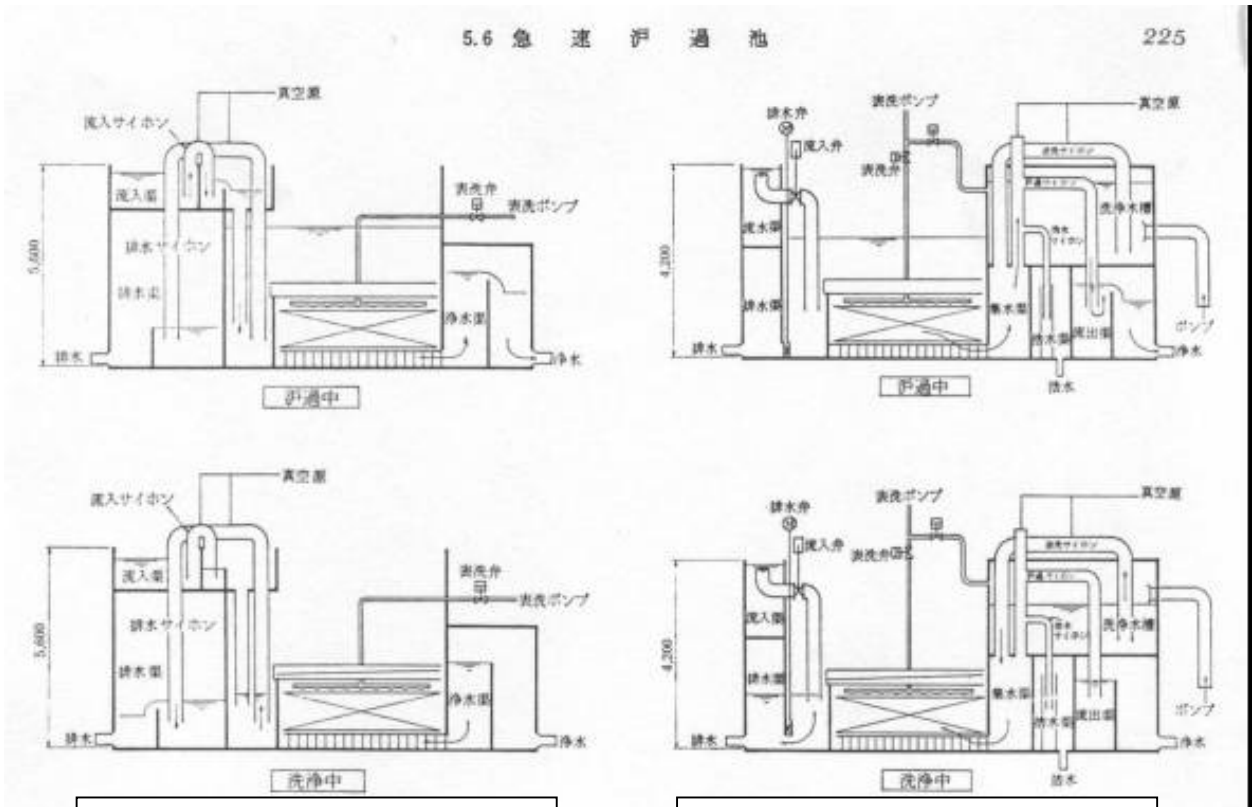


Fig.16(3) Method(3)

Fig.16(4) Method(4)

Fig.1-17 shows an example of filter facility by method (3). Since the inflow water is drop Fig.2-17 shows an example of method (3) filter. Water through sedimentation basin flows into each filter and flow of outlet water is not controlled, and water level of each filter basin is gradually raised as head loss of filter layer is increasing.

