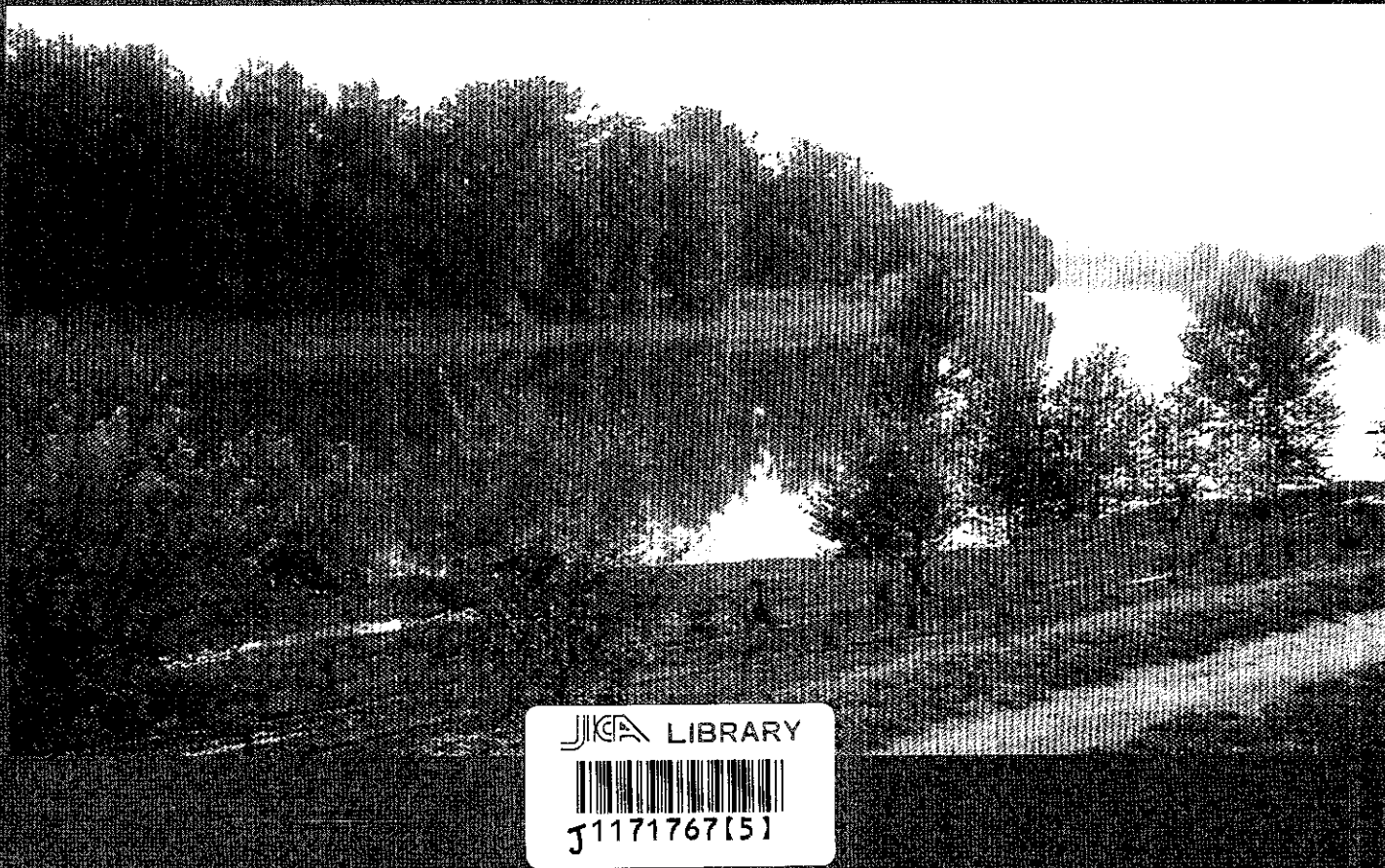



MINISTRY OF ECONOMY
MINISTRY OF AGRICULTURE AND FOOD INDUSTRY
THE STATE WATER RESOURCES MANAGEMENT CONCERN
"APELE MOLDOVEI"
THE REPUBLIC OF MOLDOVA

THE STUDY ON WATER SUPPLY SYSTEMS FOR THE NORTHERN REGION IN THE REPUBLIC OF MOLDOVA

FINAL REPORT Drawings



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January 2003

PACIFIC CONSULTANTS INTERNATIONAL, TOKYO
TOKYO ENGINEERING CONSULTANTS, TOKYO

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**MINISTRY OF ECONOMY
MINISTRY OF AGRICULTURE AND FOOD INDUSTRY
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**THE STUDY ON WATER SUPPLY SYSTEMS
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FINAL REPORT

DRAWINGS

JANUARY 2003

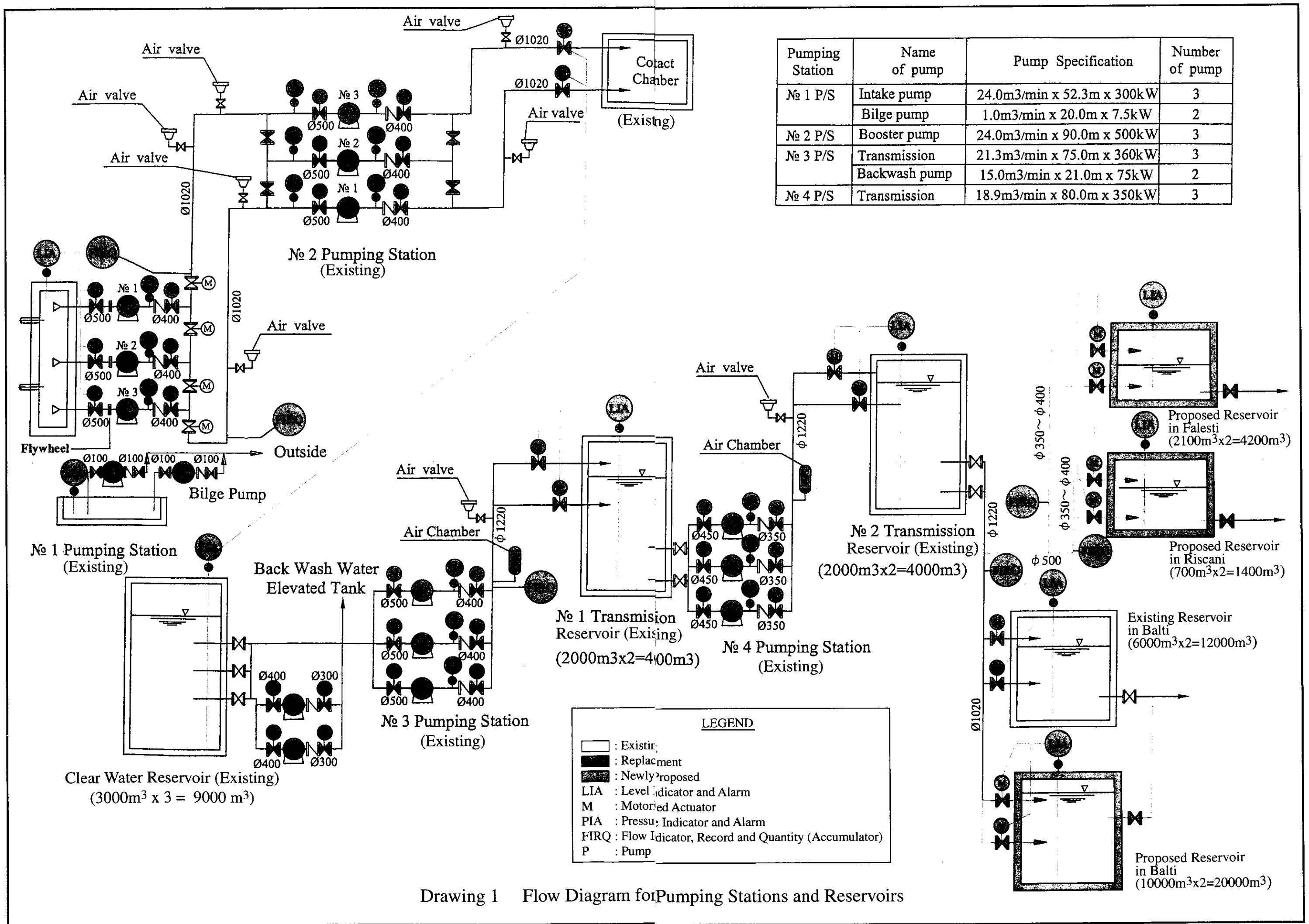
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1171767[5]

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Drawing 3	Plan and Section of No.2 Pumping Station
Drawing 4	Plan and Section of No.3 Pumping Station
Drawing 5	Plan and Section of No.4 Pumping Station
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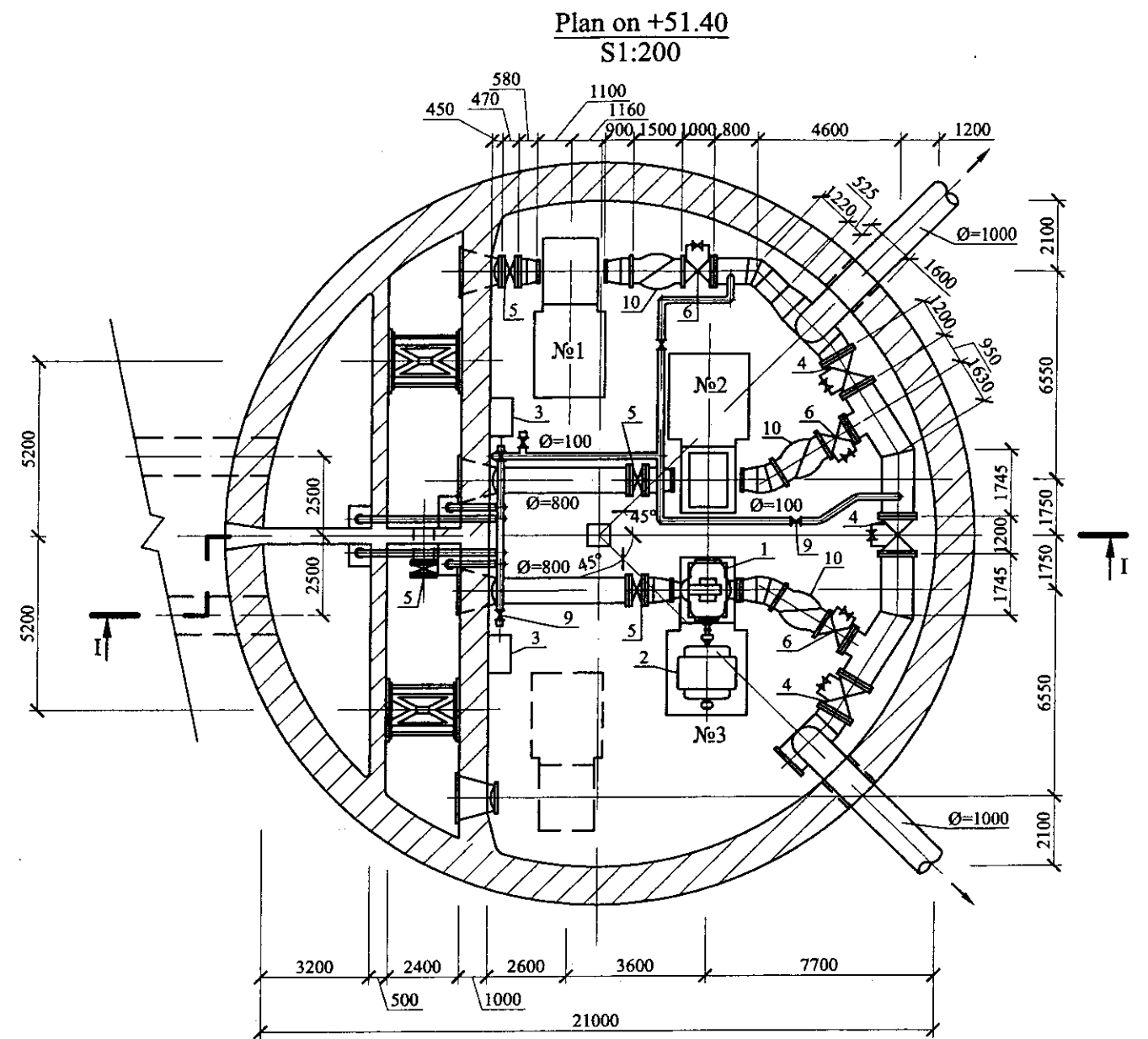
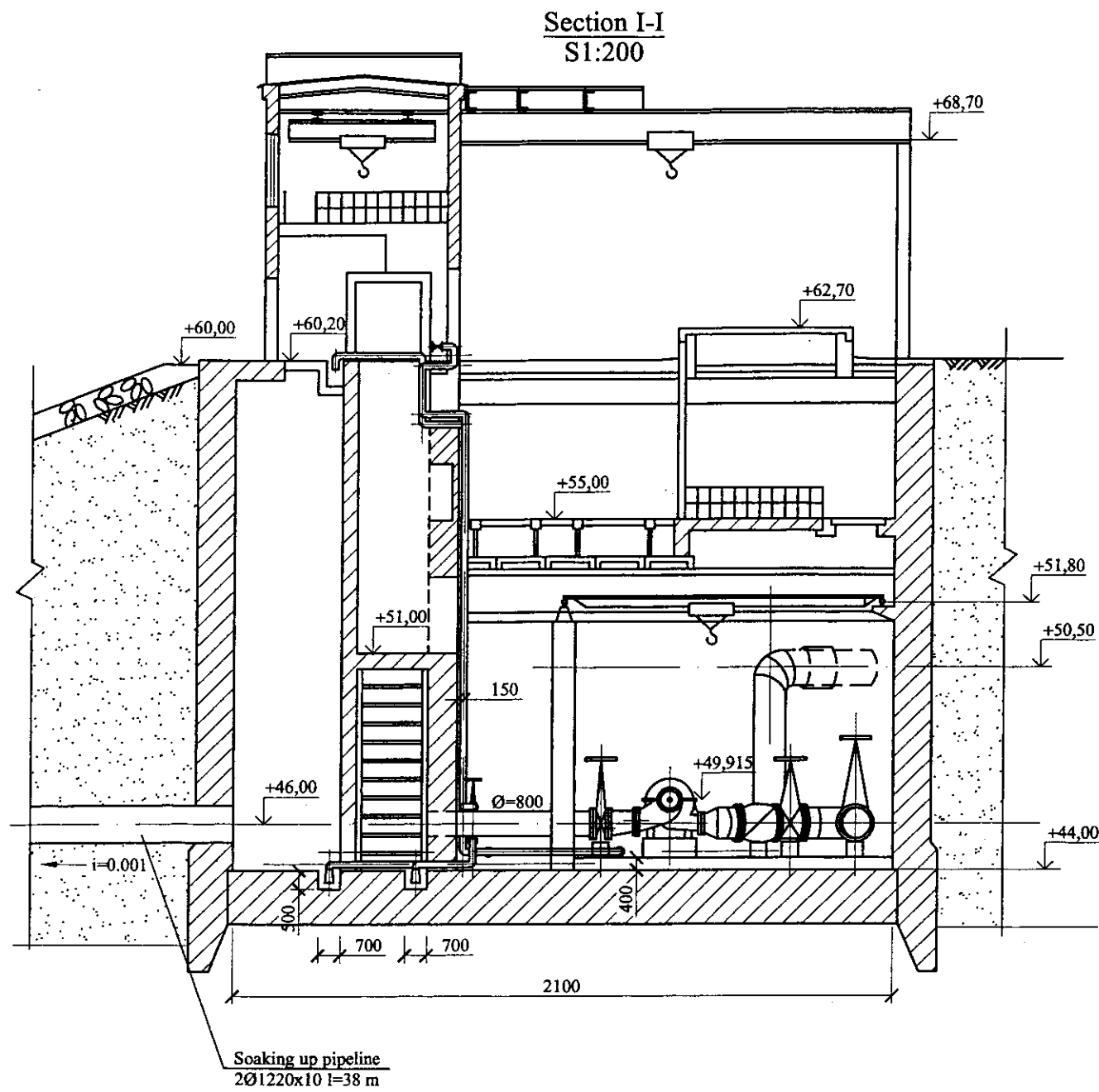


Pumping Station	Name of pump	Pump Specification	Number of pump
№ 1 P/S	Intake pump	24.0m ³ /min x 52.3m x 300kW	3
	Bilge pump	1.0m ³ /min x 20.0m x 7.5kW	2
№ 2 P/S	Booster pump	24.0m ³ /min x 90.0m x 500kW	3
№ 3 P/S	Transmission	21.3m ³ /min x 75.0m x 360kW	3
	Backwash pump	15.0m ³ /min x 21.0m x 75kW	2
№ 4 P/S	Transmission	18.9m ³ /min x 80.0m x 350kW	3

LEGEND

	: Existing
	: Replacement
	: Newly proposed
	: Level Indicator and Alarm
	: Motorized Actuator
	: Pressure Indicator and Alarm
	: Flow Indicator, Record and Quantity (Accumulator)
	: Pump

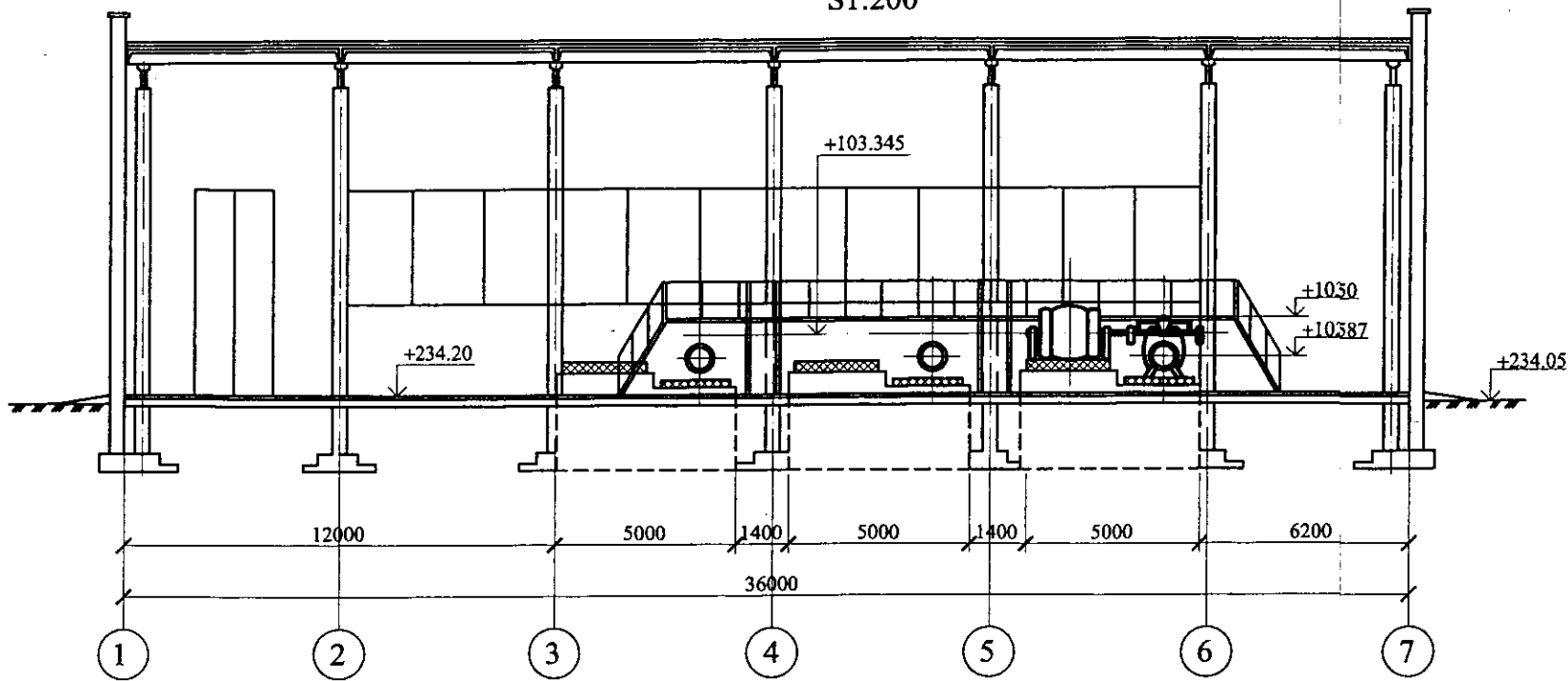
Drawing 1 Flow Diagram for Pumping Stations and Reservoirs



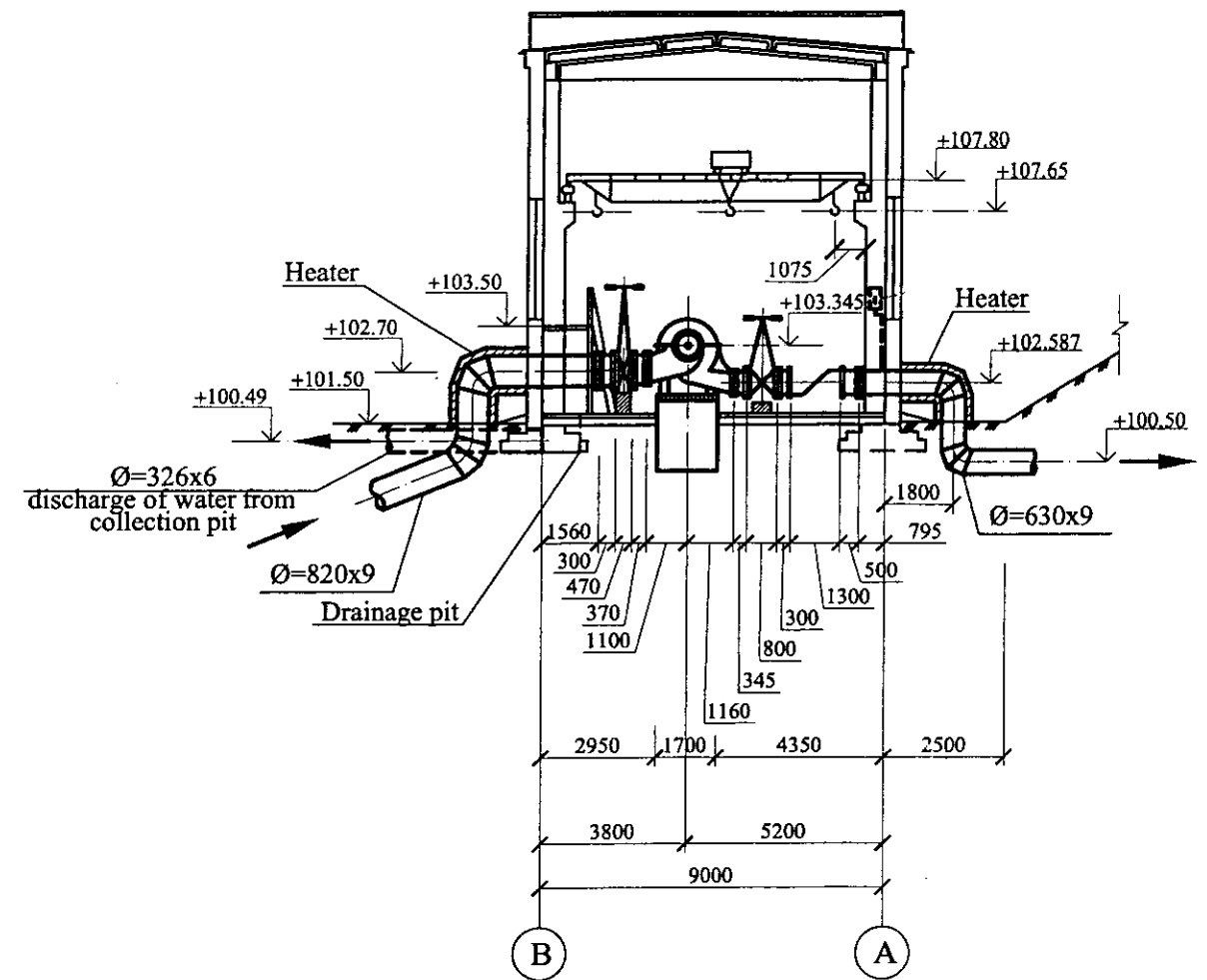
No. of the Position	Name	Quantity (amount)	Model or GOST
1	Pump Д4000-95(22НДс) Q=3996 m ³ /h, H=79 m	3	
2	Electric motor СДН-15-39-6 N=1250 kw	3	
3	Pump С-569 Q=54 m ³ /h, H=25 m Electric motor N=13 kw	2	
4	Gate valve electrically-actuated DN=1000 mm P=10Bar	3	30ч9156р
5	Gate valve electrically-actuated DN=800 mm P=25Bar	4	30ч9256р
6	Gate valve electrically-actuated DN=500 mm P=25Bar	3	30с927НЖ
7	Manual gate valve DN=100 mm P=10 Bar	1	30ч66р
8	Manual gate valve DN=100 mm P=10 Bar	2	30ч9066р
9	Manual gate valve DN=150 mm P=10 Bar	13	30ч66р
10	Check valve DN=600 mm P=25 Bar	3	19с156р

