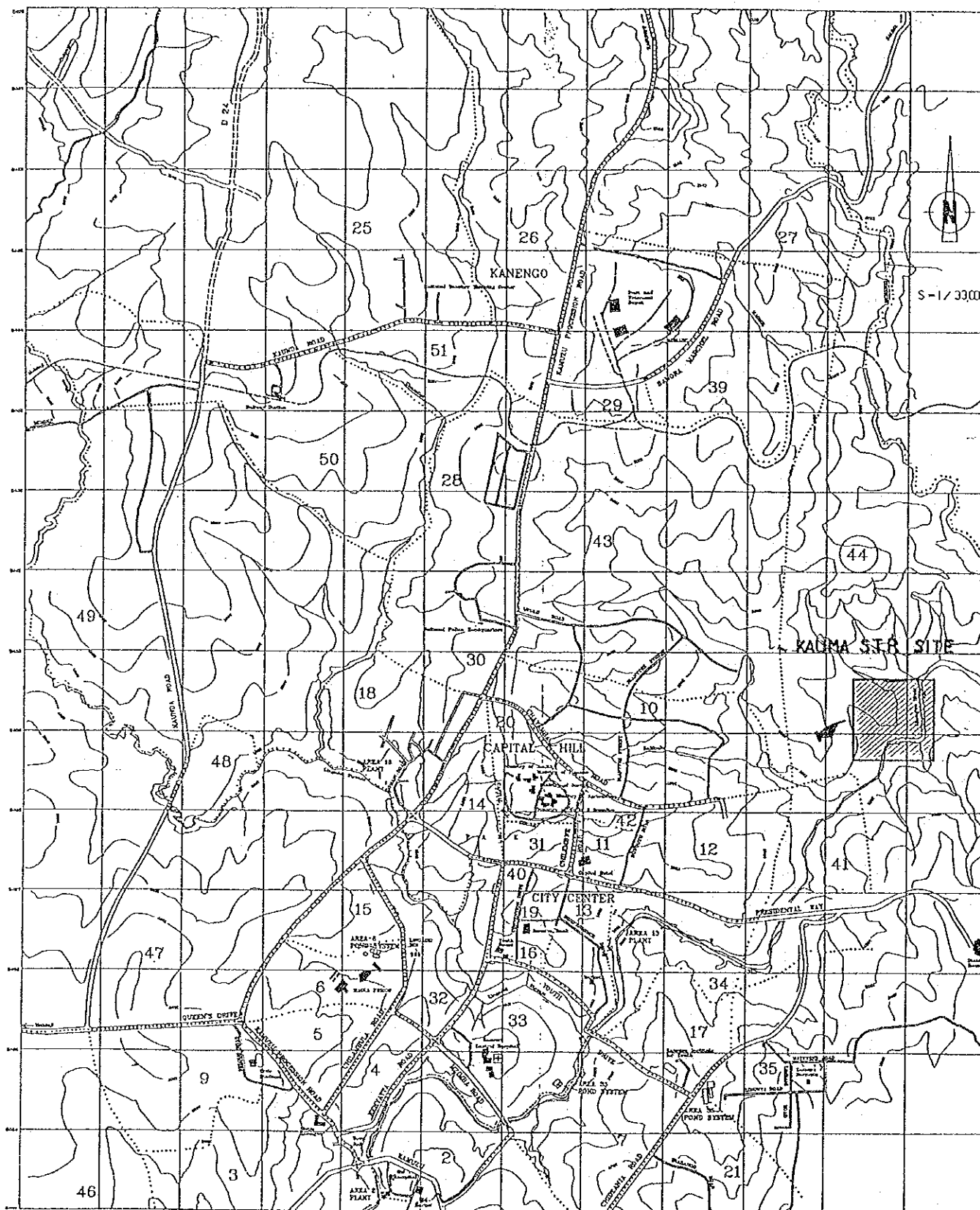


Appendix 7 Basic Design Drawings

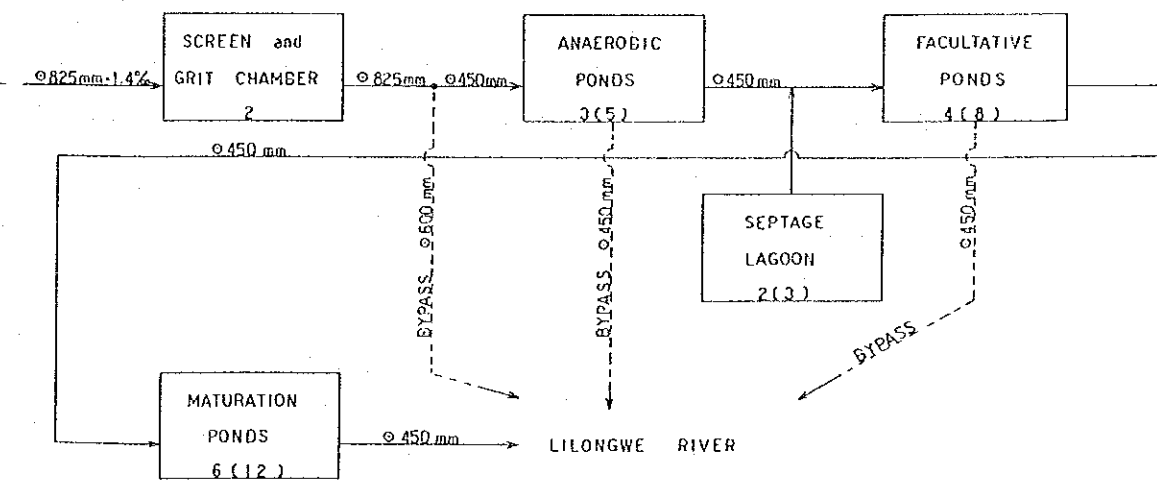
Appendix 7 Basic Design Drawings

List of Basic Design Drawings

- No. 1. GUIDE MAP FOR PLANT SITE
- No. 2. LAYOUT PLAN
- No. 3. FLOW DIAGRAM
- No. 4. HYDRAULIC PROFILE
- No. 5. COMPLETION PLAN
- No. 6. TRANSVERSE AND VERTICAL SECTION
- No. 7. SCREEN AND GRIT-CHAMBER
- No. 8. ANAEROBIC POND AND SEPTAGE LAGOON
- No. 9. FACULTATIVE POND AND MATURATION POND
- No.10. PARSHALL-FLUME, DISTRIBUTION CHAMBER (1) & (2)
- No.11. DETAILS (1)
- No.12. DETAILS (2)
- No.13. DETAILS (3)
- No.14. ADMINISTRATION BUILDING PLAN
- No.15. LANDSCAPE PLAN
- No.16. No.1 TRUNK SEWER (1/3)
- No.17. No.1 TRUNK SEWER (2/3)
- No.18. No.1 TRUNK SEWER (3/3)
- No.19. No.2 TRUNK SEWER (1/4)
- No.20. No.2 TRUNK SEWER (2/4)
- No.21. No.2 TRUNK SEWER (3/4)
- No.22. No.2 TRUNK SEWER (4/4)
- No.23. No.3 TRUNK SEWER (1/7)
- No.24. No.3 TRUNK SEWER (2/7)
- No.25. No.3 TRUNK SEWER (3/7)
- No.26. No.3 TRUNK SEWER (4/7)
- No.27. No.3 TRUNK SEWER (5/7)
- No.28. No.3 TRUNK SEWER (6/7)
- No.29. No.3 TRUNK SEWER (7/7)
- No.30. AREA 1 SEWER PLAN
- No.31. AREA 2 SEWER PLAN
- No.32. CONNECTION SEWER FROM AREA 6
- No.33. MANHOLE




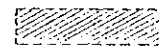
- (1) SEWAGE QUANTITY : GRAVITY FLOW
 DAILY AVERAGE (Q1) = 6,100 m³/day (15,600 m³/day)
 HOURLY MAX (Q2) = 585 m³/hour (1495 m³/hour) = 14,030 m³/day (35,880 m³/day)
 () : FUTURE PROJECT.
 HOURLY MAX = DAILY AVERAGE · 2.3 · 1/24
- (2) SEWAGE QUALITY
 BOD in = 300 mg/l
 S.S in = 350 mg/l
 NUMBER OF FECAL COLIFORM BACTERIA GROUP = 2.0 · 10⁷ MPN / 100 ml
- (3) TREATED SEWAGE QUALITY
 BOD out = 20 mg/l
 S.S out = 30 mg/l
 NUMBER OF FECAL COLIFORM BACTERIA GROUP = 1.0 · 10³ MPN / 100 ml
- (4) TREATMENT SYSTEM
 STABILIZATION POND SYSTEM (S.P.)
- (5) DESIGN CRITERIA
 - 1) GRIT CHAMBER : G.C.
 WATER SURFACE LOADING = LESS THAN 1,800 m³/m²·day at HOURLY MAXIMUM FLOW
 - 2) ANAEROBIC POND : A.P.
 BOD VOLUMETRIC LOADING = 160 g · BOD₅ / m³·day
 DETENTION TIME = 2.0 days
 WATER DEPTH = 4.0 m
 - 3) FACULTATIVE POND : F.P.
 BOD SURFACE LOADING = 192 Kg · BOD₅ / ha · day (15.2 °C)
 WATER DEPTH = 1.5 m
 - 4) MATURATION POND : M.P.
 DETENTION TIME = 3.0 days
 WATER DEPTH = 1.5 m
 - 5) SEPTAGE LAGOON : S.L.
 BOD VOLUMETRIC LOADING = 200 g · BOD₅ / m³·day
 DETENTION TIME = 20.0 day
- (6) FLOW DIAGRAM



Drawing No. 1. GUIDE MAP FOR PLANT SITE



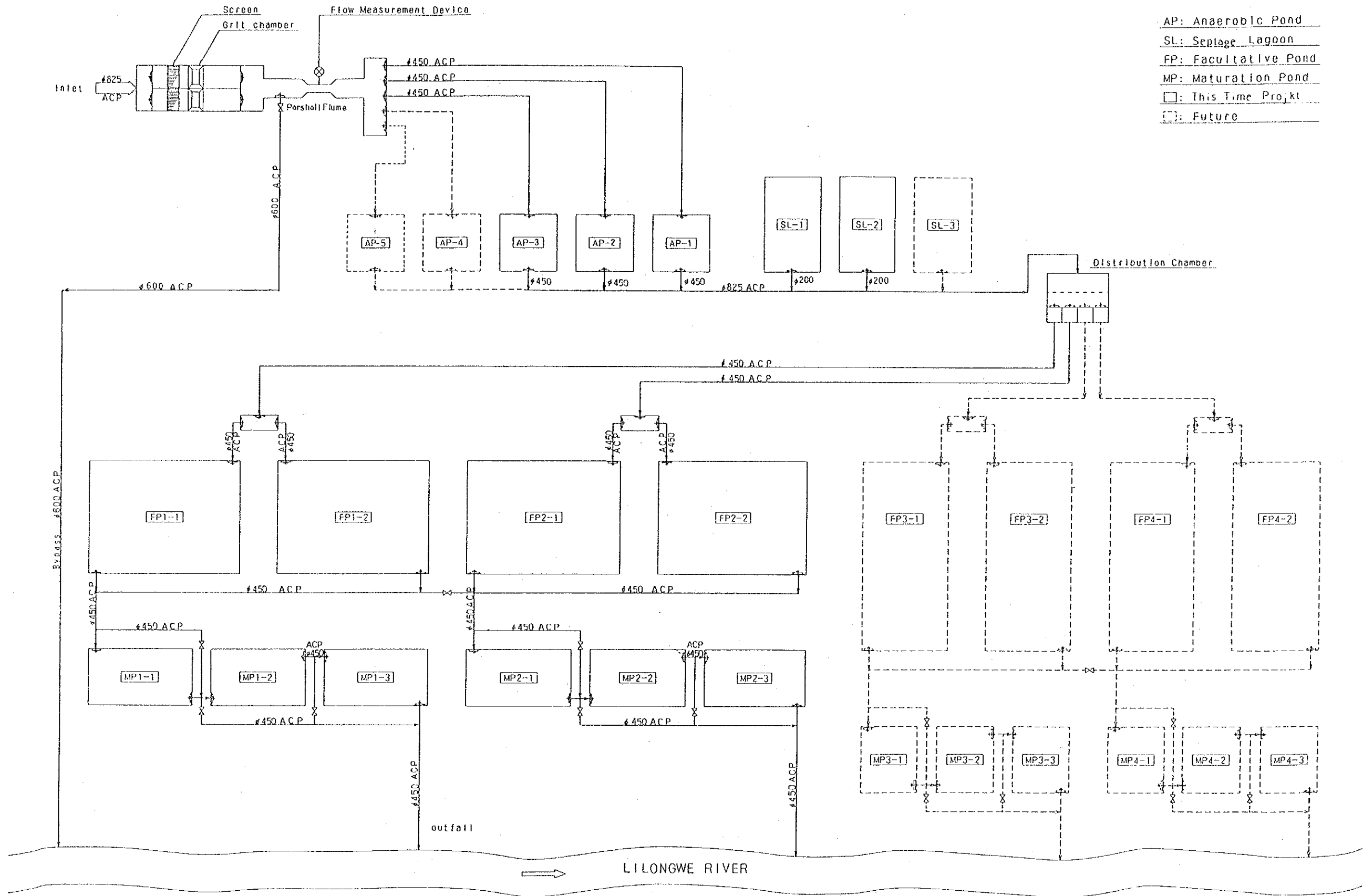
LEGEND

-  THIS TIME PROJECT
-  FUTURE EQUIPMENT

LAYOUT PLAN 1 / 2500

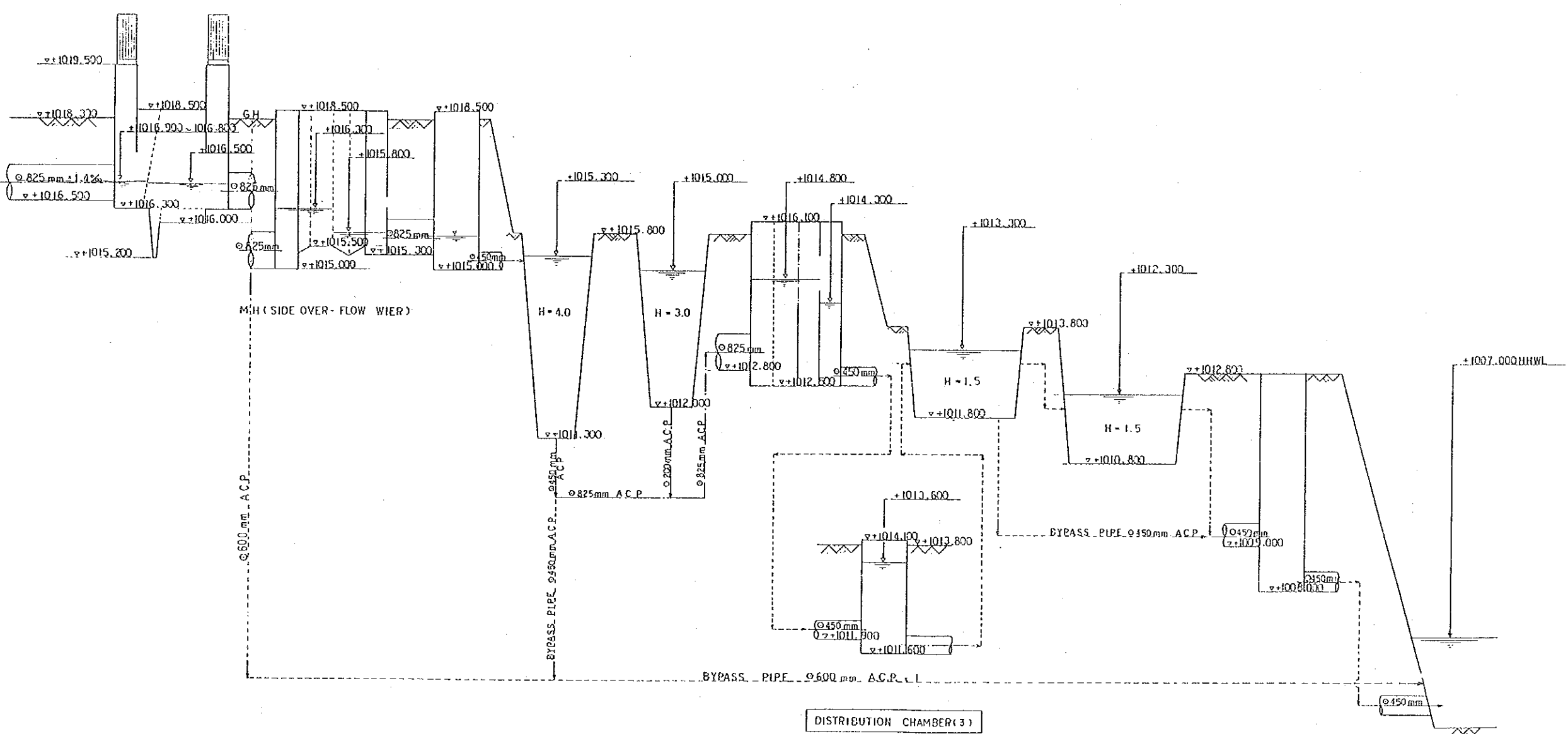
Drawing No. 2. LAYOUT PLAN

Flow Diagram of KAUMA Sewage Treatment Plant



Drawing No. 3. FLOW DIAGRAM

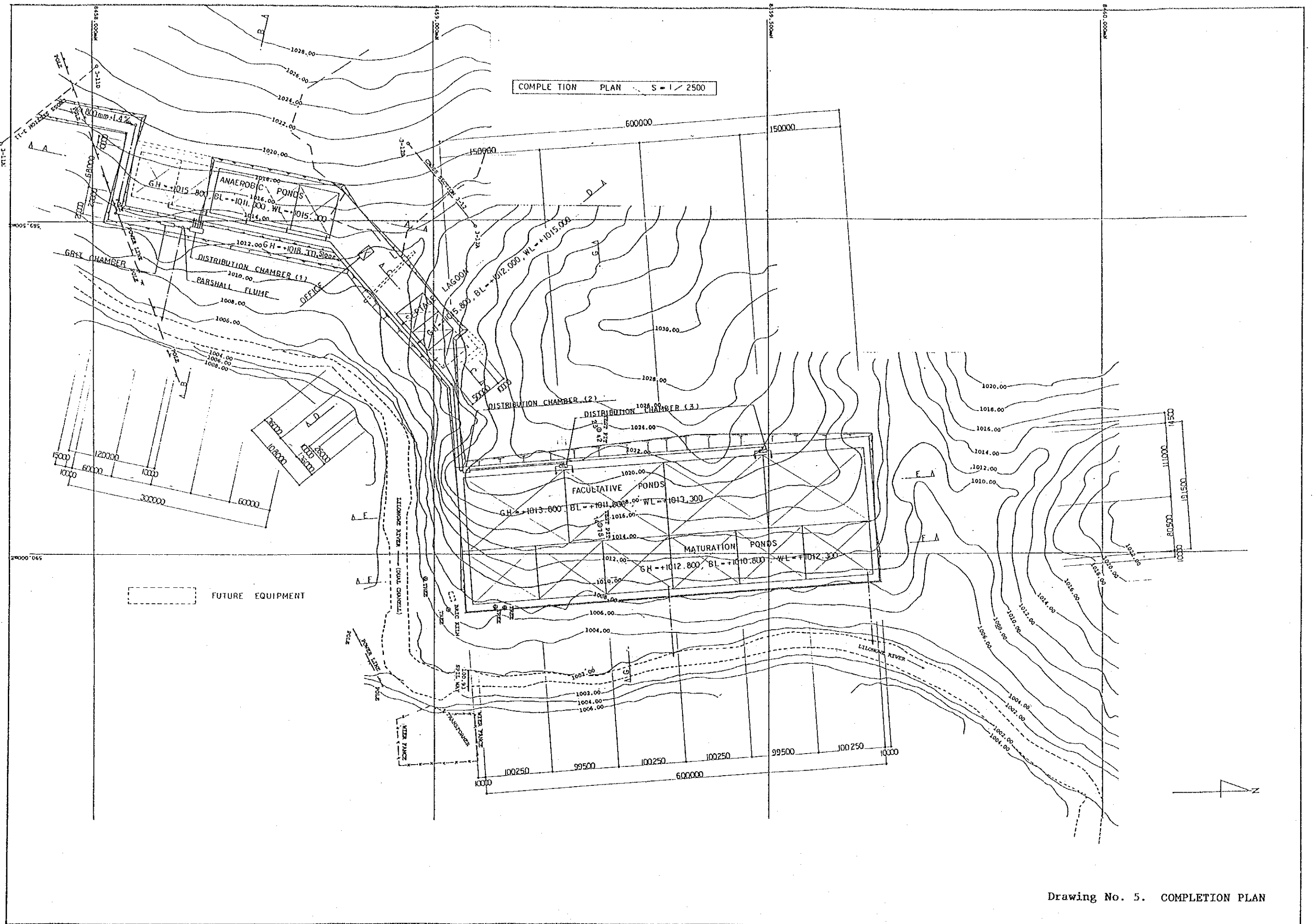
+ 1021.000
 + 1020.000
 + 1019.000
 + 1018.000
 + 1017.000
 + 1016.000
 + 1015.000
 + 1014.000
 + 1013.000
 + 1012.000
 + 1011.000
 + 1010.000
 + 1009.000
 + 1008.000
 + 1007.000
 + 1006.000
 + 1005.000



	GRIT CHAMBER	PARSHALL FLUME	DISTRIBUTION CHAMBER(1)	ANAEROBIC PONDS	SEPTAGE LAGOON	DISTRIBUTION CHAMBER(2)	FACULTATIVE PONDS	MATURATION PONDS	MANHOLE	LILONGWE RIVER					
NUMBER(FUTURE NUMBER)	1	2	1	3(5)	3(5)	1	2(3)	1	2(4)	4(8)	4(8)	6(12)	2(4)	2(4)	2(4) + 1(BYPASS)

HYDRAULIC PROFILE H = 1/50 V = NOT SC

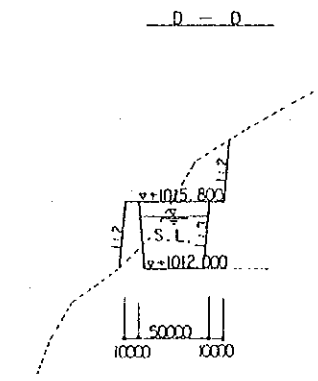
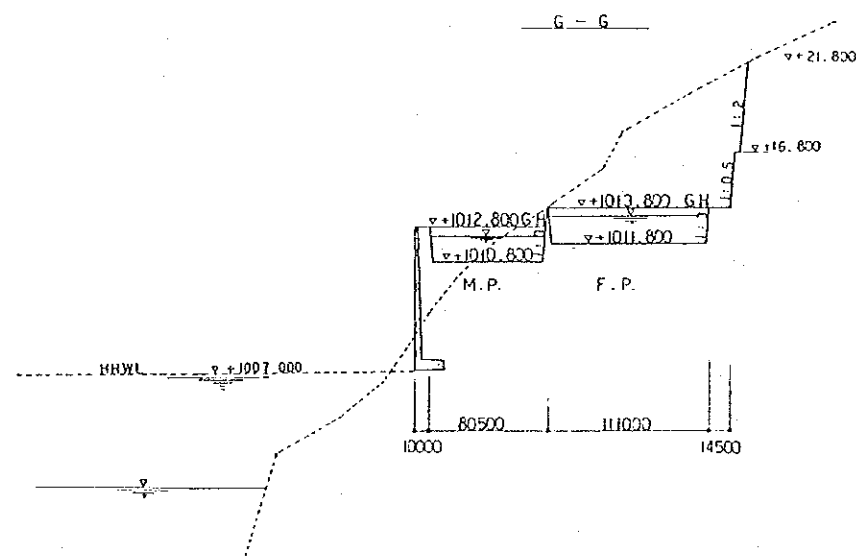
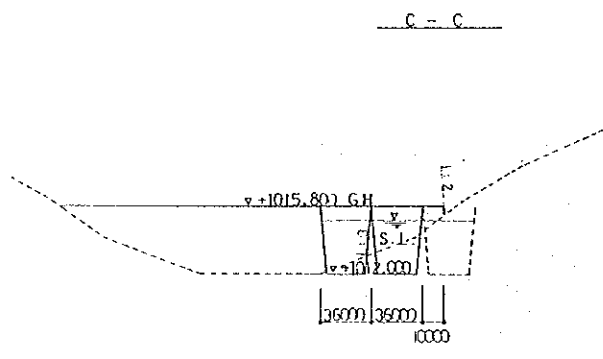
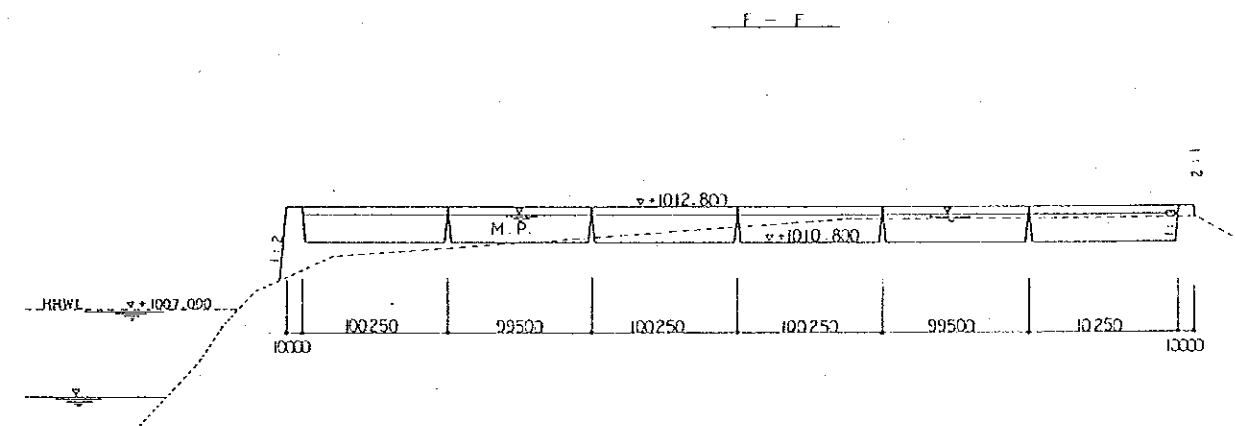
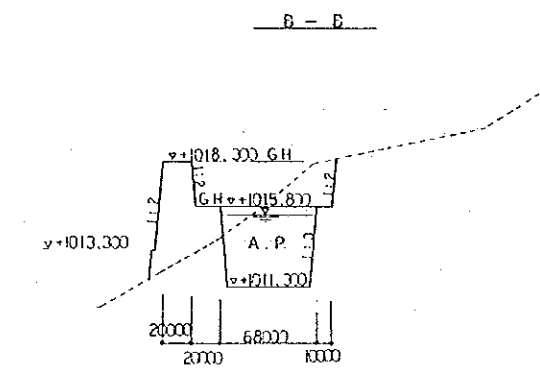
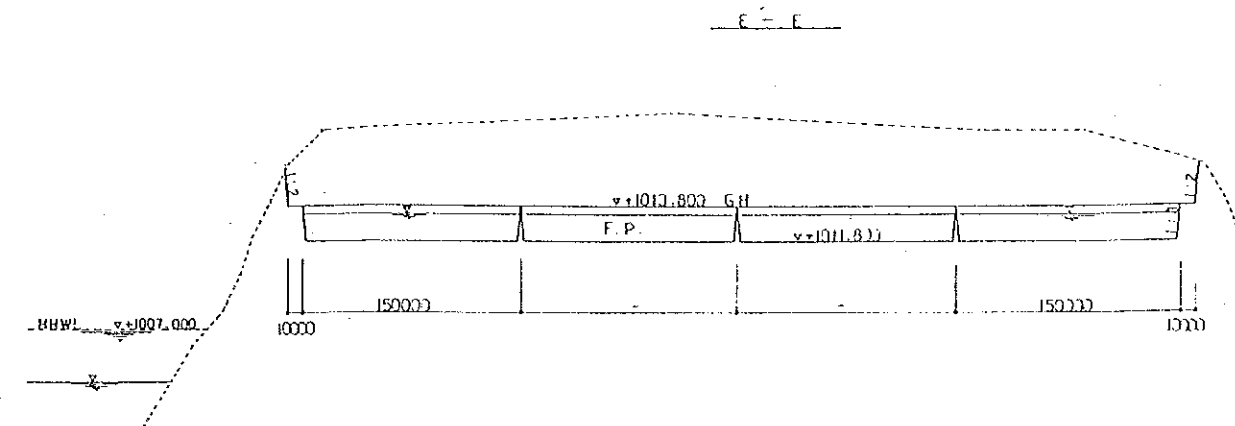
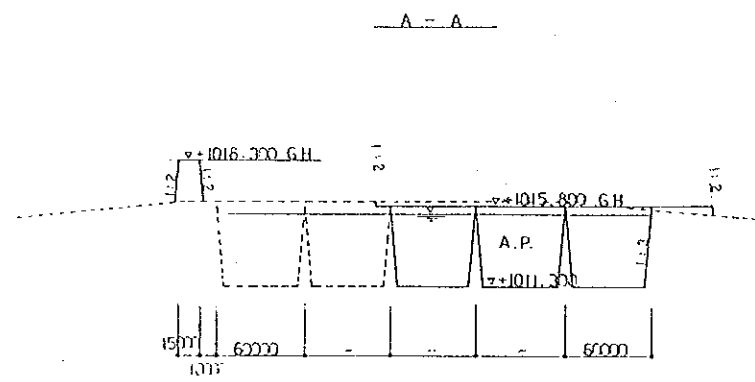
Drawing No. 4. HYDRAULIC PROFILE



