

FEASIBILITY STUDY
ON
EL-ARISH SEWERAGE AND
DRAINAGE SYSTEM
IN
THE NORTH SINAI PROVINCE
ARAB REPUBLIC OF EGYPT

FEASIBILITY REPORT

VOLUME FOUR

DRAWINGS

MARCH 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団	
受入 月日 '85.11.28	405
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**FEASIBILITY
STUDY
REPORTS AND
DRAWINGS
ON
EL-ARISH SEWERAGE
AND
DRAINAGE SYSTEM**

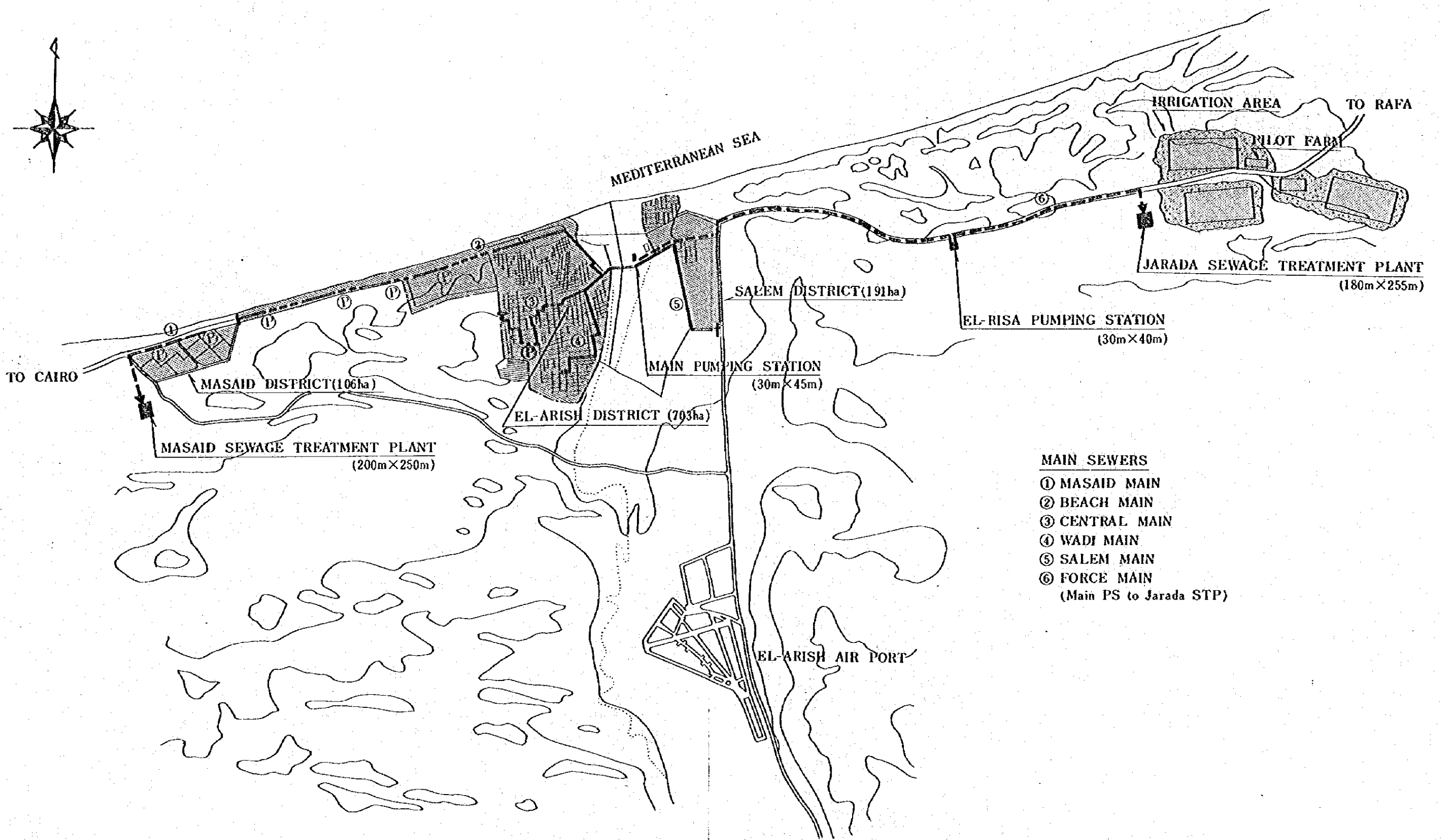
No.	TITLE
VOLUME ONE	EXECUTIVE SUMMARY
VOLUME TWO	MAIN REPORT
VOLUME THREE	APPENDICES
VOLUME FOUR	DRAWINGS

CONTENTS OF
VOLUME FOUR
DRAWINGS

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1. SYSTEM KEY PLAN

SYSTEM KEY PLAN

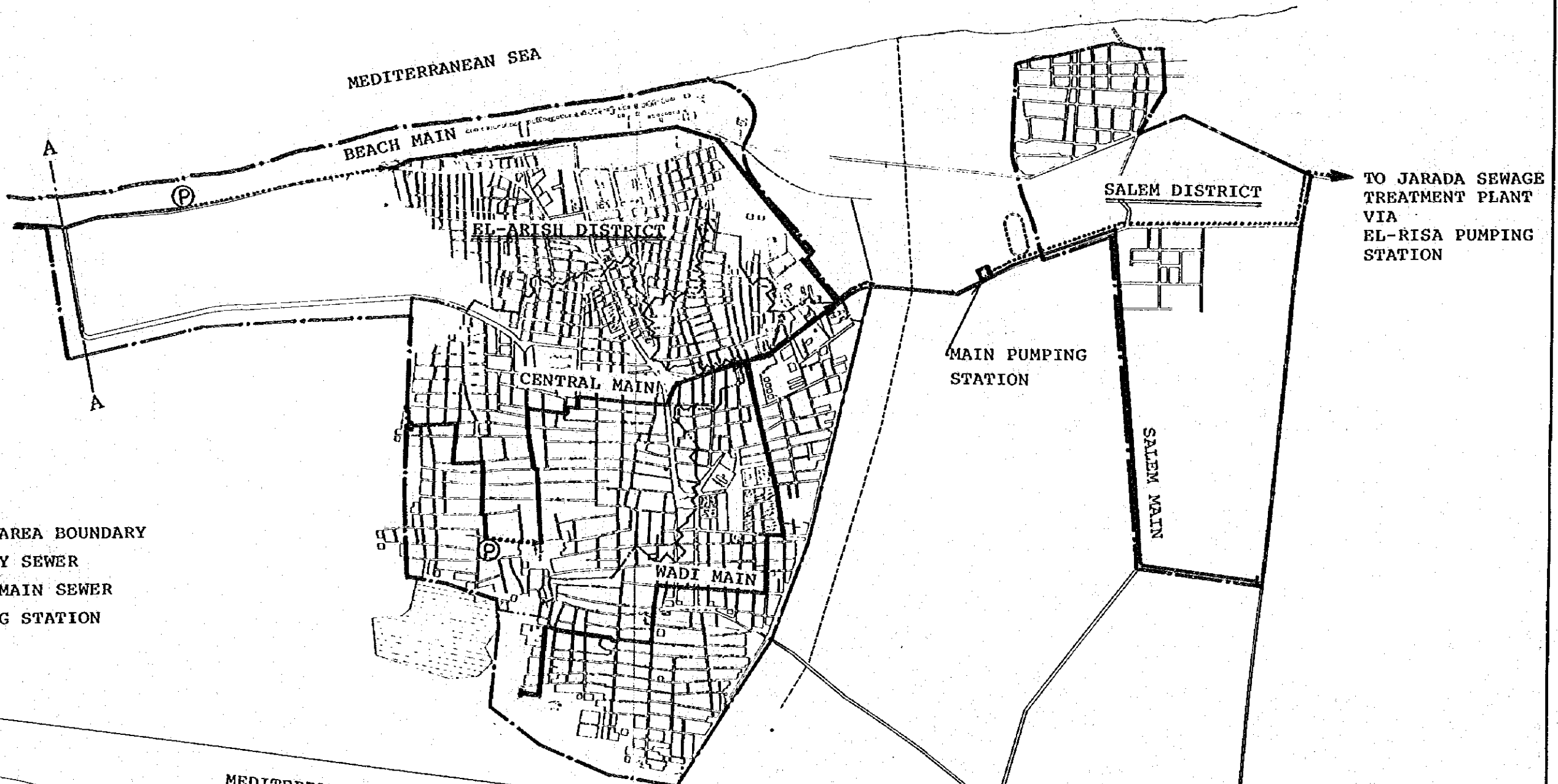


MAIN SEWERS

- ① MASAIID MAIN
- ② BEACH MAIN
- ③ CENTRAL MAIN
- ④ WADI MAIN
- ⑤ SALEM MAIN
- ⑥ FORCE MAIN
(Main PS to Jarada STP)

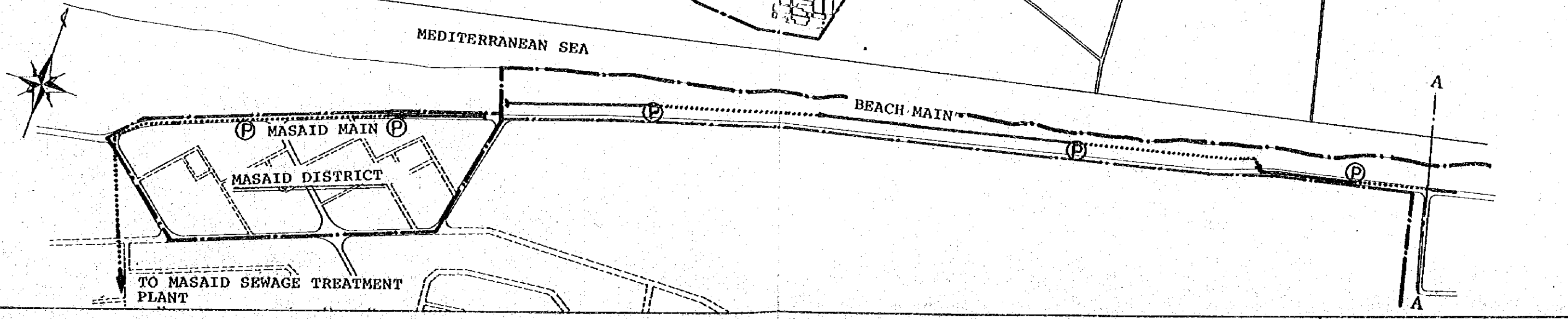
2. SEWERAGE SYSTEM MAP

SEWERAGE SYSTEM MAP



LEGEND

- STUDY AREA BOUNDARY
- GRAVITY SEWER
- - - FORCE MAIN SEWER
- (P) PUMPING STATION



SEWERAGE SYSTEM MAP PLAN I

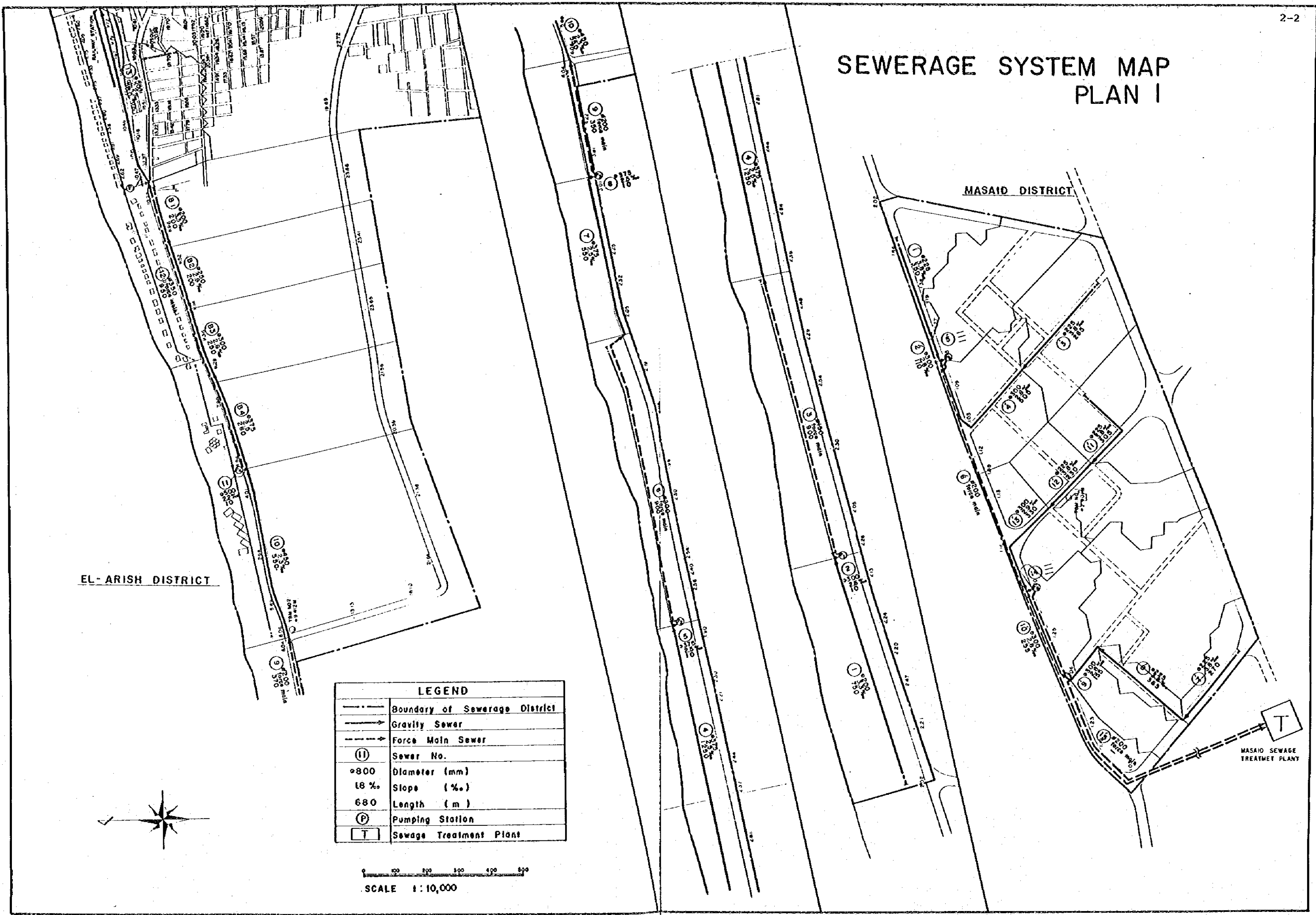
EL-ARISH DISTRICT

MASAI DISTRICT

MASAI SEWAGE TREATMENT PLANT

LEGEND	
	Boundary of Sewerage District
	Gravity Sewer
	Force Main Sewer
	Sewer No.
	800 Diameter (mm)
	18 % Slope (%)
	680 Length (m)
	Pumping Station
	Sewage Treatment Plant

0 100 200 300 400 500
SCALE 1:10,000



SEWERAGE SYSTEM MAP PLAN 2

EL - ARISH DISTRICT



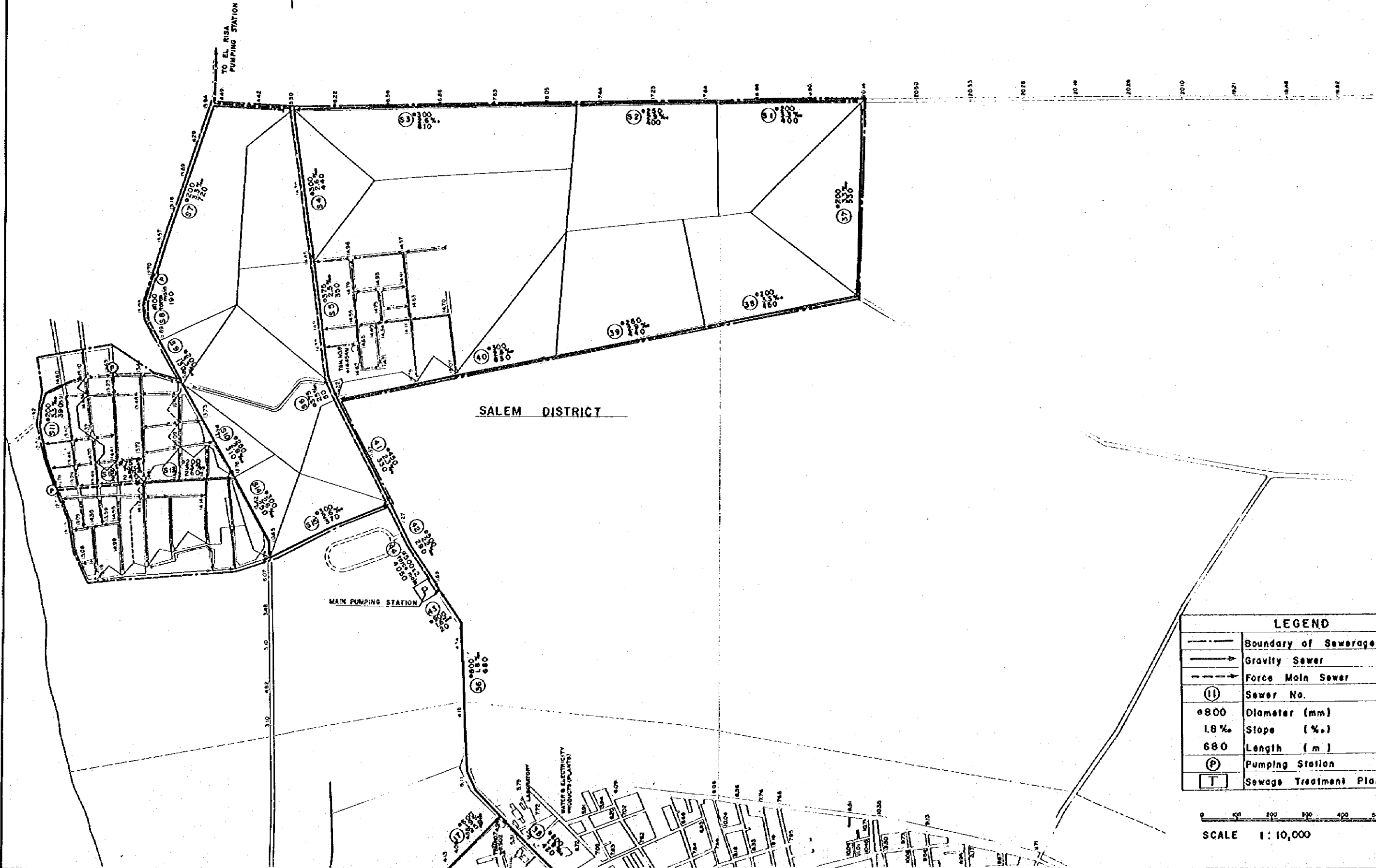
LEGEND	
	Boundary of Sewerage District
	Gravity Sewer
	Force Main Sewer
	Sewer No.
	Diameter (mm)
	Slope (%)
	Length (m)
	Pumping Station
	Sewage Treatment Plant

0 100 200 300 400 500
 SCALE 1 : 10,000

SEWERAGE SYSTEM MAP PLAN 3



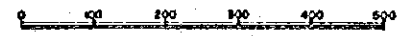
TO EL RISA
PUMPING STATION



SALEM DISTRICT

MAIN PUMPING STATION

LEGEND	
	Boundary of Sewerage District
	Gravity Sewer
	Force Moin Sewer
	Sewer No.
$\phi 800$	Diameter (mm)
1.8%	Slope (%)
680	Length (m)
	Pumping Station
	Sewage Treatment Plant

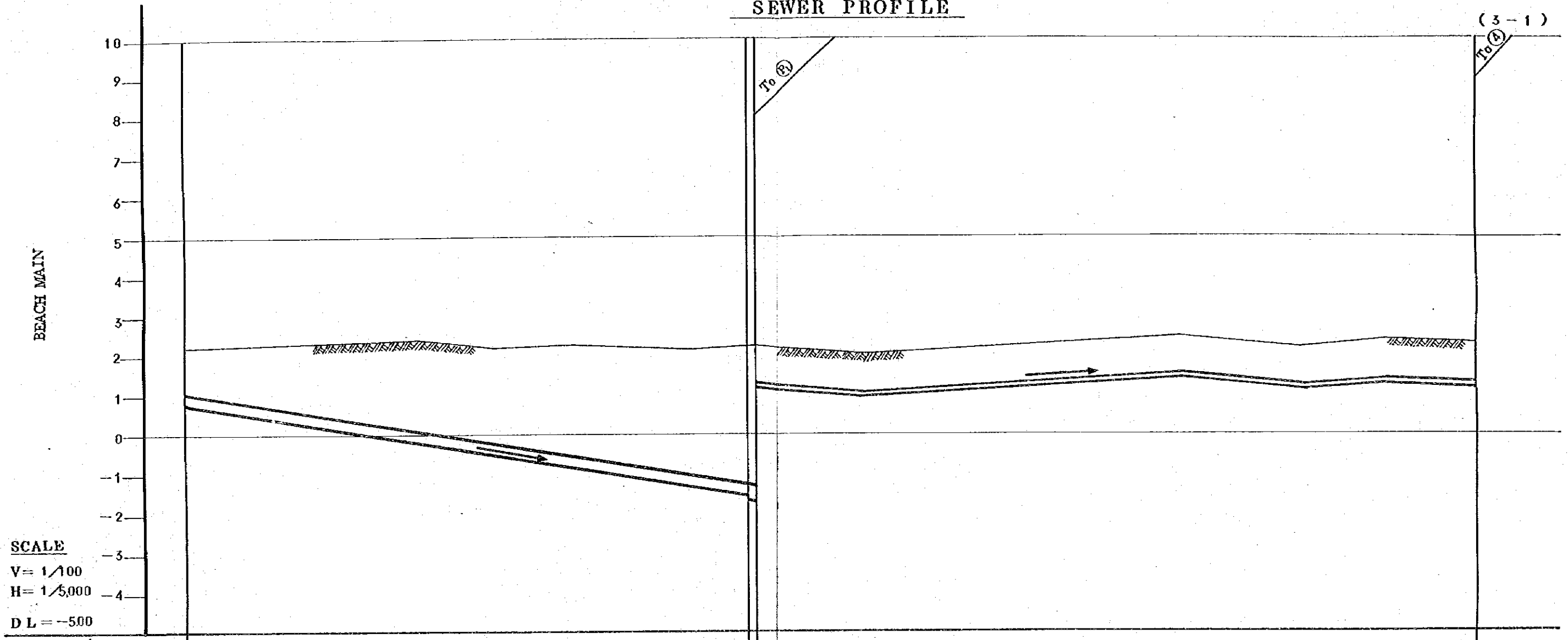


SCALE 1 : 10,000

3. SEWER PROFILE

SEWER PROFILE

(3-1)