Drawing 2 Plan and Section of N1 Pumping Station

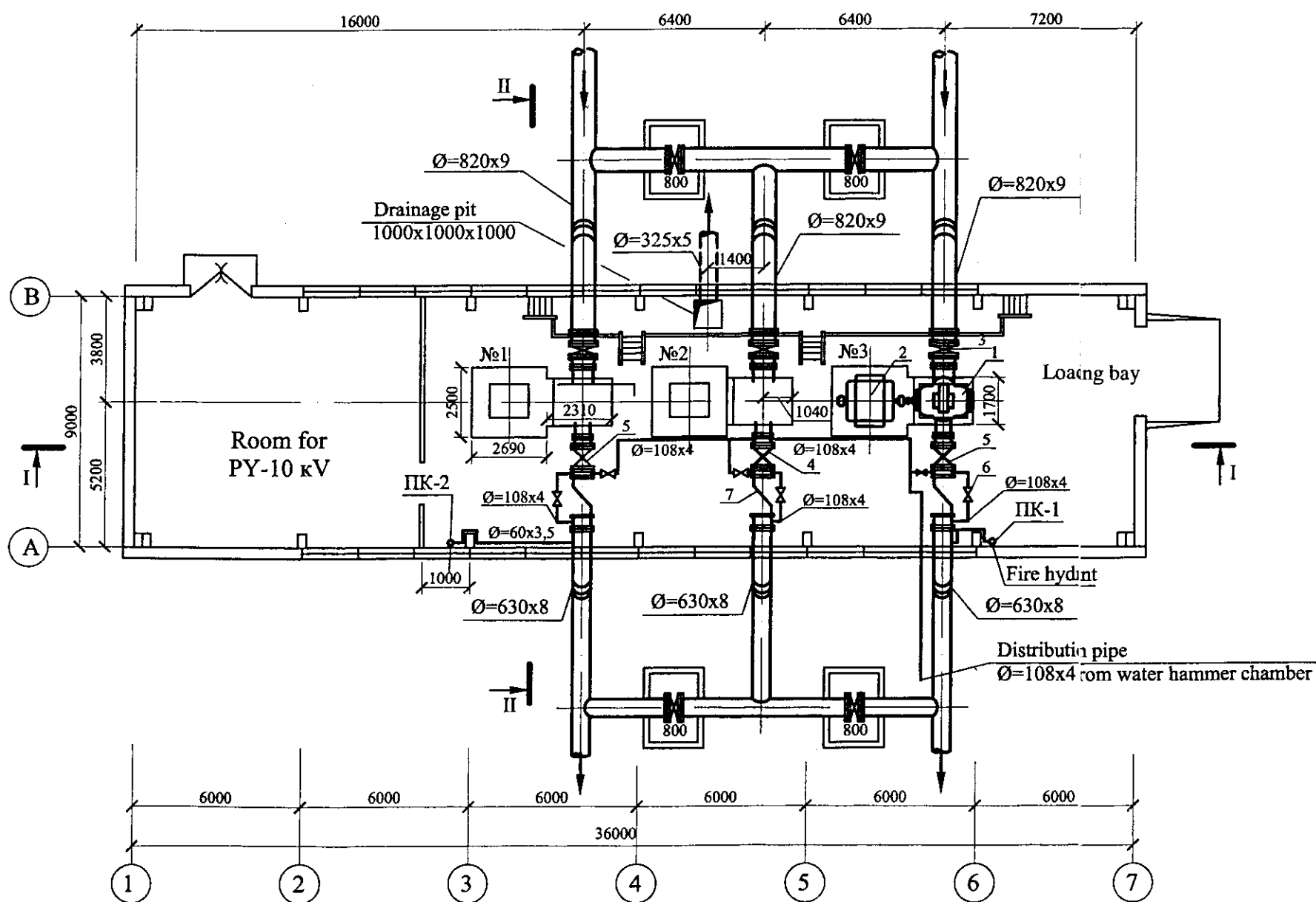
Section I-I
S1:200



Section II-II
S1:200



Plan
S1:200

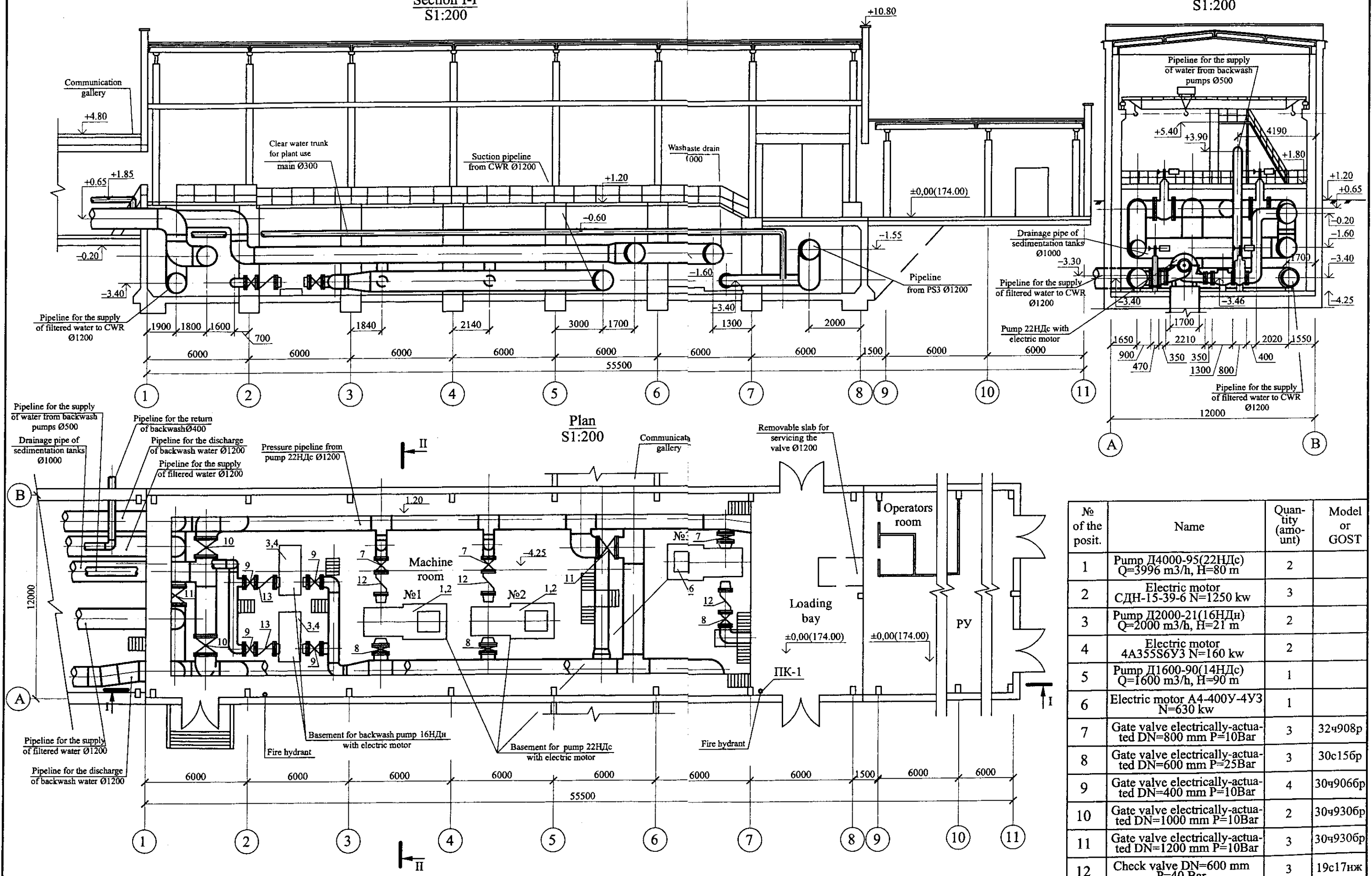


№ of the position	Name	Quantity (amount)	Model or GOST
1	Pump Д4000-95(22НДс) Q=3996 m ³ /h, H=80 m	3	
2	Electric motor СДН-15-39-6 N=1250 kw	3	
3	Gate valve electrically-actuated DN=800 mm P=25Bar	3	30ч9256p
4	Gate valve electrically-actuated DN=600 mm P=10Bar	1	30ч9306p
5	Gate valve electrically-actuated DN=500 mm P=10Bar	2	30ч9156p
6	Manual gate valve DN=100 mm P=10 Bar	6	30ч66p
7	Check valve DN=600 mm P=25 Bar	3	19c156p

Drawing 3 Plan and Section of №2 Pumping Station

Section I-I
S1:200

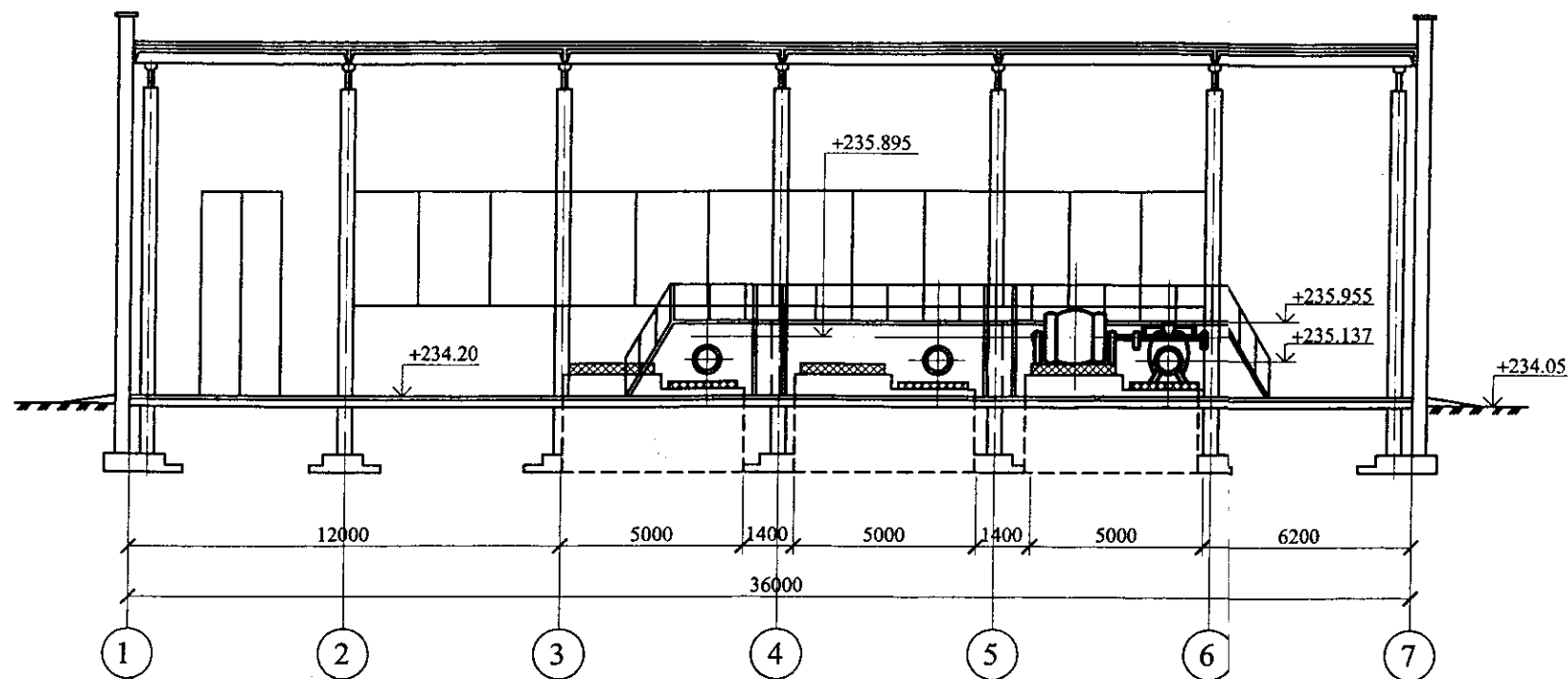
Section II-II
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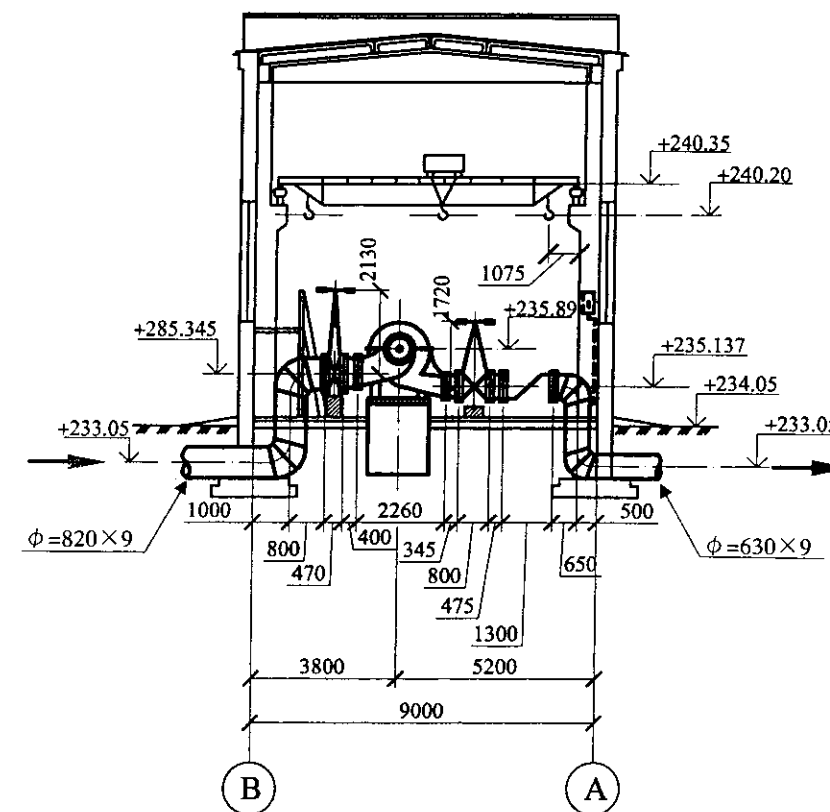
No of posit.	Name	Quantity (amount)	Model or GOST
1	Pump Д4000-95(22НДс) Q=3996 m ³ /h, H=80 m	2	
2	Electric motor СДН-15-39-6 N=1250 kw	3	
3	Pump Д2000-21(16НДн) Q=2000 m ³ /h, H=21 m	2	
4	Electric motor 4А355S6У3 N=160 kw	2	
5	Pump Д1600-90(14НДс) Q=1600 m ³ /h, H=90 m	1	
6	Electric motor А4-400У-4У3 N=630 kw	1	
7	Gate valve electrically-actuated DN=800 mm P=10Bar	3	32ч908р
8	Gate valve electrically-actuated DN=600 mm P=25Bar	3	30с156р
9	Gate valve electrically-actuated DN=400 mm P=10Bar	4	30ч9066р
10	Gate valve electrically-actuated DN=1000 mm P=10Bar	2	30ч9306р
11	Gate valve electrically-actuated DN=1200 mm P=10Bar	3	30ч9306р
12	Check valve DN=600 mm P=40 Bar	3	19с17нж
13	Check valve DN=400 mm P=10 Bar	2	19ч16р

