APPENDIX - E (Utilities)

Table E.1 Existing Utilities

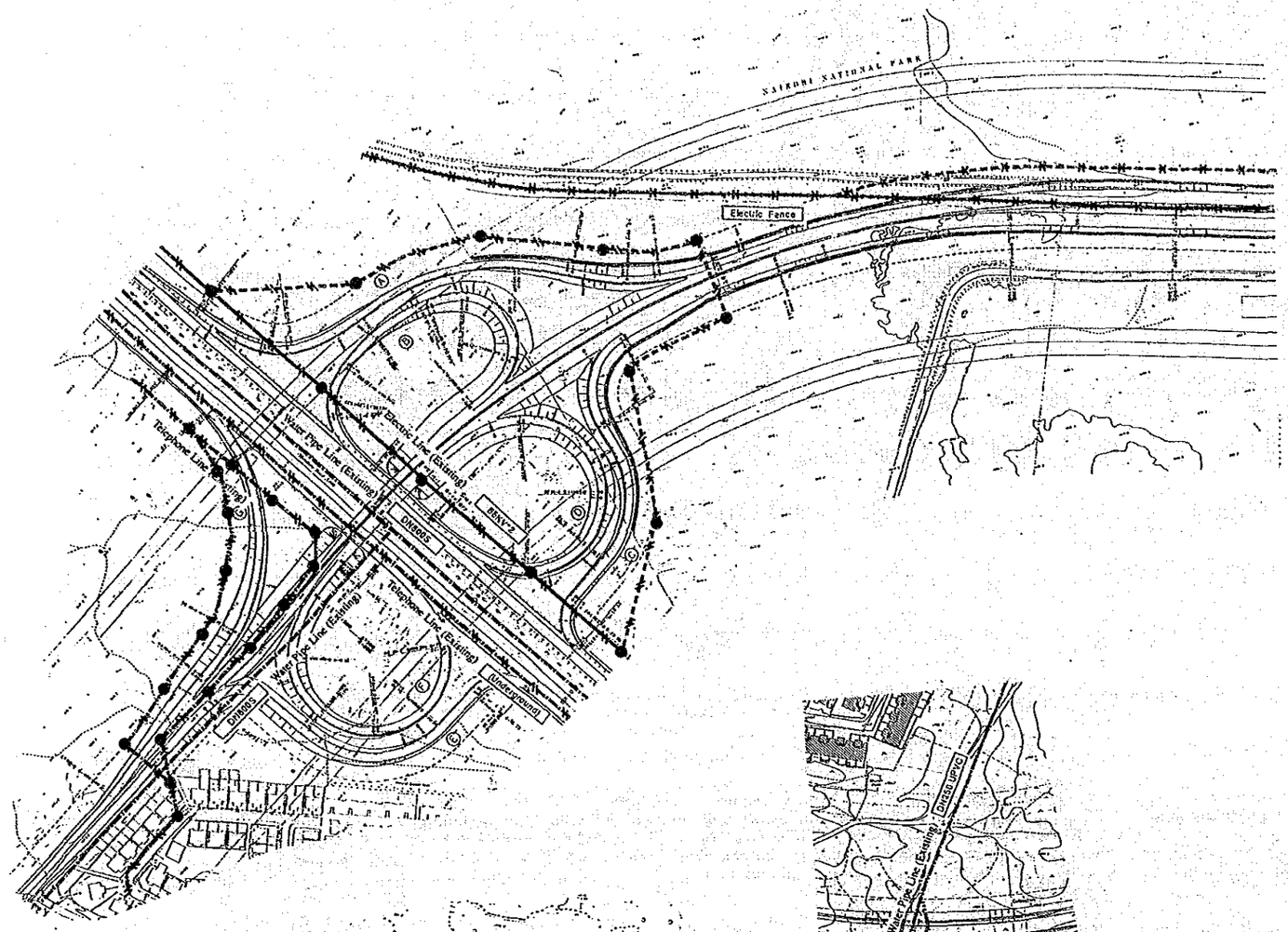
Chainage	Utility	Capacity or Size	Aerial or Underground
CH.0 + 000	Water Line	DN 600S	Aerial
to CH.0 + 500	Telecommunication Line		Aerial
(Mombasa Road J/C)	Electric Line	2 x 66 KV	Underground
	Telecommunication Line		
	Electric Fence		
CH.5 + 900	Electric Line	66 KV	Aerial
CH.6 + 650	Telecommunication Line		Underground
to CH.7 + 500	Telecommunication Line		Aerial
(Uhuru Monument J/C)	Electric Line	66 KV	Aerial
	Street Lighting		
	Sewerage Line	Dia. 300 mm	Underground
	Fence		
CH.7 + 150	Sewerage Line	Dia. 535 mm	Underground
CH.7 + 475	Sewerage Line	Dia. 535 mm	Underground
CH.7 + 910	Water Line	DN 250 UPVC	Underground
CH.8 + 660	Telecommunication Line		Aerial
CH.8 + 820	Electric Line	66 KV	Aerial
CH.9 + 400	Water Line	DN 400S 16"S	Underground
	Water Line	8" PVC	Underground
	Water Line	4" GI	Underground
CH.11 + 160	Electric Line	66 KV	Aerial
to CH.13 + 800			
CH.15 + 500	Telecommunication Line		Underground
(Ngong Rd J/C)	Telecommunication Line		Aerial
	Electric Line	2 x 11 KV	Aerial
CH.16 + 160	Electric Line	11 KV	Aerial
CH.19 + 550	Electric Line	66 KV	Aerial
CH.20 + 850	Telecommunication Line		Aerial
to CH.21 + 240	Electric Line	11 KV	Aerial
(Dagoretti Forest J/C)	Water Line	500 mm INLET	
	Telecommunication Line		Underground
CH.22 + 390	Water Line	3/4"	Underground
CH.22 + 640	Water Line	3/4"	Underground
CH.22 + 680	Electric Line	66 KV	Aerial
CH.22 + 880	Water Line	3/4"	Underground
CH.22 + 960	Water Line	1/2"	Underground
CH.23 + 010	Water Line	1/2"	Underground
CH.23 + 020	Water Line	3/4"	Underground
to CH.23 + 160			
CH.23 + 160	Water Line	2 1/2"	Underground
CH.23 + 170	Water Line	2 1/2"	Underground
CH.23 + 180	Telecommunication Line		Aerial
to CH.23 + 500	Electric Line	66 KV, 11 KV	Aerial
(Thogoto J/C)	Electric Line	11 KV	Aerial
	Electric Line	11 KV	Aerial
	Electric Line	66 KV	Aerial

