

**JAPAN INTERNATIONAL COOPERATION AGENCY  
CAPITAL DEVELOPMENT CORPORATION  
THE CITY OF ASTANA**

**THE FEASIBILITY STUDY ON  
WATER SUPPLY AND SEWERAGE IN THE CITY OF ASTANA  
IN  
THE REPUBLIC OF KAZAKHSTAN**

**FINAL REPORT  
VOL. IV DRAWINGS**

**MARCH 2001**

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**KISHO KUROKAWA ARCHITECT & ASSOCIATES  
NIPPON KOEI CO., LTD.  
INTERNATIONAL DEVELOPMENT CENTER OF JAPAN**

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# DRAWINGS

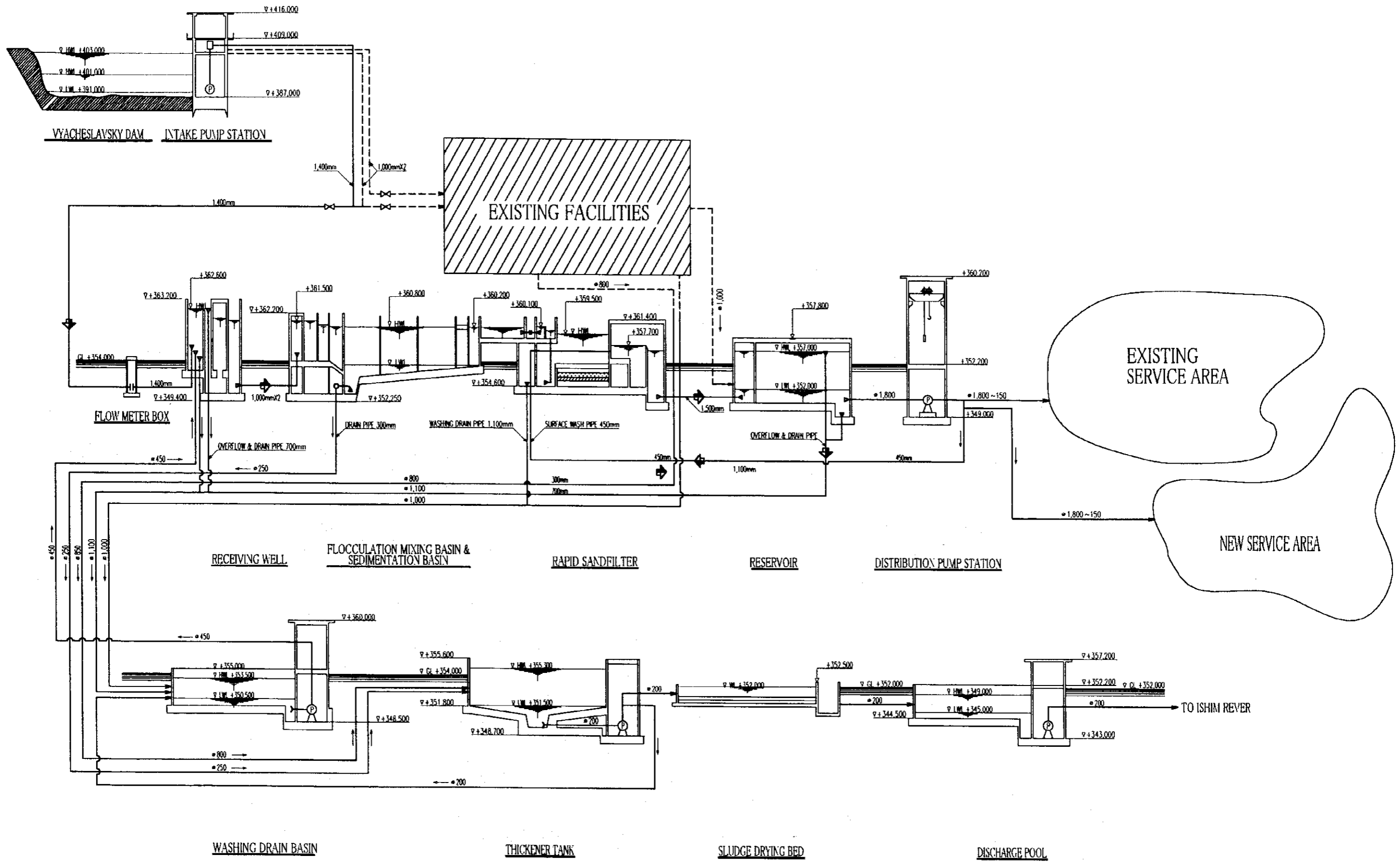
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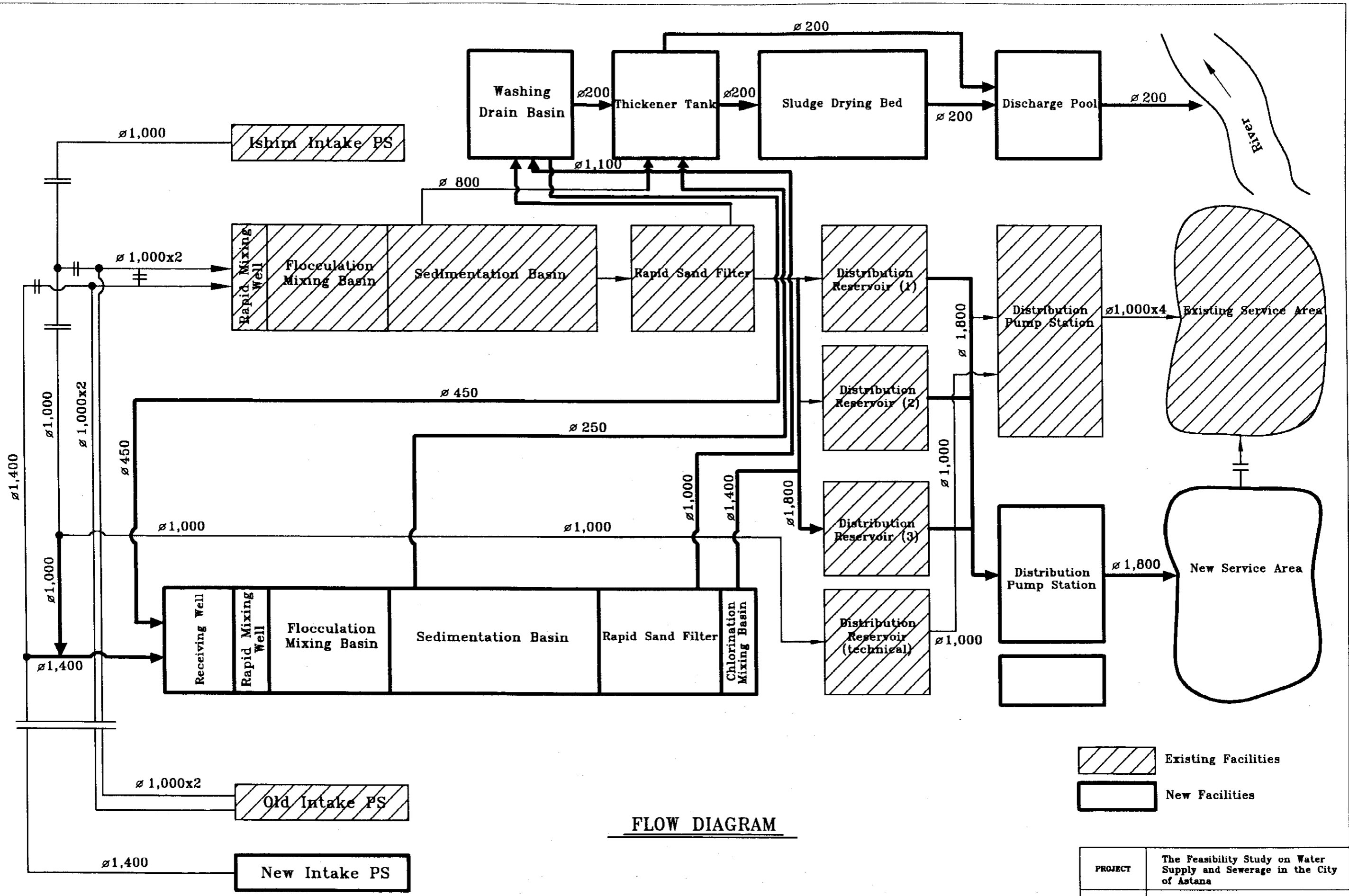
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○ HYDRAULIC PROFILE  
NOT TO SCALE

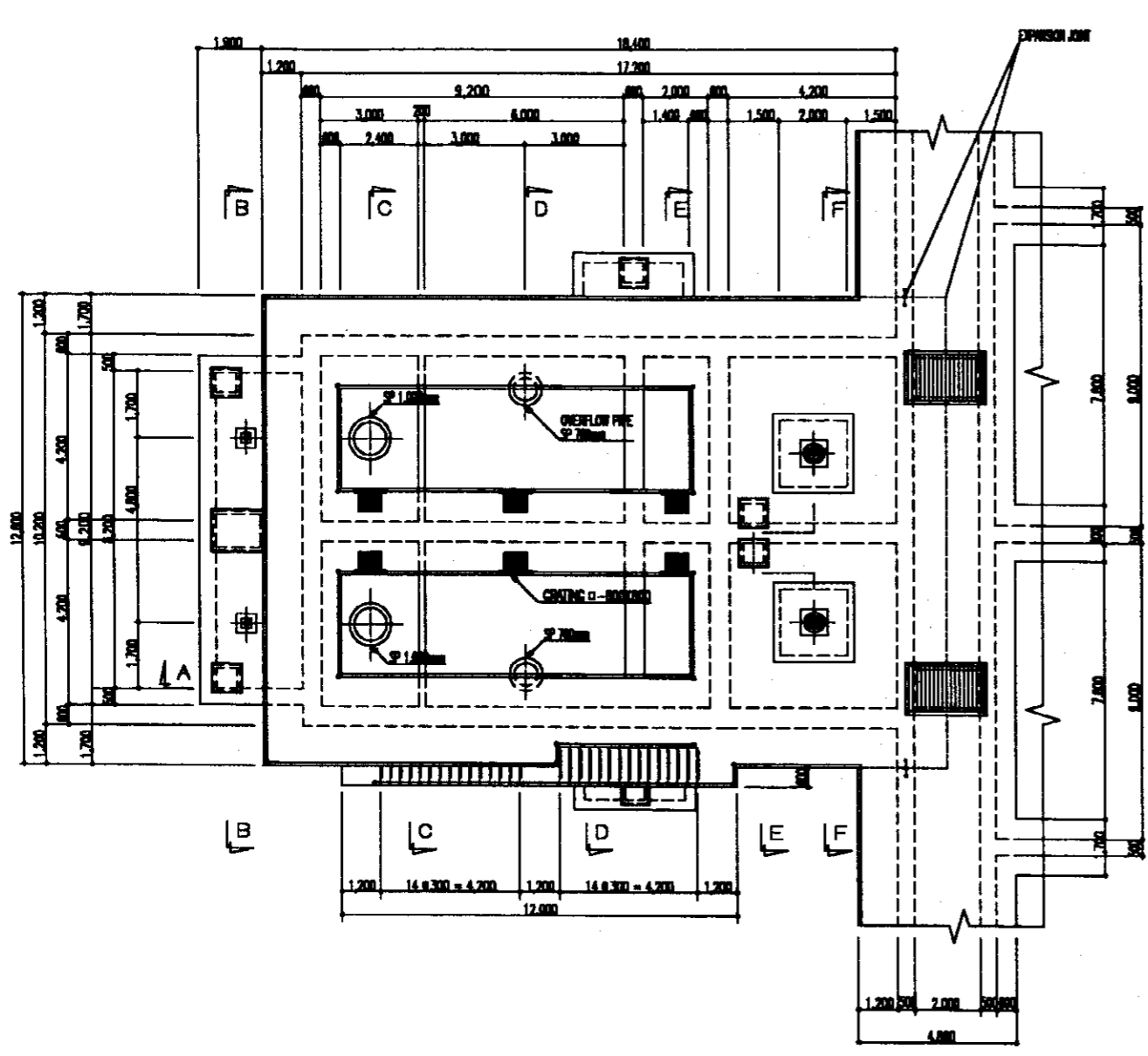
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
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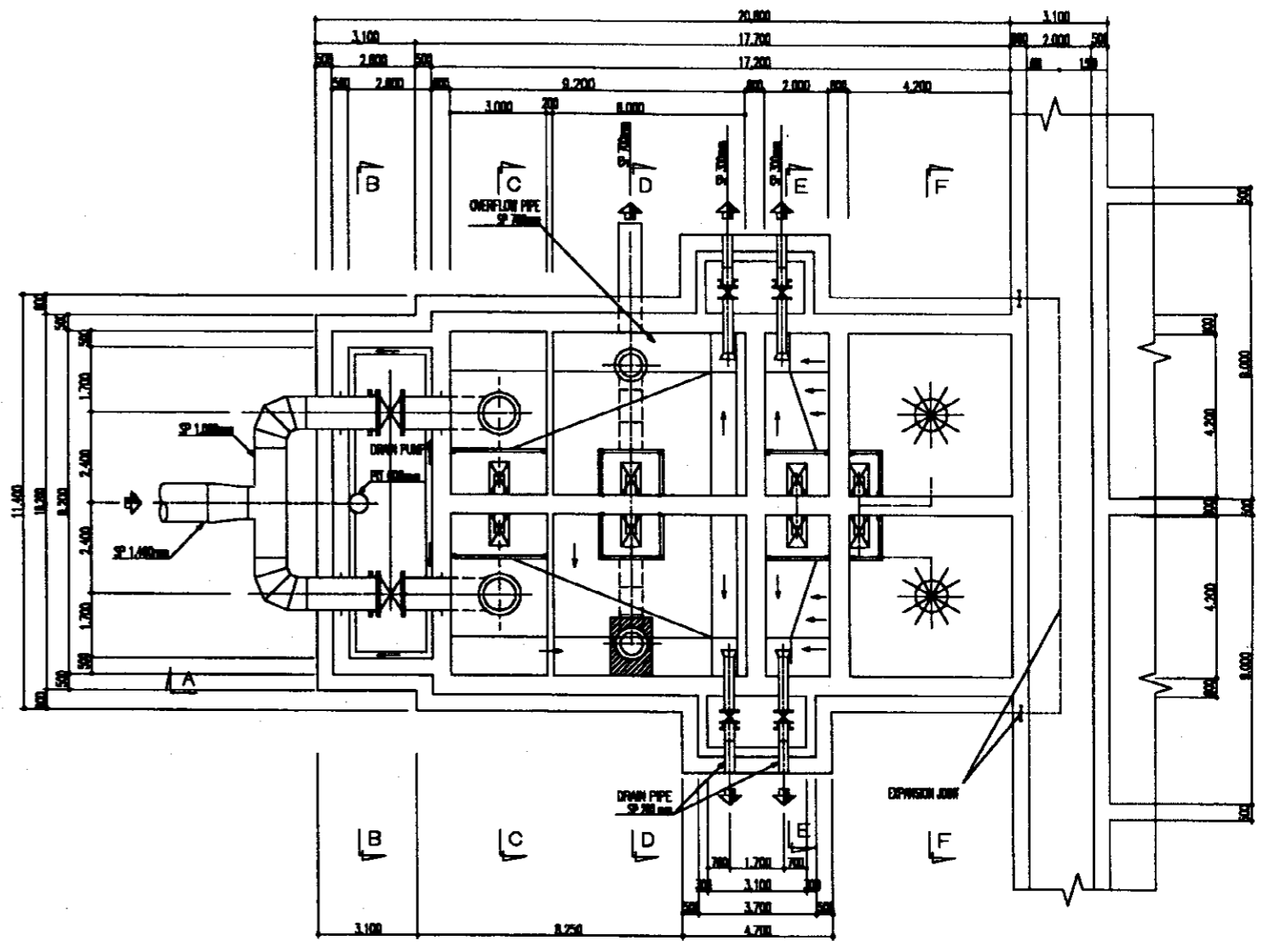
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 Existing Facilities  
 New Facilities

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT FLOW DIAGRAM		
DATE	SCALE	SHEET NO.	
MARCH 2001	no scale	A-2	



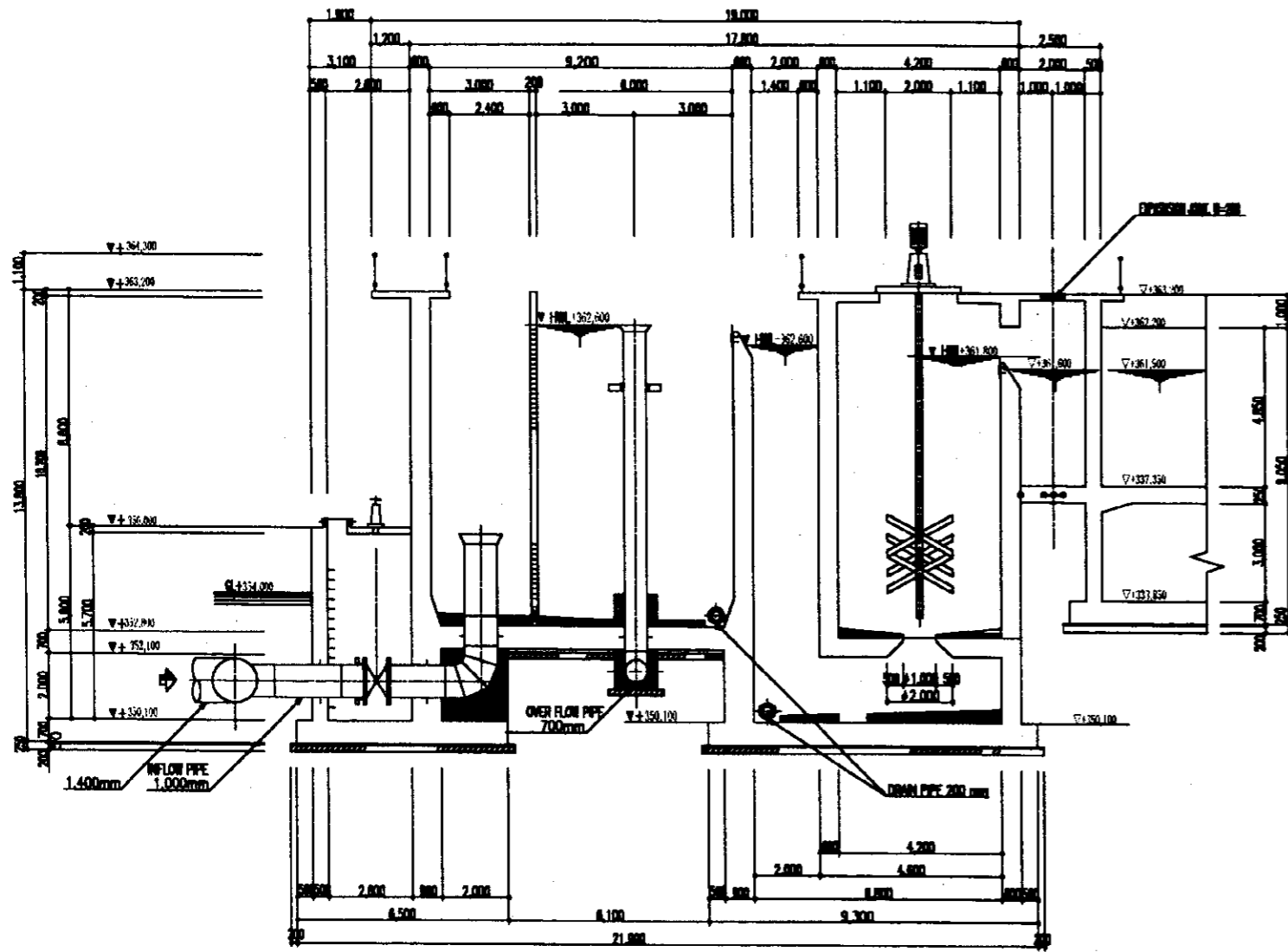
TOP PLAN  
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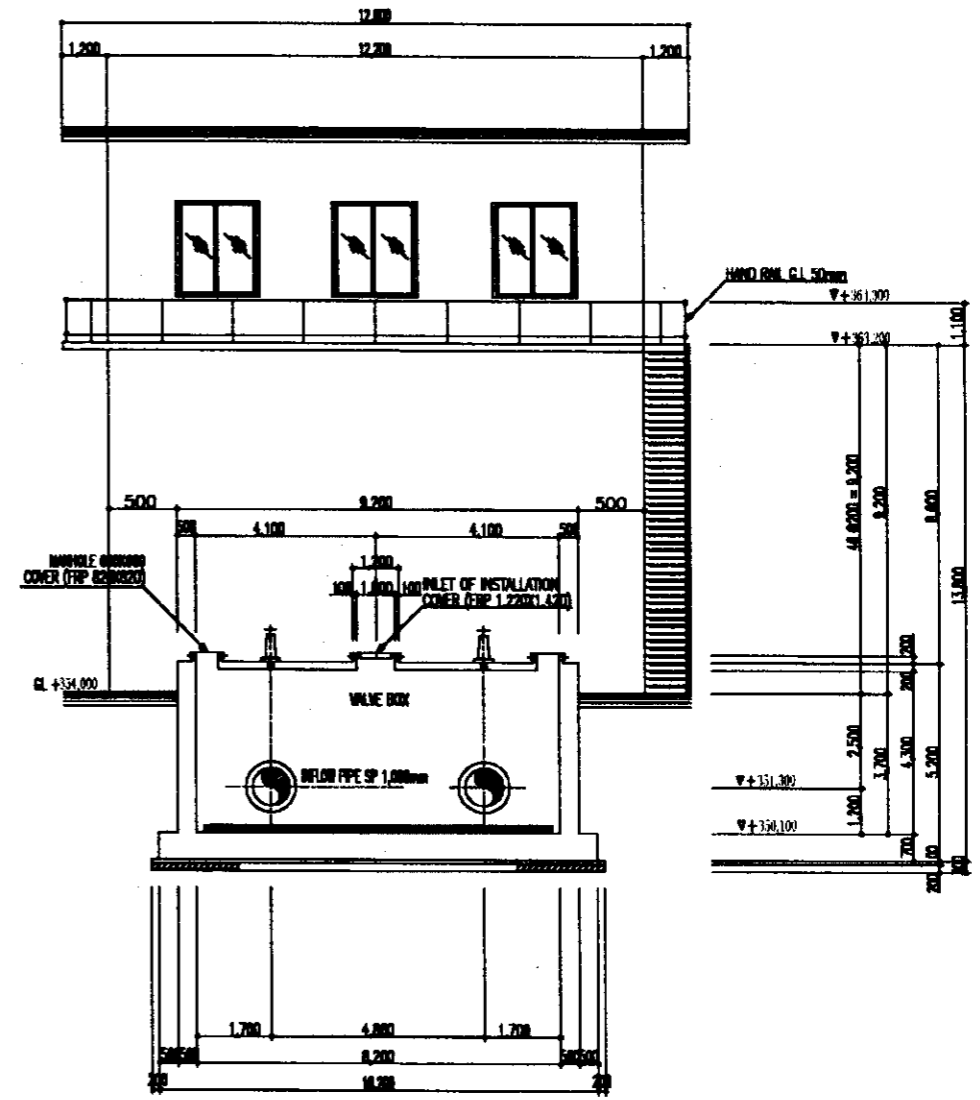
BOTTOM PLAN  
SCALE: 1:100 M

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT RECEIVING WELL PLAN		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/100	A-3	



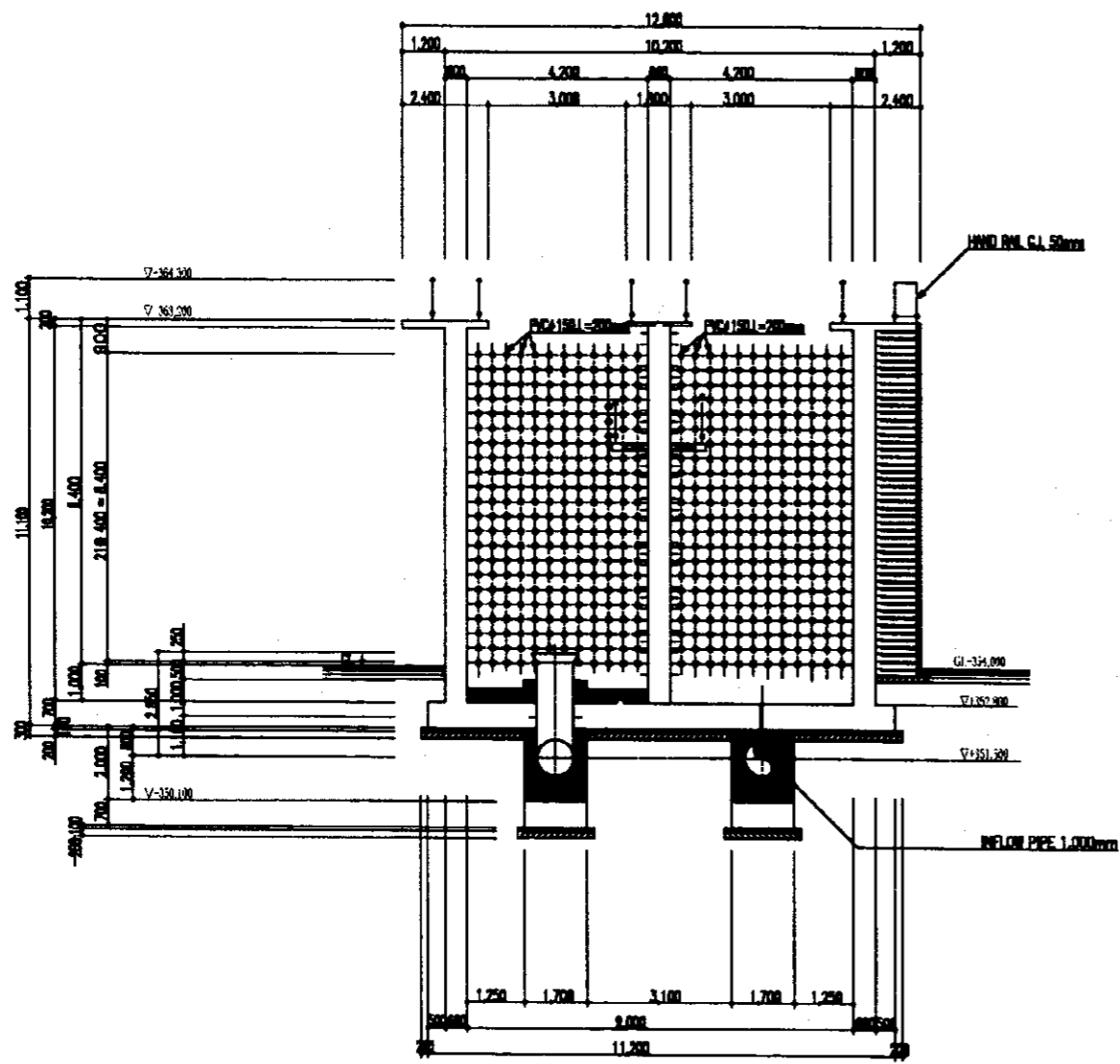


SECTION A-A  
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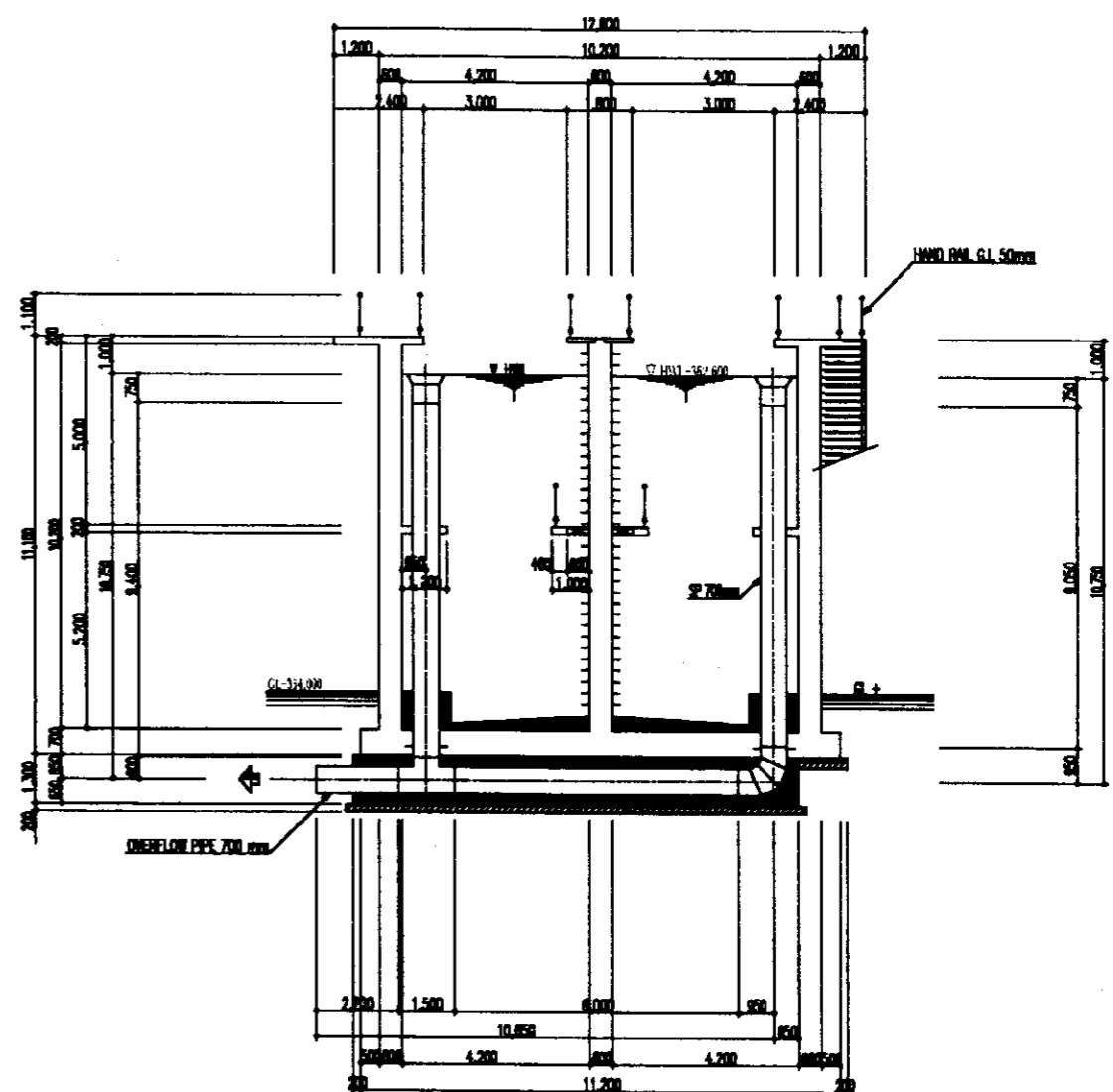