Drawing 4 Plan and Section of №3 Pumping Station

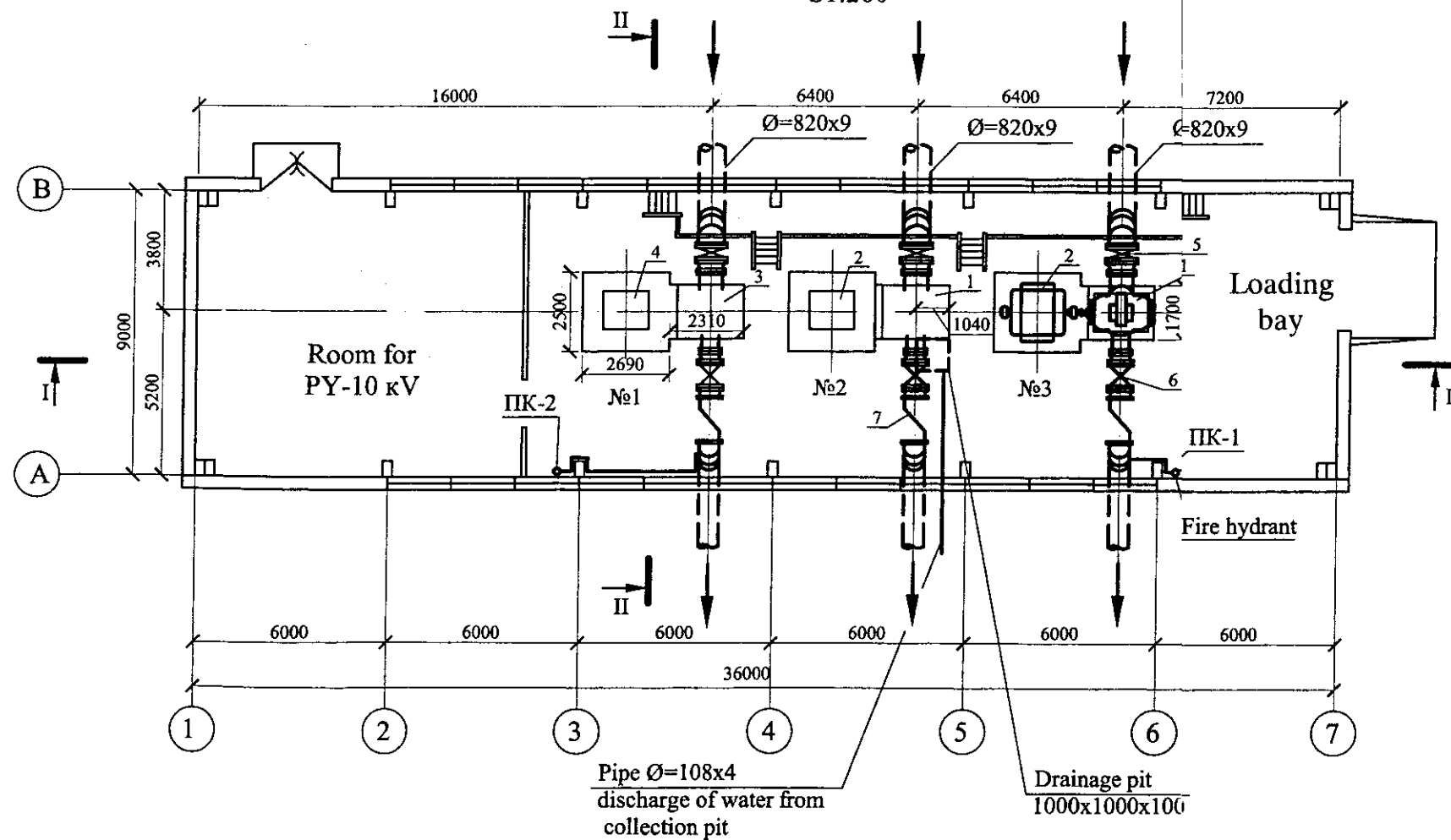
Section I-I
S1:200



Section II-II
S1:200

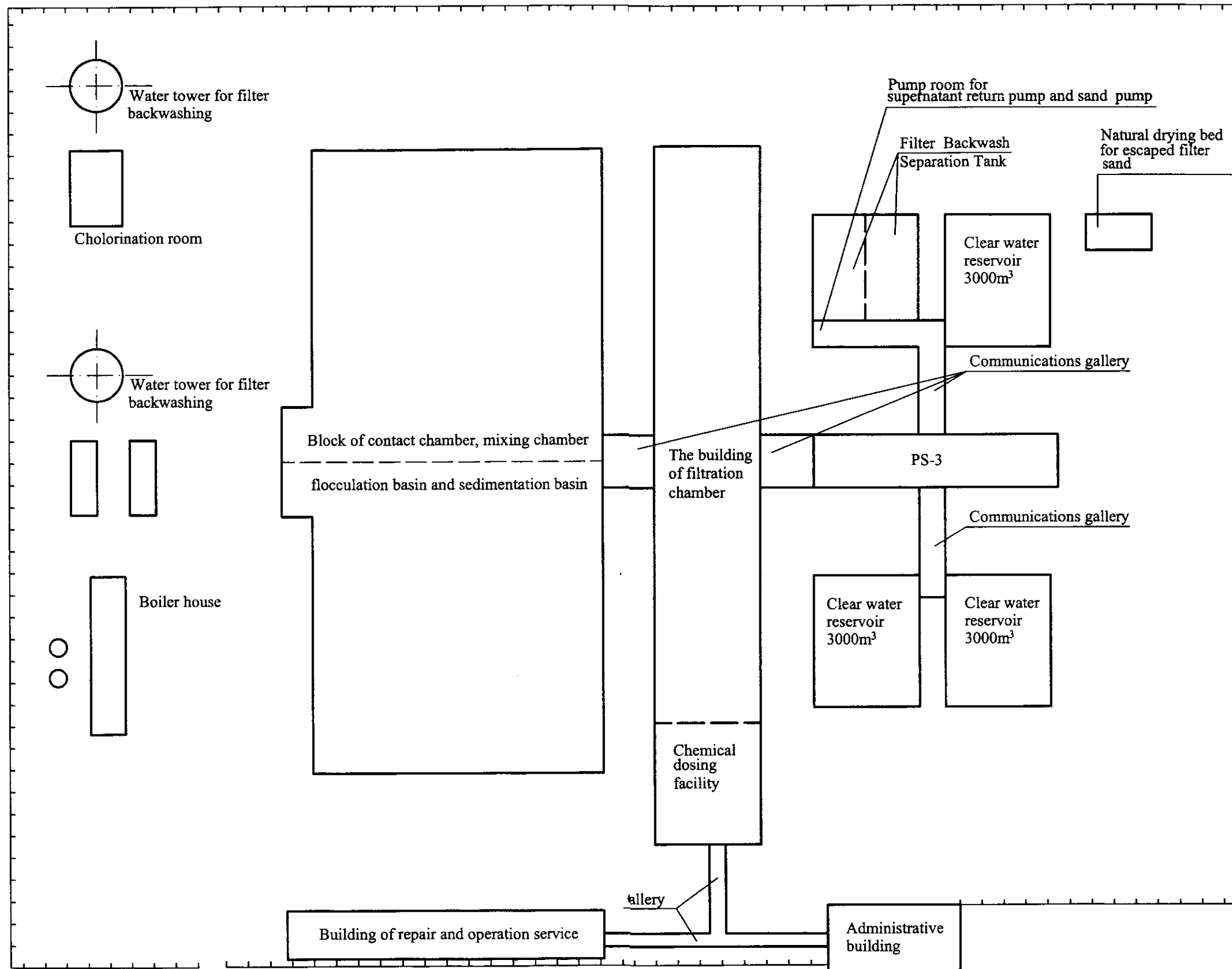


Plan
S1:200

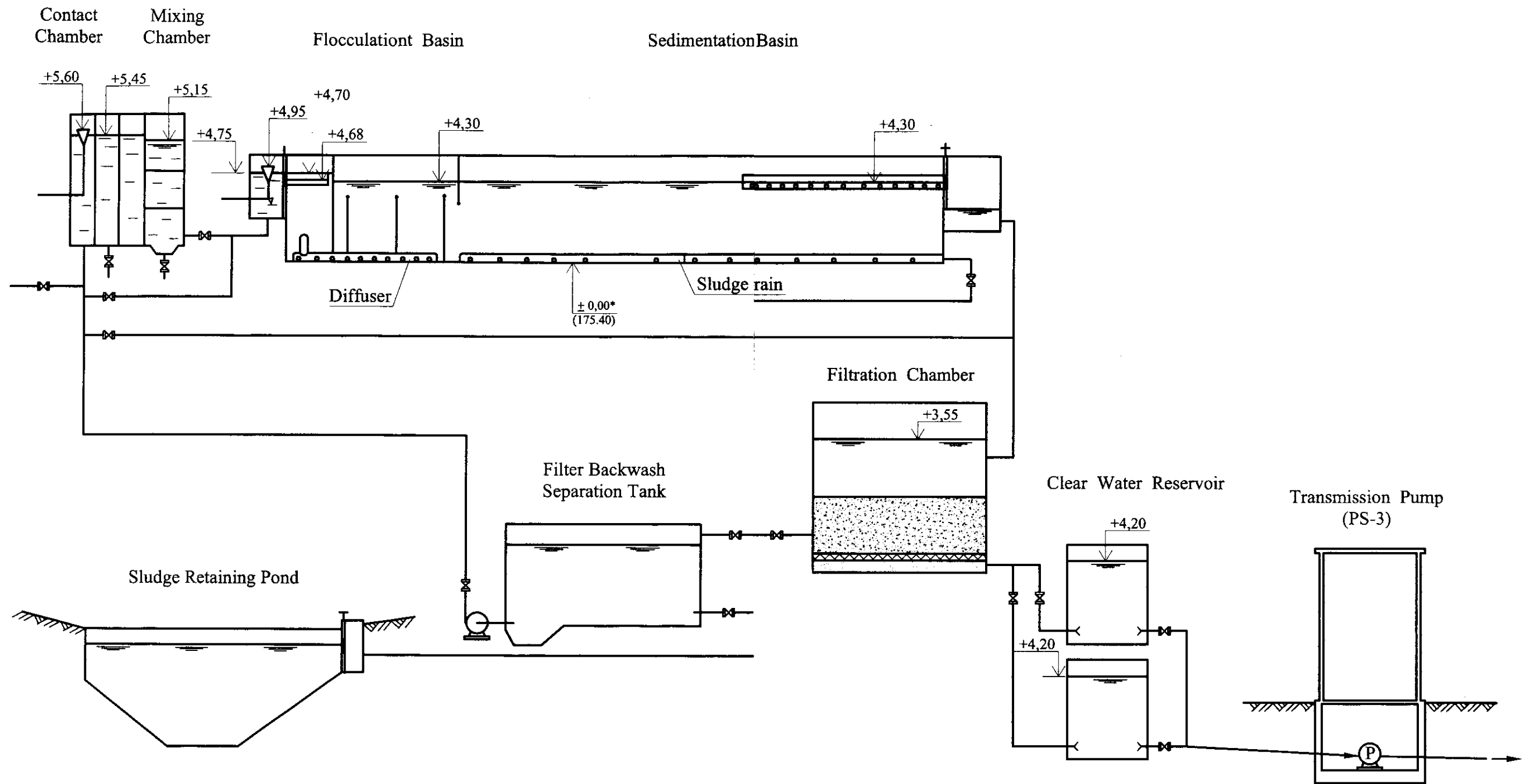


No of the position	Name	Quantity (amount)	Model or GOST
1	Pump Д4000-95(22НДс) Q=2880 m ³ /h, H=86 m	2	
2	Electric motor СДН-15-39-6 N=1250 kw	2	
3	Pump Д1600-90(14НДс) Q=1600 m ³ /h, H=90 m	1	
4	Electric motor А4-400У-4У3 N=630 kw	1	
5	Gate valve electrically-actuated DN=800 mm P=25Bar	3	30ч9256р
6	Gate valve electrically-actuated DN=600 mm P=10Bar	3	30ч9306р
7	Check valve DN=600 mm P=25 Bar	3	19с156р

Drawing 5 Plan and Section of №4 Pumping Station



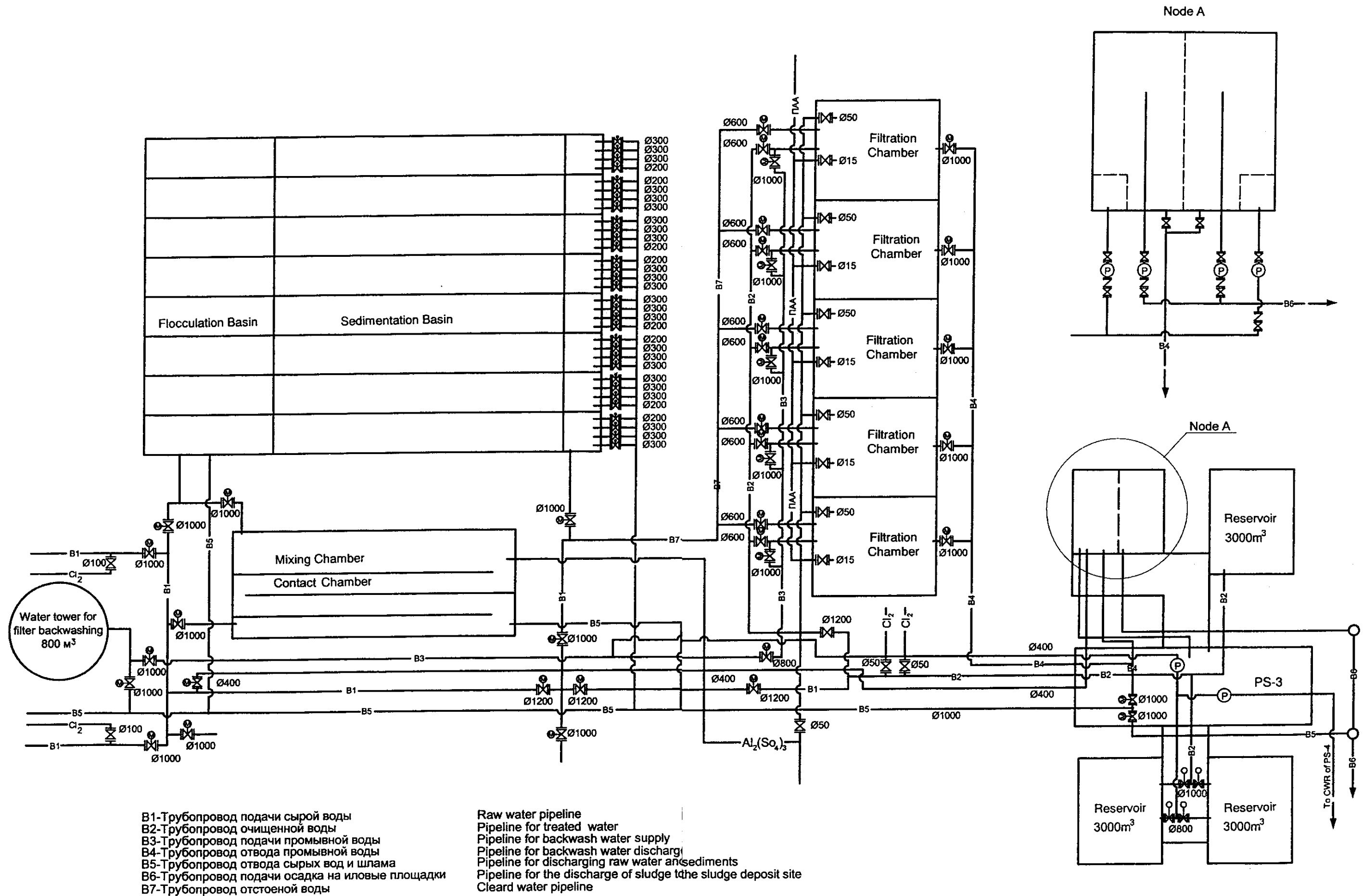
Drawing 6 Plan of Apa-Canal Soroa-Balti Water Treatment Plant



Note: * For the level ± 0.00 is referred to elevation of 175.40

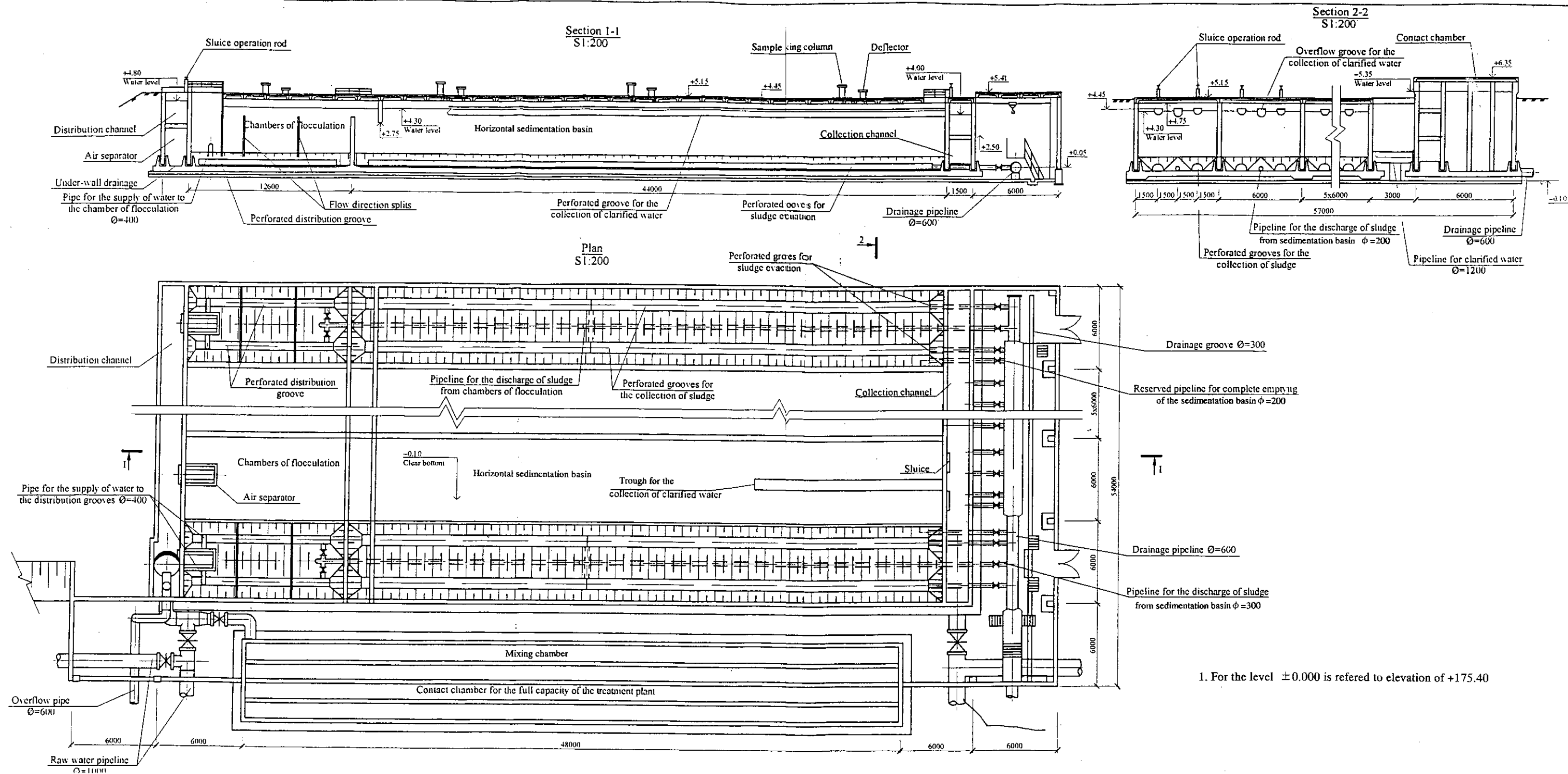
Drawing 7 Hidraulic Profile of the Treatment Plant

Drawing 8 Scheme of Existing Yard Pipelines of the Water Treatment Facility of Apa-Canal "Soroca-Balti"



B1-Трубопровод подачи сырой воды
 B2-Трубопровод очищенной воды
 B3-Трубопровод подачи промывной воды
 B4-Трубопровод отвода промывной воды
 B5-Трубопровод отвода сырых вод и шлама
 B6-Трубопровод подачи осадка на иловые площадки
 B7-Трубопровод отстоенной воды

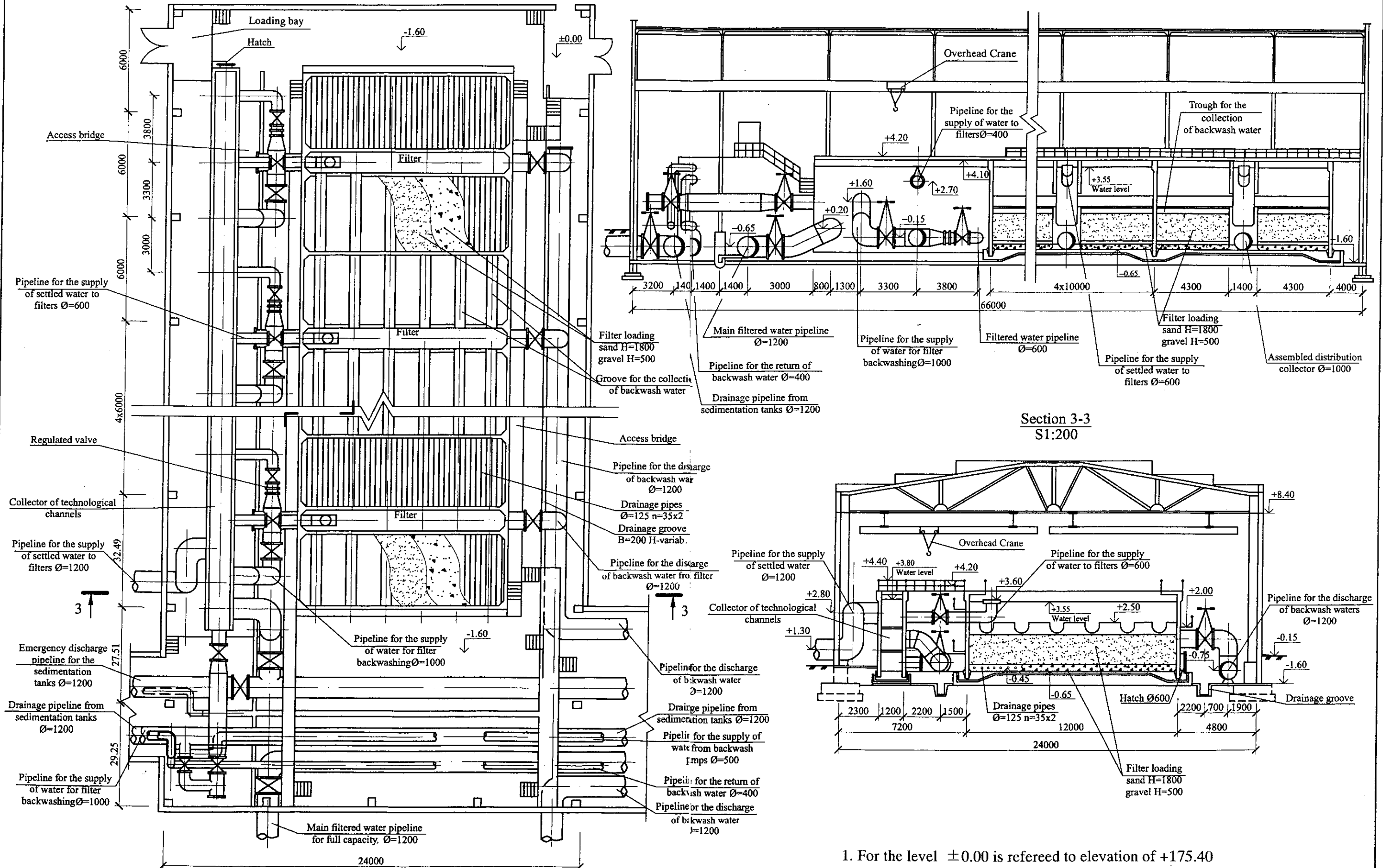
Raw water pipeline
 Pipeline for treated water
 Pipeline for backwash water supply
 Pipeline for backwash water discharge
 Pipeline for discharging raw water and sediments
 Pipeline for the discharge of sludge to the sludge deposit site
 Clear water pipeline



Drawing 9 Plan and Section of the Horizontal Sedimentation Basin

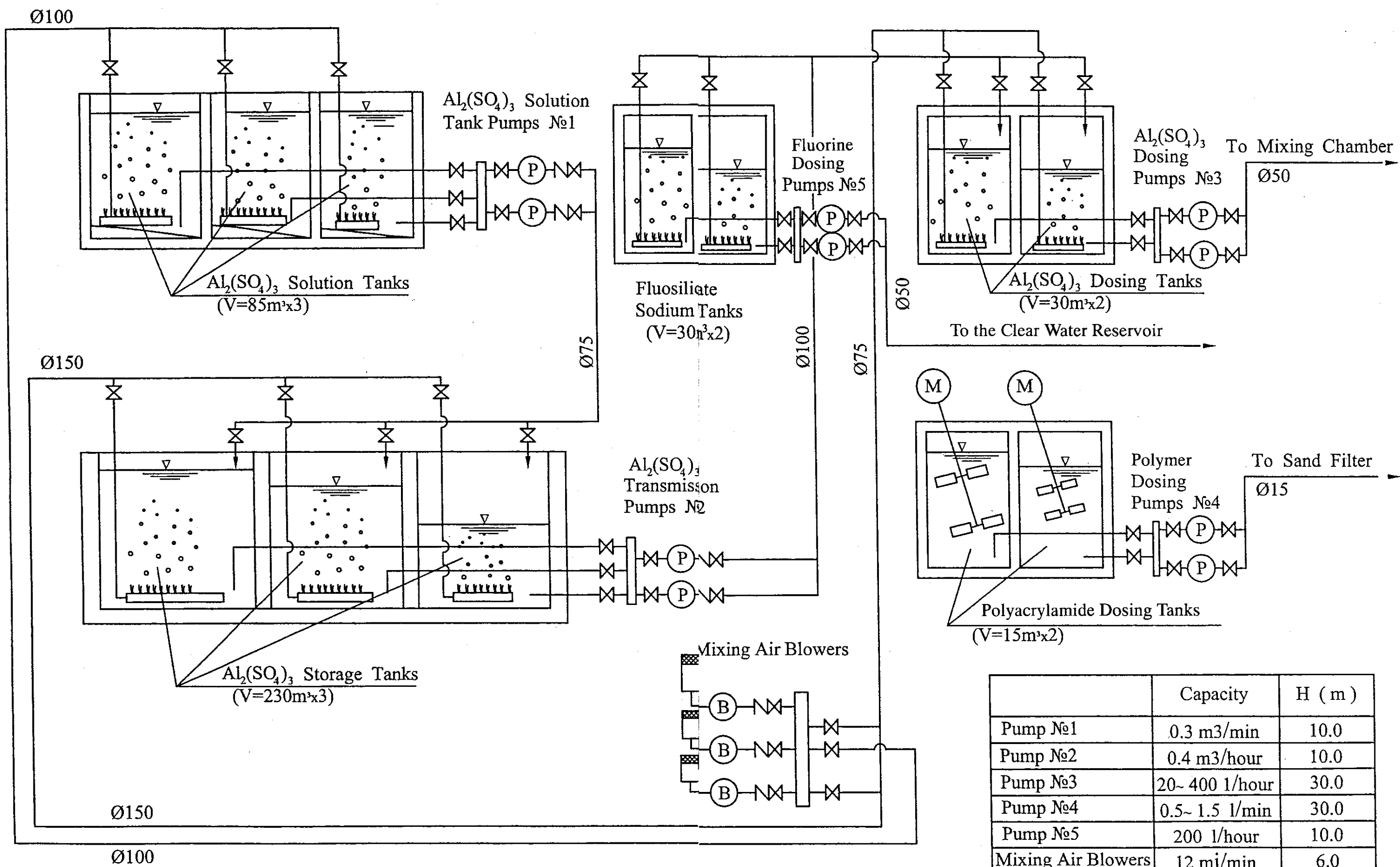
Plan
S1:200

Section 1-1
S1:200



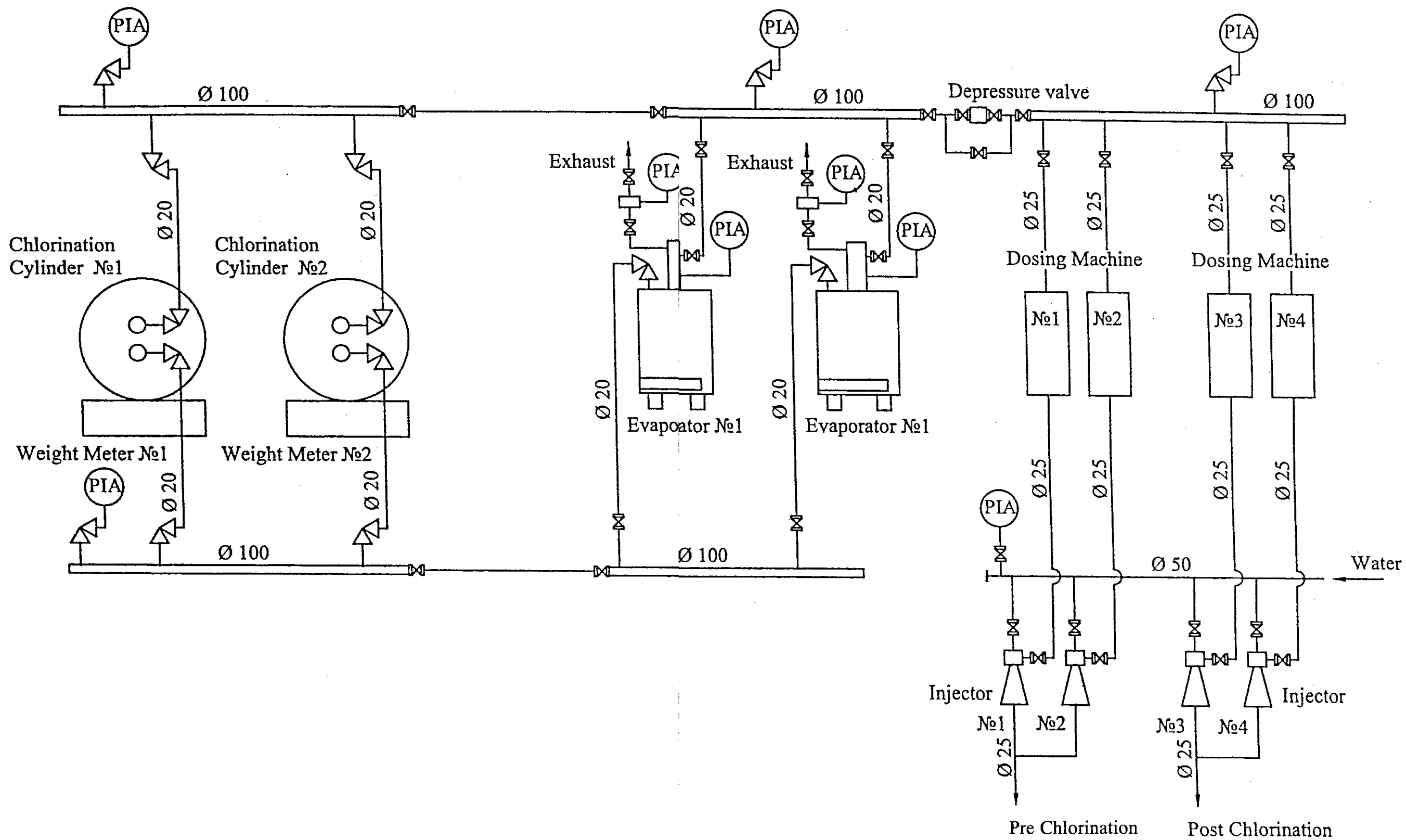
1. For the level ± 0.00 is referred to elevation of $+175.40$