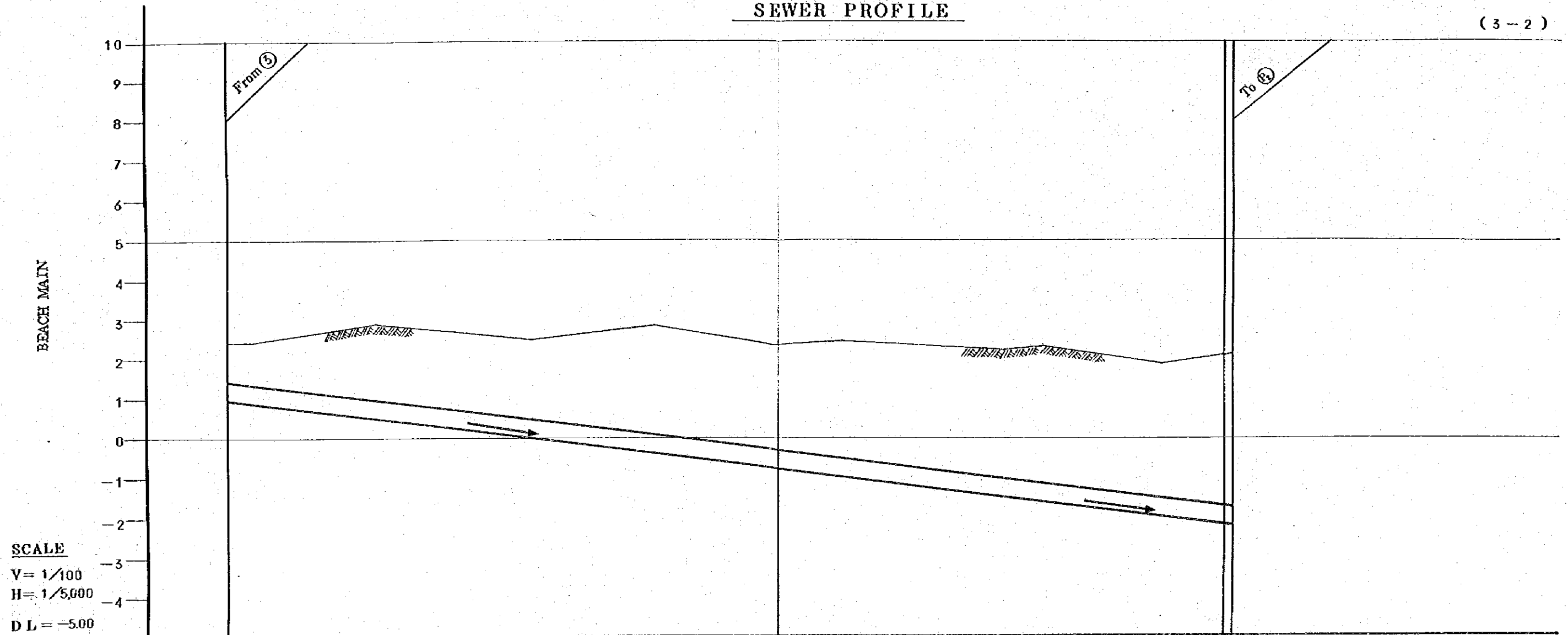
SCALE
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 H = 1/5,000
 D L = -500

SEWER NUMBER		①	②	③	
DIAMETER		Ø200	Ø300	Ø150	
SLOPE		3.3‰	2.6‰	Force main	
LENGTH		750m	10m	900m	

GROUND ELEVATION	M	2.02		2.26		2.37
EARTH COVER	M	1.00		3.72		1.00
INVERT ELEVATION	M	0.790		-1.685		-
ACCUMULATED DISTANCE	M	0.0		750.0		1,660.0
				760.0		
				-1.790		
				-1.816		
				1.00		

SEWER PROFILE

(3 - 2)



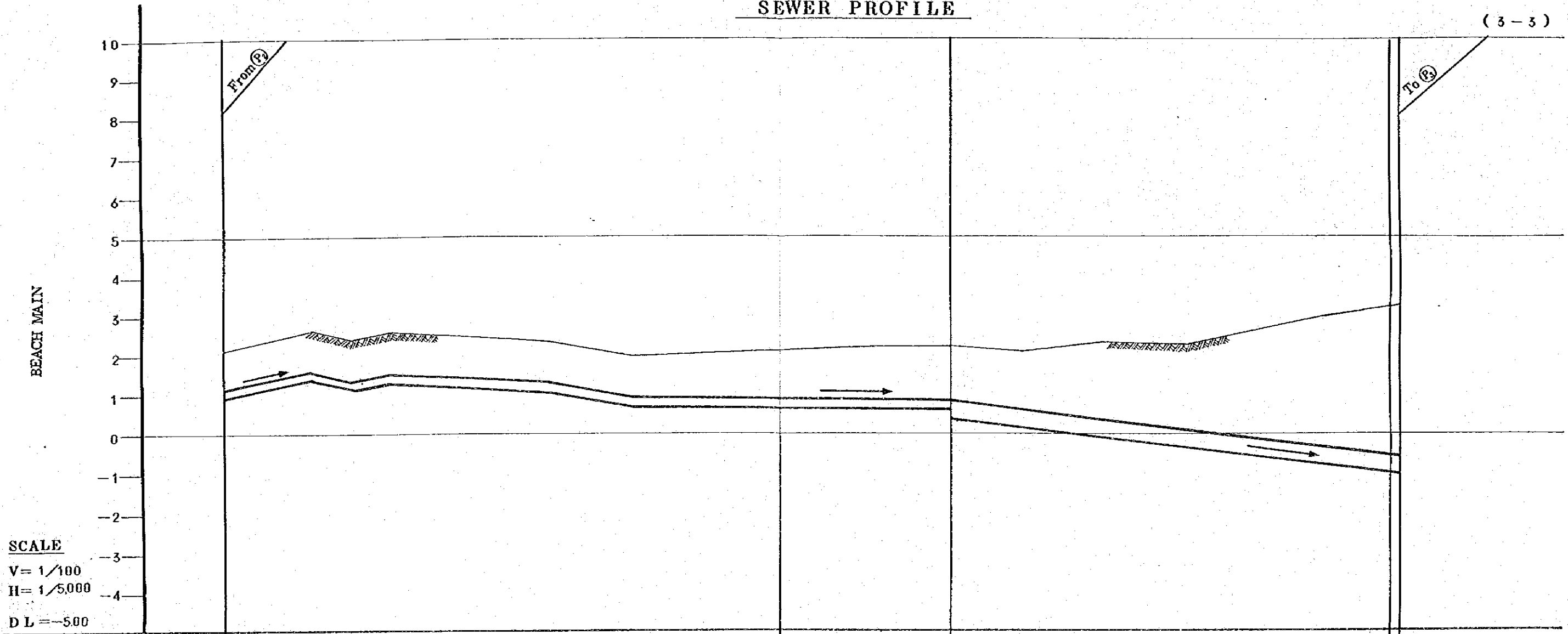
SCALE
 V = 1/100
 H = 1/5,000
 D L = -5.00

SEWER NUMBER			④			⑤
DIAMETER			Ø375			Ø375
SLOPE			2.5‰			2.5‰
LENGTH			1,250 _m			0 _m

GROUND ELEVATION	M						
EARTH COVER	M						
INVERT ELEVATION	M						
ACCUMULATED DISTANCE	M						
		1,660	0	2,37	2,910	0	2,920
					-2,165	3,86	-2,190
						5,88	5,88

SEWER PROFILE

(3 - 3)



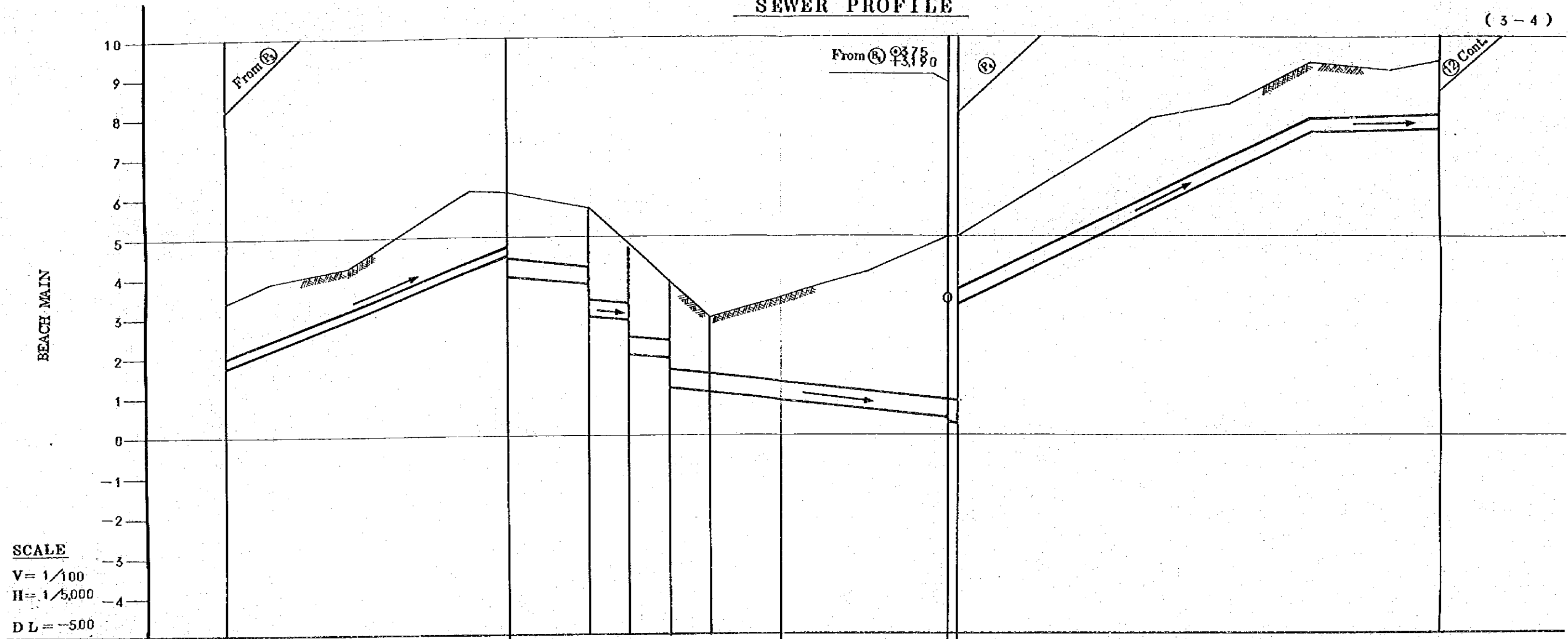
SCALE
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 H = 1/5,000
 D L = -5.00

SEWER NUMBER		⑥		⑦		⑧
DIAMETER		ø200		ø375		ø375
SLOPE		Force main		2.5‰		2.5‰
LENGTH		900m		550m		10m

GROUND ELEVATION	M	2.10		2.12		3.20
EARTH COVER	M	1.00		1.40		3.86
INVERT ELEVATION	M	1		0.310		-1.065
ACCUMULATED DISTANCE	M	2920.0		3820.0		4370.0
						4380.0

SEWER PROFILE

(3 - 4)



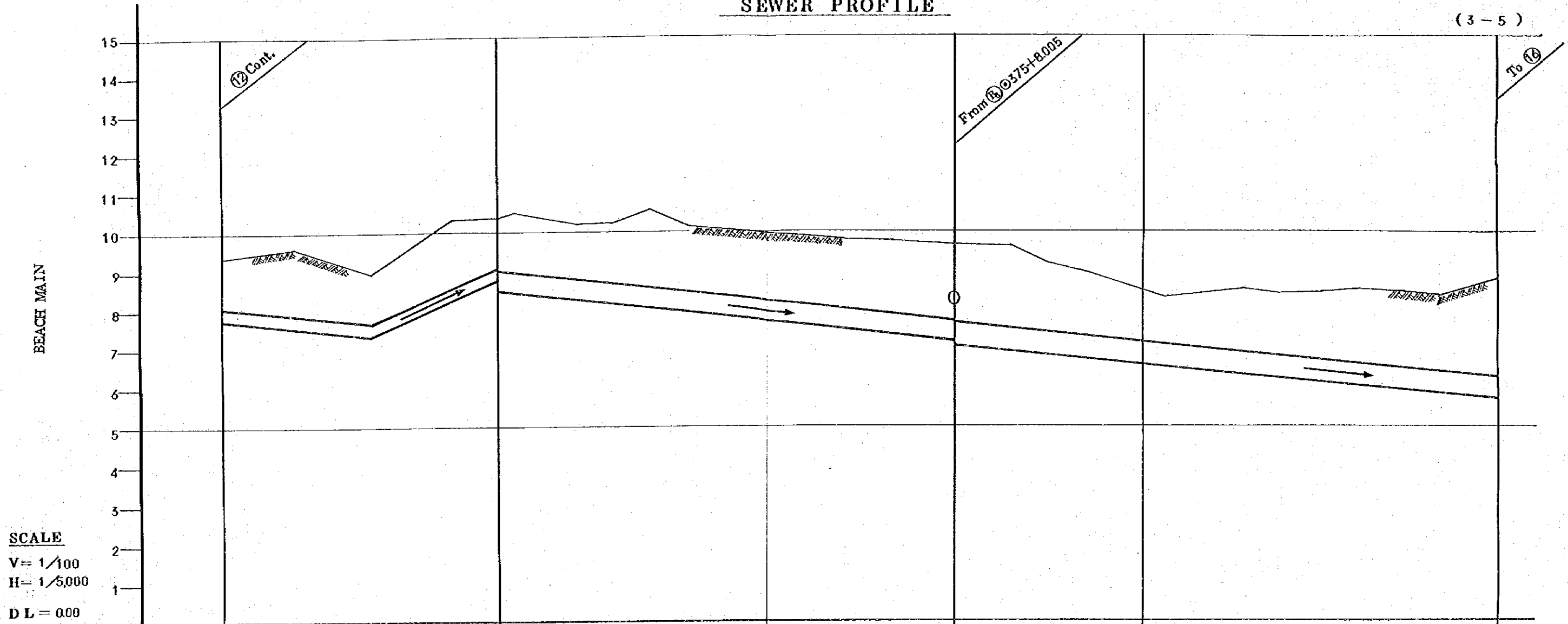
SCALE
 V = 1/100
 H = 1/5,000
 D L = -500

SEWER NUMBER	⑨	⑩	⑪
DIAMETER	ø200	ø450	ø500
SLOPE	Force main	25%	2.7%
LENGTH	350m	550m	10m
			⑫
			ø350
			Force main
			950m
			(600m)

GROUND ELEVATION	M	3.40	6.06	5.65	2.98	4.90	4.90	4.90	9.35
EARTH COVER	M	1.40	1.40	1.40	1.40	4.01	4.01	1.40	1.40
INVERT ELEVATION	M	-	3.990	3.760	1.090	0.400	0.350	-	-
ACCUMULATED DISTANCE	M	4580.0	4730.0	4830.0	4980.0	5280.0	5290.0	-	5890.0

SEWER PROFILE

(3 - 5)

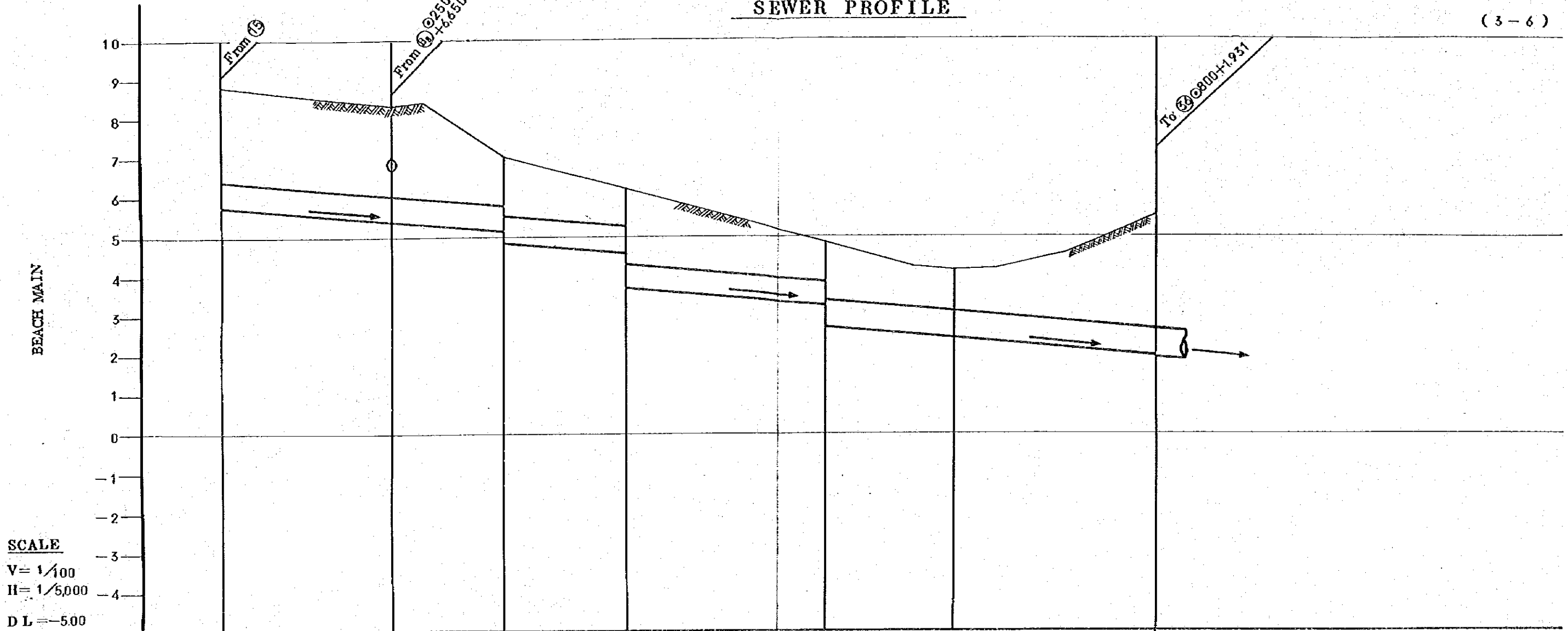


SCALE
 V = 1/100
 H = 1/5,000
 D L = 0.00

SEWER NUMBER	(12)	(13)	(14)	(15)
DIAMETER	Ø350	Ø500	Ø600	Ø600
SLOPE	Force main	2.2%	1.9%	1.9%
LENGTH	950m (350m)	580m	240m	450m

GROUND ELEVATION	M	9.35	10.30	10.30	9.69	9.69	8.50	8.78
EARTH COVER	M	1.30	1.30	1.30	1.97	2.03	1.30	2.44
INVERT ELEVATION	M	-	-	8.460	7.184	7.016	6.560	5.705
ACCUMULATED DISTANCE	M	5890.0	6240.0		6820.0		7060.0	7510.0

SEWER PROFILE



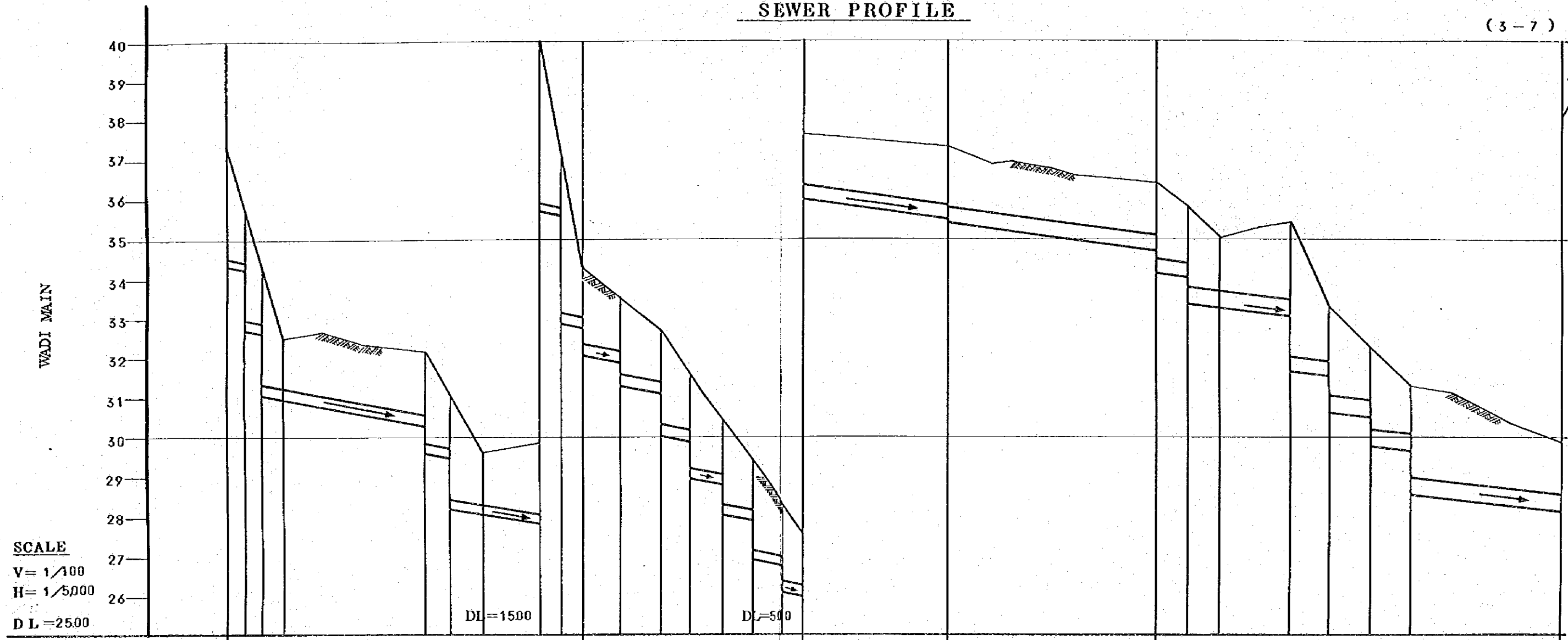
SCALE
 V = 1/100
 H = 1/5,000
 D L = -5.00