SECTION B-B  
SCALE: 1:100 M

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT RECEIVING WELL SECTIONS (1/3)		
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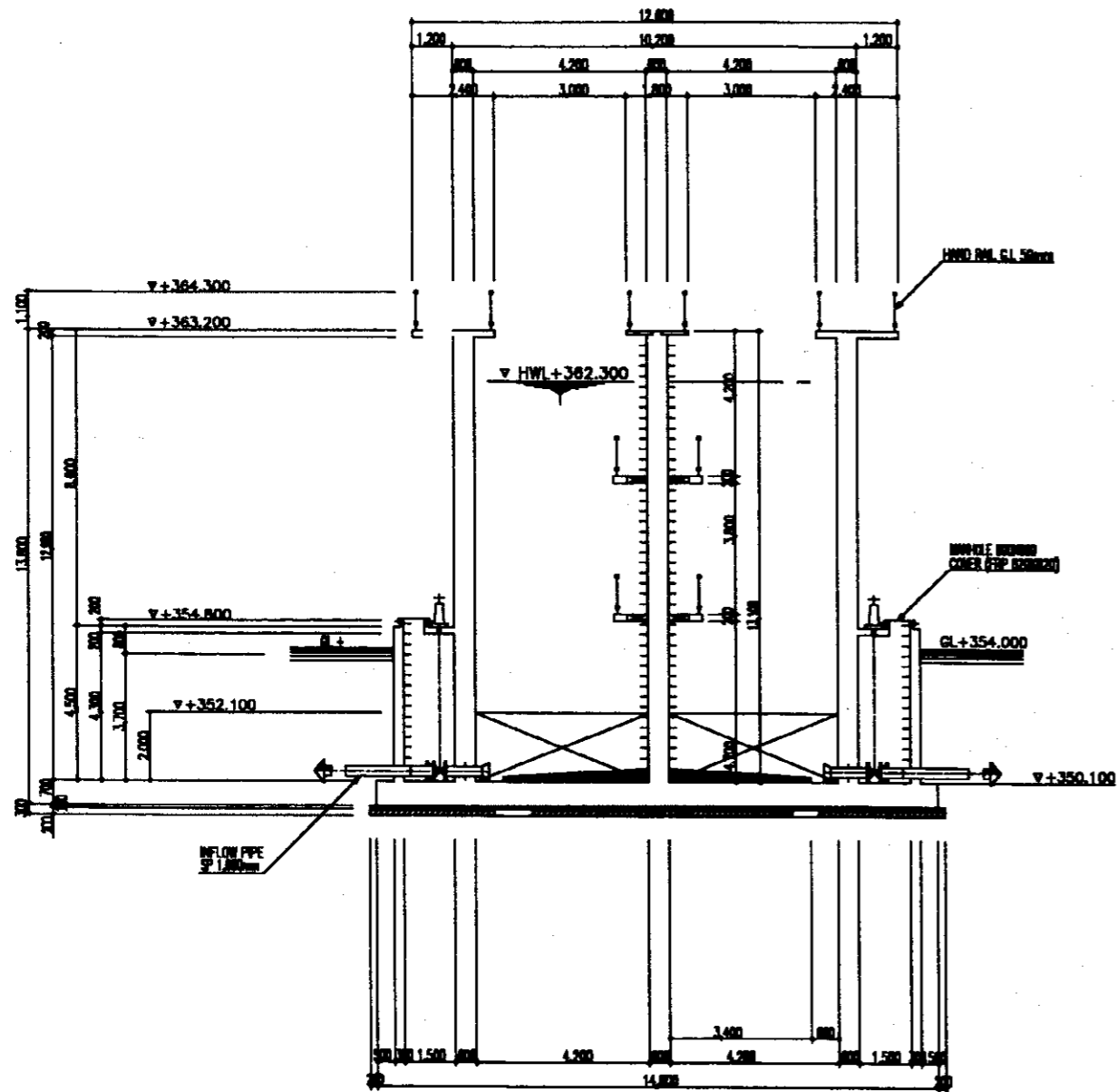


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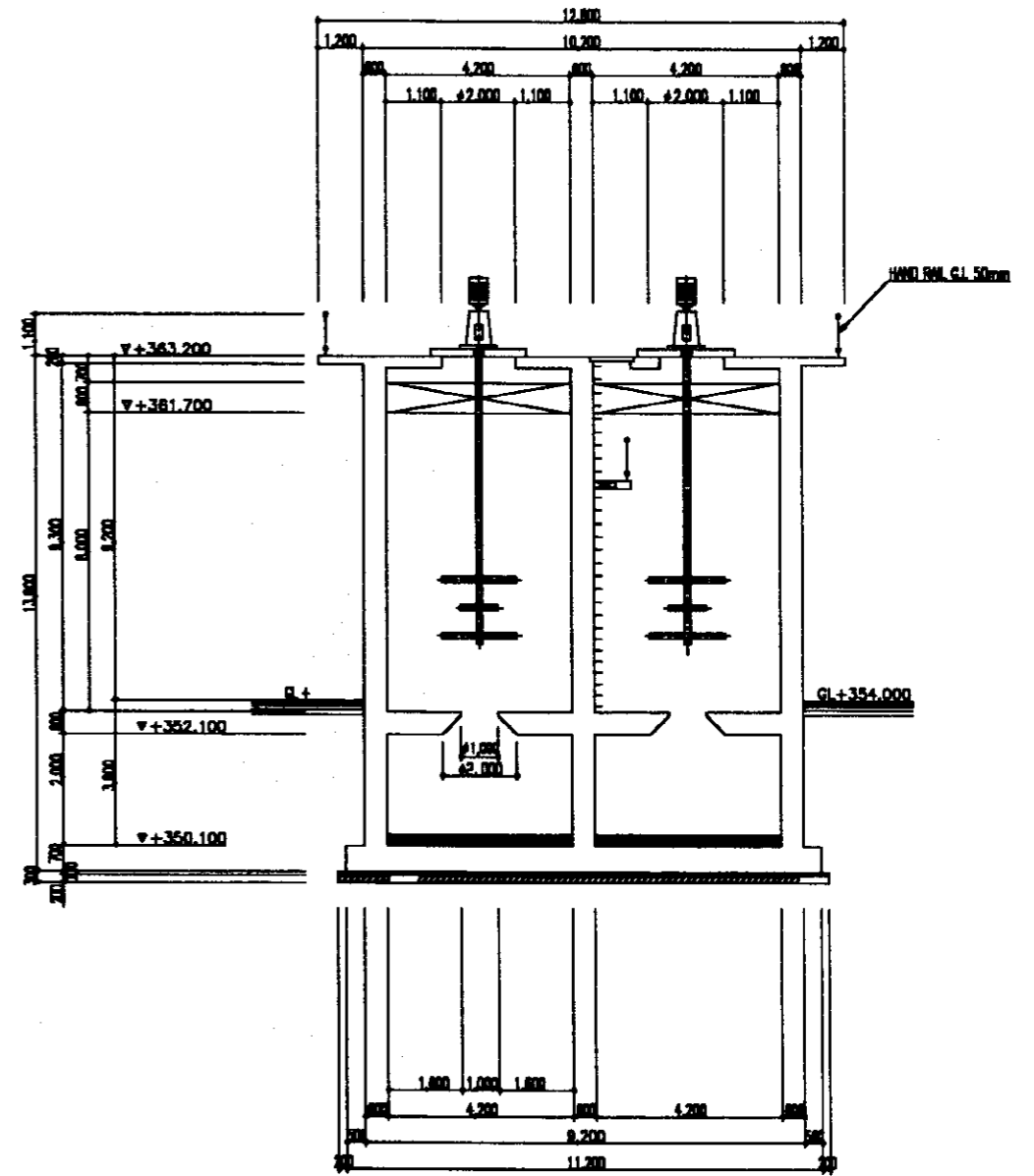


SECTION D-D  
SCALE: 1:100 M

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
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DATE	SCALE	SHEET NO.	
MARCH 2001	1/100	A-5	

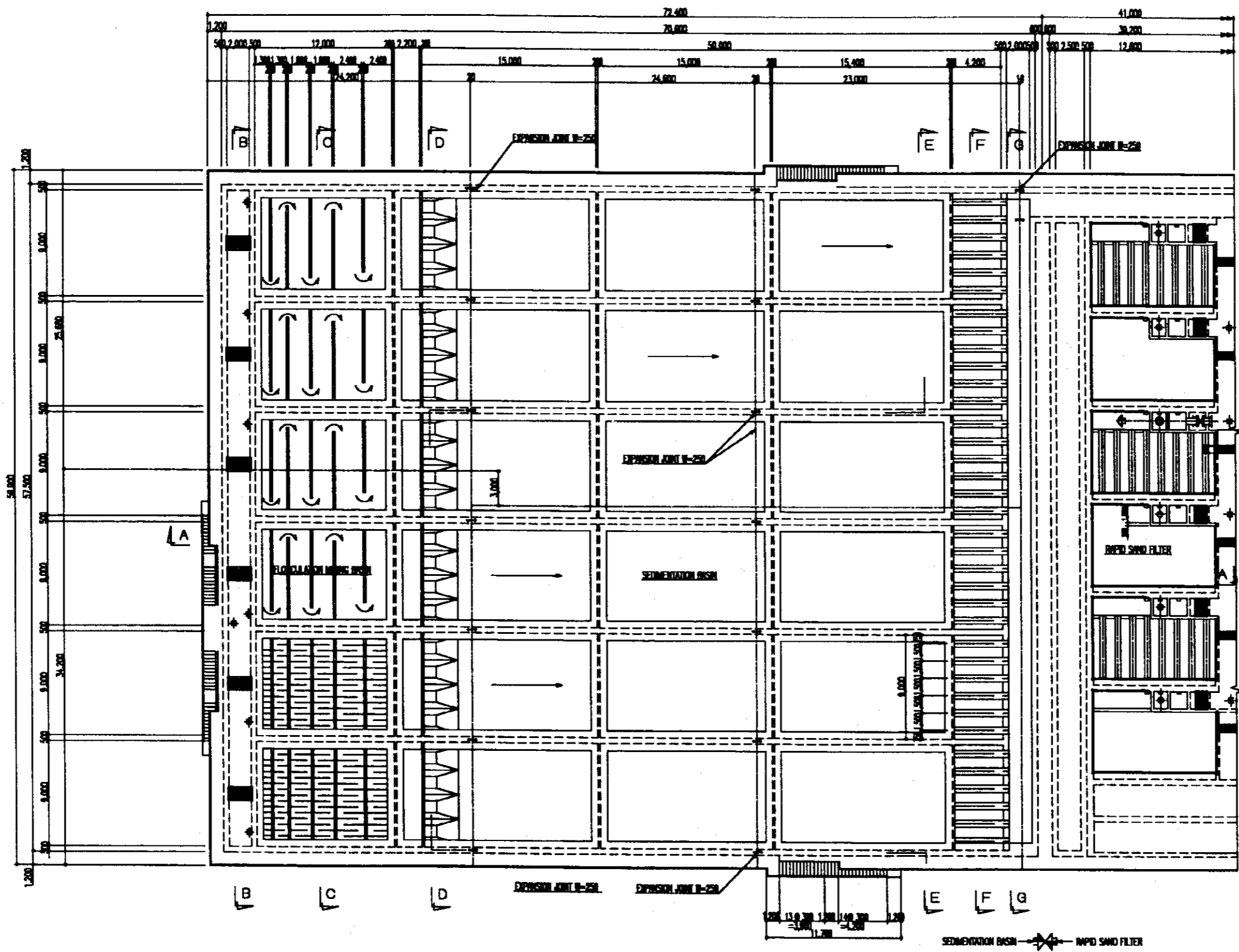


SECTION E-E  
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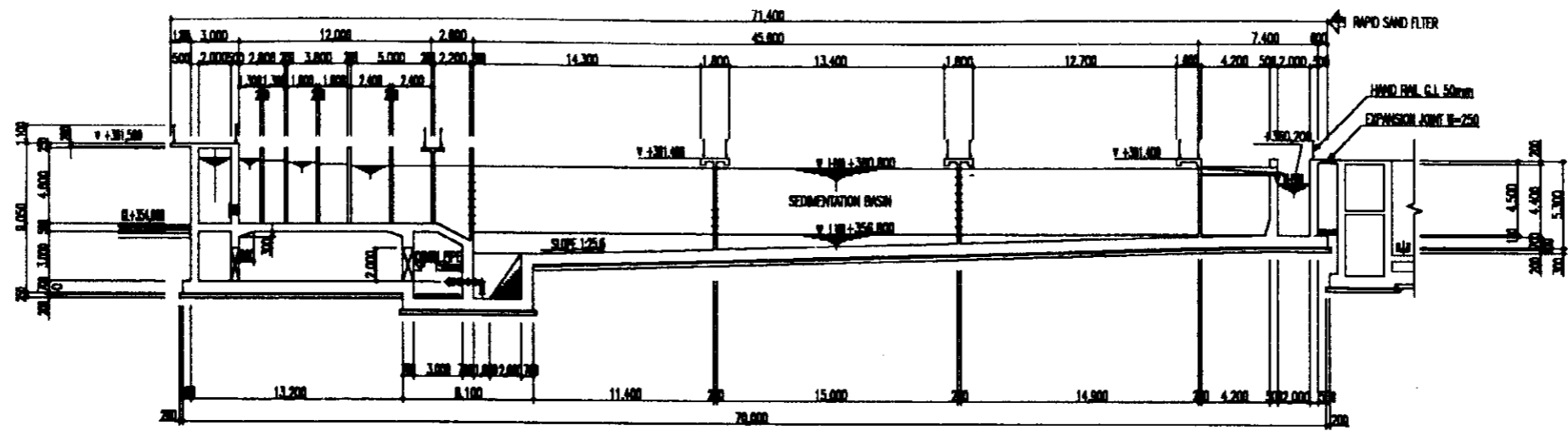
SECTION F-F  
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PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT RECEIVING WELL SECTIONS (3/3)		
DATE	SCALE	SHEET NO.	
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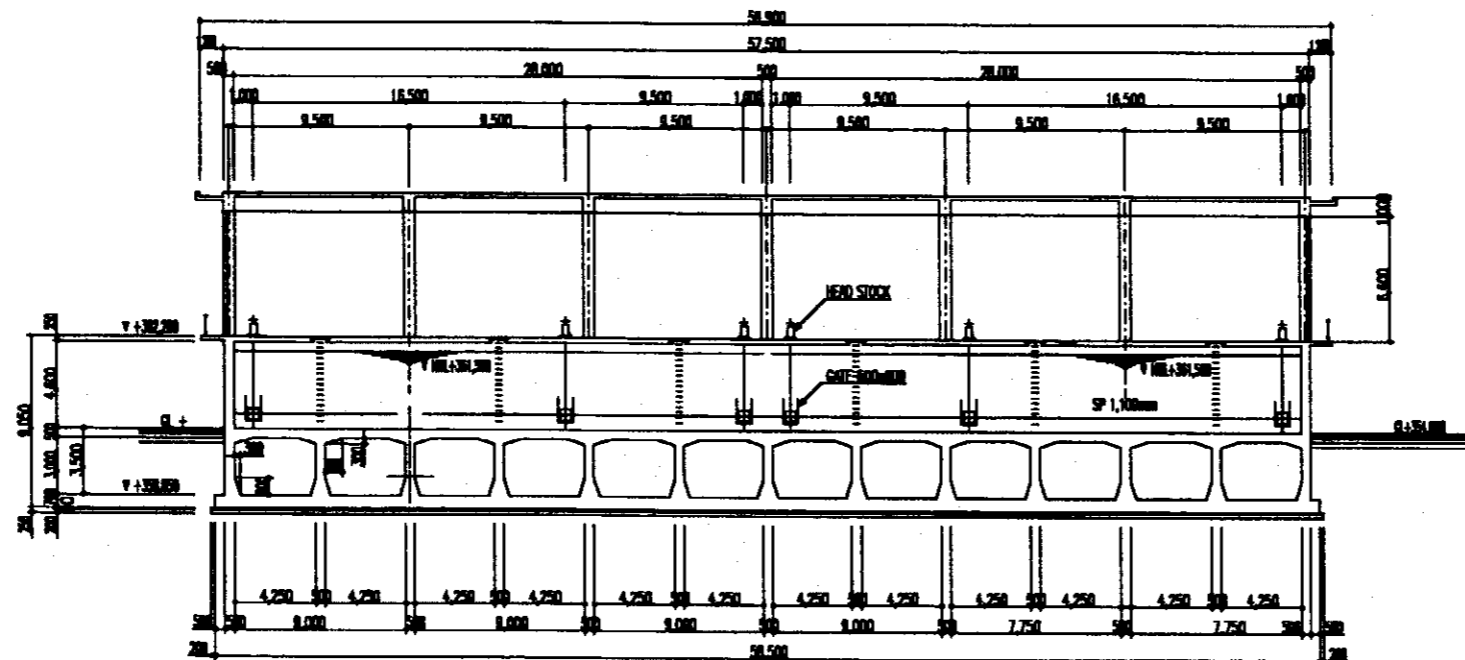


PLAN  
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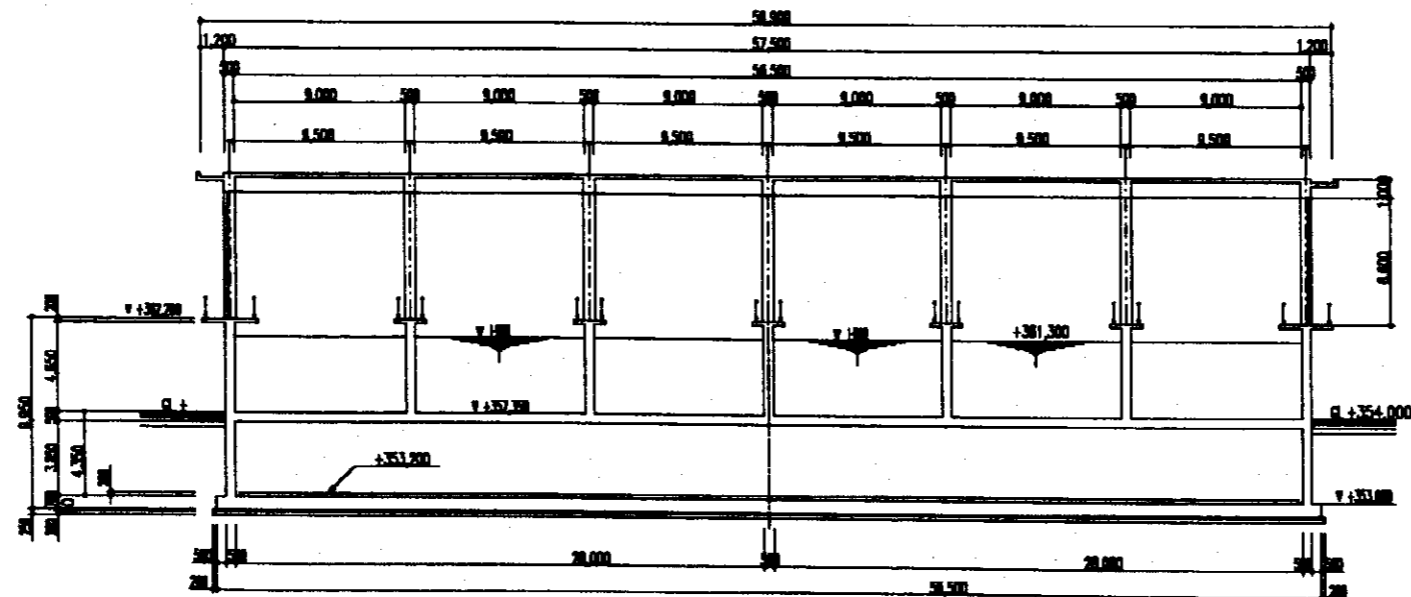
<b>PROJECT</b>	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
<b>DRAWING TITLE</b>	WATER TREATMENT PLANT FLOCCULATION & SEDIMENTATION BASIN PLAN		
<b>DATE</b>	<b>SCALE</b>	<b>SHEET NO.</b>	
MARCH 2001	1/200	A-7	



SECTION A-A  
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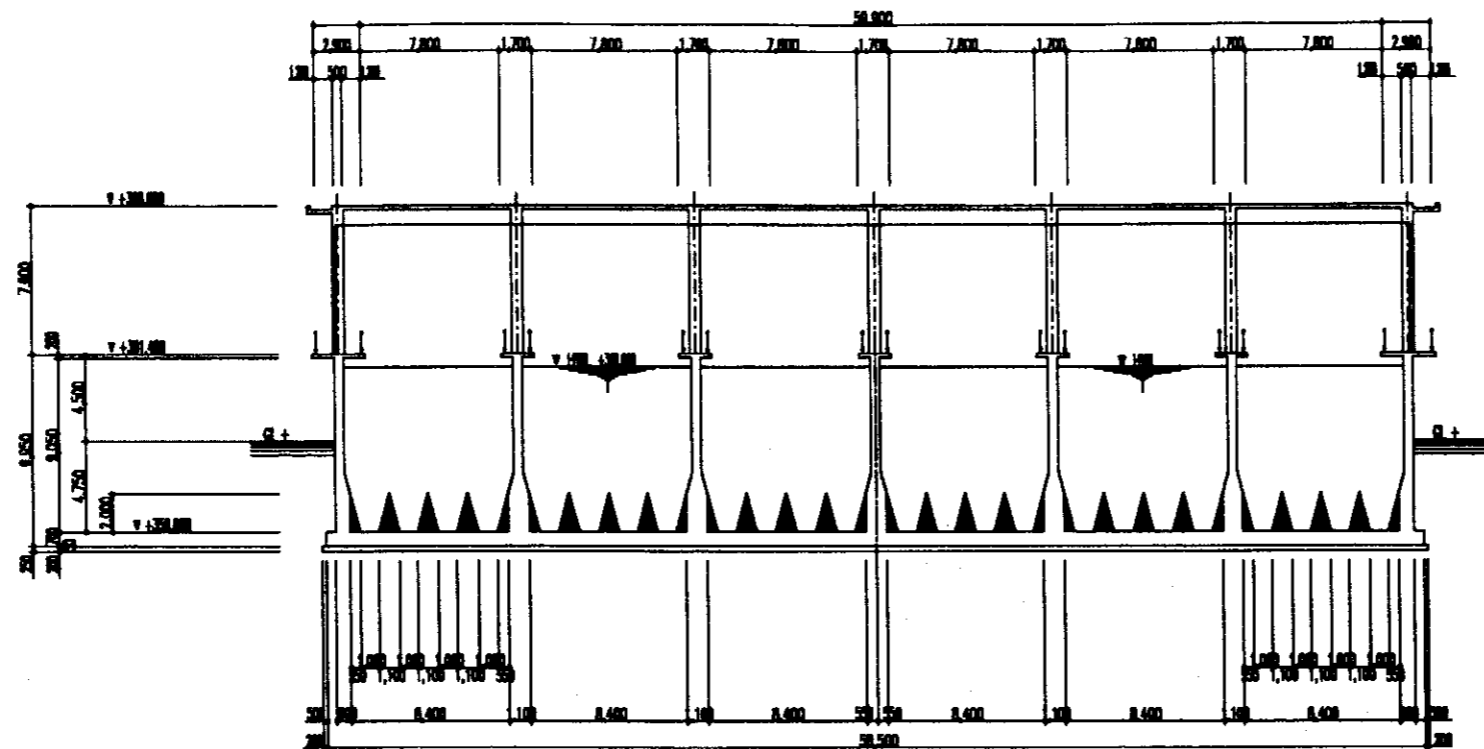


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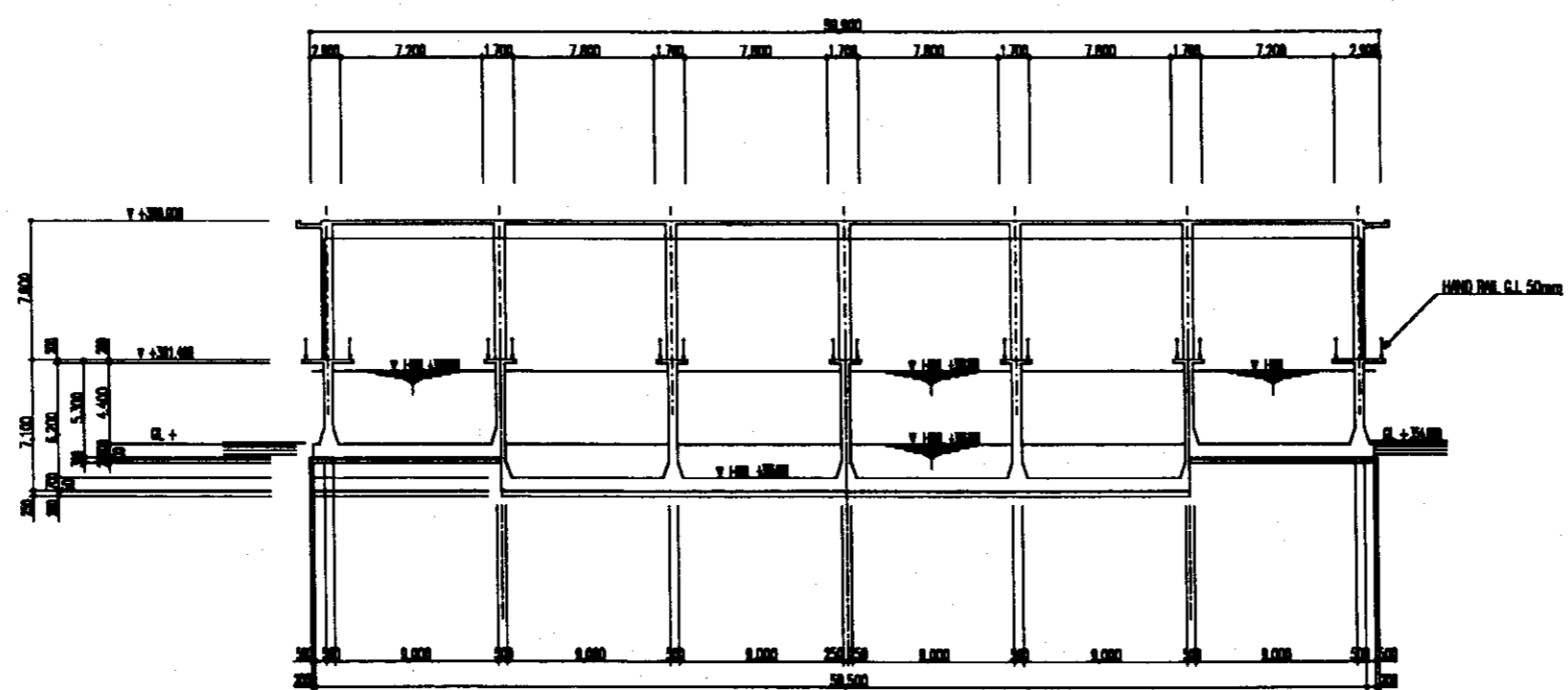


SECTION C-C  
SCALE: 1:200 M

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT FLOCCULATION & SEDIMENTATION BASIN SECTIONS (1/3)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200	A-8	

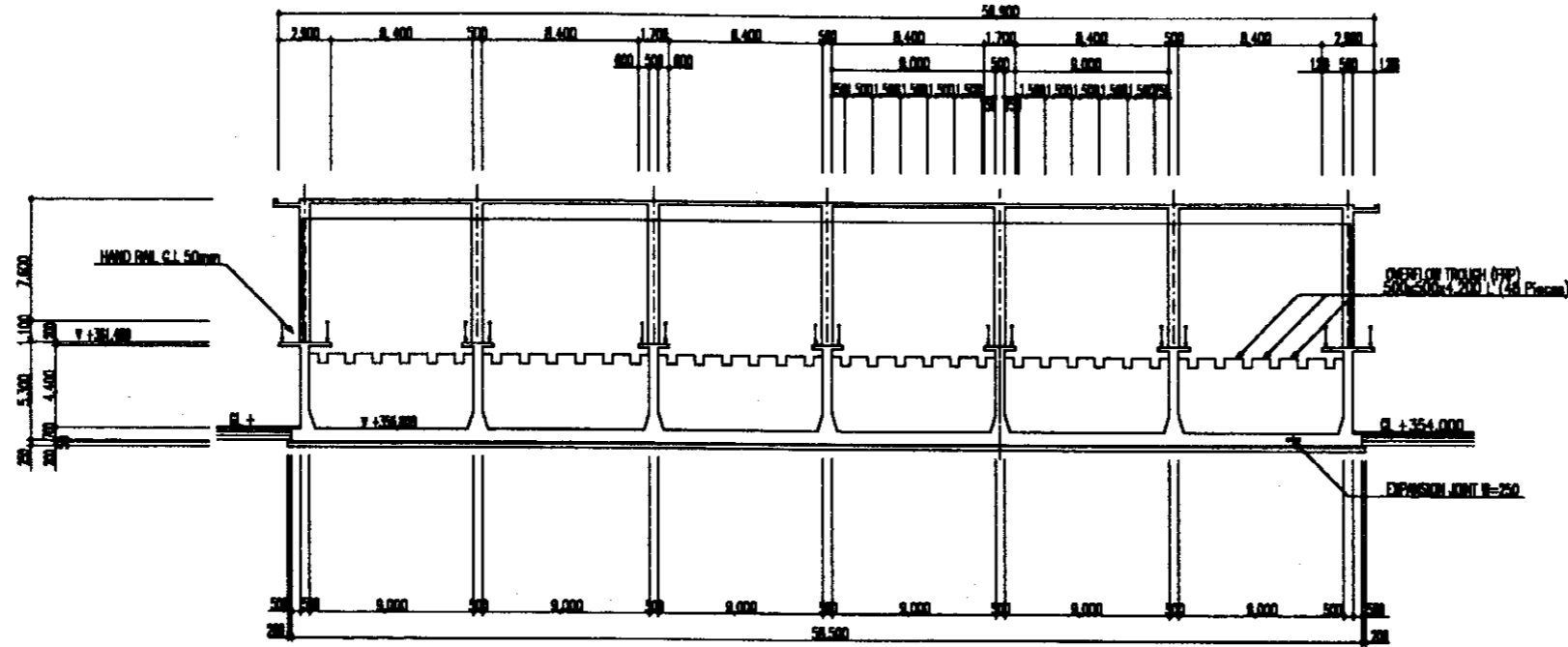


SECTION D-D  
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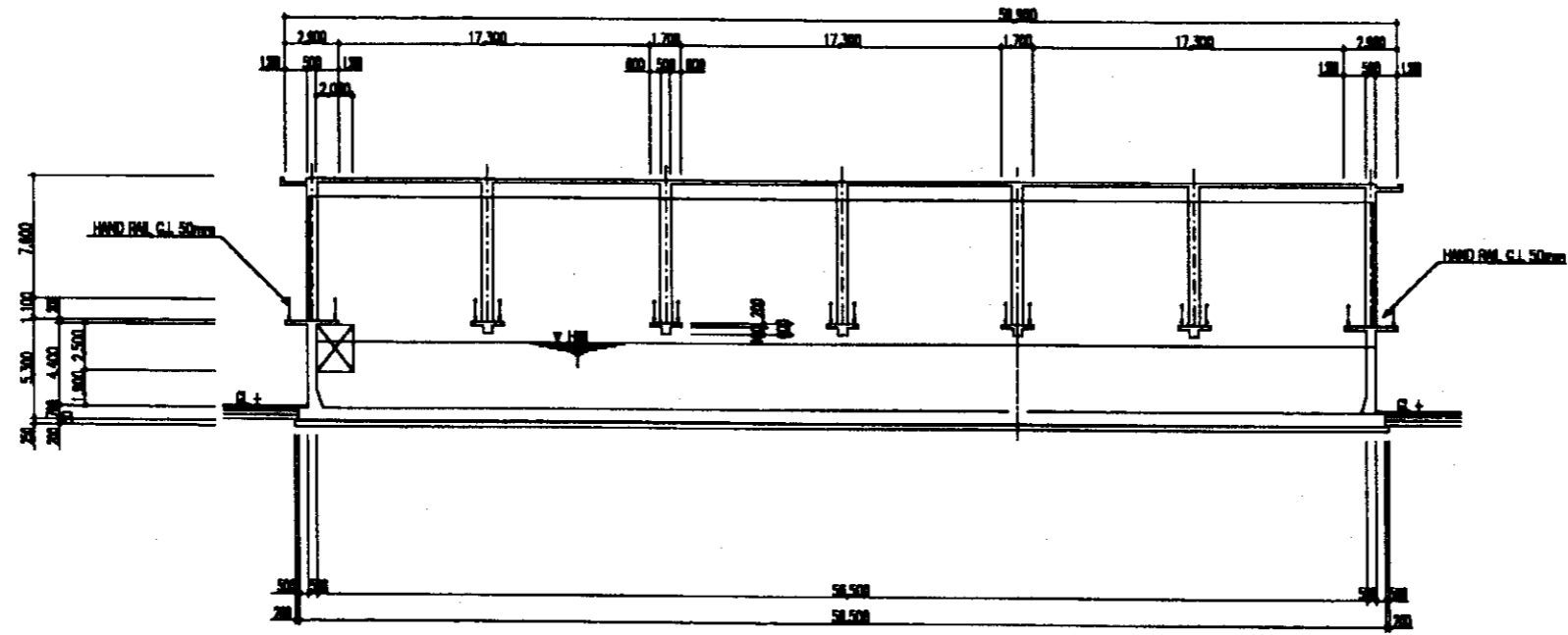