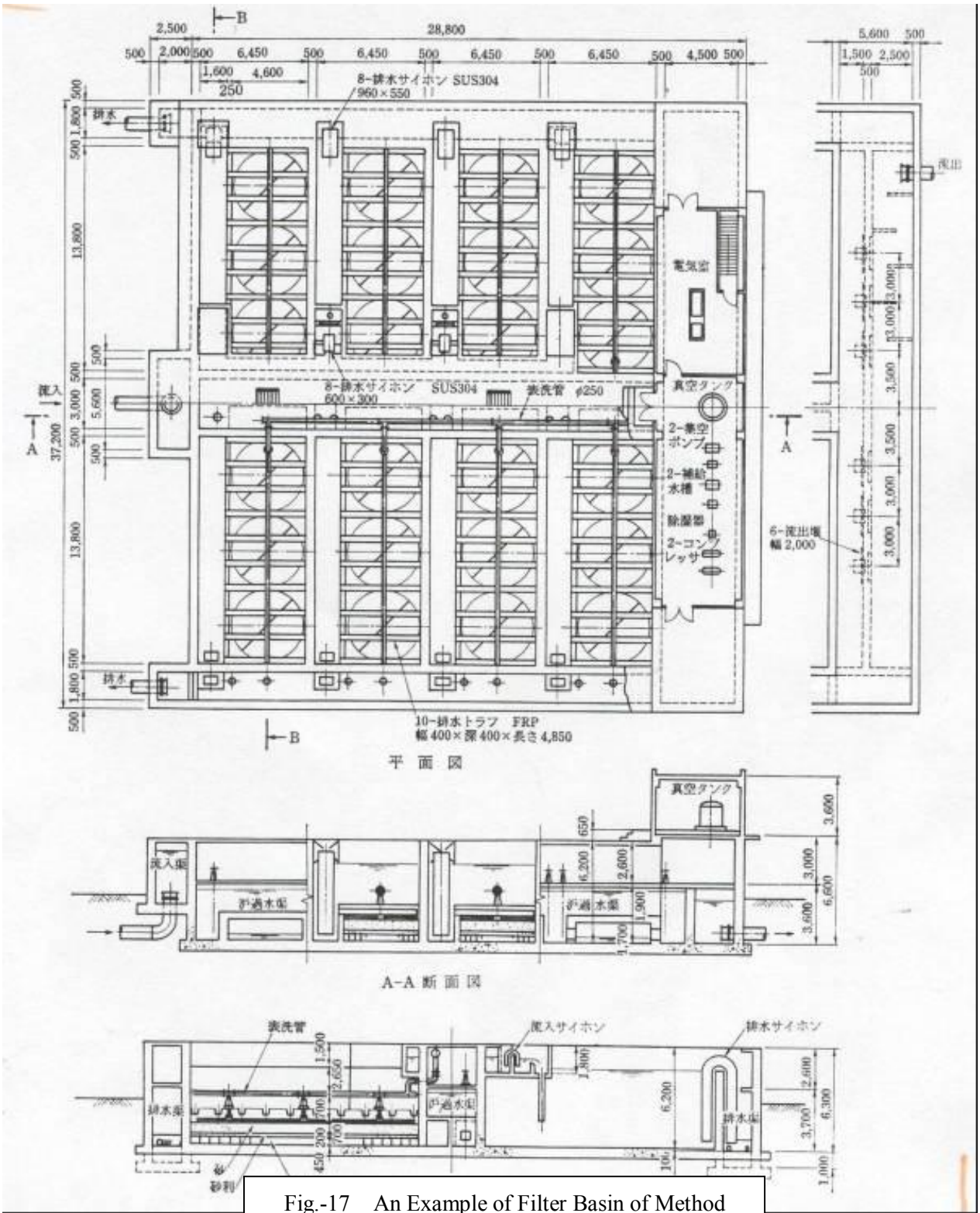


Fig.-17 An Example of Filter Basin of Method

A filter bed is the most important equipment for filter facilities, which supports filter layer and gravel layer, equally gather filtered water, and make back washing water spouting equally

Fig.2-18(1) shows a perforated brick type, which is the most ordinal type in Japan, Fig.2-18(2) shows a perforated pipes type, Fig.2-18(3) shows a strainer type, and Fig.2-18(4) shows a perforated brick type and porous plate type to be able to make back-washing.