SEWER NUMBER		⑬		⑰	
DIAMETER		Ø600		Ø600	
SLOPE		1.9‰		1.9‰	
LENGTH		210m		950m	

GROUND ELEVATION	M	8.78	8.23		4.10		5.50
EARTH COVER	M	2.44	2.28		1.00		2.88
INVERT ELEVATION	M	5.705	5.306		2.460		1.985
ACCUMULATED DISTANCE	M	7510.0	7720.0		8420.0		8670.0

SEWER PROFILE

(3 - 7)

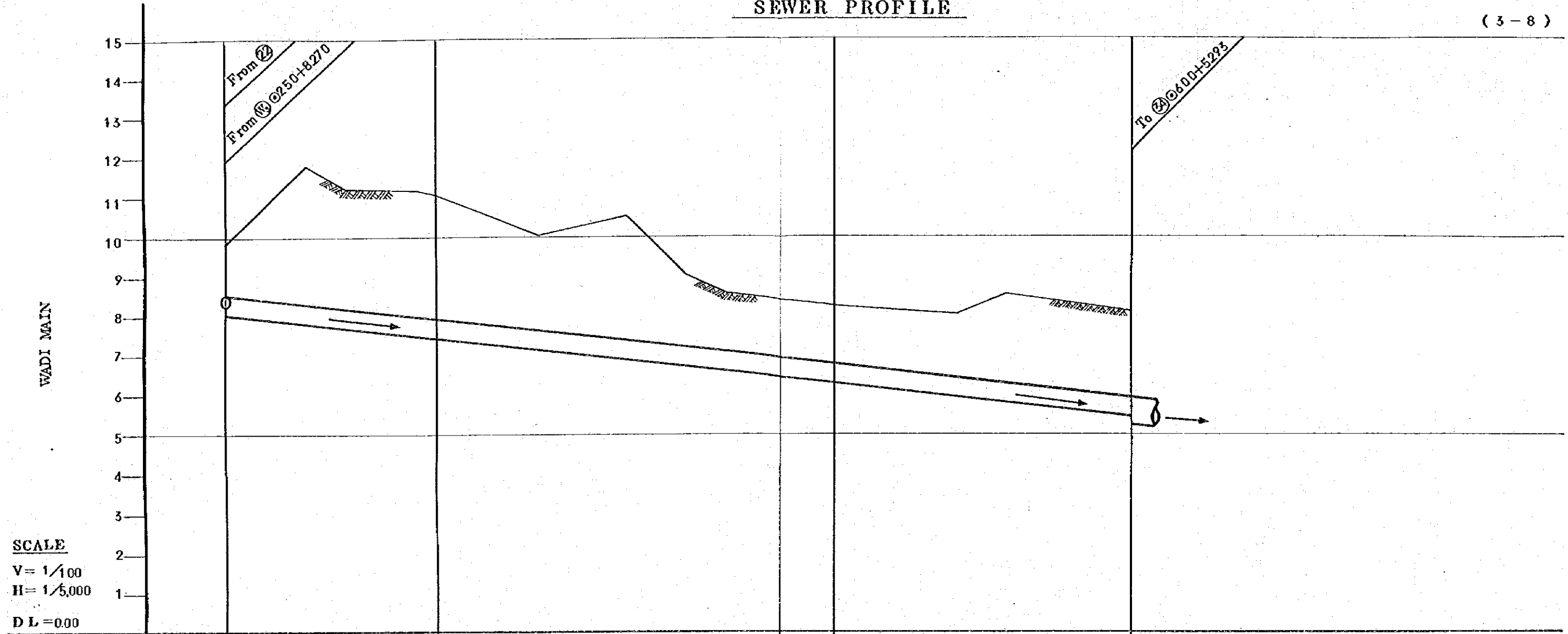


SCALE
 V = 1/100
 H = 1/5000
 D L = 25.00

SEWER NUMBER		⑱		⑲		⑳		㉑		㉒
DIAMETER		Ø200		Ø250		Ø300		Ø300		Ø375
SLOPE		3.3‰		2.9‰		2.6‰		2.6‰		2.5‰
LENGTH		440m		280m		180m		260m		500m

GROUND ELEVATION	M	0 0	34 28	37 28	35 70	28 60	29 60	29 88	24 26	24 26	23 47	17 60	17 60	17 29	17 29	16 36	16 36	15 75	15 75	15 00	15 00	9 85
EARTH COVER	M		2 75	1 50	1 50	1 30	1 81	1 30	1 96	1 30	1 30	1 30	1 30	1 46	1 55	1 30	1 81	1 30	1 30	1 30	1 30	1 30
INVERT ELEVATION	M		34 302	34 170		28 070	27 839	22 730	22 020	21 890		16 020	15 965	15 497	15 401	14 725	14 140	14 040	13 390	13 290		8 140
ACCUMULATED DISTANCE	M		0 0	40 0		320 0	390 0	440 0	485 0			720 0		900 0		1160 0	1200 0	1240 0				1660 0

SEWER PROFILE



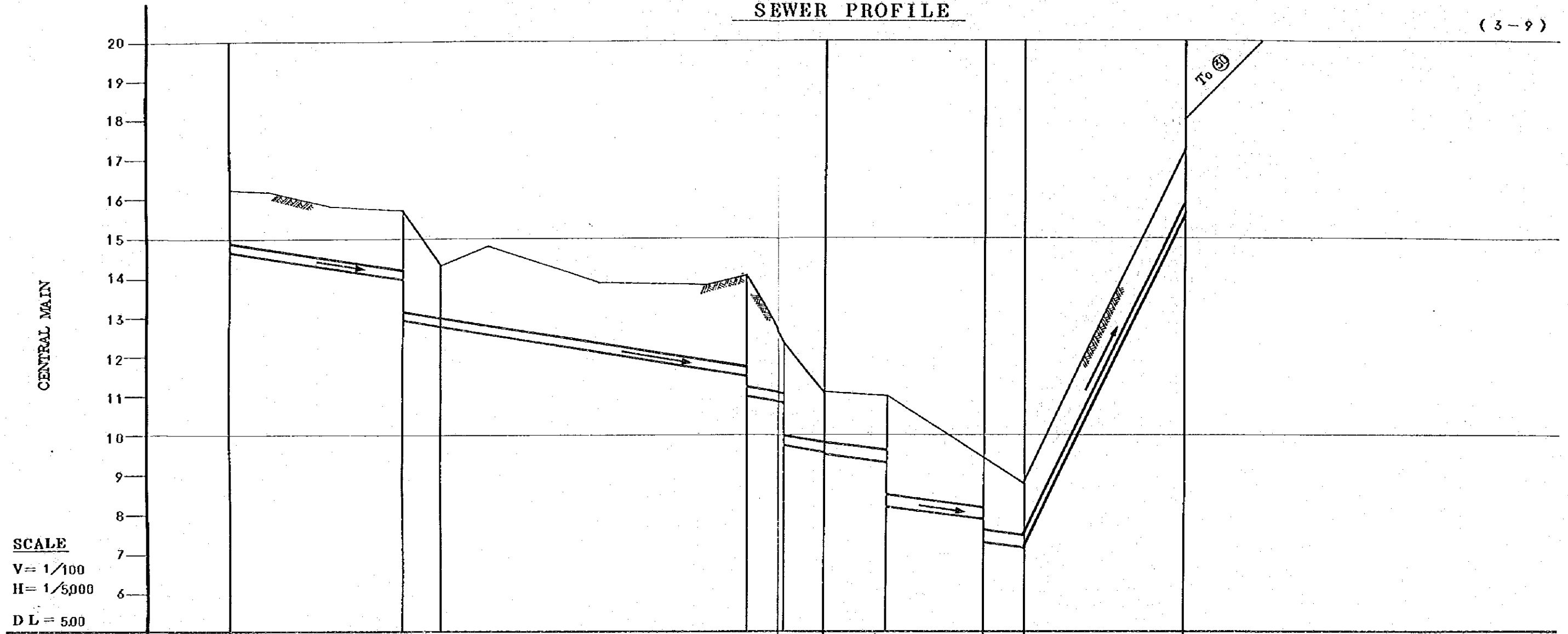
SCALE
 V = 1/100
 H = 1/5,000
 DL = 0.00

SEWER NUMBER		23		24		25	
DIAMETER		Ø450		Ø450		Ø450	
SLOPE		2.3‰		2.3‰		2.3‰	
LENGTH		260m		500m		370m	

GROUND ELEVATION	M	9.85	11.59	8.26	8.15
EARTH COVER	M	1.30	3.64	1.46	2.20
INVERT ELEVATION	M	8.060	7.462	6.312	5.461
ACCUMULATED DISTANCE	M	1660.0	1920.0	2420.0	2790.0

SEWER PROFILE

(3 - 9)

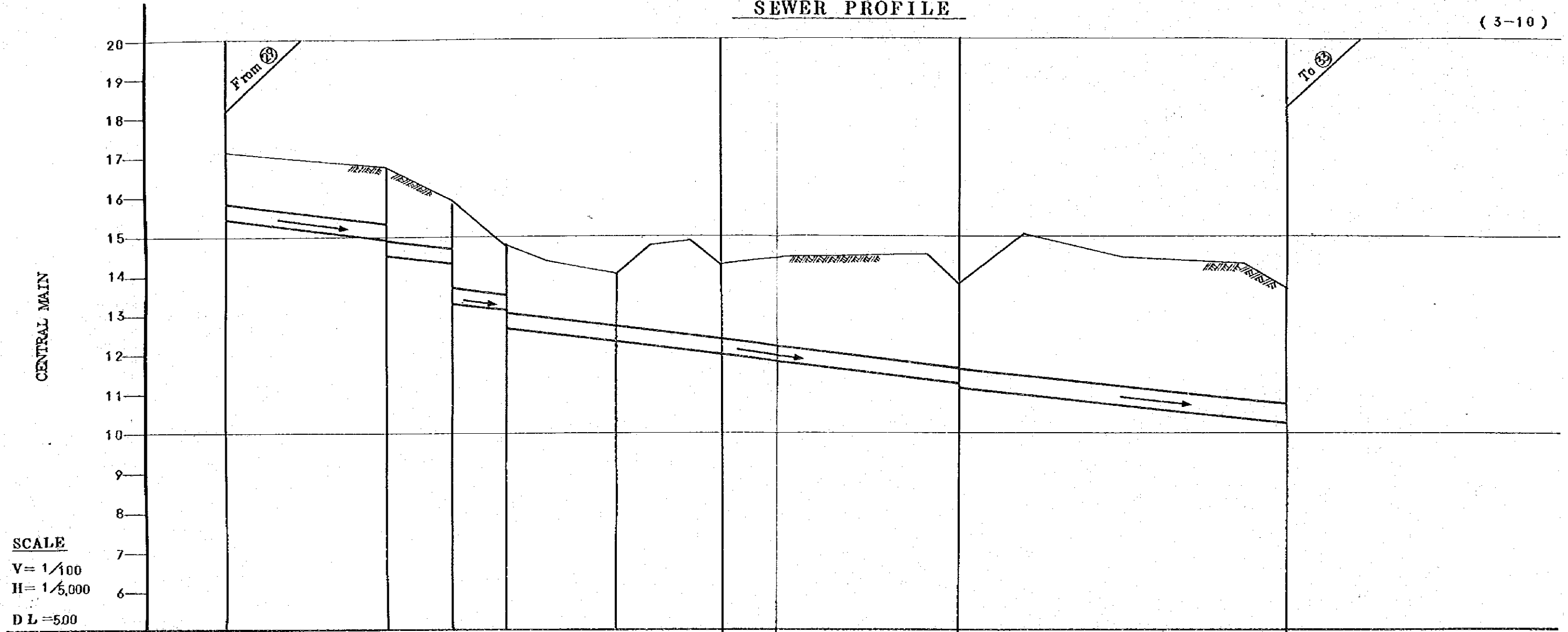


SEWER NUMBER		②⑥		②⑦	②⑧	②⑨
DIAMETER		Ø200		Ø250	Ø300	Ø150
SLOPE		3.3‰		2.9‰	2.6‰	Force main
LENGTH		750m		200m	50m	200m

GROUND ELEVATION	M	16.20	15.70	14.30	11.10	9.47	17.17
EARTH COVER	M	1.30	1.53	2.64	1.30	1.30	1.30
INVERT ELEVATION	M	14.670	13.944	11.433	9.570	7.890	-
ACCUMULATED DISTANCE	M	0.0	220.0	650.0	750.0	950.0	1200.0
			12.852		9.520	7.295	
			12.720		8.238	7.165	
			14.25		11.00	8.80	
					11.00	8.80	

SEWER PROFILE

(3-10)



SCALE
 V = 1/100
 H = 1/5,000
 D L = 500

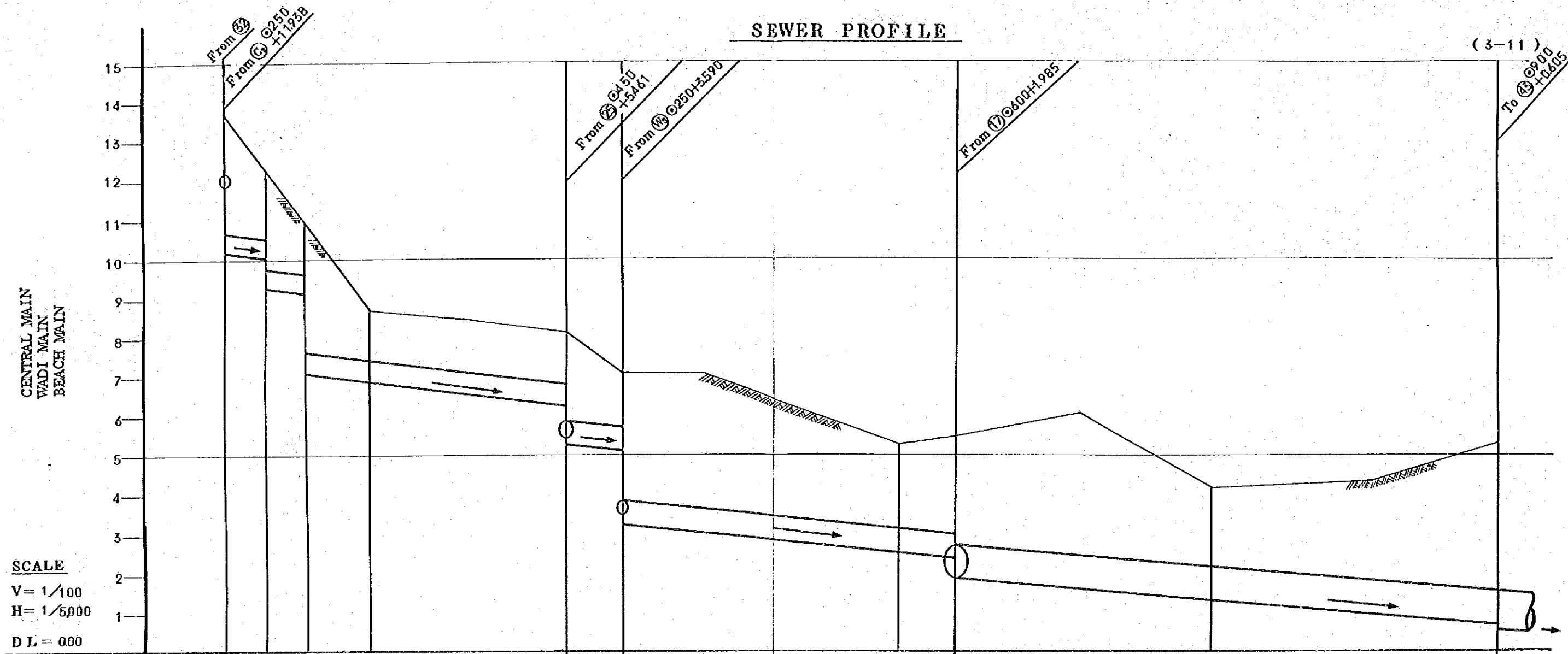
SEWER NUMBER
 DIAMETER
 SLOPE
 LENGTH

30	31	32
Ø375	Ø375	Ø450
2.5%	2.5%	2.3%
620m	300m	410m

GROUND ELEVATION	M	17.17	16.72	14.05	14.21	13.73	13.73	13.63
EARTH COVER	M	1.30	1.35	1.30	1.79	2.06	2.06	2.90
INVERT ELEVATION	M	15.460	14.960	12.340	12.015	11.265	11.185	10.242
ACCUMULATED DISTANCE	M	1200 0	1400 0	1690 0	1820 0	2120 0		2530 0

SEWER PROFILE

(3-11)

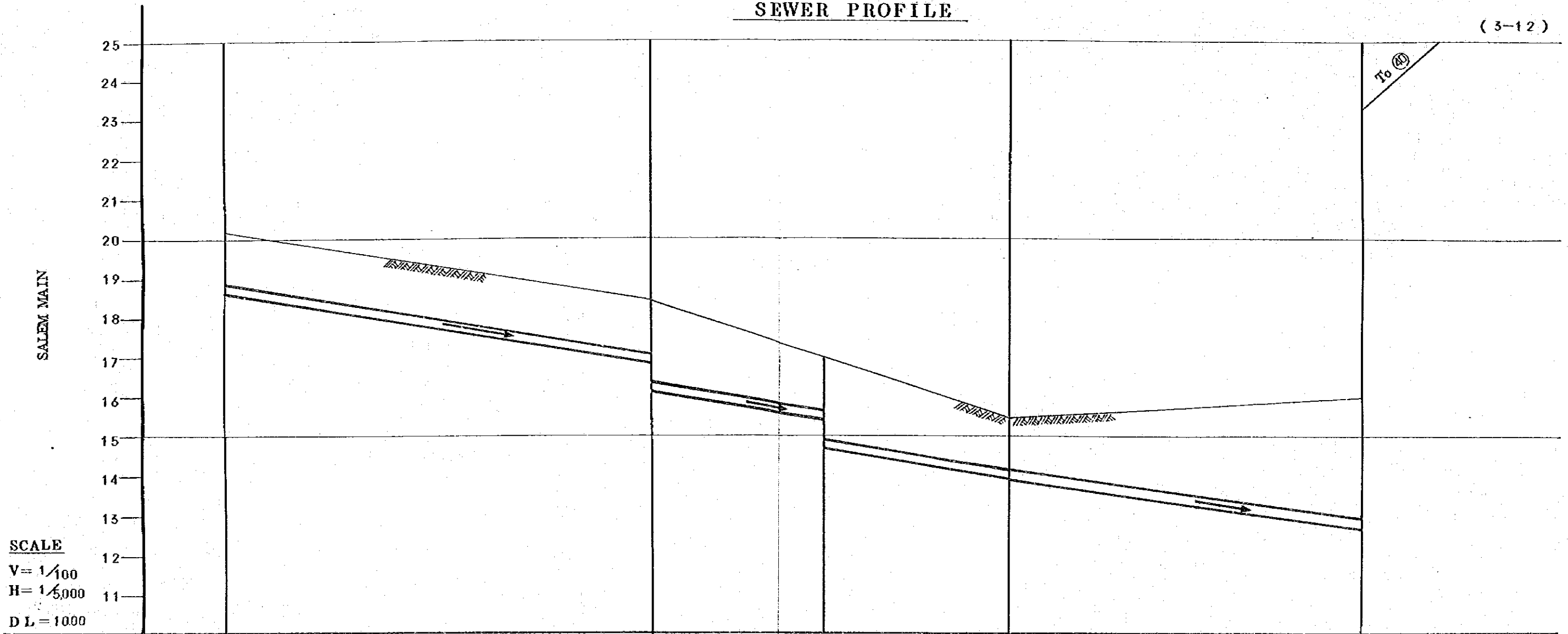


SCALE
 V = 1/100
 H = 1/5000
 D L = 000

SEWER NUMBER		33	34	35	36	37	38
DIAMETER		500	600	600	600	600	800
SLOPE		22‰	19‰	19‰	19‰	19‰	18‰
LENGTH		430 m	70 m	420 m	420 m	420 m	680 m
GROUND ELEVATION	M	10 13 63	8 15	8 15	5 50	5 50	4 20
EARTH COVER	M	2 90	1 32	2 22	2 43	2 72	3 75
INVERT ELEVATION	M	6 840	5 293	5 160	2 432	1 931	0 707
ACCUMULATED DISTANCE	M	2530 0	2710 0	2860 0	3280 0	3670 0	4350 0

SEWER PROFILE

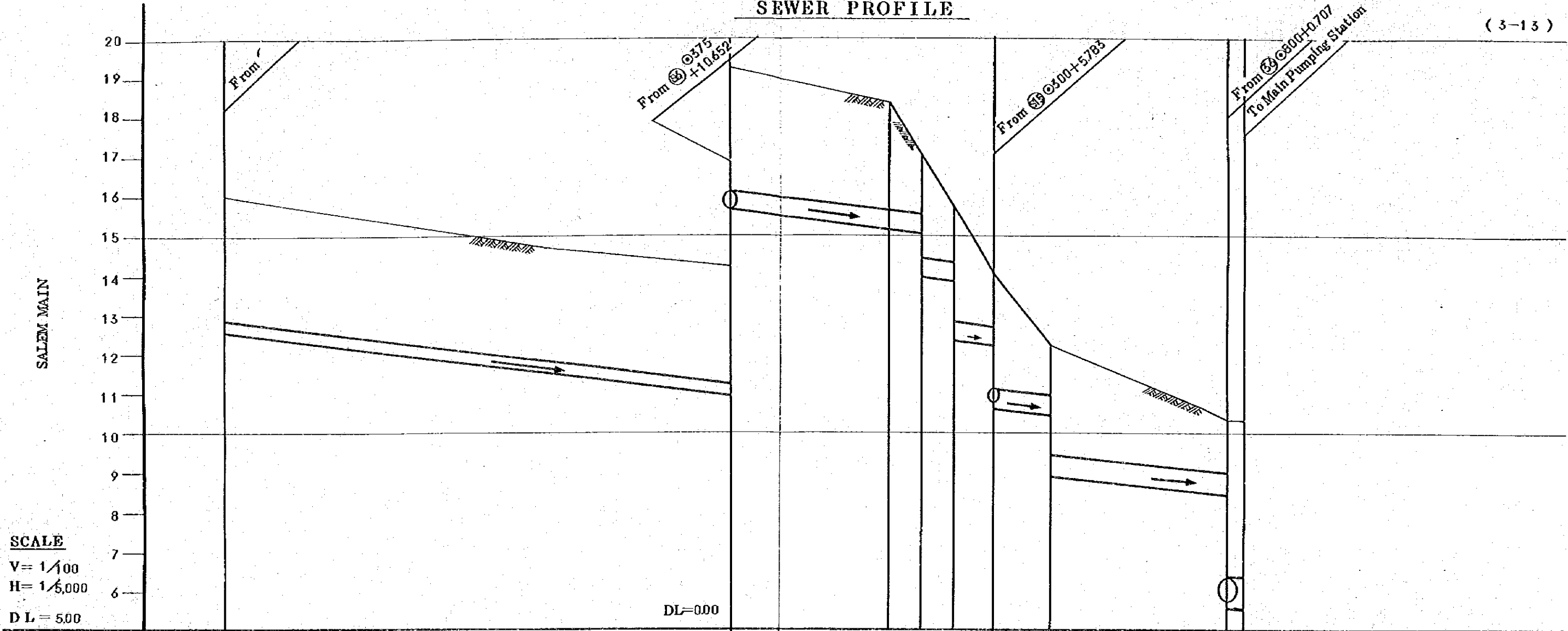
(3-12)