SECTION E-E  
SCALE: 1:200 M

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT FLOCCULATION & SEDIMENTATION BASIN SECTION ( 2/3 )		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200	A-9	

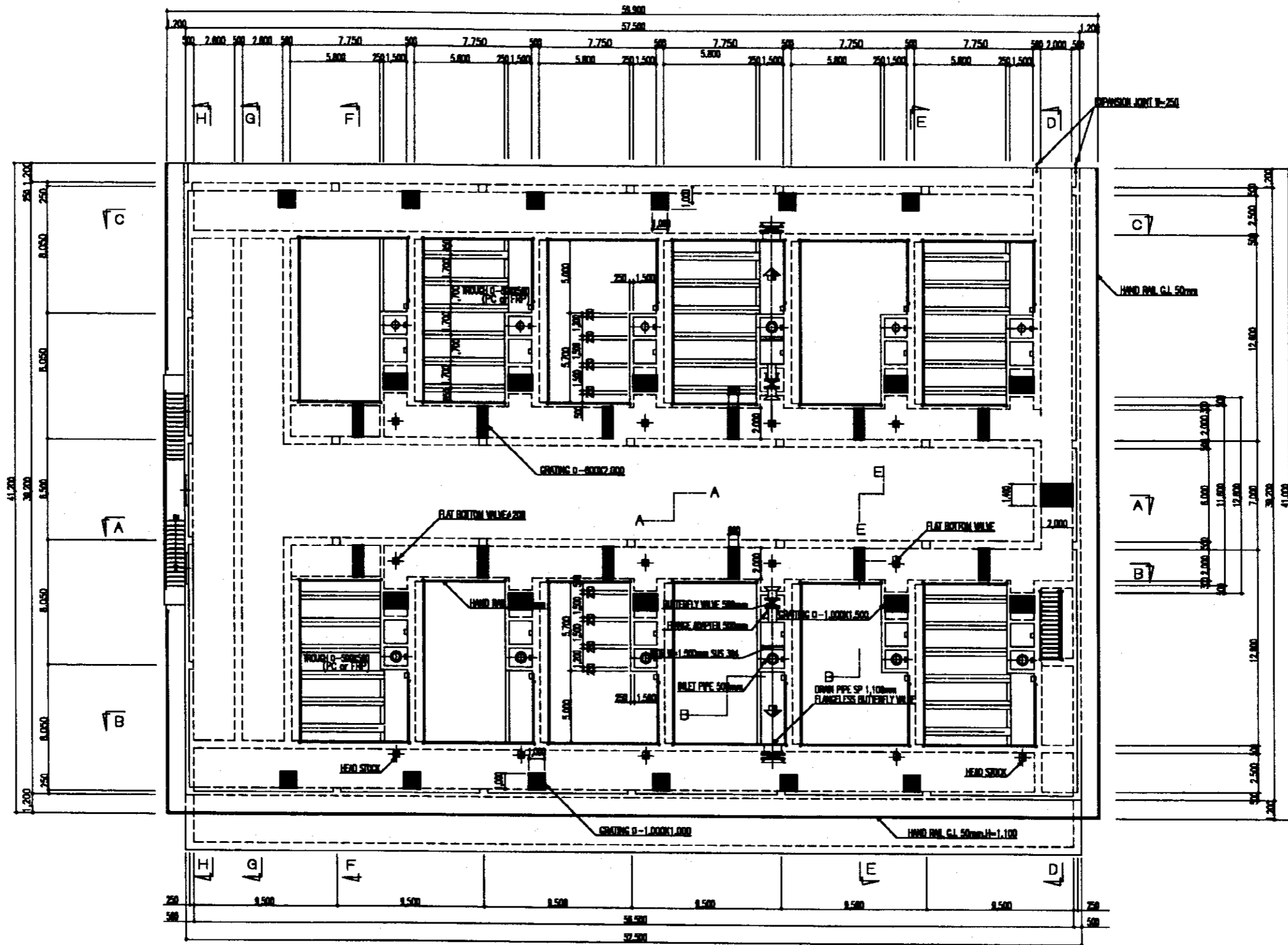


SECTION F-F  
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SECTION G-G  
SCALE: 1:200 M

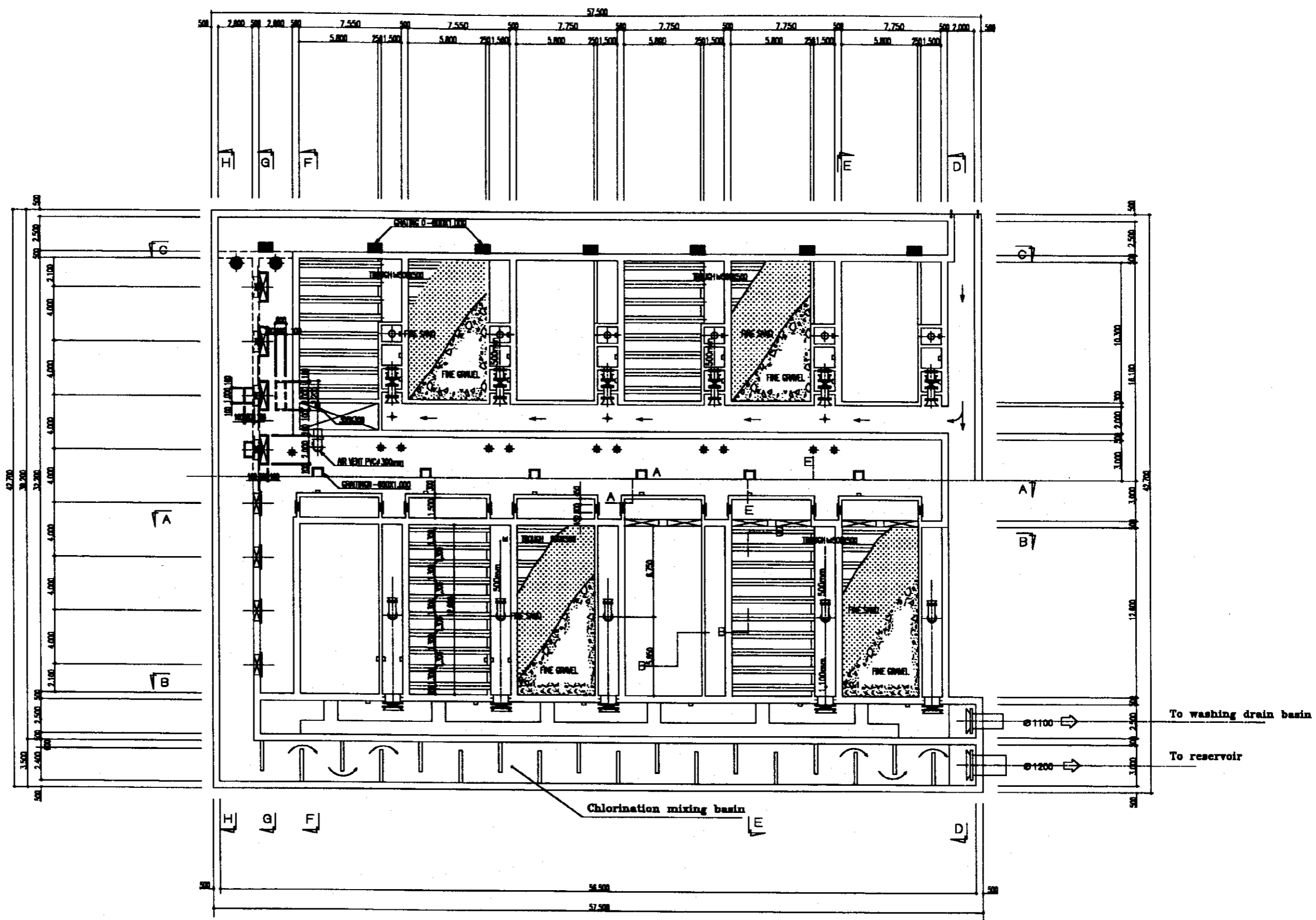
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana	
DRAWING TITLE	WATER TREATMENT PLANT FLOCCULATION & SEDIMENTATION BASIN SECTION ( 3/3 )	
DATE	SCALE	SHEET NO.
MARCH 2001	1/200	A-10



**TOP PLAN**  
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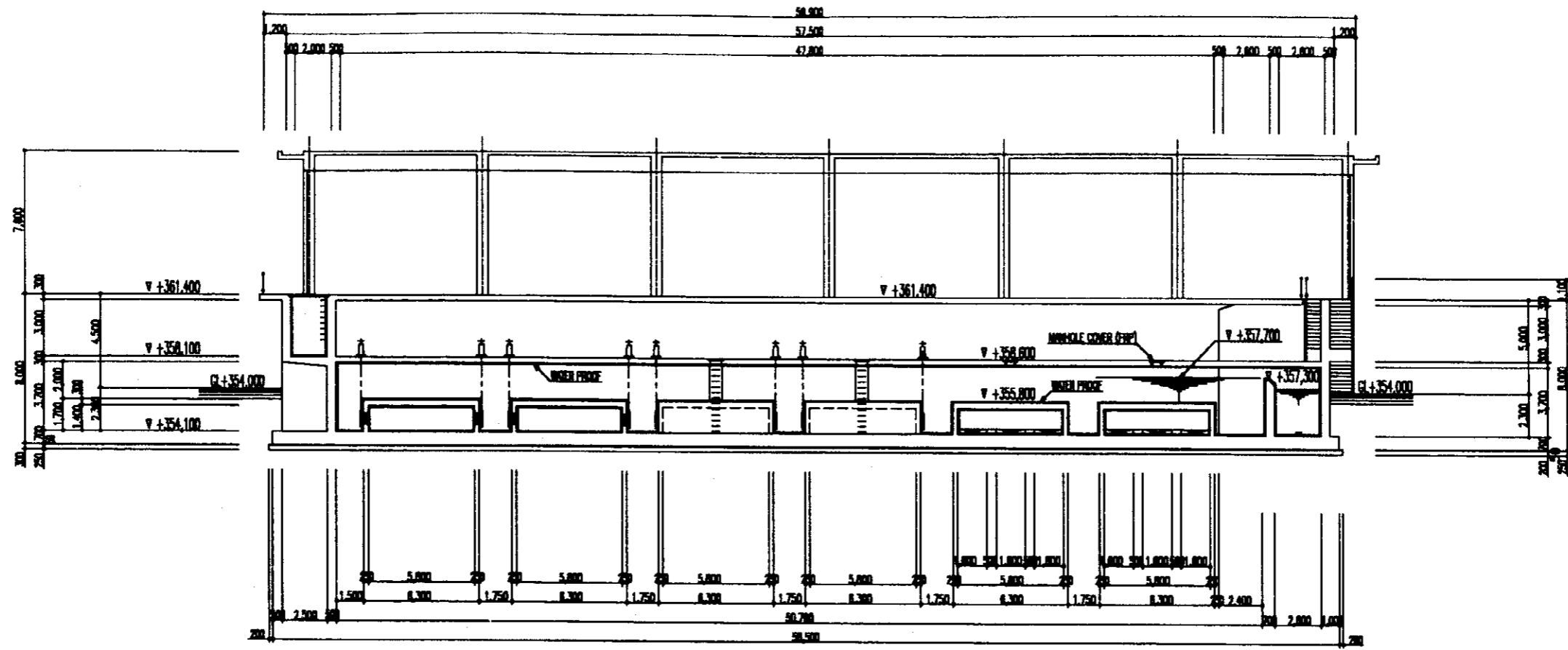
<b>PROJECT</b>	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
<b>DRAWING TITLE</b>	WATER TREATMENT PLANT RAPID SAND FILTER TOP PLAN		
<b>DATE</b>	<b>SCALE</b>	<b>SHEET NO.</b>	
MARCH 2001	1/150	<b>A-11</b>	





**BOTTOM PLAN**  
 SCALE: 1:150 M

<b>PROJECT</b>	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
<b>DRAWING TITLE</b>	WATER TREATMENT PLANT RAPID SAND FILTER BOTTOM PLAN		
<b>DATE</b>	<b>SCALE</b>	<b>SHEET NO.</b>	
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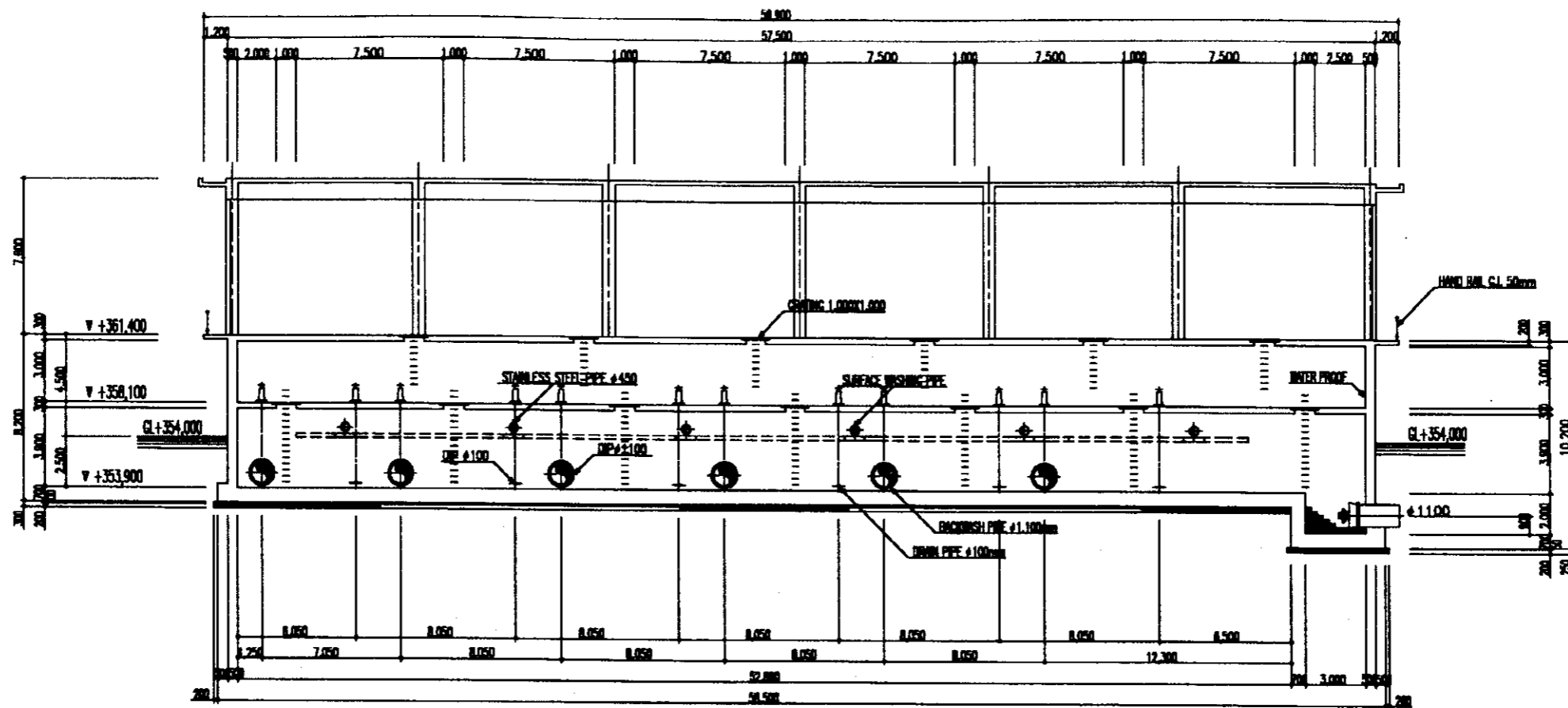


SECTION A-A  
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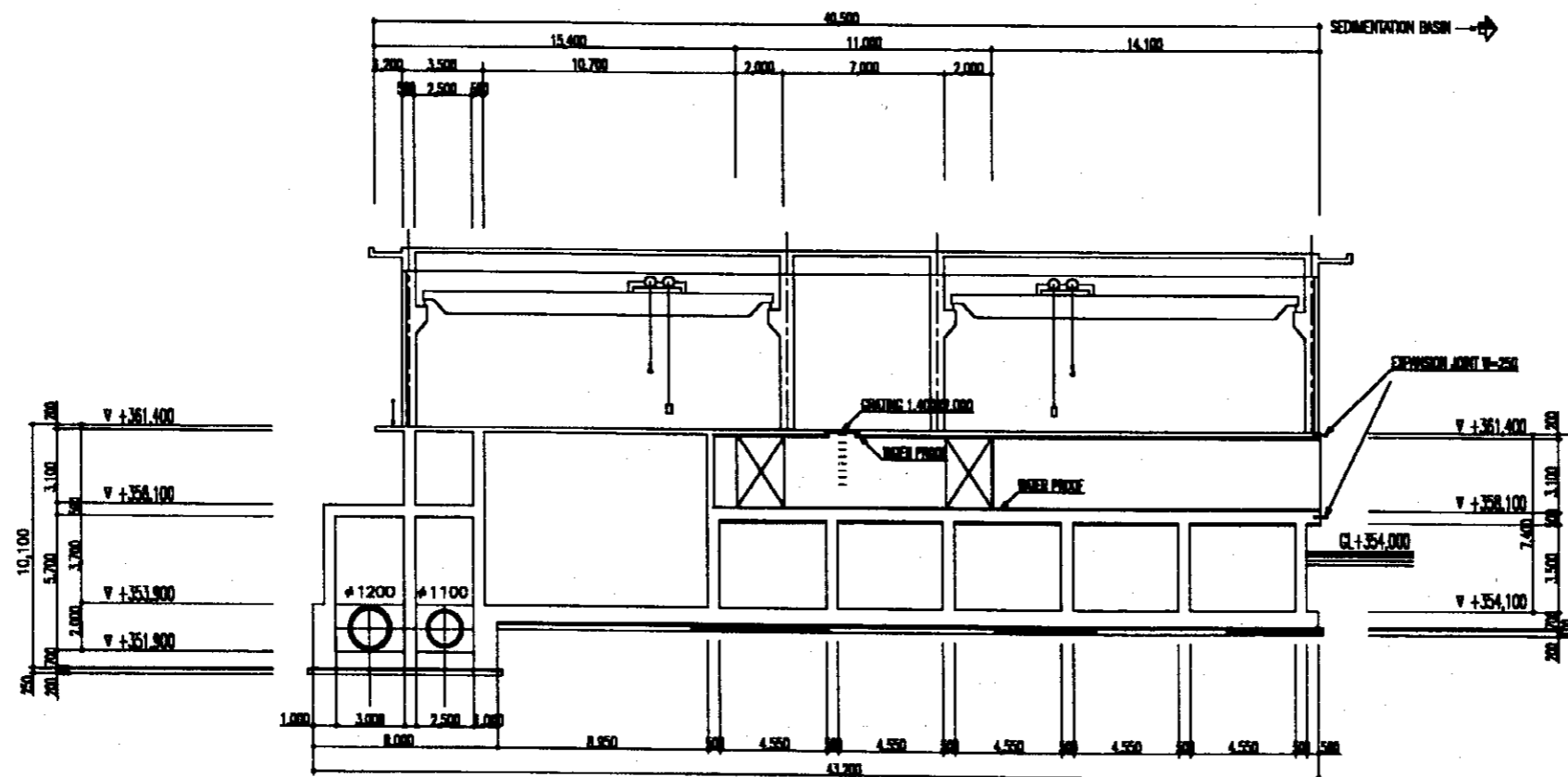


SECTION B-B  
SCALE: 1:150 M

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
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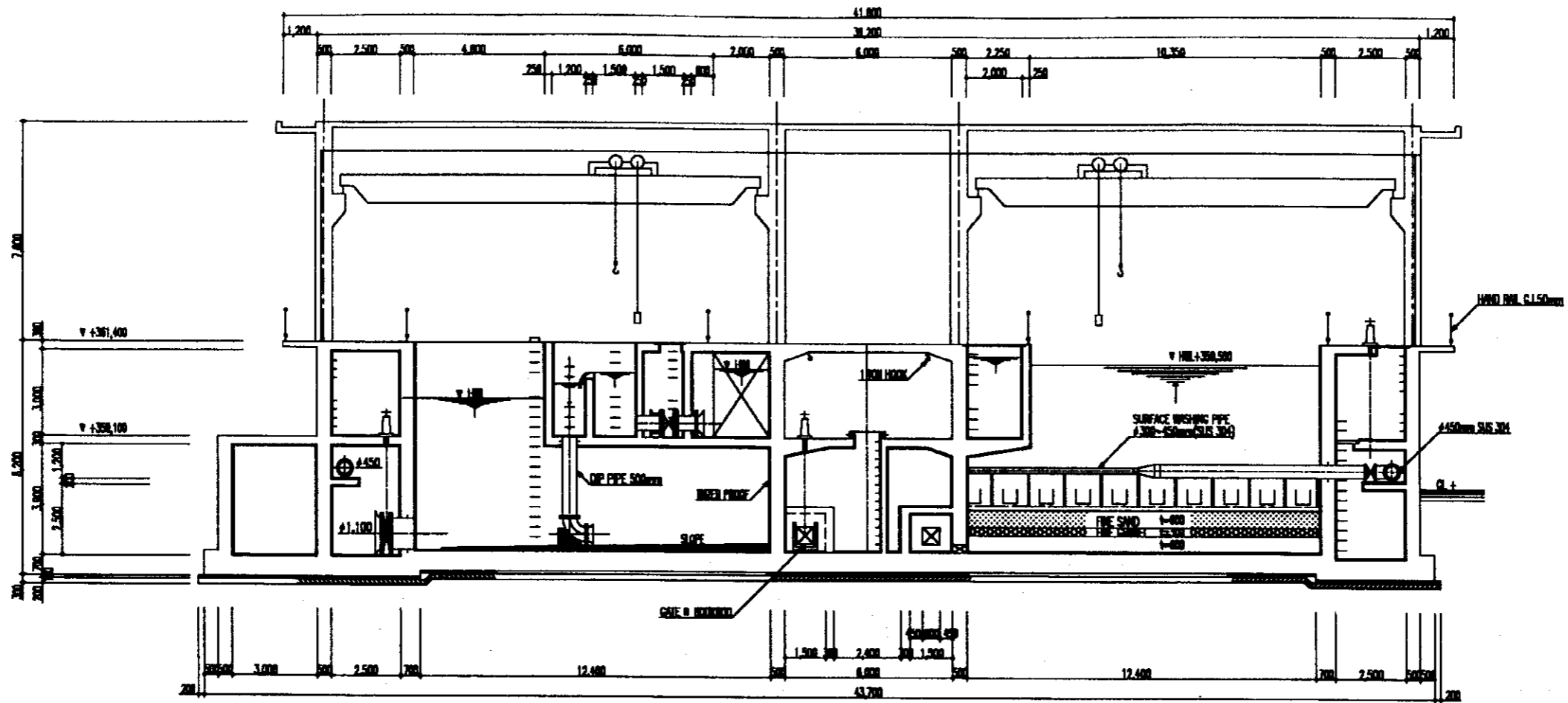


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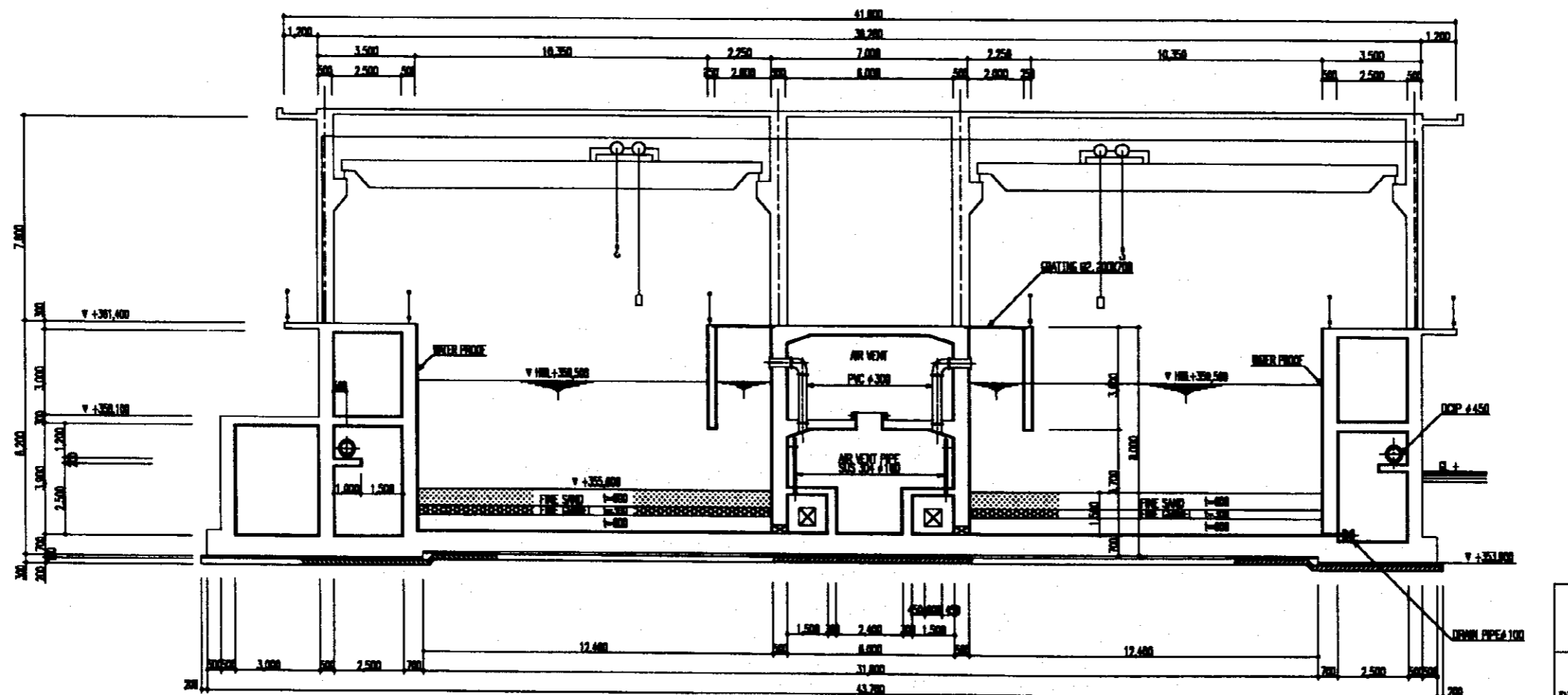