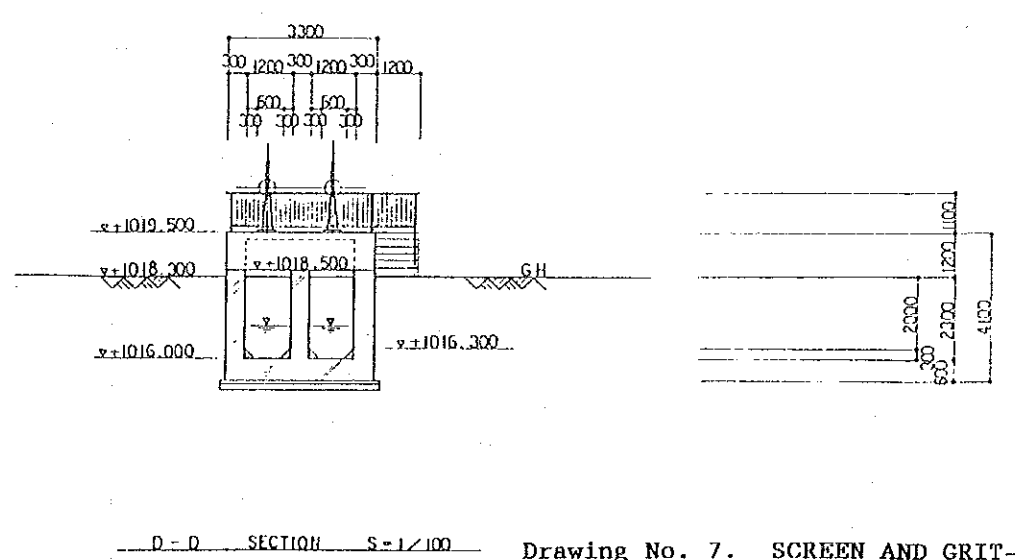
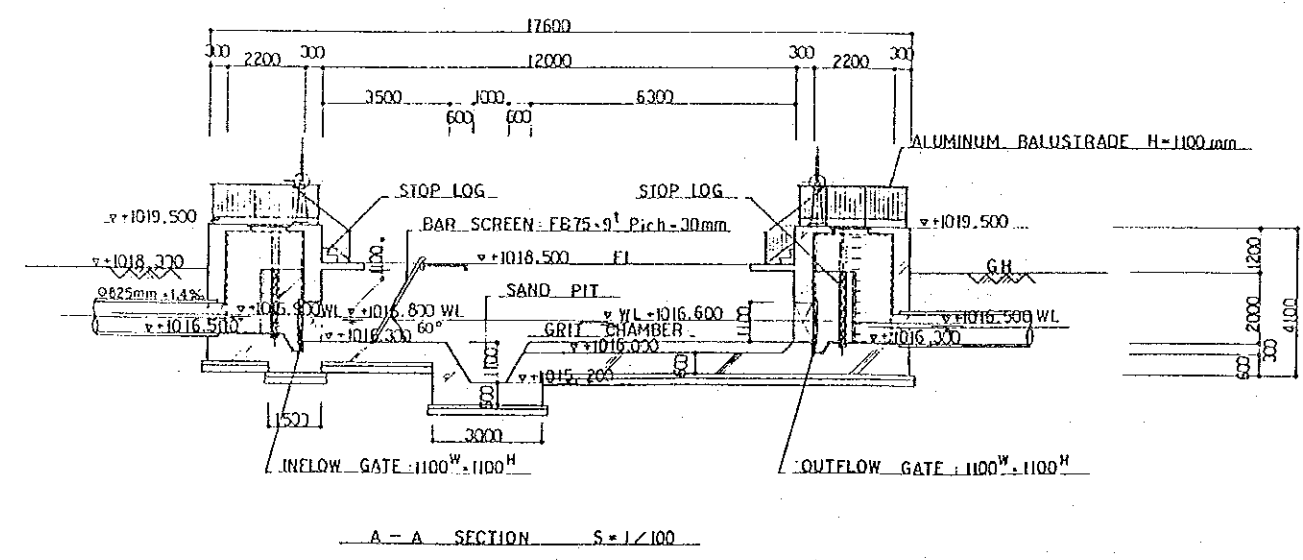
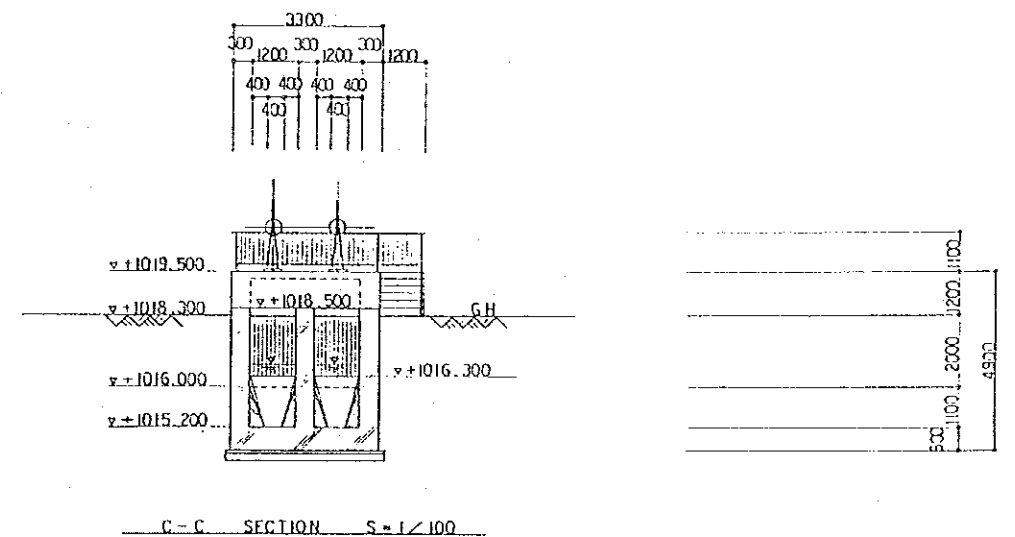
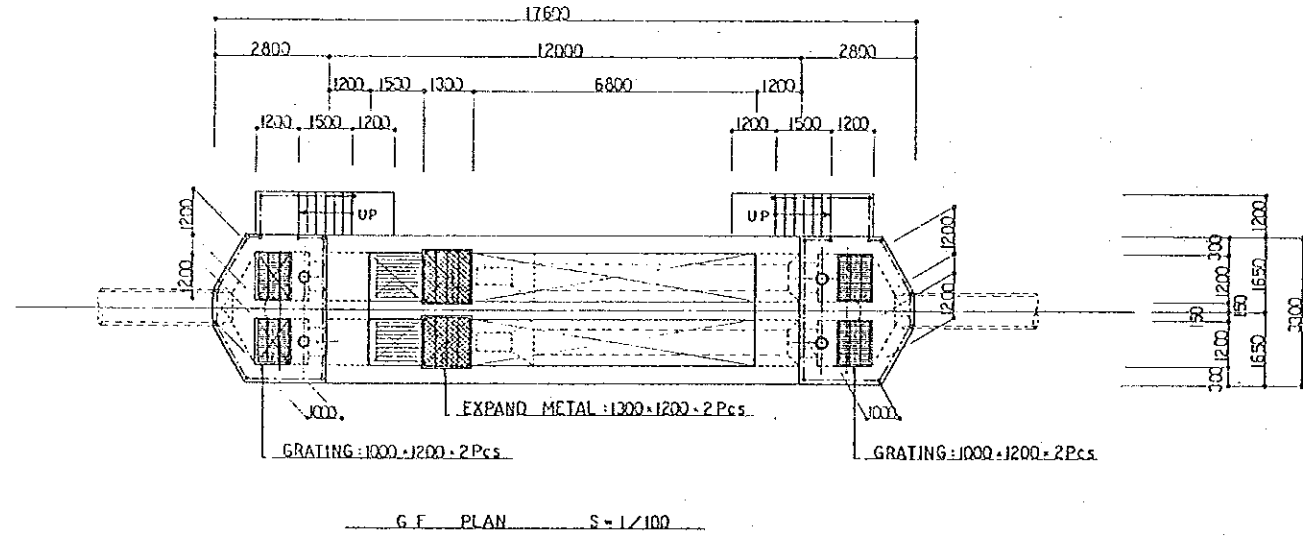
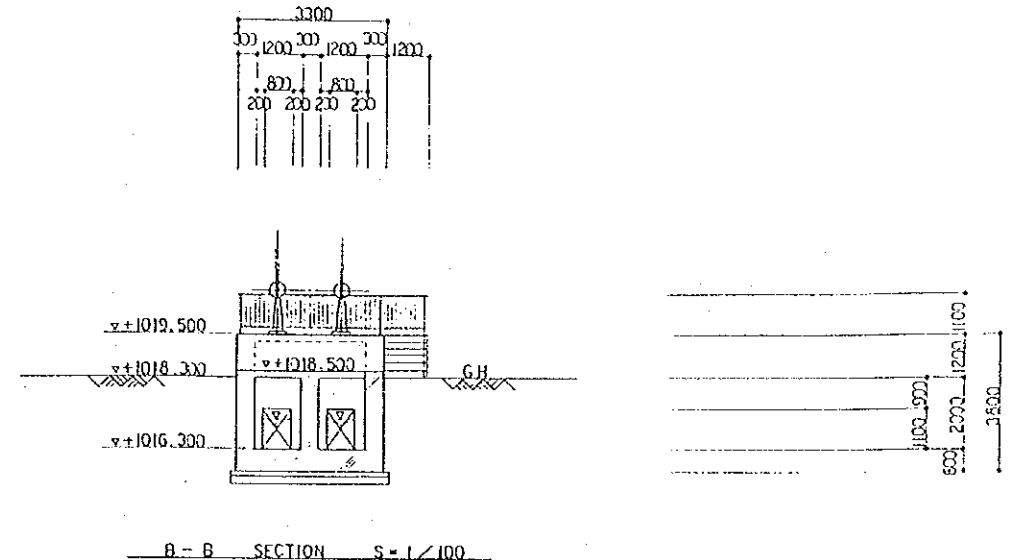
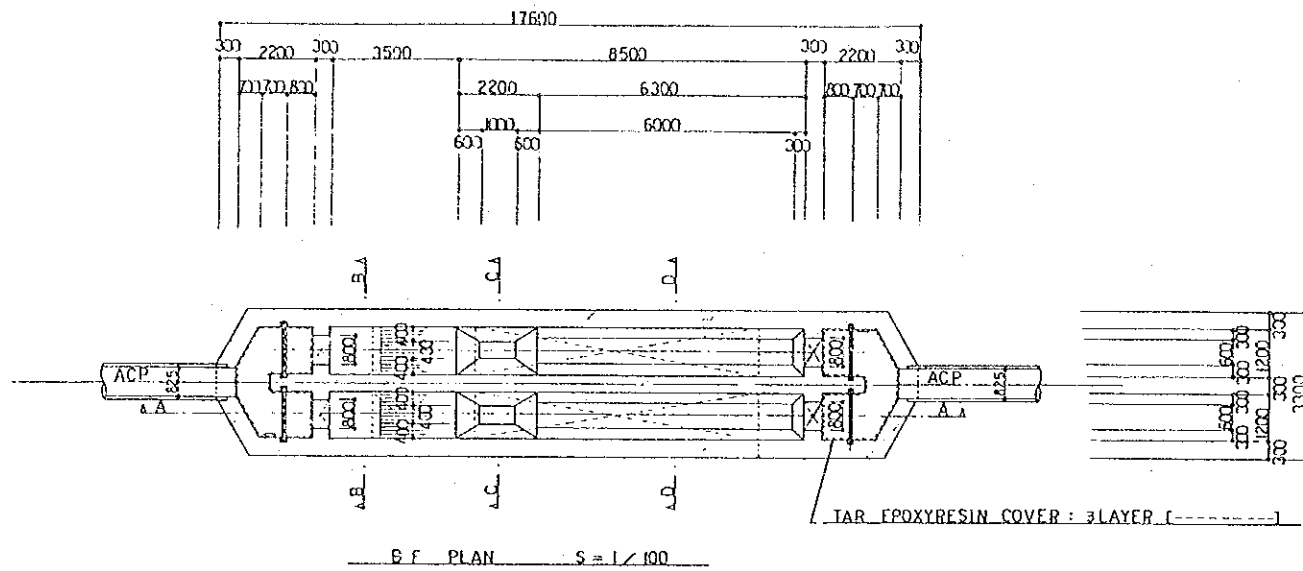
COMPLETION PLAN S = 1 / 2500

Drawing No. 5. COMPLETION PLAN

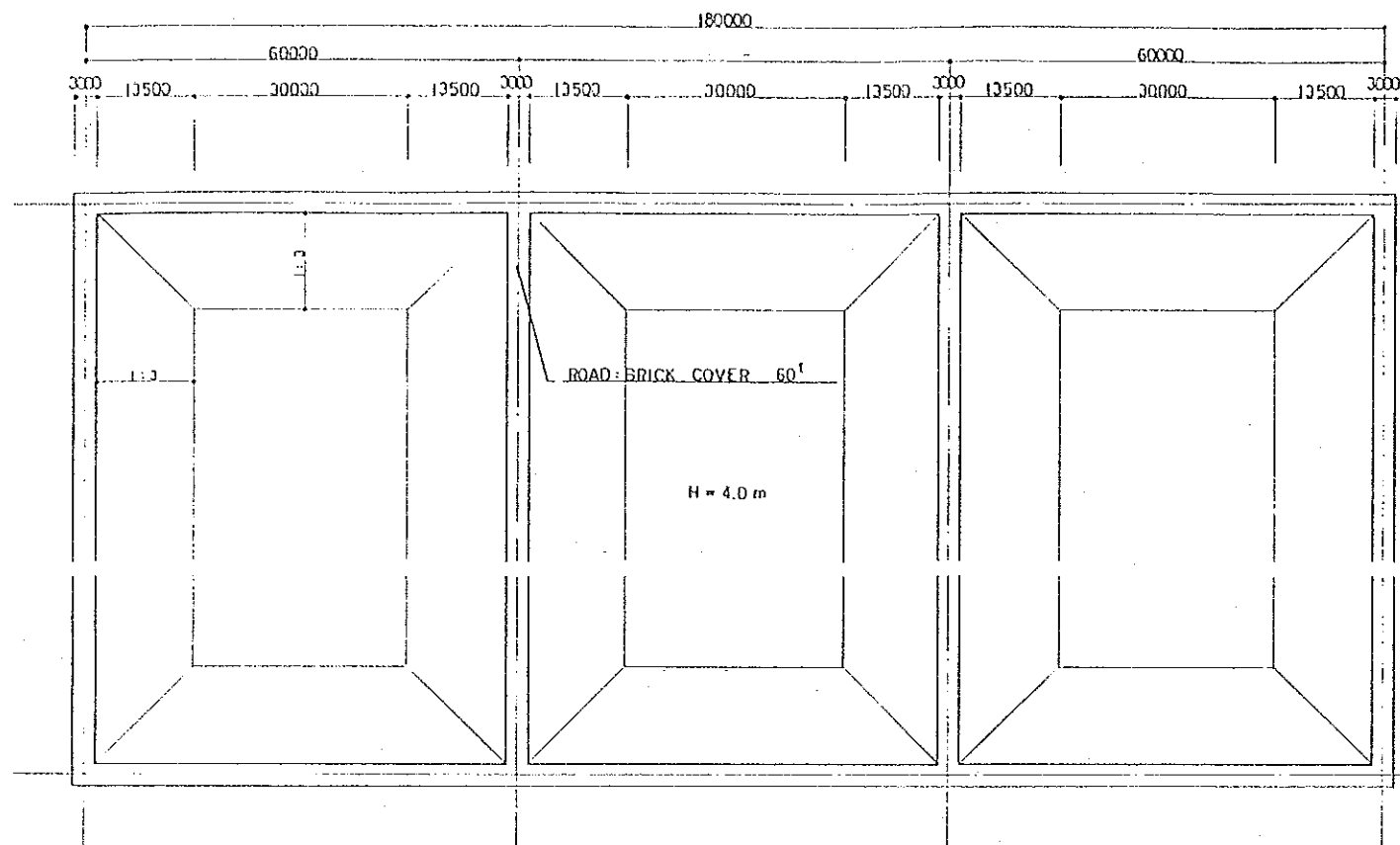
TRANSVERSE and VERTICAL SECTION S : V=1/2500, H=1/200



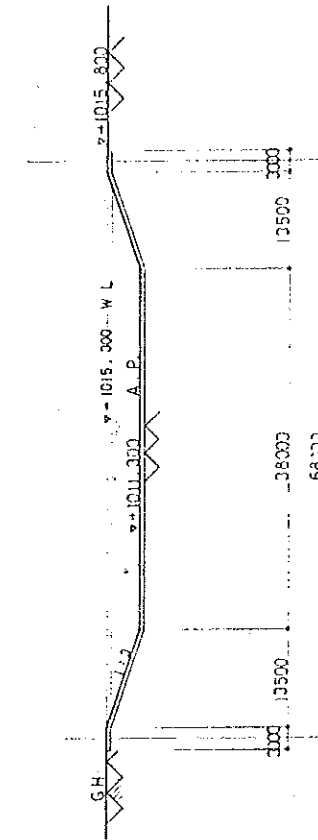
Drawing No. 6. TRANSVERSE AND VERTICAL SECTION



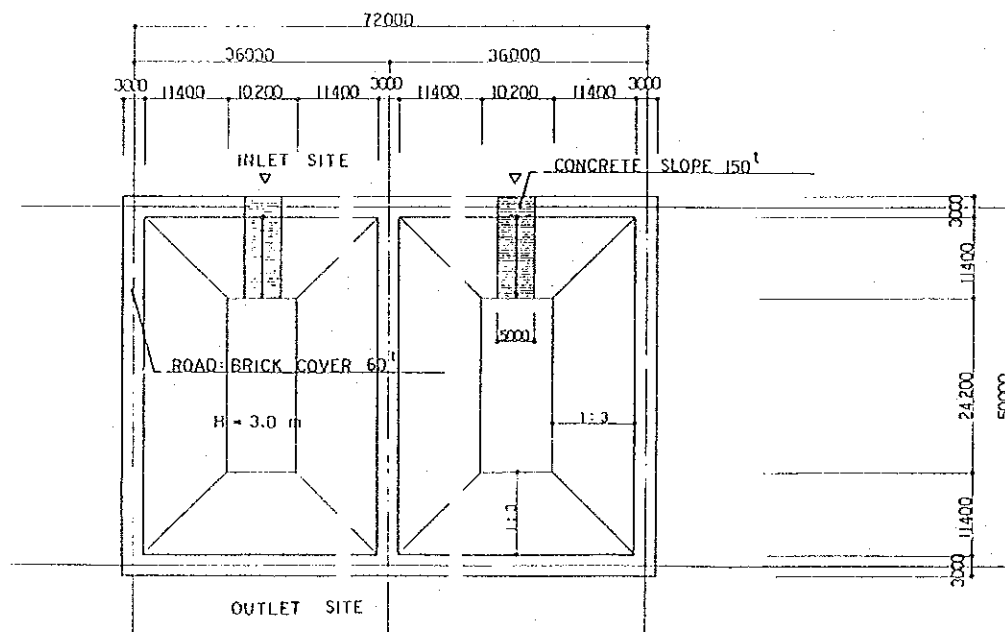
Drawing No. 7. SCREEN AND GRIT-CHAMBER



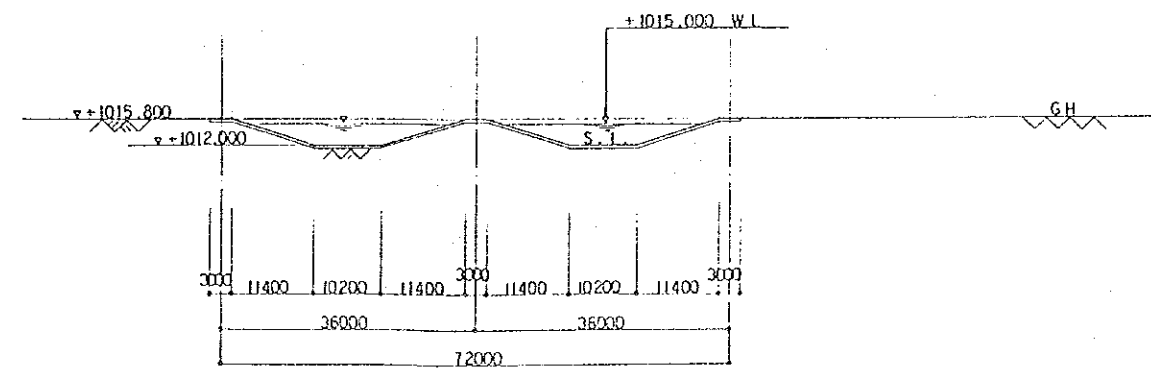
ANAEROBIC PONDS PLAN S=1/500



ANAEROBIC PONDS SECTION S=1/500



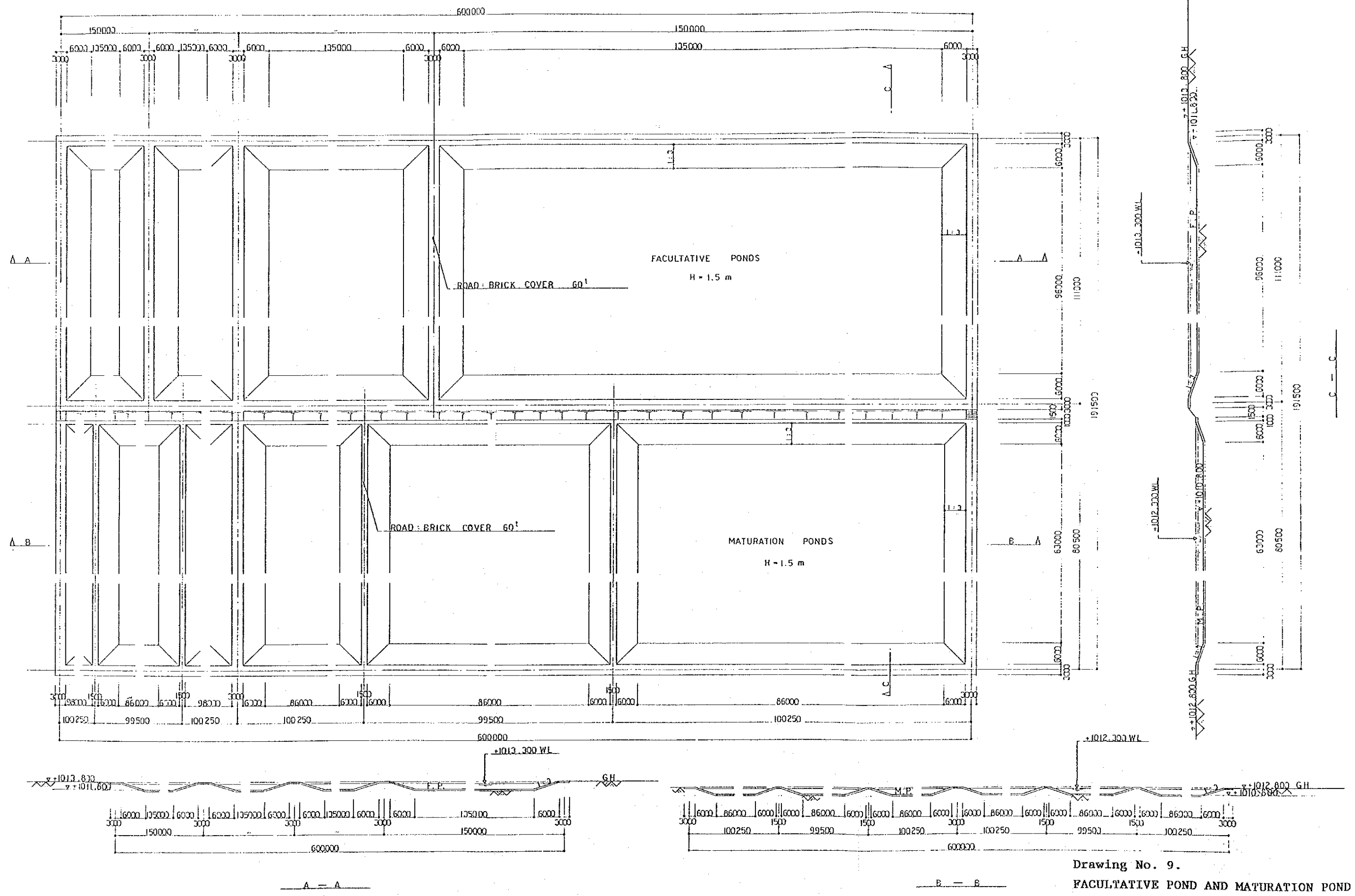
SEPTAGE LAGOON PLAN S=1/500



SEPTAGE LAGOON SECTION S=1/500

Drawing No. 8. ANAEROBIC POND AND SEPTAGE LAGOON

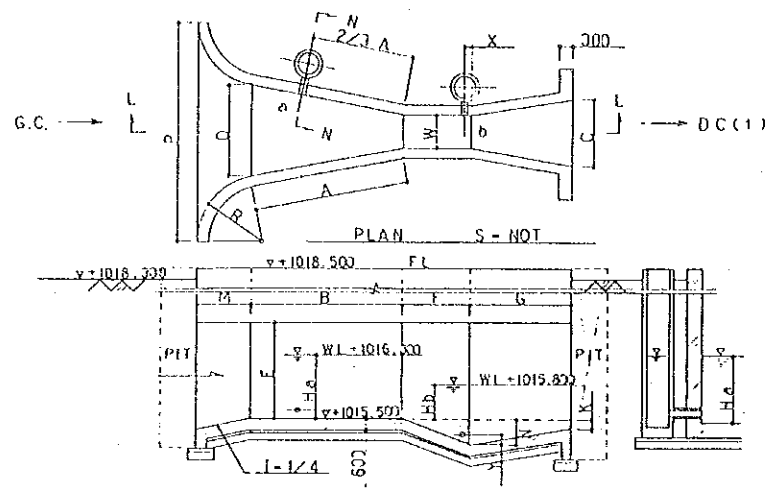
FACULTATIVE PONDS MATURATION PONDS PLAN and SECTION S=1/500