SEWER NUMBER		⑤⑦		⑤⑧		⑤⑨
DIAMETER		Ø200		Ø200		Ø250
SLOPE		3.3‰		3.3‰		2.9‰
LENGTH		530m		450m		440m

GROUND ELEVATION	M	0+0	530+0	750+0	980+0	1420+0
EARTH COVER	M	1.30	1.31	1.30	1.30	3.08
INVERT ELEVATION	M	18.610	16.861	15.420	13.970	12.644
ACCUMULATED DISTANCE	M	0.0	530.0	750.0	980.0	1420.0

SEWER PROFILE



SCALE
 V = 1/100
 H = 1/5,000
 D L = 500

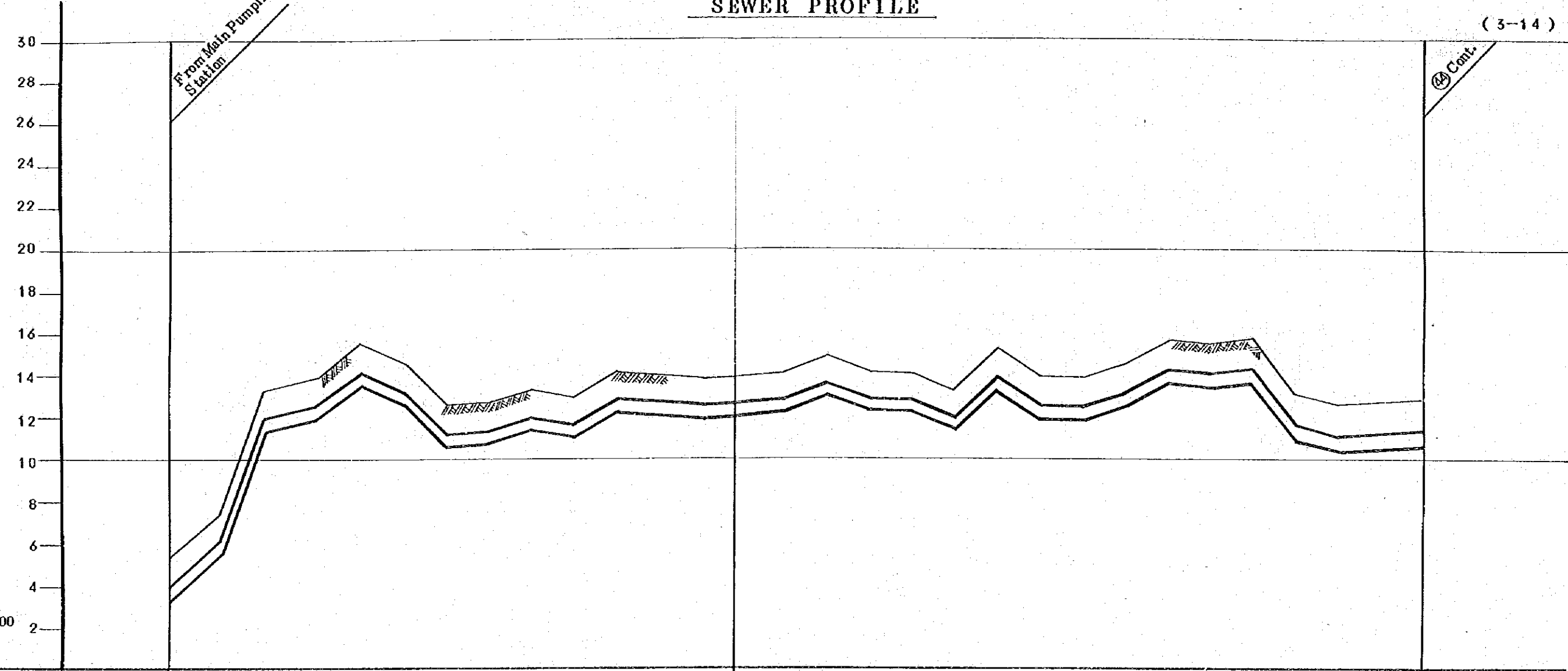
SEWER NUMBER		④		④		④	④
DIAMETER		300		450		500	200
SLOPE		2.6%		2.3%		2.2%	1.6%
LENGTH		630m		330m		290m	20m

GROUND ELEVATION	M	1420:0	2050:0	2250:0	2370:0	2660:0	9350:0	9370:0
EARTH COVER	M	16:00	14:22	13:35	9:00	5:30	5:30	5:30
INVERT ELEVATION	M	12:585	10:947	10:112	7:210	3:460	0:605	0:573
ACCUMULATED DISTANCE	M	0	630	1000	1330	1620	1910	1930

SEWER PROFILE

(3-14)

FORCE MAIN TO TREATMENT PLANT



SCALE
 V = 1/200
 H = 1/10,000
 D L = 0.00

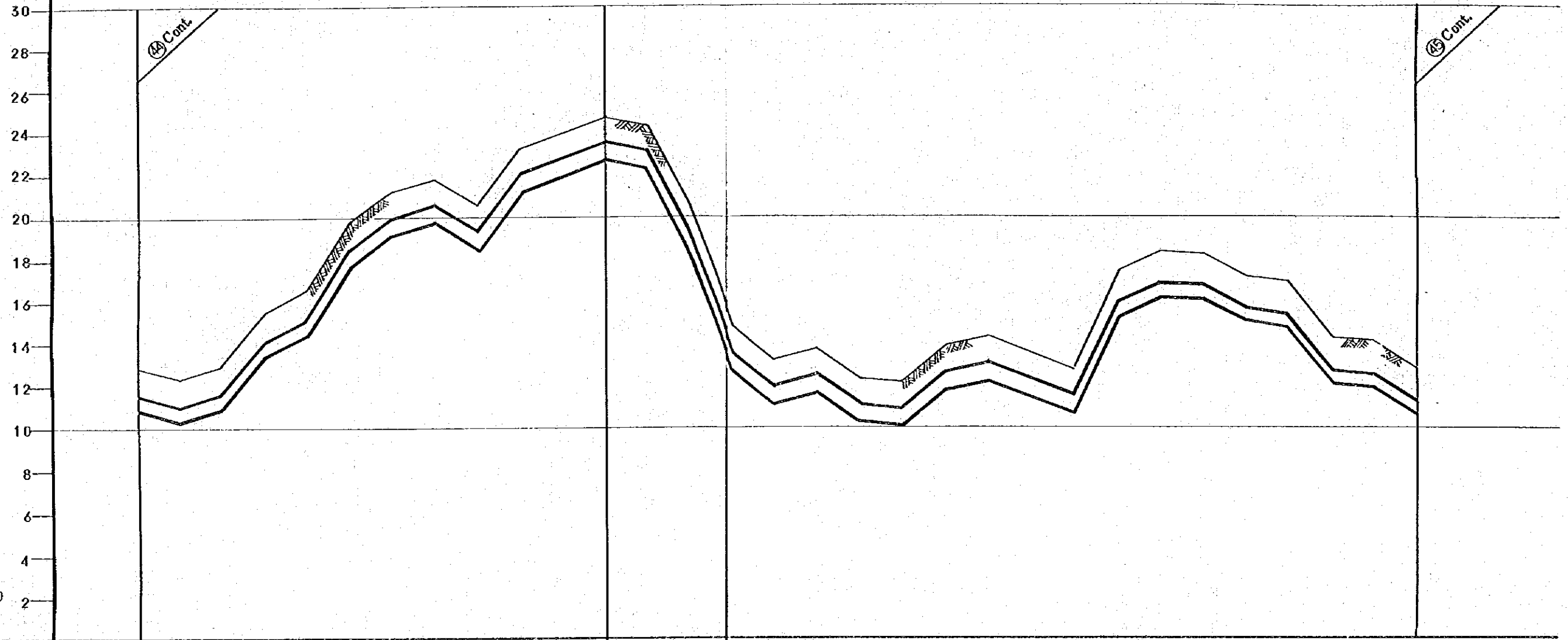
SEWER NUMBER		④
DIAMETER		ø500x2
SLOPE		Force main
LENGTH		4050m (2950m)

GROUND ELEVATION	M	9370	530			
EARTH COVER	M	140				140 1281
INVERT ELEVATION	M					-
ACCUMULATED DISTANCE	M	9370	0			12320

SEWER PROFILE

(3-15)

FORCE MAIN TO TREATMENT PLANT



SCALE
 V = 1/200
 H = 1/10,000
 D L = 0.00

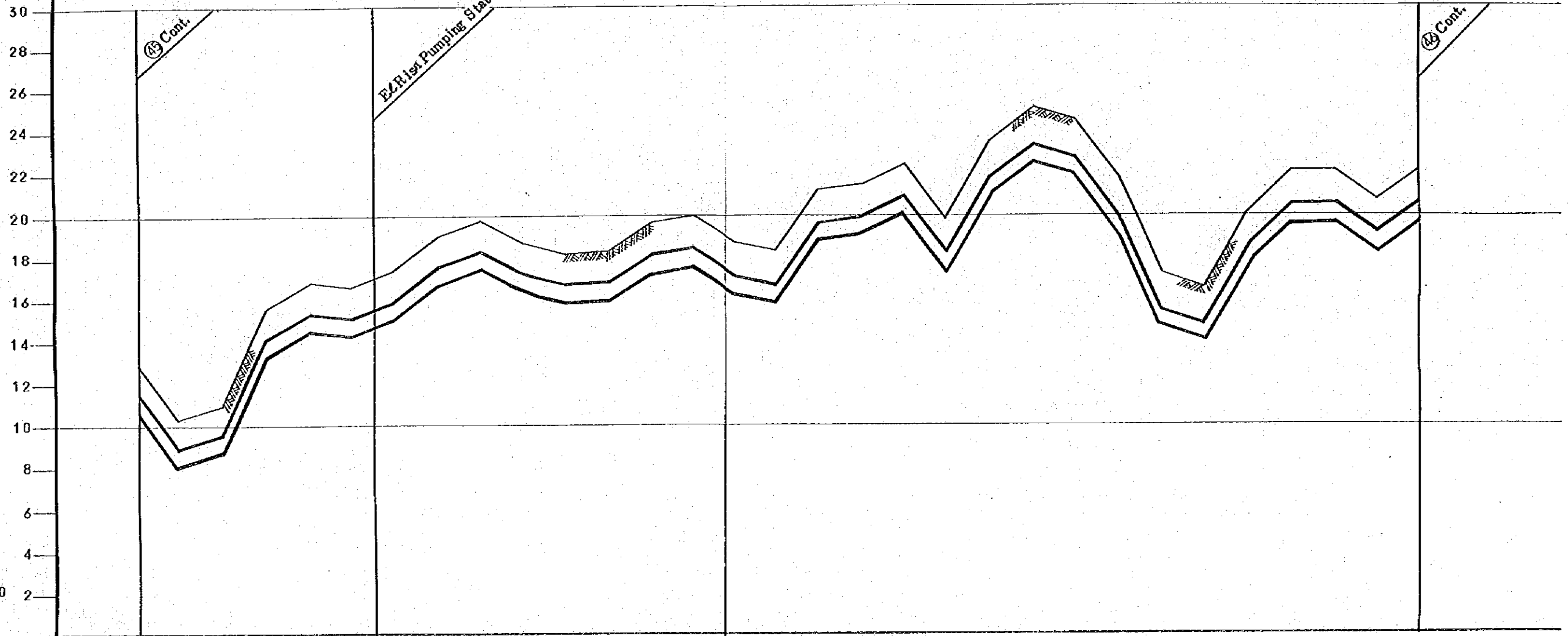
SEWER NUMBER	④	⑤
DIAMETER	ø500x2	ø500x2
SLOPE	Force main	Pressured Pipe
LENGTH	4050m (1,100m)	2450m (1,900m)

GROUND ELEVATION	M	12 81	24 65	12 85
EARTH COVER	M	1 40	1 40	1 40
INVERT ELEVATION	M	—	—	—
ACCUMULATED DISTANCE	M	12320 0	13420 0	15320 0

SEWER PROFILE

(3-16)

FORCE MAIN TO TREATMENT PLANT



SCALE
 V = 1/200
 H = 1/10,000
 D L = 0.00

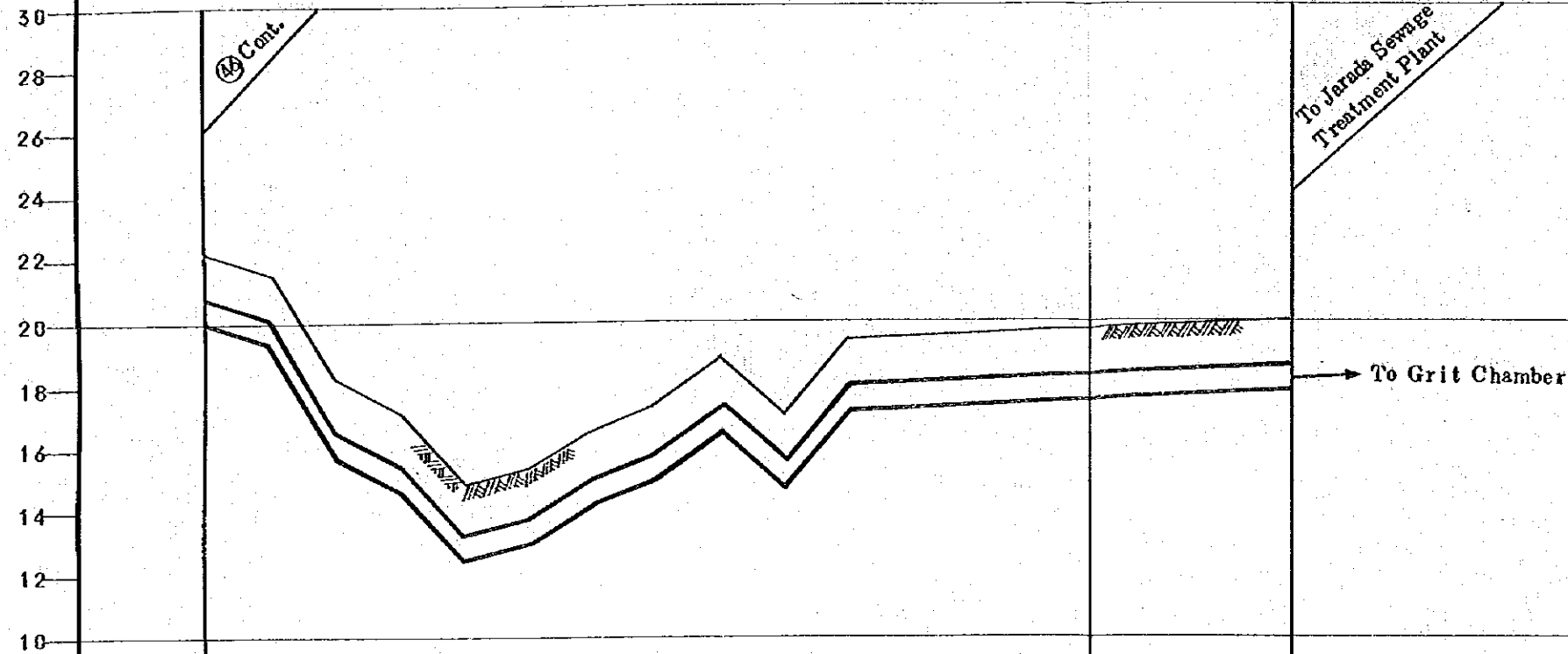
SEWER NUMBER	④⑤		④⑥
DIAMETER	ø500x2		ø500x2
SLOPE	Pressured Pipe		Force main
LENGTH	2450m (550m)		4,150m (2,450m)

GROUND ELEVATION	M	15320.0	15870.0		18320.0	18870.0
EARTH COVER	M	1.40	1.40		1.40	1.40
INVERT ELEVATION	M	-	-		-	-
ACCUMULATED DISTANCE	M	15320.0	15870.0		18320.0	18870.0

SEWER PROFILE

(3-17)

FORCE MAIN TO TREATMENT PLANT



SCALE
 V=1/200
 H=1/10,000
 D L = 0.00

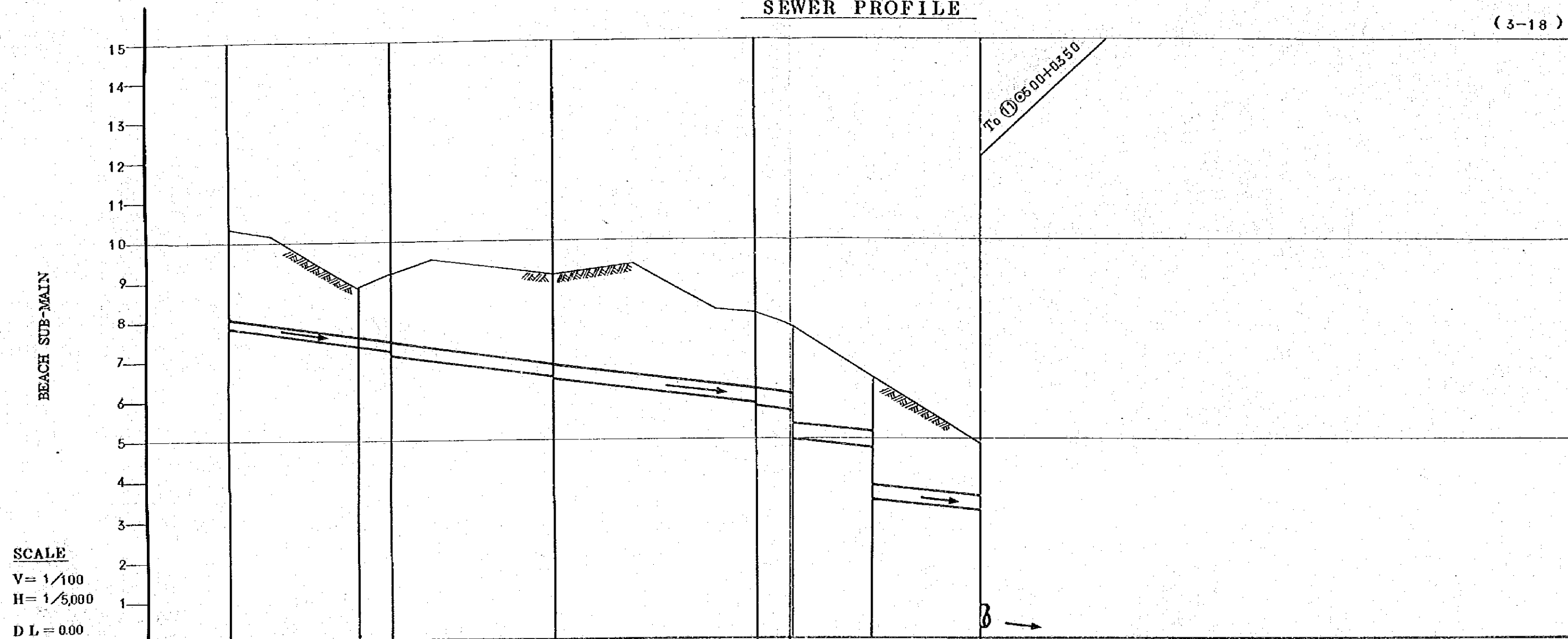
SEWER NUMBER _____
 DIAMETER _____
 SLOPE _____
 LENGTH _____

④
 ∅500x2
 Force main
 4,150m
 (1,700m)

GROUND ELEVATION	M	22.06			20.00
EARTH COVER	M	1.40			1.40
INVERT ELEVATION	M	-			-
ACCUMULATED DISTANCE	M	18,520.0			20,020.0

SEWER PROFILE

(3-18)