SECTION D-D  
SCALE: 1:150 M

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
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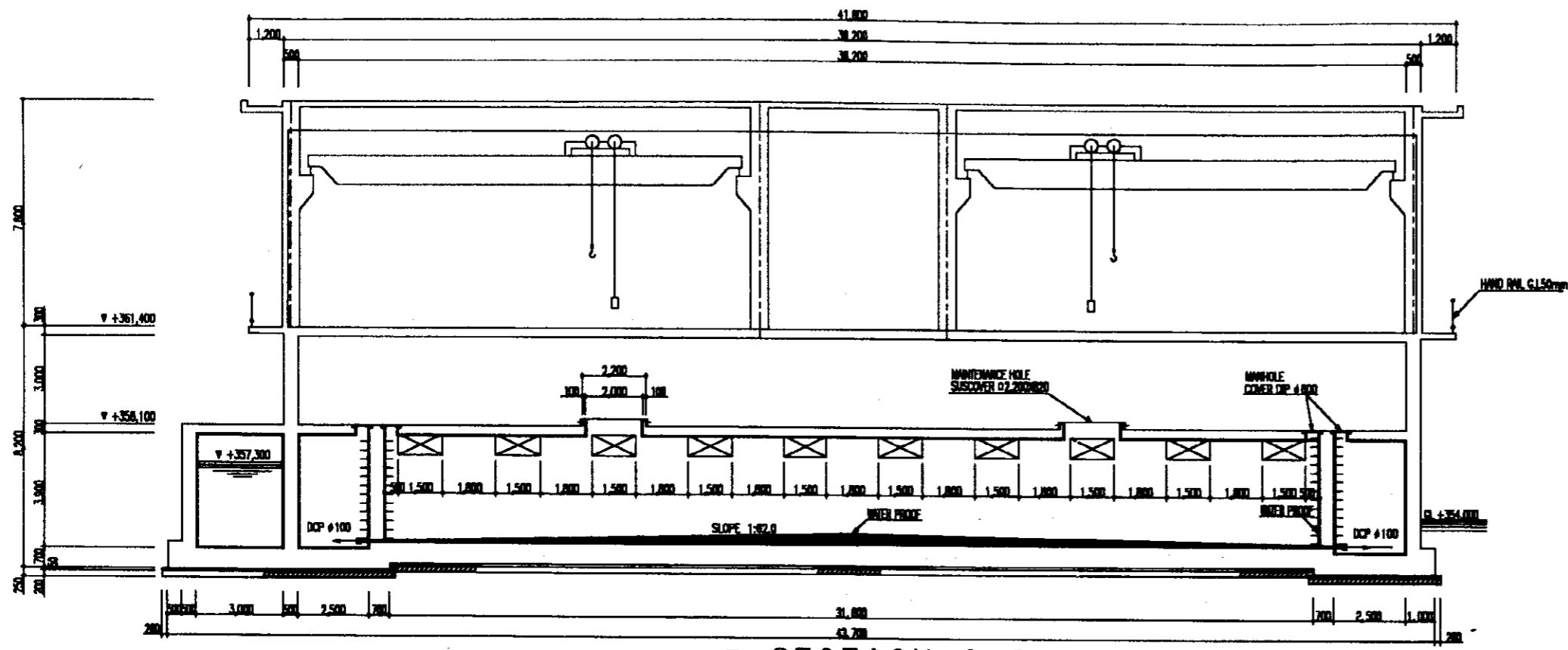


SECTION E-E  
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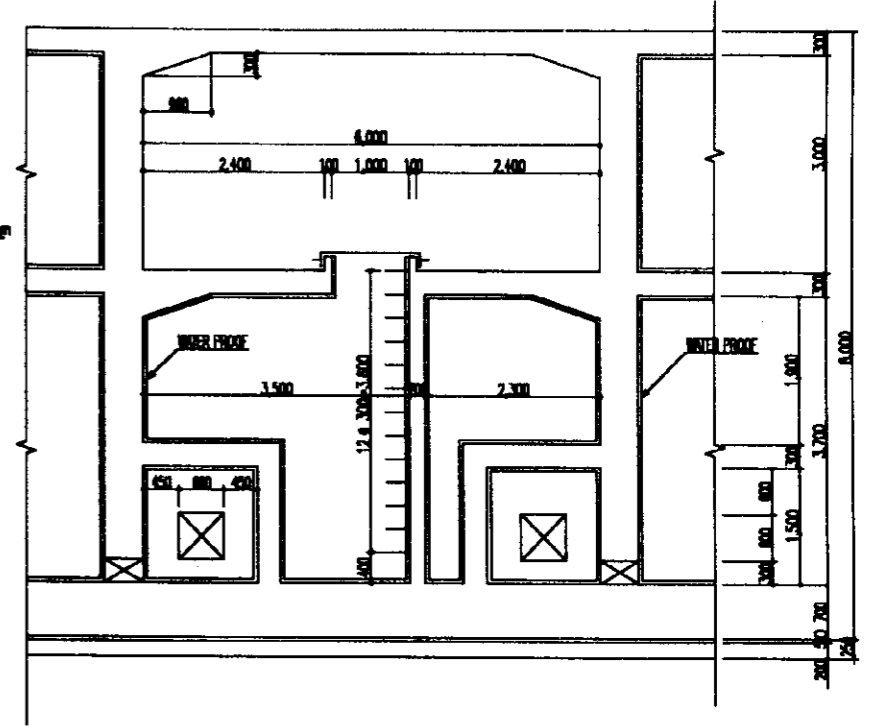


SECTION F-F  
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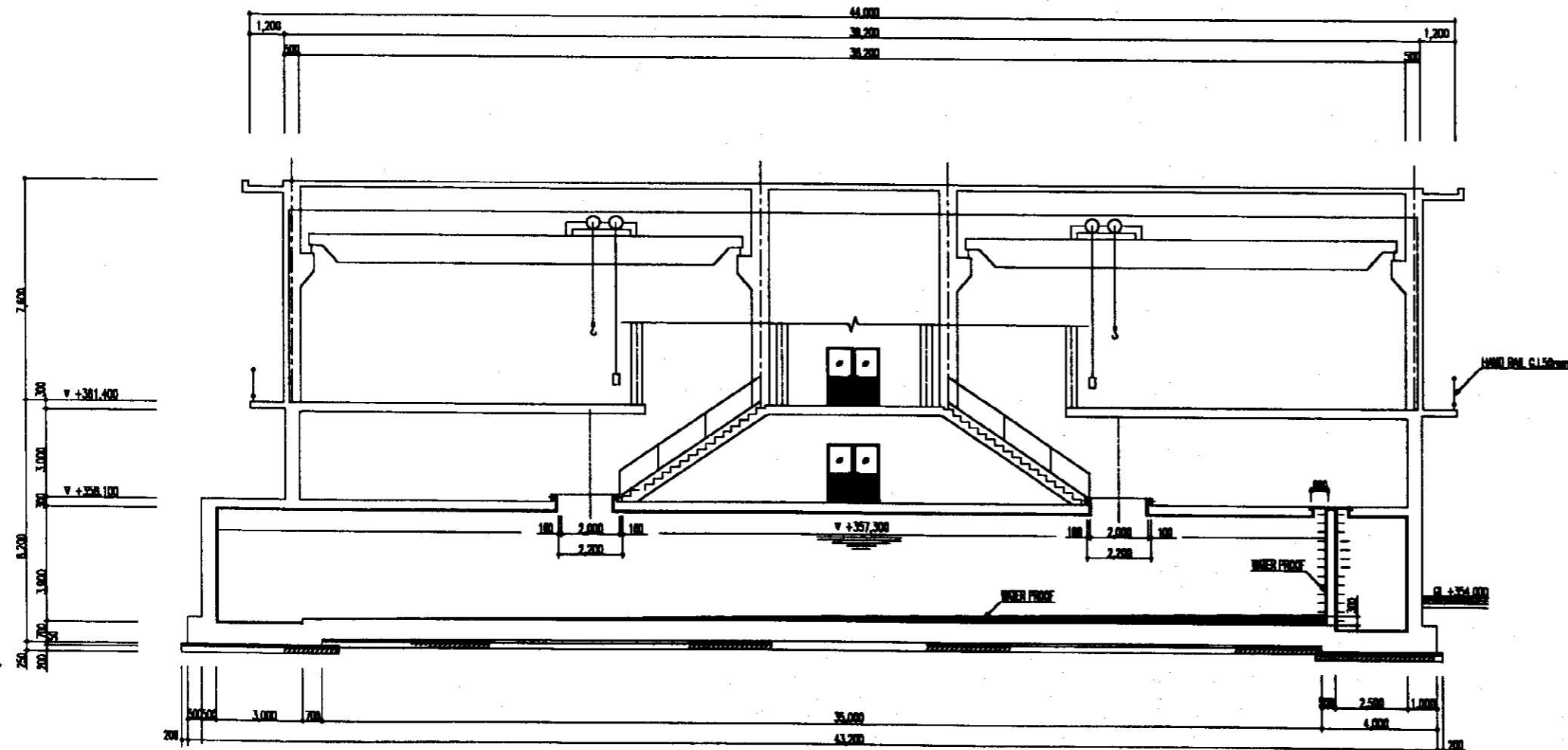
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLAN RAPID SAND FILTER SECTION (3/4)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/100	A-15	



SECTION G-G  
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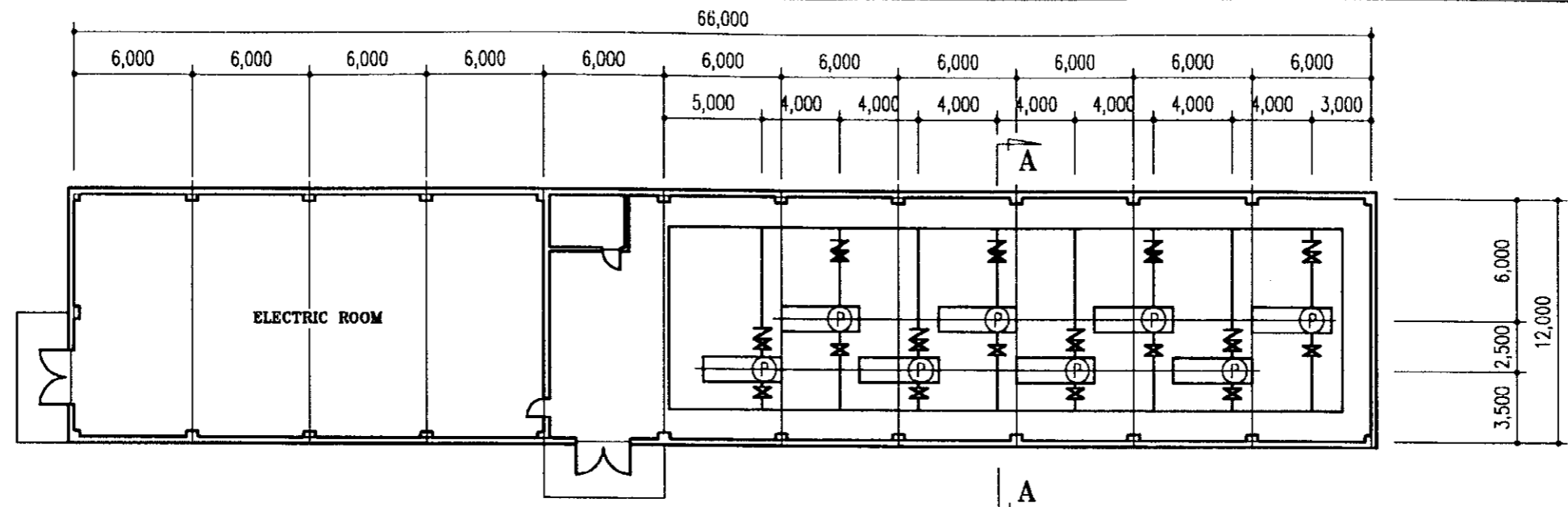


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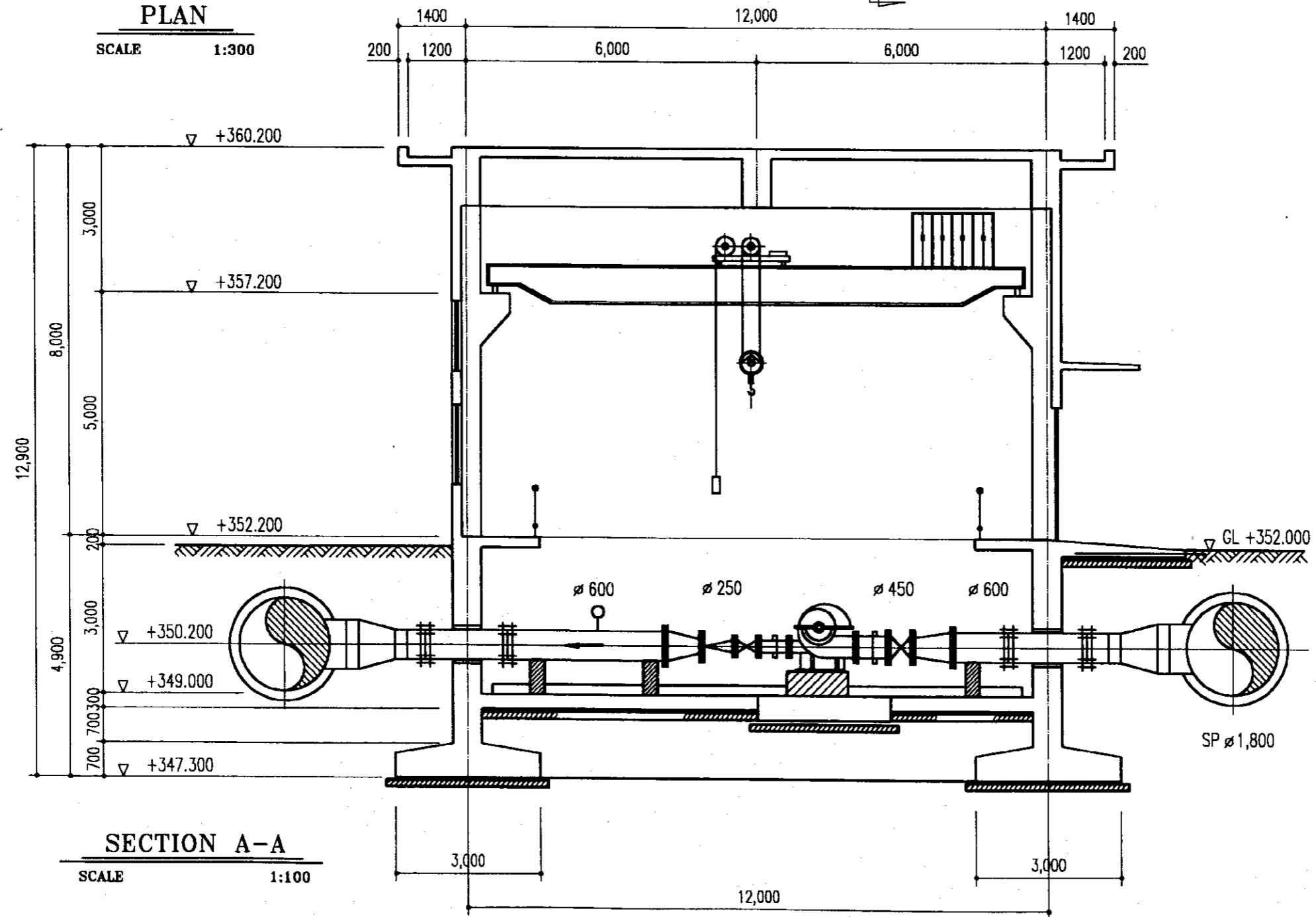


SECTION H-H  
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PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana	
DRAWING TITLE	WATER TREATMENT PLANT RAPID SAND FILTER SECTIONS (4/4)	
DATE	SCALE	SHEET NO.
MARCH 2001	1/100, 1/50	A-16

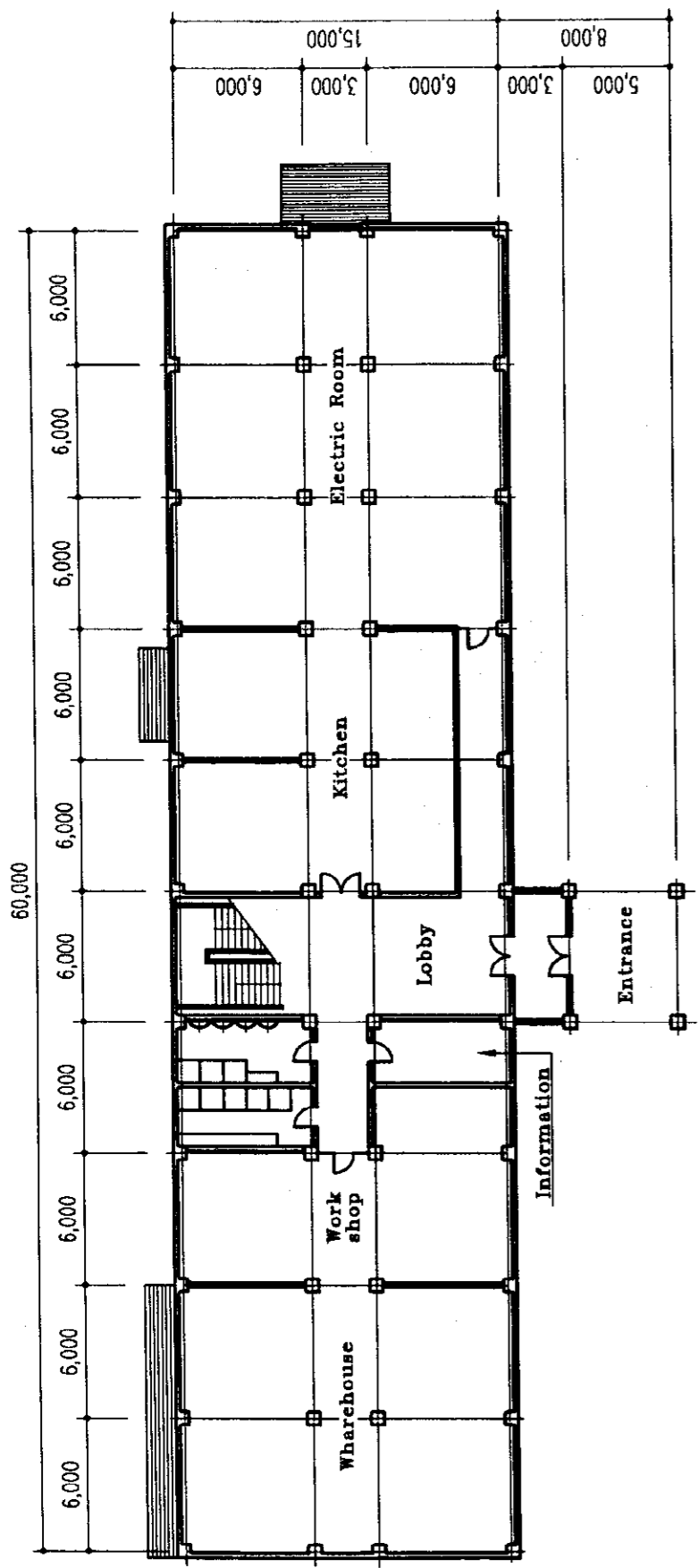


**PLAN**  
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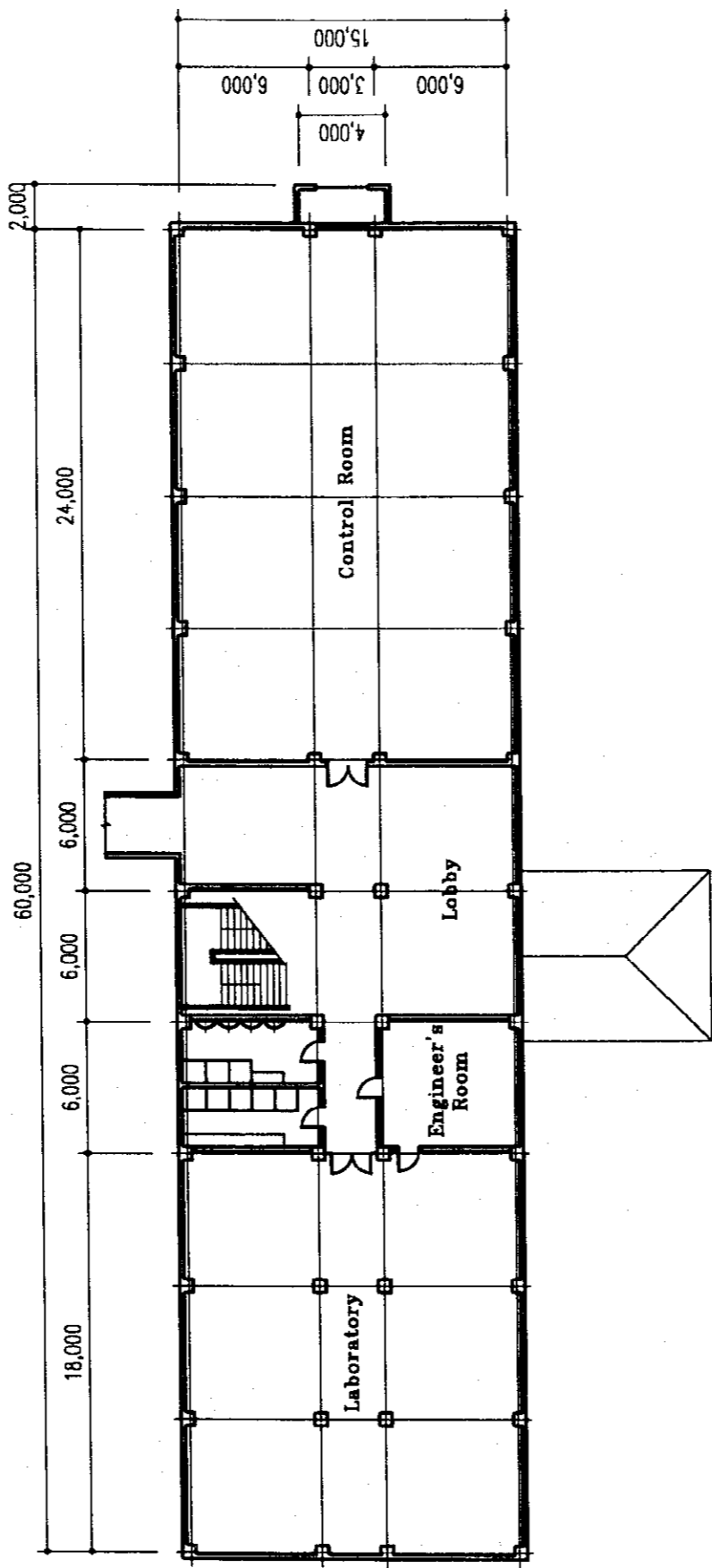


**SECTION A-A**  
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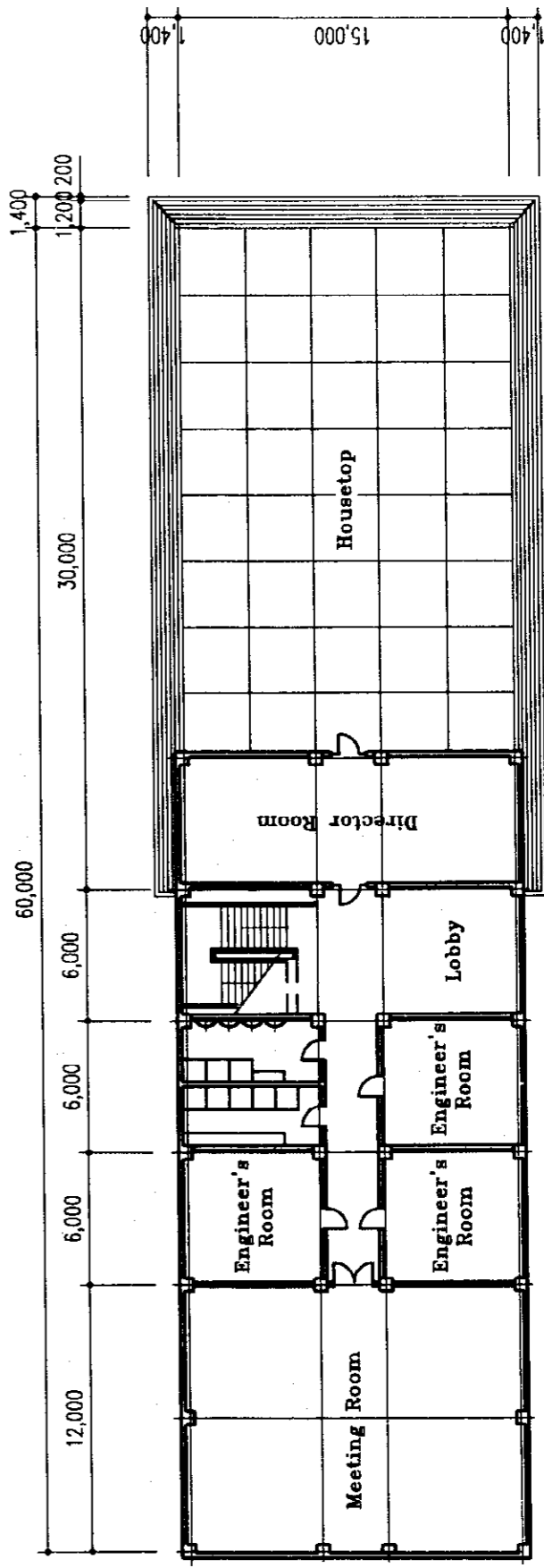
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT DISTRIBUTION PUMPING STATION BUILDING PLAN		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/300 1/100	A-17	



PLAN of 1st FLOOR

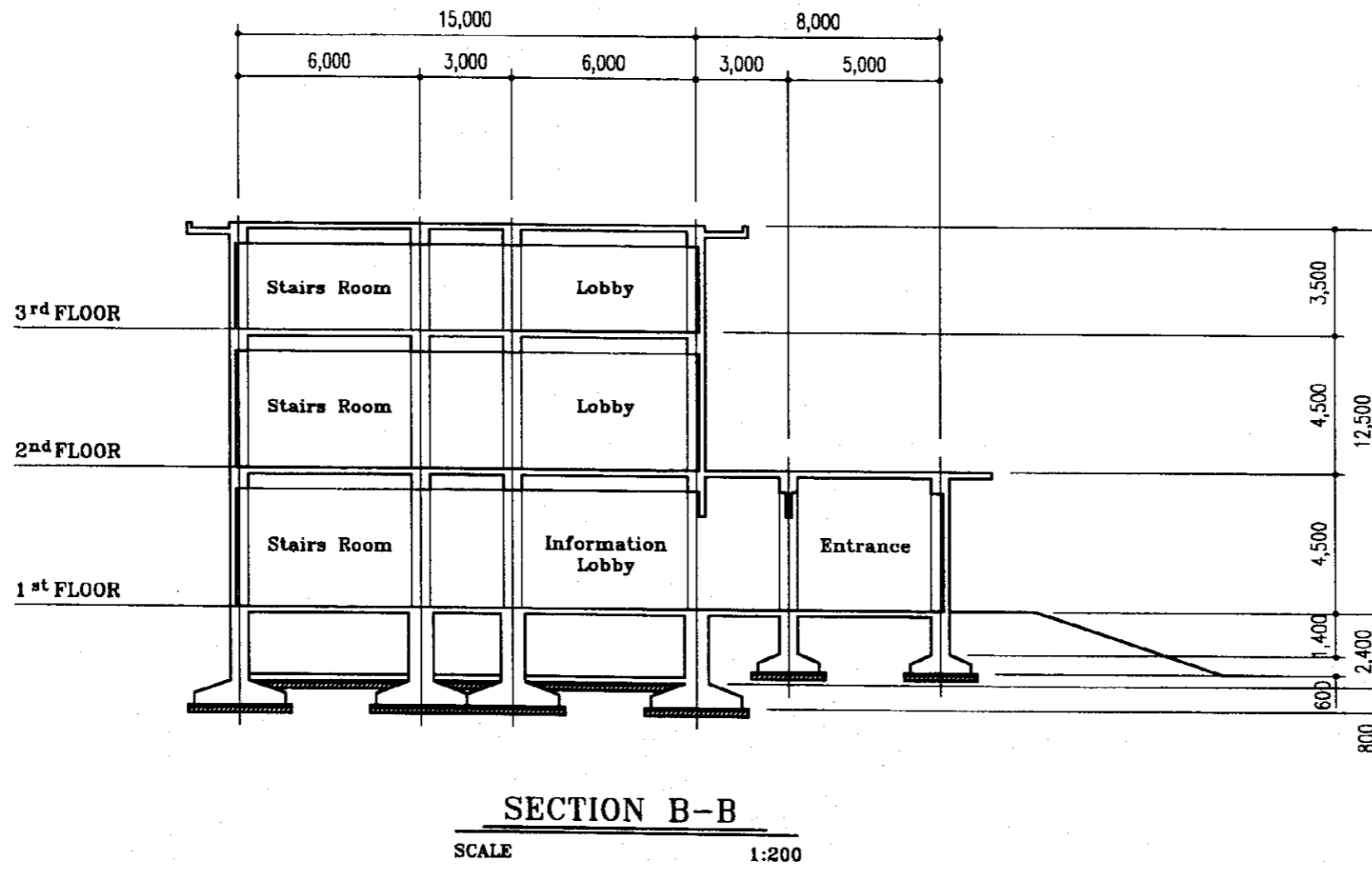
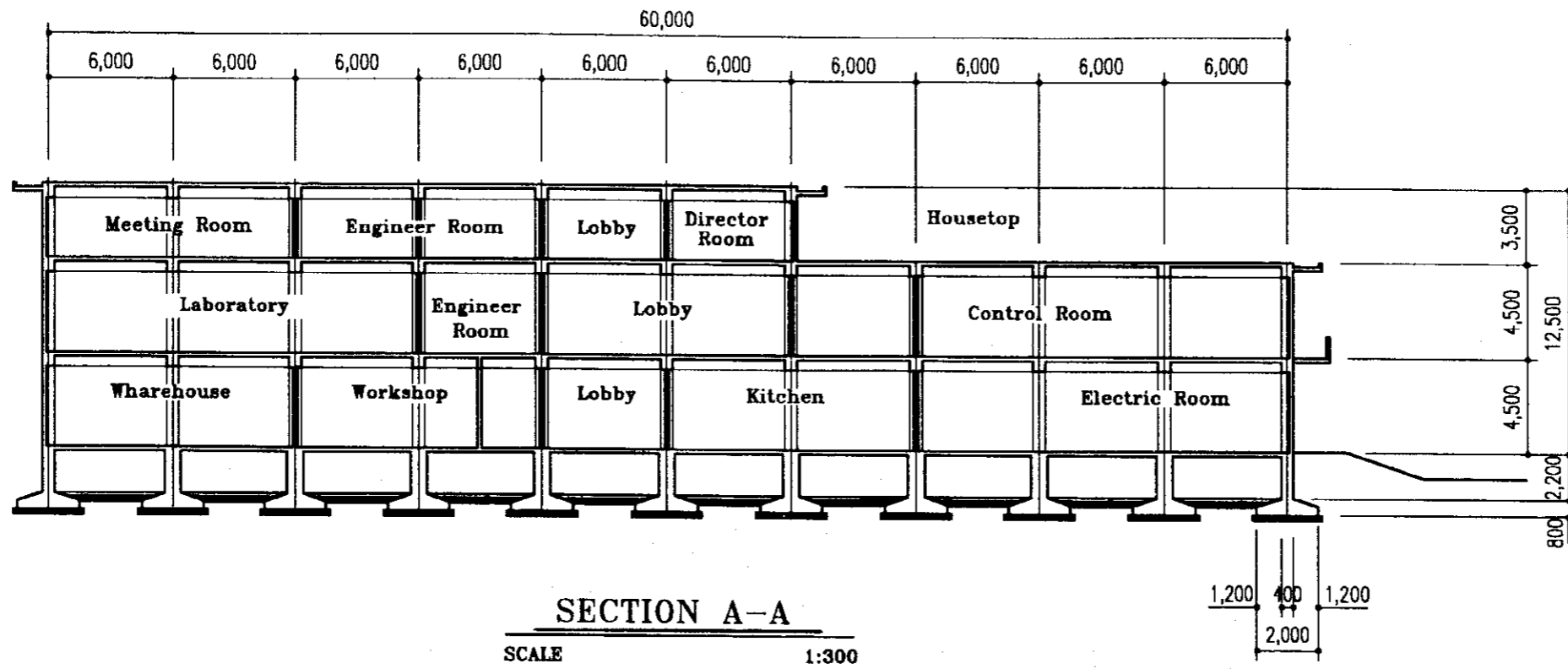