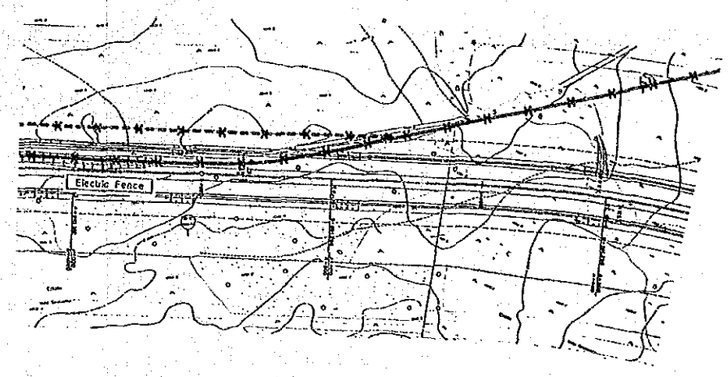
Table E.1 Existing Utilities

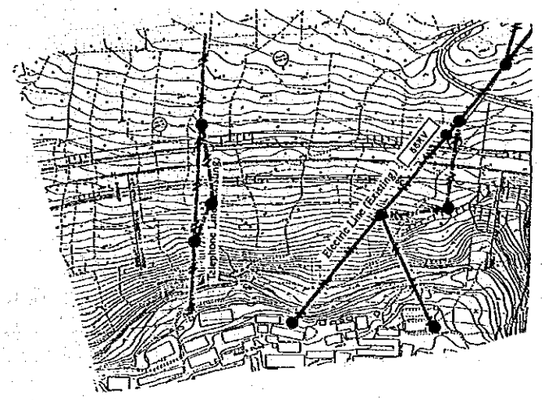
Chainage	Utility	Capacity or Size	Aerial or Underground
CH.23 + 560	Electric Line	11 KV	Aerial
CH.23 + 800	Sewerage line	Dia. 225 m	Underground
	Electric Line	11 KV	Aerial
CH.24 + 580	Electric Line	11 KV	Aerial
CH.24 + 720	Electric Line	11 KV	Aerial
CH.24 + 800	Electric Line	11 KV	Aerial
	Water Line	1 1/2"	Underground
CH.24 + 810	Water Line	1 1/2"	Underground
	Telecommunication Line	3/4"	Aerial
CH.24 + 900	Water Line	11 KV	Underground
CH.24 + 950	Electric Line	11 KV	Aerial
CH.25 + 020	Water Line	1/2"	Underground
	Electric Line	11 KV	Aerial
CH.25 + 120	Electric Line	66 KV	Aerial
CH.25 + 260	Electric Line	11 KV	Aerial
CH.25 + 380	Telecommunication Line		Aerial
CH.25 + 420	Water Line	1 1/2"	Underground
CH.25 + 480	Electric Line	66 KV	Aerial
CH.25 + 480	Water Line	1 1/2"	Underground
CH.26 + 660	Water Line	6"	Underground
	Water Line	2 x 2 "	Underground
CH.26 + 680	Telecommunication Line		Aerial
CH.26 + 700	Water Line	1"	Underground
CH.26 + 570	Water Line	3/4"	Underground
	Electric Line	11 KV	Aerial
CH.26 + 560	Telecommunication Line		Underground
to CH.26 + 960			
CH.26 + 860	Water Line	1/2"	Underground
CH.26 + 860	Electric Line	11 KV	Aerial
CH.26 + 900	Water Line	3/4"	Underground
CH.26 + 960	Telecommunication Line		
to CH.27+ 360			
CH.27 + 020	Railway		
CH.27 + 240	Water Line	1"	Underground
CH.27 + 300	Water Line	1"	Underground
CH.27 + 300	Water Line	2"	Underground
to CH.28 + 400			
CH.27 + 360	Telecommunication		Aerial
to CH.27 + 780			
CH.27 + 420	Electric Line	11 KV	Aerial
CH.27 + 240	Electric Line	11 KV	Aerial
to CH.27 + 720			
CH.27 + 680	Water Line	1"	Underground
CH.27 + 720	Water Line	1"	Underground
CH.27 + 960	Electric Line	11 KV	Aerial
to CH.28 + 020			
CH.28 + 220	Water Line	3/4"	Underground