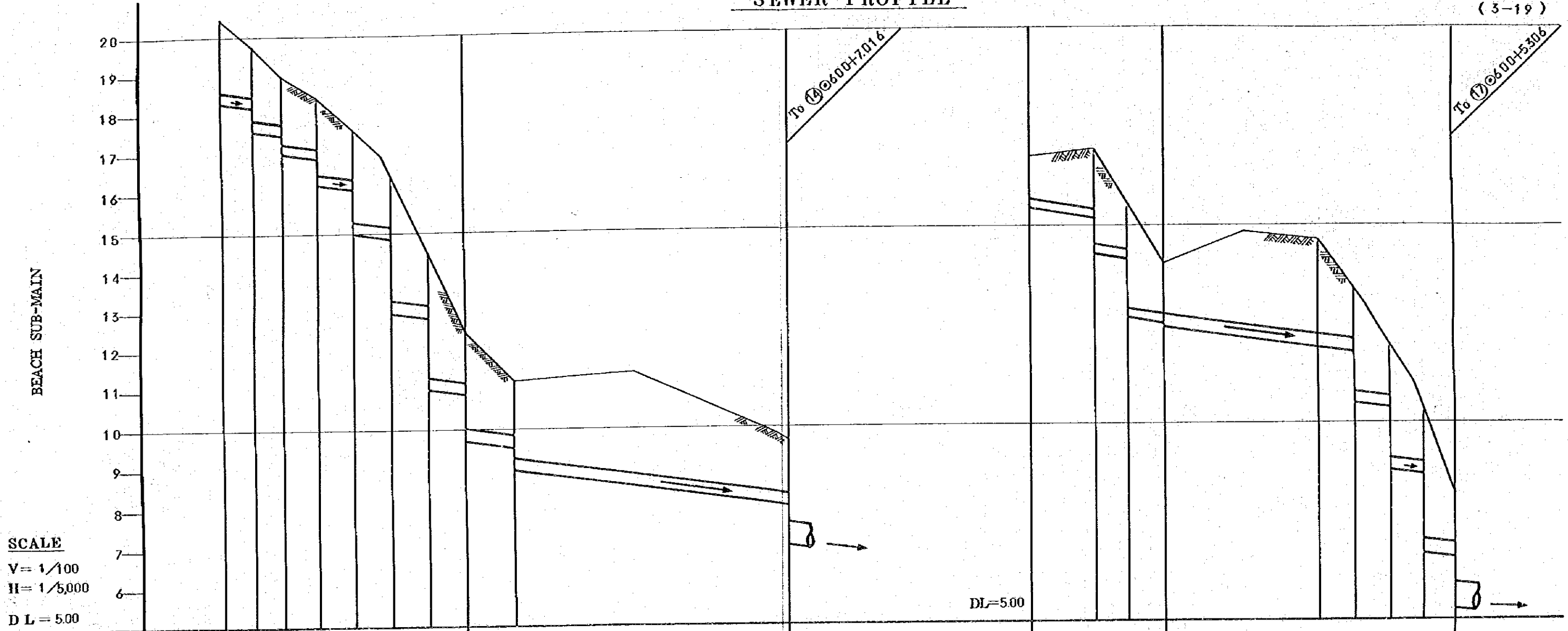


SEWER NUMBER	①	②	③	④
DIAMETER	⊙200	⊙250	⊙300	⊙375
SLOPE	3.3‰	2.9‰	2.6‰	2.5‰
LENGTH	200m	200m	250m	280m

GROUND ELEVATION	M	10.30	8.90	9.14	8.15	4.90
EARTH COVER	M	2.17	1.30	2.25	1.91	1.30
INVERT ELEVATION	M	7.898	7.370	6.608	5.903	3.190
ACCUMULATED DISTANCE	M	0.0	160.0	400.0	650.0	930.0

SEWER PROFILE

(3-19)

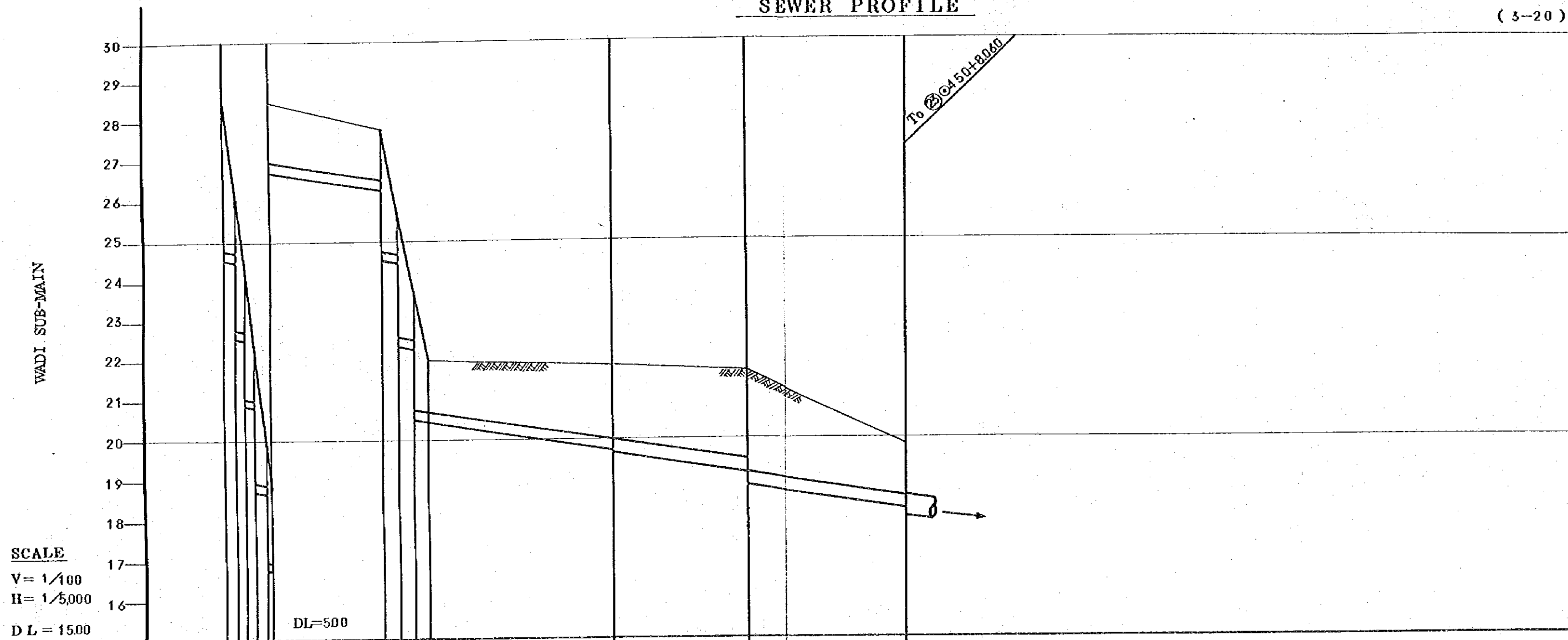


SCALE
 V = 1/100
 H = 1/5,000
 D L = 5.00

SEWER NUMBER		Ⓟ		Ⓟ		Ⓟ	Ⓟ
DIAMETER		Ⓟ250		Ⓟ300		Ⓟ200	Ⓟ250
SLOPE		2.9‰		2.6‰		3.3‰	2.9‰
LENGTH		300m		400m		170m	360m

	M	0.0	40.0	300.0	360.0	700.0	80.0	170.0	360.0	530.0
GROUND ELEVATION		20.41	19.70	12.47	12.47	9.69	17.00	14.06	14.65	8.23
EARTH COVER		1.90	1.30	1.30	2.40	1.30	1.74	1.30	2.44	1.30
INVERT ELEVATION		18.230	18.114	10.890	9.731	8.939	15.206	12.530	11.929	6.650
ACCUMULATED DISTANCE		0.0	40.0	300.0	360.0	700.0	80.0	170.0	360.0	530.0

SEWER PROFILE



SCALE
 V = 1/100
 H = 1/5,000
 D L = 15.00

SEWER NUMBER		①		②		③
DIAMETER		Ø200		Ø250		Ø250
SLOPE		3.3‰		2.9‰		2.9‰
LENGTH		480m		160m		200m

GROUND ELEVATION	M		28.17		12.00				
EARTH COVER	M		3.35		1.30				
INVERT ELEVATION	M		24.590		10.470		9.711		9.661
ACCUMULATED DISTANCE	M		0.0		250.0		480.0		640.0
			60.0				9.197		8.850
			26.880				2.23		2.58
			26.732				11.71		11.71
			1.68				9.85		1.30
			28.41						
			28.41						

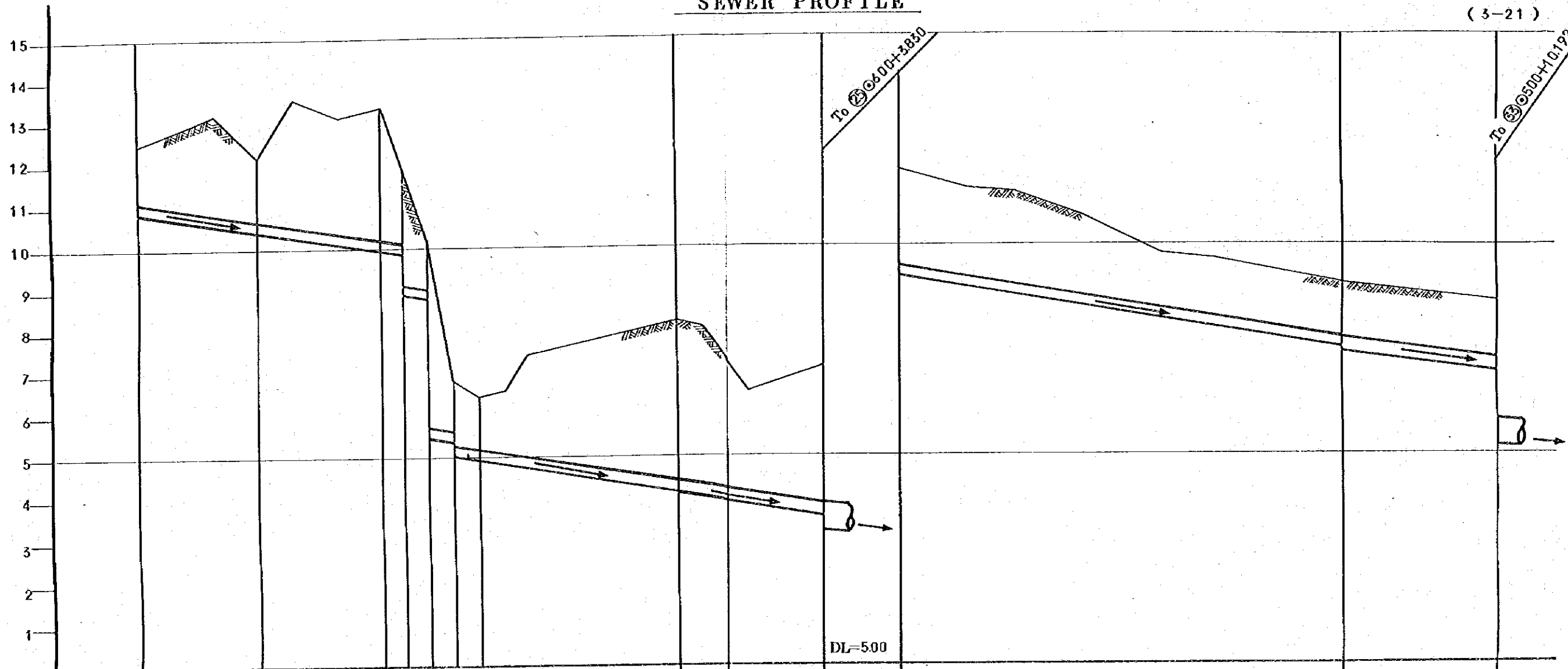
SEWER PROFILE

(5-21)

WADI SUB-MAIN
CENTRAL SUB-MAIN

SCALE

V = 1/100
H = 1/5,000
D L = 0.00



SEWER NUMBER
DIAMETER
SLOPE
LENGTH

⑪
Ø200
3.5%
630m

⑫
Ø250
2.9%
180m

⑬
Ø200
3.3%
520m

⑭
Ø250
2.9%
180m

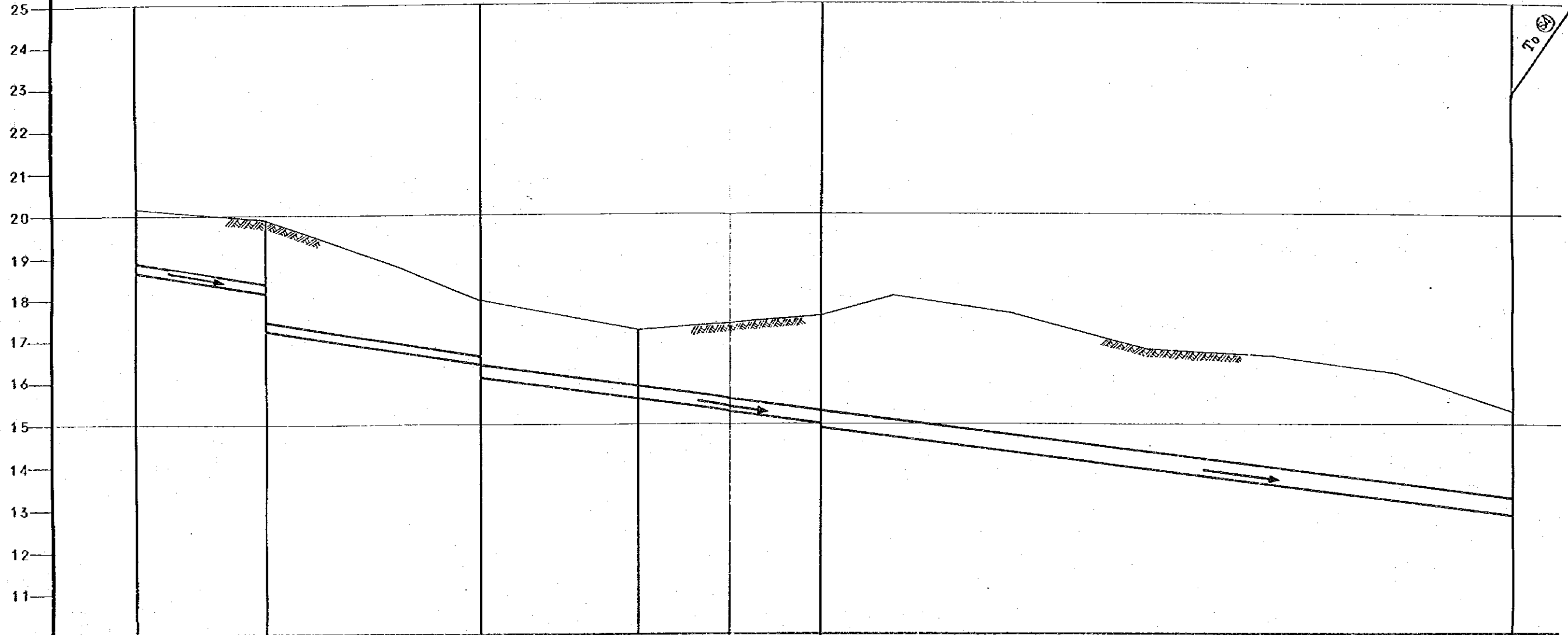
GROUND ELEVATION	M	0 0	10 880	12 41	140 0	10 418	12 15	290 0	9 923	13 28	400 0	4 920	6 45	630 0	4 162	8 20	8 20	810 0	3 590	7 10	0 0	14 226	16 74	520 0	12 510	14 04	700 0	11 938	13 63	
EARTH COVER	M		1 30		1 50			3 13			1 30			3 81				3 23			2 28			1 30		1 30		1 41		
INVERT ELEVATION	M		10 880		10 418			9 923			4 920			4 162		4 112		3 590			14 226			12 510		12 460		11 938		
ACCUMULATED DISTANCE	M	0 0			140 0			290 0			400 0			630 0				810 0			0 0			520 0		700 0				

SEWER PROFILE

(3-22)

SALEM SUB-MAIN

SCALE
 V = 1/100
 H = 1/5000
 D L = 1000



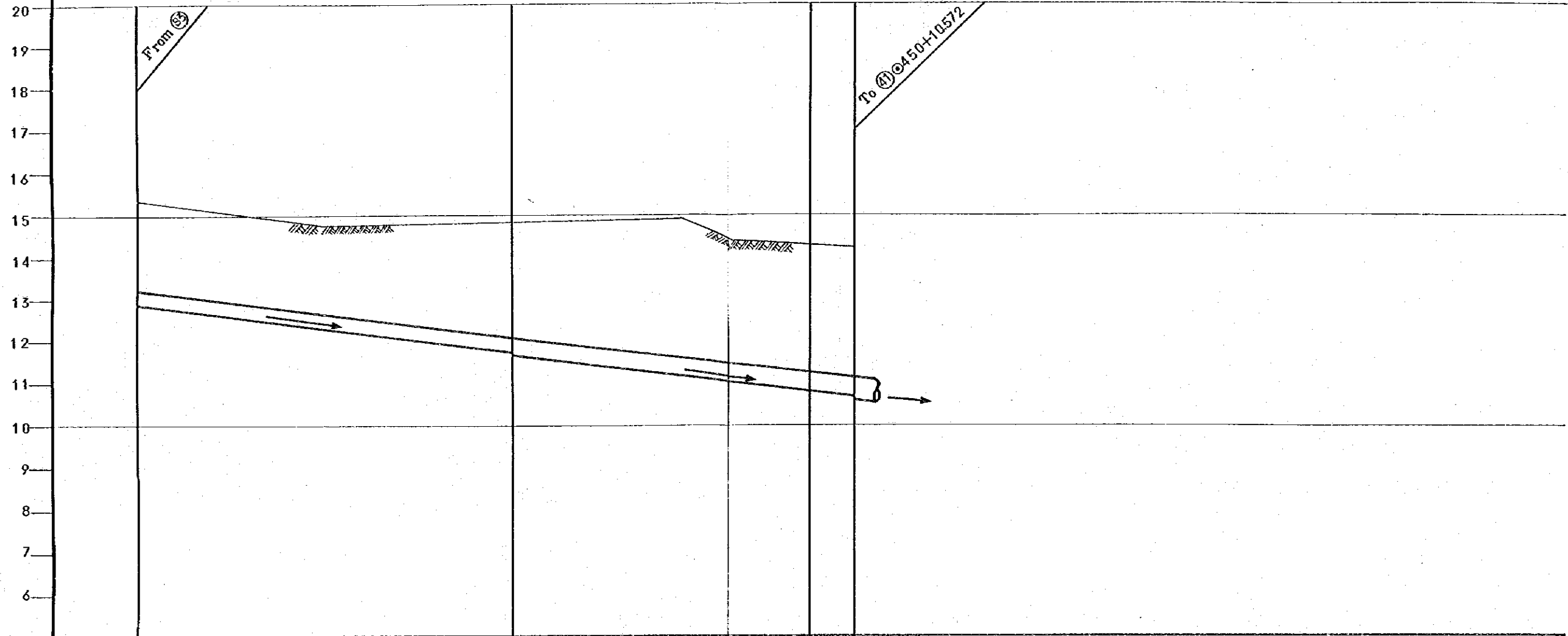
SEWER NUMBER		S1		S2		S3
DIAMETER		Ø200		Ø250		Ø300
SLOPE		3.5‰		2.9‰		2.6‰
LENGTH		400m		400m		810m

GROUND ELEVATION	M	0	150	400	580	800	1610
EARTH COVER	M	1 30	1 54	1 30	1 30	2 29	2 09
INVERT ELEVATION	M	18 610	18 115	16 470	15 670	15 032	12 871
ACCUMULATED DISTANCE	M	0 0	150 0	400 0	580 0	800 0	1610 0

SEWER PROFILE

(3-23)

SALEM SUB-MAIN



SCALE
 V = 1/100
 H = 1/5,000
 D L = 500

SEWER NUMBER	SA	SS	SA
DIAMETER	Ø300	Ø375	Ø375
SLOPE	2.6‰	2.5‰	2.5‰
LENGTH	440m	350m	50m

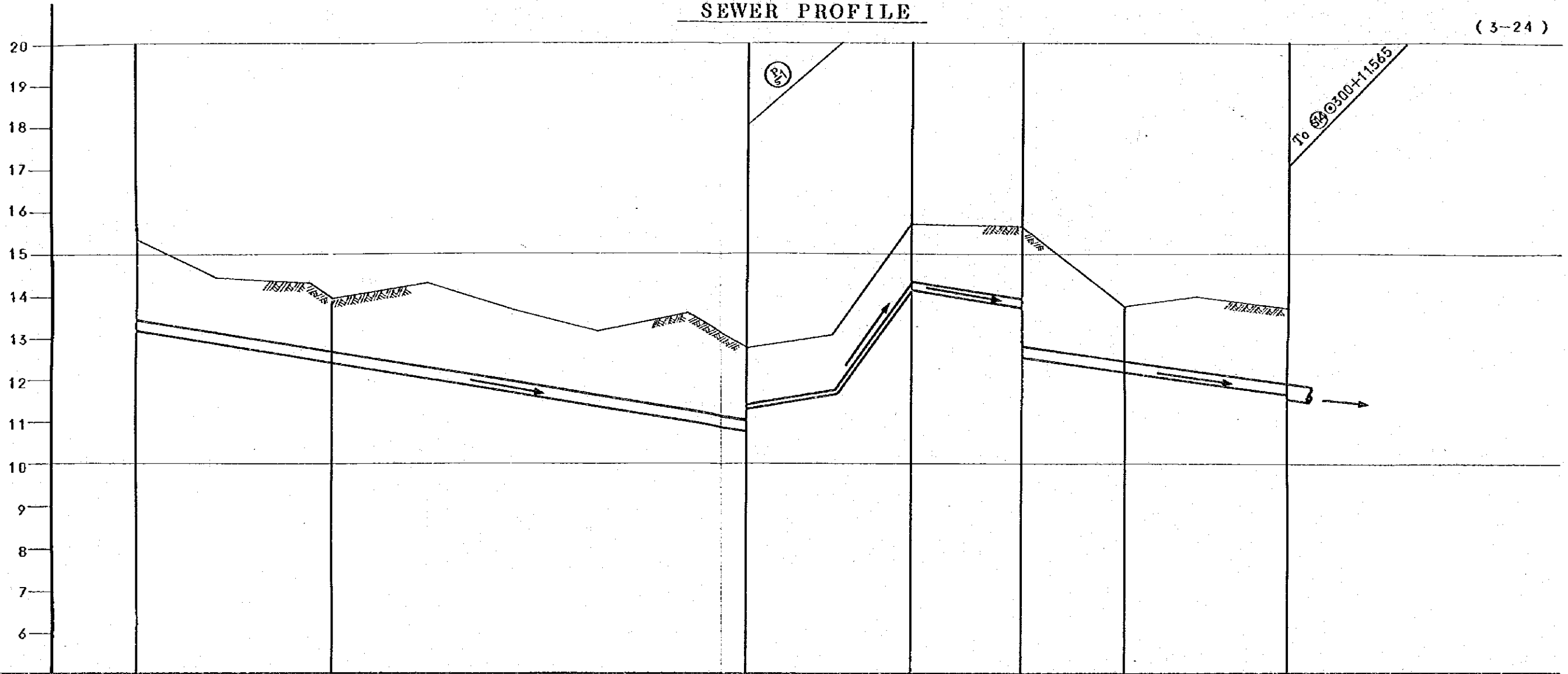
GROUND ELEVATION	M	15.30	14.85	14.85	14.25	14.22
EARTH COVER	M	2.09	2.79	2.79	3.06	3.16
INVERT ELEVATION	M	12.871	11.727	11.652	10.777	10.652
ACCUMULATED DISTANCE	M	1610.0	2050.0	2400.0	2450.0	

SEWER PROFILE

(3-24)