Drawing No. 9.
FACULTATIVE POND AND MATURATION POND

PARSHALL-FLUME DETAIL

S = NOT



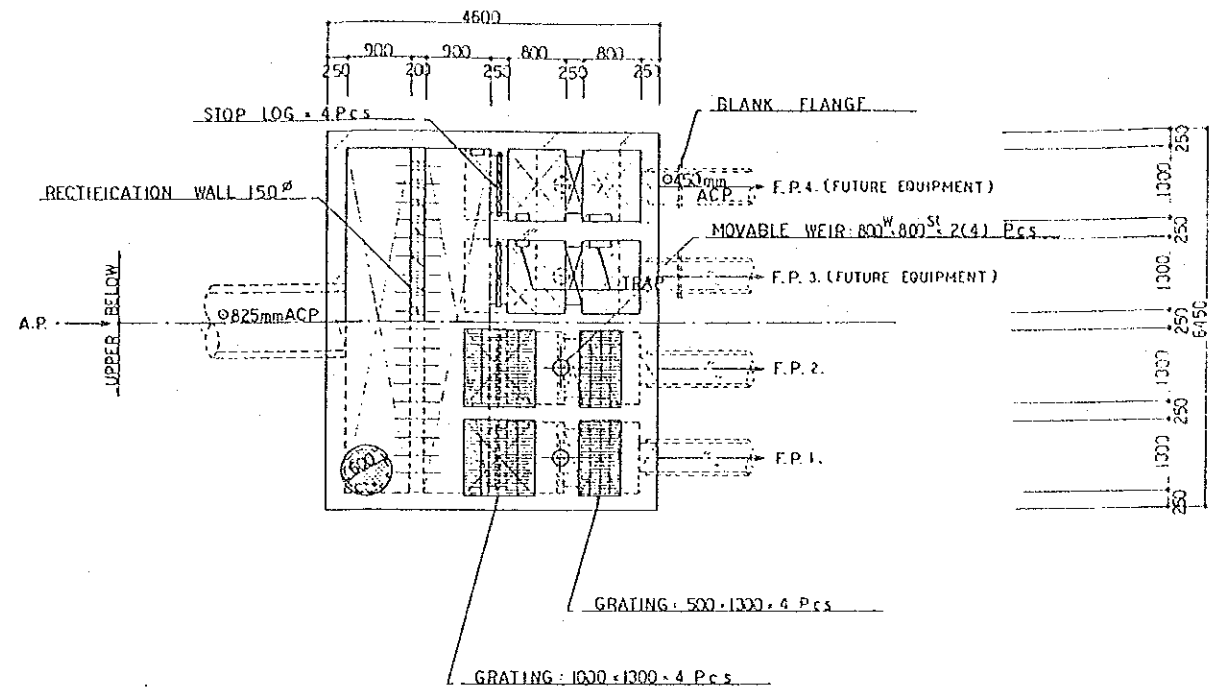
W	45.72	K	7.6
A	144.8	N	22.9
2/3 A	96.5	R	50.8
B	141.9	M	38.1
C	76.2	P	167.6
D	102.6	X	5.1
E	91.4	Y	7.6
F	61.0		UNIT: Cm
G	91.4		

(Q : FLUX PER SECOND)
 MAX = 0.697 m³/s
 MIN = 0.00425 m³/s

L-L SECTION S-NOT N-N SECTION S-NOT

DISTRIBUTION CHAMBER (2) DETAIL

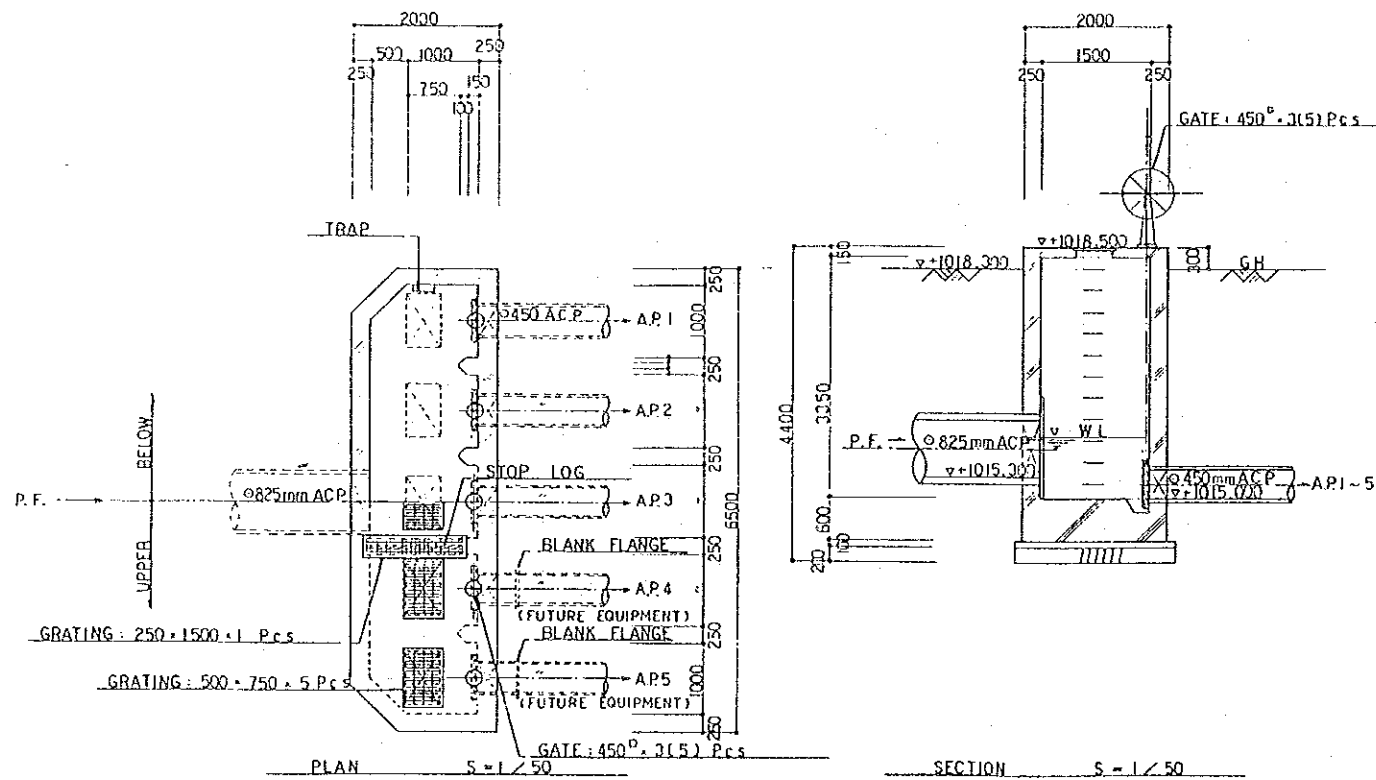
S = 1 / 50



PLAN S = 1 / 50

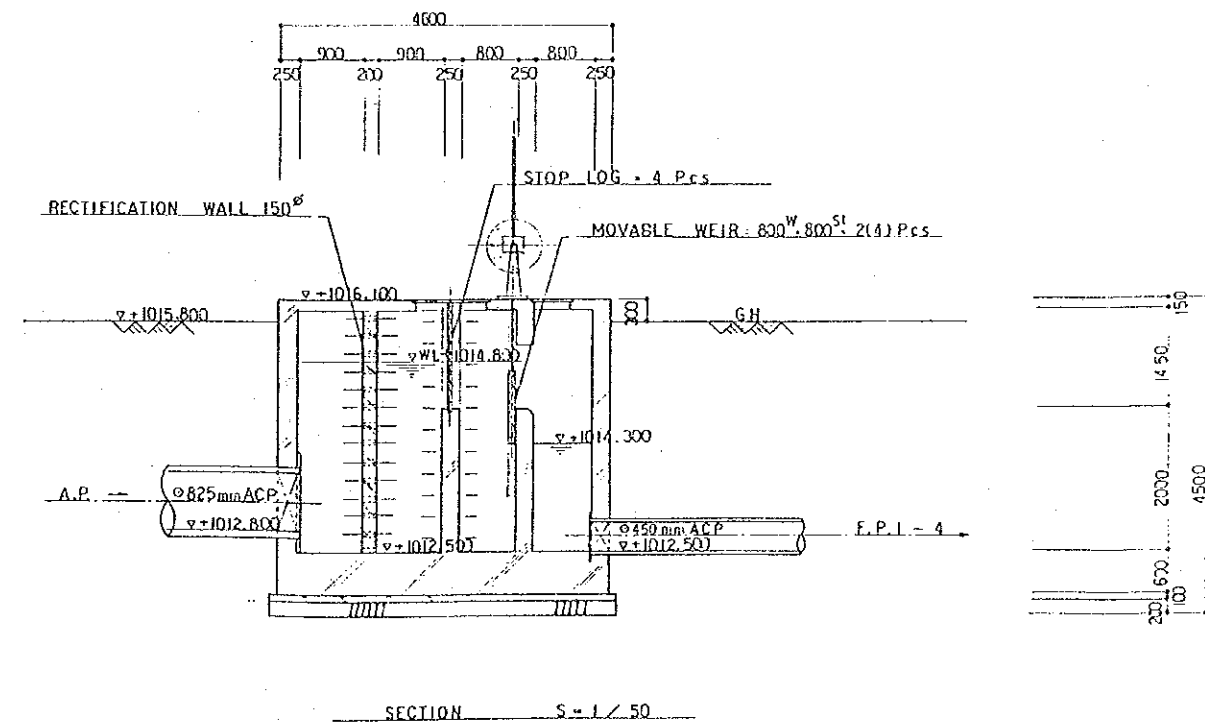
DISTRIBUTION CHAMBER (1) DETAIL

S = 1 / 50



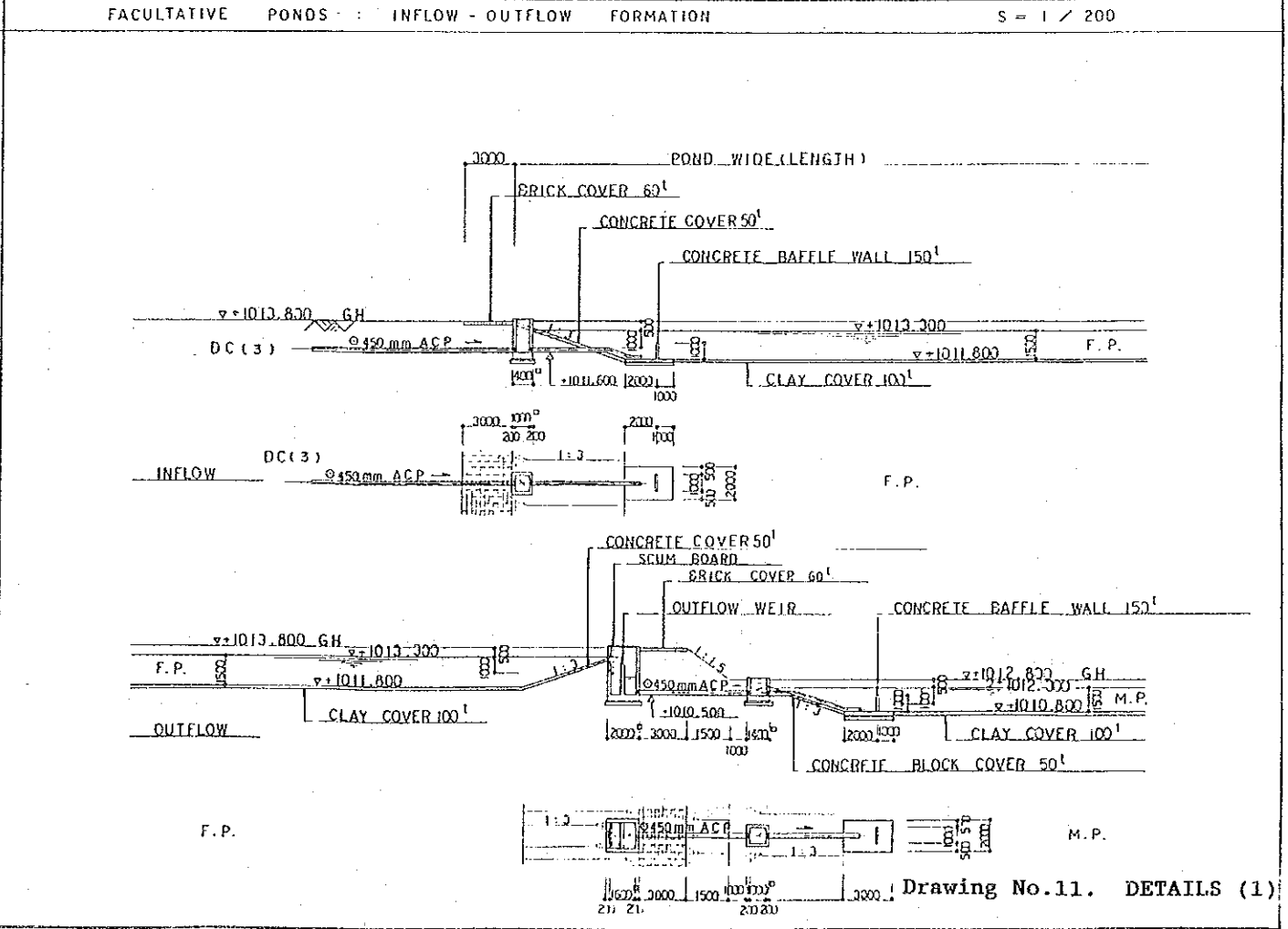
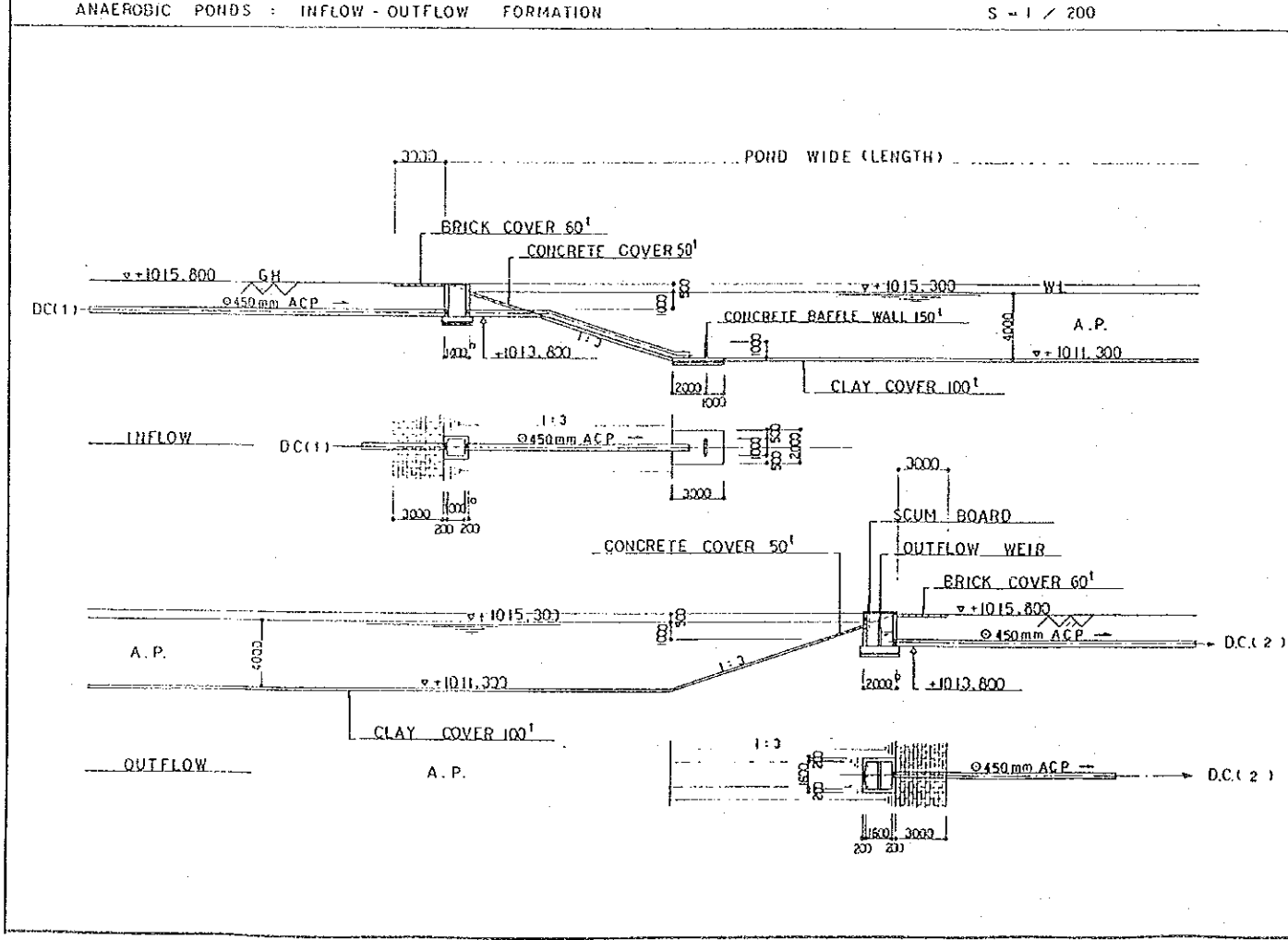
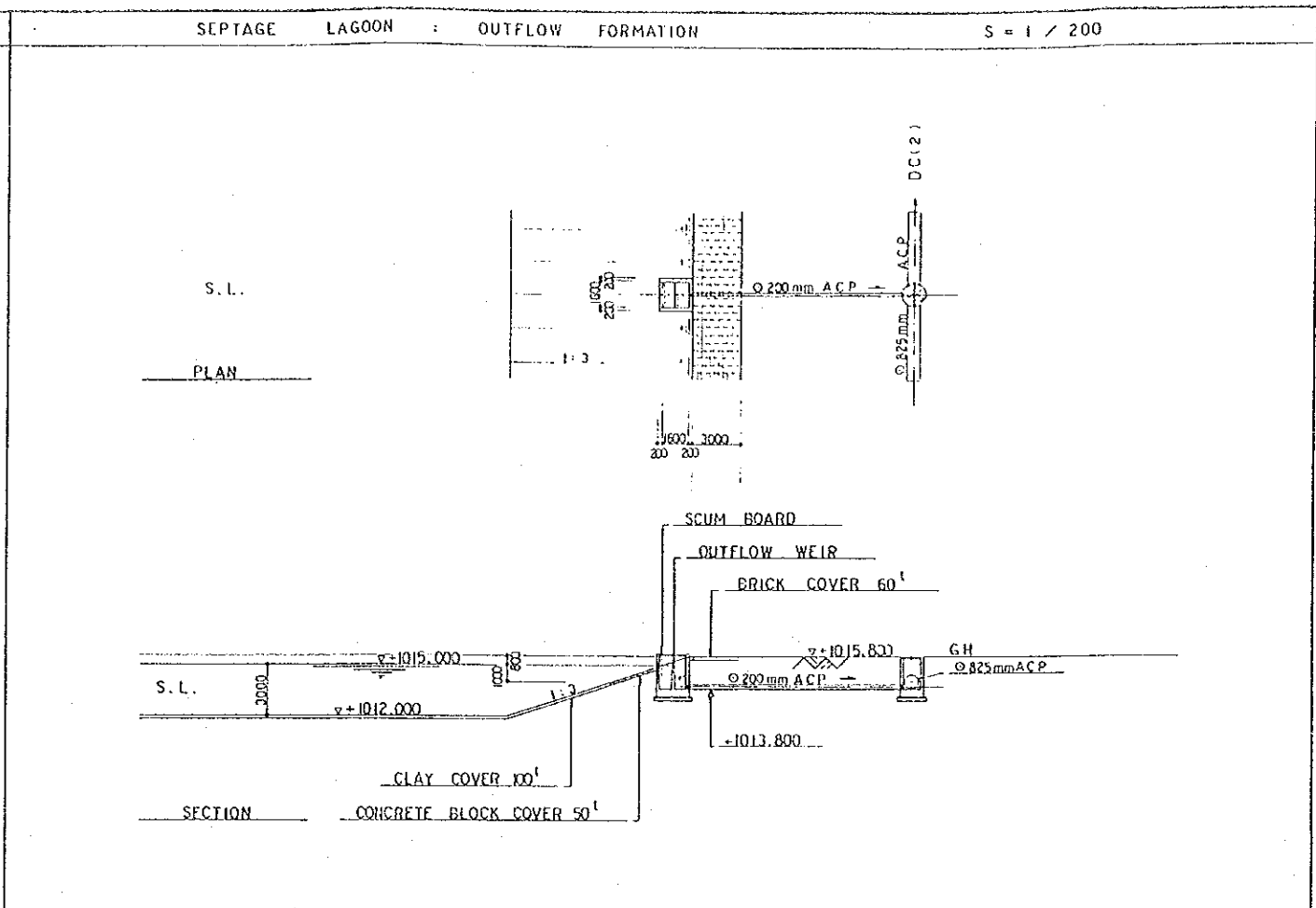
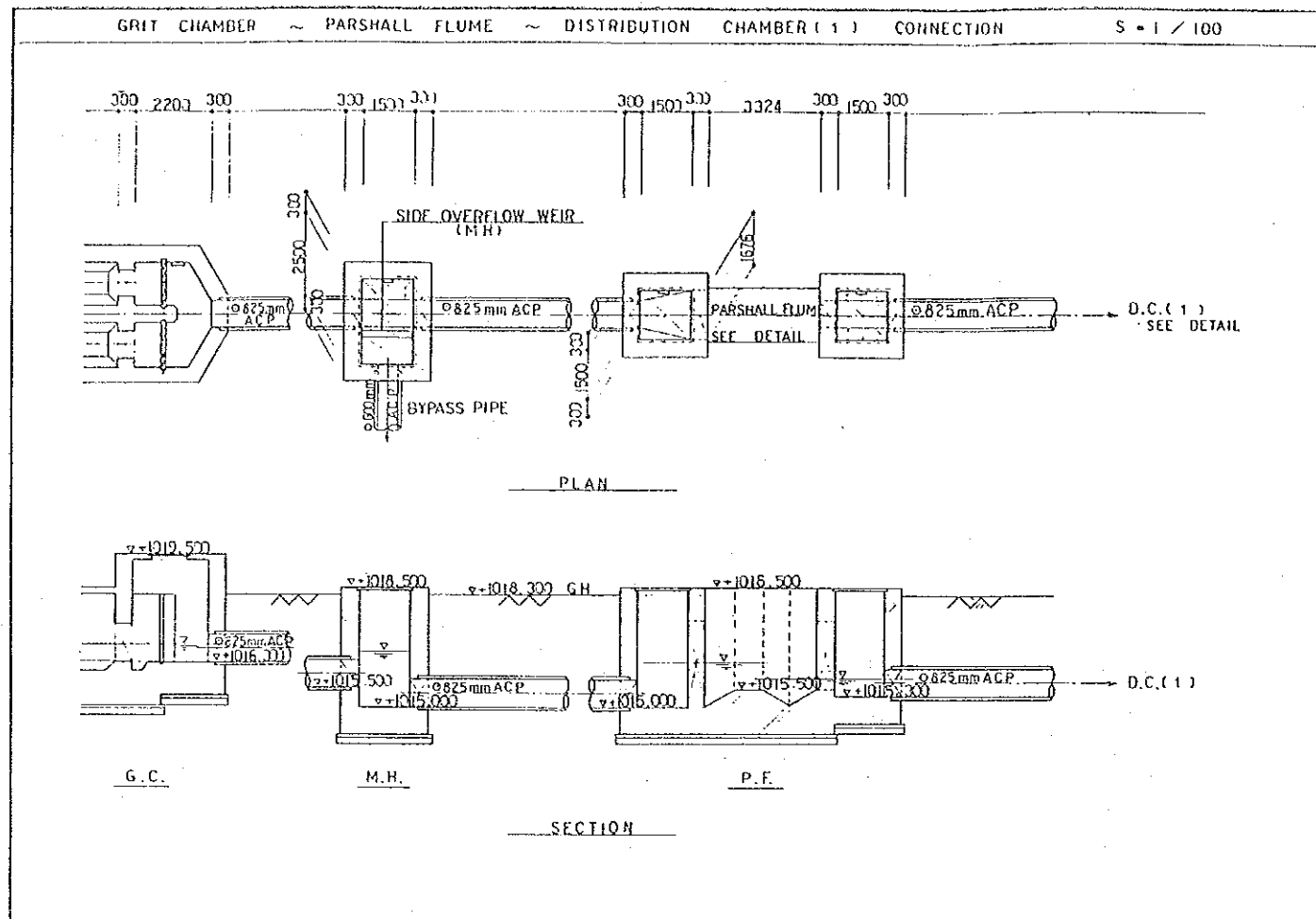
PLAN S = 1 / 50