PLAN of 2nd FLOOR



PLAN of 3rd FLOOR

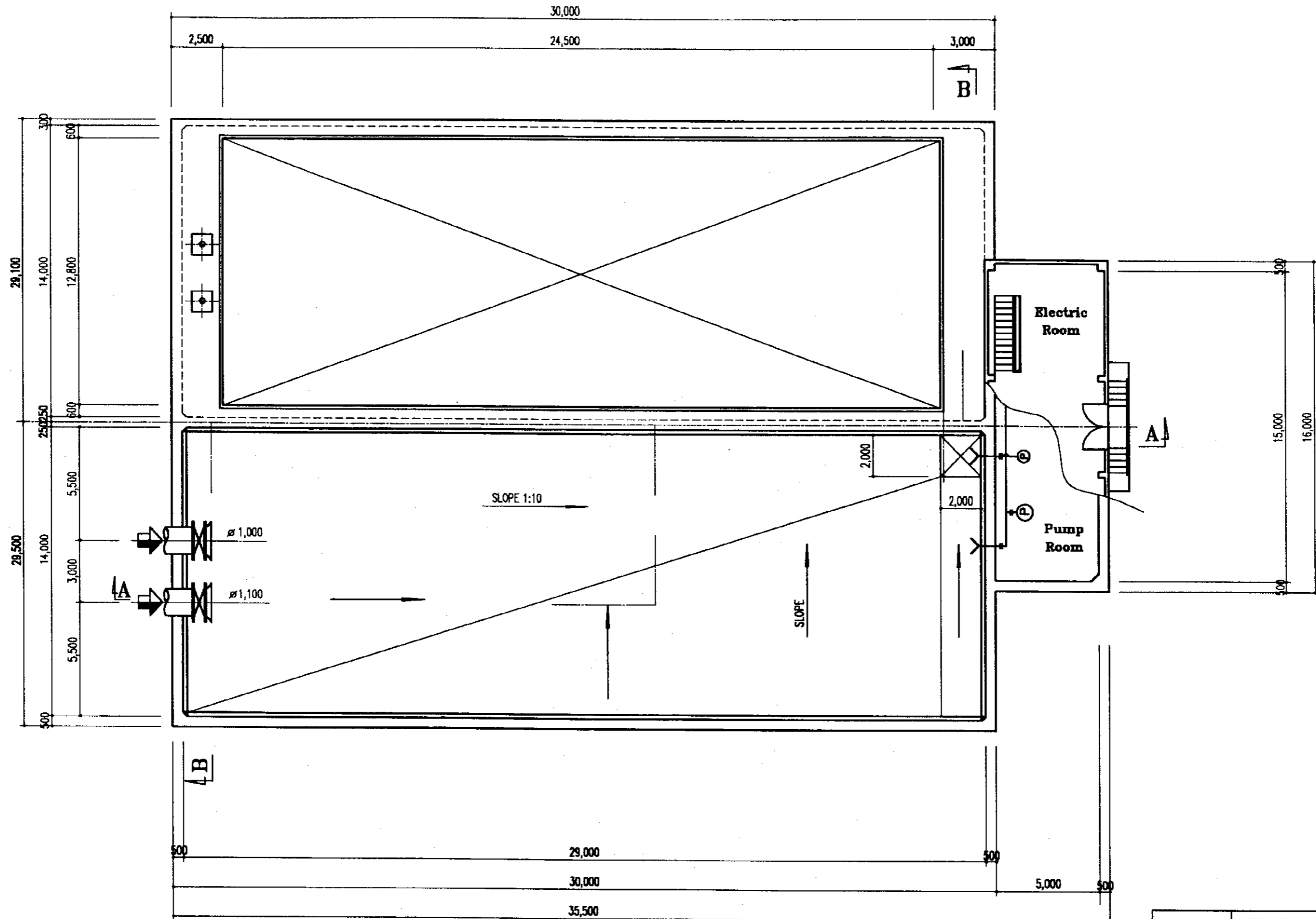
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT ADMINISTRATION BUILDING PLAN		
DATE	MARCH 2001	SCALE	1/300
		SHEET NO.	A-18



PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana	
DRAWING TITLE	WATER TREATMENT PLANT ADMINISTRATION BUILDING SECTIONS	
DATE	SCALE	SHEET NO.
MARCH 2001	1/300 1/200	A-19

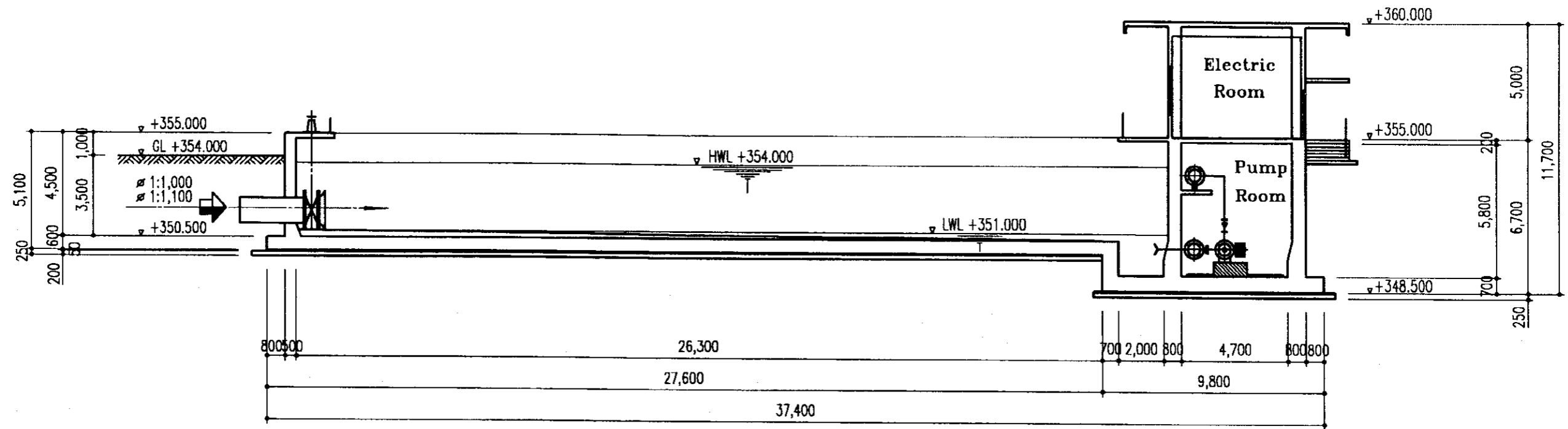


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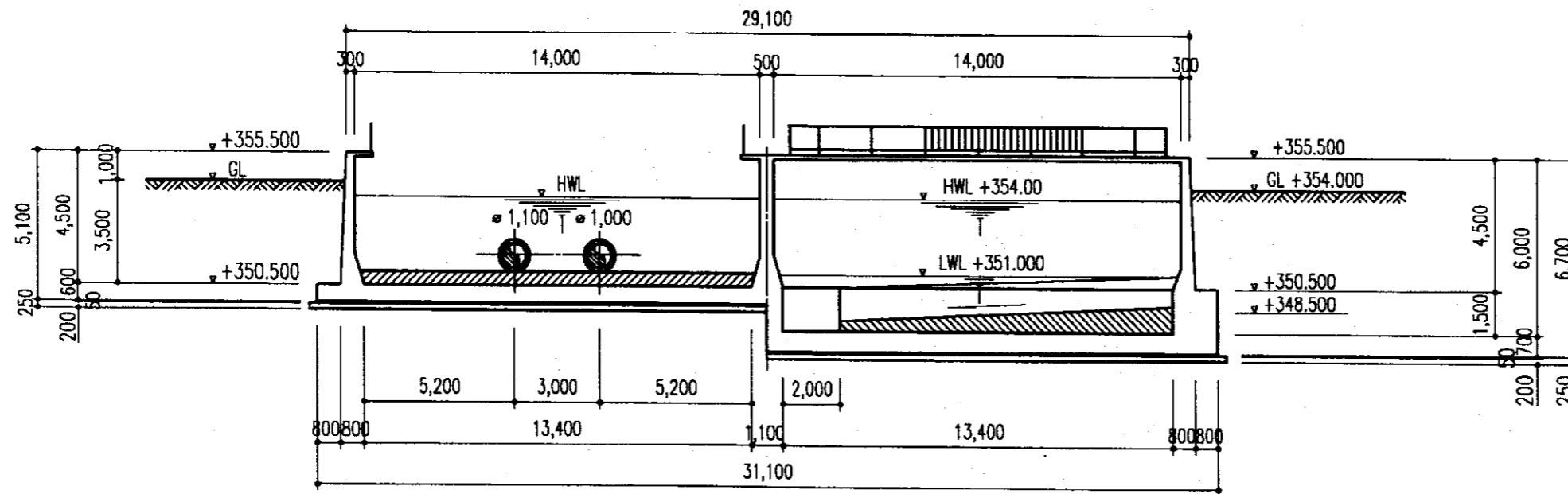


BOTTOM PLAN

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT BACK-WASH DRAINAGE BASIN PLAN		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200	A-20	

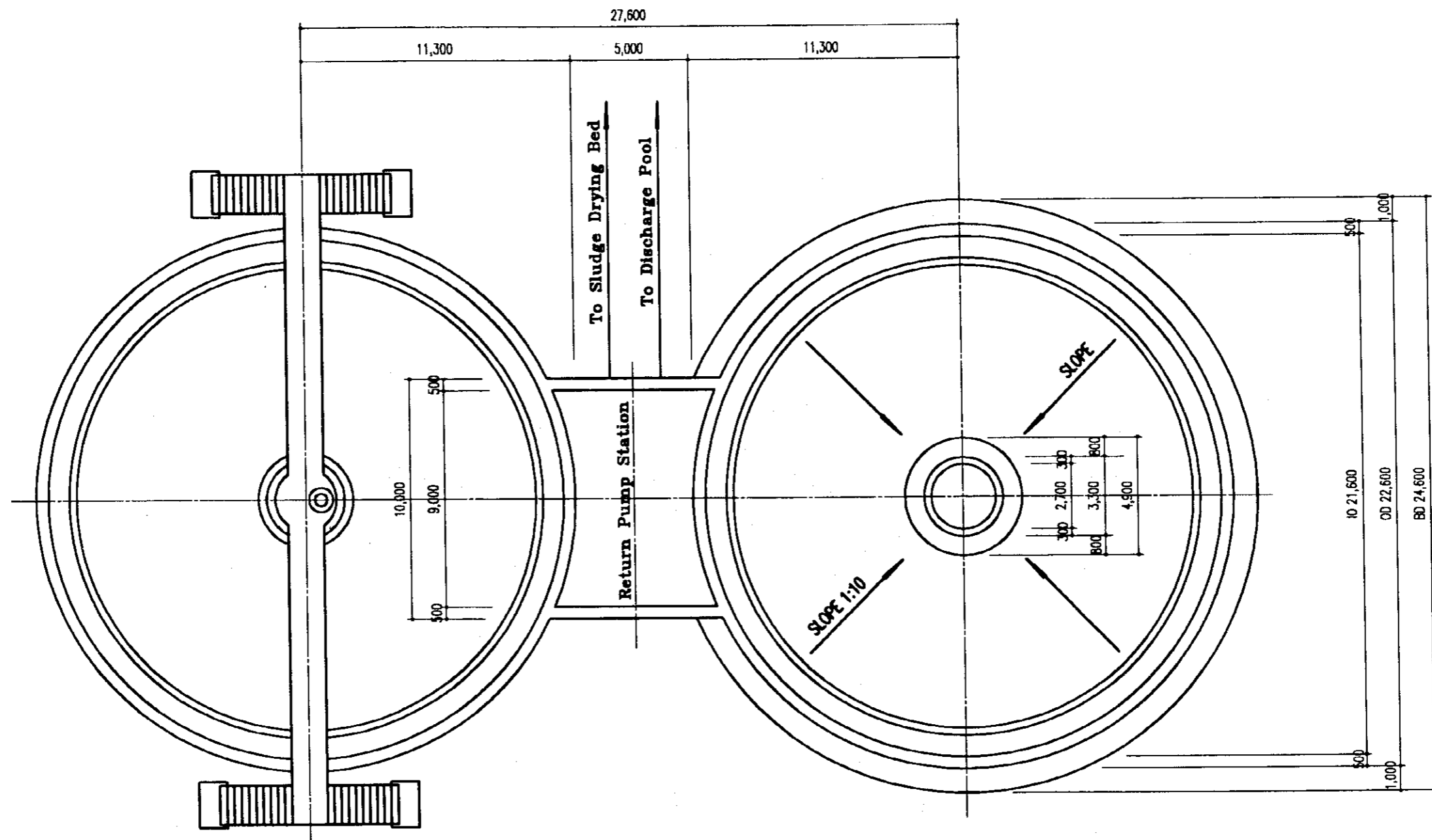


**SECTION A-A**



**SECTION B-B**

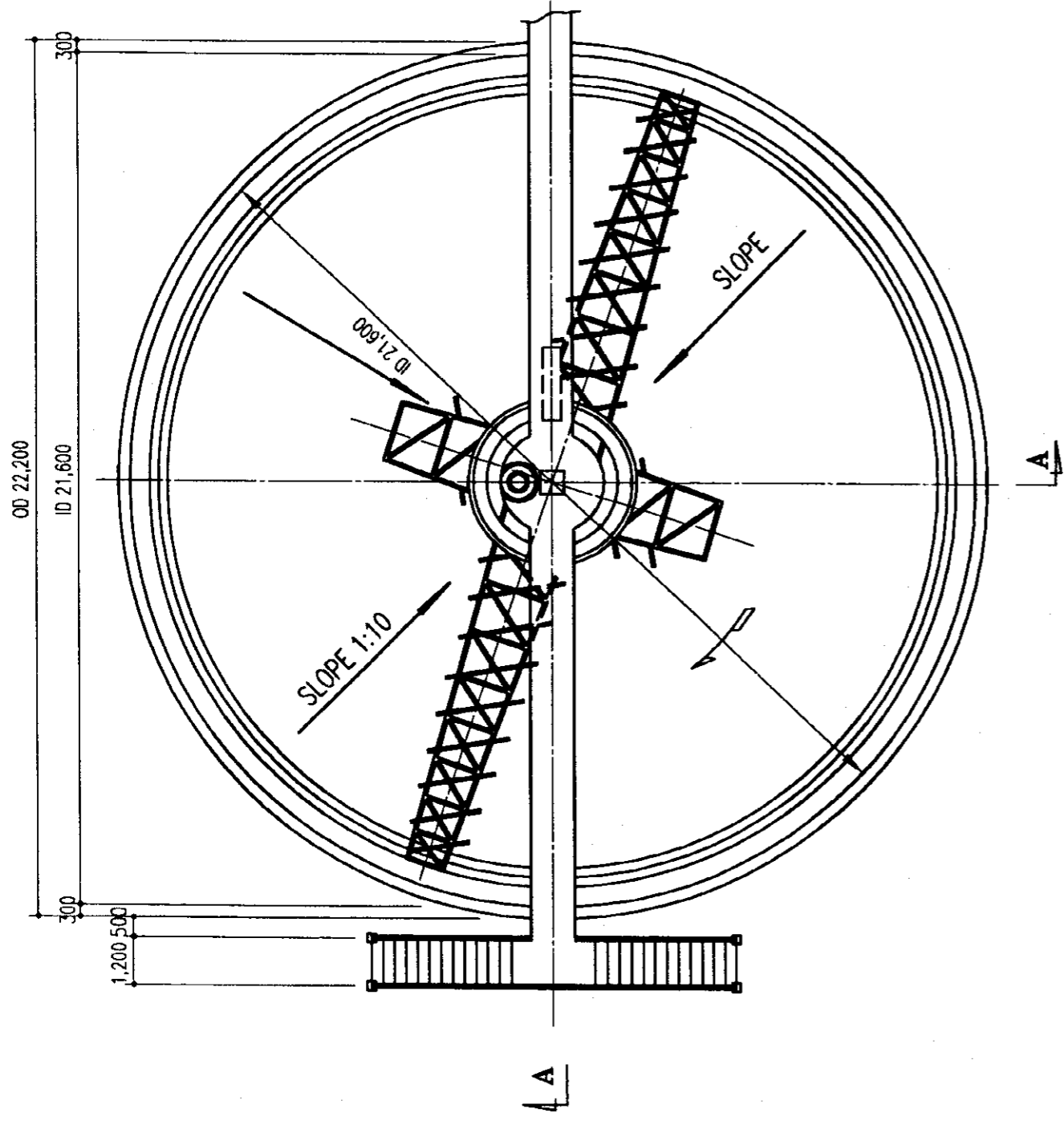
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
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DATE	SCALE	SHEET NO.	
MARCH 2001	1/200	A-21	



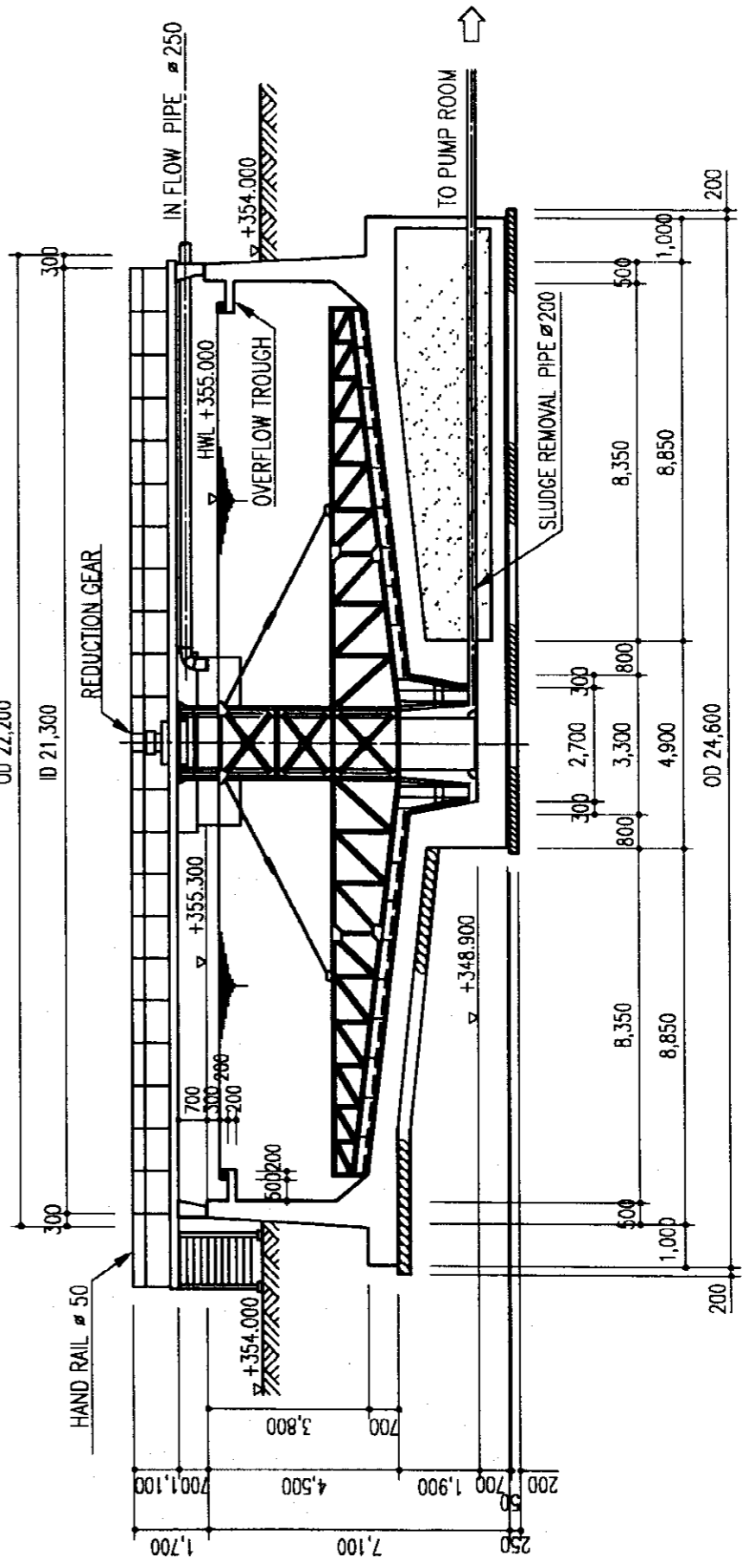
TOP PLAN

BOTTOM PLAN

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT THICKENER TANK PLAN		
DATE	SCALE	SHEET NO.	
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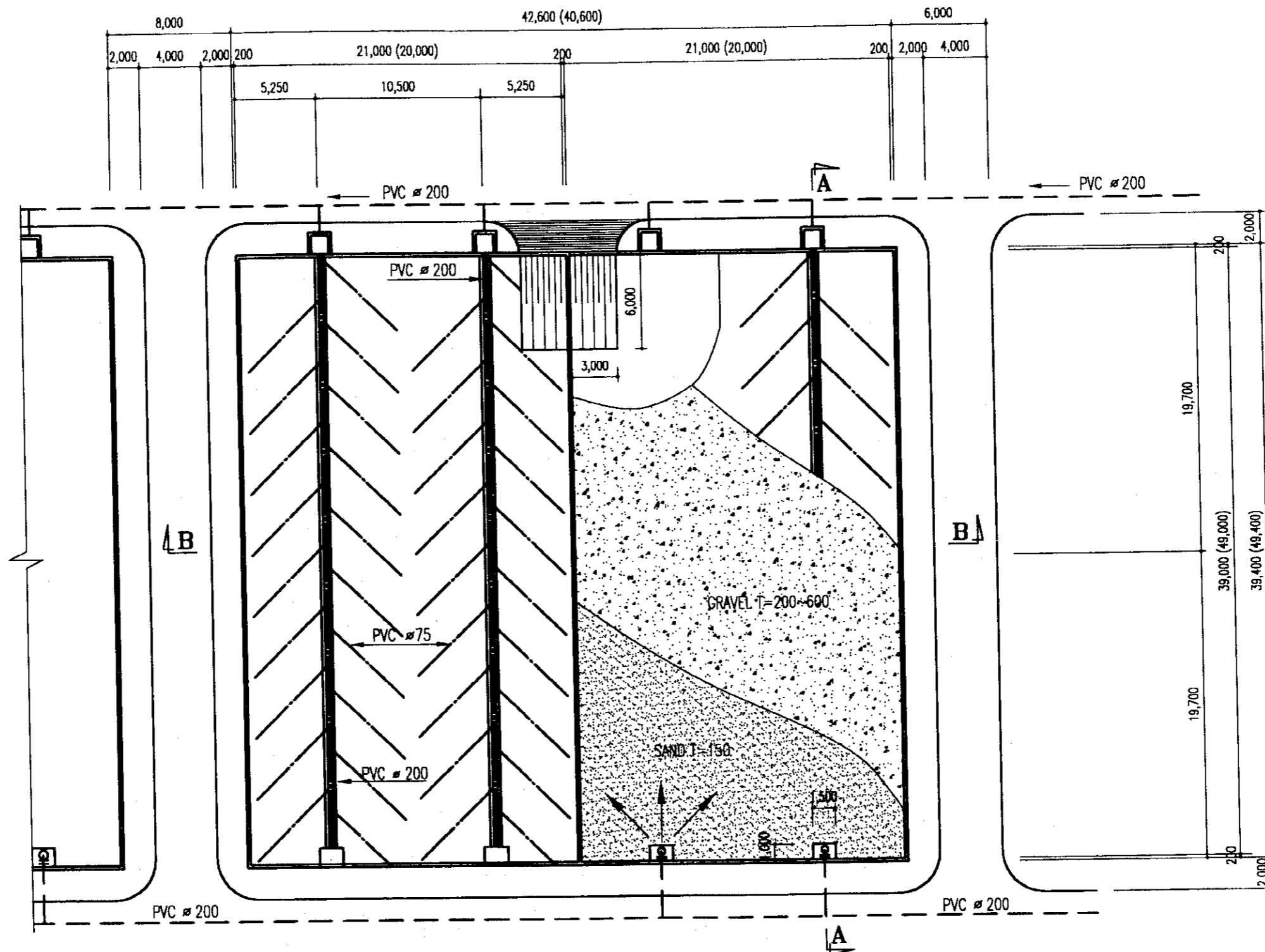


TOP PLAN



SECTION A-A

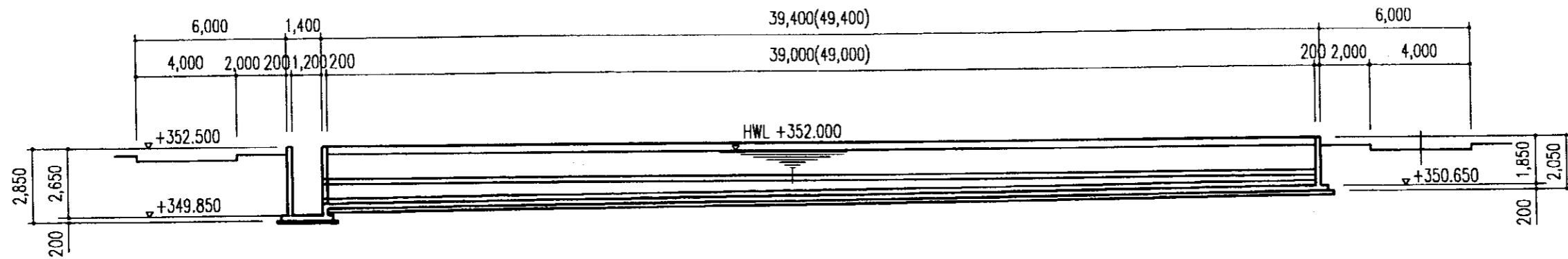
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana
DRAWING TITLE	WATER TREATMENT PLANT THICKENER PLAN, SECTIONS
DATE	MARCH 2001
SCALE	1/150
SHEET NO.	A-23



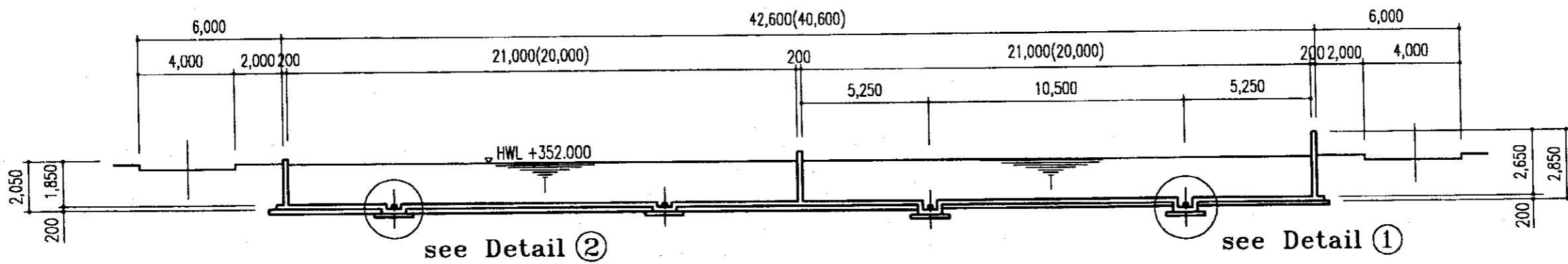
### SLUDGE DRYING BED

Legend  
 39m x 21m x 4 units  
 49m x 20m x 5 units

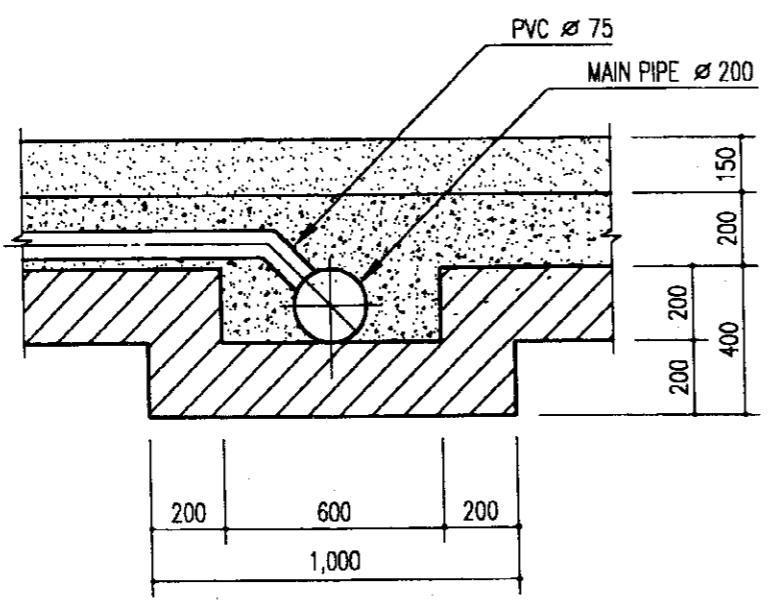
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT SLUDGE DRYING BED PLAN		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/150	A-24	