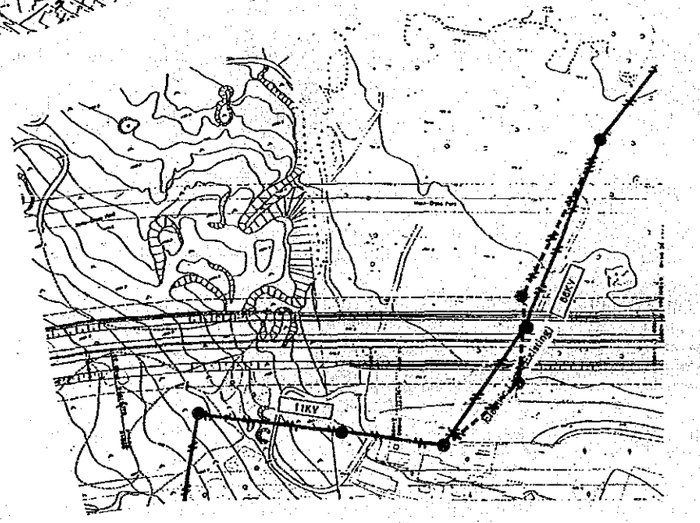
Table E.2 Utility Bill of Quantities

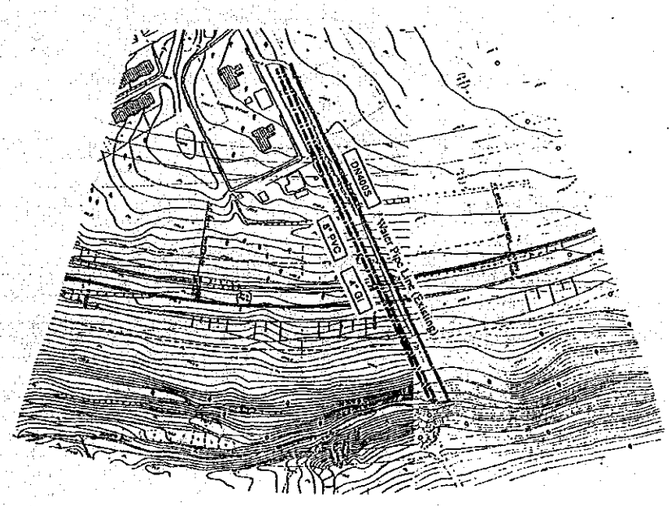
	Existing (m)	Pole (nos.)	Plan (m)	Pole (nos.)	Unit Quantities (/m) Excavation (m3)	Backfill (m3)	Class 15/20 Concrete (m3)	Form Work (m2)	Total Quantities Excavation (m3)	Backfill (m3)	Class 15/20 Concrete (m3)	Form Work (m2)	Remarks
Fence	755		675										Relocated
Electric Fence	4,335		4,340										Relocated
Street Lighting	6		6										Relocated
Swerage Line													
Dia.225 mm CP	65		65		2.475	2.199	0.236	1.050	160.875	142.959	15.331	68.250	Surrounded Concrete
Dia.300 mm CP	710		710		2.700	2.340	0.289	1.200	1,917.000	1,661.400	205.413	852.000	Surrounded Concrete
Dia.535 mm CP	140		140		3.405	2.708	0.472	1.670	476.700	379.089	66.139	233.800	Surrounded Concrete
									2,554.575	2,183.448	286.884	1,154.050	
Telephone Line													
Aerial	3,660	71	4,200	73									
Underground	2,470		2,520										
Water Line													
DN600S	380				3.600	2.790	0.527	1.800	1,368.000	1,060.200	200.358	684.000	Surrounded Concrete
DN250UPVC	65		80		2.550	2.248	0.253	1.100	204.000	179.800	20.273	88.000	Relocated
DN400S	65				3.000	2.510	0.364	1.400	195.000	163.150	23.682	91.000	Surrounded Concrete
500mm INLET	70				3.300	2.660	0.444	1.600	231.000	186.200	31.056	112.000	Surrounded Concrete
8"PVC	65				2.409	2.156	0.221	1.006	156.585	140.139	14.342	65.390	Surrounded Concrete
6"	110		110		2.256	2.052	0.186	0.904	248.160	225.687	20.477	99.440	Relocated
4'GI	65				2.105	1.944	0.153	0.803	136.812	126.329	9.956	52.208	Surrounded Concrete
2'1/2"	290		370		1.991	1.921	0.066	0.527	736.485	710.795	24.518	194.990	Relocated
2'GI	40				1.952	1.889	0.061	0.502	78.096	75.580	2.435	20.064	Surrounded Concrete
2'	1,420		1,420		1.952	1.889	0.061	0.502	2,772.408	2,683.089	86.441	712.272	Relocated
1'1/2"	70		90		1.914	1.858	0.056	0.476	172.287	167.185	5.000	42.858	Relocated
1'1/2"	220				1.914	1.858	0.056	0.476	421.146	408.674	12.221	104.764	Surrounded Concrete
1'	250		370		1.876	1.825	0.050	0.451	694.194	675.396	18.610	166.796	Relocated
3/4"	450		530		1.857	1.809	0.048	0.438	984.290	958.859	25.280	232.193	Relocated
3/4"	125				1.857	1.809	0.048	0.438	232.144	226.146	5.962	54.763	Surrounded Concrete
1/2"	80		100		1.838	1.793	0.045	0.425	183.810	179.286	4.511	42.540	Relocated
1/2"	245				1.838	1.793	0.045	0.425	450.335	439.250	11.053	104.223	Surrounded Concrete
									9,264.751	8,605.764	516.176	2,867.501	
Electric Line													
66KV x 2	400	3	930	9									Relocated
66KV	4,470	26	7,230	62									Relocated
11KV x 2	195	2	385	5									Relocated
11KV	2,200	16	3,030	36									Relocated