SECTION S = 1 / 50



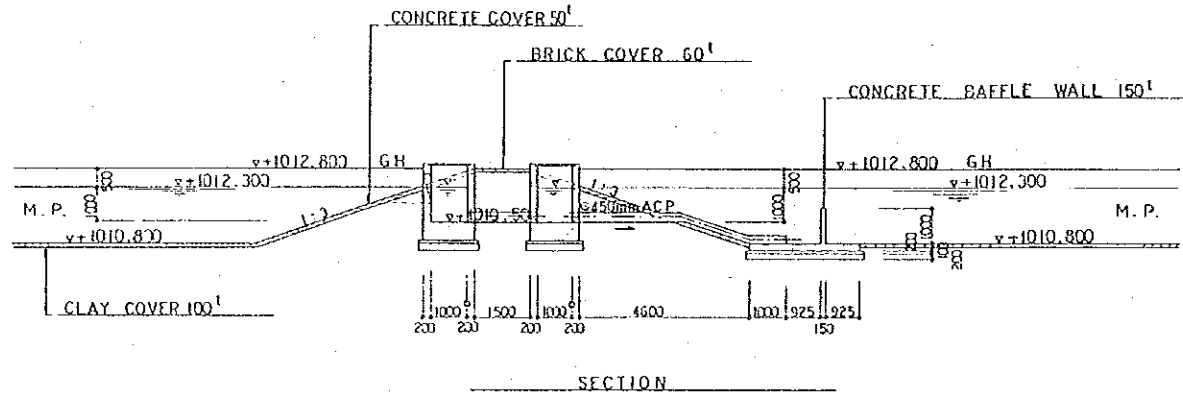
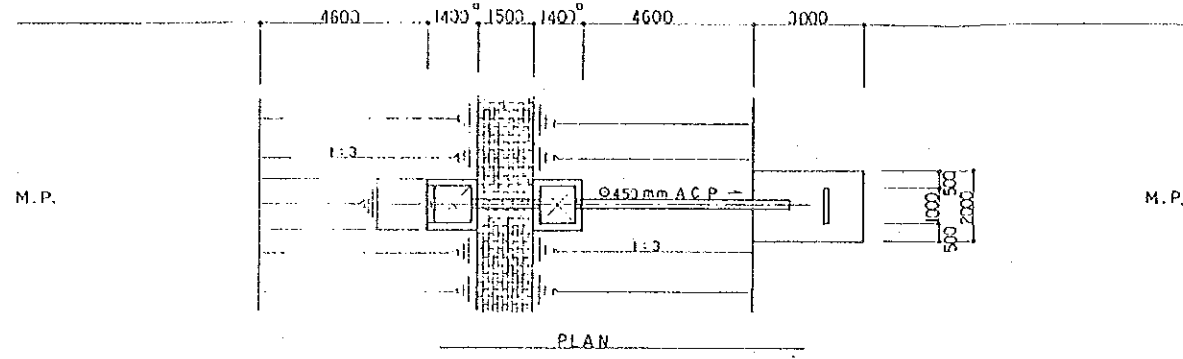
SECTION S = 1 / 50

Drawing No.10. PARSHALL-FLUME, DISTRIBUTION CHAMBER (1) & (2)

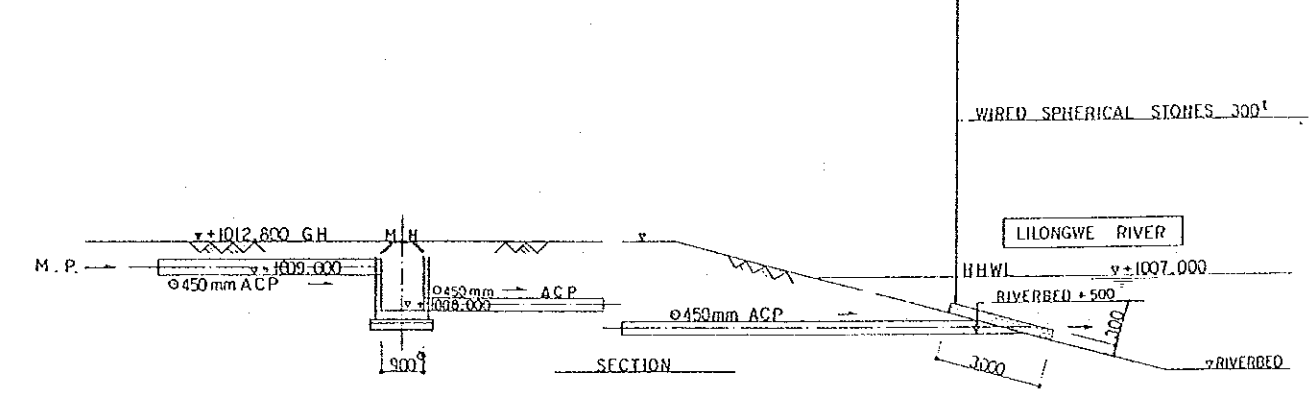
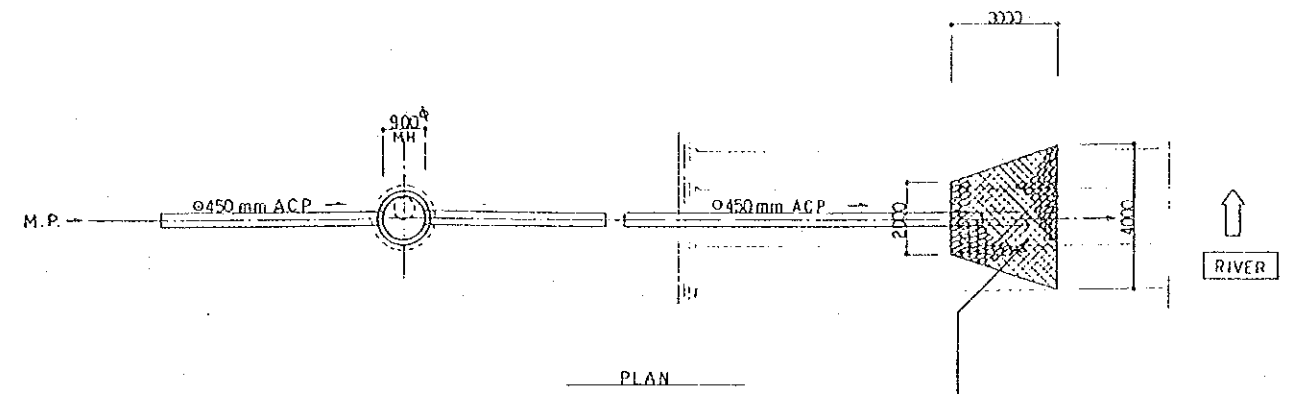


Drawing No.11. DETAILS (1)

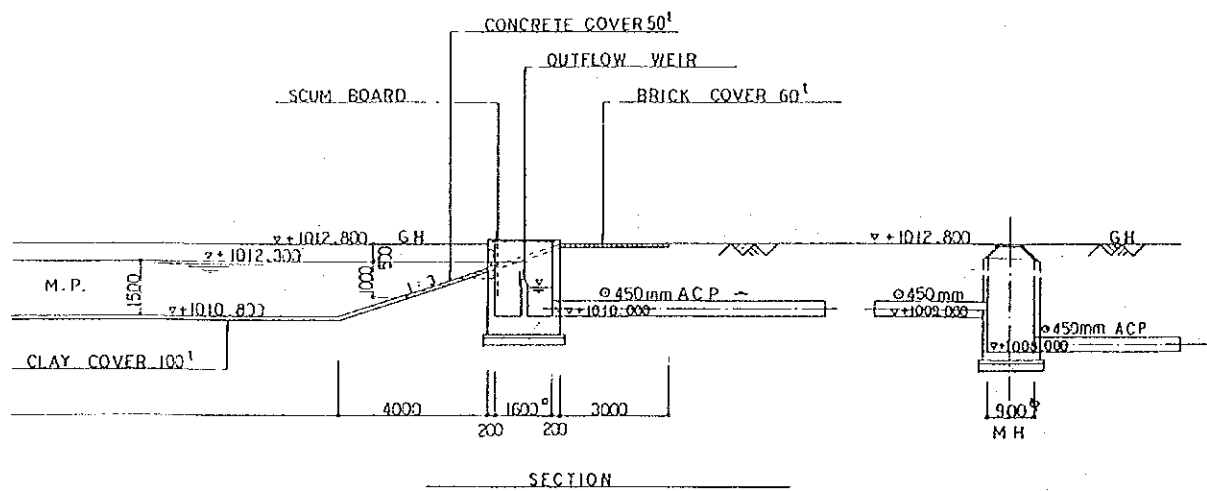
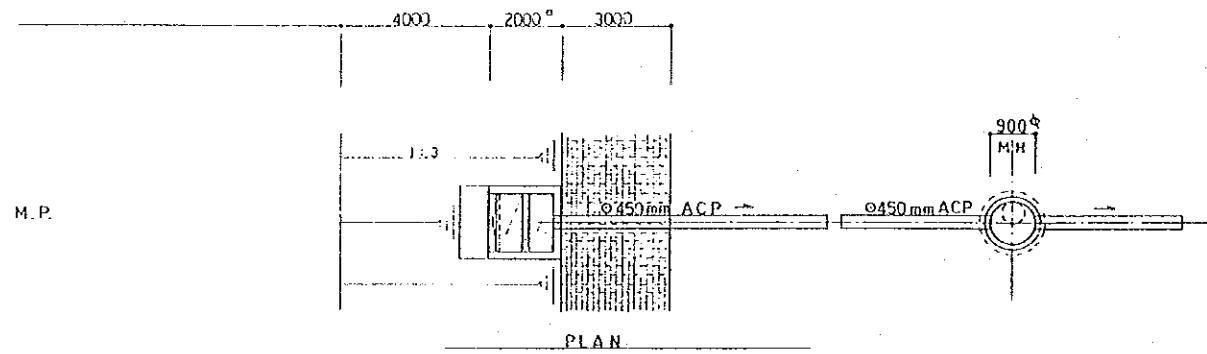
MATURATION PONDS : CONNECTION S = 1 / 100



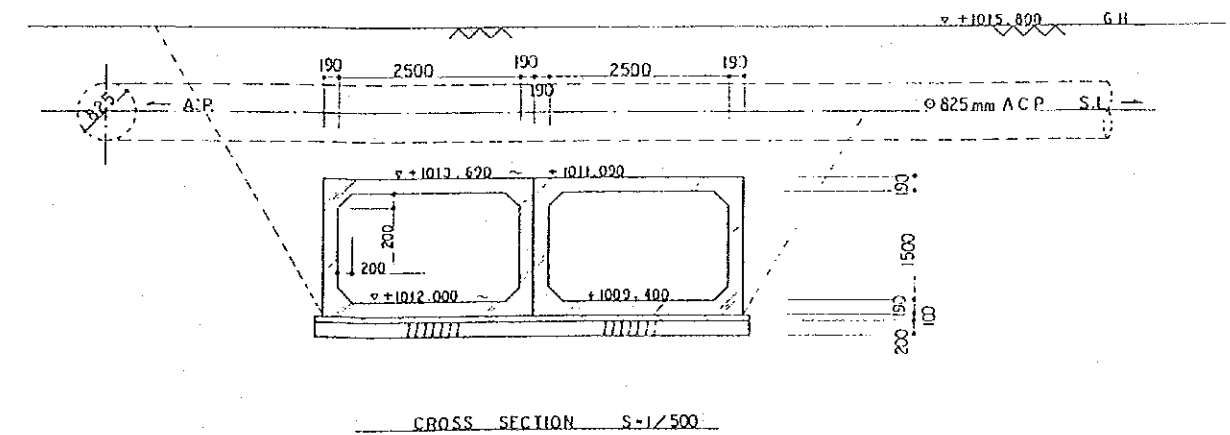
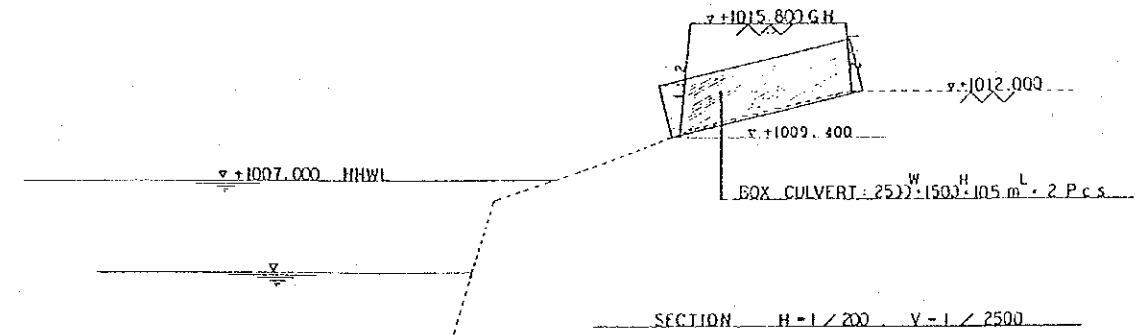
[LILONGWE RIVER] : OUTFLOW FORMATION S = 1 / 100



MATURATION PONDS : OUTFLOW FORMATION S = 1 / 100



BOX CULVERT DETAIL S = 1 / 2500, 200, 500



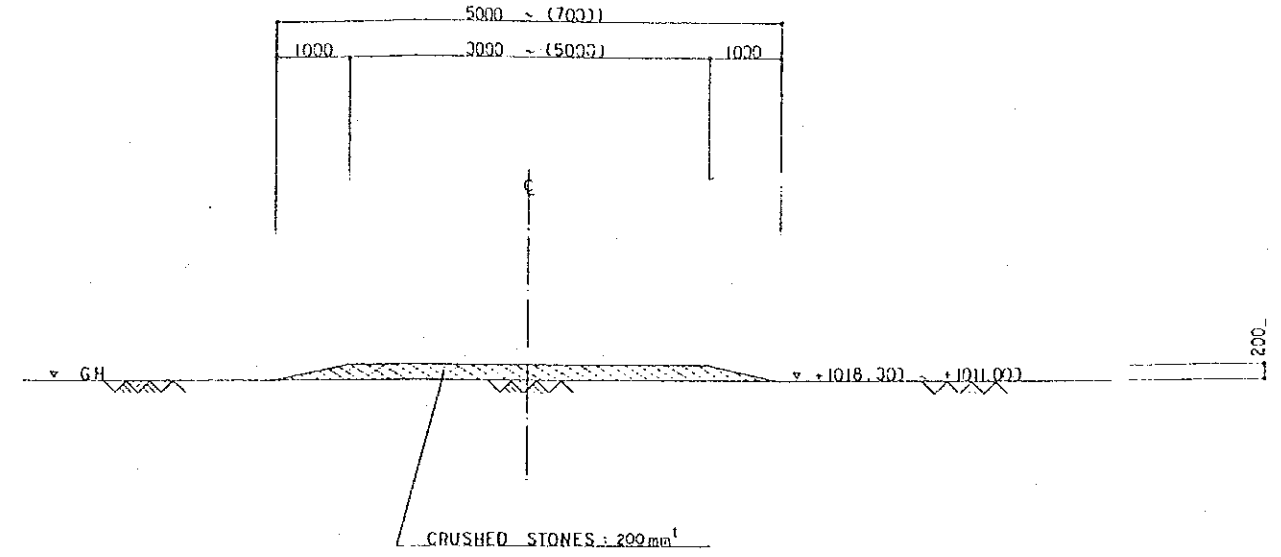
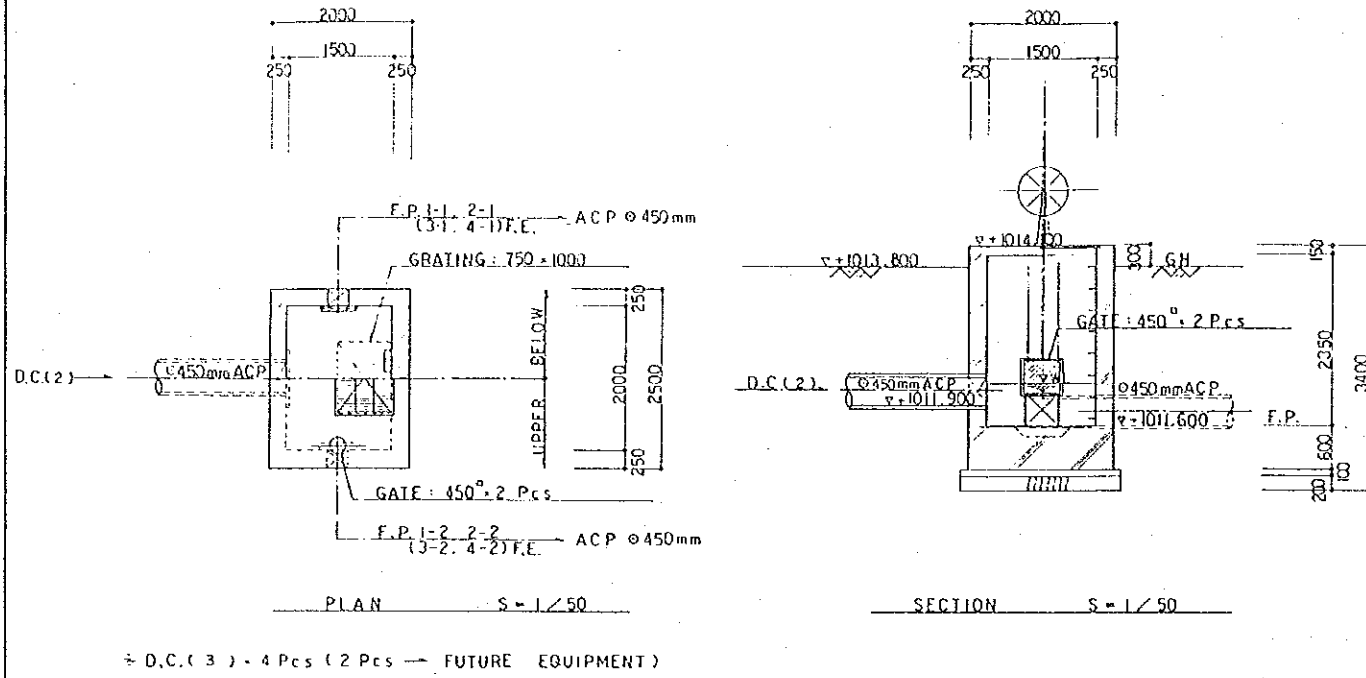
Drawing No.12. DETAILS (2)

DISTRIBUTION CHAMBER (3) DETAIL

S = 1 / 50

GRAVEL PAVING ROAD CROSS SECTION DETAIL

S = 1 / 50

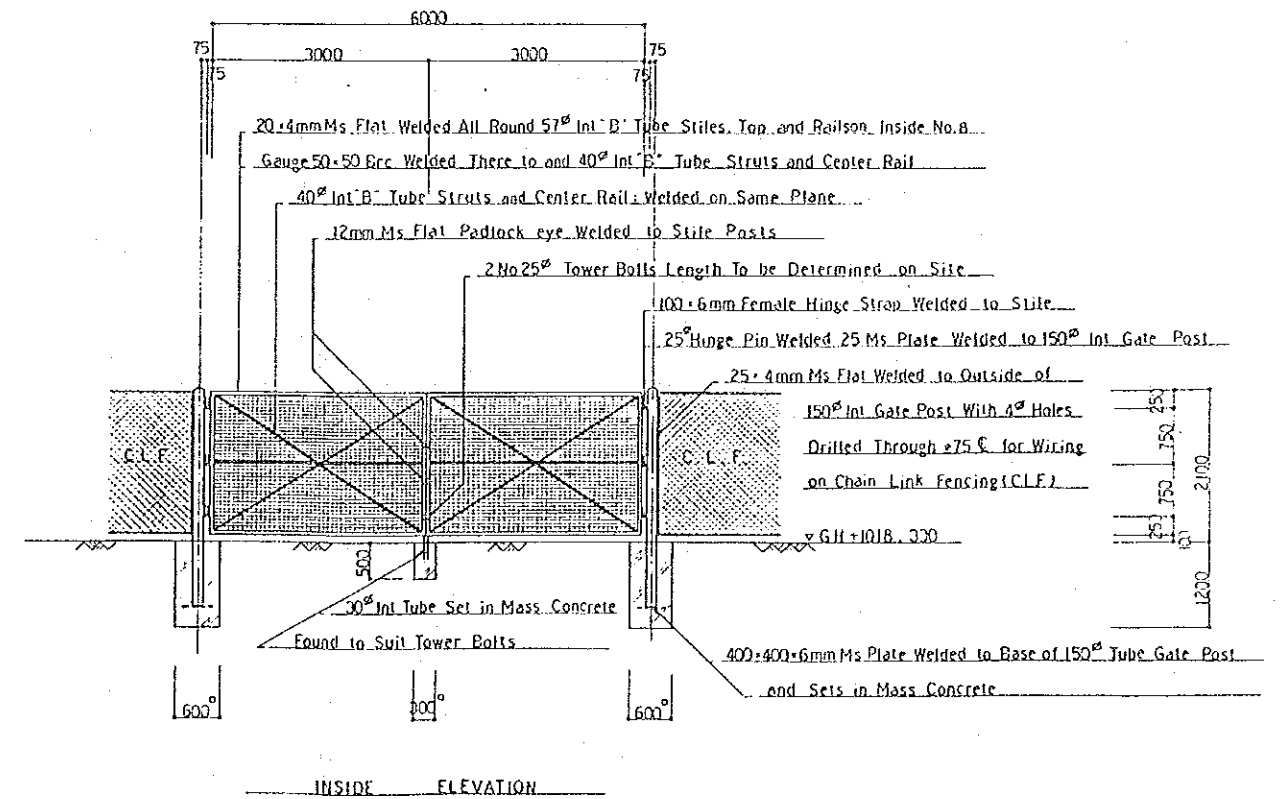
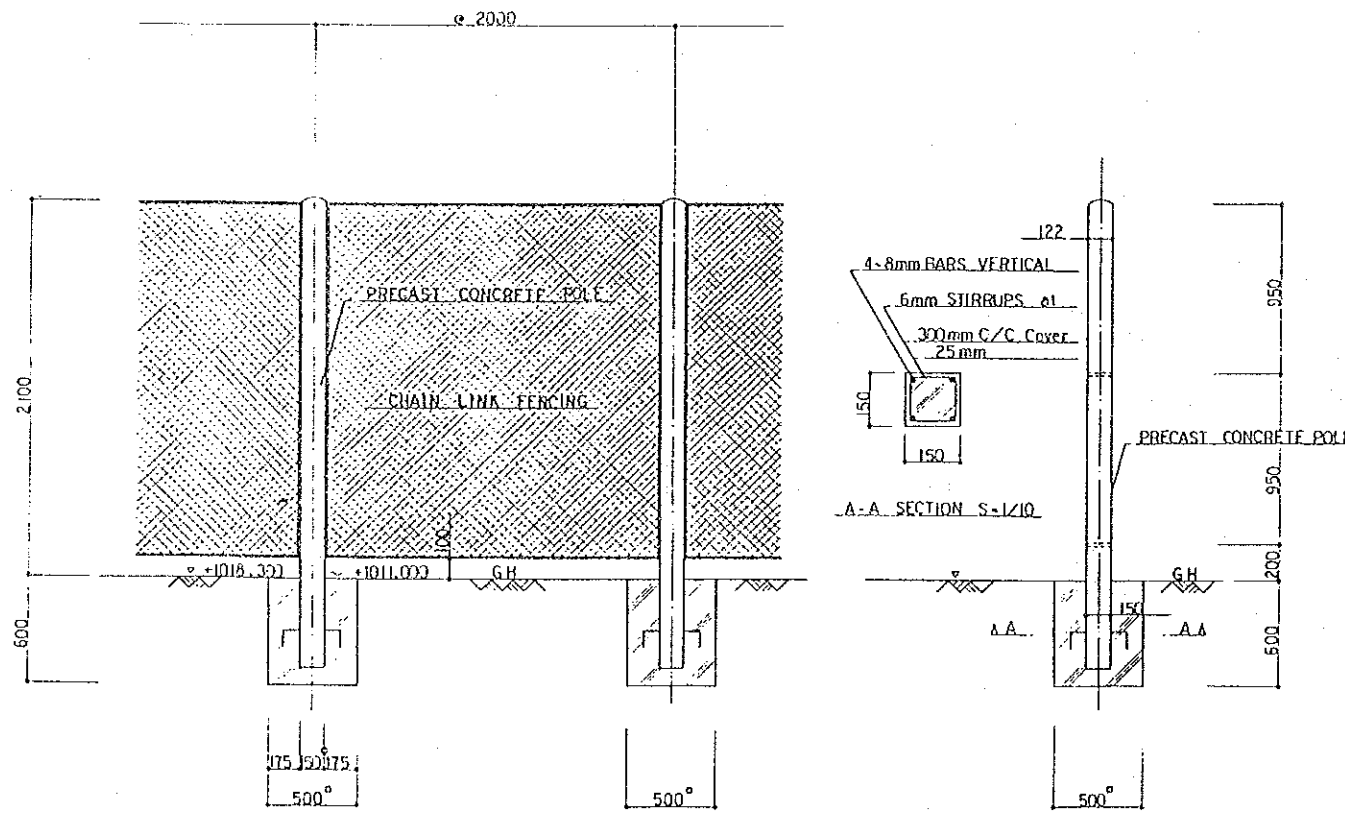