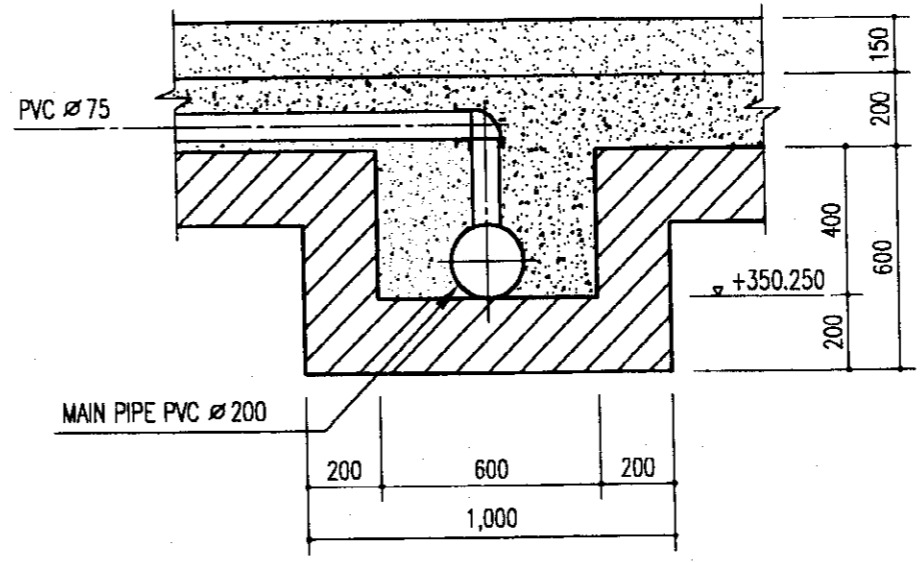
**SECTION A-A**



**SECTION B-B**

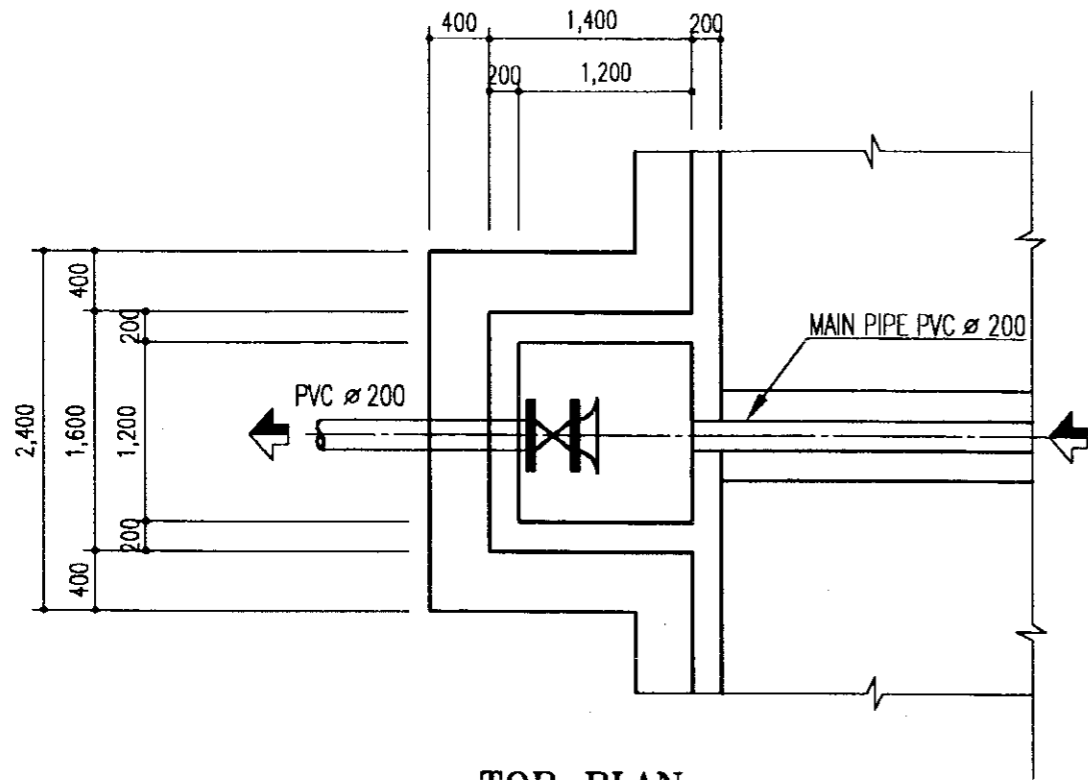


**DETAIL ②**

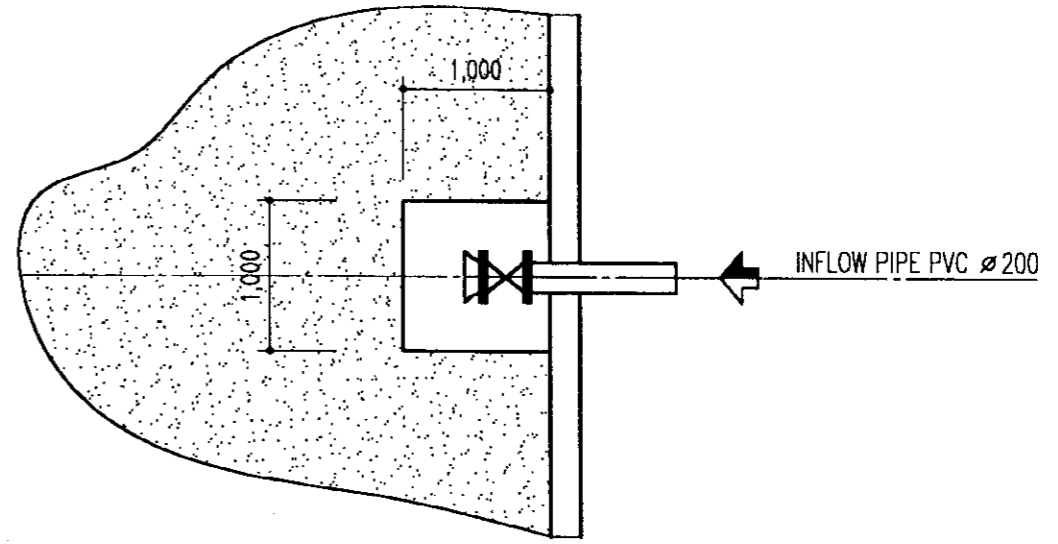


**DETAIL ①**

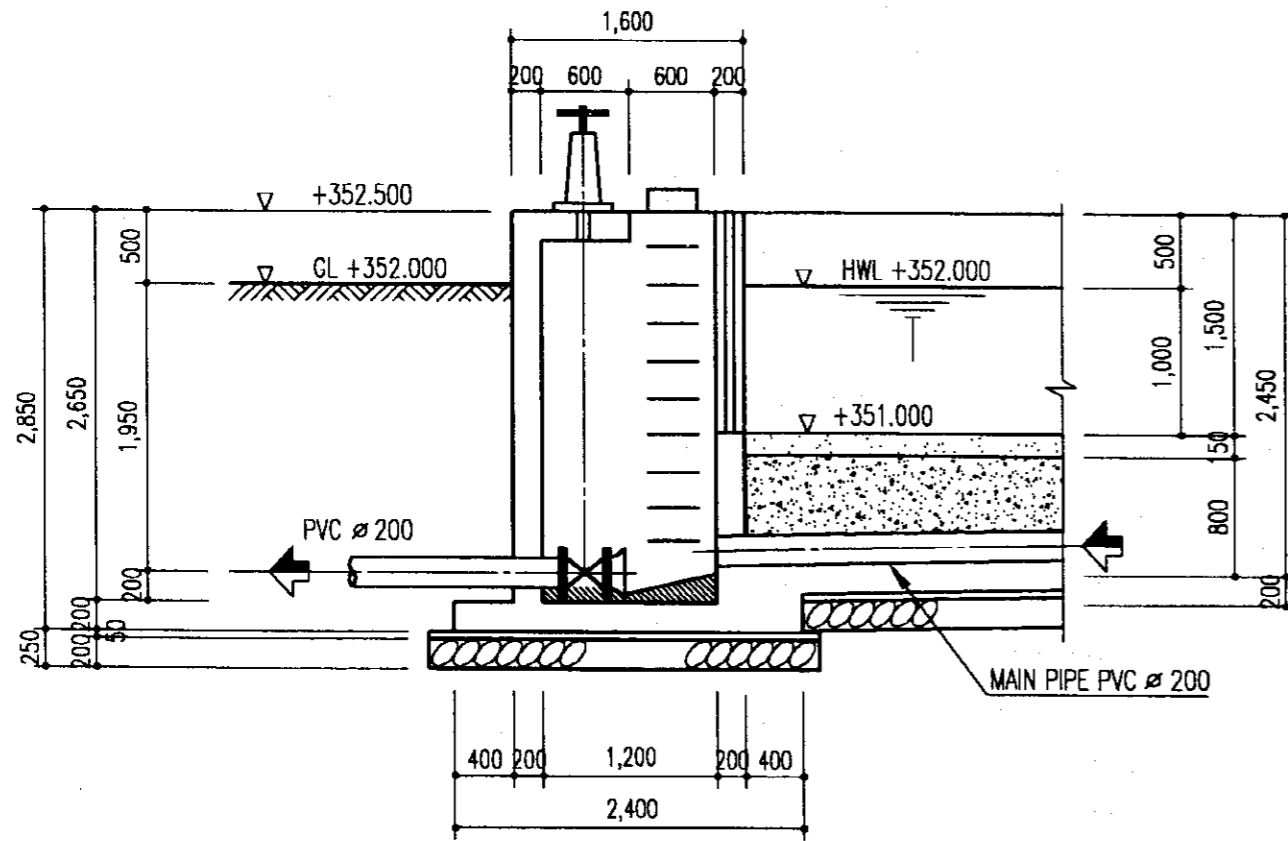
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT SLUDGE DRYING BED SECTIONS (1/2)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200 1/25	A-25	



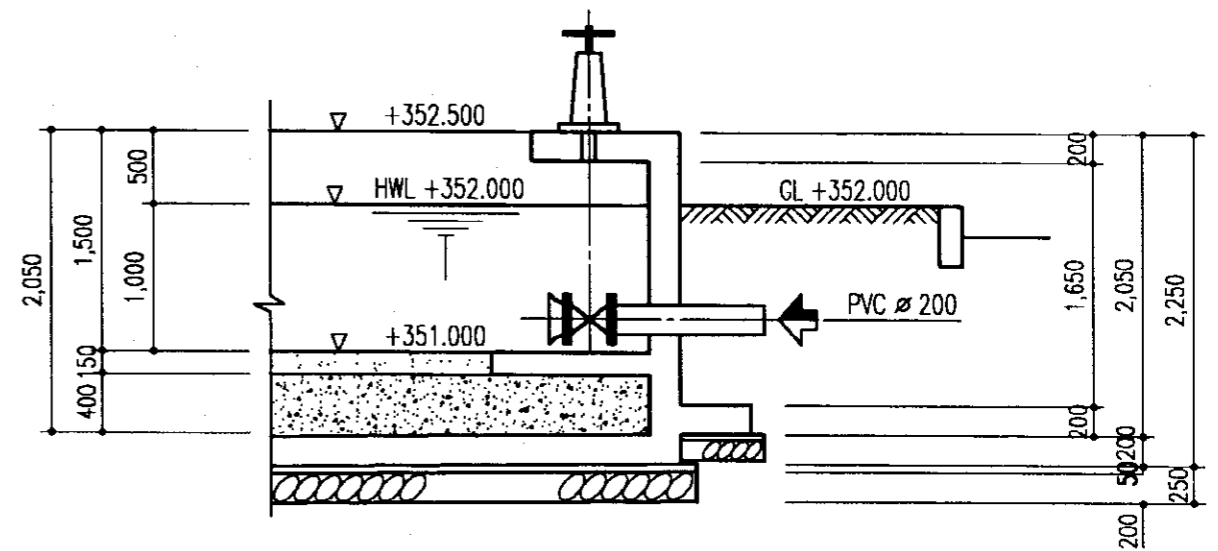
**TOP PLAN**



**TOP PLAN**

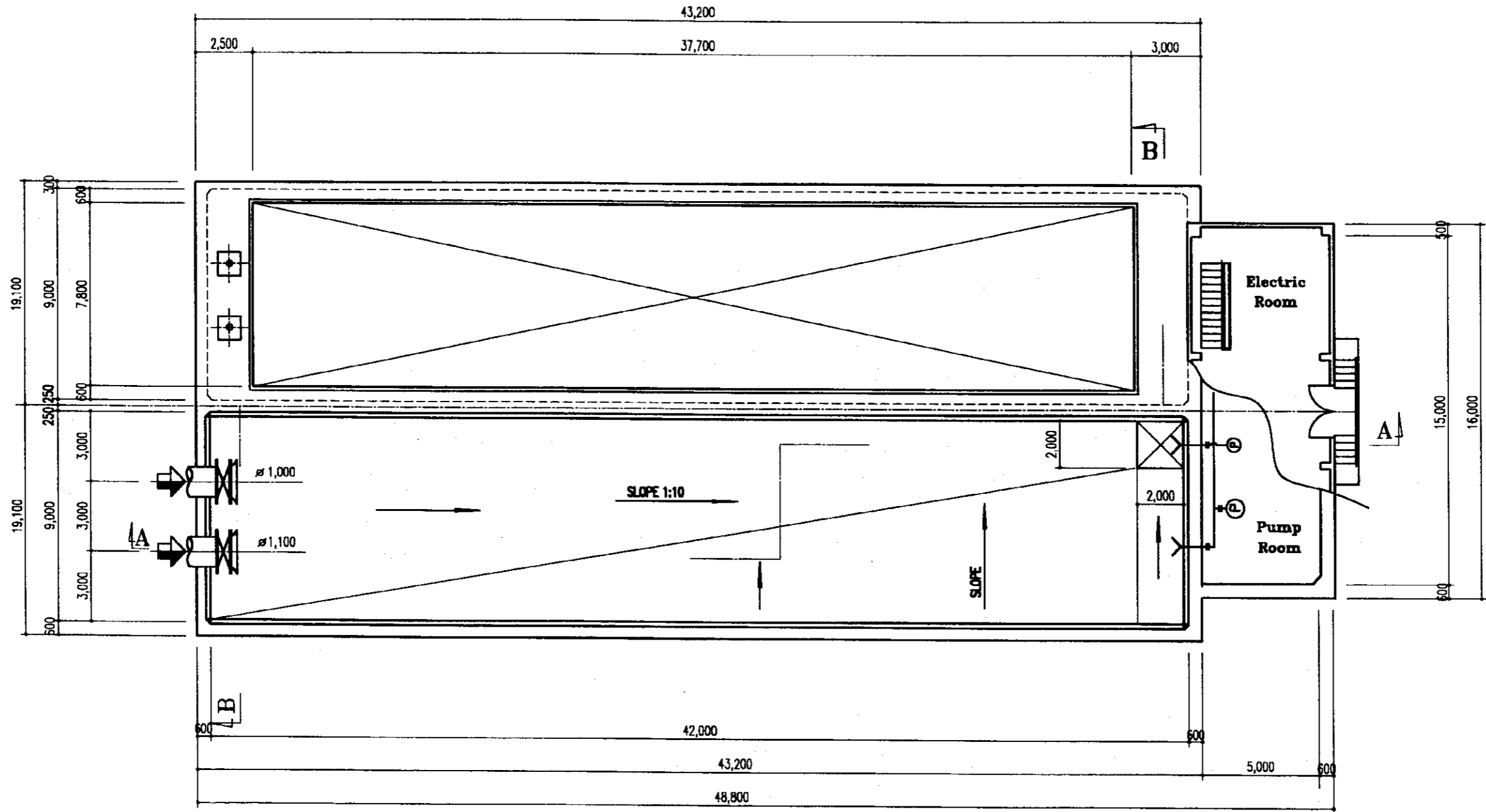


**DETAIL OF OUTLET**



**DETAIL OF OUTLET**

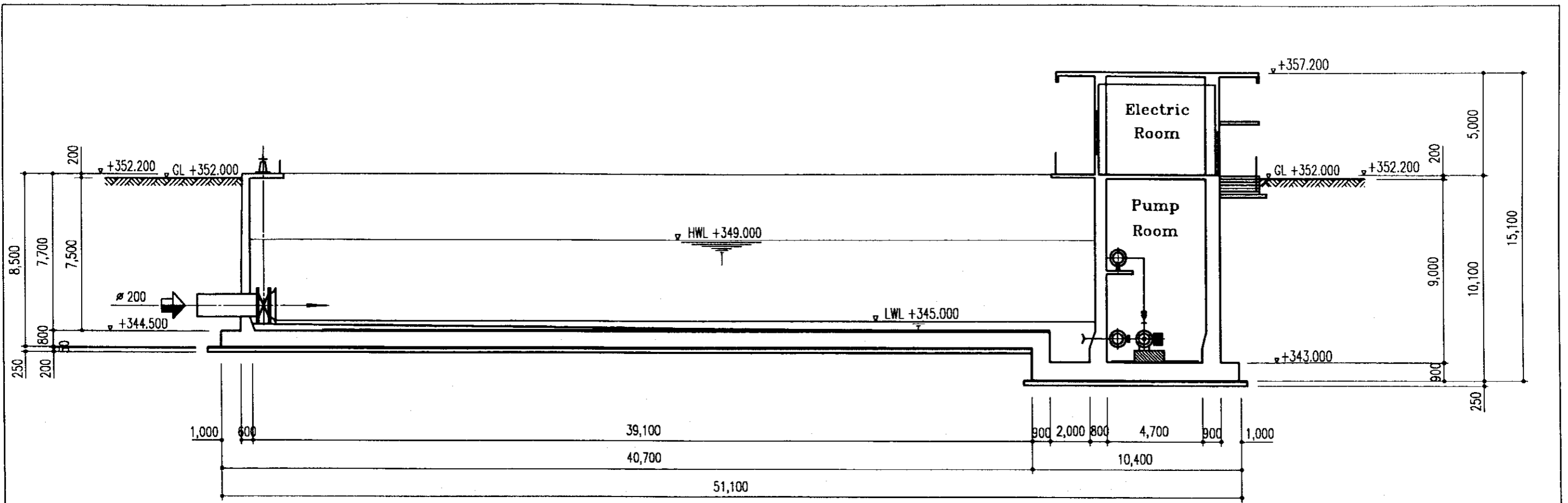
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana	
DRAWING TITLE	WATER TREATMENT PLANT SLUDGE DRYING BED SECTIONS AND DETAILS (2/2)	
DATE	SCALE	SHEET NO.
MARCH 2001	1/200	A-26



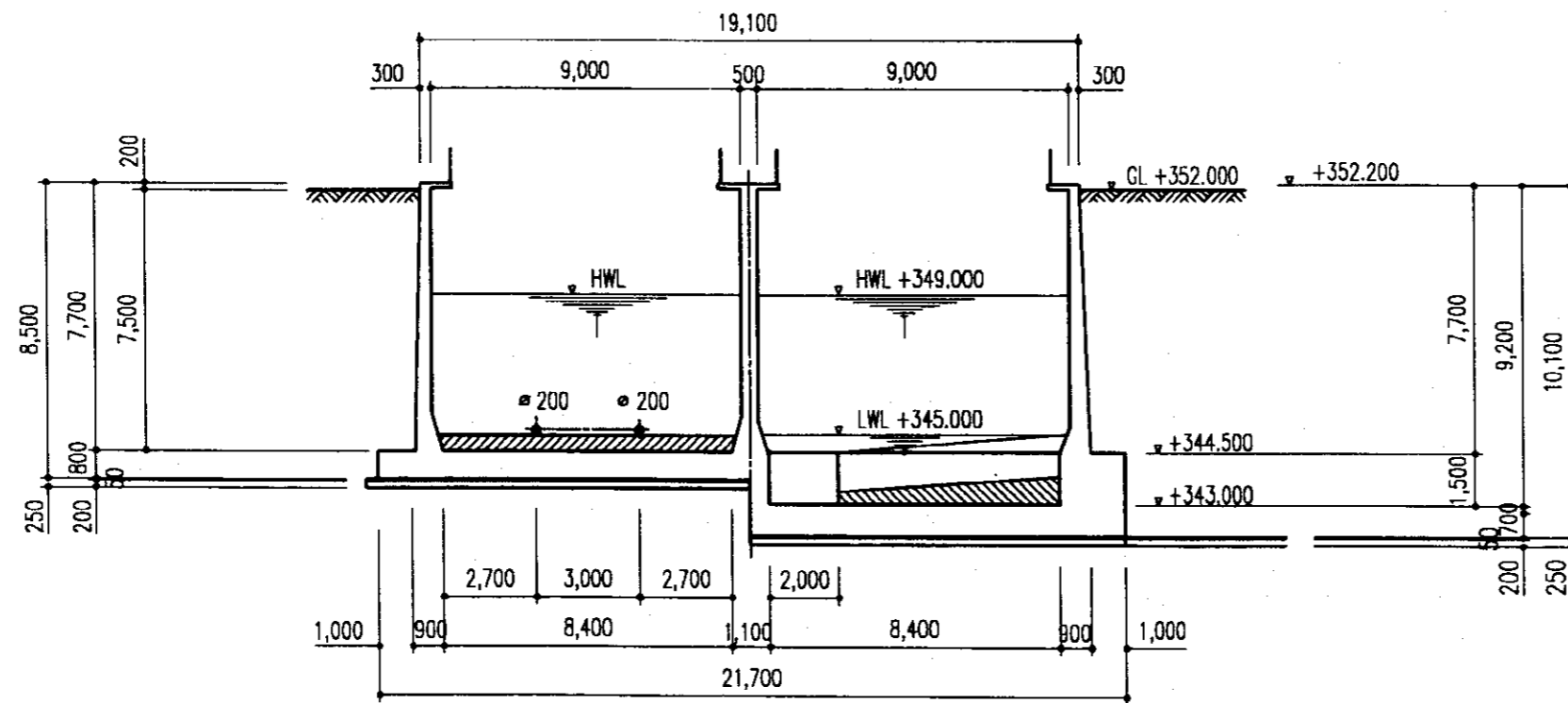
PLAN

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT DISCHARGE POOL PLAN		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200	A-27	



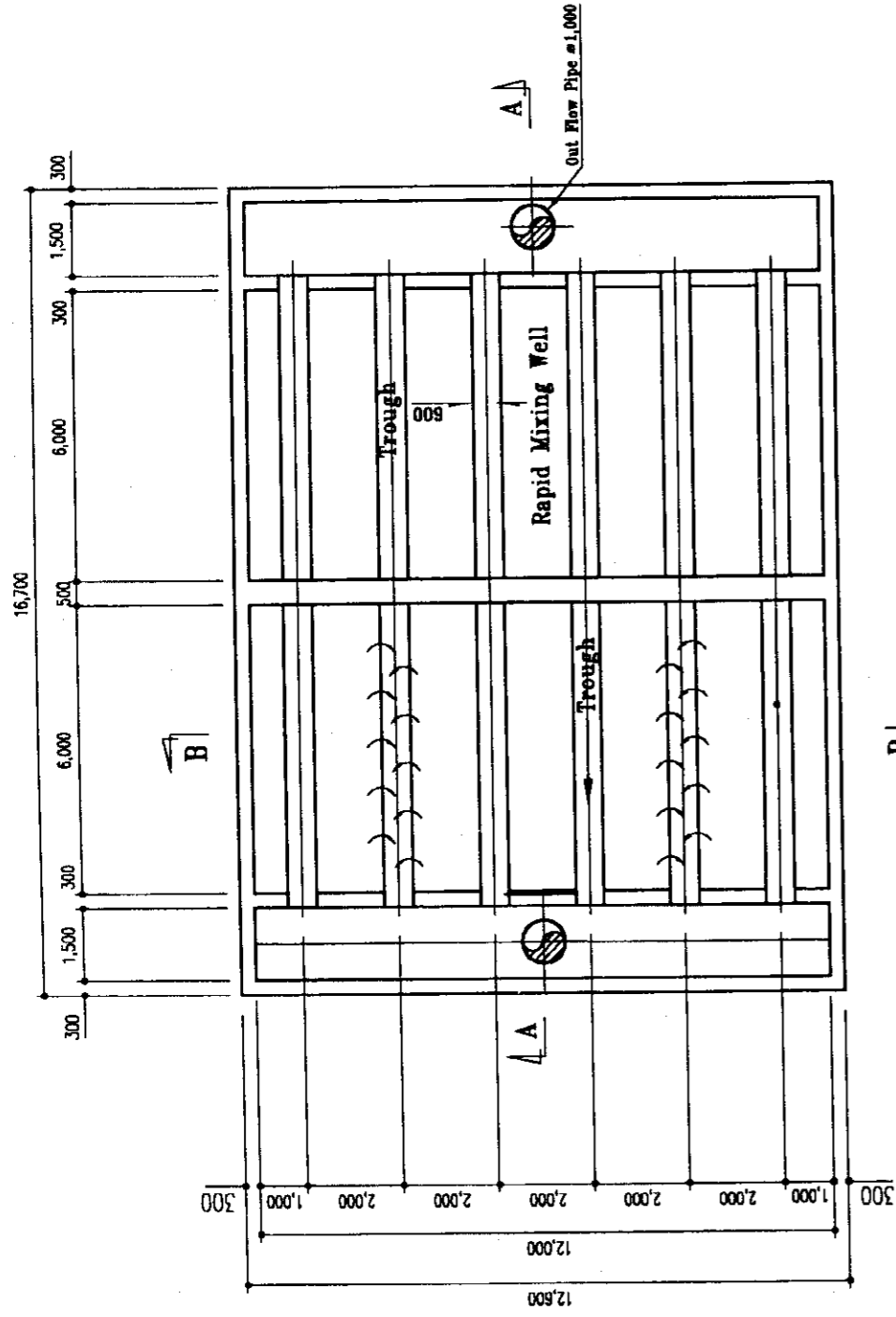


**SECTION A-A**



**SECTION B-B**

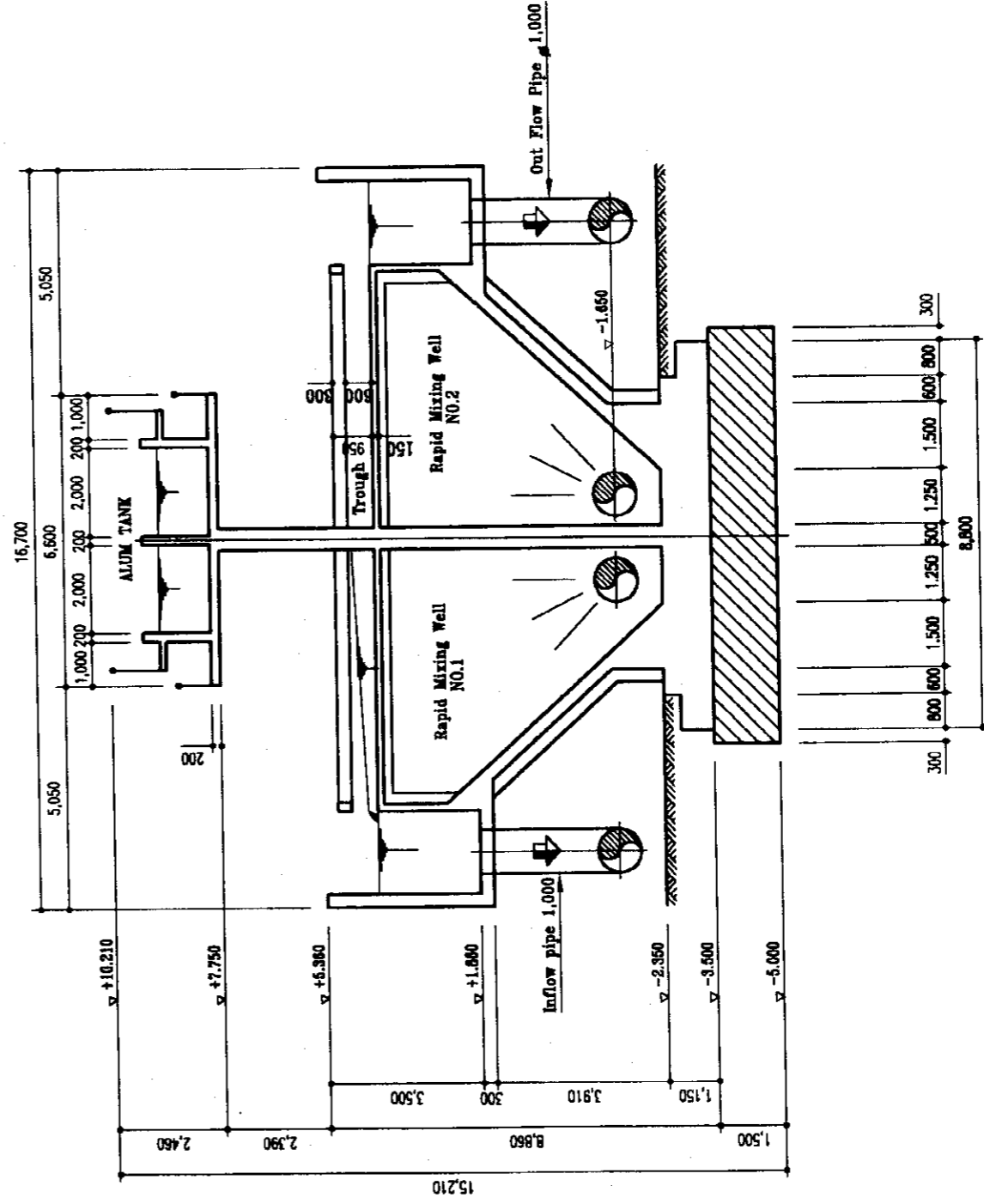
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT DISCHARGE POOL SECTIONS		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200	A-28	