LEGEND

- Electric Line (Existing)
- Electric Line (Plan)
- Telephone Line (Existing)
- Telephone Line (Plan)
- Sewerage Pipe Line (Existing)
- Sewerage Pipe Line (Plan)
- Water Pipe Line (Existing)
- Water Pipe Line (Plan)
- Electric Fence (Existing)
- Electric Fence (Plan)
- Fence (Existing)
- Fence (Plan)
- Road Lighting (Plan)

REVISIONS				JAPAN INTERNATIONAL COOPERATION AGENCY	CHIEF ENGINEER (ROADS)	SEN. SUPT. ENG. (DESIGN)		SCALES	NAIROBI BYPASS	
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						PROJECT ENGINEER				

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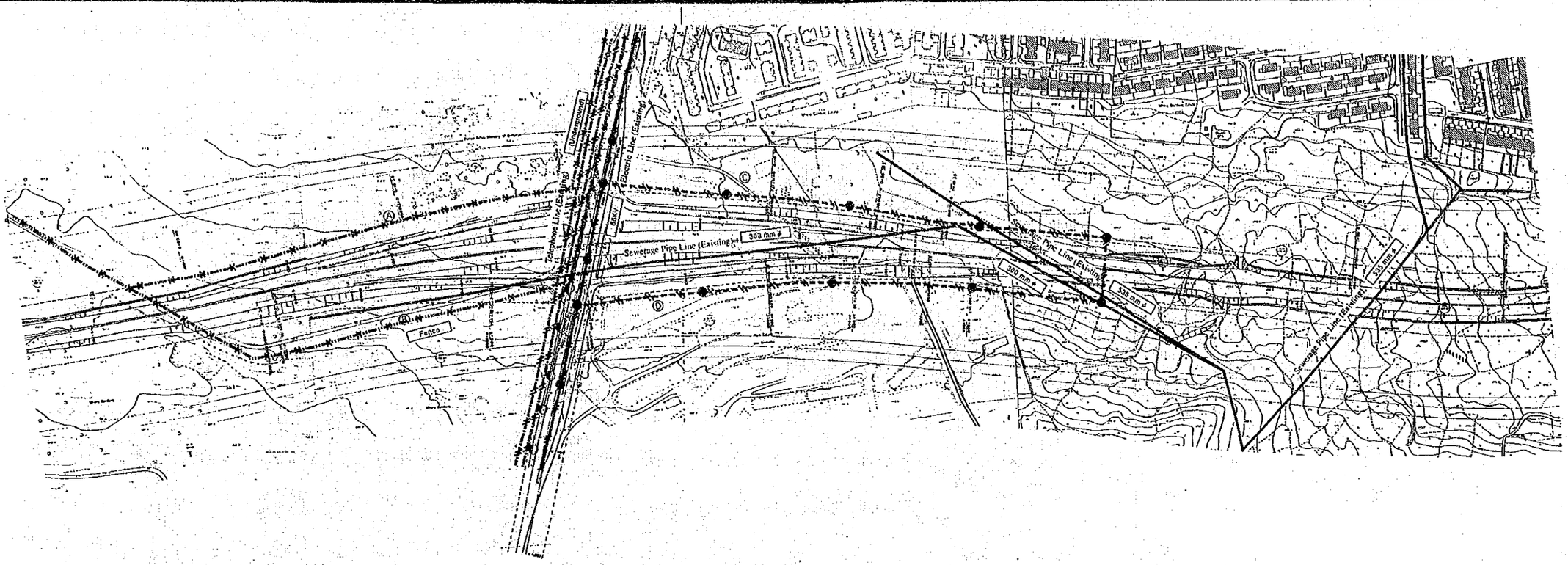
M.O.P.W ROADS DEPT DRG NO