Drawing 10 Plan and Section of the Filtration Chamber

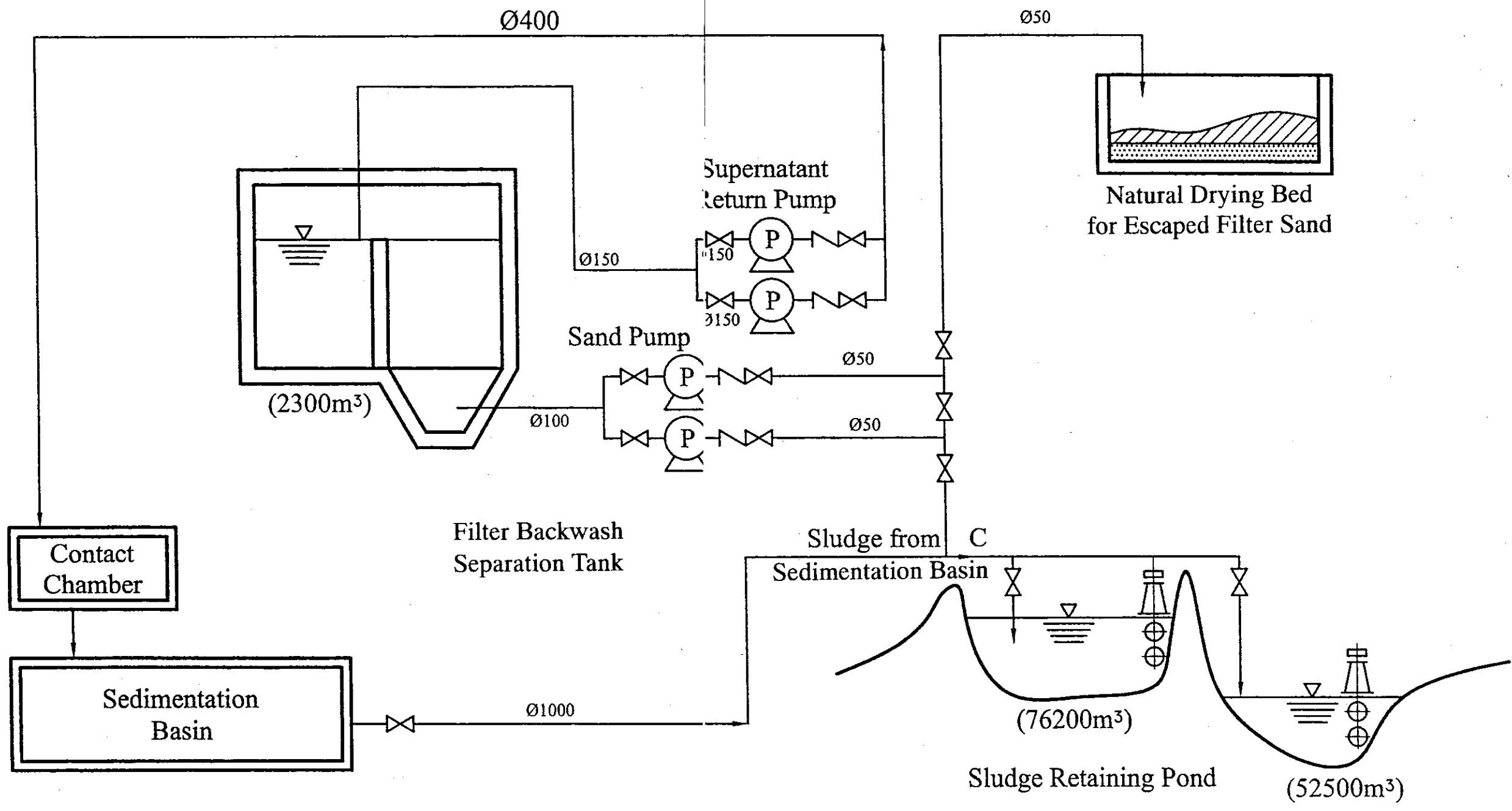


	Capacity	H (m)
Pump №1	0.3 m ³ /min	10.0
Pump №2	0.4 m ³ /hour	10.0
Pump №3	20- 400 l/hour	30.0
Pump №4	0.5- 1.5 l/min	30.0
Pump №5	200 l/hour	10.0
Mixing Air Blowers	12 m ³ /min	6.0

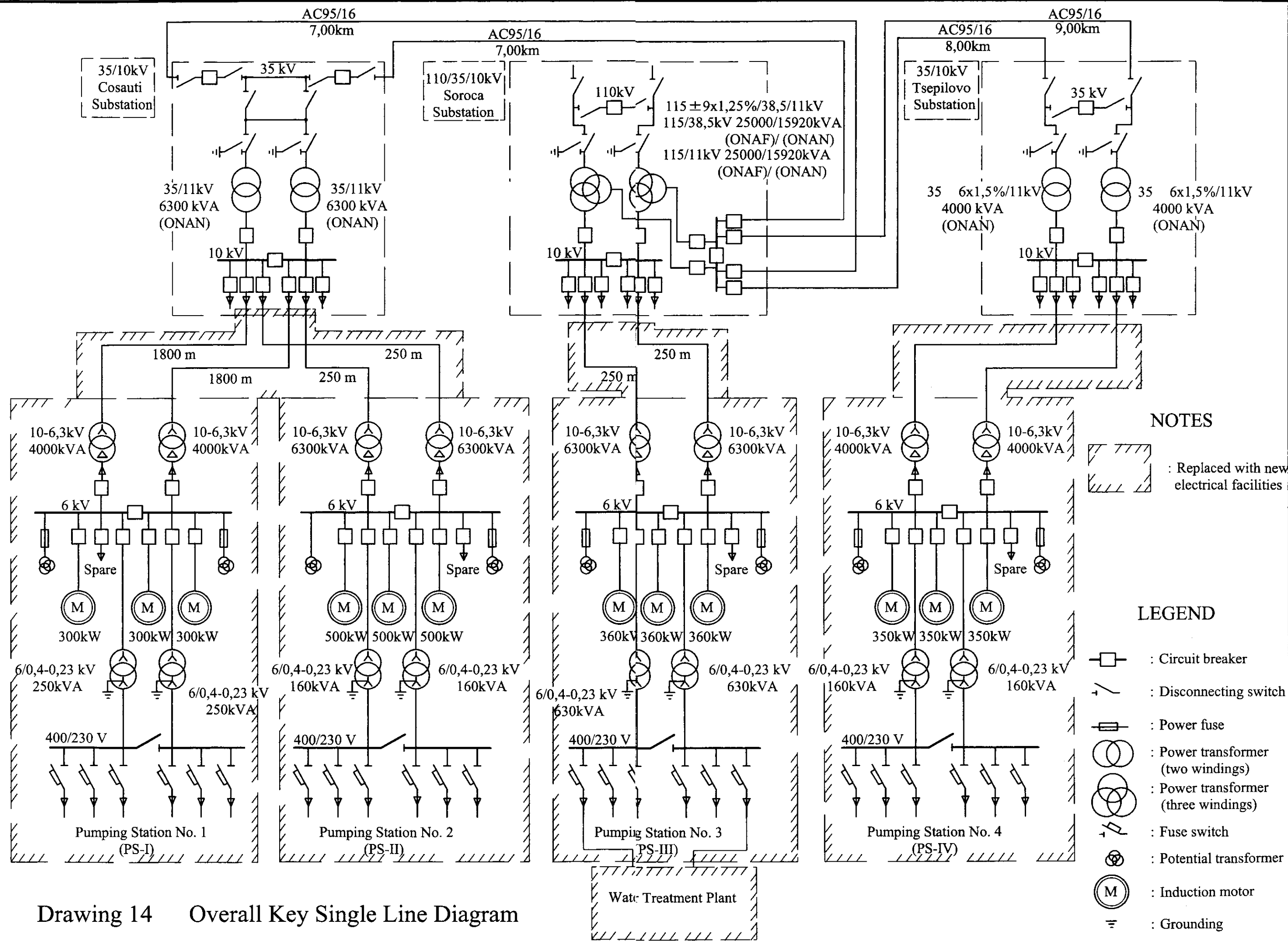
Drawing 11 Coagulant Soution and Dosing Diagram.



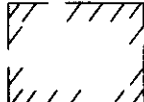
Drawing 12 Chlorination System Diagram












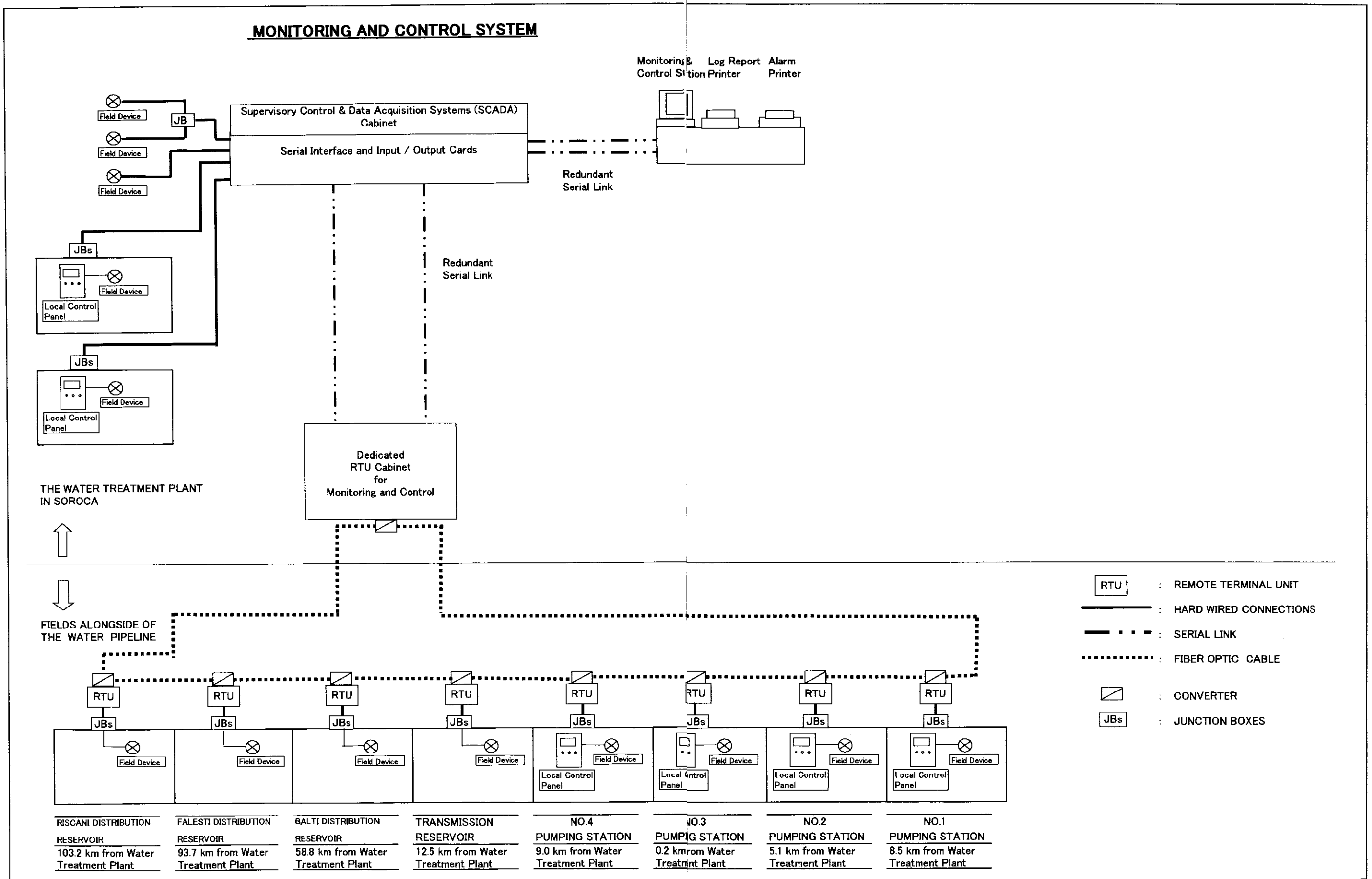
Drawing 13 Sludge Treatment Diagram



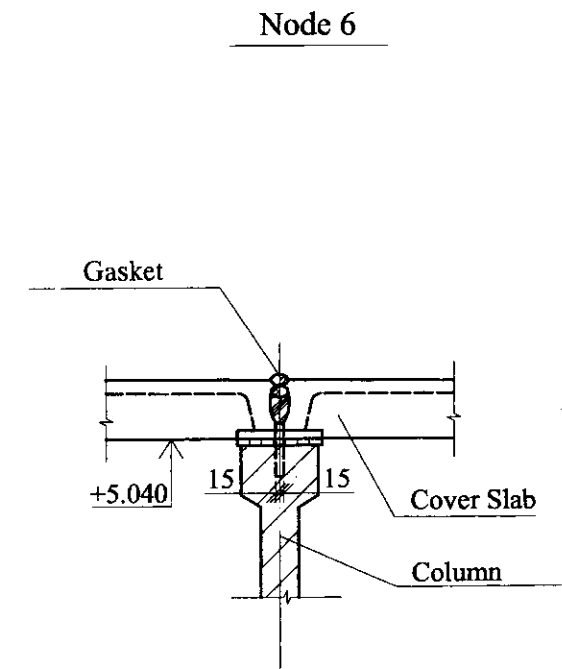
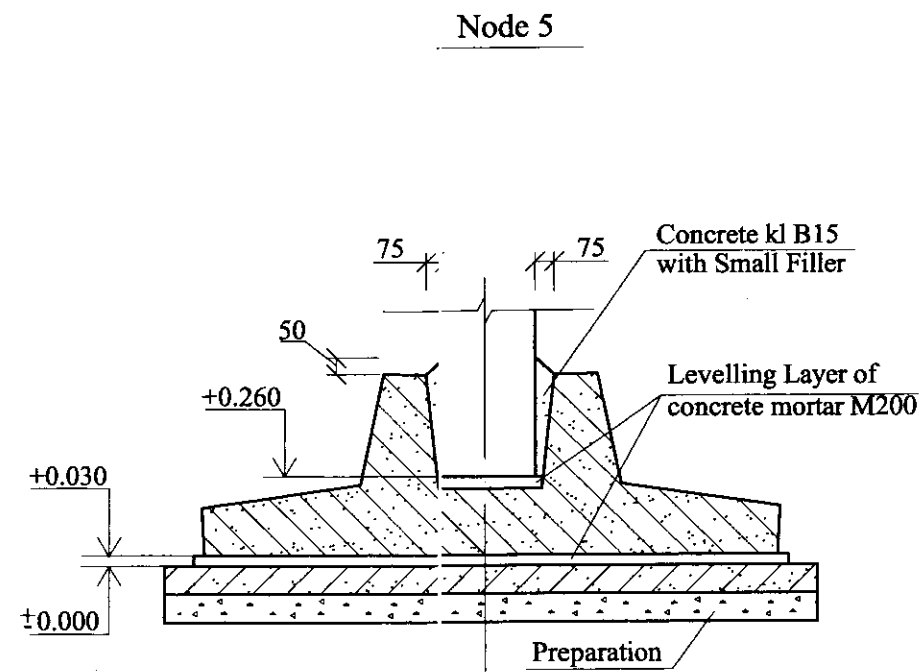
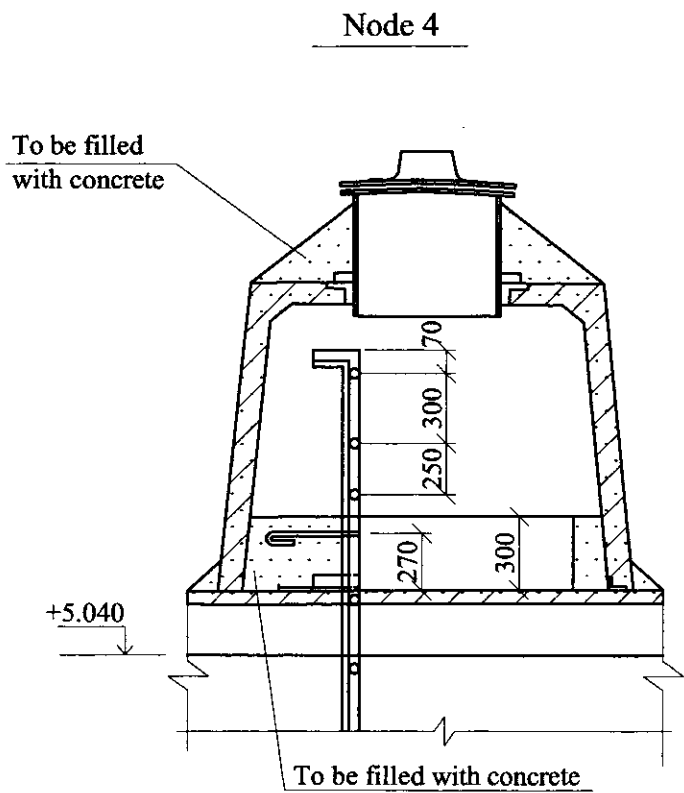
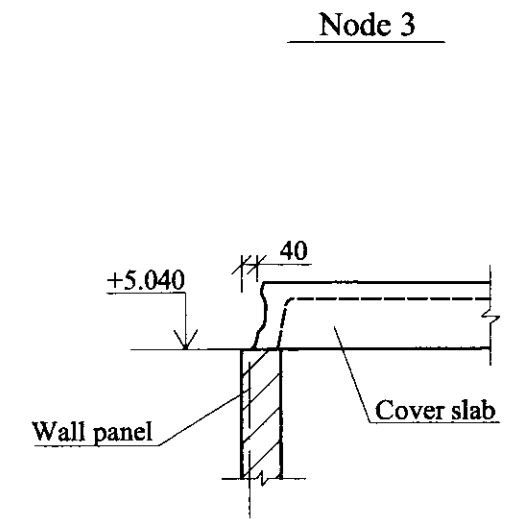
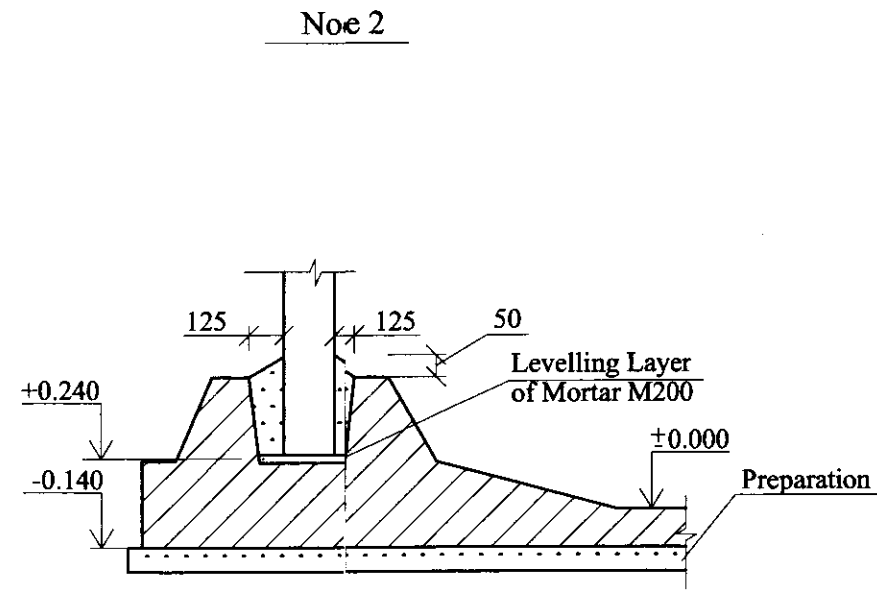
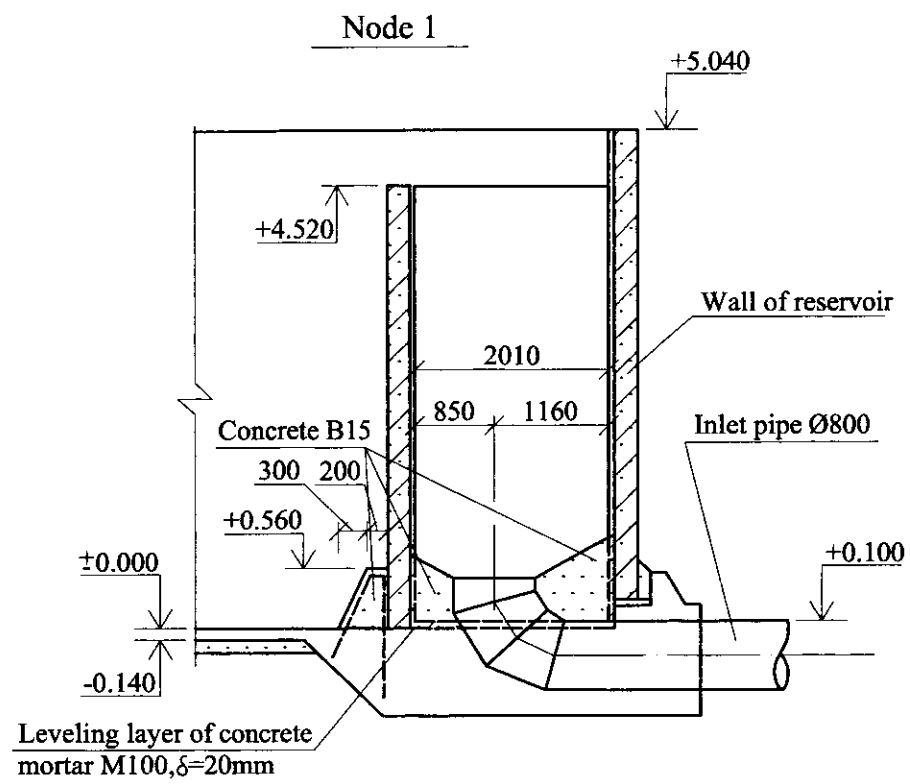
Drawing 14 Overall Key Single Line Diagram

NOTES
 : Replaced with new electrical facilities

- LEGEND**
-  : Circuit breaker
 -  : Disconnecting switch
 -  : Power fuse
 -  : Power transformer (two windings)
 -  : Power transformer (three windings)
 -  : Fuse switch
 -  : Potential transformer
 -  : Induction motor
 -  : Grounding