SALEM SUB-MAIN

SCALE
 V = 1/100
 H = 1/5,000
 D L = 500

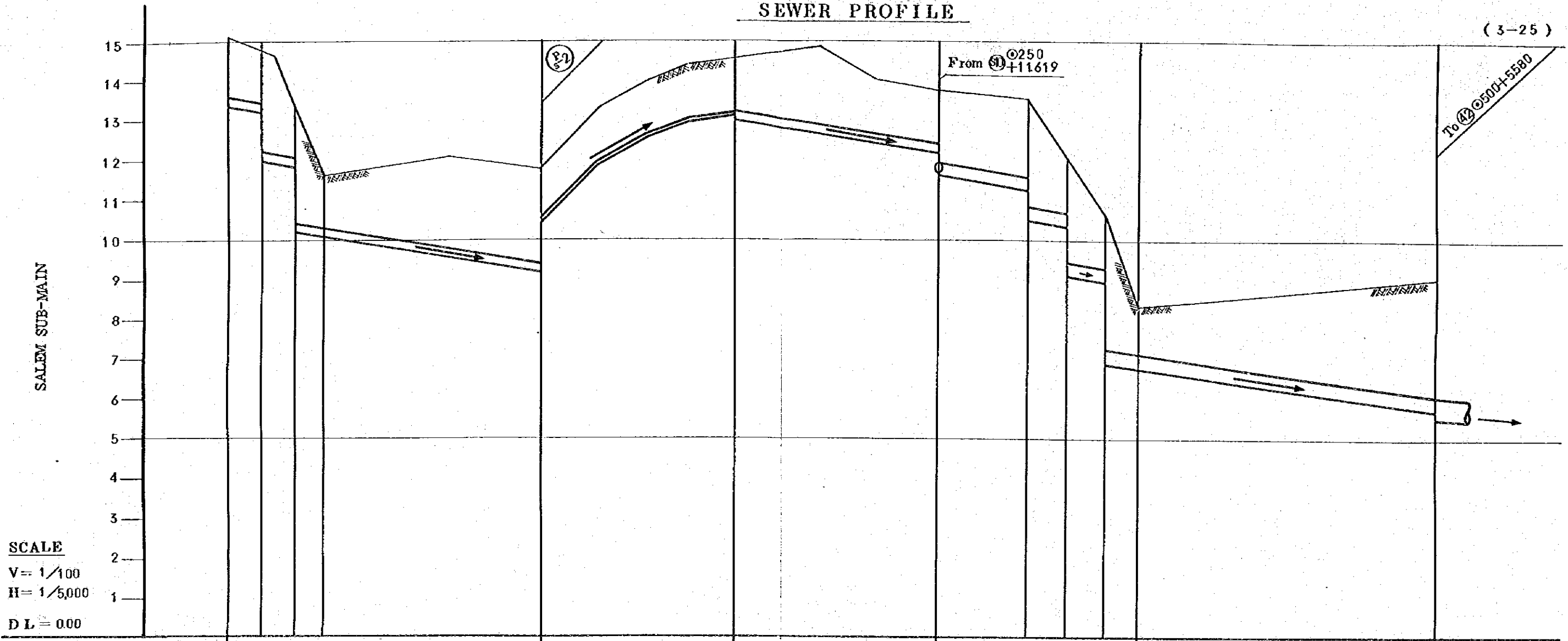


SEWER NUMBER	S7	S8	S9	S10
DIAMETER	Ø200	Ø75	Ø200	Ø250
SLOPE	3.3%	Force main	3.3%	2.9%
LENGTH	720m	190m	130m	310m

GROUND ELEVATION	M	EARTH COVER	M	INVERT ELEVATION	M	ACCUMULATED DISTANCE	M
						0.0	
						230.0	
						720.0	
						910.0	
						1040.0	
						1160.0	
						1350.0	

SEWER PROFILE

(3-25)



SCALE
 V= 1/100
 H= 1/5,000
 D L = 0.00

SEWER NUMBER	S1	S2	S3	S4	S5
DIAMETER	Ø200	Ø75	Ø200	Ø300	Ø300
SLOPE	3.3%	Force main	3.3%	2.6%	2.6%
LENGTH	390m	240m	260m	250m	370m

GROUND ELEVATION	M	15.10	11.78	14.51	13.58	8.38	9.00
EARTH COVER	M	1.51	2.37	1.30	1.97	1.30	2.89
INVERT ELEVATION	M	13.302	9.179	12.122	11.279	6.745	5.783
ACCUMULATED DISTANCE	M	0.0	390.0	650.0	910.0	1160.0	1530.0

**4. SEWERAGE
COMPUTATION
SHEET**

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - EL ARISH DISTRICT

UNIT SEWAGE FLOW PER ha 0.000505

m³/sec/ha

(4-1)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS
			INCREMENT AREA	CUMULATED AREA		SEWER FLOW	CUMULATED FLOW	SEWER DIAMETER	SLOPE	VELOCITY (FULL)	CAPACITY (FULL)	SEWER INVERT ELEVATION	GROUND ELEVATION	EARTH COVER	
			ha	ha		m ³ /sec	m ³ /sec	mm	‰	m/sec	m ³ /sec	m	m	m	
BEACH MAIN	①		18.60	18.60	750	0.0094	0.0094	Ø200	3.3	0.60	0.0188	0.790	2.02	1.00	
	②		18.17	36.77	10	0.0092	0.0186	Ø300	2.6	0.70	0.0493	-1.685	2.26	3.72	To (P ₁)
	③		0.00	36.77	900	0	0.0186	Ø150 Force main	-	-	-	-1.790	2.26	3.74	From (P ₁)
	④		20.59	57.36	1250	0.0104	0.0290	Ø375	2.5	0.79	0.0876	-	2.26	1.00	
	⑤		13.35	70.71	10	0.0067	0.0357	Ø375	2.5	0.79	0.0876	-2.165	2.37	1.00	
	⑥		0.00	70.71	900	0	0.0357	Ø200 Force main	-	-	-	-2.165	2.10	3.86	To (P ₂)
	⑦		7.21	77.92	550	0.0036	0.0394	Ø375	2.5	0.79	0.0876	-2.190	2.10	3.88	From (P ₂)
	⑧		5.47	83.39	10	0.0028	0.0421	Ø375	2.5	0.79	0.0876	0.310	2.12	1.40	
	⑨		0.00	83.39	350	0	0.0421	Ø200 Force main	-	-	-	-1.065	3.20	3.86	
	⑩		36.57	119.96	550	0.0185	0.0606	Ø450	2.3	0.86	0.1366	-1.065	3.20	3.88	To (P ₃)
	⑪		12.68	194.04	10	0.0064	0.0980	Ø500	2.2	0.90	0.1770	-1.090	3.20	3.88	From (P ₃)
												3.990	6.06	1.58	
												0.400	4.90	4.01	
												0.350	4.90	4.01	Flow From (B ₄) Ø375 +3.230
												0.328	4.90	4.93	To (P ₄)

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - EL ARISH DISTRICT

UNIT SEWAGE FLOW PER ha 0.000505

m³/sec/ha

(4-2)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS
			INCREMENT AREA ha	CUMULATED AREA ha		SEWER FLOW m ³ /sec	CUMULATED FLOW m ³ /sec	SEWER DIAMETER mm	SLOPE ‰	VELOCITY (FULL) m/sec	CAPACITY (FULL) m ³ /sec	SEWER INVERT ELEVATION m	GROUND ELEVATION m	EARTH COVER m	
BEACH MAIN	(12)		0.00	194.04	950	0	0.0980	∅350 Force main	—	—	—	—	4.90	1.40	From (P ₁)
	(13)		28.38	222.42	580	0.0143	0.1123	∅500	2.2	0.90	0.1770	8.460	10.30	1.30	
	(14)		1.90	268.91	240	0.0010	0.1358	∅600	1.9	0.95	0.2675	7.184	9.69	1.97	
	(15)		15.68	284.59	450	0.0079	0.1437	∅600	1.9	0.95	0.2675	7.016	9.69	2.03	Flow From (B ₀) ∅375 +8.055
	(16)		15.77	300.36	210	0.0080	0.1517	∅600	1.9	0.95	0.2675	6.560	8.50	1.30	
	(17)		15.37	343.05	950	0.0078	0.1732	∅600	1.9	0.95	0.2675	6.560	8.50	1.30	
	(36)														
WADI MAIN	(18)		8.85	8.85	440	0.0045	0.0045	∅200	3.3	0.60	0.0188	34.302	37.28	2.75	
	(19)		20.46	29.31	280	0.0103	0.0148	∅250	2.9	0.65	0.0320	22.730	24.26	1.30	
	(20)		7.50	36.81	180	0.0038	0.0186	∅300	2.6	0.70	0.0493	22.020	24.26	1.96	
	(21)		17.61	54.42	260	0.0089	0.0275	∅300	2.6	0.70	0.0493	16.020	17.60	1.30	
	(22)											15.965	17.60	1.30	
											15.497	17.29	1.46		
											15.401	17.29	1.55		
											14.725	16.36	1.30	To (22)	

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - EL ARISH DISTRICT

UNIT SEWAGE FLOW PER ha 0.000505

m³/sec/ha

(4-3)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS
			INCREMENT AREA ha	CUMULATED AREA ha		SEWER FLOW m ³ /sec	CUMULATED FLOW m ³ /sec	SEWER DIAMETER mm	SLOPE ‰	VELOCITY (FULL) m/sec	CAPACITY (FULL) m ³ /sec	SEWER INVERT ELEVATION m	GROUND ELEVATION m	EARTH COVER m	
WADI MAIN												14.140	16.36	1.81	From (21)
	(22)		15.40	69.82	500	0.0078	0.0353	Ø375	2.5	0.79	0.0876	8.140	9.85	1.30	
	(23)		5.34	103.93	260	0.0027	0.0525	Ø450	2.3	0.86	0.1366	7.462	11.59	3.64	Flow From (W) Ø250 +8270
	(24)		20.62	124.55	500	0.0104	0.0629	Ø450	2.3	0.86	0.1366	7.462	11.59	3.64	
	(25)		24.98	149.53	370	0.0126	0.0755	Ø450	2.3	0.86	0.1366	6.312	8.26	1.46	
	(34)												6.312	8.26	1.46
CENTRAL MAIN												14.670	16.20	1.30	
	(26)		12.10	12.10	750	0.0061	0.0061	Ø200	3.3	0.60	0.0188	9.570	11.10	1.30	
	(27)		13.99	26.09	200	0.0071	0.0132	Ø250	2.9	0.65	0.0320	9.520	11.10	1.30	
	(28)		17.79	43.88	50	0.0090	0.0222	Ø300	2.6	0.70	0.0493	7.890	9.47	1.30	
	(29)		0.00	43.88	200	0	0.0222	Ø150 Force main	-	-	-	7.295	9.47	1.84	
	(30)		22.76	66.64	620	0.0115	0.0337	Ø375	2.5	0.79	0.0876	7.165	8.80	1.30	
	(31)		32.35	98.99	300	0.0163	0.0500	Ø375	2.5	0.79	0.0876	-	8.80	1.30	
												15.460	17.17	1.30	
												12.015	14.21	1.79	
												12.015	14.21	1.79	
												11.265	13.73	2.06	To (32)

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - EL ARISH AND SALEM DISTRICTS

UNIT SEWAGE FLOW PER ha 0.000505 m³/sec/ha (4-4)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW						SEWER INVERT ELEVATION m	GROUND ELEVATION m	EARTH COVER m	REMARKS
			INCREMENT AREA	CUMULATED AREA		SEWER FLOW	CUMULATED FLOW	SEWER DIAMETER	SLOPE	VELOCITY (FULL)	CAPACITY (FULL)				
			ha	ha		m ³ /sec	m ³ /sec	mm	‰	m/sec	m ³ /sec				
CENTRAL MAIN	(32)		21.31	120.30	410	0.0108	0.0608	Ø450	2.3	0.86	0.1366	11.185	13.73	2.06	From (31)
	(33)		22.70	168.85	430	0.0115	0.0853	Ø500	2.2	0.90	0.1770	10.242	13.63	2.90	Flow From (C2) Ø250 +11938
WADI MAIN	(34)		0.34	318.72	70	0.0002	0.1610	Ø600	1.9	0.95	0.2675	6.290	8.15	1.32	Flow From (25) Ø450 +5461
	(35)		16.13	358.47	420	0.0081	0.1810	Ø600	1.9	0.95	0.2675	5.160	7.10	1.30	Flow From (W) Ø250 +3590
BEACH MAIN	(36)		1.48	703.00	680	0.0007	0.3550	Ø800	1.8	1.12	0.5607	3.230	7.10	3.23	Flow From (17) Ø600 +1985
	(43)											1.931	5.50	2.72	
SALEM MAIN	(37)		8.81	8.81	530	0.0045	0.0045	Ø200	3.3	0.60	0.0188	0.707	5.30	3.75	
	(38)		9.80	18.61	450	0.0049	0.0094	Ø200	3.3	0.60	0.0188	18.610	20.14	1.30	
	(39)		12.83	31.44	440	0.0065	0.0159	Ø250	2.9	0.65	0.0320	16.861	18.40	1.31	
	(40)		6.32	37.76	630	0.0032	0.0191	Ø300	2.6	0.70	0.0493	16.146	18.40	2.02	
	(41)		3.87	137.73	330	0.0020	0.0696	Ø450	2.3	0.79	0.0876	13.920	15.50	1.30	
													12.644	16.00	3.08
												12.585	16.00	3.08	
												10.947	14.22	2.94	
												10.572	14.22	3.16	Flow From (S) Ø375 +10.652
												7.210	9.00	1.30	To (42)

SEWERAGE COMPUTATION SHEET

MAIN PUMPING STATION TO JARADA TREATMENT PLANT

UNIT SEWAGE FLOW PER ha — $m^3/sec/ha$ (4-5)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS
			INCREMENT AREA ha	CUMULATED AREA ha		SEWER FLOW m^3/sec	CUMULATED FLOW m^3/sec	SEWER DIAMETER mm	SLOPE %	VELOCITY (FULL) m/sec	CAPACITY (FULL) m^3/sec	SEWER INVERT ELEVATION m	GROUND ELEVATION m	EARTH COVER m	
WADI MAIN	(42)		0.00	191.00	290	0.00	0.0965	Ø500	2.2	0.90	0.1770	5.580	9.00	2.88	Flow From (S15) Ø300 +5.783
	(43)		0.00	894.00	20	0.00	0.4515	Ø900	1.6	1.14	0.7238	3.460	5.30	1.30	From (41)
													0.605	5.30	3.75
MAIN PUMPING STATION TO JARADA SEWAGE TREATMENT PLANT															To Main Pumping Station
	(44)		—	894.00	4050	—	0.4515	Ø500x2 Force Main Dual Pipes	—	—	—	—	5.30	1.40	From main Pumping Station
													24.65	1.40	To (45)
	(45)		—	894.00	2450	—	0.4515	Ø500x2 Pressured Pipe Dual Pipes	—	—	—	—	24.65	1.40	From (45)
													17.00	1.40	Pressured Flow
	(46)		—	894.00	4150	—	0.4515	Ø500x2 Force Main Dual Pipes	—	—	—	—	17.00	1.40	To El Risa Pumping Station
												20.00	1.40	From El Risa Pumping Station	
															To Jarada Sewage Treatment Plant

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - EL ARISH DISTRICT

UNIT SEWAGE FLOW PER ha 0.000505 m³/sec/ha (4-7)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS
			INCREMENT AREA	CUMULATED AREA		SEWER FLOW	CUMULATED FLOW	SEWER DIAMETER	SLOPE	VELOCITY (FULL)	CAPACITY (FULL)	SEWER INVERT ELEVATION	GROUND ELEVATION	EARTH COVER	
			ha	ha		m ³ /sec	m ³ /sec	mm	‰	m/sec	m ³ /sec	m	m	m	
WADI SUB-MAIN	(W ₁)		14.21	14.21	480	0.0072	0.0072	Ø200	3.3	0.60	0.0188	24.590	28.17	3.35	
	(W ₂)		8.43	22.64	160	0.0042	0.0114	Ø250	2.9	0.65	0.0320	9.711	11.89	1.95	
	(W ₃)		6.13	28.77	200	0.0031	0.0145	Ø250	2.9	0.65	0.0320	9.661	11.89	1.95	
	(23)											8.850	11.71	2.58	
	(W ₄)		7.03	7.03	630	0.0036	0.0036	Ø200	3.3	0.60	0.0188	8.270	9.85	1.30	
	(W ₅)		16.59	23.62	180	0.0083	0.0119	Ø250	2.9	0.65	0.0320	10.880	12.41	1.30	
	(35)														
CENTRAL SUB-MAIN	(C ₁)		13.80	13.80	520	0.0070	0.0070	Ø200	3.3	0.60	0.0188	14.226	16.74	2.28	
	(C ₂)		12.05	25.85	180	0.0061	0.0131	Ø250	2.9	0.65	0.0320	12.510	14.04	1.30	
	(33)											12.460	14.04	1.30	

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - SALEM DISTRICT

UNIT SEWAGE FLOW PER ha 0.000505 m³/sec/ha (4-8)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS	
			INCREMENT AREA	CUMULATED AREA		SEWER FLOW	CUMULATED FLOW	SEWER DIAMETER	SLOPE	VELOCITY (FULL)	CAPACITY (FULL)	SEWER INVERT ELEVATION	GROUND ELEVATION	EARTH COVER		
			ha	ha		m ³ /sec	m ³ /sec	mm	%	m/sec	m ³ /sec	m	m	m		
SALEM SUB-MAIN	(S ₁)		8.45	8.45	400	0.0043	0.0043	200	3.3	0.60	0.0188	18.610	20.14	1.30		
	(S ₂)		14.70	23.15	400	0.0074	0.0117	250	2.9	0.65	0.0320	16.192	18.00	1.53		
	(S ₃)		14.21	37.36	810	0.0072	0.0189	300	2.6	0.70	0.0493	15.032	17.60	2.29		
	(S ₄)		11.61	48.97	440	0.0058	0.0247	300	2.6	0.70	0.0493	12.871	15.30	2.09		
	(S ₅)		36.80	85.77	350	0.0186	0.0433	375	2.5	0.79	0.0876	11.727	14.85	2.79		
	(S ₆)		10.33	96.10	50	0.0052	0.0485	375	2.5	0.79	0.0876	11.652	14.85	2.79		
	(41)															
	(S ₇)		13.07	13.07	720	0.0066	0.0066	200	3.3	0.60	0.0188	10.777	14.25	3.06		
	(S ₈)		-	13.07	190	-	0.0066	Force Main	75	-	-	-	10.777	14.25	3.06	
	(S ₉)		1.63	14.70	130	0.0008	0.0074	200	3.3	0.60	0.0188	10.652	14.22	3.16		
(S ₁₀)		11.39	26.09	310	0.0058	0.0132	250	2.9	0.65	0.0320	13.149	15.30	1.92			
												13.149	15.30	1.92		
												-	12.70	1.70		
												-	15.69	1.30		
												14.160	15.69	1.30		
												13.731	15.65	1.69		
												12.518	15.65	2.85		
												11.619	13.76	1.86	To (S ₁₁)	

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - MASAI D DISTRICT (REVIEW)

UNIT SEWAGE FLOW PER ha 0.000755 m³/sec/ha (4-10)

ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS	
			INCREMENT AREA	CUMULATED AREA		SEWER FLOW	CUMULATED FLOW	SEWER DIAMETER	SLOPE	VELOCITY (FULL)	CAPACITY (FULL)	SEWER INVERT ELEVATION	GROUND ELEVATION	EARTH COVER		
			ha	ha		m ³ /sec	m ³ /sec	mm	‰	m/sec	m ³ /sec	m	m	m		
MASAI D MAIN	①'		6.21	6.21	350	0.0047	0.0047	Ø225	3.8	0.70	0.0277	0.00	2.00	1.75		
	②'		14.53	20.74	110	0.0110	0.0157	Ø300	2.8	0.72	0.0512	-1.32	2.00	3.07		
		⑤'										-1.50	2.00	3.17		
												-1.80	2.00	3.47		
	③'		9.67	9.67	285	0.0073	0.0073	Ø225	3.8	0.70	0.0277	2.70	4.70	1.75		
	④'		11.33	21.00	505	0.0086	0.0159	Ø300	2.8	0.72	0.0512	-0.58	2.20	2.53		
												-0.68	2.20	2.55		
	⑤'		0.00	41.74	-	-	0.0315	-	-	-	-	-	-	-	-	
			P ₂													TO PUMPING STATION (P ₂)
⑥'		0.00	41.74	750	-	0.0315	Ø200 Force main	-	-	-	-	0.80	2.00	0.99		
												0.80	2.00	0.99	TO MASAI D SEWNGE TREATMENT PLANT	

SEWERAGE COMPUTATION SHEET

SEWERAGE DISTRICT - MASAI DISTRICT (REVIEW)

UNIT SEWAGE FLOW PER ha 0.000755 m³/sec/ha (4-11)










ROUTE NAME	SEWER No	MERGE SEWER No	SEWERAGE AREA		SEWER LENGTH m	DESIGN SEWER FLOW		DESIGNED SEWER							REMARKS	
			INCREMENT AREA ha	CUMULATED AREA ha		SEWER FLOW m ³ /sec	CUMULATED FLOW m ³ /sec	SEWER DIAMETER mm	SLOPE ‰	VELOCITY (FULL) m/sec	CAPACITY (FULL) m ³ /sec	SEWER INVERT ELEVATION m	GROUND ELEVATION m	EARTH COVER m		
MASAI MAIN	(7)		2.16	2.16	270	0.0016	0.0016	Ø225	3.8	0.70	0.0277	3.75	5.75	1.75		
	(8)		2.61	4.77	365	0.0020	0.0036	Ø225	3.8	0.70	0.0277	2.73	4.91	1.93		
	(9)		23.72	28.49	155	0.0179	0.0215	Ø300	2.8	0.72	0.0512	0.83	2.00	0.92		
	(10)		8.55	37.04	255	0.0065	0.0280	Ø300	2.8	0.72	0.0512	-1.05	2.00	2.72		
	(11)	(14)	8.09	8.09	305	0.0061	0.0061	Ø225	3.8	0.72	0.0277	-1.49	2.00	3.16		
	(12)		13.50	21.59	230	0.0102	0.0163	Ø225	3.8	0.72	0.0277	-1.49	2.00	3.16		
	(13)		5.63	27.22	330	0.0043	0.0206	Ø300	2.9	0.74	0.0521	-2.21	2.00	3.88		
	(14)		0.00	64.26	-	-	0.0485	-	-	-	-	-	-	-	-	
	(15)	(P ₆)	0.00	64.26	-	-	0.0485	-	-	-	-	-	-	-	-	To PUMPING STATION (P ₆)
	(15)		0.00	64.26	-	-	0.0485	-	Ø200 Force Main	-	-	-	-	-	-	TO MASAI SEWAGE TREATMENT PLANT