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		PROJECT ENGINEER	

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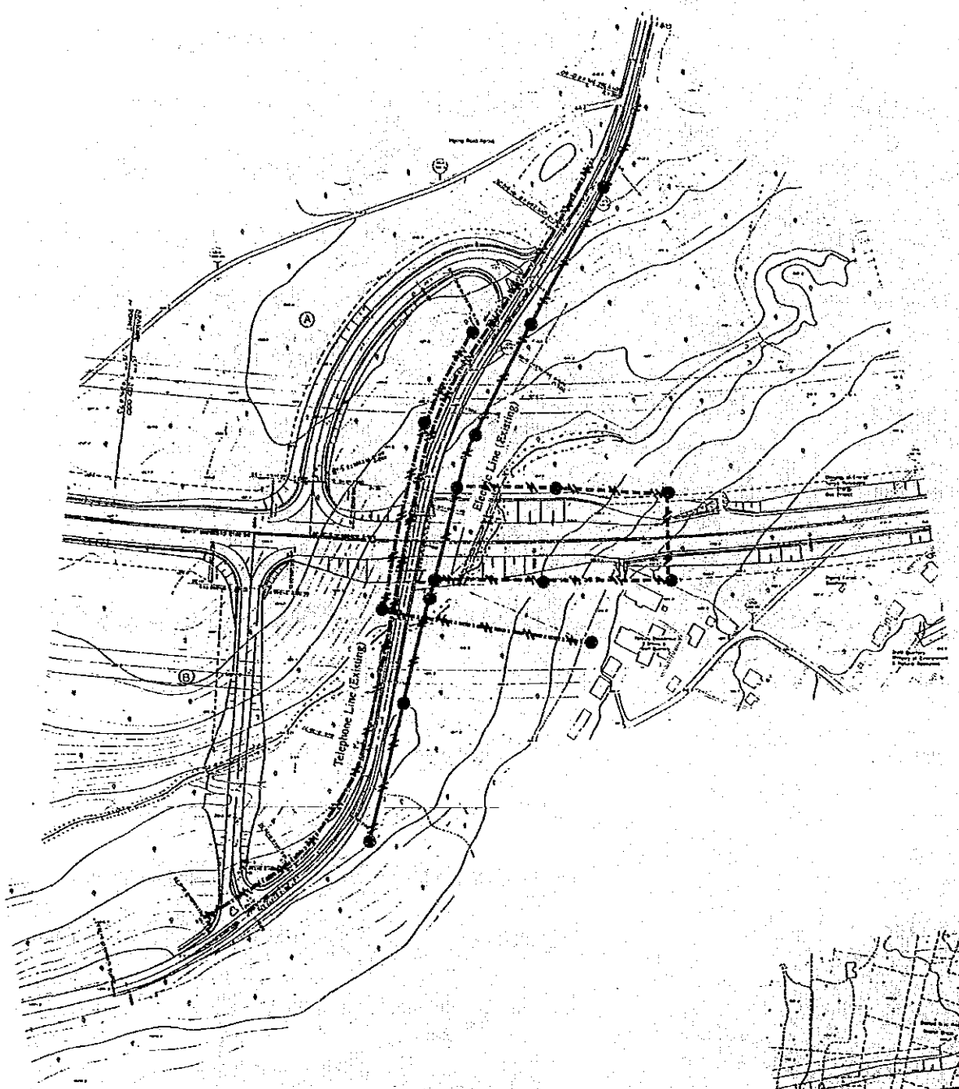