FENCING ELEVATION, FENCE POST SECTION, DETAIL

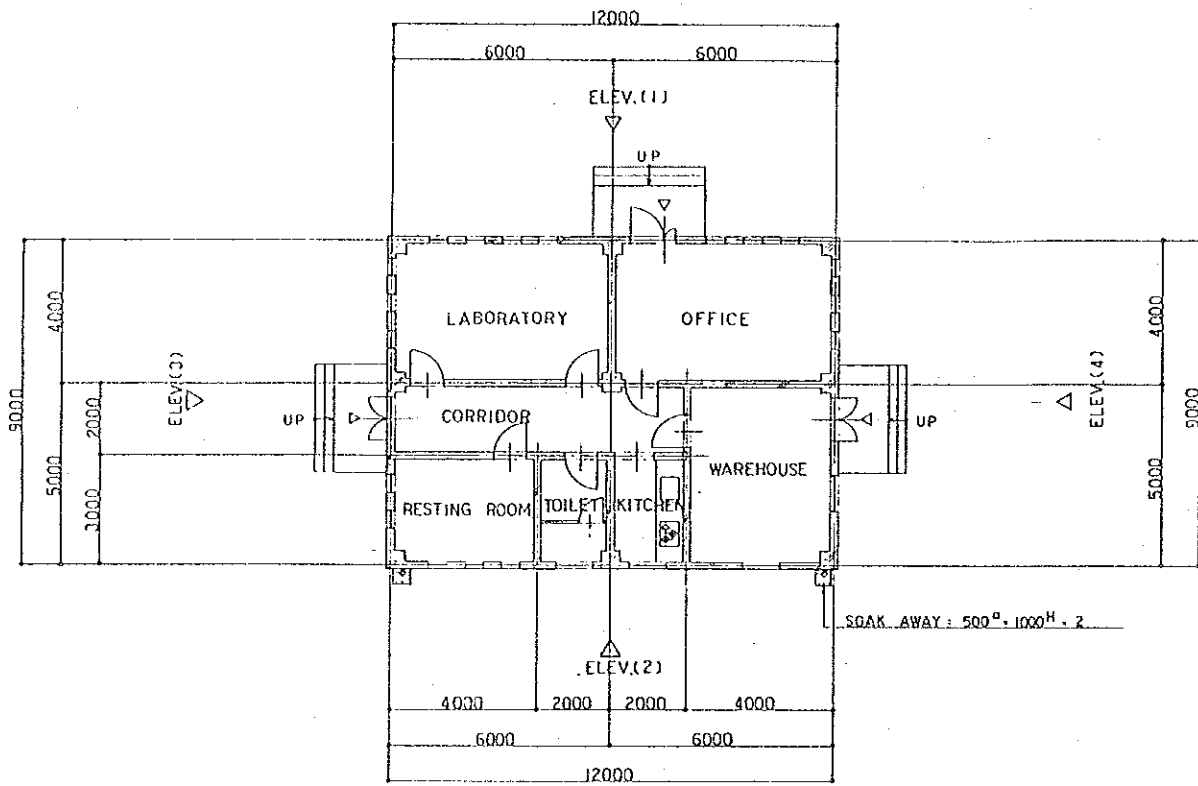
S = 1 / 20, 1 / 10

MAIN GATE DETAIL

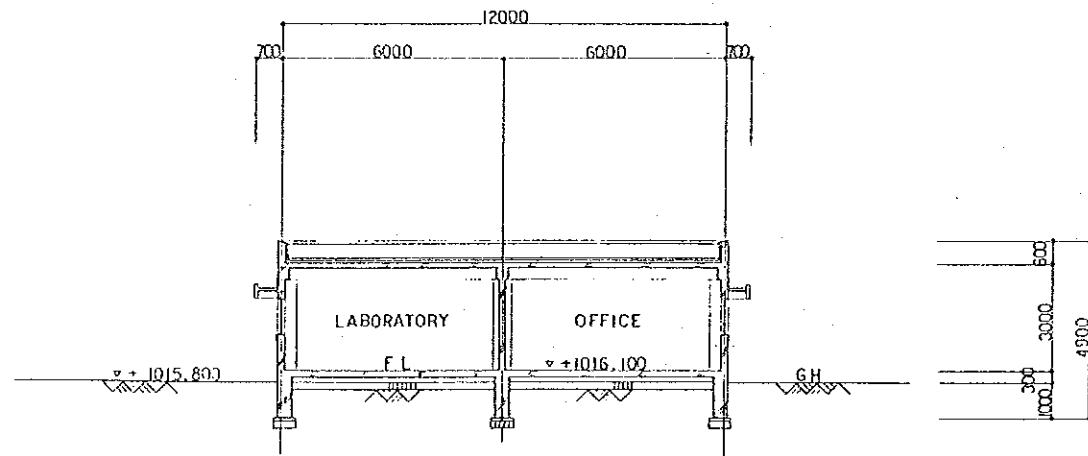
S = 1 / 50



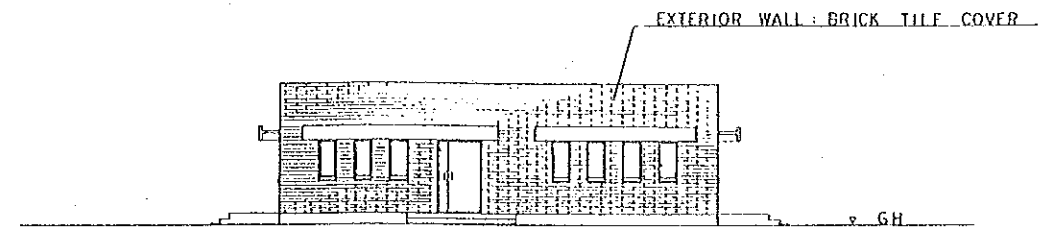
Drawing No.13. DETAILS (3)



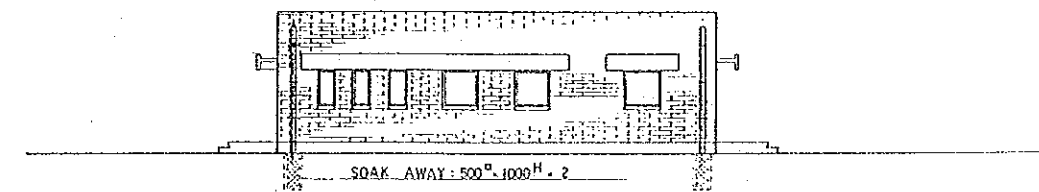
OFFICE PLAN S=1/100



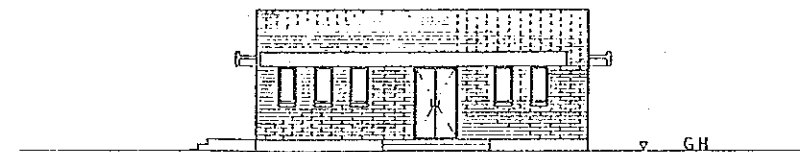
OFFICE SECTION S=1/100



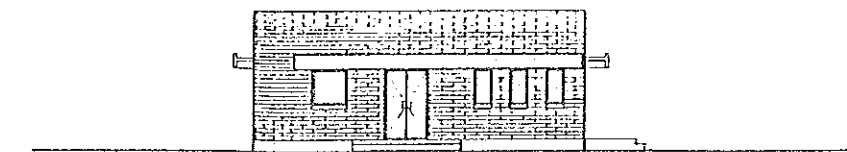
OFFICE ELEVATION (1) S=1/100



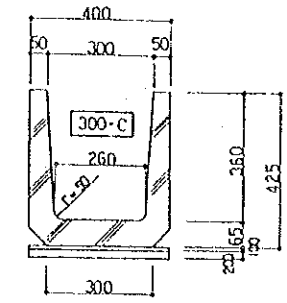
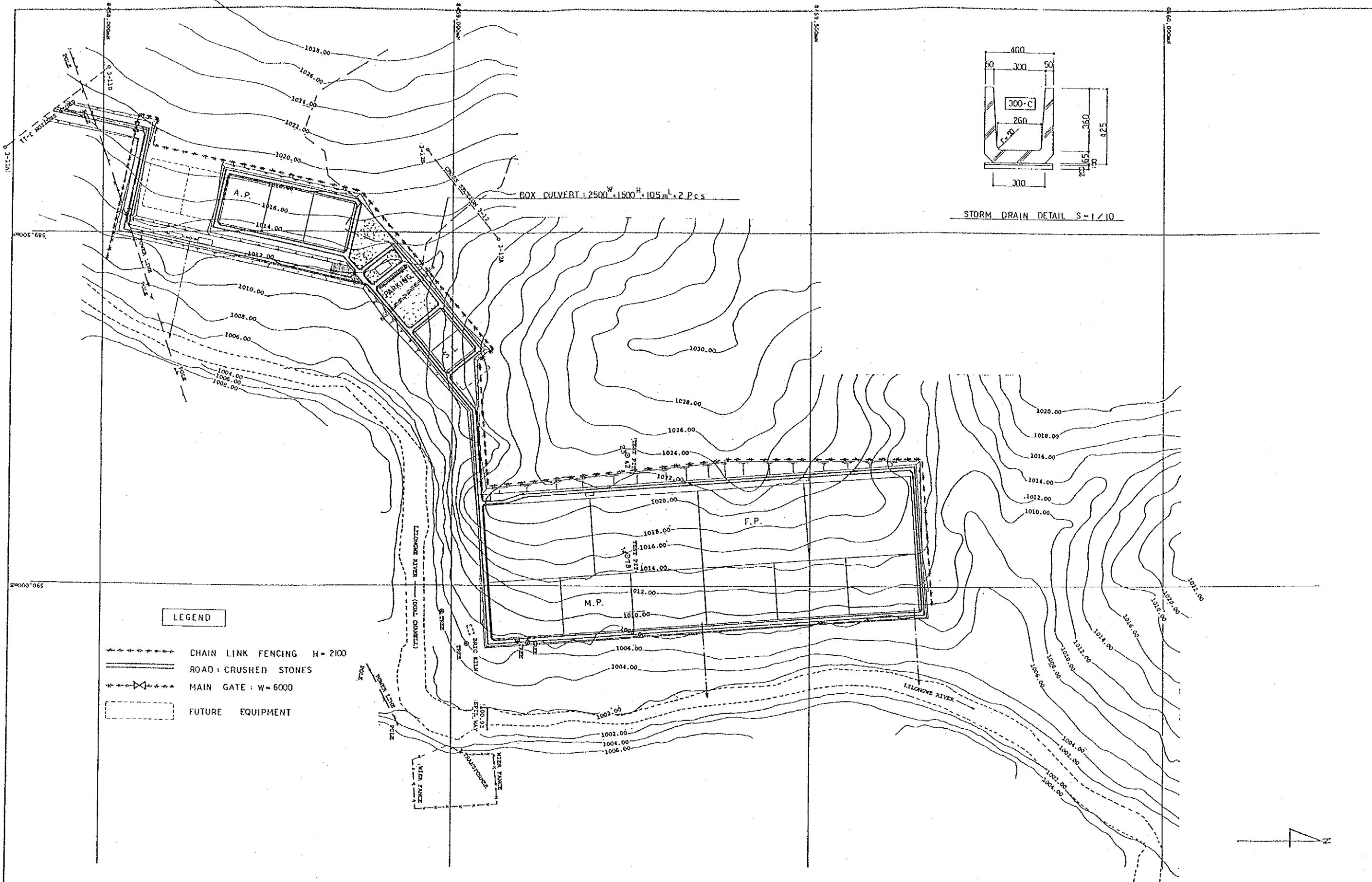
OFFICE ELEVATION (2) S=1/100



OFFICE ELEVATION (3) S=1/100



OFFICE ELEVATION (4) S=1/100



BOX CULVERT : 2500^W x 1500^H x 105^{mL} x 2 Pcs

LEGEND

- CHAIN LINK FENCING H = 2100
- ==== ROAD : CRUSHED STONES
- >--- MAIN GATE : W = 6000
- FUTURE EQUIPMENT

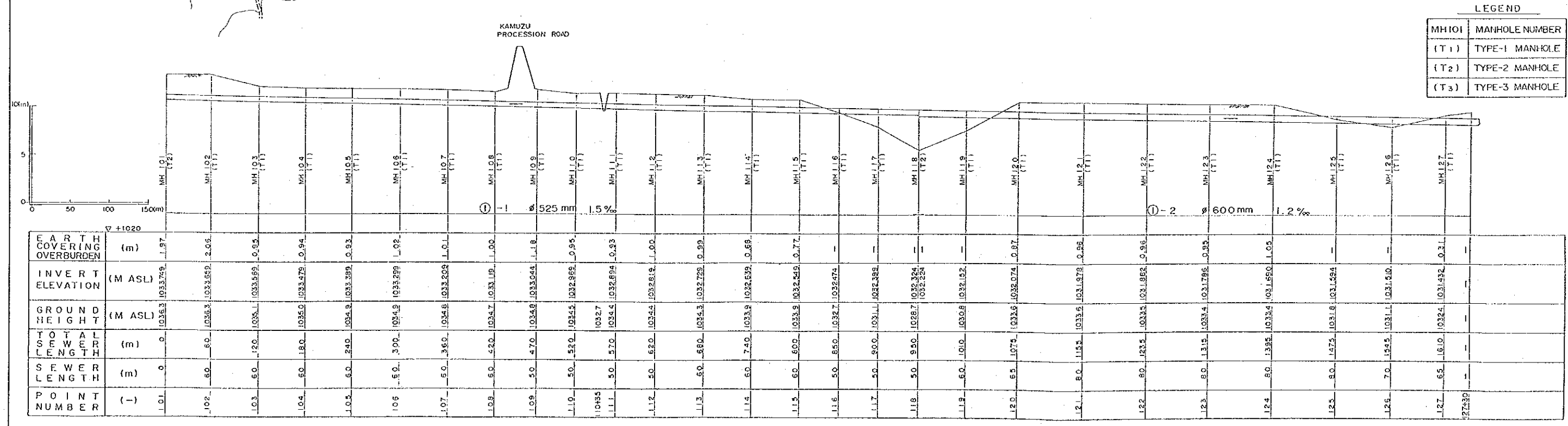
LANDSCAPE PLANNING S = 1 / 2500

Drawing No.15. LANDSCAPE PLAN

PLAN SCALE 1:2500



SEWER PROFILE SCALE H=1:2500

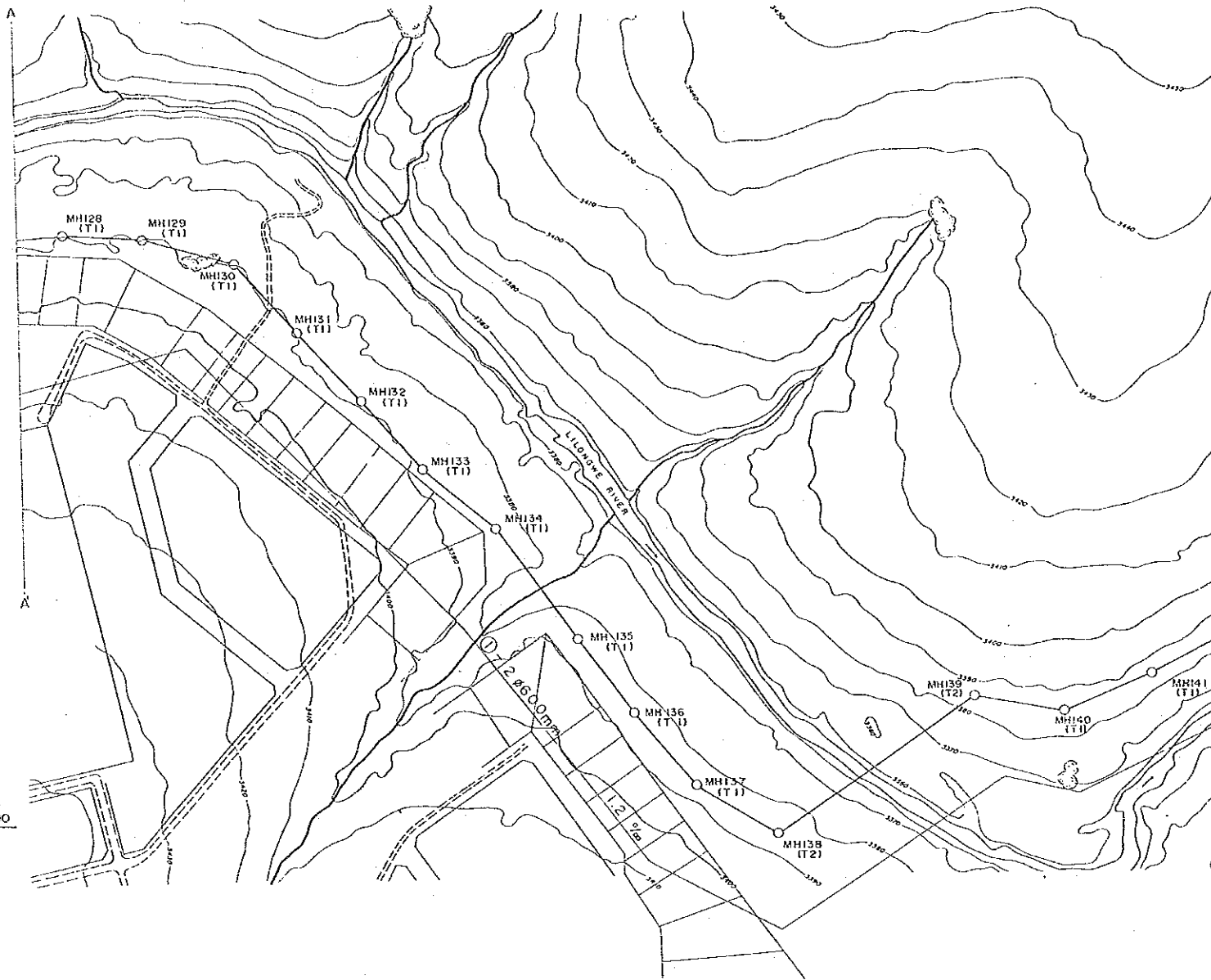


LEGEND

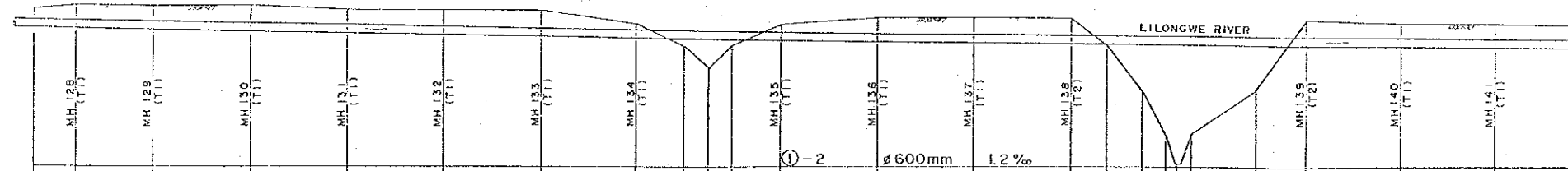
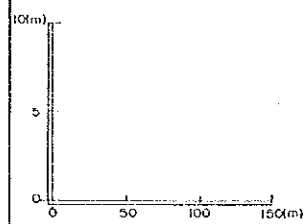
MH 101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

Drawing No.16. No.1 TRUNK SEWER (1/3)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200 H=1:2500



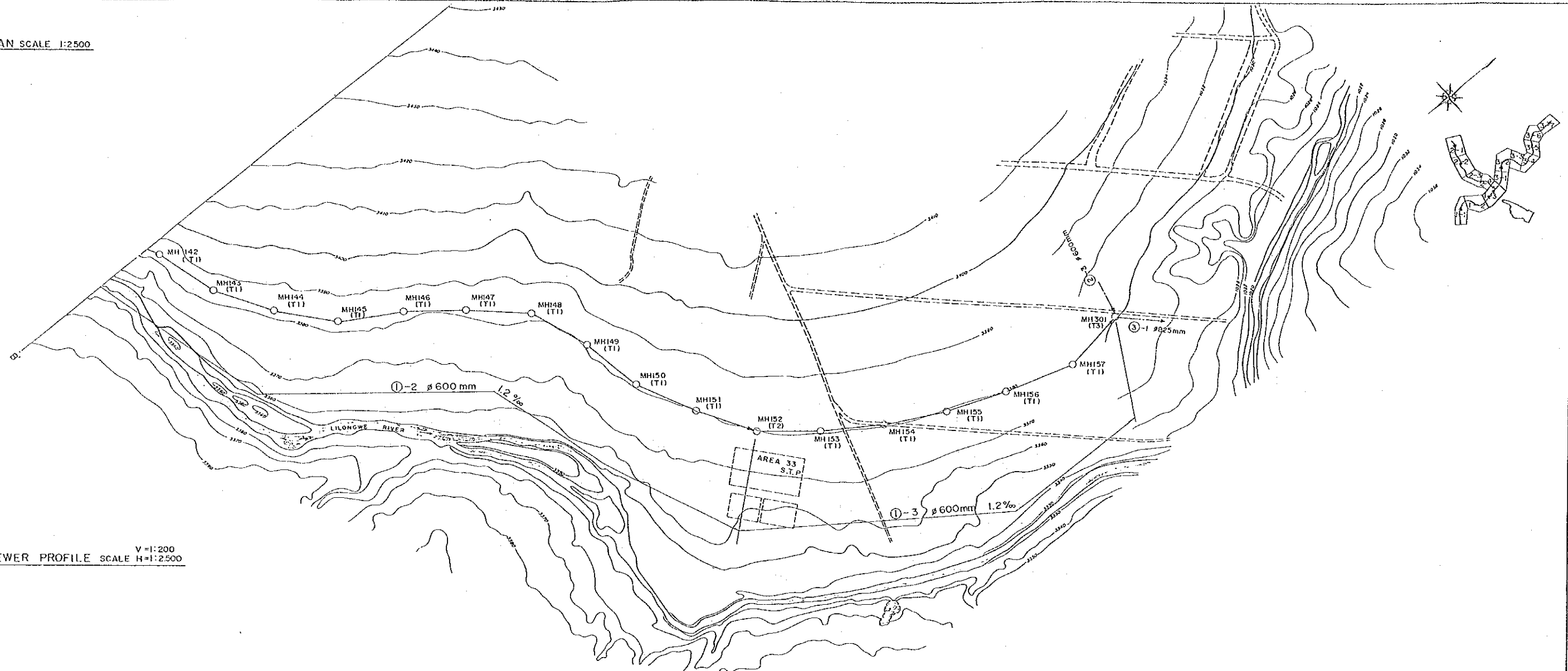
LEGEND

MH 101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

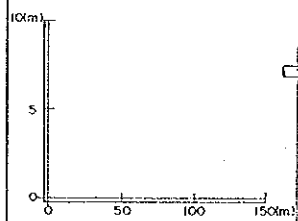
EARTH COVERING OVERBURDEN		(m)
INVERT ELEVATION		(M ASL)
GROUND HEIGHT		(M ASL)
TOTAL SEWER LENGTH		(m)
SEWER LENGTH		(m)
POINT NUMBER		(-)
127	MH 128 (T1)	0.99
128	MH 129 (T1)	0.98
129	MH 130 (T1)	0.98
130	MH 131 (T1)	0.98
131	MH 132 (T1)	1.05
132	MH 133 (T1)	0.95
133	MH 134 (T1)	0.24
134	MH 135 (T1)	0.39
135	MH 136 (T1)	0.98
136	MH 137 (T1)	0.99
137	MH 138 (T2)	0.98
138	MH 139 (T1)	1.02
139	MH 140 (T1)	1.01
140	MH 141 (T1)	1.01
141		
142		
143		
144		
145		
146		
147		
148		
149		
150		

Drawing No.17. No.1 TRUNK SEWER (2/3)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200
H=1:2500