**5. EXISTING
DRAINAGE
MAP**

EXISTING DRAINAGE SYSTEM MAP

LEGEND

Construction Year of Drains

-  Before 1967
-  1967 - 1981 (First Stage)
-  1982 (Second Stage)
-  Hotel Drain
-  1983 (Third Stage)
-  1984 (Under Construction)
-  Trench for Drain (1.6m x 3m)
-  Trench for Drain (3m x 20m x 2.5m)
-  Improved Area



Note: Pipe Material, Size & Slope

First Stage
 Asbestos
 8 inches
 0.002 mean slope

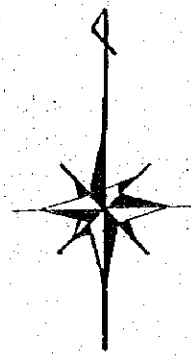
Since Second Stage
 Asbestos
 10-12 inches
 0.002 mean slope

SCALE 1:10,000



**6. EXISTING
UNDERGROUND
STRUCTURE
MAP**

EXISTING UNDERGROUND STRUCTURE MAP

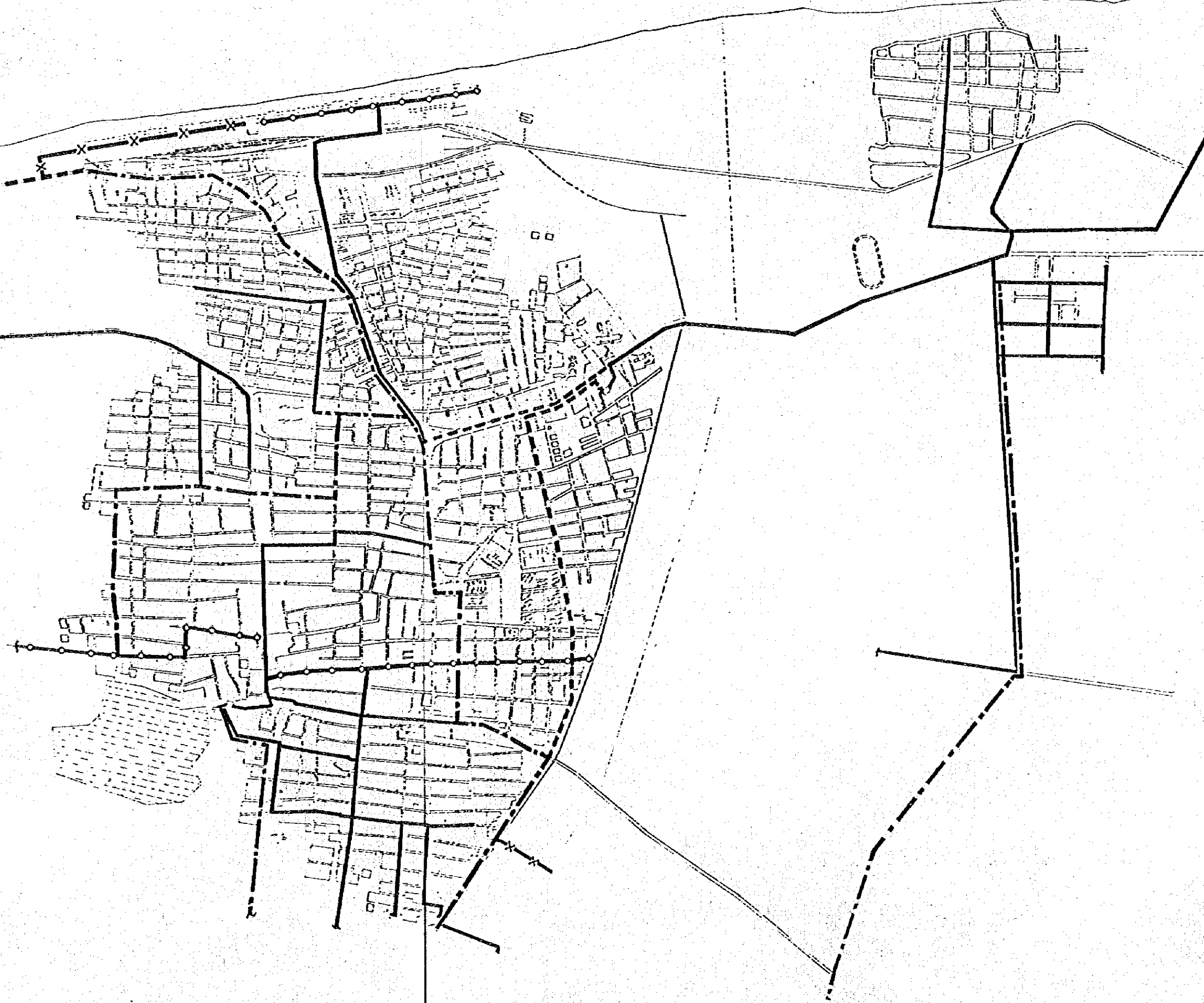


SCALE 1:15,000

LEGEND

WATER SUPPLY PIPE SIZE

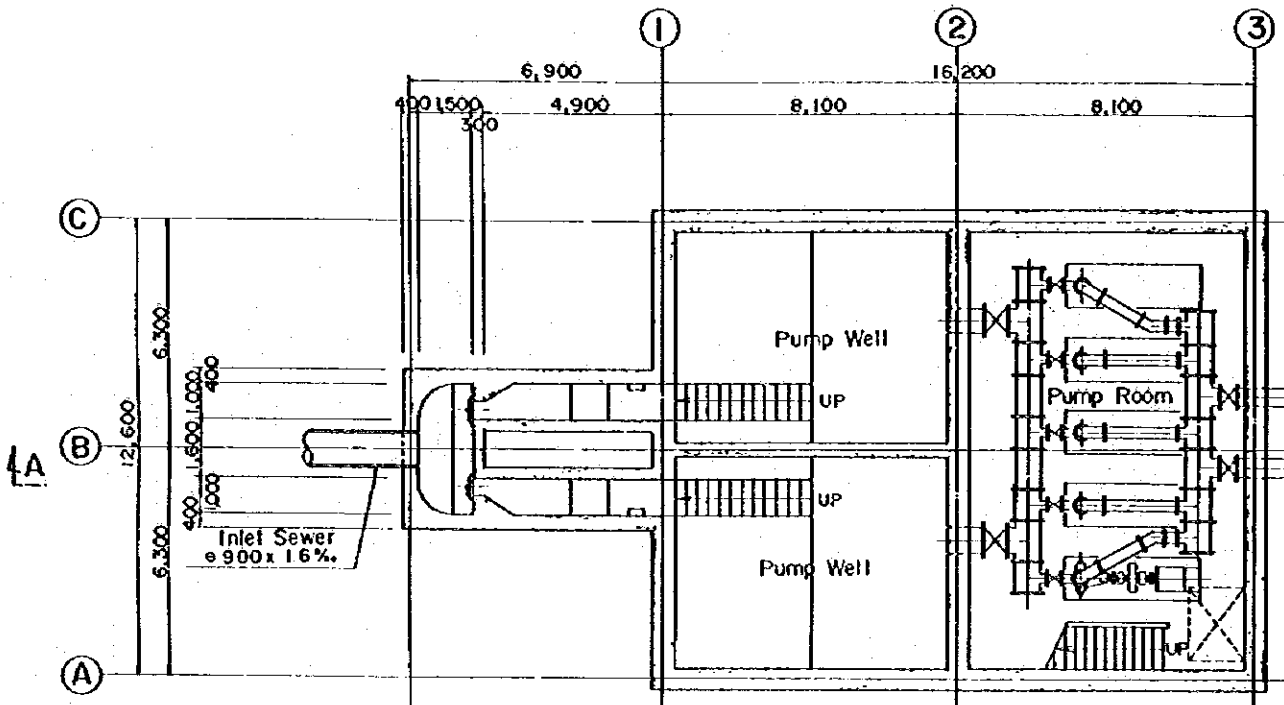
- 12-inches
- - - - - 10-inches
- 8-inches
- 6-inches
- X-X- 4-inches



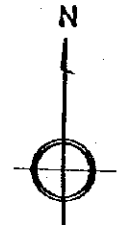
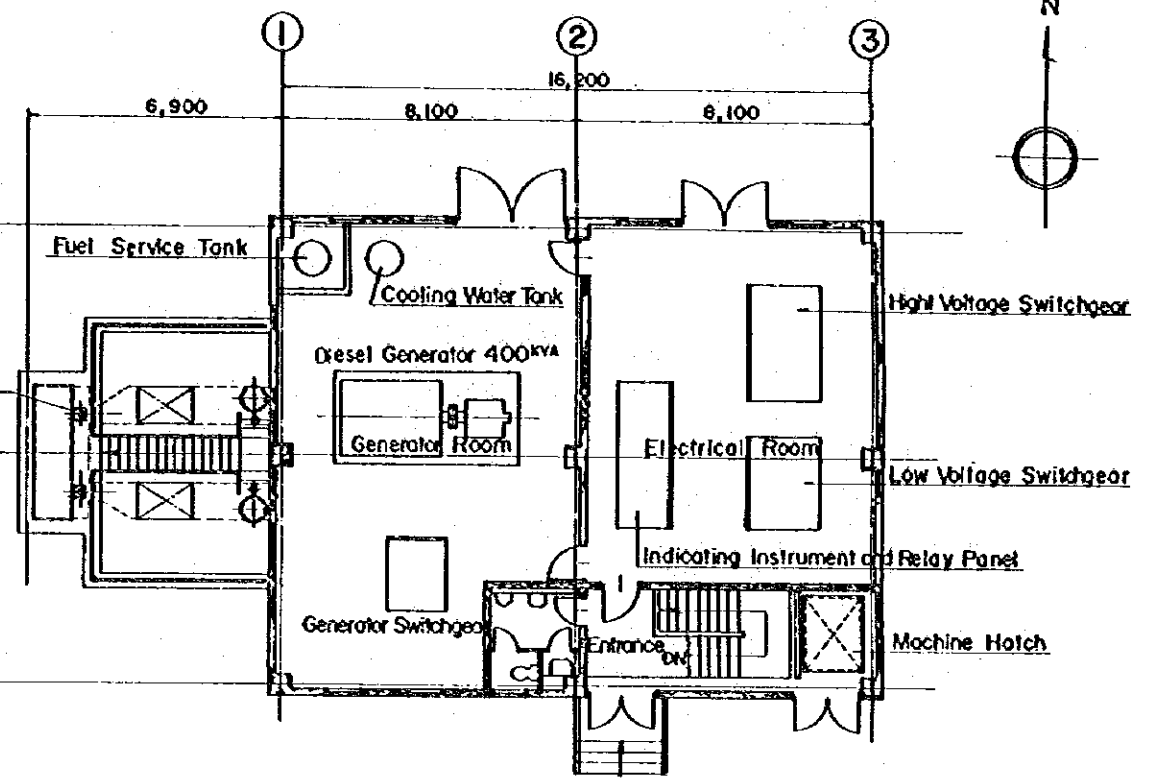
7. PUMPING STATION DESIGN

PLAN OF MAIN PUMPING STATION S=1:200

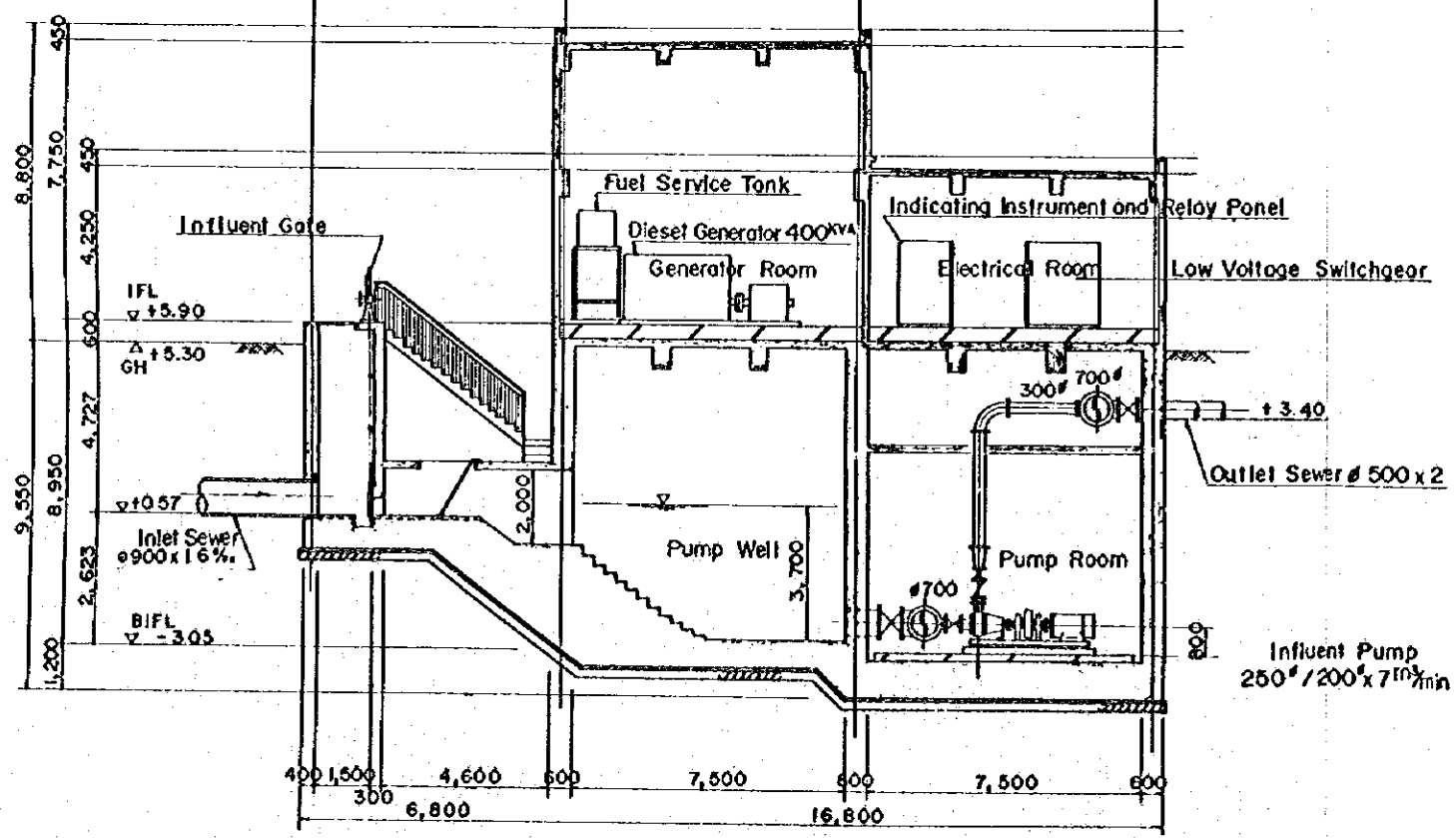
B 1st Floor Plan



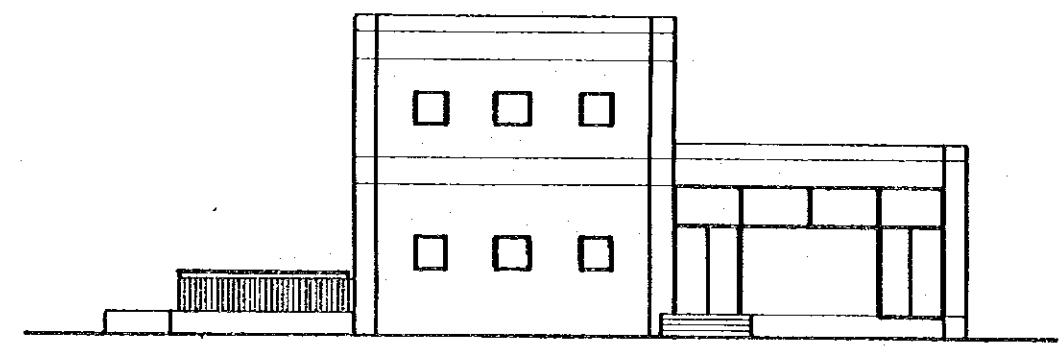
1st Floor Plan



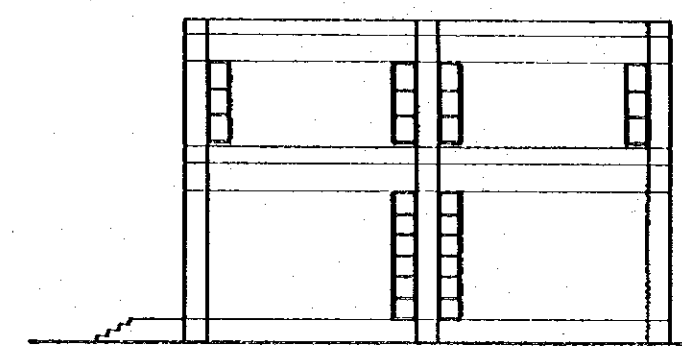
Section A ~ A



South Elevation



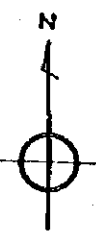
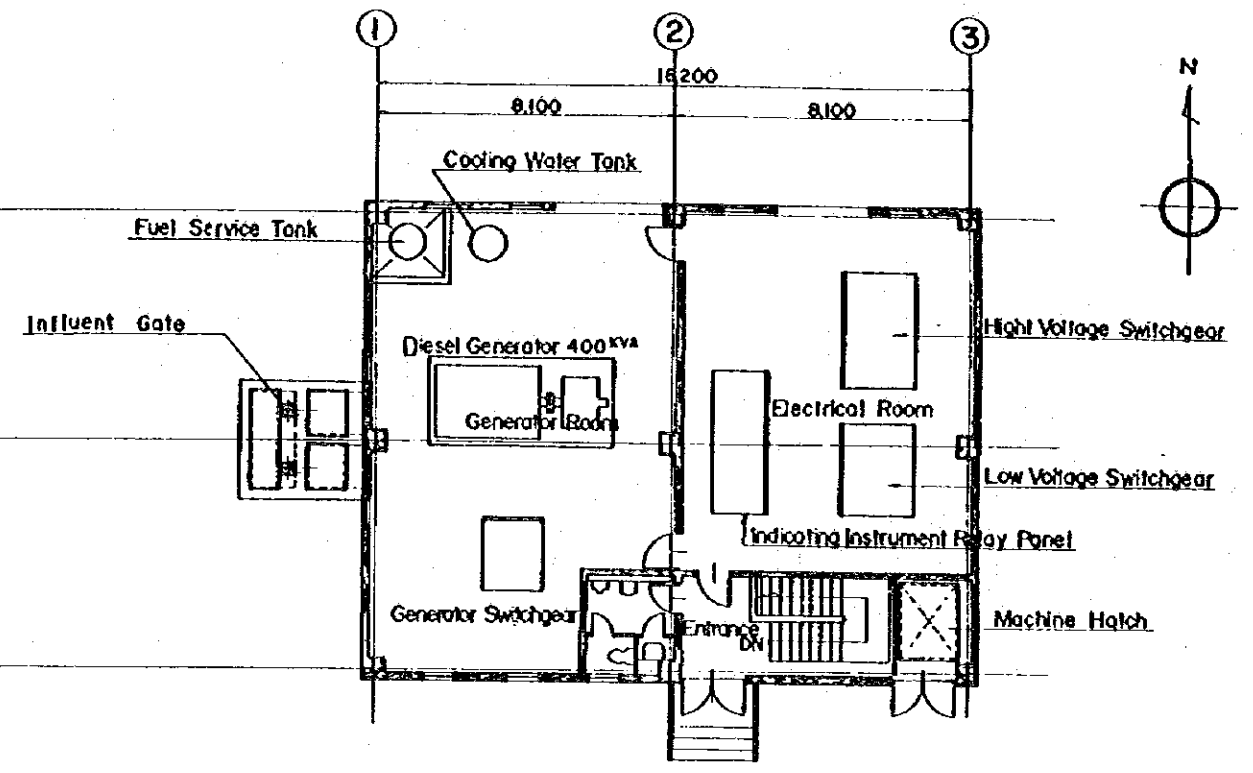
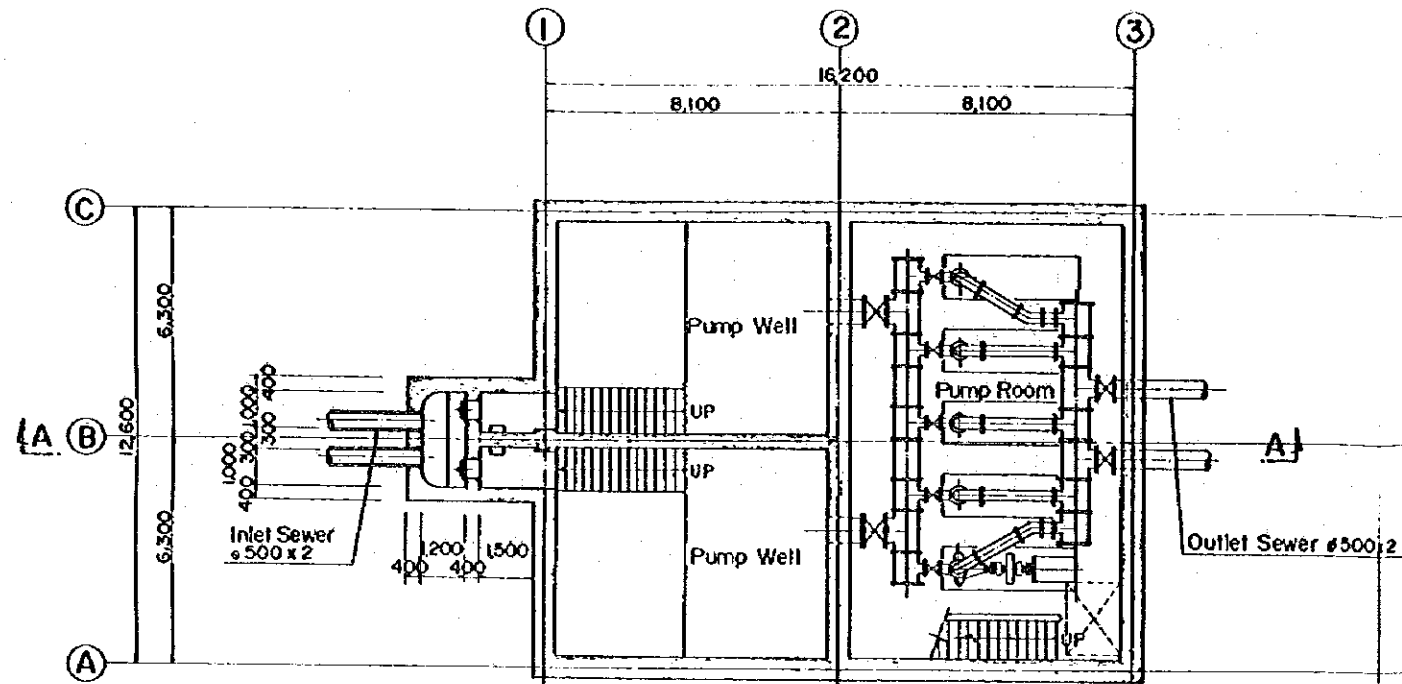
East Elevation