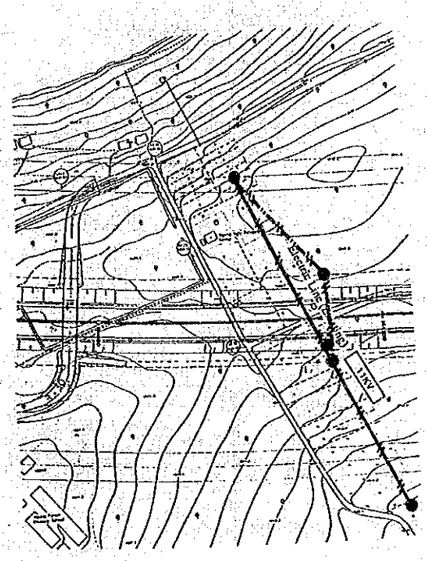

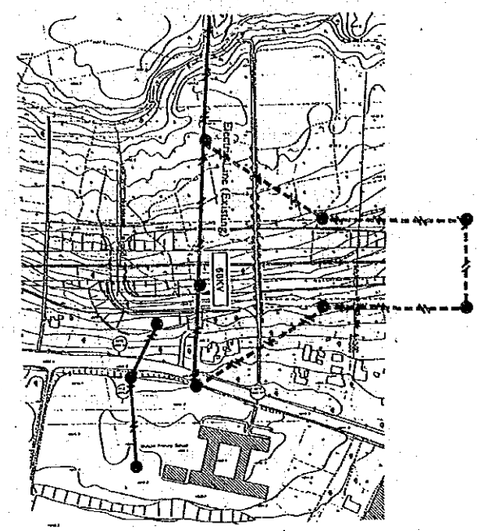

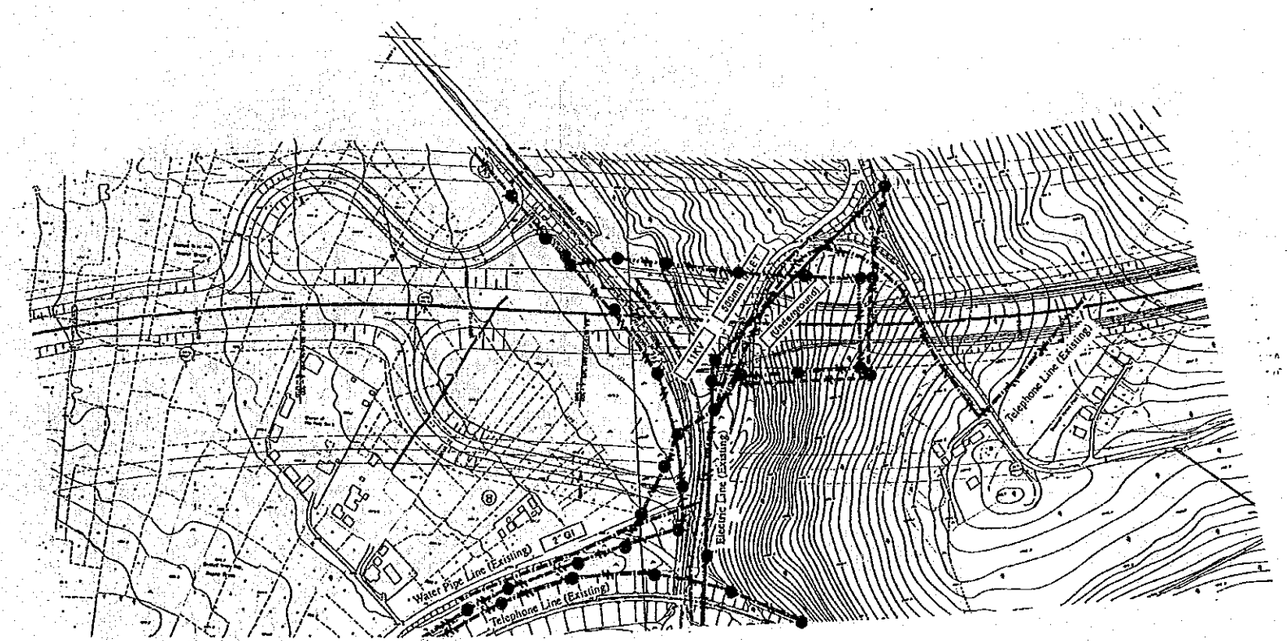

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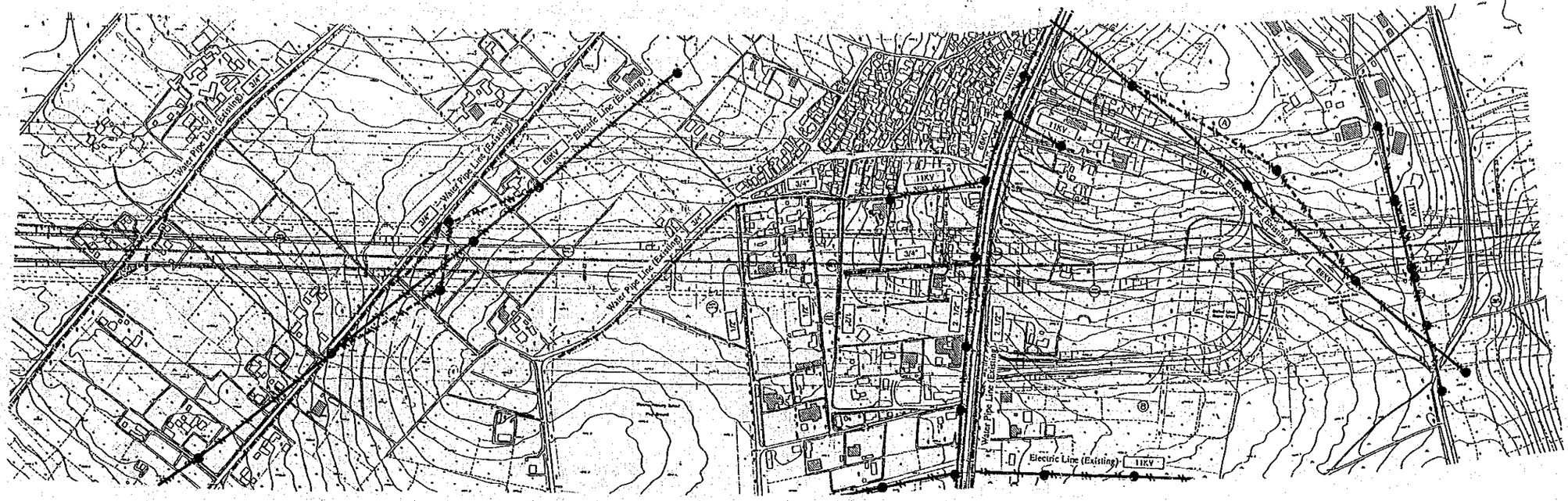