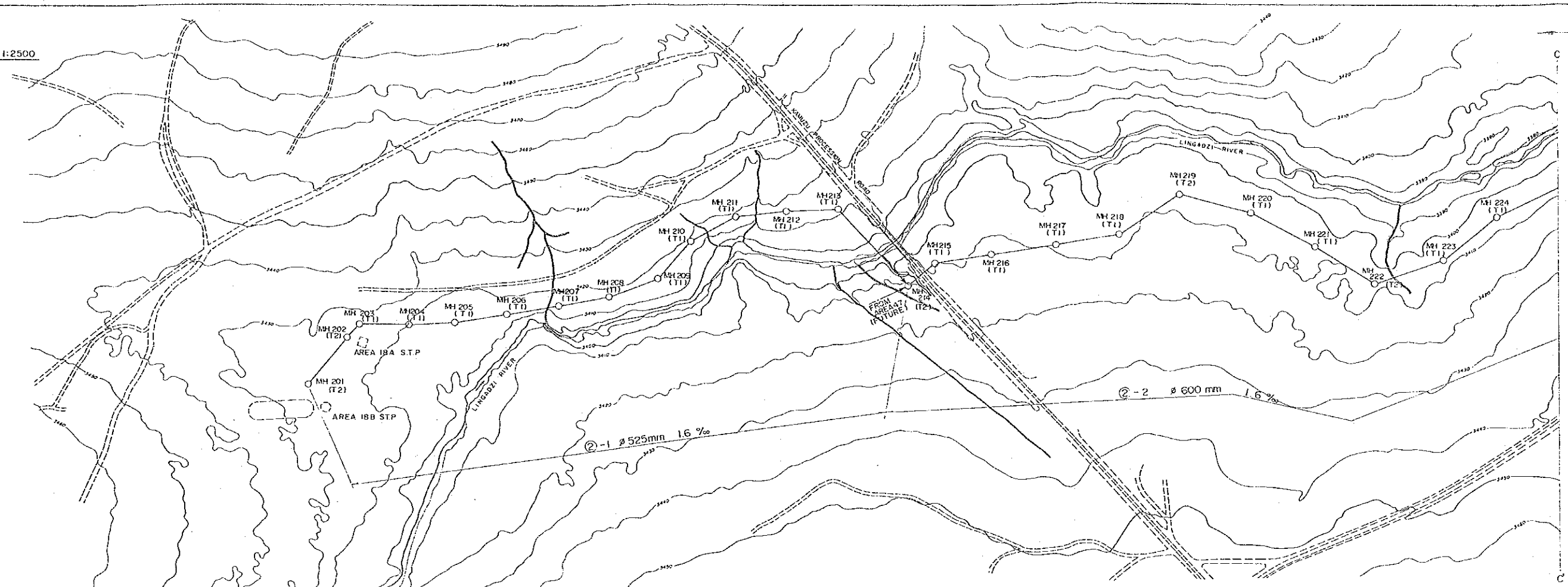
	MH 142 (T1)	MH 143 (T1)	MH 144 (T1)	MH 145 (T1)	MH 146 (T1)	MH 147 (T1)	MH 148 (T1)	MH 149 (T1)	MH 150 (T1)	MH 151 (T1)	MH 152 (T2)	MH 153 (T1)	MH 154 (T1)	MH 155 (T1)	MH 156 (T1)	MH 157 (T1)	MH 301 (T3)
EARTH COVERING OVERBURDEN (m)	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.97	0.97	0.96	0.96	0.96	0.95	1.05	1.04	1.24
INVERT ELEVATION (M ASL)	1029.636	1029.740	1029.644	1029.548	1029.452	1029.356	1029.260	1029.164	1029.068	1028.972	1028.876	1028.780	1028.684	1028.588	1028.492	1028.396	1028.300
GROUND HEIGHT (M ASL)	1031.5	1031.4	1031.3	1031.2	1031.1	1031.0	1030.9	1030.8	1030.7	1030.6	1030.5	1030.4	1030.3	1030.2	1028.492	1028.396	1028.300
TOTAL SEWER LENGTH (m)	2340	3020	3100	3180	3250	3340	3420	3500	3580	3650	3740	3820	3900	3980	4060	4140	4220
SEWER LENGTH (m)	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
POINT NUMBER (-)	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	301

LEGEND

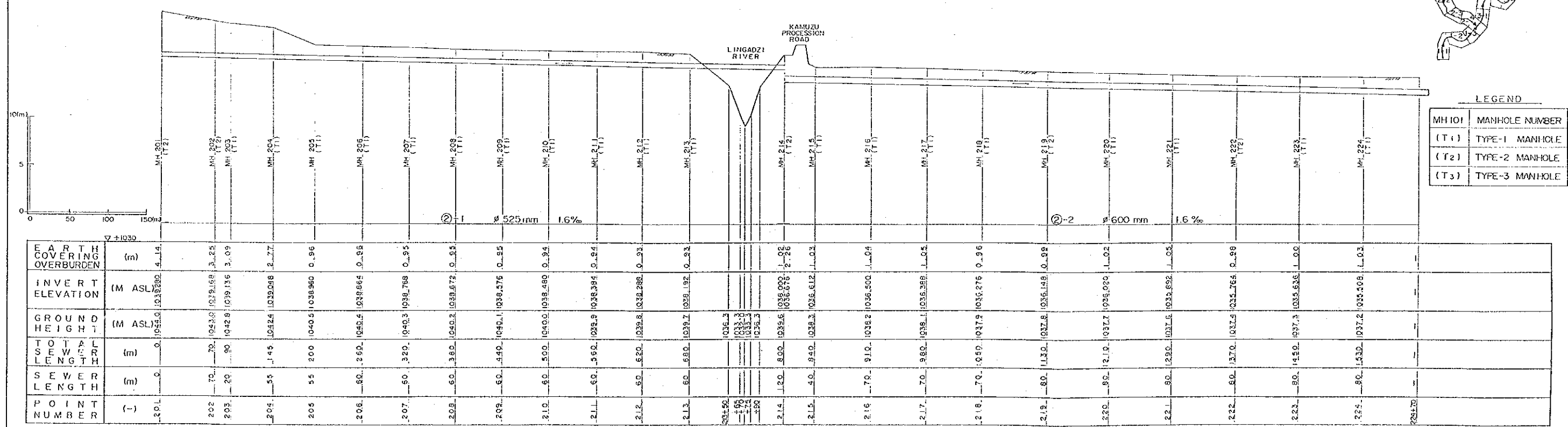
MH 101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

Drawing No.18. No.1 TRUNK SEWER (3/3)

PLAN SCALE 1:2500

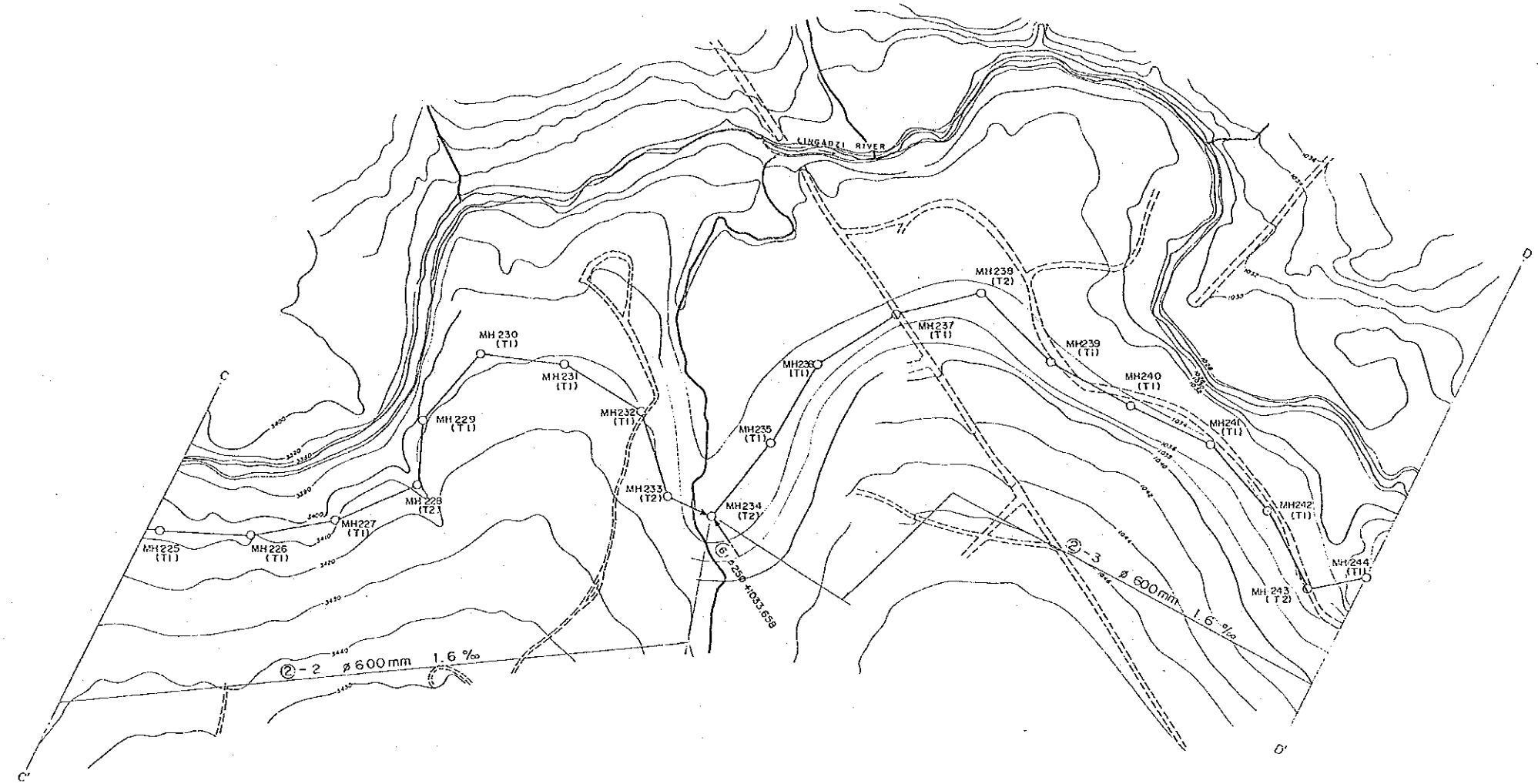
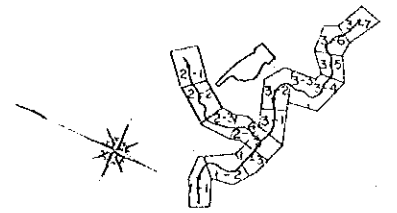


SEWER PROFILE SCALE V=1:200 H=1:2500



Drawing No.19. No.2 TRUNK SEWER (1/4)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200 H=1:2500

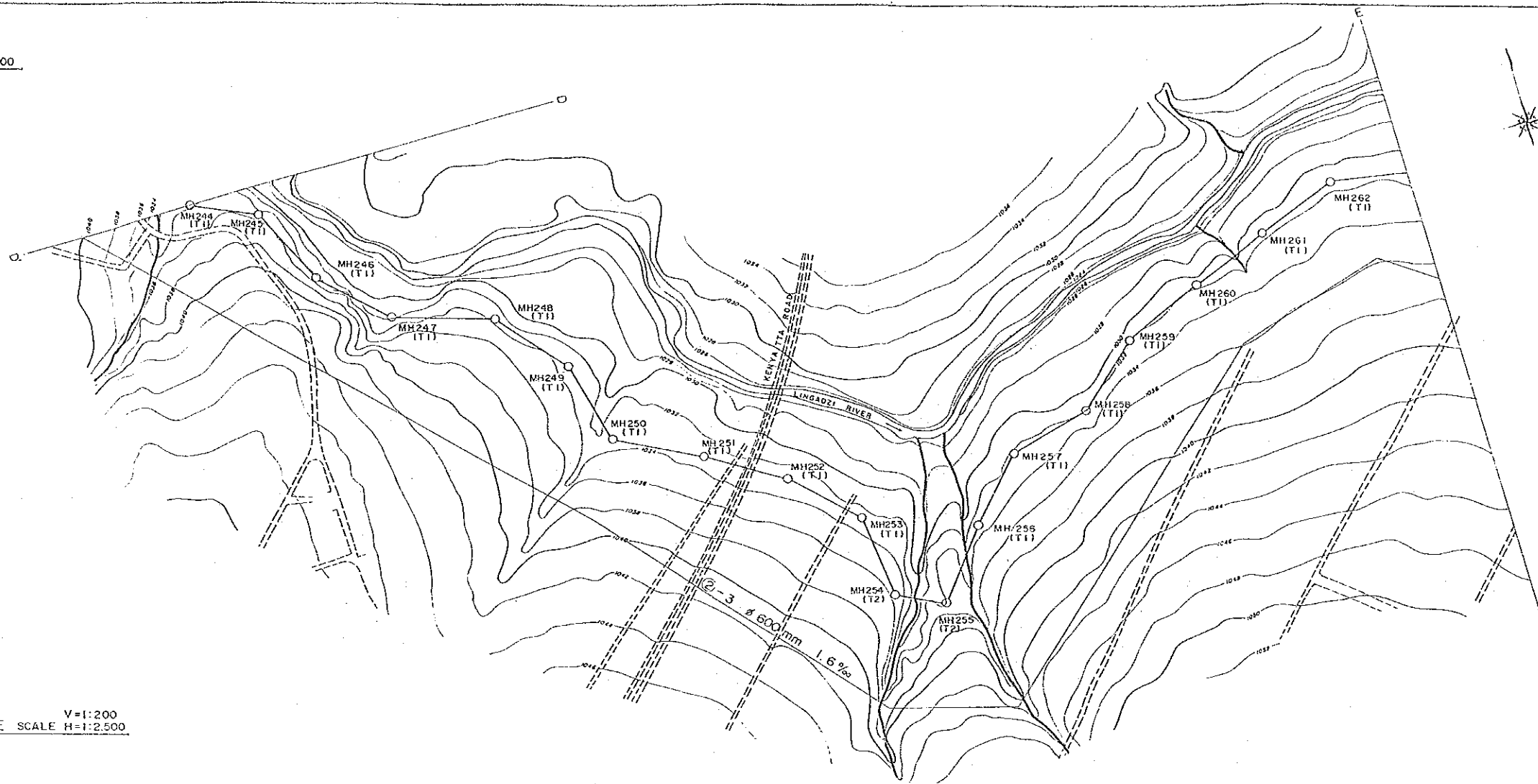
		MH 225 (T1)		MH 226 (T1)		MH 227 (T1)		MH 228 (T2)		MH 229 (T1)		MH 230 (T1)		MH 231 (T1)		MH 232 (T1)		MH 233 (T2)		MH 234 (T2)		MH 235 (T1)		MH 236 (T1)		MH 237 (T1)		MH 238 (T2)		MH 239 (T1)		MH 240 (T1)		MH 241 (T1)		MH 242 (T1)		MH 243 (T2)		MH 244 (T1)							
EARTH COVERING OVERBURDEN (m)		1.00	0.98	1.02	1.04	1.04	0.97	1.00	1.02	0.95	1.05	1.05	0.98	1.01	1.04	0.98	0.99	1.02	1.05	0.98	0.98	1.02	1.02	0.99	1.02	1.05	0.98	0.99	1.02	1.05	0.98	0.98	1.02	1.05	0.98	0.98	1.02	1.05	0.98	0.98							
INVERT ELEVATION (M ASL)		1031.390	1031.236	1031.184	1031.956	1034.900	1034.772	1034.644	1034.516	1033.886	1033.568	1033.396	1032.188	1032.060	1032.932	1032.804	1032.676	1032.548	1032.420	1032.292	1032.164	1032.036	1031.908	1031.780	1031.652	1031.524	1031.396	1031.268	1031.140	1031.012	1030.884	1030.756	1030.628	1030.500	1030.372	1030.244	1030.116	1030.000	1029.872	1029.744	1029.616	1029.488					
GROUND HEIGHT (M ASL)		1032.390	1032.236	1032.184	1032.956	1034.900	1034.772	1034.644	1034.516	1033.886	1033.568	1033.396	1032.188	1032.060	1032.932	1032.804	1032.676	1032.548	1032.420	1032.292	1032.164	1032.036	1031.908	1031.780	1031.652	1031.524	1031.396	1031.268	1031.140	1031.012	1030.884	1030.756	1030.628	1030.500	1030.372	1030.244	1030.116	1030.000	1029.872	1029.744	1029.616	1029.488					
TOTAL SEWER LENGTH (m)		151.0	169.0	177.0	185.0	191.0	199.0	207.0	215.0	223.0	231.0	239.0	247.0	255.0	263.0	271.0	279.0	287.0	295.0	303.0	311.0	319.0	327.0	335.0	343.0	351.0	359.0	367.0	375.0	383.0	391.0	399.0	407.0	415.0	423.0	431.0	439.0	447.0	455.0	463.0	471.0	479.0					
SEWER LENGTH (m)		80	80	80	80	80	80	80	82	80	80	80	75	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80				
POINT NUMBER (-)		234.70	235	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280

LEGEND

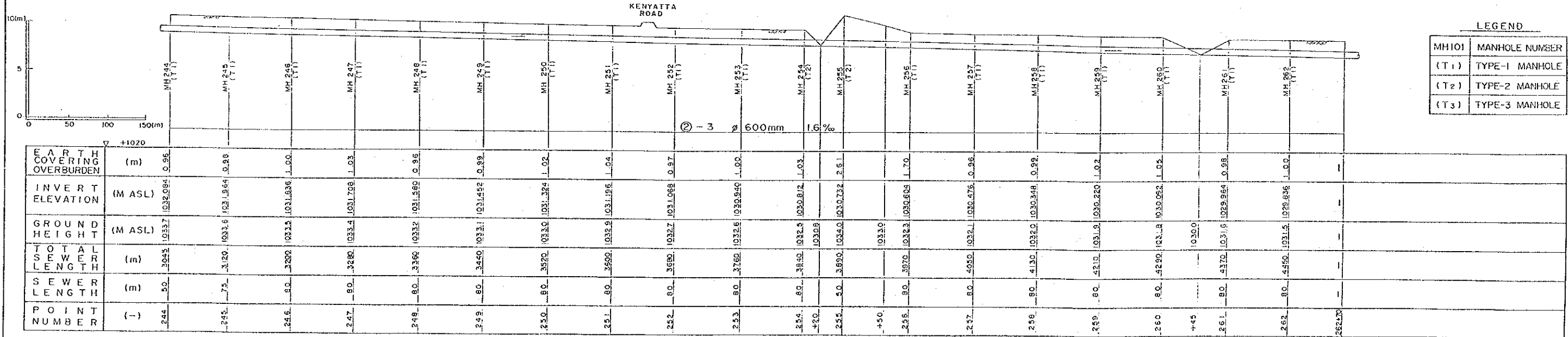
MH 101	MANHOLE NUMBER
(T 1)	TYPE-1 MANHOLE
(T 2)	TYPE-2 MANHOLE
(T 3)	TYPE-3 MANHOLE

Drawing No.20. No.2 TRUNK SEWER (2/4)

PLAN SCALE 1:2,500



SEWER PROFILE SCALE V=1:200 H=1:2,500

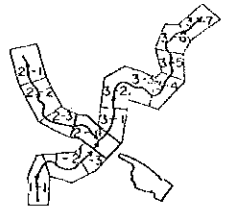
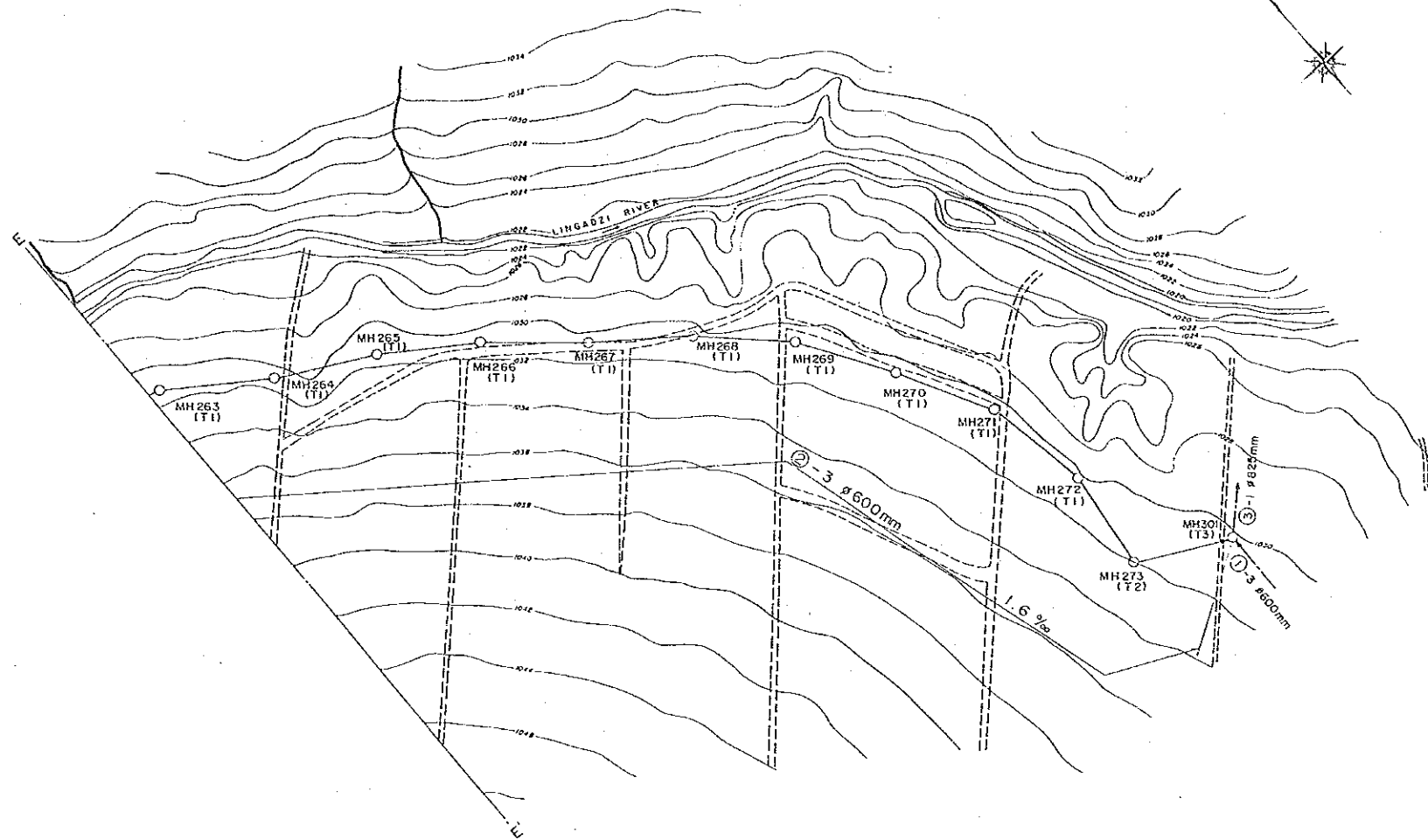


LEGEND

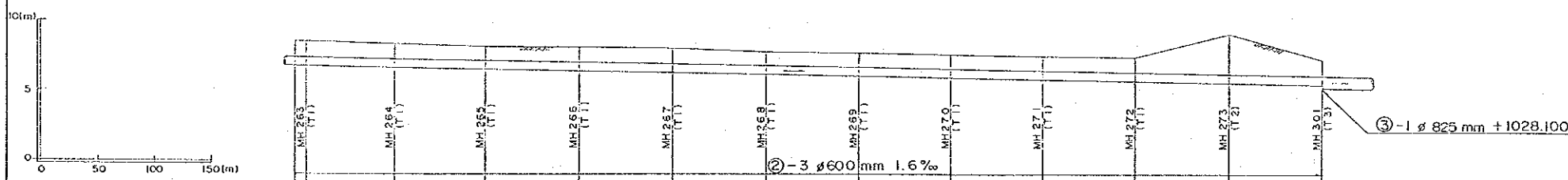
MH101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

Drawing No.21. No.2 TRUNK SEWER (3/4)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200 H=1:2500



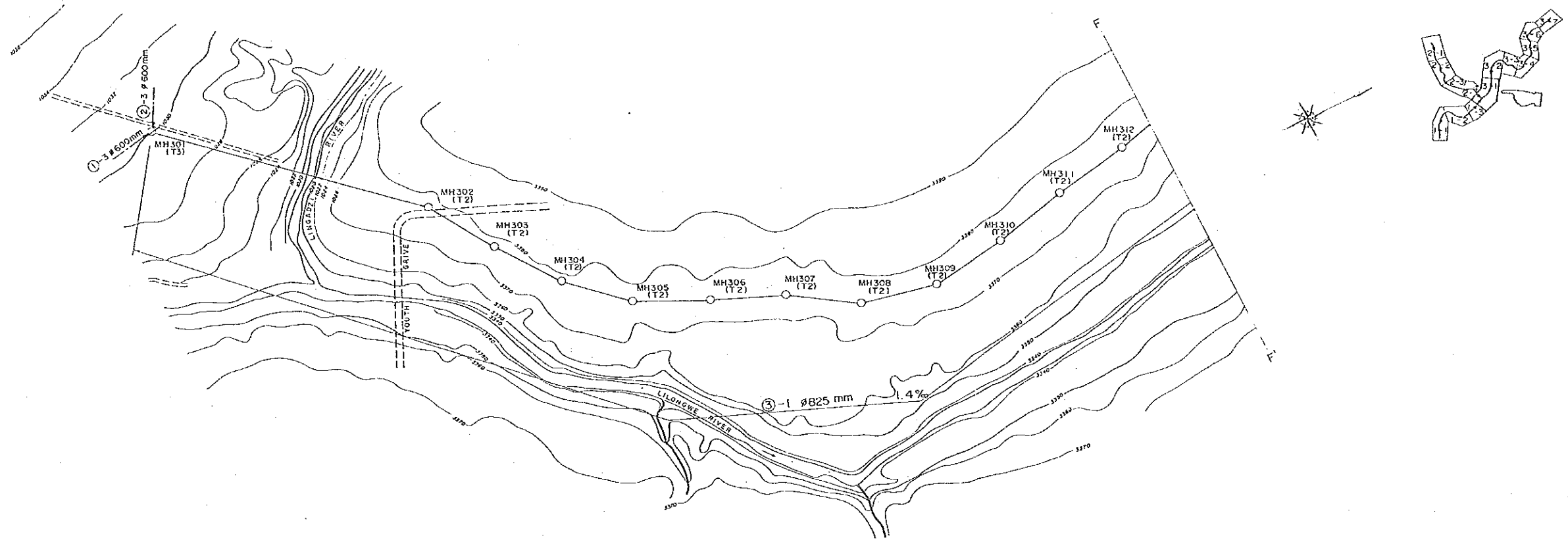
LEGEND

MH 101	MANHOLE NUMBER
(T ₁)	TYPE-1 MANHOLE
(T ₂)	TYPE-2 MANHOLE
(T ₃)	TYPE-3 MANHOLE

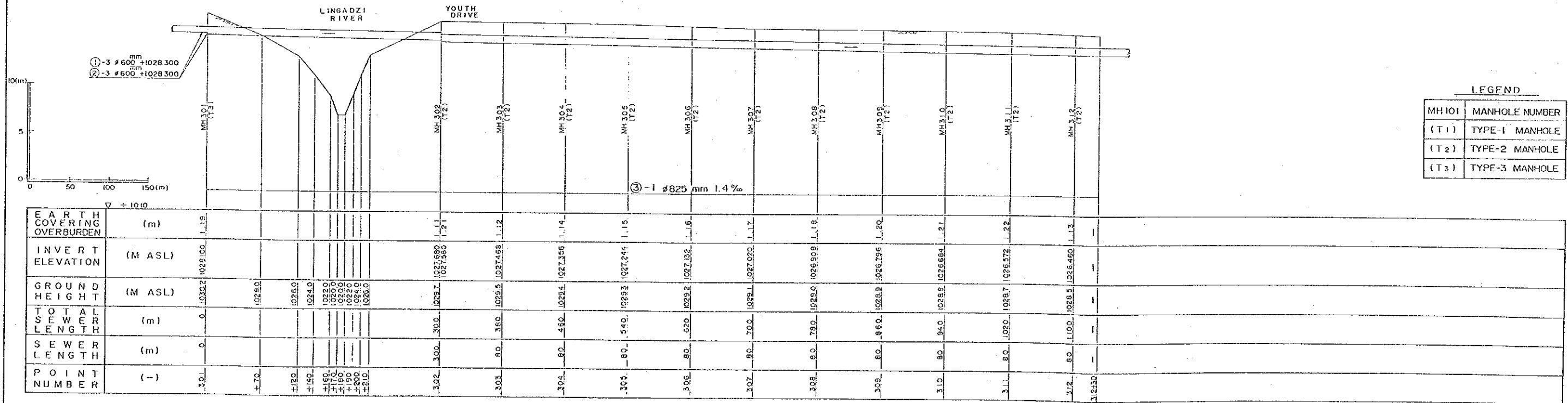
		MH 263 (T ₁)	MH 264 (T ₁)	MH 265 (T ₁)	MH 266 (T ₁)	MH 267 (T ₁)	MH 268 (T ₁)	MH 269 (T ₁)	MH 270 (T ₁)	MH 271 (T ₁)	MH 272 (T ₁)	MH 273 (T ₂)	MH 301 (T ₃)
EARTH COVERING OVERBURDEN	(m)	1.03	0.96	0.99	1.02	1.04	0.97	1.00	1.03	0.96	0.98	2.91	1.24
INVERT ELEVATION	(M ASL)	1028.108	1028.580	1028.482	1028.324	1028.196	1028.068	1028.940	1028.812	1028.684	1028.556	1028.428	1028.300
GROUND HEIGHT	(M ASL)	1031.4	1031.2	1031.1	1031.0	1030.9	1030.7	1030.6	1030.5	1030.3	1030.2	1028.0	1030.2
TOTAL SEWER LENGTH	(m)	45.00	45.00	45.99	47.70	48.50	49.30	50.10	50.90	51.70	52.50	53.30	54.10
SEWER LENGTH	(m)	80	80	80	80	80	80	80	80	80	80	80	80
POINT NUMBER	(-)	263	264	265	266	267	268	269	270	271	272	273	301