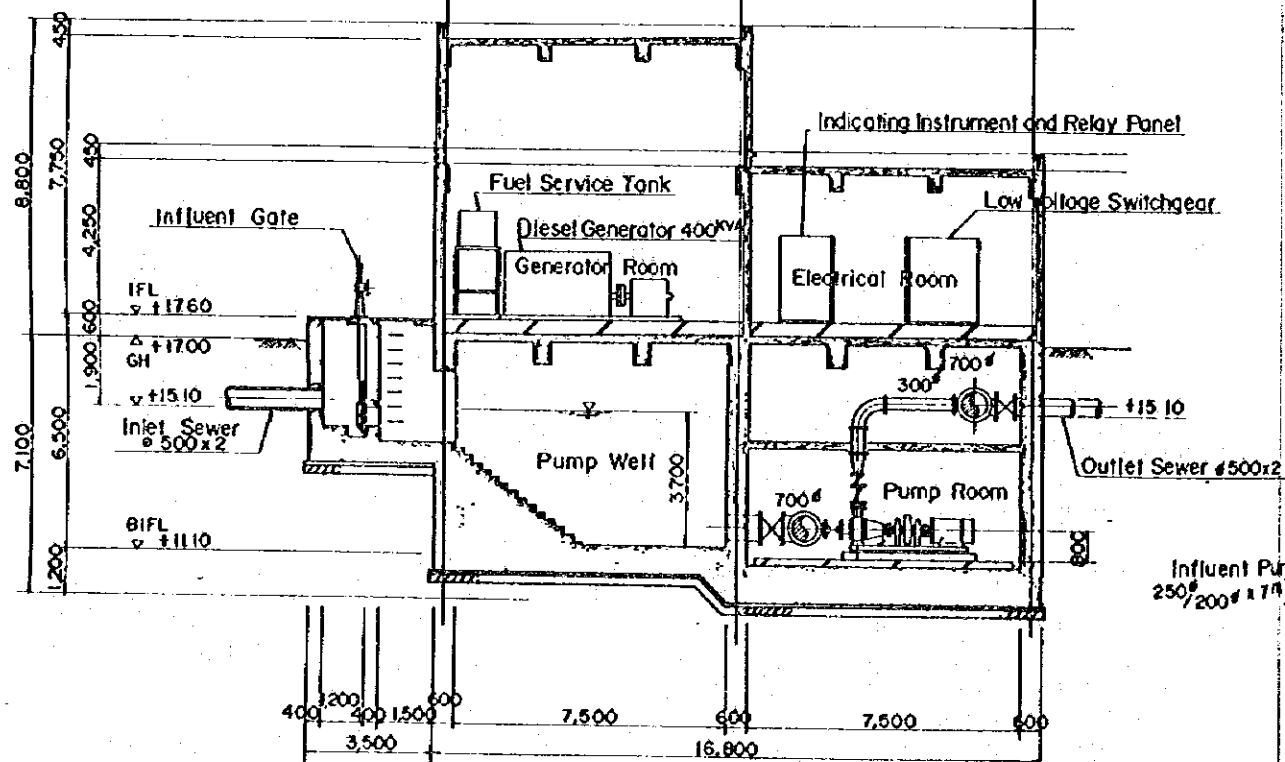
PLAN OF ELRISA PUMPING STATION S=1:200

B 1st Floor Plan

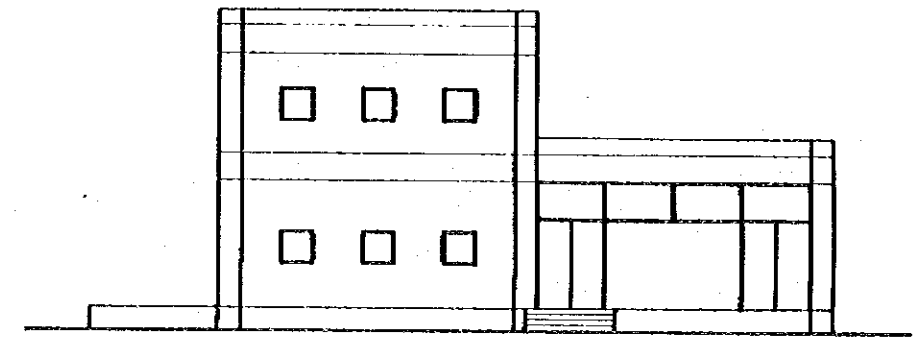
1st Floor Plan



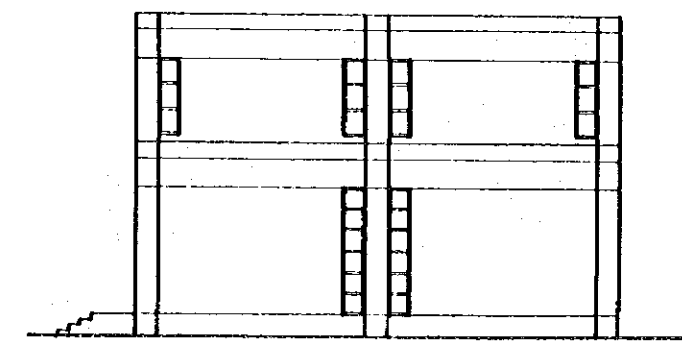
Section A ~ A



South Elevation



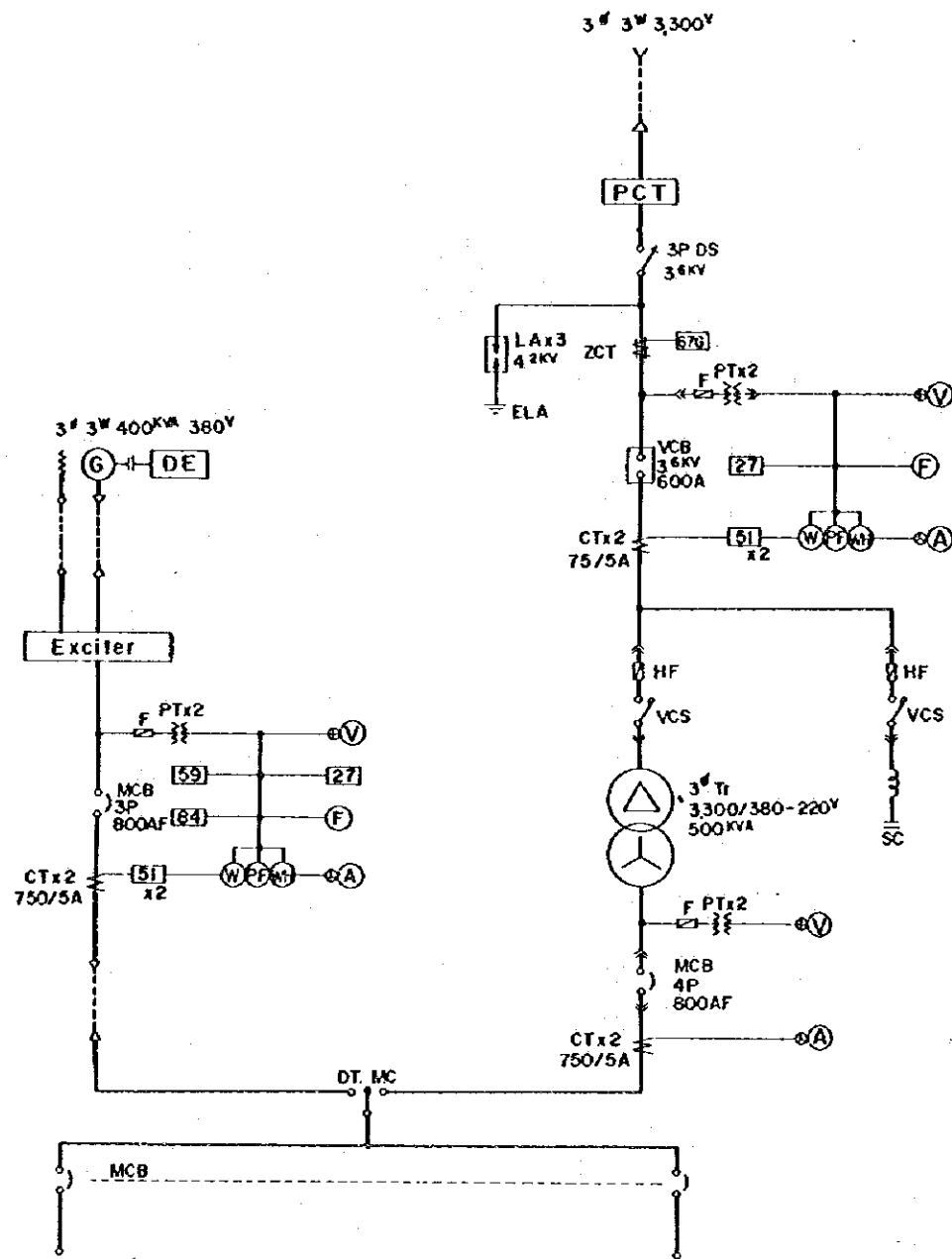
East Elevation



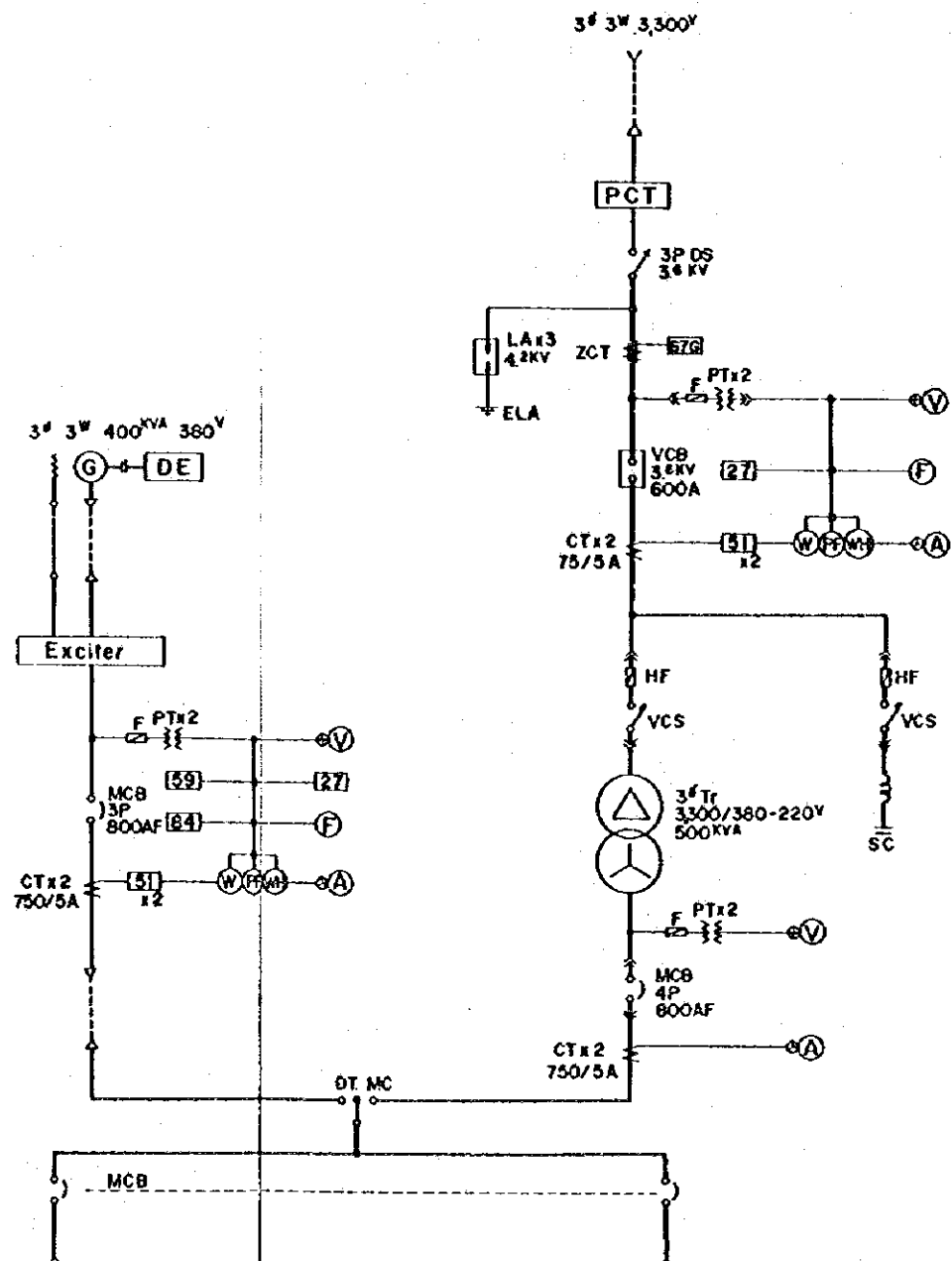
Influent Pump
250^ø/200^ø x 1.7^m / m³ x 19^m x 5 Sets

SINGLE LINE DIAGRAM

Main Pumping Station



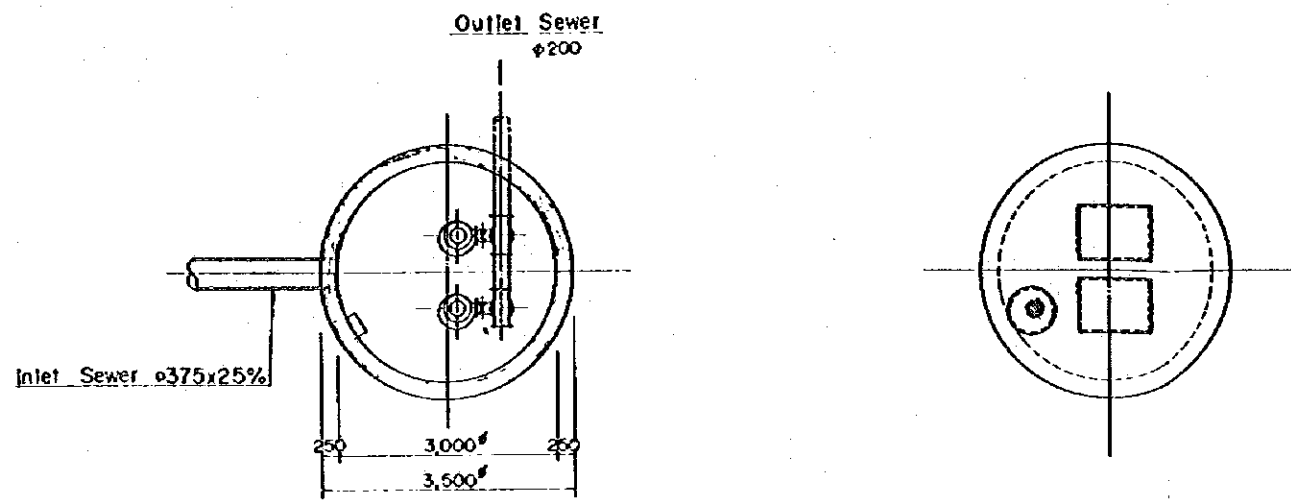
EI-Risa Pumping Station



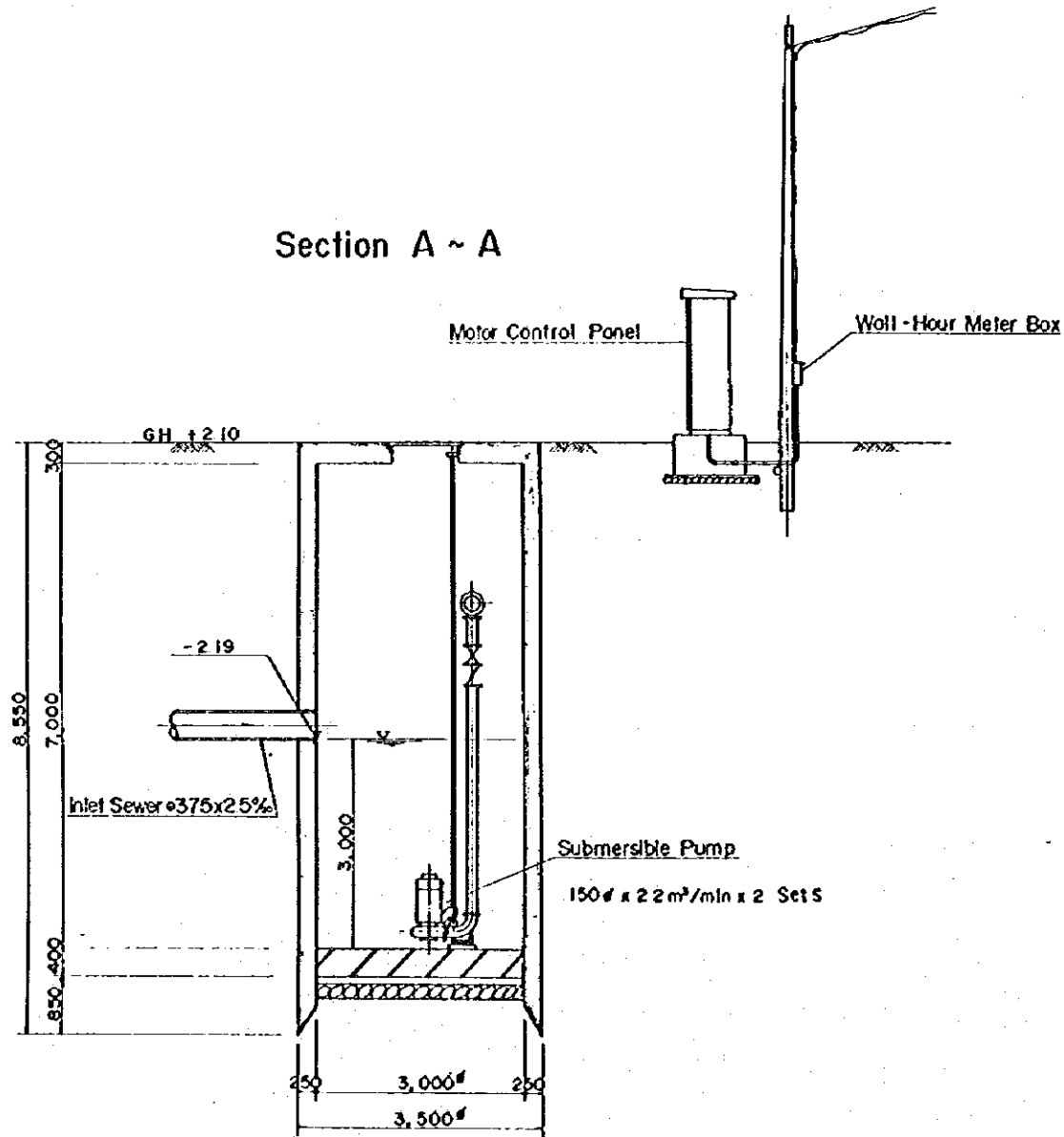
LEGEND

SYMBOL	DESCRIPTION
PCT	Potential Current Transformer
VCB	Vacuum Circuit Breaker
MCB	Molded Case Circuit Breaker
DS	Disconnecting Switch
VCS	Vacuum Circuit Switch
LA	Lightning Arrester
Tr	Transformer
SC	Static Capacitor
HF	High Voltage Fuse
F	Low Voltage Fuse
CT	Current Transformer
ZCT	Zero-phase-sequence Current Transformer
PT	Potential Transformer
A	Ammeter
⊕	Ammeter Change-over Switch
V	Voltmeter
⊕	Voltmeter Change-over Switch
W	Wattmeter
Wh	Watt-hour Meter
F	Frequency Meter
Pf	Power-factor Meter
27	Under-voltage Relay
51	Overcurrent Relay
51G	Overcurrent Ground Relay
67G	Directional Ground Relay
84	Voltage Relay
59	Overvoltage Relay

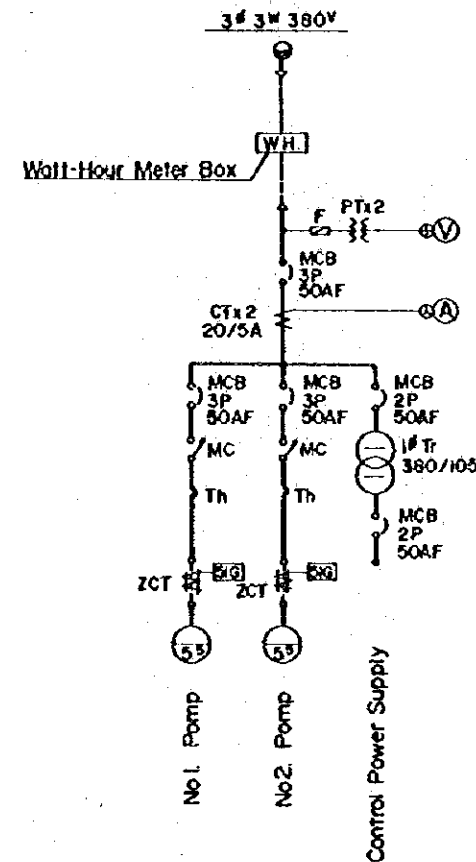
PLAN OF MANHOLE PUMPING STATION S=1:100



Section A ~ A



Single Line Diagram



LEGEND

SIMBOL	DESCRIPTION
MCB	Molded Case Circuit Breaker
MC	Electromagnetic Contactor
Th	Thermal Relay
F	Fuse
Tr	Transformer
PT	Potential Transformer
CT	Current Transformer
A	Ammeter
⊙	Ammeter Change-over Switch
⊕	Voltmeter Change-over Switch
ZCT	