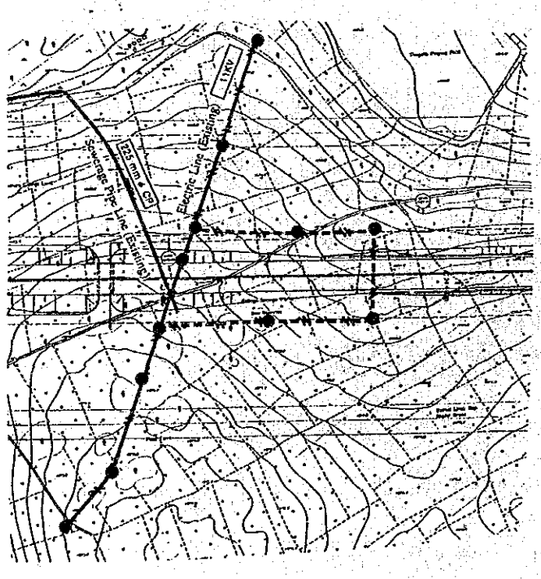

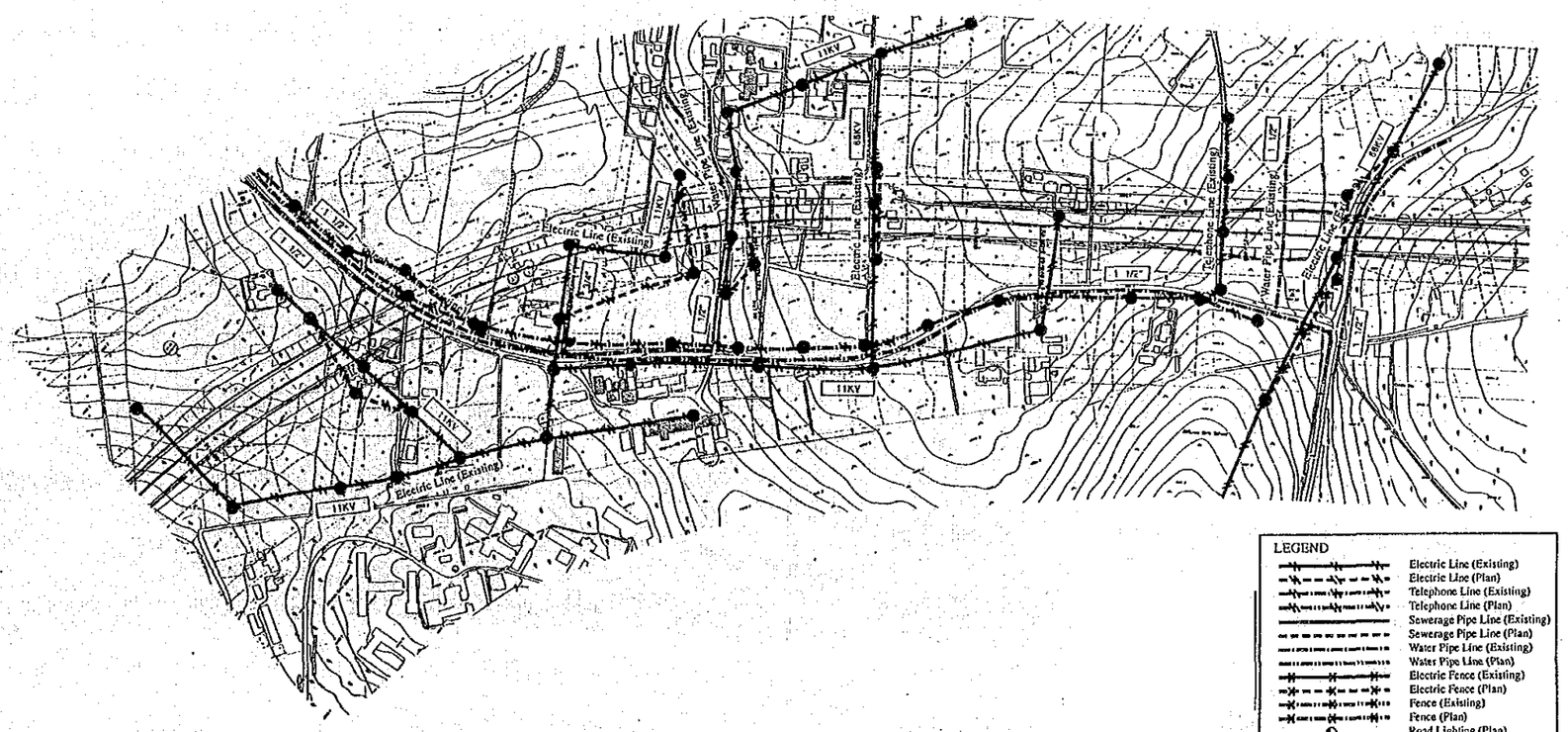

LEGEND

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- Water Pipe Line (Plan)
- Electric Fence (Existing)
- Electric Fence (Plan)
- Fence (Existing)
- Fence (Plan)
- Road Lighting (Plan)

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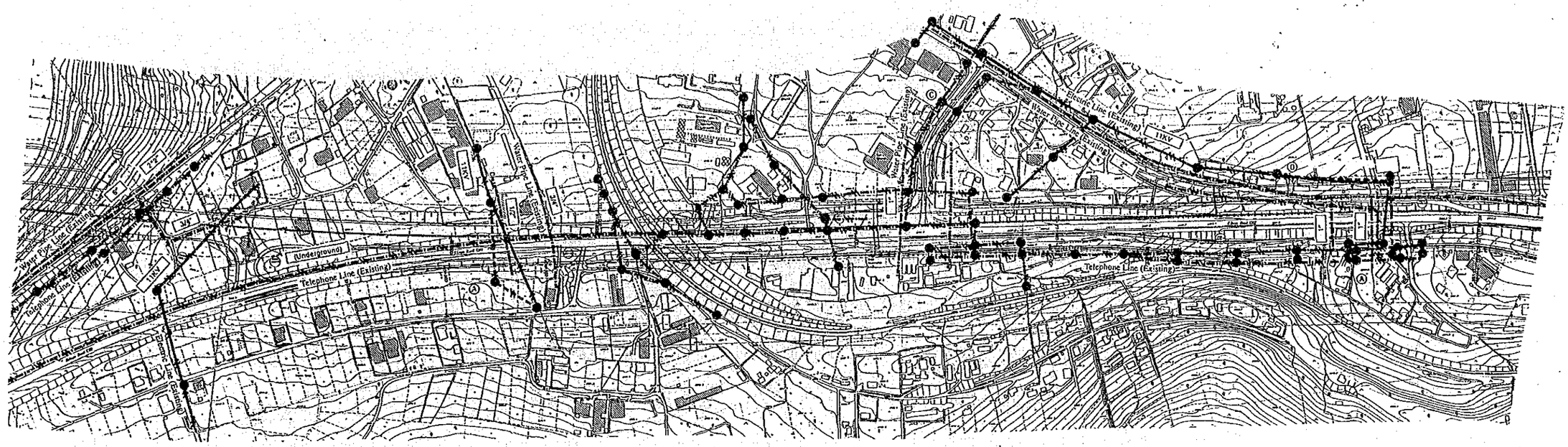