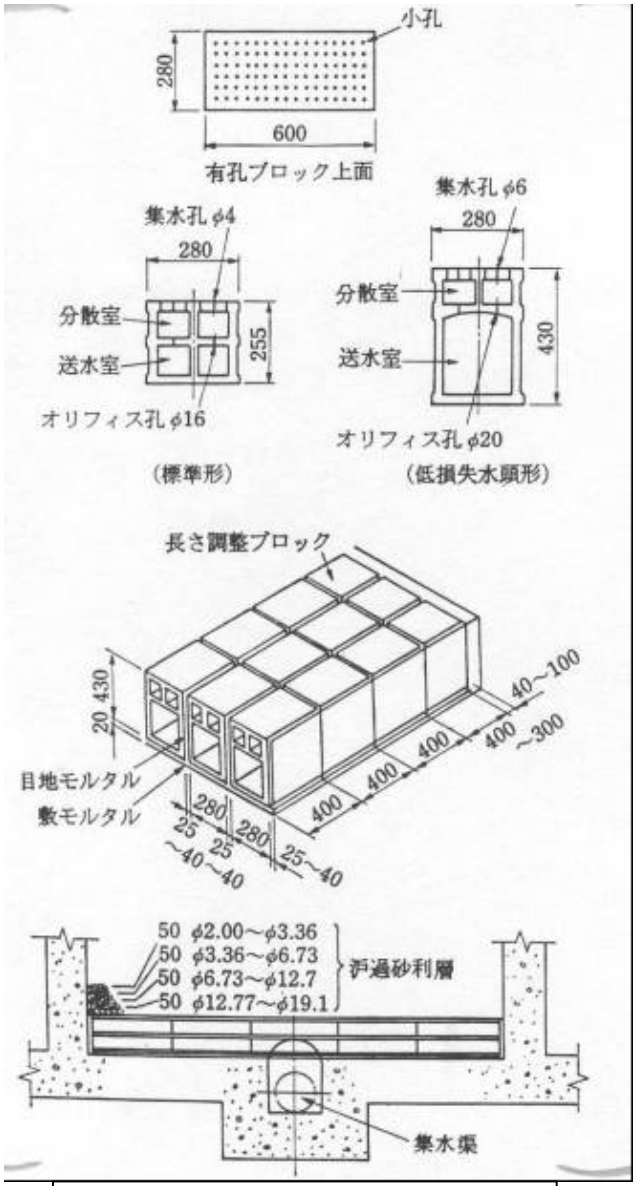


Fig.1-18(1) Perforated brick type

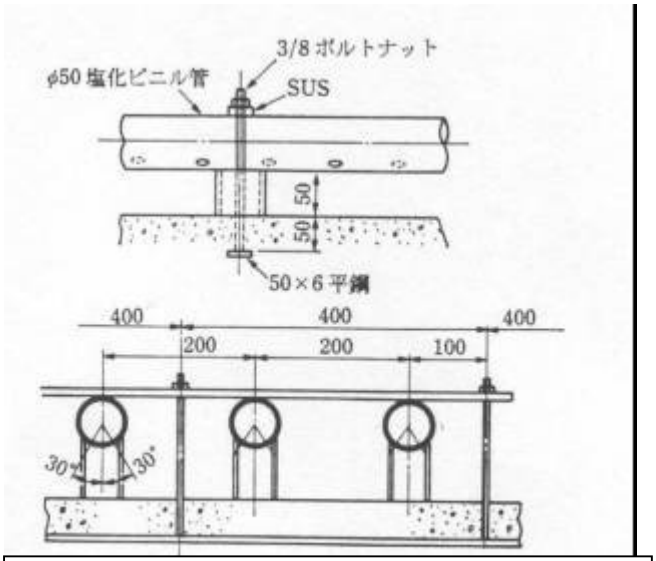


Fig.1-19(2) Perforated pipes type

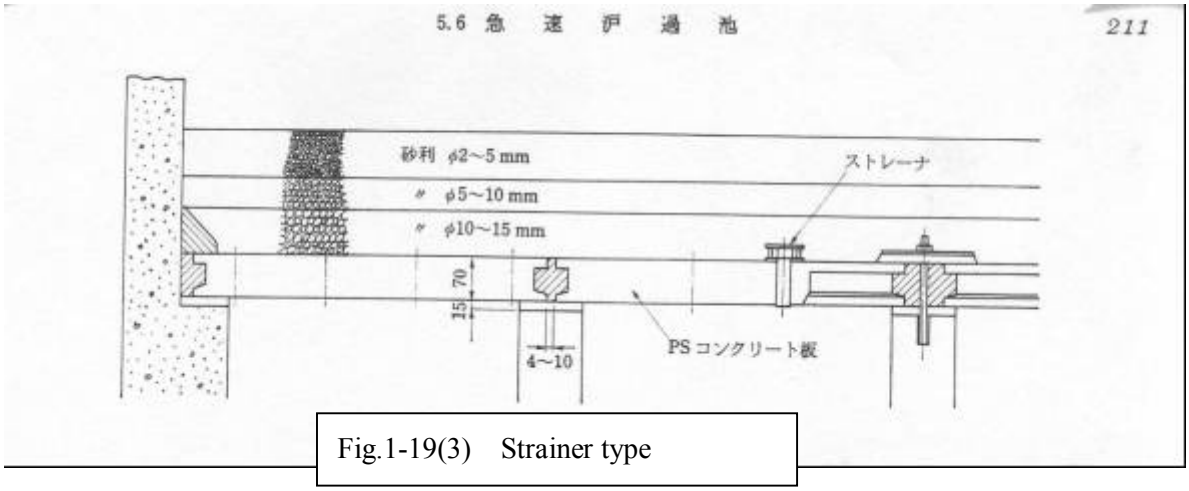