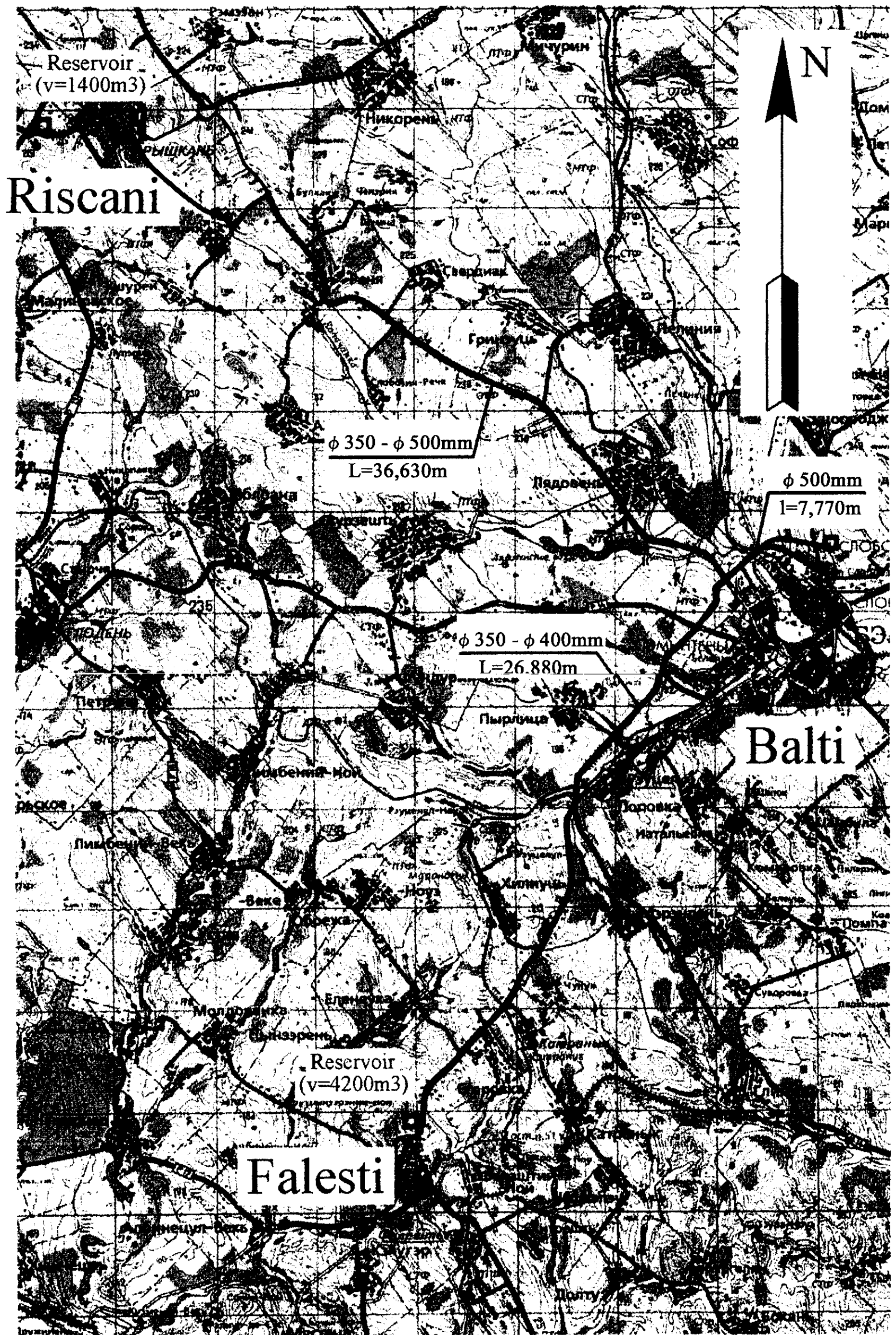


Drawing 15 SCADA Configuration



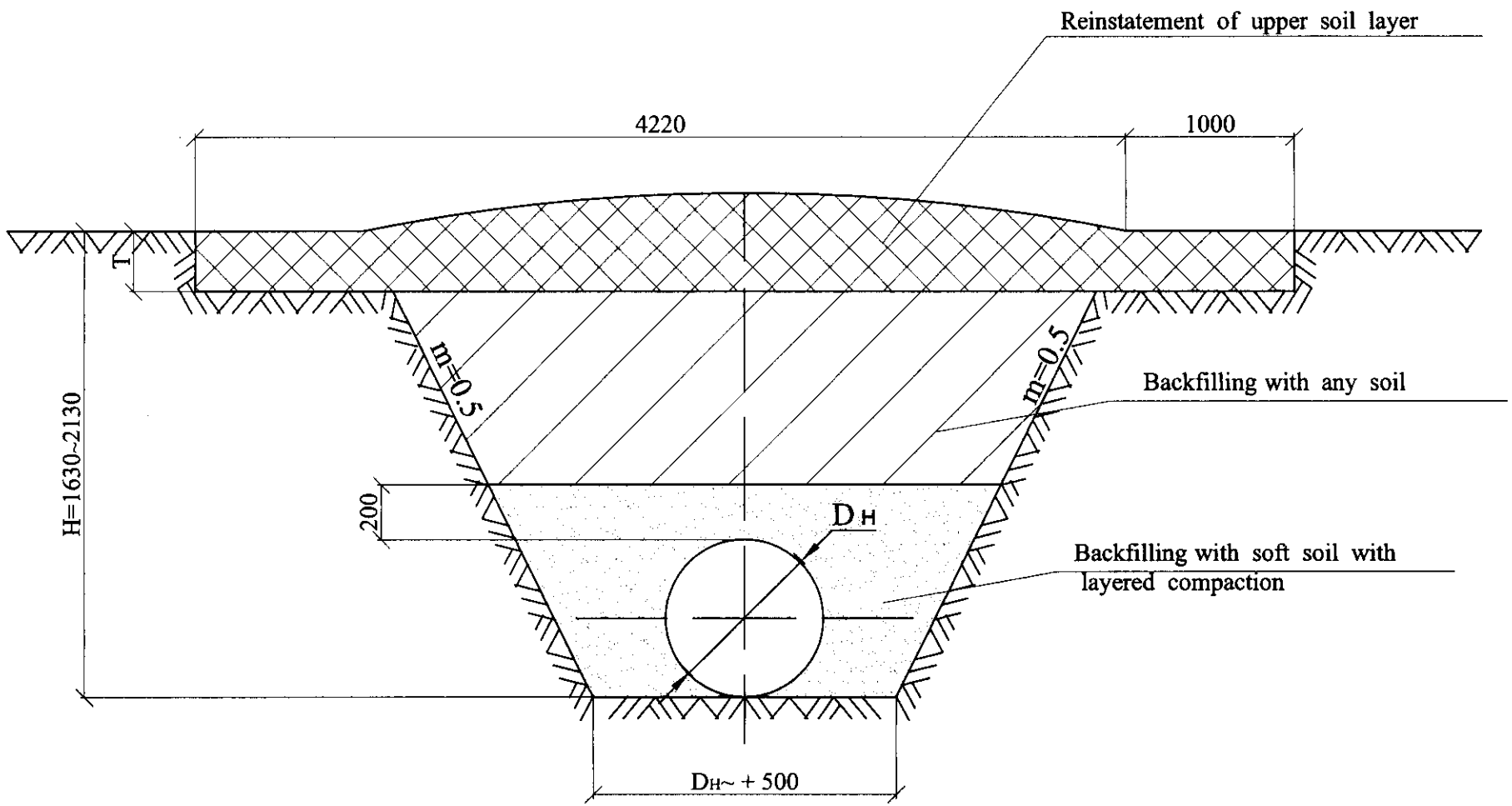
Drawing 17 Unfinished Reservoir in Balti (Details)

S 1 : 200 000



Drawing 18 Plan of Transmission Pipelines to Riscani and Falesti

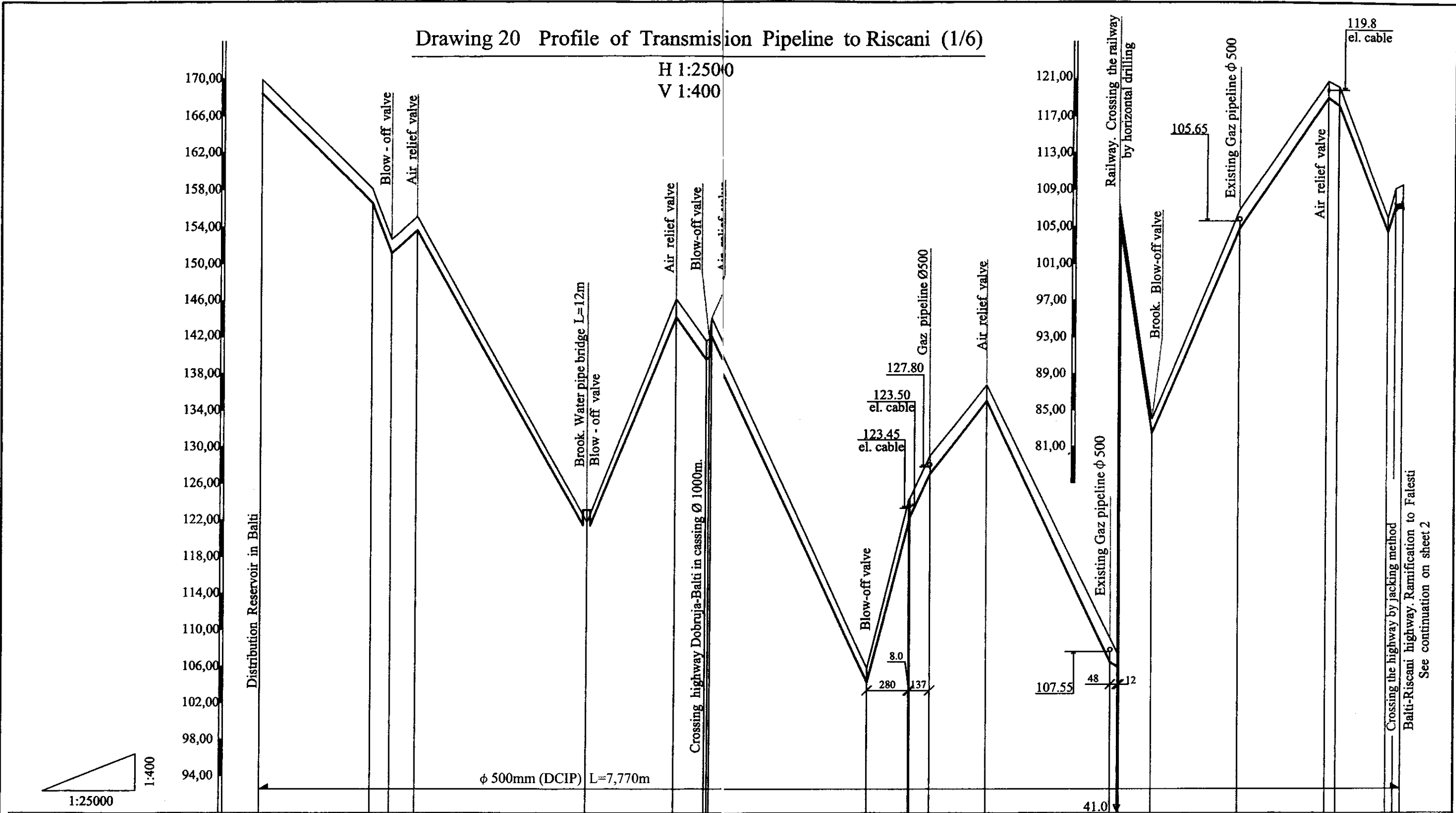
Typical Cross Section (ϕ 350 mm, ϕ 400 mm, ϕ 500 mm)



Drawing 19 Typical Cross Section of Pipe Installation
(ϕ 350 mm, ϕ 400 mm, ϕ 500 mm)

Drawing 20 Profile of Transmission Pipeline to Riscani (1/6)

H 1:2500
V 1:400

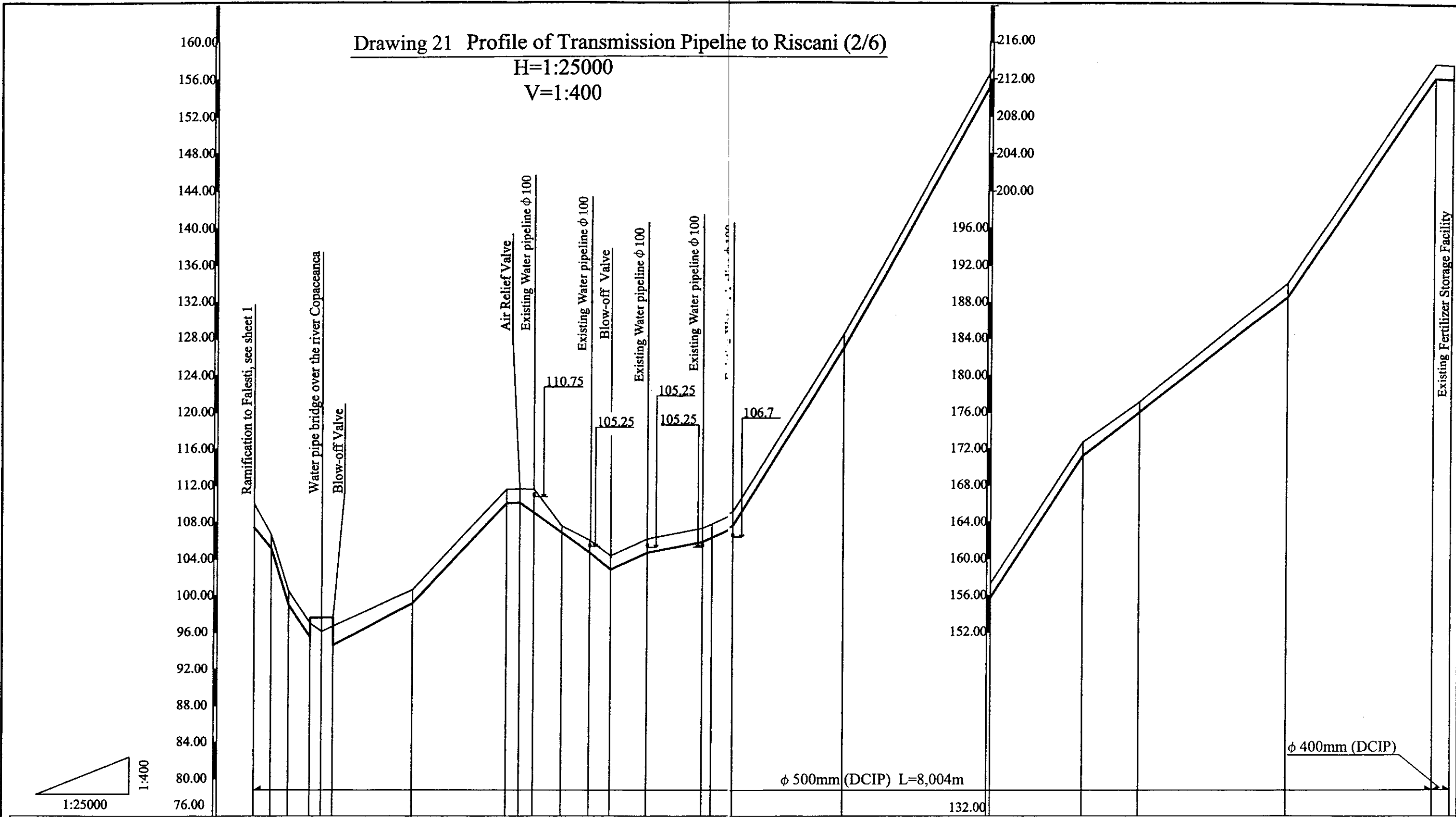


	000	750	880	1048	2204	2800	4135	5837	6067	7251	7670	7770 (000)						
Elevation of ground level	169.90	158.05	152.60	155.08	121.70	146.10	105.73	124.30	129.00	136.75	107.40	84.05	106.85	120.75	120.15	106.00	109.25	109.66
Elevation of pipeline bottom level	168.40	156.55	151.10	153.58	123.00	144.10	104.20	122.30	127.00	135.00	105.90	82.50	104.85	119.00	118.15	104.50	107.25	107.40
Distance between points		750.0	130.0	168.0	1156.0	596.0	205.0	1096.0	808.0	892.0	230.0	1183.0	420.0	100.0				
Cumulated distance	000	750	880	1048	2204	2800	3005	3024.5	3030	4135	5837	6067	7251	7670	7770			

Drawing 21 Profile of Transmission Pipeline to Riscani (2/6)

H=1:25000

V=1:400

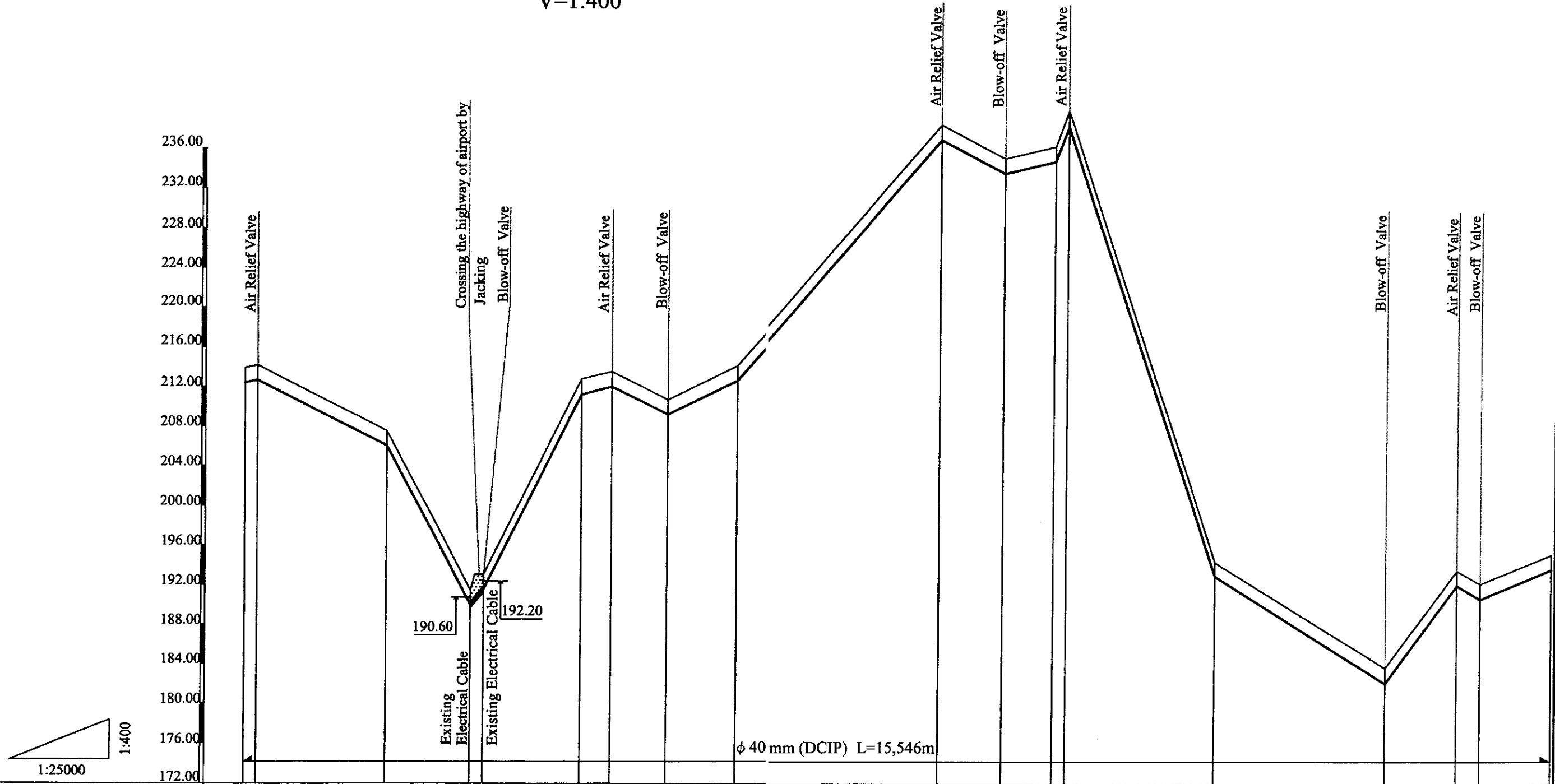


Elevation of ground level	109.96	106.65	100.50	97.00	96.10	100.65	111.55	111.60	111.55	107.55	106.00	104.30	106.15	105.25	105.25	106.7	128.50	157.30	172.75	177.15	190.10	213.85	213.75
Elevation of pipeline bottom level	107.40	105.15	99.00	95.50	97.50	94.60	99.15	110.05	110.10	104.65	102.80	104.65	105.80	107.30	107.30	127.00	155.80	171.25	177.15	188.60	212.35	212.25	
Distance between points	115	119	148	76	610	632	88	281	187	144	247	374	64	17	747	993	624	380	1000	1000	118		
Cumulated distance	5770	5885	6033	6109	6719	7351	7439	7720	7901	8045	8292	8666	9040	9057	9804	10797	11421	11801	12181	13181	14181	8004	8122

Drawing 22 Profile of Transmission Pipeline to Riscani (3/6)

H=1:25000

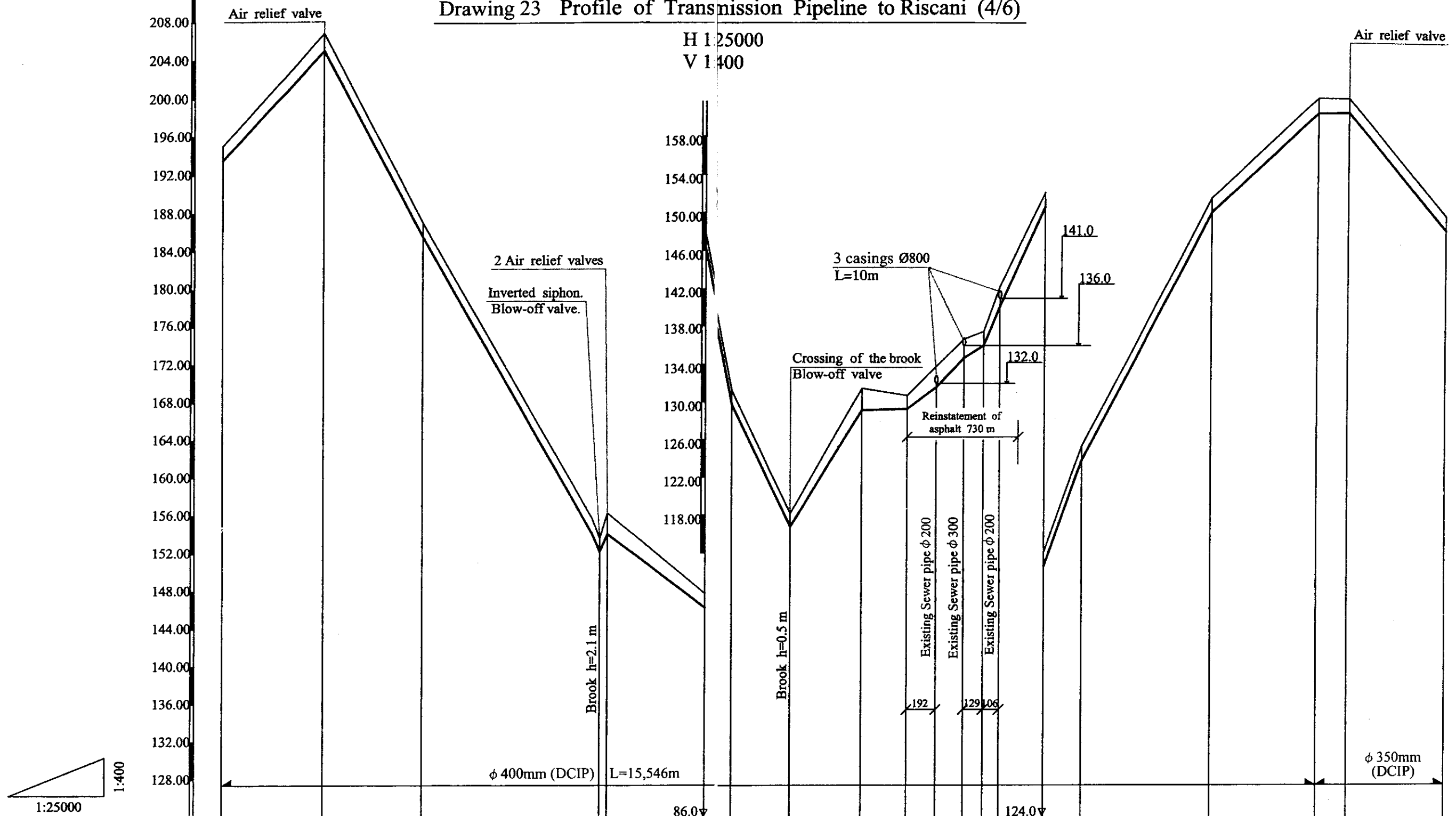
V=1:400



Elevation of ground level	213.75 214.00	207.35	191.30 192.90	212.60 213.30	210.50	213.90	238.15	234.80	236.00 239.60	193.30	183.55	193.40 192.05	195.00				
Elevation of pipeline bottom level	212.25 212.50	205.85	189.80 191.40	211.00 211.80	209.00	212.40	236.65	233.30	234.50 238.00	192.80	182.00	191.90 190.50	193.50				
Distance between points	78	804	527	82	599	188	350	461	1289	400	319	81	929	1073	448	150	440
Cumulated distance	8122 8200	9004	9531 9613	10212 10400	10750	11211	12500	12900	13219 13300	14229	15302	15750 15900	16340				