B

PLAN OF RAPID MIXING WELL

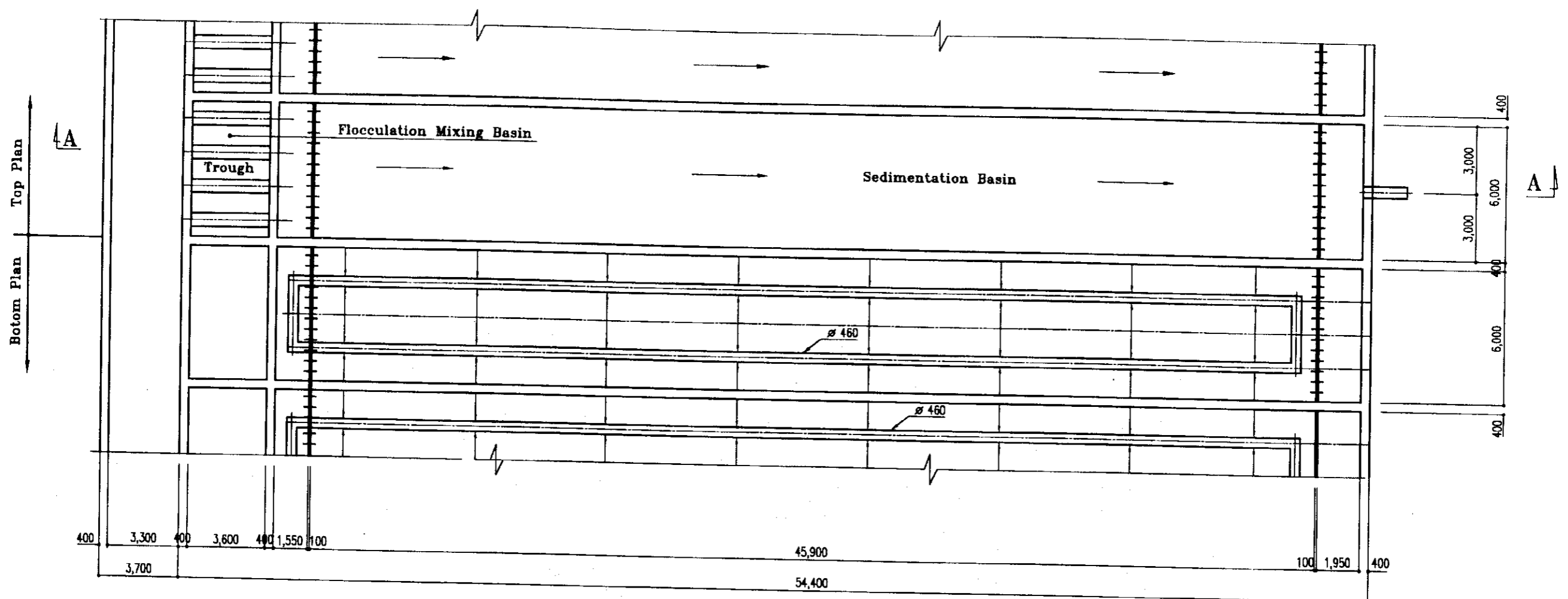
S=1:143



SECTION A-A

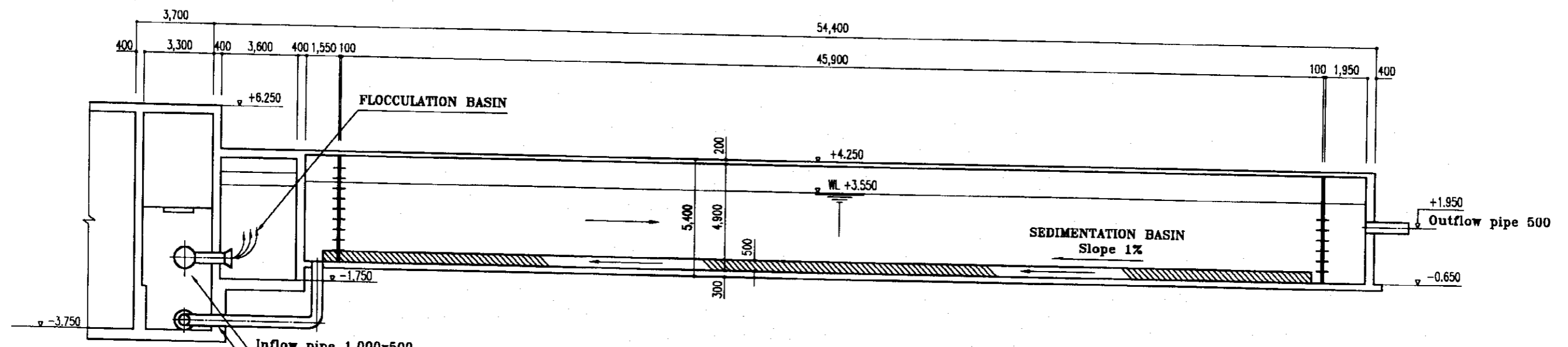
S=1:143

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana	DATE	MARCH 2001	SCALE	1/300	SHEET NO.	A-29
DRAWING TITLE	WATER TREATMENT PLANT						
	DRAWING TITULISTING RAPID MIXING TANK						



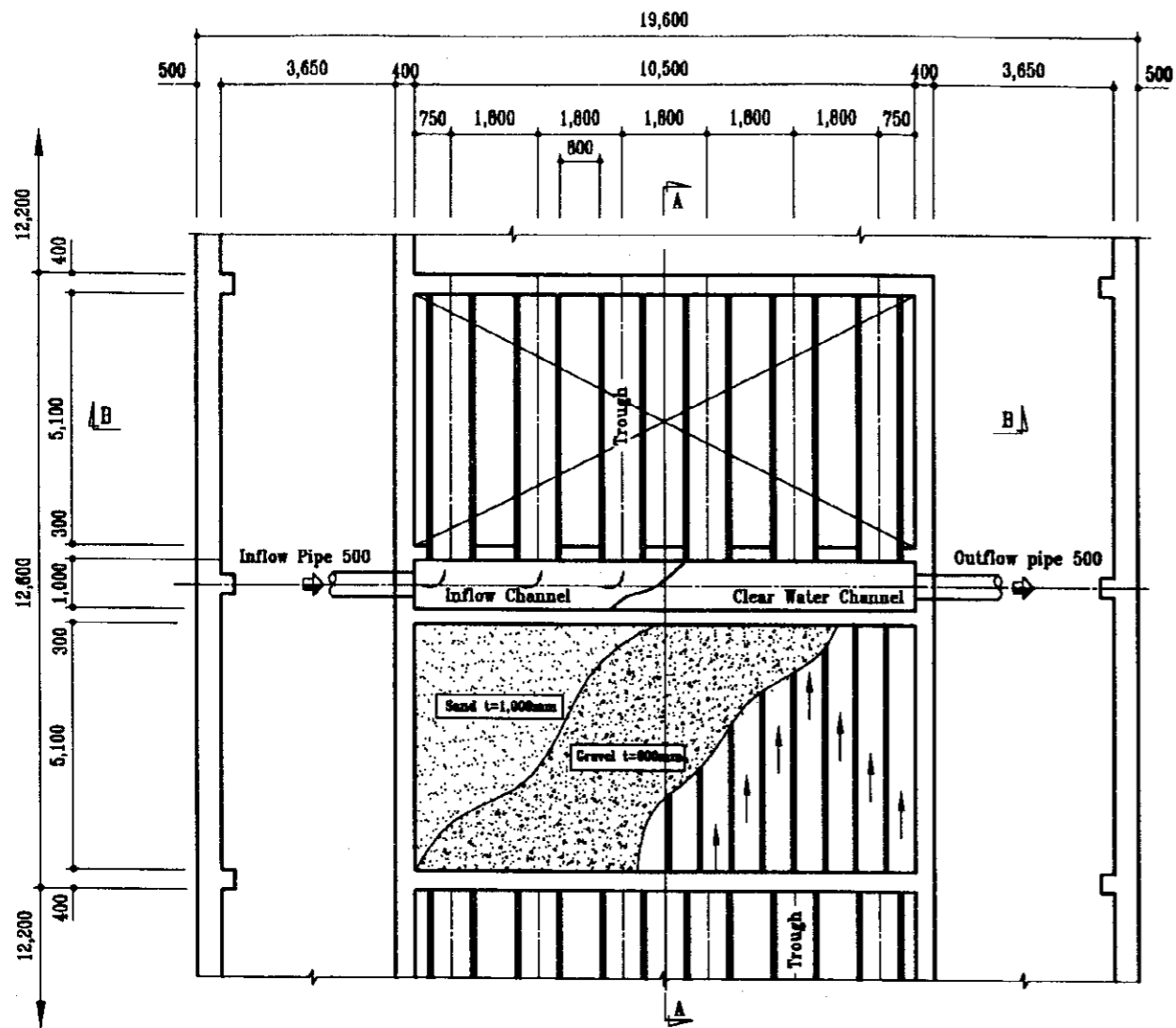
**PLAN OF FLOCCULATION & SEDIMENTATION BASIN**

20 No of units Basin



**SECTION A-A**

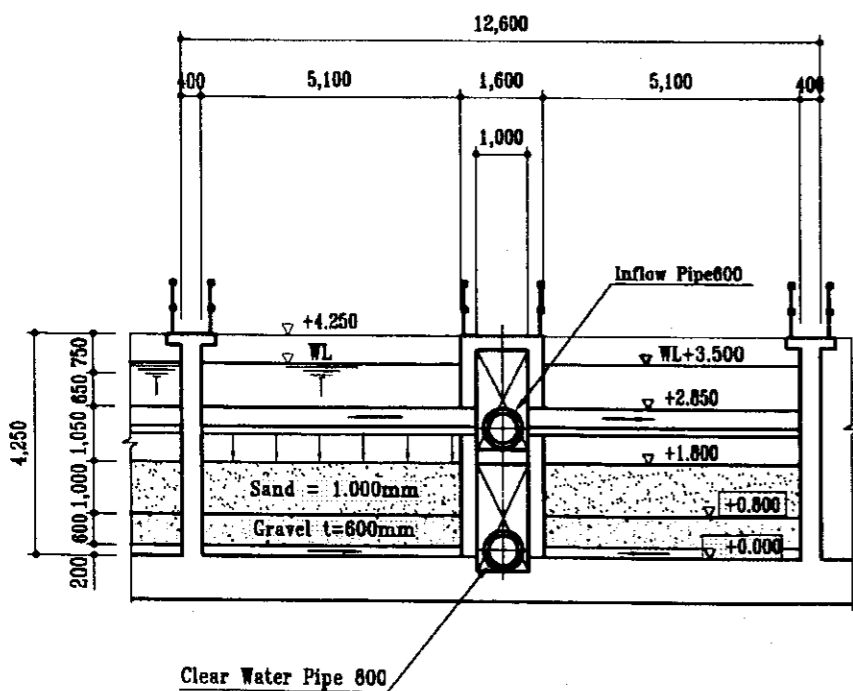
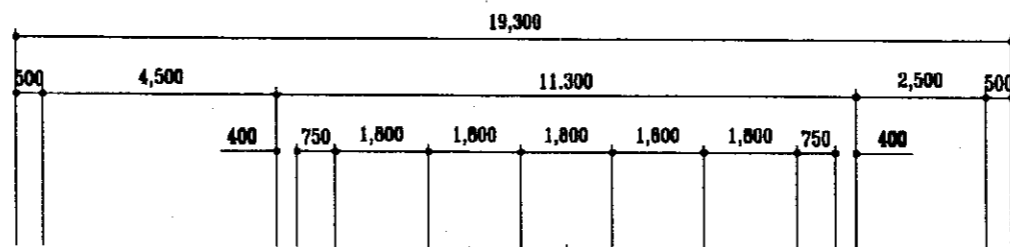
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT EXISTING FLOCCULATION TANK AND AND SEDIMENTATION BASIN		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/143	A-30	



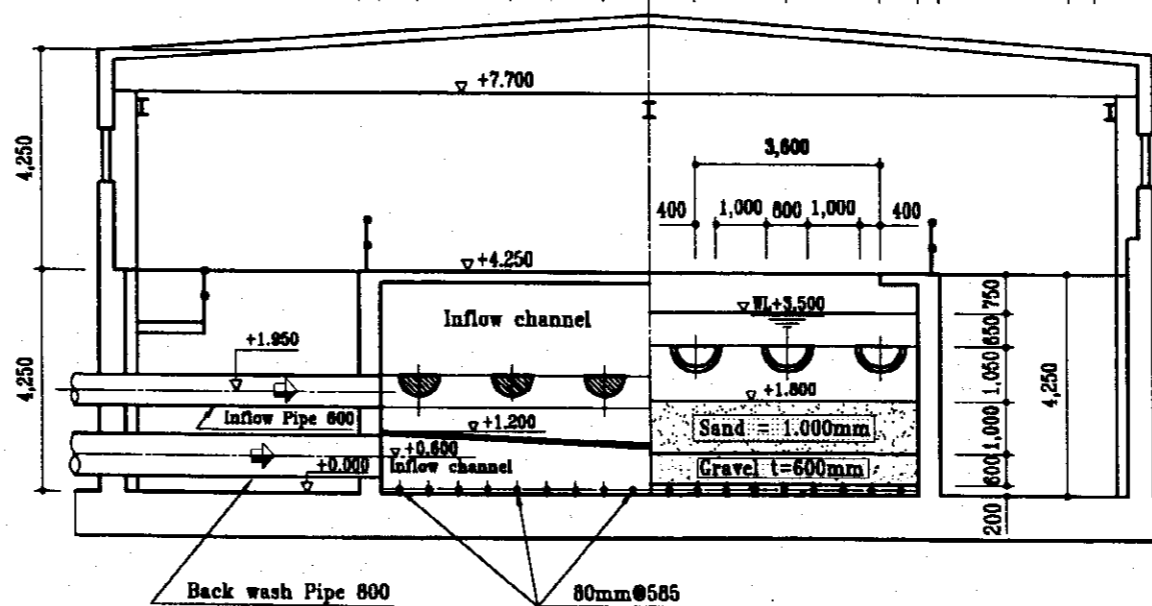
PLAN OF RAPID SAND FILTER

- A=10,5m x 5,1 x 2units=106,0m<sup>2</sup>
- Back Wash Rate 0,8m<sup>3</sup>/min/m<sup>2</sup>
- Back Wash Time 7min • Total 10units
- 106m<sup>2</sup>x0,8m<sup>3</sup>/min/m<sup>2</sup>x7minx10units=5,936m<sup>3</sup>/d
- Water Loss=5,936m<sup>3</sup>/d/150,000m<sup>3</sup>/d=4,0%

S=1:143



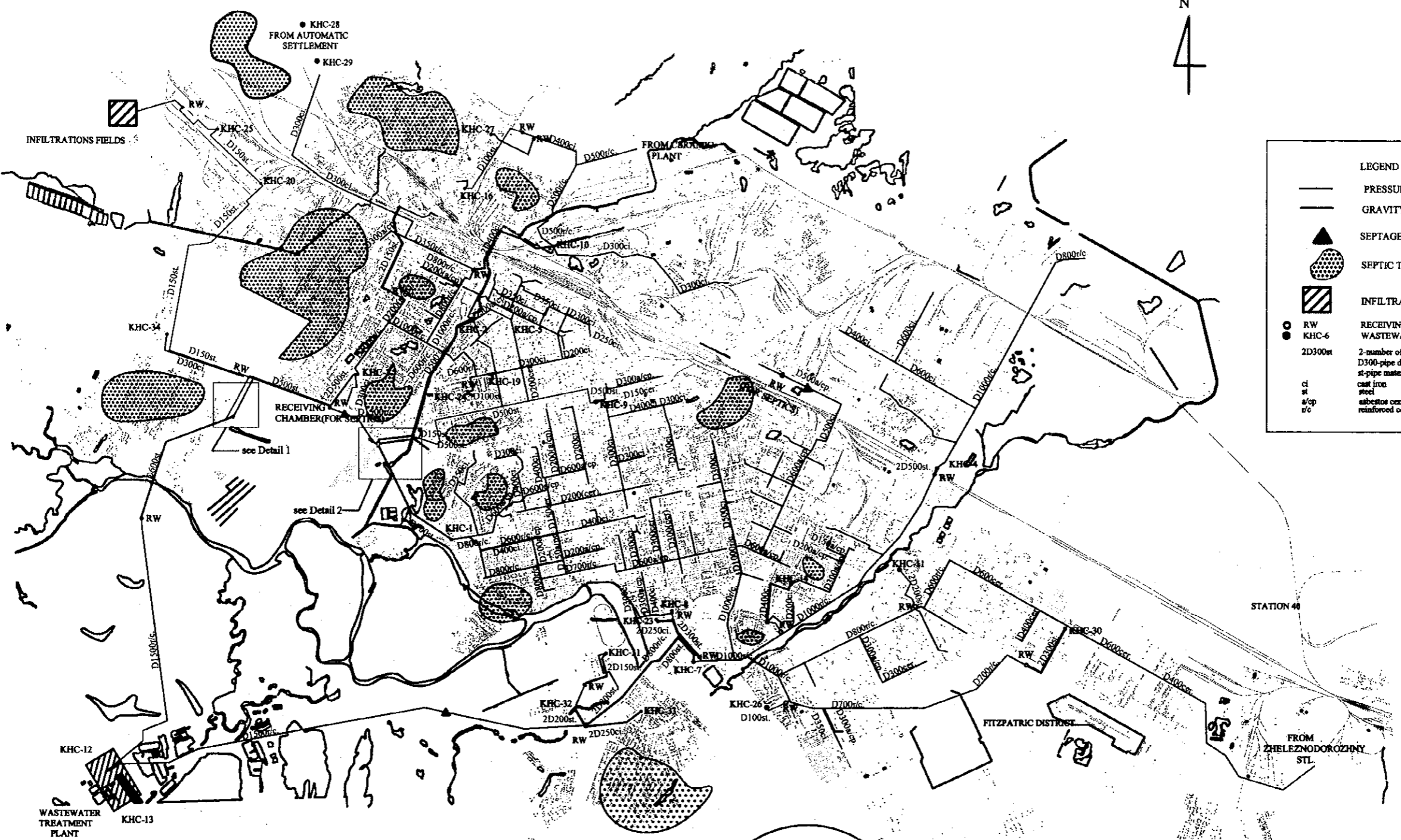
SECTION A-A



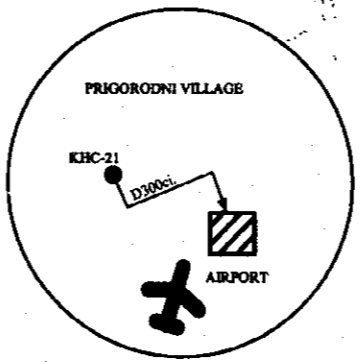
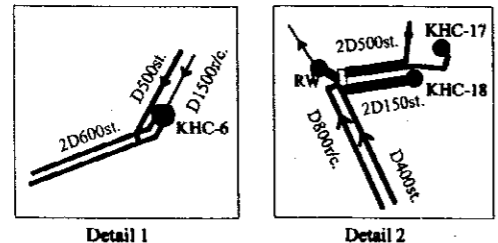
SECTION B-B

S=1:143

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WATER TREATMENT PLANT EXISTING RAPID SAND FILTRATION FACILITY		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/143	A-31	



LEGEND	
	PRESSURE MAIN
	GRAVITY PIPELINE
	SEPTAGE DISCHARGE POINT
	SEPTIC TANK AREA
	INFILTRATION FIELD
	RECEIVING WELL
	KHC-6
	2D300st
	2 - number of pipes
	D300 - pipe diameter, mm
	st - pipe material
	cl - cast iron
	st - steel
	s/cp - asbestos cement
	r/c - reinforced concrete

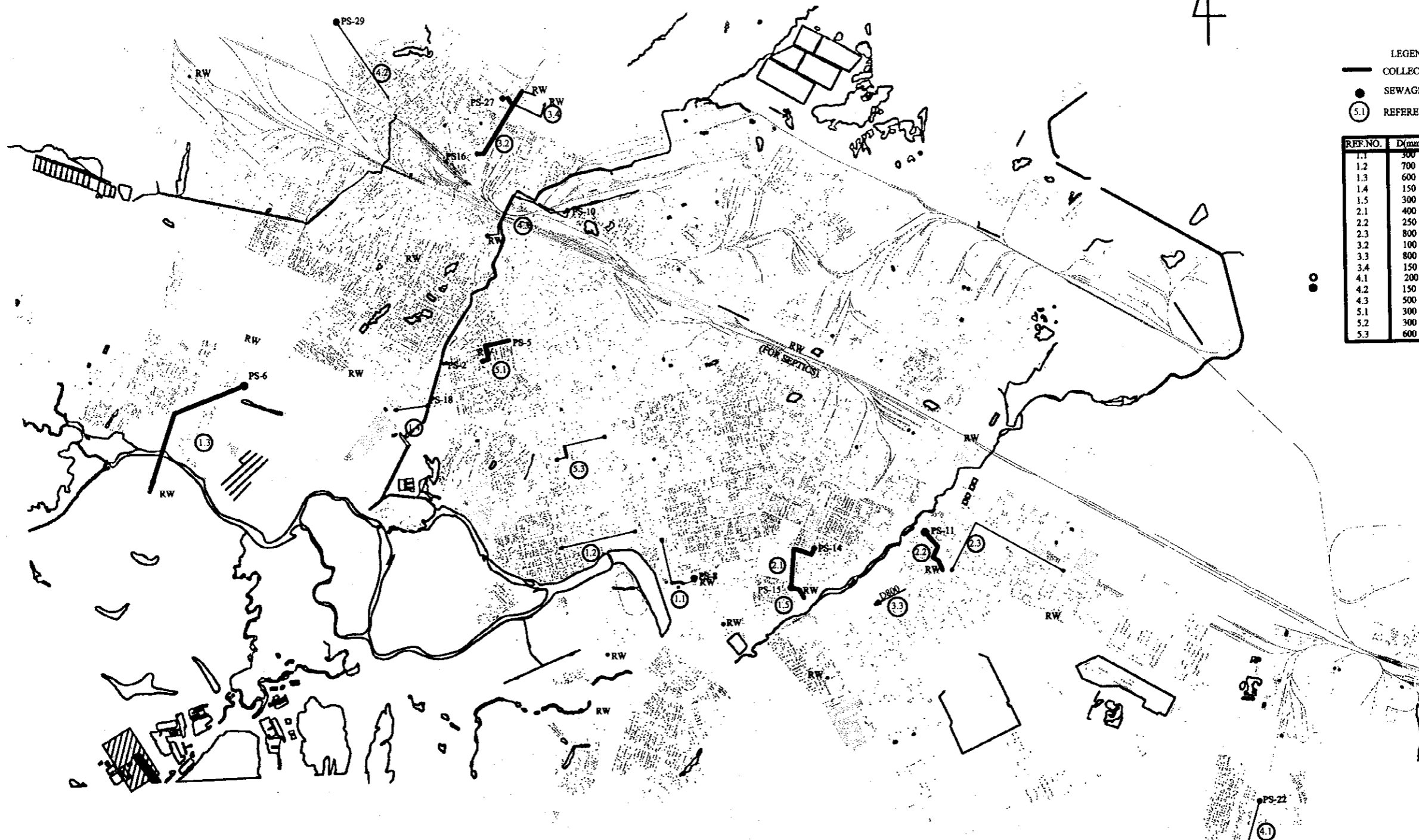


PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM EXISTING SYSTEM		
DATE	SCALE	SHEET NO.	
MARCH 2001	as noted	B-1	

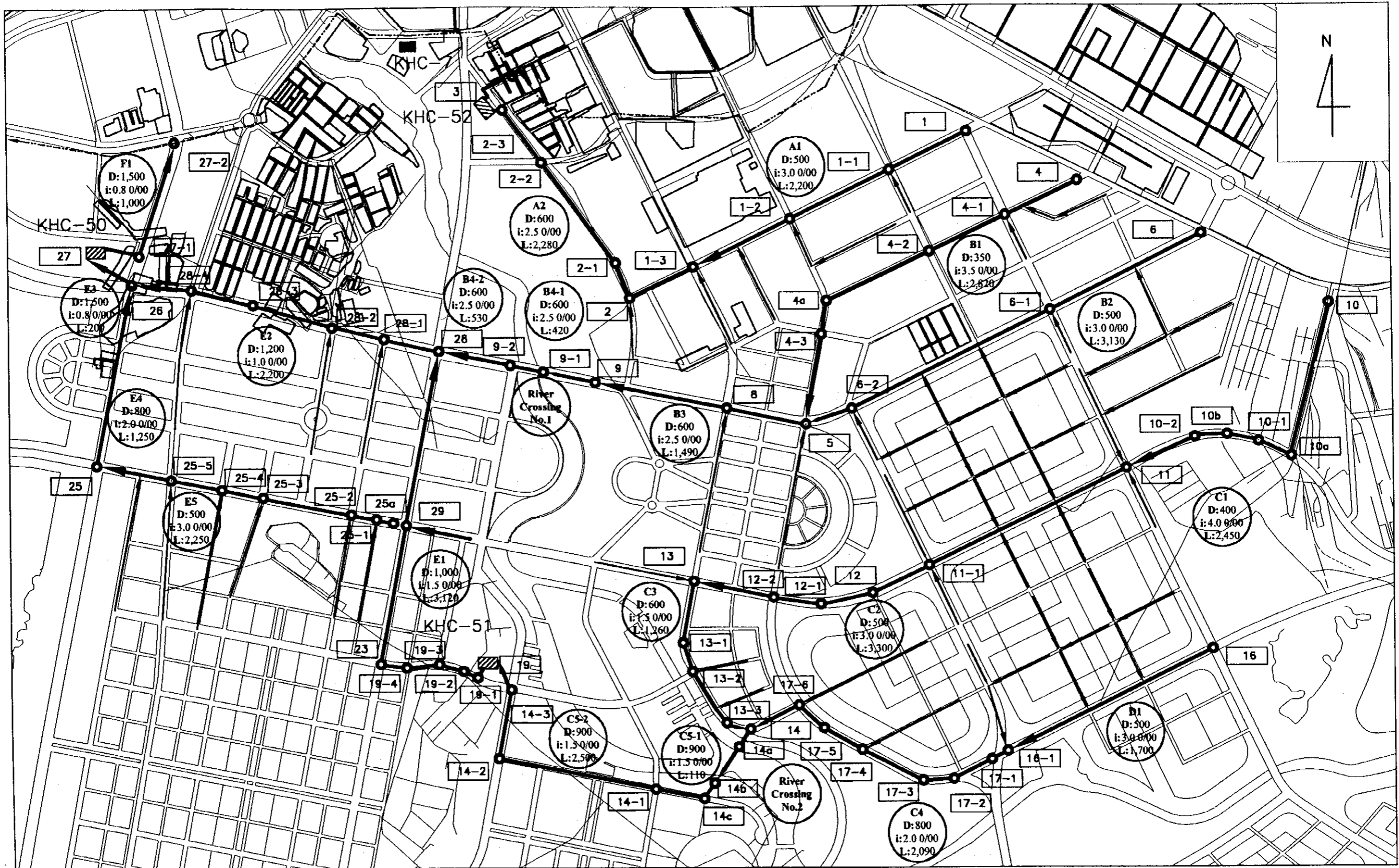


- LEGEND:
- COLLECTOR
  - SEWAGE PUMP STATION
  - ⑤.1 REFERENCE NUMBER

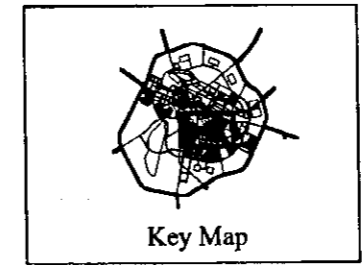
REF.NO.	D(mm)	L(m)	CATEGORY
1.1	300	800	GRAVITY
1.2	700	300	GRAVITY
1.3	600	1.100	PRESSURE
1.4	150	800	PRESSURE
1.5	300	600	PRESSURE
2.1	400	1.100	PRESSURE
2.2	250	700	PRESSURE
2.3	800	2.000	GRAVITY
3.2	100	1.000	PRESSURE
3.3	800	400	GRAVITY
3.4	150	900	PRESSURE
4.1	200	1900*2	PRESSURE
4.2	150	2.400	PRESSURE
4.3	500	1.600	PRESSURE
5.1	300	800	PRESSURE
5.2	300	800*2	PRESSURE
5.3	600	1.200	GRAVITY



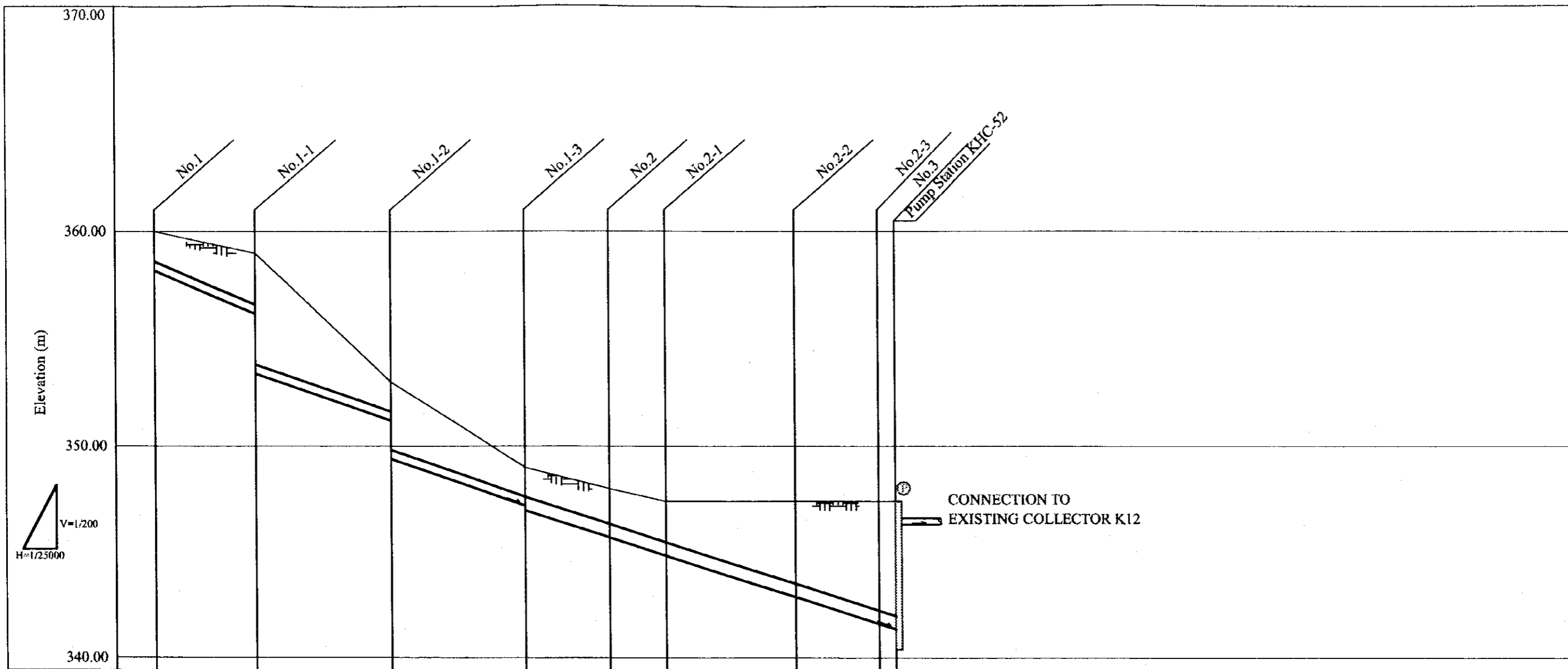
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM LOCATION OF REPLACEMENT SEWERS		
DATE	SCALE	SHEET NO.	
MARCH 2001	as noted	B-2	



- Legend**
- E1 Reference Number of Collector
  - D Diameter (mm)
  - i Gradient(0/00)
  - L Length (m)
  - Primary Collector
  - Secondary Collector
  - - - Existing Collector
  - ▨ Proposed Pump Station
  - Existing Pump Station
  - Manhole