Drawing No.22. No.2 TRUNK SEWER (4/4)

PLAN SCALE 1:2,500



SEWER PROFILE SCALE V=1:200 H=1:2,500

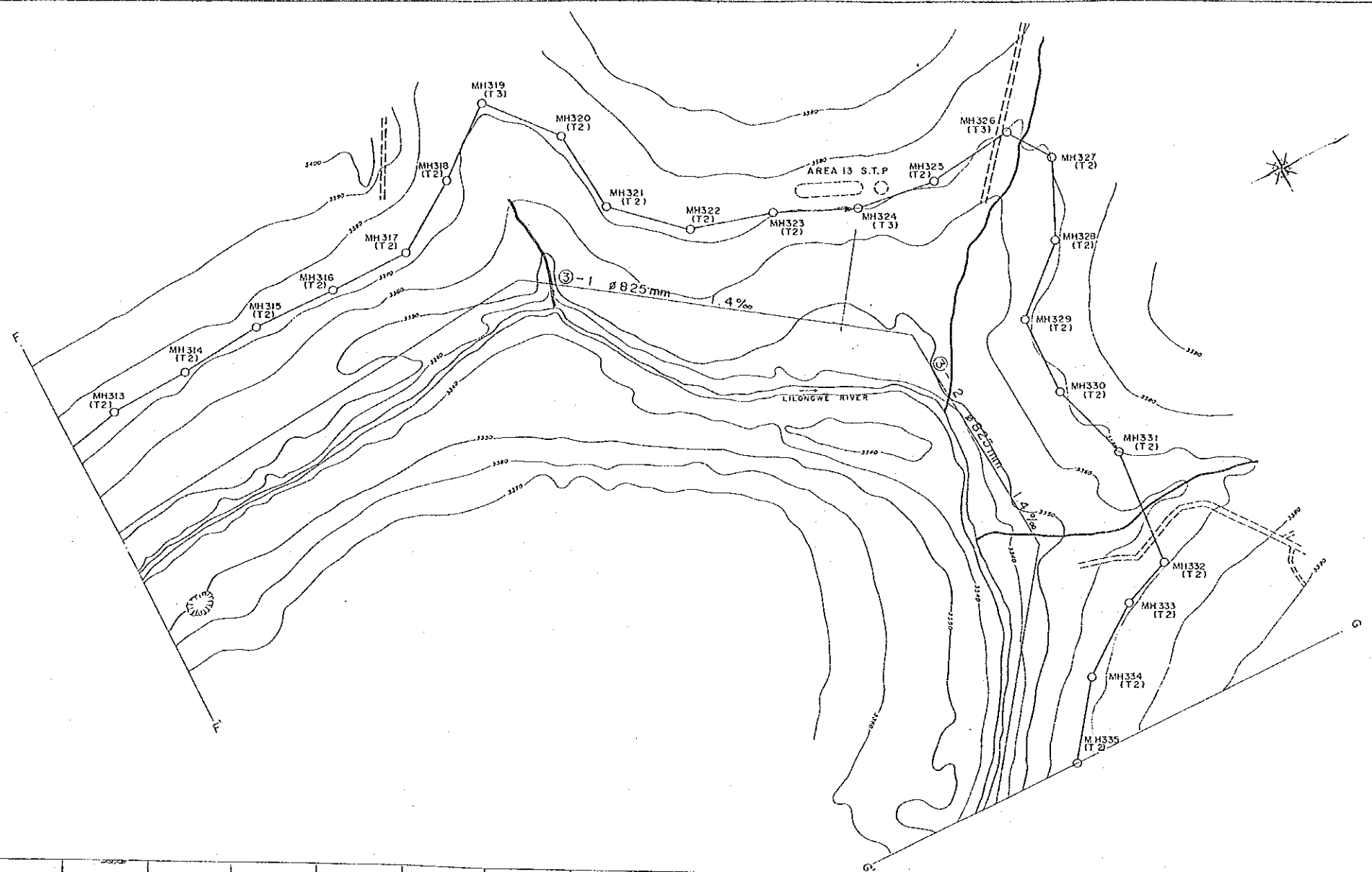


LEGEND

MH101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

Drawing No.23. No.3 TRUNK SEWER (1/7)

PLAN SCALE 1:2500



SEWER PROFILE SCALE H=1:2500 V=1:200

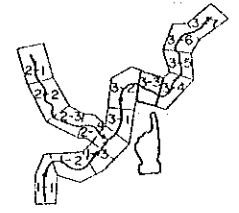
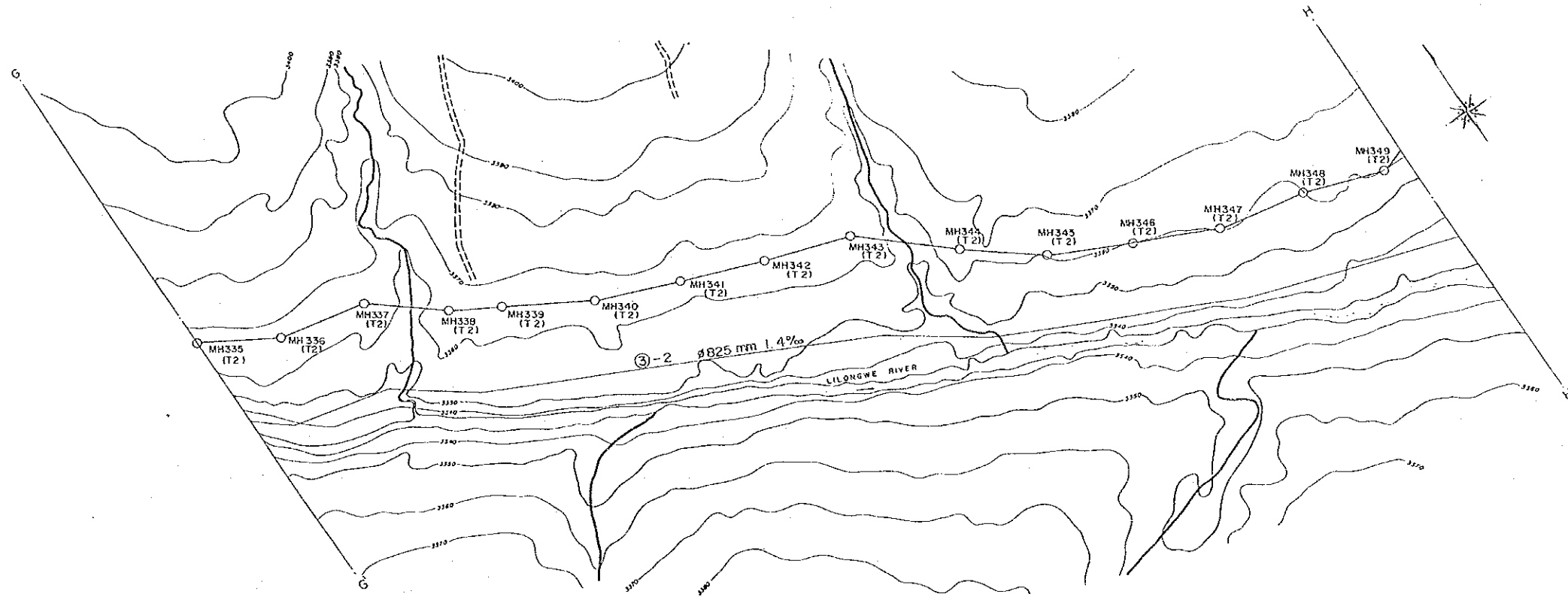
LEGEND

MH101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

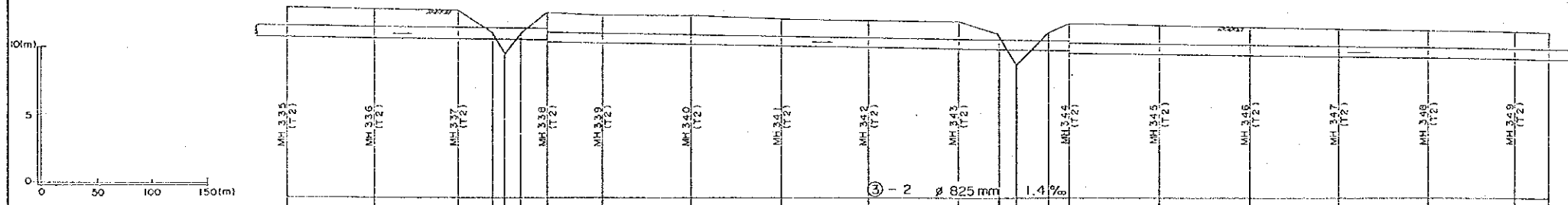
POINT NUMBER	SEWER LENGTH (m)	TOTAL SEWER LENGTH (m)	GROUND HEIGHT (M ASL)	INVERT ELEVATION (M ASL)	EARTH COVERING OVERBURDEN (m)
312.50					
313	80	1150	10284	10263.49	1.14
314	80	1230	10283	10262.35	1.16
315	80	1310	10282	10261.24	1.17
316	80	1390	10281	10260.12	1.18
317	90	1480	10280	1025.90	1.19
318	80	1560	10279	1025.76	1.20
319	80	1640	10278	1025.675	1.22
320	80	1720	10276	1025.55	1.13
321	80	1800	10275	1025.52	1.14
322	80	1880	10274	1025.40	1.15
323	80	1960	10273	1025.28	1.16
324	80	2040	10272	1025.16	1.18
325	80	2120	10271	1025.04	1.19
326	80	2200	10270	1024.92	1.20
327	50	2270	10269	1024.82	1.17
328	80	2350	10268	1024.70	1.18
329	80	2430	10267	1024.58	1.19
330	80	2510	10266	1024.46	1.21
331	80	2590	10265	1024.34	1.22
332	110	2700	10263	1024.220	1.17
333	50	2750	10261	1024.100	1.25
334	80	2830	10260	1023.98	1.17
335	80	2910	10259	1023.865	1.19

Drawing No.24. No.3 TRUNK SEWER (2/7)

PLAN SCALE 1:2500



V=1:200
SEWER PROFILE SCALE H=1:2500

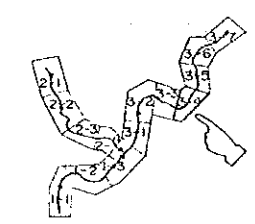
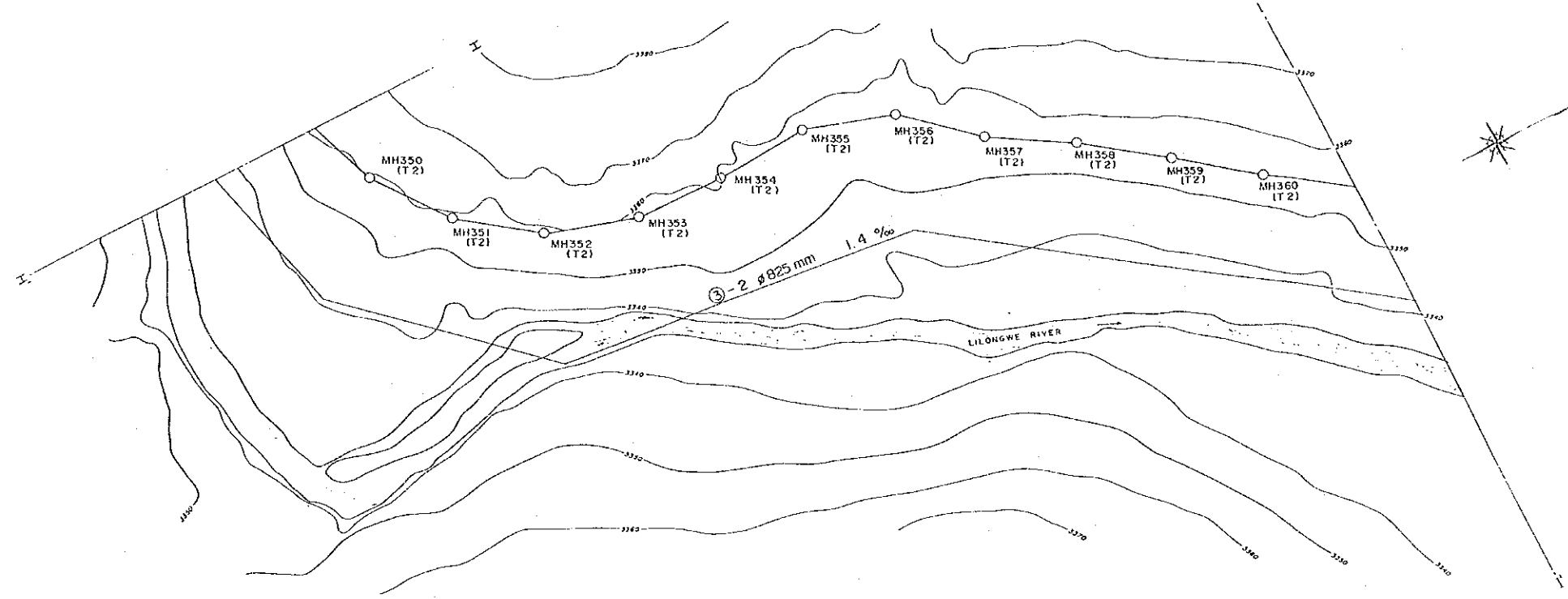


LEGEND	
MH101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

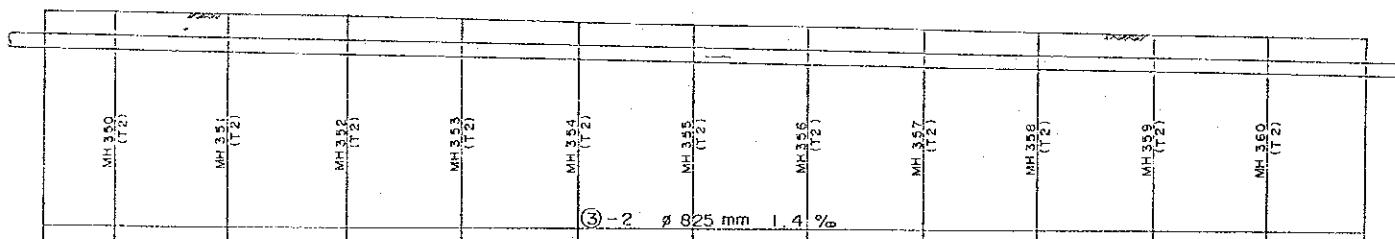
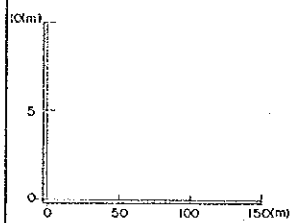
		V + 1010	
EARTH COVERING OVERBURDEN	(m)	1.19	1.20
INVERT ELEVATION	(M ASL)	1023.606	1023.582
GROUND HEIGHT	(M ASL)	1024.9	1024.7
TOTAL SEWER LENGTH	(m)	291.0	307.0
SEWER LENGTH	(m)	8.0	8.0
POINT NUMBER	(-)	335	337

Drawing No.25. No.3 TRUNK SEWER (3/7)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200 H=1:2500



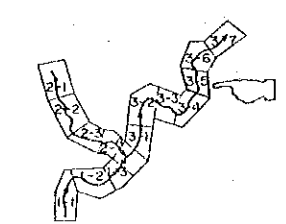
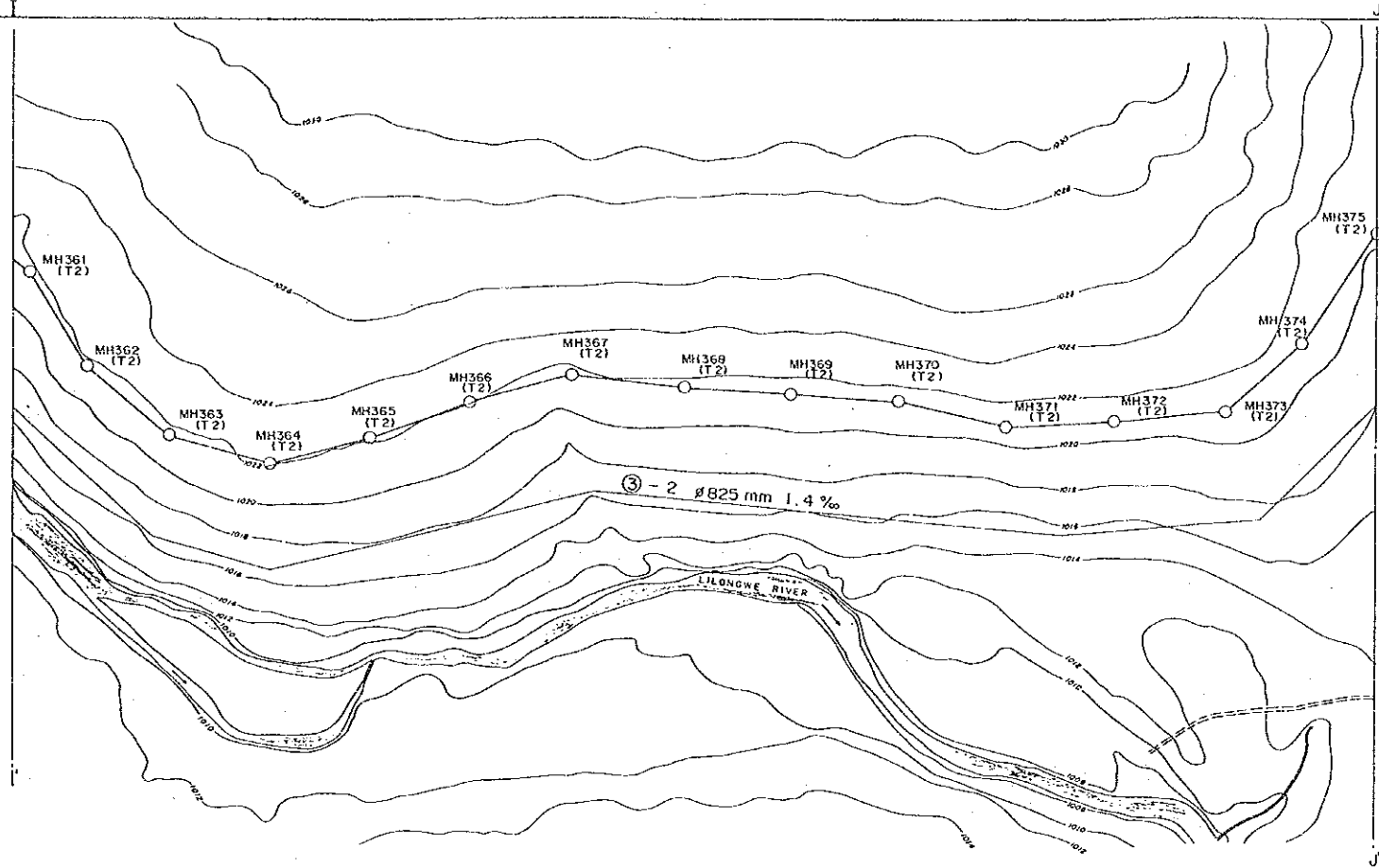
LEGEND

MH101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

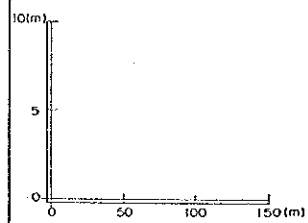
	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12
EARTH COVERING OVERBURDEN (m)	1.18	1.19	1.21	1.22	1.13	1.14	1.15	1.17	1.18	1.19	1.20	-
INVERT ELEVATION (M ASL)	1021.910	1021.798	1021.686	1021.574	1021.462	1021.350	1021.239	1021.126	1021.014	1020.902	1020.790	-
GROUND HEIGHT (M ASL)	1023.0	1023.9	1023.8	1023.7	1023.5	1023.4	1023.3	1023.2	1023.1	1023.0	1022.9	-
TOTAL SEWER LENGTH (m)	4100	4180	4260	4340	4420	4500	4580	4660	4740	4820	4900	-
SEWER LENGTH (m)	80	80	80	80	80	80	80	90	80	80	80	-
POINT NUMBER (-)	350	351	352	353	354	355	356	357	358	359	360	360

Drawing No.26. No.3 TRUNK SEWER (4/7)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200 H=1:2500



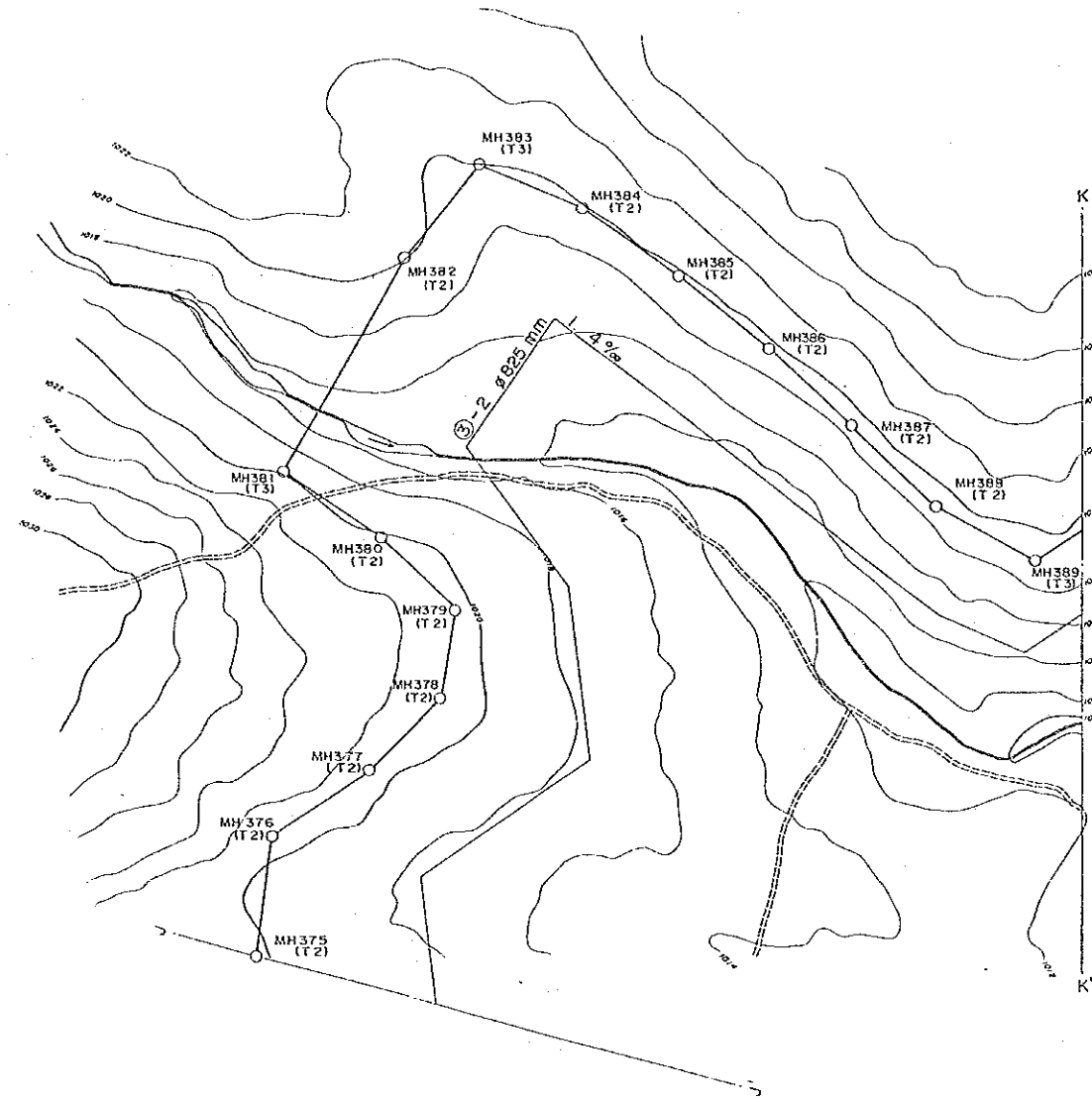
		V = +1010														
EARTH COVERING OVERBURDEN	(m)	1.2	1.3	1.4	1.5	1.5	1.7	1.9	2.0	2.1	2.2	1.3	1.5	1.7	1.8	
INVERT ELEVATION	(M ASL)	1020.678	1020.565	1020.454	1020.342	1020.230	1020.118	1020.005	1019.894	1019.782	1019.670	1019.558	1019.446	1019.334	1019.222	1019.110
GROUND HEIGHT	(M ASL)	1022.8	1022.6	1022.5	1022.4	1022.3	1022.1	1022.0	1021.9	1021.8	1021.7	1021.6	1021.5	1021.4	1021.3	1021.2
TOTAL SEWER LENGTH	(m)	4980	5060	5140	5220	5300	5380	5460	5540	5620	5700	5780	5860	5940	6020	6100
SEWER LENGTH	(m)	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
POINT NUMBER	(-)	360.70 3.61	362	363	364	365	366	367	368	369	370	371	372	373	374	375