Drawing 23 Profile of Transmission Pipeline to Riscani (4/6)

H 1:25000
V 1:400

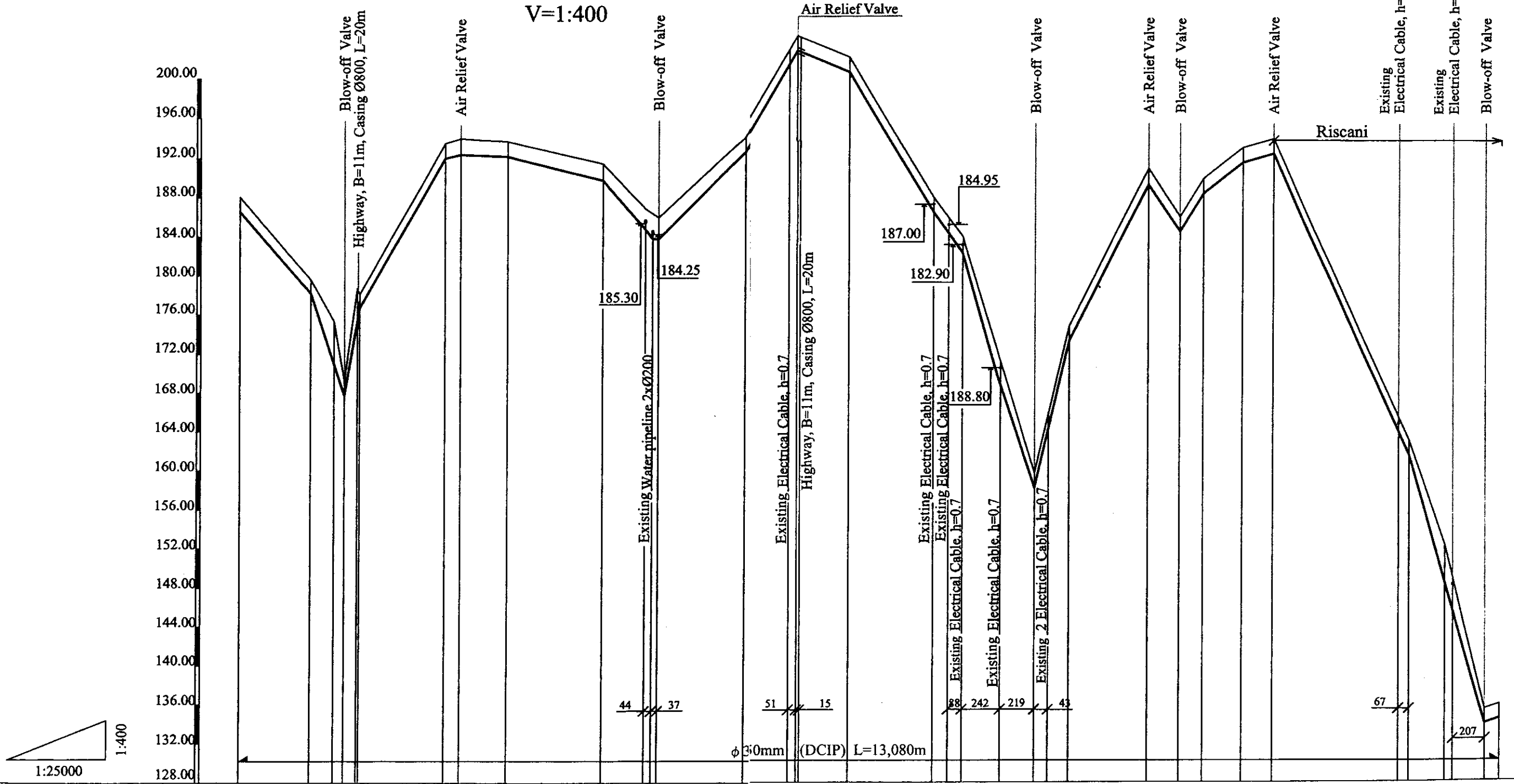


Elevation of ground level	195.00	206.80	187.00	155.65	153.55	156.23	147.70	131.25	118.20	131.47	130.70	133.70	136.70	137.50	142.25	152.10	163.35	189.60	200.10	200.10	187.80
Elevation of pipeline bottom level	193.50	205.00	185.50	154.00	152.15	154.00	146.20	129.75	116.80	129.15	129.30	131.60	134.70	136.00	140.15	150.60	161.85	188.10	198.50	198.60	186.30
Distance between points		660.0	650.0	1162.0	688.0	86.0	384.0	466.0	300.0	500.0	400.0	250.0	850.0	700.0	200.0	650.0					
Cumulated distance	16340	17000	17650	18812	19500	19700	20084	20550	20850	21350	21750	22000	22850	23550	23750	24400					

Drawing 24 Profile of Transmission Pipeline to Riscani (5/6)

H=1:25000

V=1:400

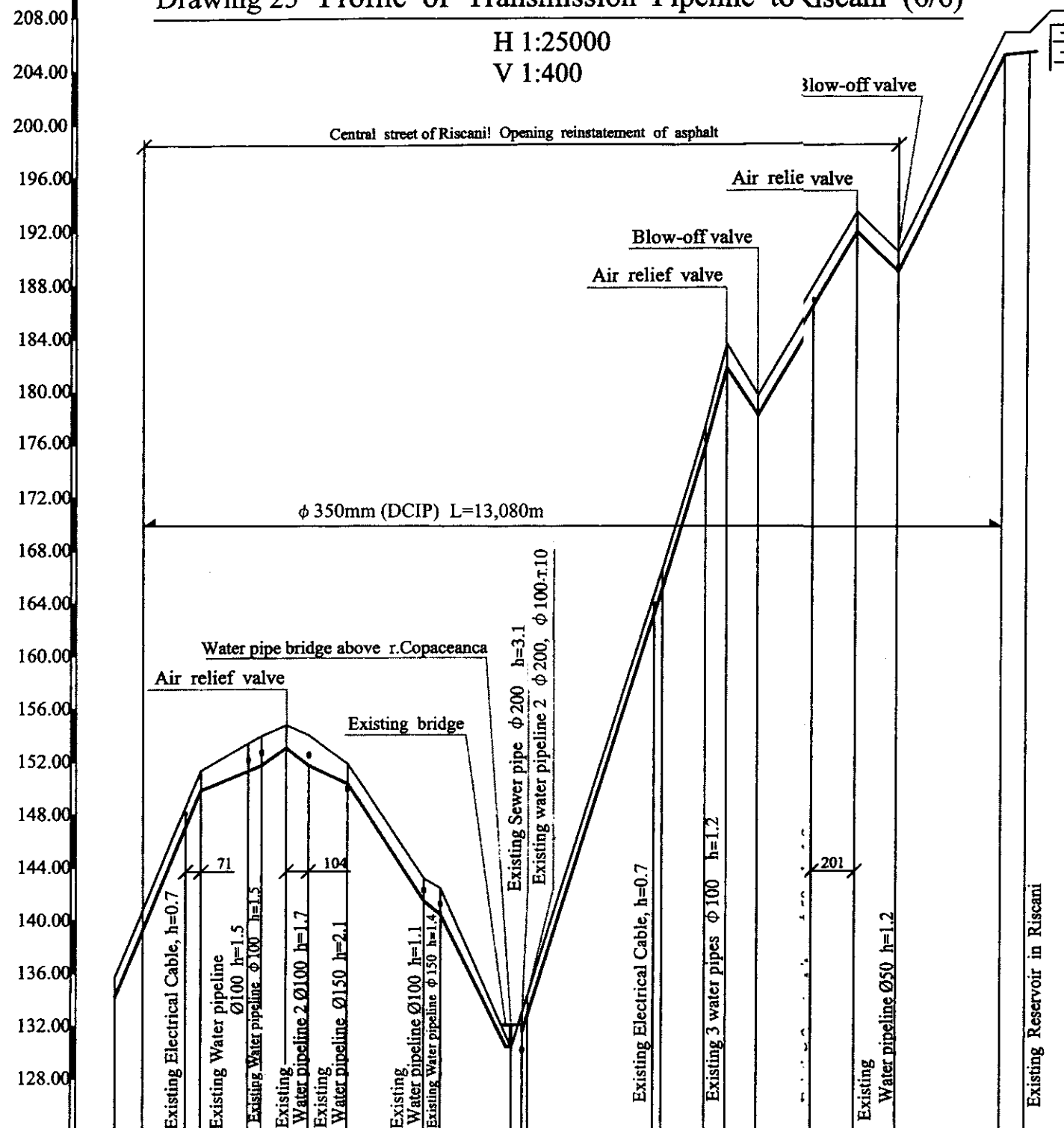
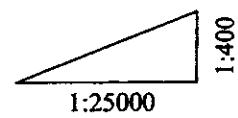


Elevation of ground level	187.80	179.40	175.18	178.00	177.90	193.35	193.80	193.50	191.15	186.80	185.80	193.80	203.95	203.40	201.85	187.70	185.65	183.60	171.00	161.00	174.60	190.65	185.65	189.50	192.60	193.60	162.80	152.15	135.20	135.70
Elevation of pipeline bottom level	186.30	178.00	167.50	176.50	177.90	191.85	192.20	192.00	189.65	184.70	183.75	183.70	192.30	202.45	200.35	186.20	182.10	169.50	159.50	173.10	189.00	184.15	188.00	191.10	192.10	161.30	133.70	134.20		
Distance between points		450	150	60	17	538	100	300	600	350	550	370	330	535	644	221	500	200	150	250	200	867	233	257	93					
Cumulated distance	24400	24850	25000	25060	25162	25700	25800	26100	26700	27050	27600	27970	27985	28300	28835	29479	29523	29700	30200	30400	30550	30800	31000	31867	32100	32357	32450			

Drawing 25 Profile of Transmission Pipeline to Riscani (6/6)

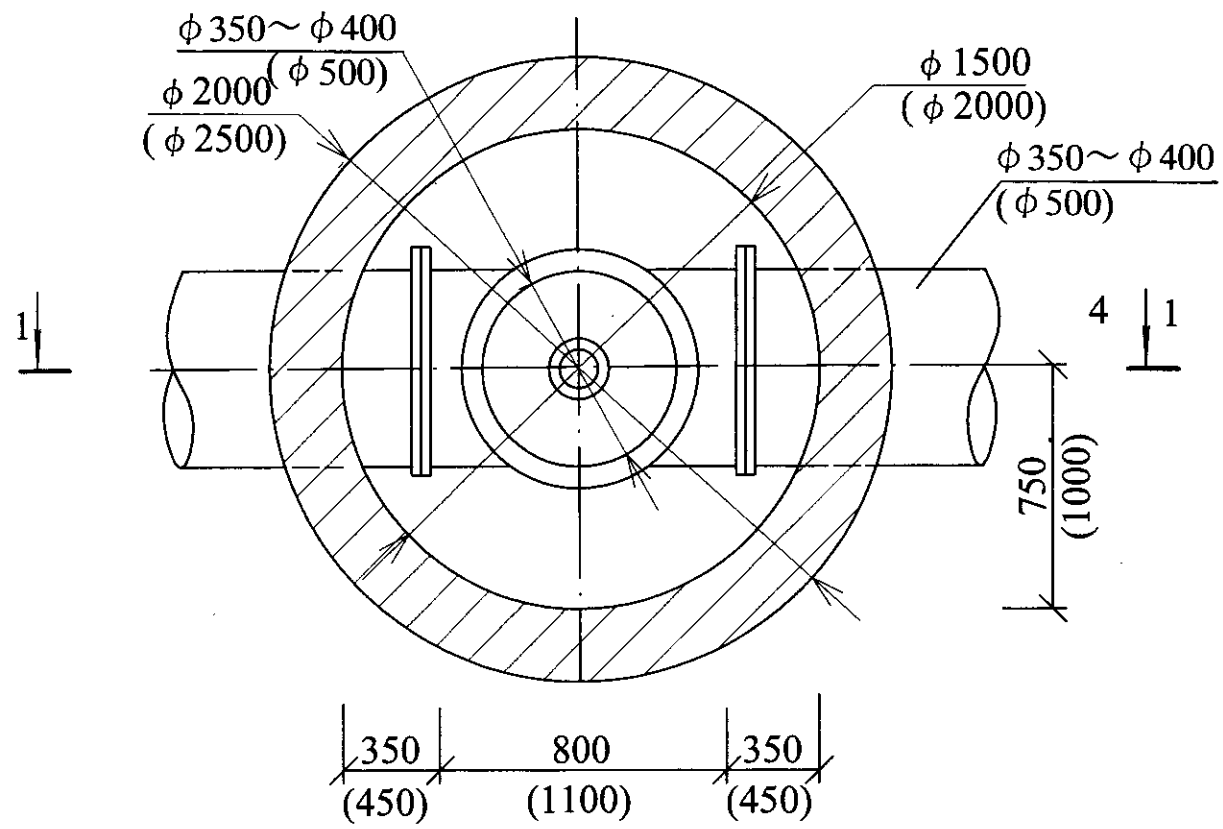
H 1:25000

V 1:400

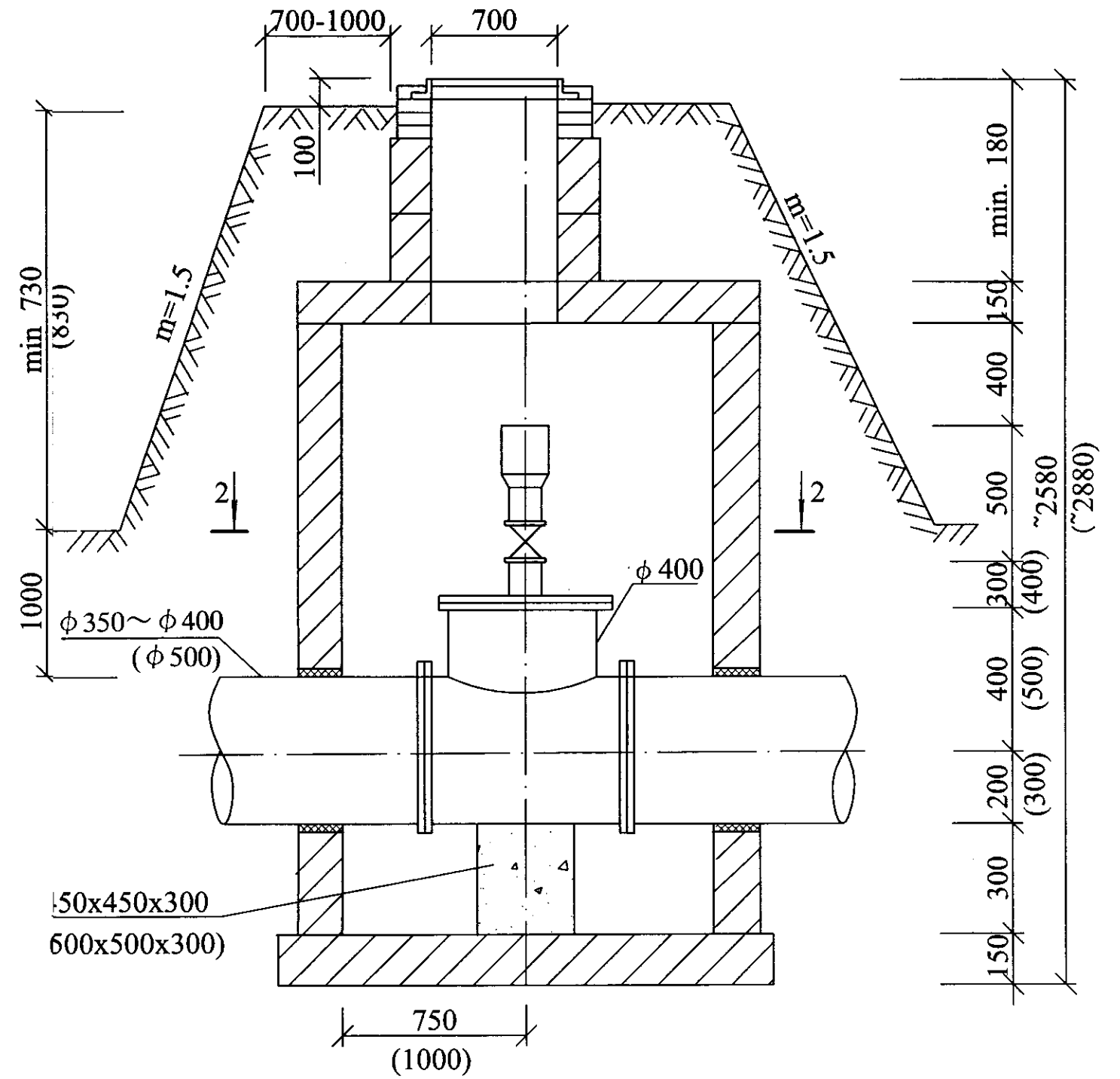


Elevation of ground level	135.70	151.30	153.35	153.80	154.73	153.97	151.80	143.10	130.25	133.00	166.45	177.30	183.50	179.60	193.40	190.40	206.80	206.80
Elevation of pipeline bottom level	134.20	149.80	151.25	151.70	153.00	151.67	150.30	141.40	132.00	131.50	165.00	175.80	181.70	178.10	191.90	189.00	205.10	205.30
Distance between points		400.0	222.0	178.0	283.0	359.0	76.0	332.0	50.0	650.0	200.0	100.0	146.0	50.0	190.0	490.0	116.0	
Cumulated distance	32450	32850	33072	33250	33533	33892	33968	34300	34350	35000	35200	35300	35446	35950	36140	36630	36746	

Plan 2-2

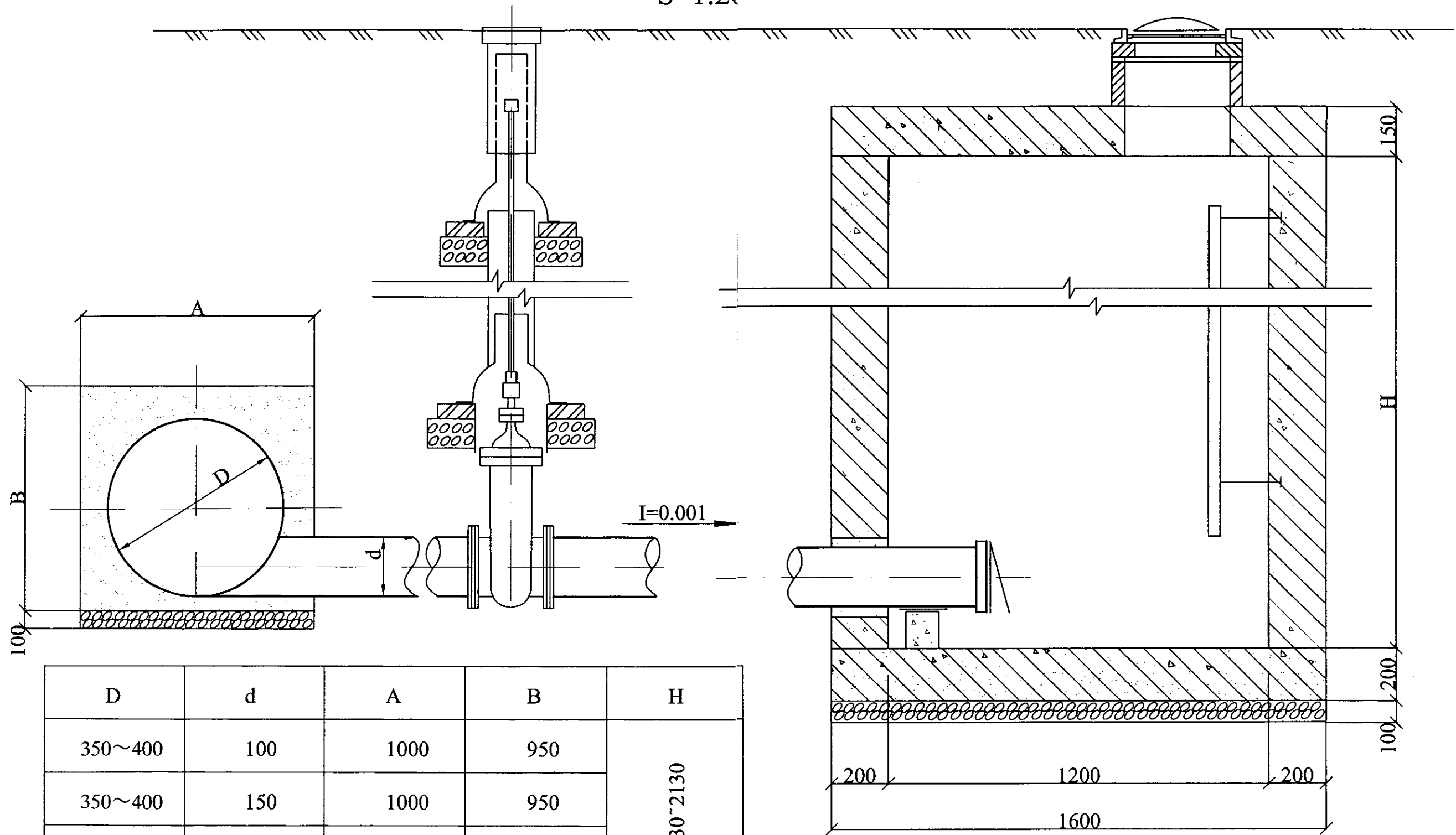


Section 1-1



Drawing 26 Air Relief Valve Chamber ($\phi 350 \sim \phi 400$ mm, $\phi 500$ mm)