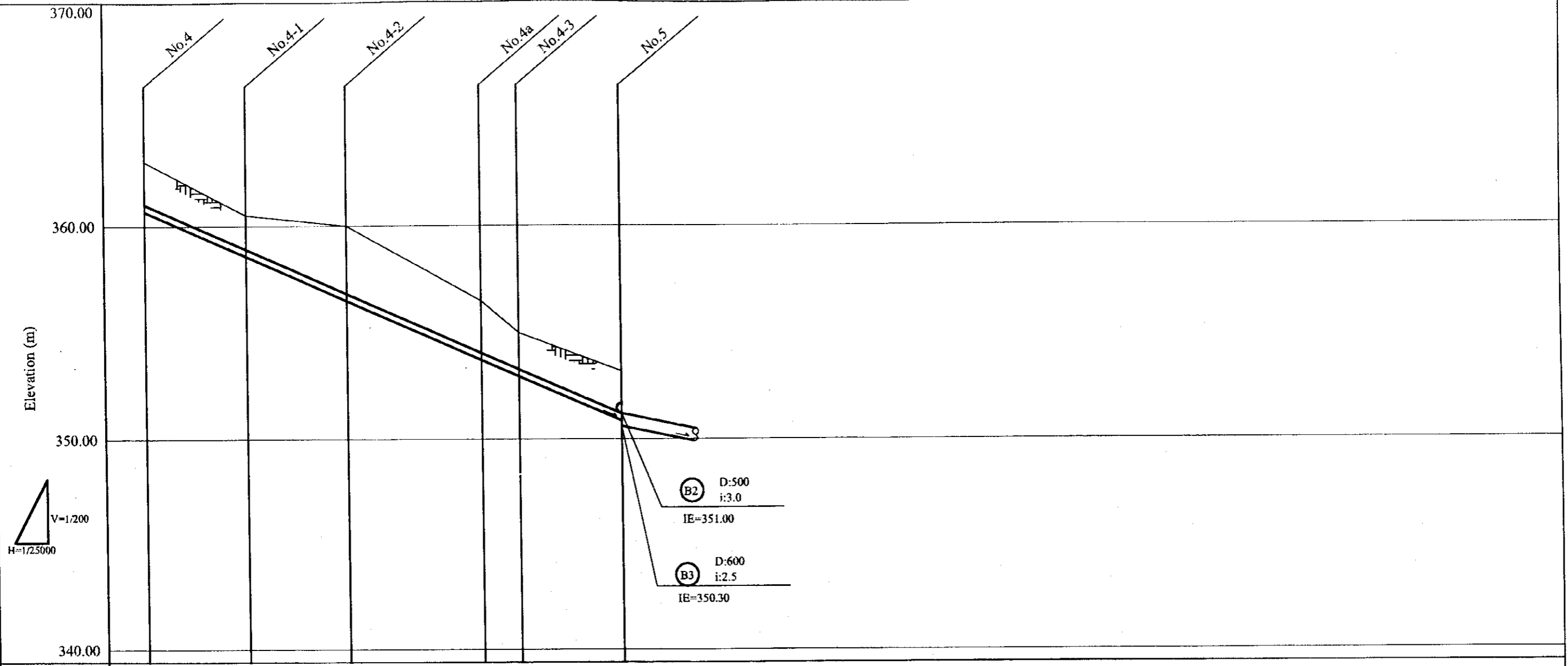
<b>PROJECT</b>	The Feasibility Study on Water Supply and Sewerage in the City of Astana	
<b>DRAWING TITLE</b>	WASTEWATER COLLECTION SYSTEM LAYOUT OF PROPOSED EXTENSION TO WASTEWATER COLLECTION SYSTEM	
<b>DATE</b>	<b>SCALE</b>	<b>SHEET NO.</b>
MARCH 2001	as noted	B-3



Sewer Line No.	A1			A2				
Diameter (mm)	500			600				
Gradient ( )	3.0			2.5				
Length (m)	600	800	800	500	320	760	500	100
Ground Elevation (m)	360.00	359.00	353.00	349.00	348.00	347.50	347.50	347.50
Earth Cover (m)	1.50	2.30 5.10	1.50 3.10	1.50 1.50	1.80 1.80	2.10 2.10	4.00 4.00	5.30 5.30 5.60
Invert Elevation (m)	358.00	356.20 353.40	351.00 349.40	347.00 346.90	345.60 345.60	344.80 344.80	342.90 342.90	341.60 341.60 341.30
Cumulative Length (m)	0	600	1400	2200	2700	3020	3780	4280 4380

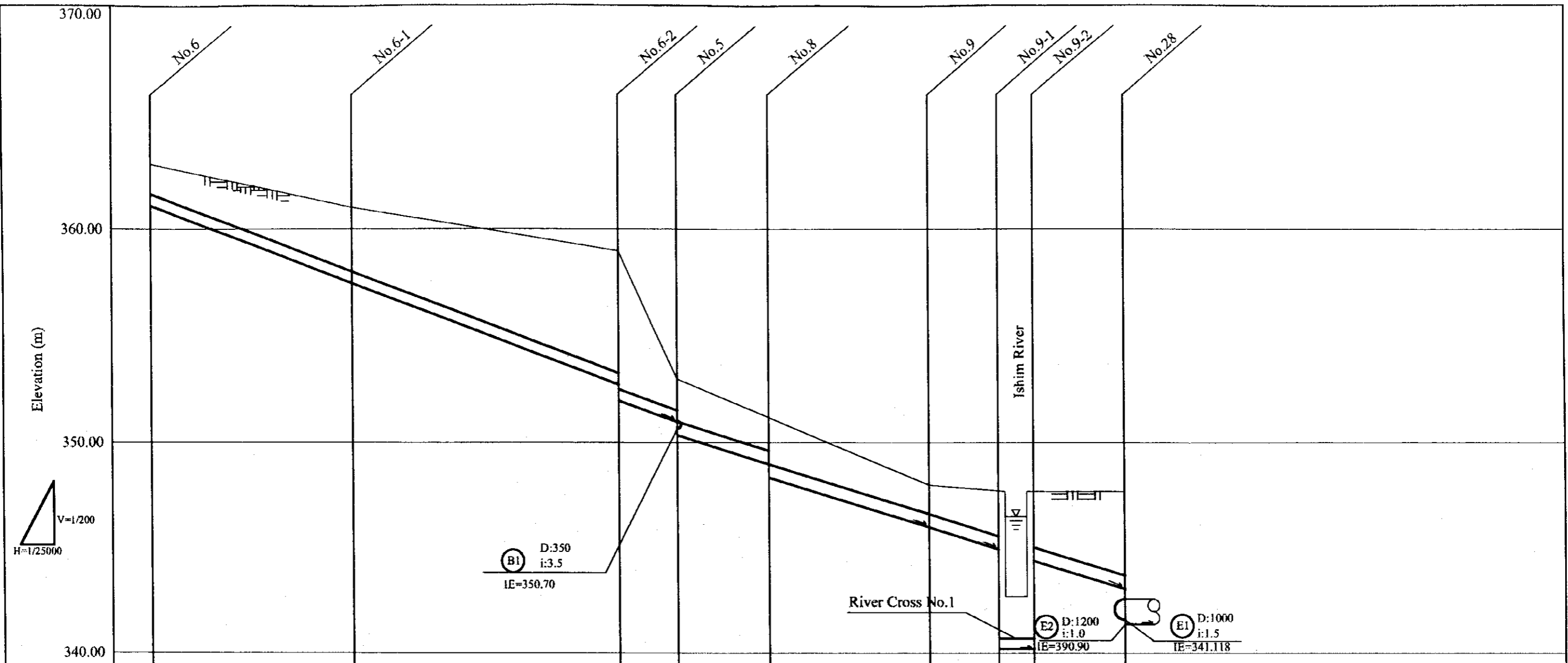
PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM LONGITUDINAL SECTIONS OF PROPOSED MAIN COLLECTORS (1/7)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/500;1/25000	B-4	





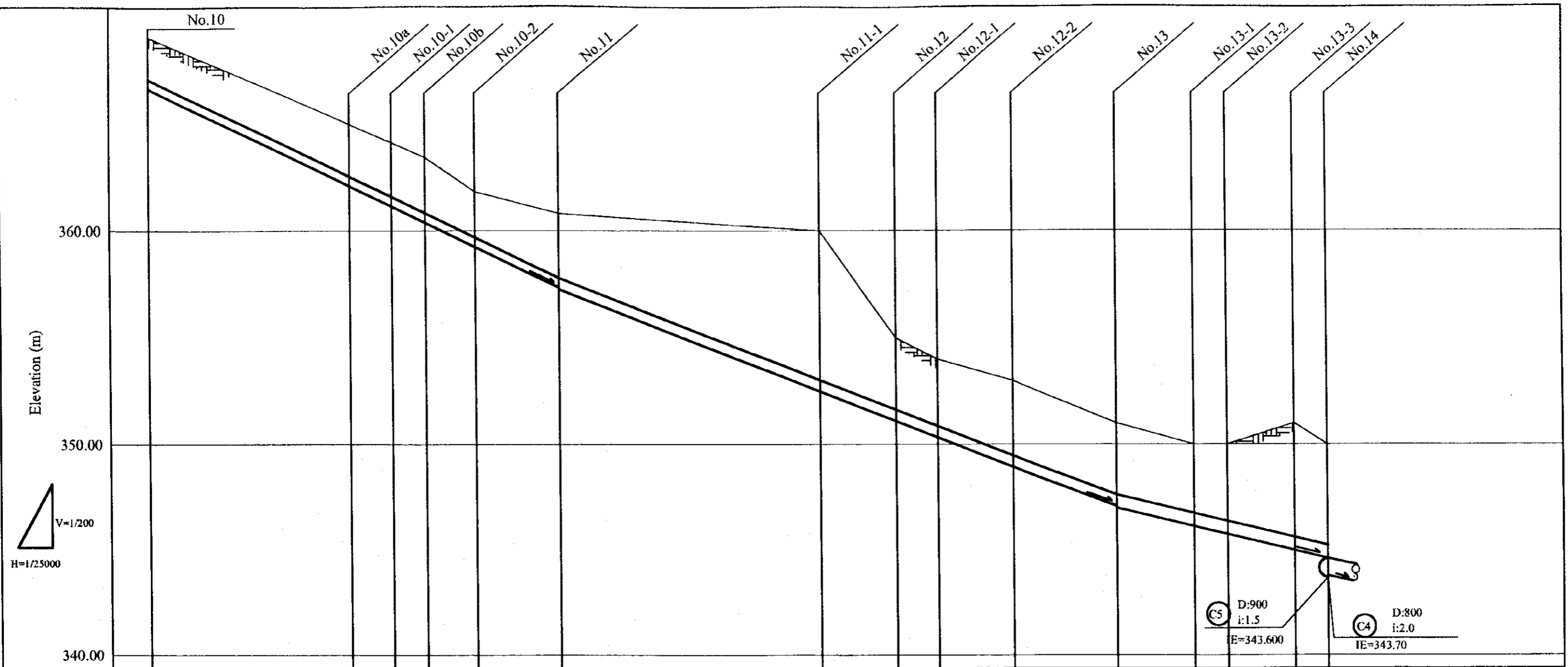
Sewer Line No.	(B1)					
Diameter (mm)	350					
Gradient ( )	3.5					
Length (m)	600	600	800	220	600	
Ground Elevation (m)	363.00	360.50	360.00	356.50	355.00	353.00
Earth Cover (m)	2.00	1.60 1.60	3.20 3.20	2.50 2.50	1.80 1.80	1.90
Invert Elevation (m)	360.60	358.50 358.50	356.40 356.40	353.60 353.60	352.80 352.80	350.70
Cumulative Length (m)	0	600	1,200	2,000	2,220	2,820

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM LONGITUDINAL SECTIONS OF PROPOSED MAIN COLLECTORS (2/7)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200; 1/25000	B-5	



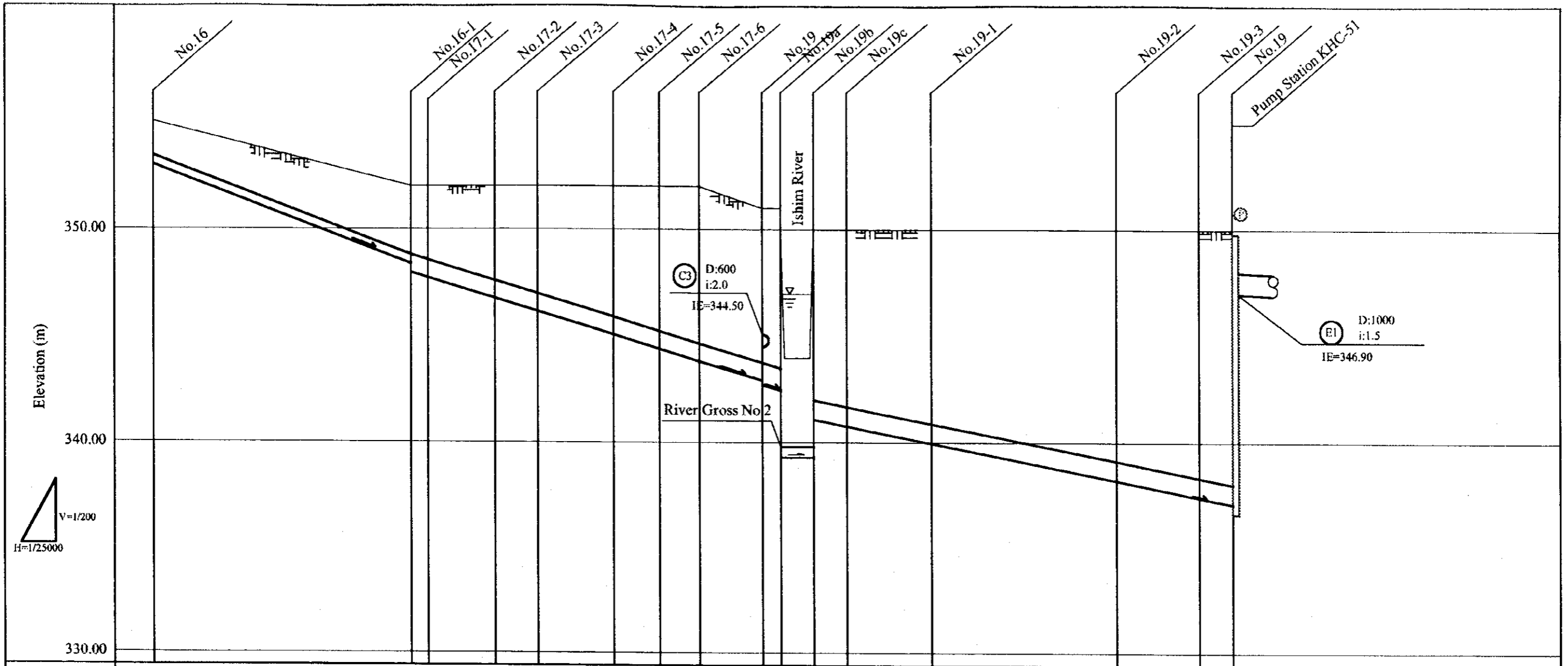
Sewer Line No.	B2		B3		B4-1	B4-2	
Diameter (mm)	500		600		600	600	
Gradient ( )	3.0		2.5		2.5	2.5	
Length (m)	1,200	1,580	350	550	940	420	530
Ground Elevation (m)	363.00	361.00	359.00	353.00	351.00	348.00	347.90
Earth Cover (m)	1.50	3.10 3.10	5.80 6.40	1.50 2.10	1.50 2.10	1.50 1.50	2.50 3.50
Invert Elevation (m)	361.00	357.40 357.40	352.70 352.10	351.00 350.30	348.90 348.30	345.90 345.90	344.80 343.80
Cumulative Length (m)	0	1,200	2,780	3,130	3,680	4,620	5,040

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM LONGITUDINAL SECTIONS OF PROPOSED MAIN COLLECTORS (3/7)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200; 1/25000	B-6	



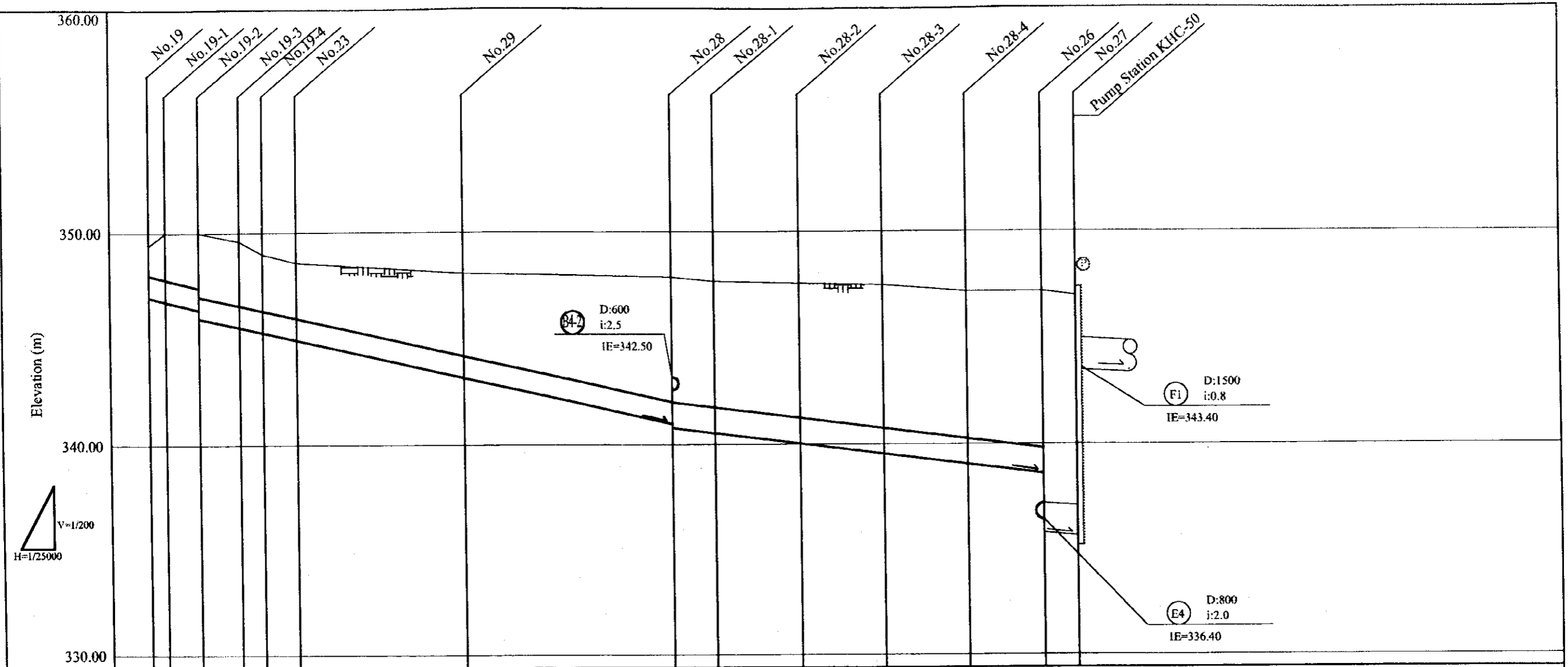
Sewer Line No.	C1					C2					C3																																															
Diameter (mm)	400					500					600																																															
Gradient ( )	4.0					3.0					2.0																																															
Length (m)	1,200		250	200	300	500		1,550			450	250	450	600	460	200	400	200																																								
Ground Elevation (m)	<table border="1"> <tr> <td>369.00</td> <td colspan="5">365.00</td> <td colspan="5">361.00</td> <td colspan="5">355.00</td> <td colspan="5">351.00</td> </tr> <tr> <td></td> <td>362.30</td> <td>362.30</td> <td>361.30</td> <td>361.30</td> <td>360.50</td> <td>359.30</td> <td>359.30</td> <td>357.30</td> <td>357.20</td> <td>360.00</td> <td>355.00</td> <td>354.00</td> <td>353.00</td> <td>351.00</td> <td>350.00</td> <td>350.00</td> <td>351.00</td> <td>350.00</td> </tr> </table>																		369.00	365.00					361.00					355.00					351.00						362.30	362.30	361.30	361.30	360.50	359.30	359.30	357.30	357.20	360.00	355.00	354.00	353.00	351.00	350.00	350.00	351.00	350.00
369.00	365.00					361.00					355.00					351.00																																										
	362.30	362.30	361.30	361.30	360.50	359.30	359.30	357.30	357.20	360.00	355.00	354.00	353.00	351.00	350.00	350.00	351.00	350.00																																								
Earth Cover (m)	<table border="1"> <tr> <td>1.50</td> <td>2.30</td> <td>2.30</td> <td>2.30</td> <td>2.30</td> <td>2.60</td> <td>2.30</td> <td>2.30</td> <td>2.30</td> <td>2.30</td> <td>7.00</td> <td>7.00</td> <td>3.40</td> <td>3.40</td> <td>3.20</td> <td>3.20</td> <td>3.60</td> <td>3.60</td> <td>3.40</td> <td>3.40</td> <td>3.30</td> <td>3.30</td> <td>3.70</td> <td>3.70</td> <td>5.50</td> <td>5.50</td> <td>4.90</td> </tr> </table>																		1.50	2.30	2.30	2.30	2.30	2.60	2.30	2.30	2.30	2.30	7.00	7.00	3.40	3.40	3.20	3.20	3.60	3.60	3.40	3.40	3.30	3.30	3.70	3.70	5.50	5.50	4.90													
1.50	2.30	2.30	2.30	2.30	2.60	2.30	2.30	2.30	2.30	7.00	7.00	3.40	3.40	3.20	3.20	3.60	3.60	3.40	3.40	3.30	3.30	3.70	3.70	5.50	5.50	4.90																																
Invert Elevation (m)	<table border="1"> <tr> <td>367.10</td> <td>362.30</td> <td>362.30</td> <td>361.30</td> <td>361.30</td> <td>360.50</td> <td>359.30</td> <td>359.30</td> <td>357.30</td> <td>357.20</td> <td>352.50</td> <td>352.50</td> <td>351.10</td> <td>351.10</td> <td>350.30</td> <td>350.30</td> <td>348.90</td> <td>348.90</td> <td>347.10</td> <td>347.00</td> <td>346.10</td> <td>346.10</td> <td>345.70</td> <td>345.70</td> <td>344.90</td> <td>344.90</td> <td>344.50</td> </tr> </table>																		367.10	362.30	362.30	361.30	361.30	360.50	359.30	359.30	357.30	357.20	352.50	352.50	351.10	351.10	350.30	350.30	348.90	348.90	347.10	347.00	346.10	346.10	345.70	345.70	344.90	344.90	344.50													
367.10	362.30	362.30	361.30	361.30	360.50	359.30	359.30	357.30	357.20	352.50	352.50	351.10	351.10	350.30	350.30	348.90	348.90	347.10	347.00	346.10	346.10	345.70	345.70	344.90	344.90	344.50																																
Cumulative Length (m)	<table border="1"> <tr> <td>0</td> <td>1,200</td> <td>1,450</td> <td>1,650</td> <td>1,950</td> <td>2,450</td> <td>4,000</td> <td>4,450</td> <td>4,700</td> <td>5,150</td> <td>5,750</td> <td>6,210</td> <td>6,410</td> <td>6,810</td> <td>7,010</td> </tr> </table>																		0	1,200	1,450	1,650	1,950	2,450	4,000	4,450	4,700	5,150	5,750	6,210	6,410	6,810	7,010																									
0	1,200	1,450	1,650	1,950	2,450	4,000	4,450	4,700	5,150	5,750	6,210	6,410	6,810	7,010																																												

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM LONGITUDINAL SECTIONS OF PROPOSED MAIN COLLECTORS (4/7)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200; 1/25000	B-7	



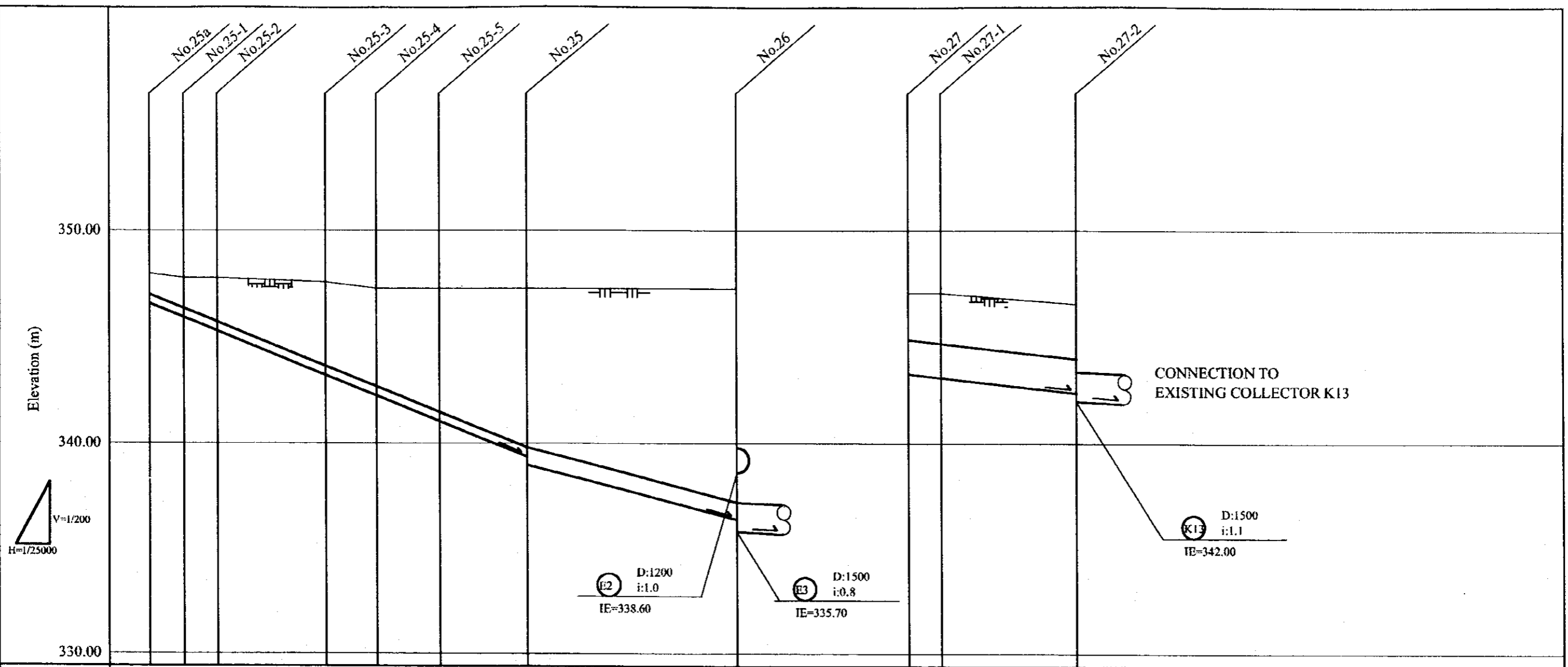
Sewer Line No.	D1				C4				C5-1		C5-2						
Diameter (mm)	400				800				900		900						
Gradient ( )	4.0				2.0				1.5		1.5						
Length (m)	1,550				100	400	250	450	280	240	370	110	200	500	1,100	500	200
Ground Elevation (m)	355.00	352.00	352.00	352.00	352.00	352.00	352.00	352.00	352.00	352.00	351.00	351.00	350.00	350.00	350.00	350.00	349.50
Earth Cover (m)	1.50	3.20	3.20	3.40	3.40	4.20	4.20	4.70	4.70	5.60	5.60	6.20	6.20	6.70	6.70	6.40	6.40
Invert Elevation (m)	353.00	348.30	347.90	347.70	347.70	346.90	346.90	346.40	346.40	345.50	345.50	344.90	344.90	344.40	344.40	343.70	343.60
Cumulative Length (m)	0	1,550	1,650	2,050	2,300	2,750	3,030	3,270	3,640	3,750	0	200	700	1,800	2,300	2,500	

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM LONGITUDINAL SECTIONS OF PROPOSED MAIN COLLECTORS (6/7)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200:1/25000	B-8	



Sewer Line No.	E1						E2						E3											
Diameter (mm)	1000						1200						1500											
Gradient ( )	1.5						1.0						0.8											
Length (m)	100	200	240	140	200	1,000	1,240		250	500	500	500	450	200										
Ground Elevation (m)	349.50	350.00	350.00	349.50	349.00	348.50	348.10		347.90	347.80	347.70	347.50	347.50	347.20	347.00									
Earth Cover (m)	1.50	2.20	2.50	2.90	2.80	2.60	2.40	2.40	3.50	3.50	5.20	5.20	5.40	5.40	5.80	5.80	6.10	6.10	6.30	6.30	6.80	9.90	9.90	
Invert Elevation (m)	346.90	346.70	346.40	345.90	345.50	345.30	345.00	345.00	343.50	343.50	341.60	341.40	341.10	341.10	340.60	340.60	340.10	340.10	339.60	339.60	339.10	335.70	335.50	335.50
Cumulative Length (m)	0	100	300	540	680	880	1,880	3,120	3,370	3,870	4,370	4,870	5,320	5,520										

<b>PROJECT</b>	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
<b>DRAWING TITLE</b>	WASTEWATER COLLECTION SYSTEM LONGITUDINAL SECTIONS OF PROPOSED MAIN COLLECTORS (6/7)		
<b>DATE</b>	<b>SCALE</b>	<b>SHEET NO.</b>	
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Sewer Line No.	E5							E4			F1	
Diameter (mm)	500							800			1500	
Gradient ( )	3.0							2.0			0.8	
Length (m)	200	200	650	300	380	520	1,250			200	800	
Ground Elevation (m)	348.10	348.60	347.90	347.70	347.70	347.20	347.20	347.20	347.00	347.20	346.50	
Earth Cover (m)	1.50	2.00	2.50	4.30	5.20	5.80	7.40	9.90	2.00	2.40	2.30	
Invert Elevation (m)	346.10	345.50	344.90	342.90	342.00	340.90	339.30	336.40	343.40	343.20	342.60	
Cumulative Length (m)	0	200	400	1,050	1,350	1,730	2,250	3,500	0	200	1,000	

PROJECT	The Feasibility Study on Water Supply and Sewerage in the City of Astana		
DRAWING TITLE	WASTEWATER COLLECTION SYSTEM LONGITUDINAL SECTIONS OF PROPOSED MAIN COLLECTORS (7/7)		
DATE	SCALE	SHEET NO.	
MARCH 2001	1/200:1/25000	B-10	