LEGEND

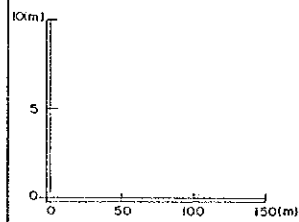
MH101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

Drawing No.27. No.3 TRUNK SEWER (5/7)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200
H=1:2500



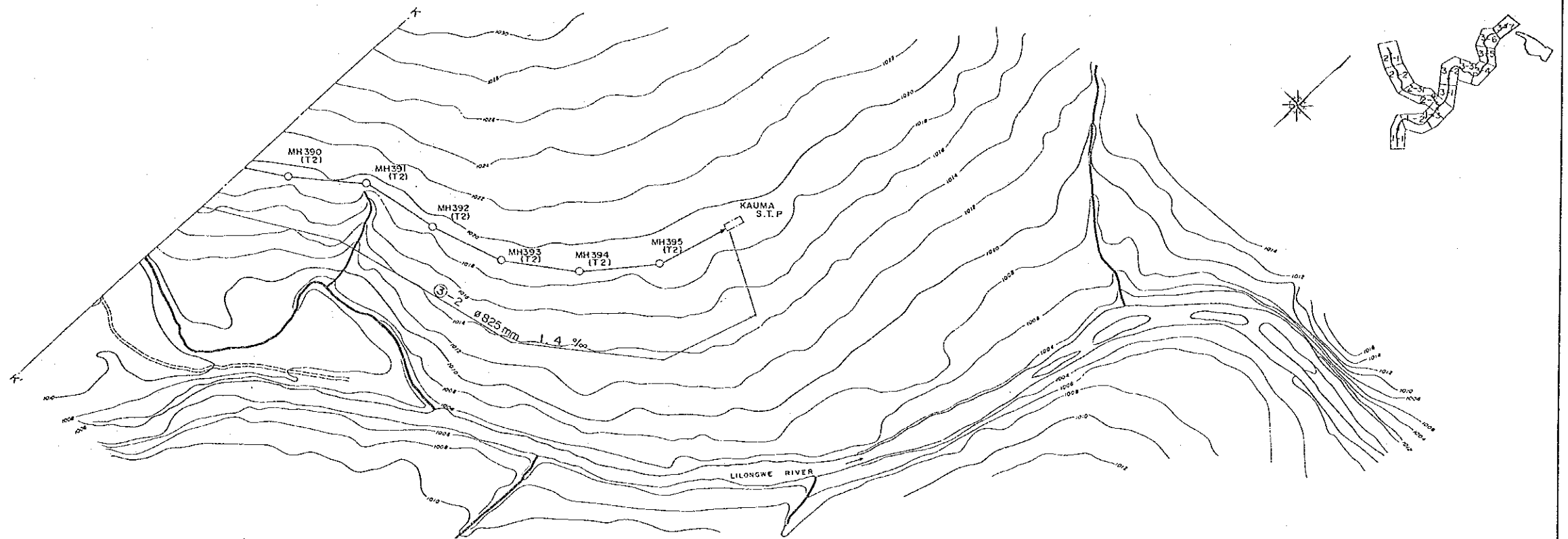
POINT NUMBER	SEWER LENGTH (m)	TOTAL SEWER LENGTH (m)	GROUND HEIGHT (M ASL)	INVERT ELEVATION (M ASL)	EARTH COVERING OVERBURDEN (m)
375	80	80	1021.2	1018.10	1.1
376	80	160	1021.1	1018.996	1.1
377	80	240	1021.0	1018.896	1.2
378	80	320	1020.9	1018.774	1.22
379	80	400	1020.7	1018.662	1.13
380	80	480	1020.6	1018.550	1.14
381	80	560	1020.5	1018.438	1.15
382	170	730	1018.0	1018.200	1.19
383	80	810	1022.0	1017.955	1.14
384	80	890	1019.9	1017.844	1.15
385	80	970	1019.6	1017.732	1.16
386	80	1050	1019.7	1017.620	1.17
387	80	1130	1019.5	1017.509	1.18
388	80	1210	1019.5	1017.396	1.20
389	80	1290	1019.4	1017.284	1.21
390	-	-	-	-	-

LEGEND

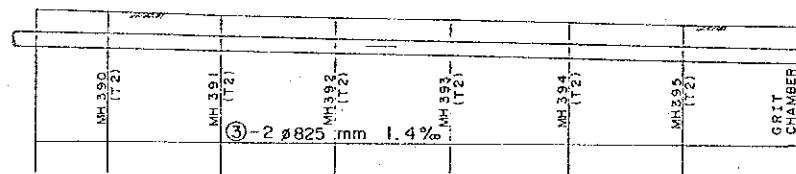
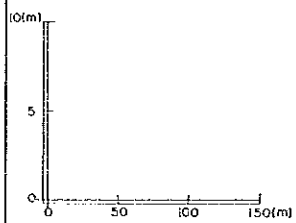
MH101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

Drawing No.28. No.3 TRUNK SEWER (6/7)

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200 H=1:2500



LEGEND

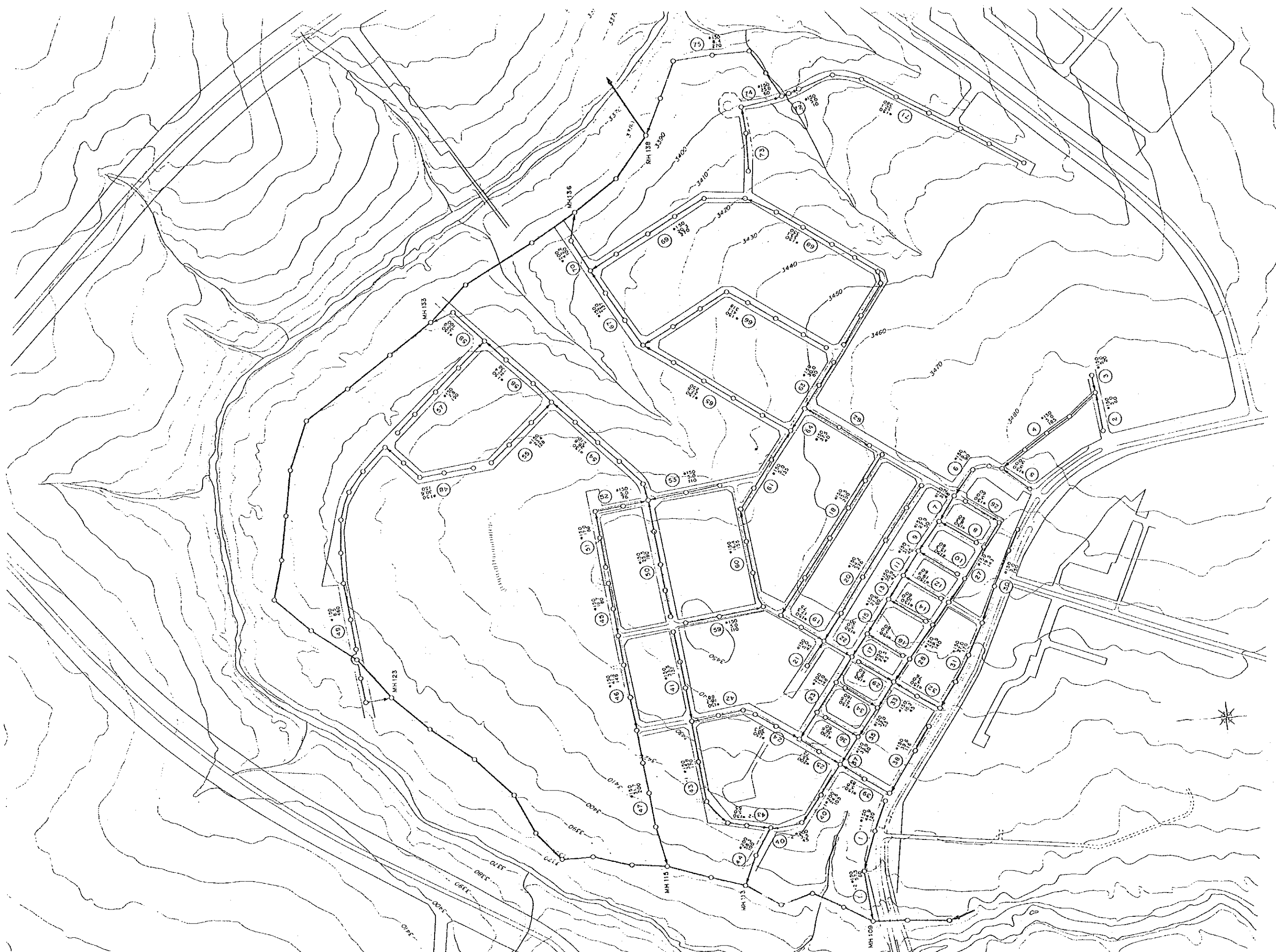
MH 101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

V + 1010									
EARTH COVERING OVERBURDEN	(m)	1.22	1.13	1.14	1.16	1.17	1.18	1.19	
INVERT ELEVATION	(M ASL)	1017.172	1017.060	1016.948	1016.836	1016.724	1016.612	1016.500	
GROUND HEIGHT	(M ASL)	1019.3	1019.1	1019.0	1018.9	1018.8	1018.7	1018.6	
TOTAL SEWER LENGTH	(m)	7350	7420	7500	7590	7710	7790	7870	
SEWER LENGTH	(m)	80	80	80	80	80	80	80	
POINT NUMBER	(-)	390	391	392	393	394	395	KAUMA S.T.P.	

Drawing No.29. No.3 TRUNK SEWER (7/7)

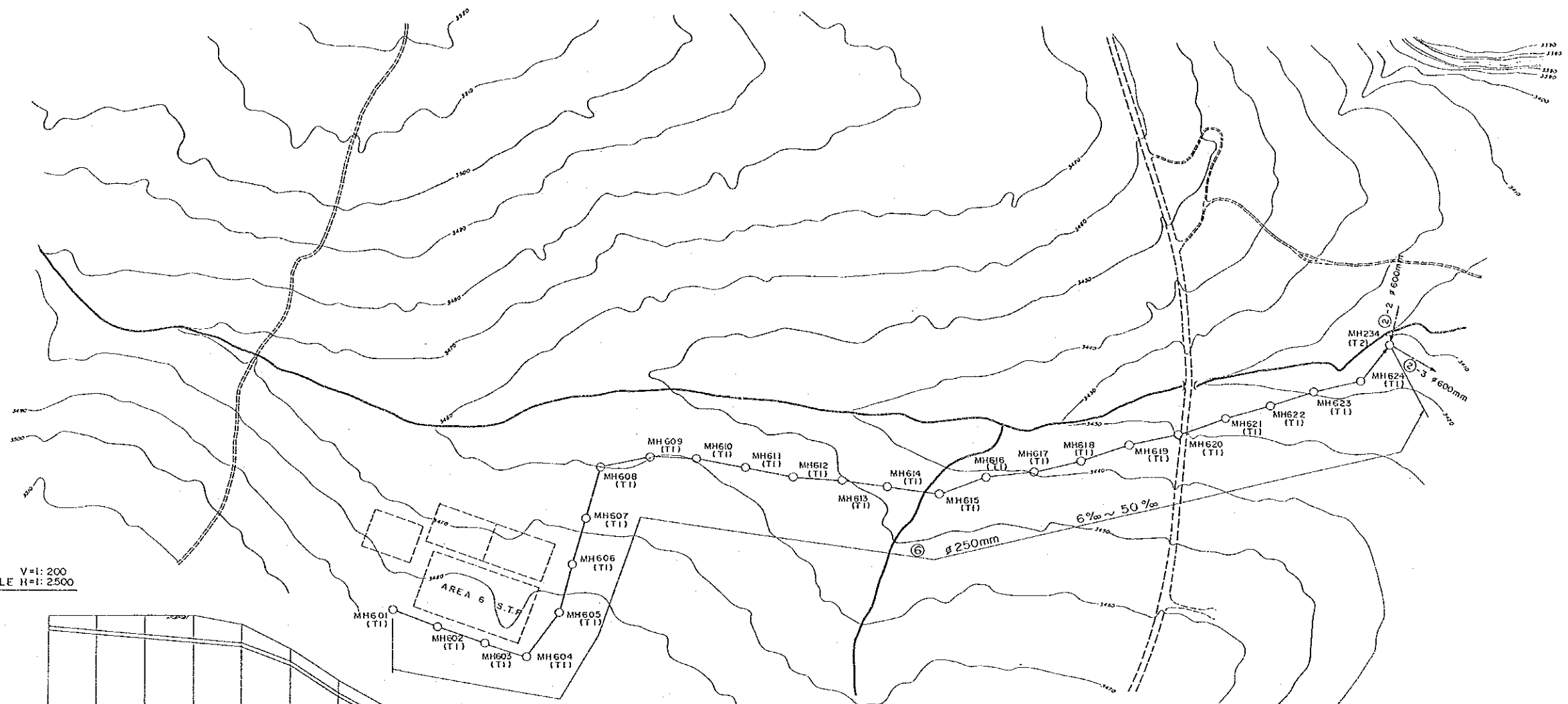


Drawing No. 30. AREA I SEWER PLAN

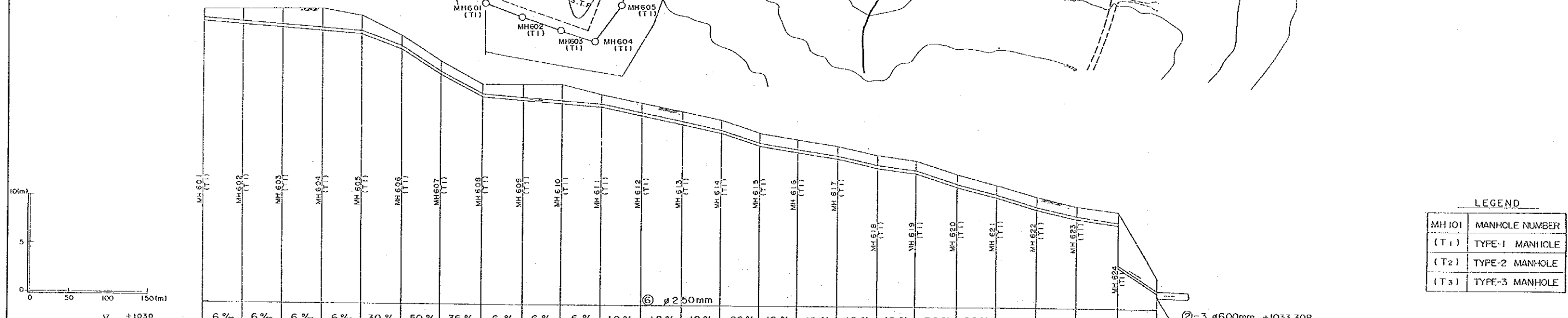


Drawing No. 31. AREA 2 SEWER PLAN

PLAN SCALE 1:2500



SEWER PROFILE SCALE V=1:200 H=1:2500

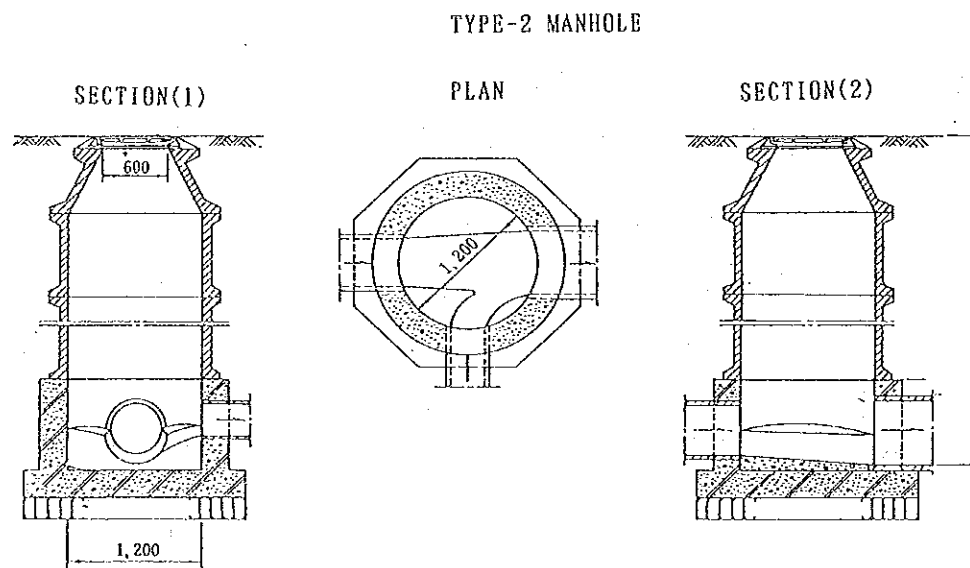
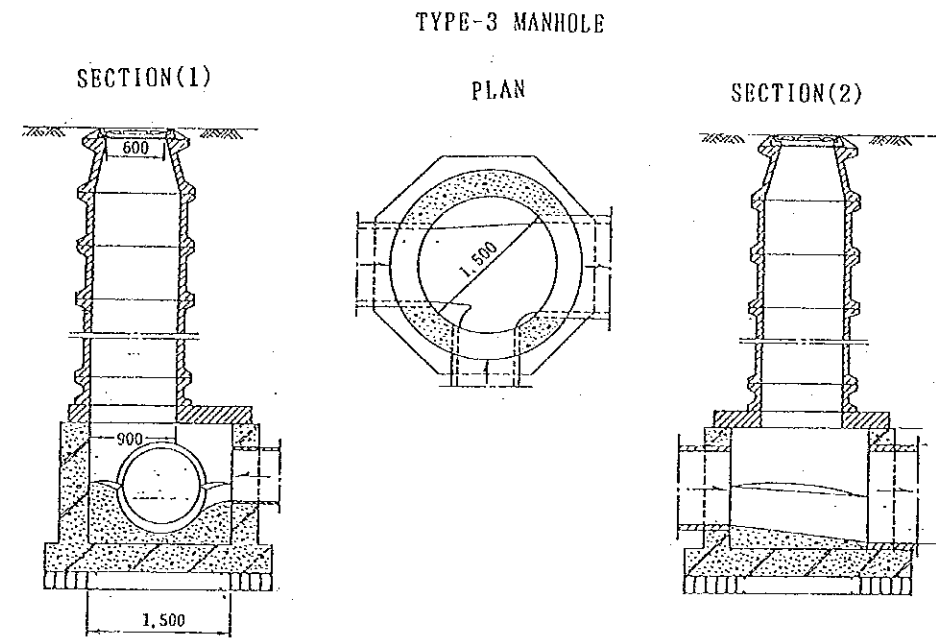
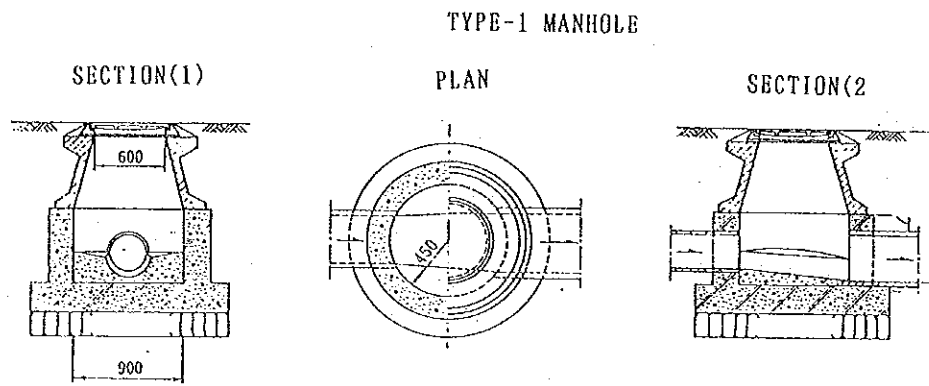


LEGEND

MH 101	MANHOLE NUMBER
(T1)	TYPE-1 MANHOLE
(T2)	TYPE-2 MANHOLE
(T3)	TYPE-3 MANHOLE

	V +1030	6%	6%	6%	6%	30%	50%	36%	6%	6%	6%	18%	18%	18%	26%	12%	12%	18%	12%	30%	20%	26%	16%	12%	50%	②-3 φ600mm +1033.308		
EARTH COVERING OVERBURDEN (m)	1.00	1.30	1.60	1.90	1.60	1.00	1.00	1.00	1.30	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
INVERT ELEVATION (M ASL)	1060.920	1060.620	1060.320	1060.020	1059.720	1058.220	1057.720	1057.320	1056.820	1056.320	1055.820	1054.320	1053.820	1053.320	1052.820	1051.320	1050.820	1049.320	1048.820	1047.320	1046.820	1045.320	1044.820	1043.320	1042.820	1041.320	1040.820	1039.320
GROUND HEIGHT (M ASL)	1062.2	1062.2	1062.2	1062.2	1061.6	1059.9	1058.7	1057.4	1056.1	1054.8	1053.5	1052.2	1050.9	1049.6	1048.3	1047.0	1045.7	1044.4	1043.1	1041.8	1040.5	1039.2	1037.9	1036.6	1035.3	1034.0	1032.7	
TOTAL SEWER LENGTH (m)	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	
SEWER LENGTH (m)	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
POINT NUMBER (-)	601	602	603	604	605	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	624	624	624		

Drawing No.32. CONNECTION SEWER FROM AREA 6



**Appendix 8 Cost Estimates of Construction Work
to be Executed by Malawi Side**

Appendix 8 Cost Estimates of Construction Works to be Executed by Malawi Side

(1) Fence

To prevent trespass and to protect people from accidents, a steel net fence will be provided along the site except on the river side. The height of the fence and gate will be 2.1m. The length was estimated as 2,000m.

Steel Net Fence (H=2.1m)	MK350 x 2,000m = MK700,000
Steel Net Gate (H=2.1m, W=6m)	3,800 x 1 set = 3,800
Total	MK703,800 say MK704,000

(2) Access Road

The access road to the proposed Kauma Sewage Treatment Plant will be provided for construction work on the site and for traffic to the STP after completion. Width of the road will be 5.0m, and the length is estimated at 2,300m from the existing paved road to the adjacent traditional village, and 700m from the village to the site. Thus total length is amounted at 3,000m. Pavement will not be provided except as subgrade and subbase course layers. One subbase course layer will be provided for the section between the existing road to the village while 2 subbase course layers will be provided for the section from the village to the site.

Grading	MK4.1 x 2,300m = MK 9,430
Clearing, Earth work, Grading	19.5 x 700m = 13,650
Subgrade, Subbase (1 layer)	97.2 x 2,300m = 223,560
Subgrade, Subbase (2 layers)	158.1 x 700m = 110,670
Total	MK357,310 say MK357,000

(3) Clearing of Trunk Sewer Route

Bamboo and tree on the trunk sewer route shall be cleared and grubbed

by the Malawi side before the commencement of construction work. Width of the work will be 5m and the length be 17km.

Clearing and Grubbing	MK1.2 x 85,000m ² = MK102,000
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Total	MK102,000

(4) Water Supply

A water supply pipe shall be provided from the adjacent distribution main to the site with 2" galvanized steel pipe. Pipe length is estimated as 2km.

Water Supply Pipe Installation	MK53.3 x 2,000m = MK107,000
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Total	MK107,000

(5) Power Supply

A power supply line shall be provided from the adjacent 11kV transmission line to the site using electric poles. Transmission length is estimated as 1km. The work will be carried out by ESCOM.

Power Supply Transmission Work	1 lot	MK598,000
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Total		MK598,000

(6) Telephone Line

A telephone line shall be provided from the adjacent main line to the site using poles. The length of the work is estimated as 2km.

Telephone Line Installation Work	1 lot	MK 56,000
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Total		MK 56,000

The costs presented above are estimated as the direct construction cost. Thus the overhead cost and engineering cost shall be added to estimate the total cost as follows:

WORK	DIRECT	OVERHEAD	ENGINEERING	TOTAL
a. Fence	704,000	281,600	49,280	1,035,000
b. Access road	357,000	142,800	39,984	540,000
c. Clearing of sewer route	102,000	40,800	7,140	150,000
d. Water supply	107,000	42,800	11,984	162,000
Sub-total	1,270,000	508,000	197,869	1,887,000
e. Power supply (incl. overhead)				837,000
f. Telephone line (incl. overhead)				78,000
TOTAL				2,802,000

Note: Overhead cost = Direct construction cost x 40%

Engineering cost = (Direct + Overhead) x 8% (fence, clearing; 5%)

MK 1 = Japanese Yen 25.25

US\$ 1 = MK 4.3090

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