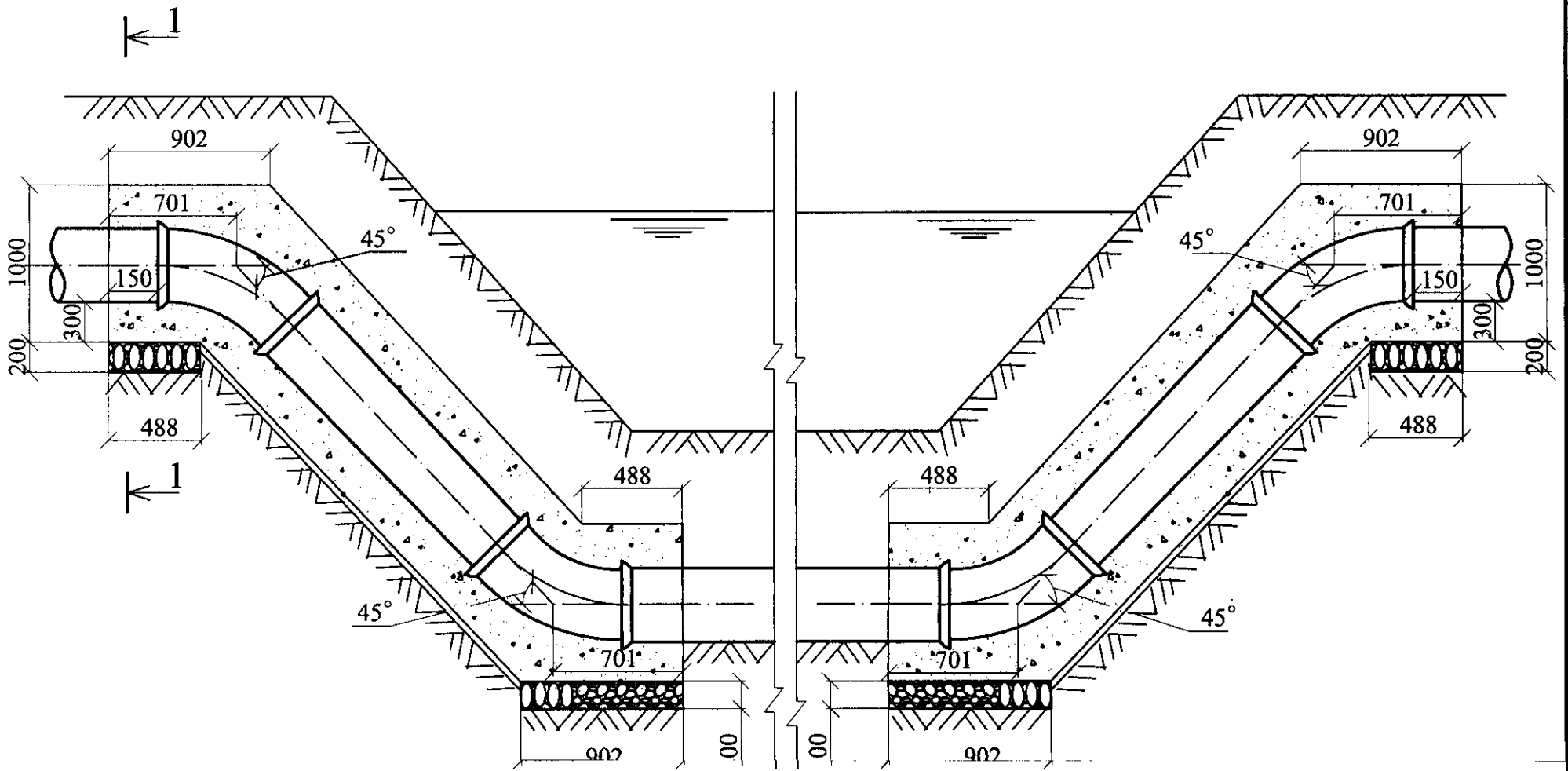
S=1:20



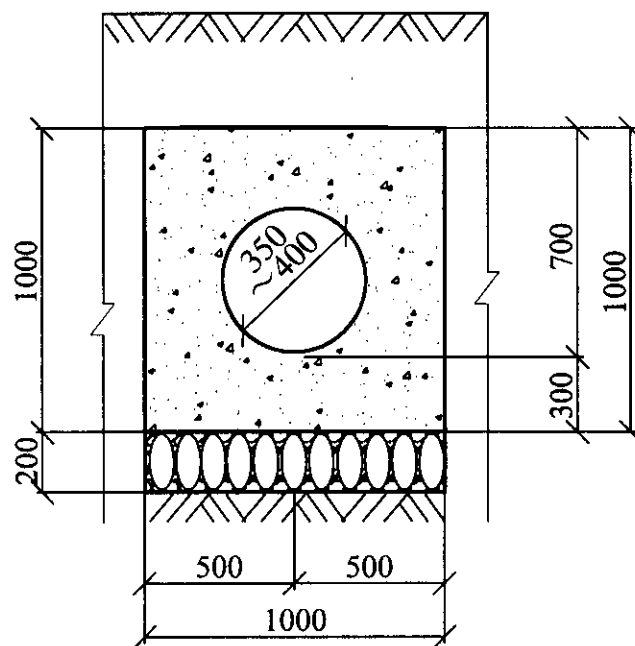
D	d	A	B	H
350~400	100	1000	950	H=1630~2130
350~400	150	1000	950	
500	200	1300	1250	
500	300	1300	1250	

Drawing 27 Typical Blow-off

Section
Not in scale

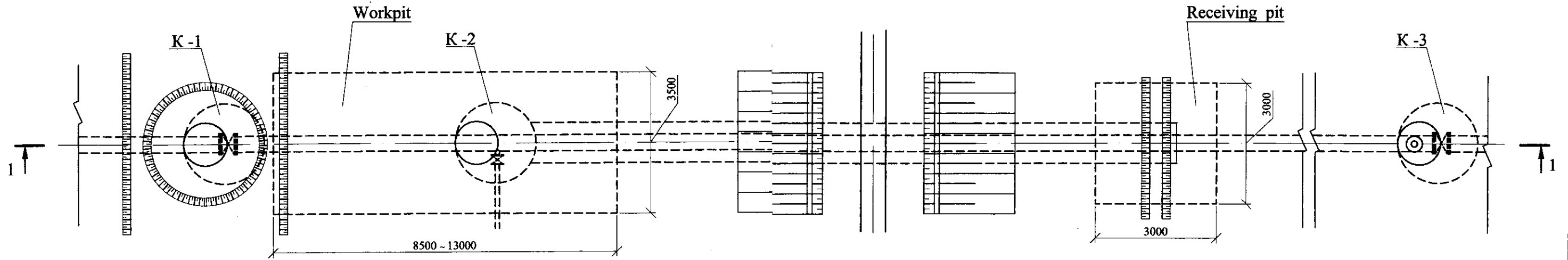


Section 1-1
Not in scale

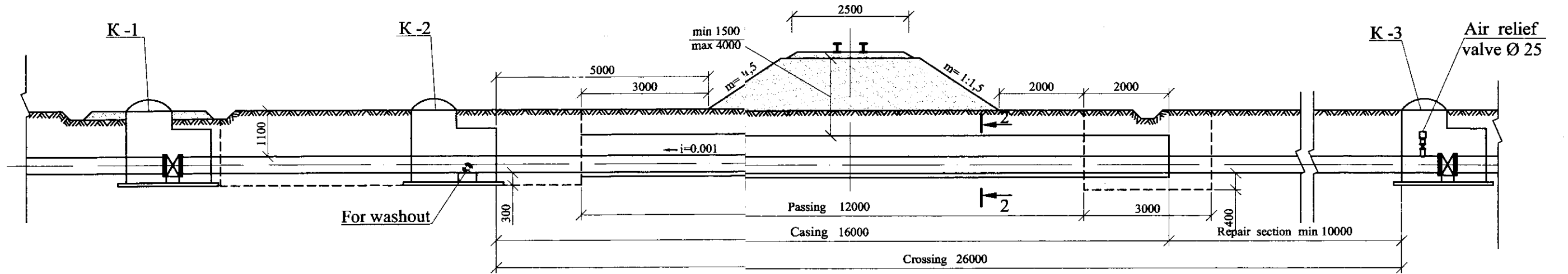


Drawing 29 Typical Protection for the Inverted Siphon Chamber ($\phi 350 \sim \phi 400\text{mm}$)

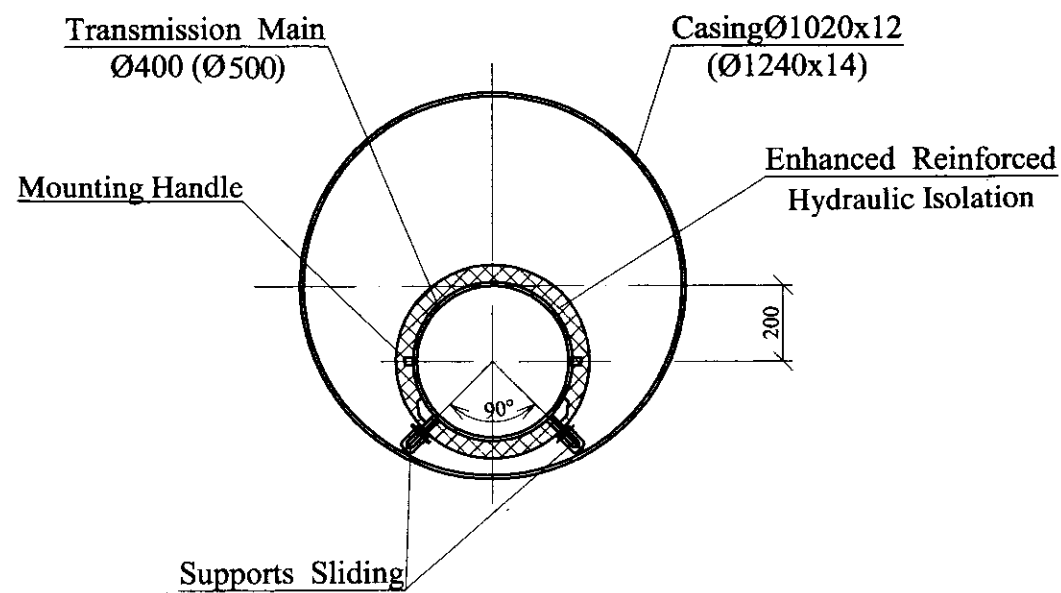
Plan
(S=1:100)



Section 1-1
(S=1:100)

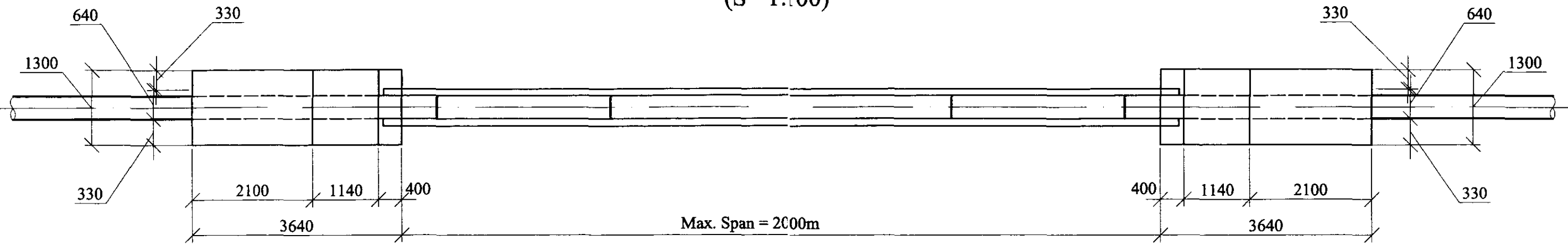


Section 2-2
(S=1:20)

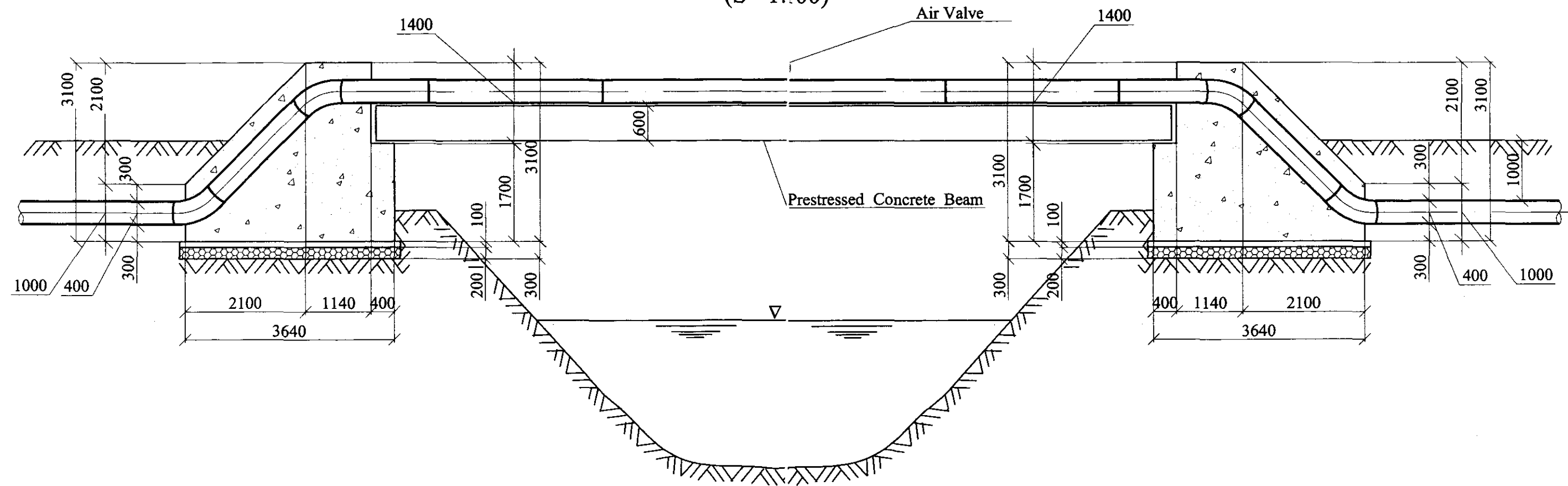


Drawing 30 Crossing the Railway (Jacking Method, ϕ 400, ϕ 500mm)

Plan
(S= 1:100)



Section
(S = 1:100)

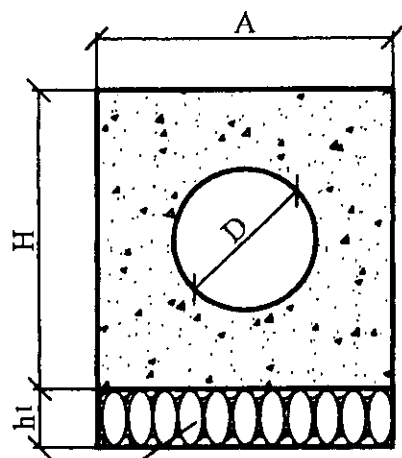


Drawing 31 Plan and Section of Water Pipe Bridge ($\phi 350 \sim \phi 400\text{mm}$)

Protection for the 11 1/4° Bend Pipe

Not in scale

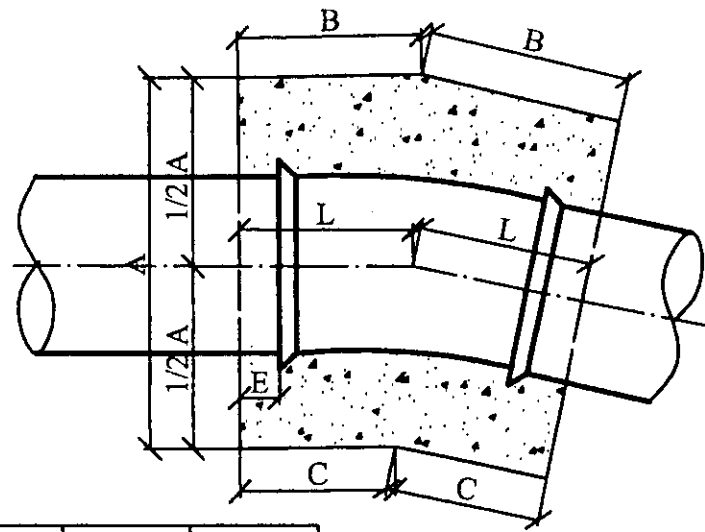
Section



Grabel

D	A	B	C	E	H	h1	L
350 ~400	1000	870	772	150	950	200	821
500	1300	1009	881	150	1250	300	945

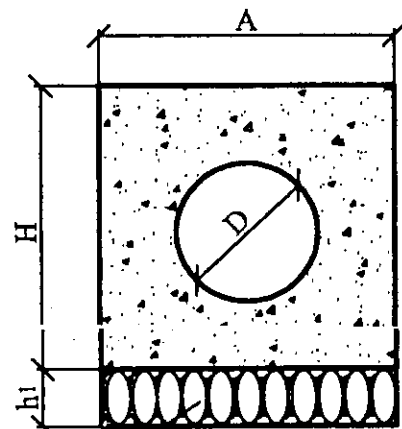
Plan



Protection for the 22 1/2° Bend Pipe

Not in scale

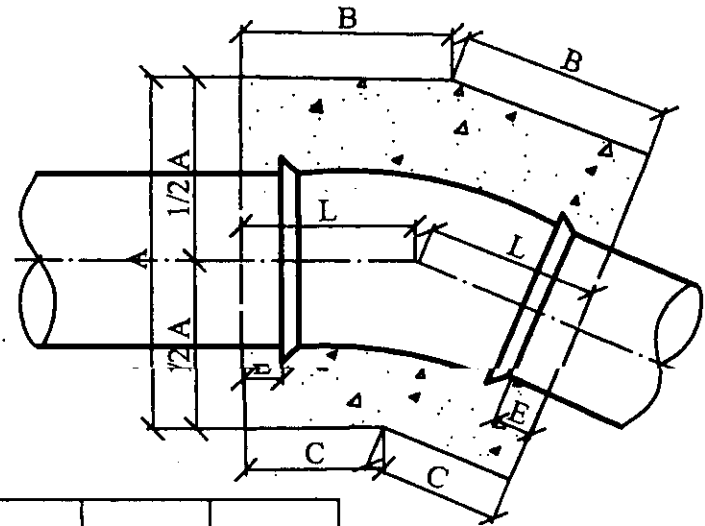
Section



Grabel

D	A	B	C	E	H	h1	L
350 ~400	1000	786	588	150	950	100	687
500	1300	1000	742	150	1250	100	871

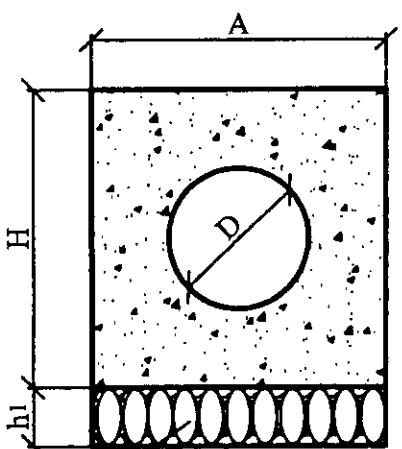
Plan



Protection for the 45° Bend Pipe

Not in scale

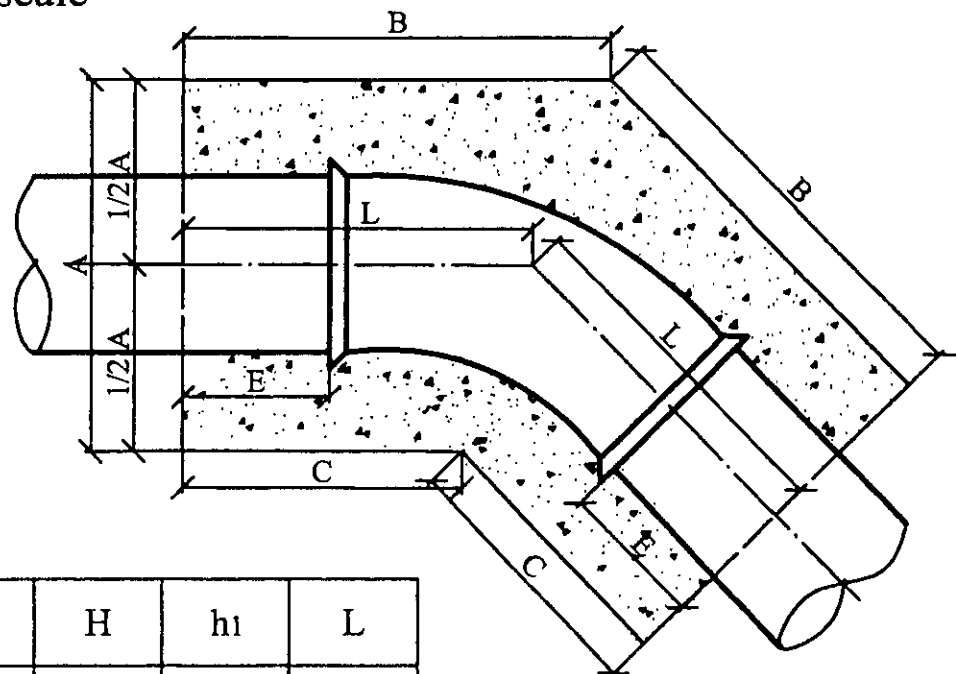
Section



Grabel

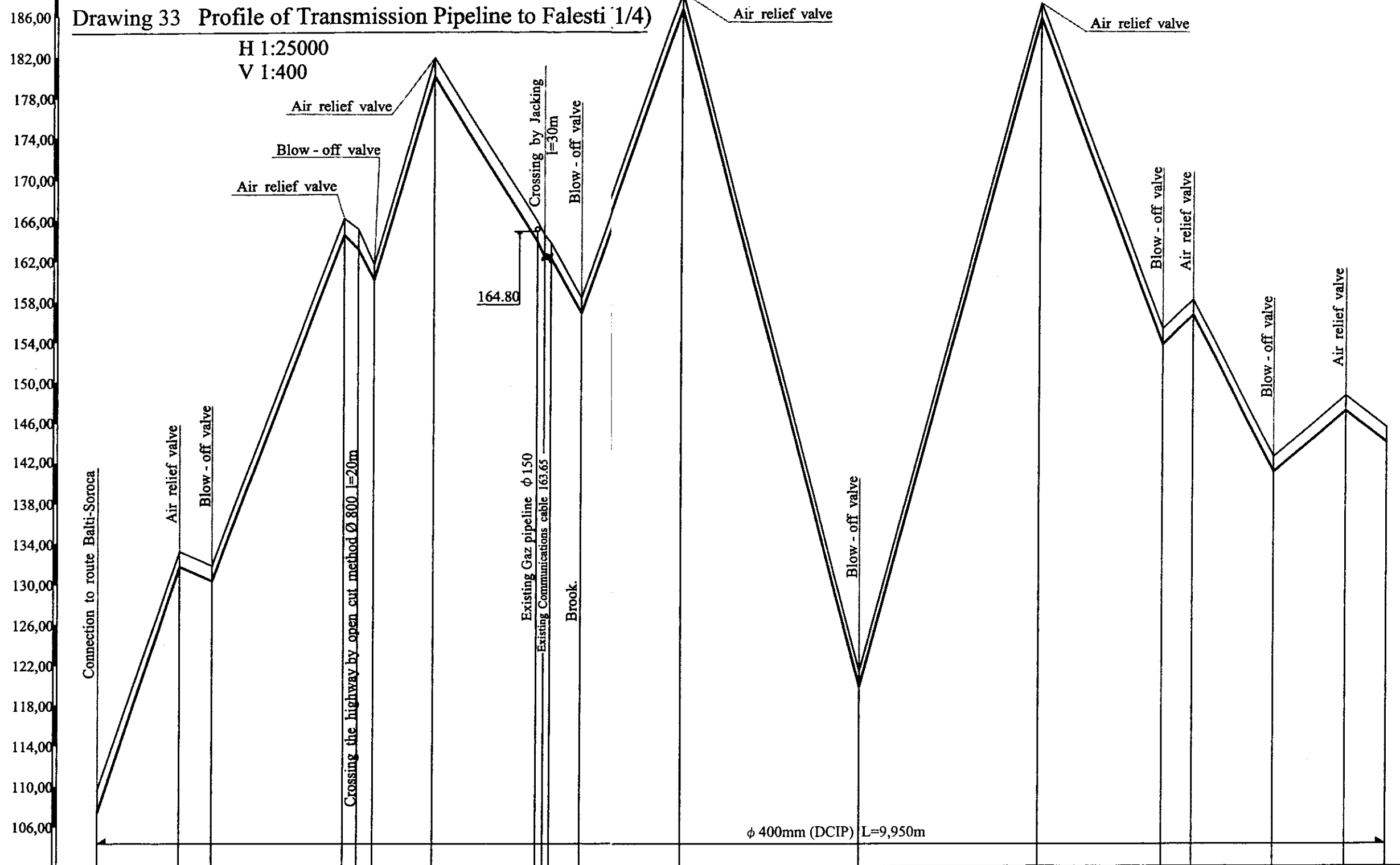
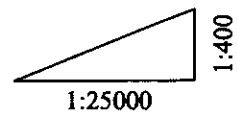
D	A	B	C	E	H	h1	L
350 ~400	1000	1140	725	382	950	100	933
500	1300	1756	1217	744	1250	100	1486