Fig.1-19(3) Strainer type

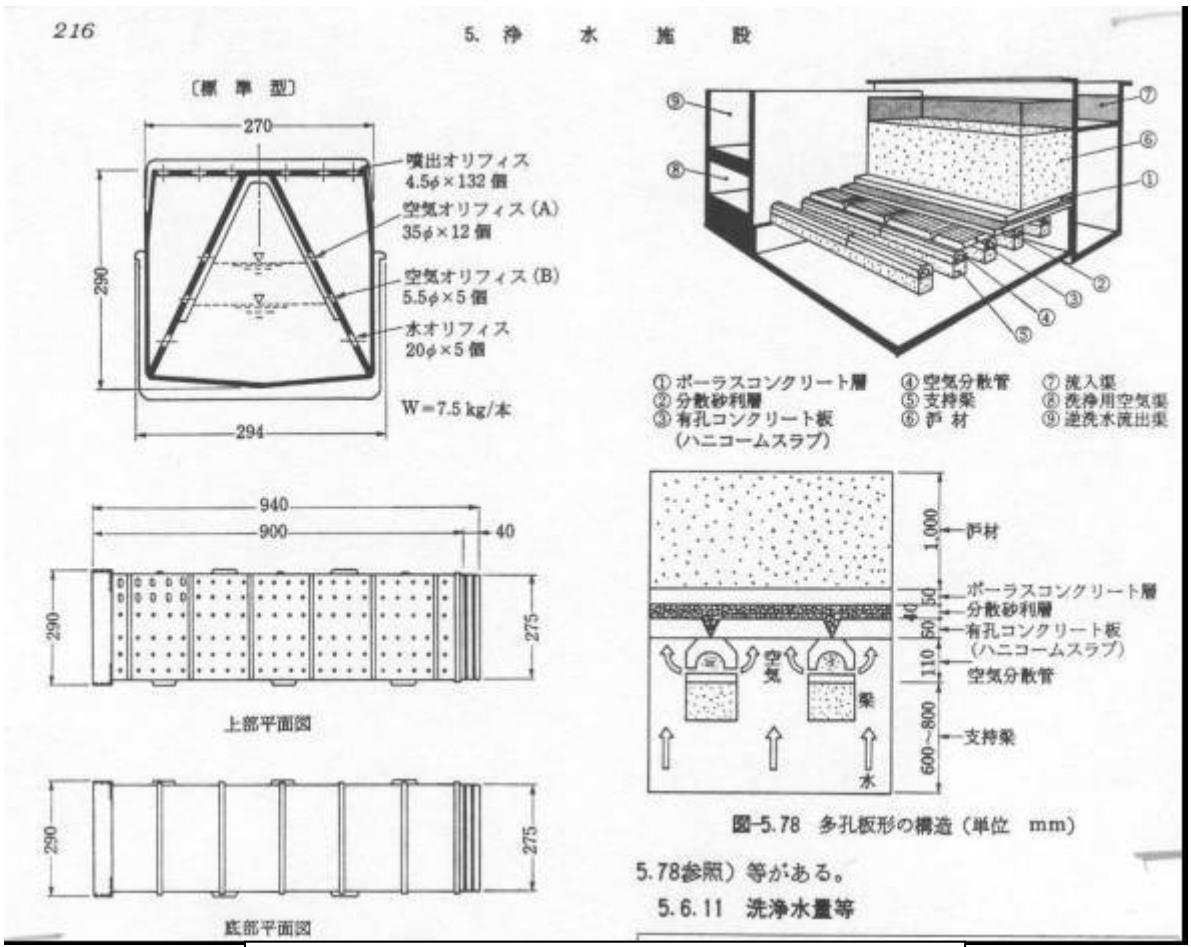


Fig.1-19(1) Perforated brick type and porous plate type to be able to make back-washing