Plan



Drawing 33 Profile of Transmission Pipeline to Falesti (1/4)

H 1:25000
V 1:400

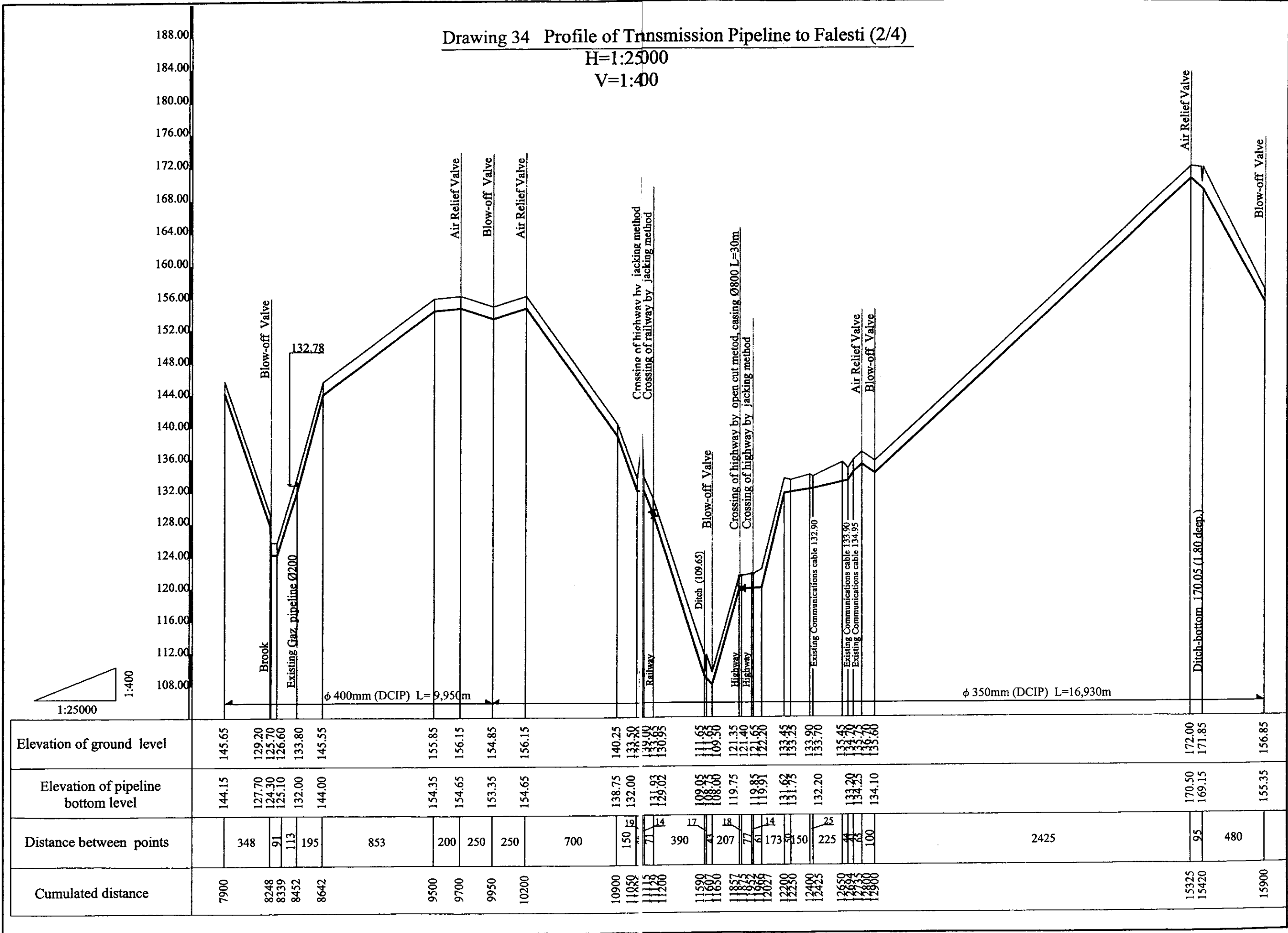


Elevation of ground level	109.66	133.20	131.80	166.15	165.09	161.60	181.81	165.80	164.45	163.70	158.25	188.10	121.25	187.20	155.27	158.15	142.60	148.75	145.65
Elevation of pipeline bottom level	107.40	131.70	130.30	164.50	163.10	160.10	180.0	163.80	162.30	162.20	156.75	186.50	119.75	185.70	153.70	156.65	141.10	147.25	144.15
Distance between points		500.0	200.0	800.0	85.0	95.0	370.0	630.0	186.0		650.0	1100.0	1100.0	764.0	186.0	500.0	447.0	253.0	
Cumulated distance	0.00	500	700	1500	1535	1630	2000	2630	2714	2900	3550	4650	5750	6514	6700	7200	7647	7900	

Drawing 34 Profile of Transmission Pipeline to Falesti (2/4)

H=1:25000

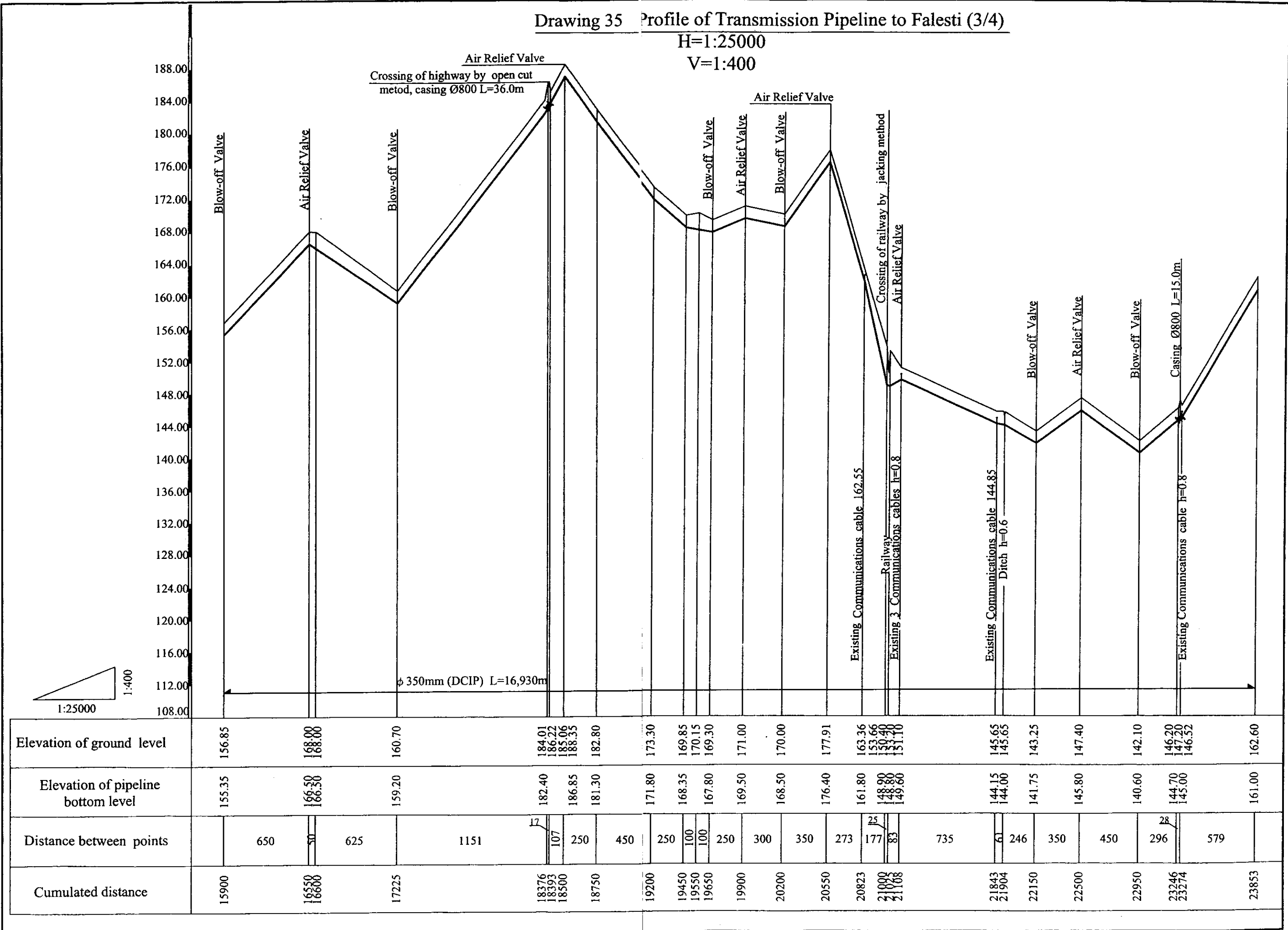
V=1:400



Drawing 35 Profile of Transmission Pipeline to Falesti (3/4)

H=1:25000

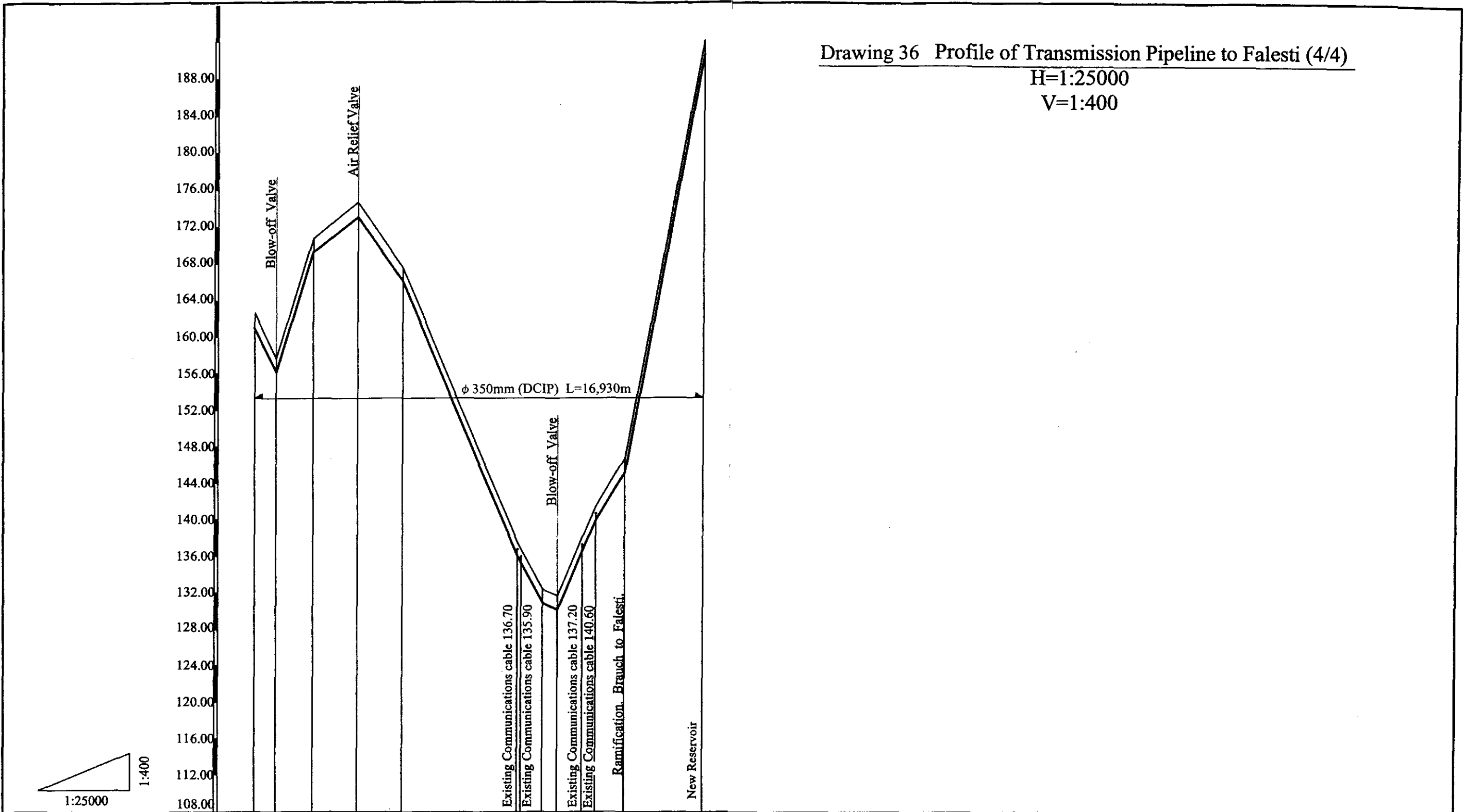
V=1:400



Drawing 36 Profile of Transmission Pipeline to Falesti (4/4)

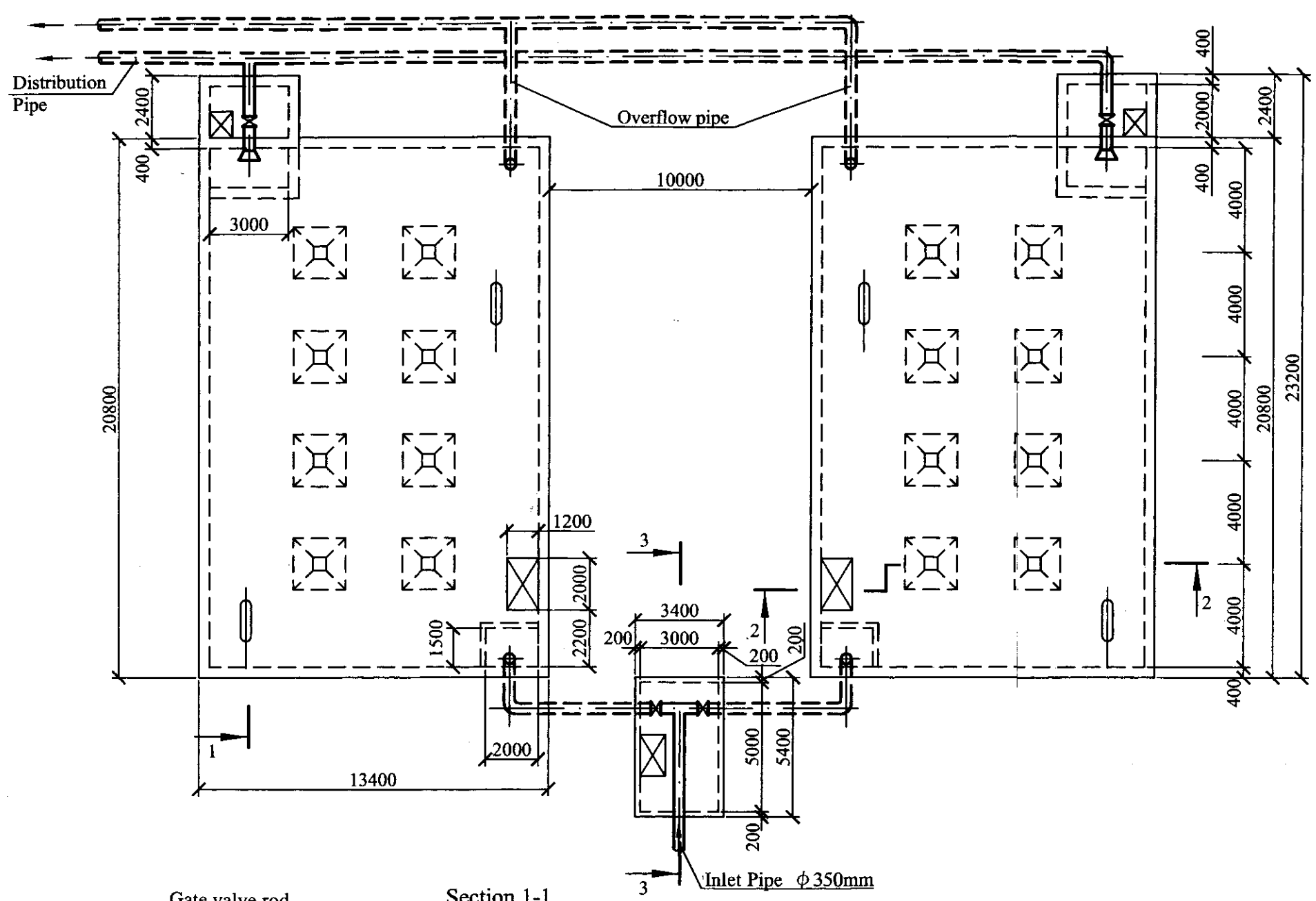
H=1:25000

V=1:400

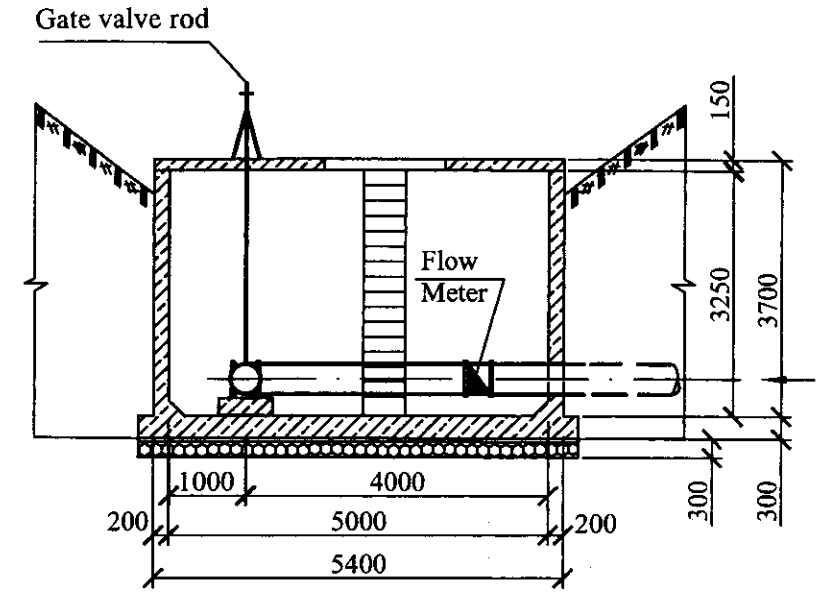


Elevation of ground level	162.60	157.65	170.75	174.65	167.50	137.50	136.70	132.30	131.60	138.00	141.40	146.65	192.10
Elevation of pipeline bottom level	161.00	156.15	169.25	173.05	166.00	136.00	135.20	130.80	130.10	136.50	139.90	145.05	190.60
Distance between points	147	250	300	303	777	25	145	100	166	90	194	530	
Cumulated distance	23853	24000	24250	24550	24853	25630	25655	25800	25900	26066	26156	26350	26880

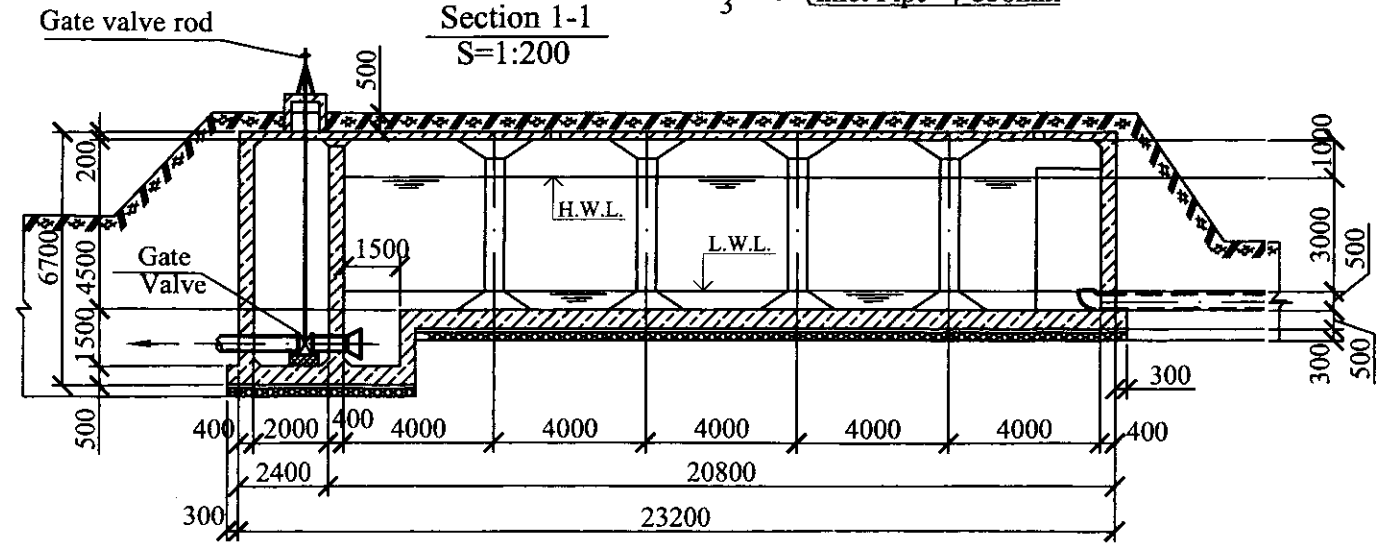
Plan
S=1:200



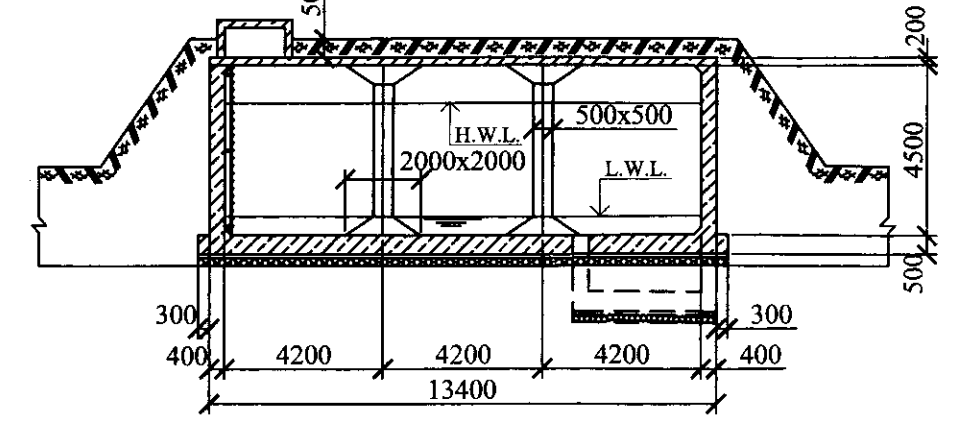
Section 3-3
S=1:100



Section 1-1
S=1:200



Section 2-2
S=1:200



Drawing 37 Plan and Section of the Reservoir in Riscani

JICA