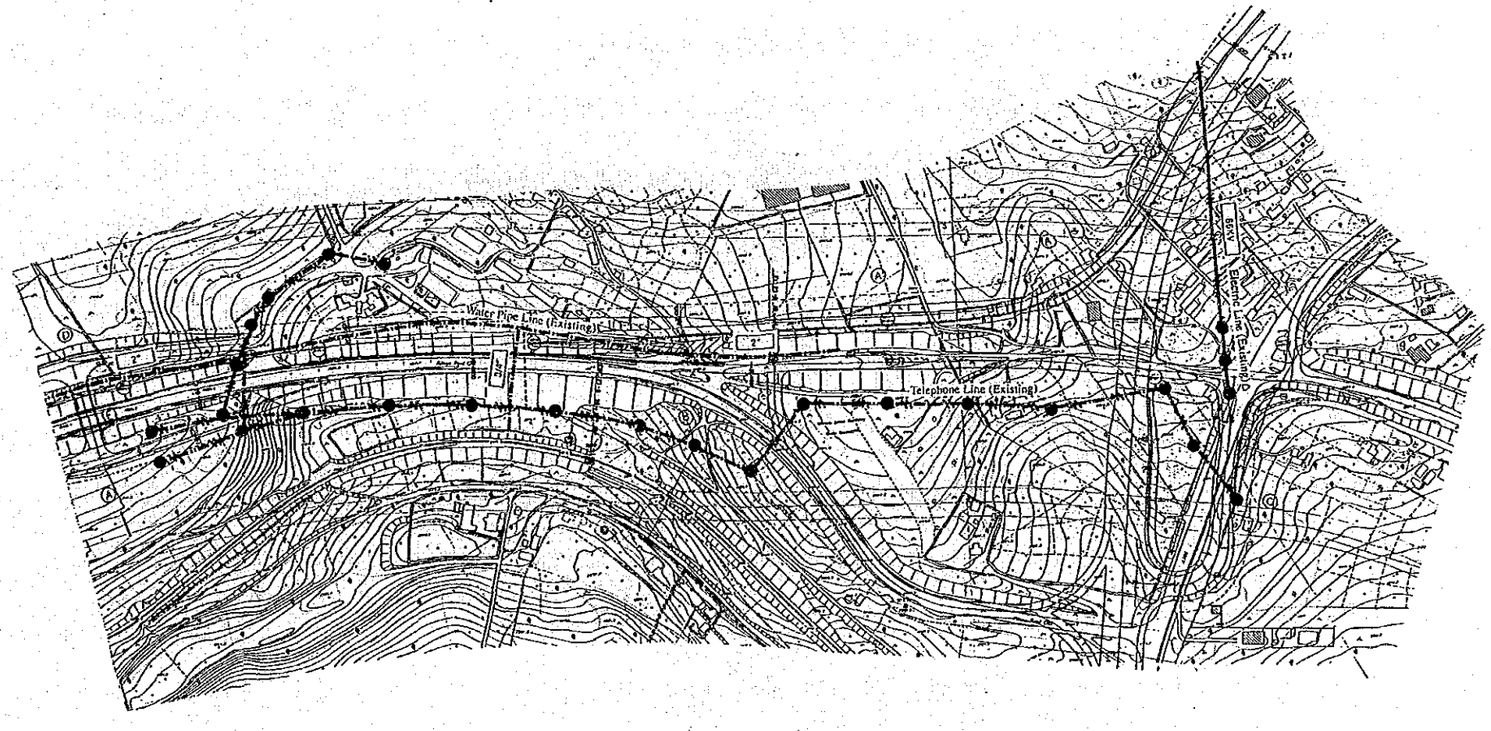

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- Electric Line (Plan)
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- Telephone Line (Plan)
- Sewerage Pipe Line (Existing)
- Sewerage Pipe Line (Plan)
- Water Pipe Line (Existing)
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- Electric Fence (Plan)
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- Fence (Plan)
- Road Lighting (Plan)

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APPENDIX - F(Structures)

Appendix - F - 1

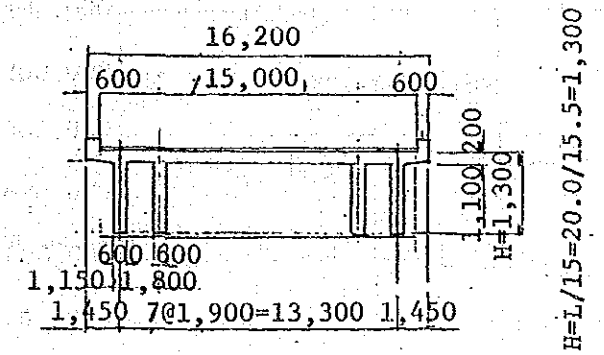
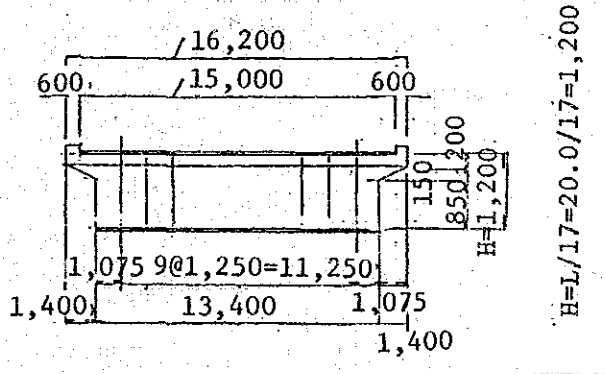
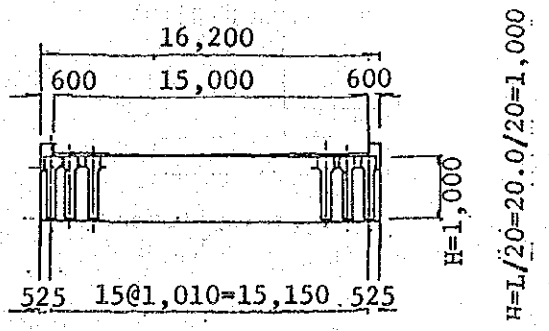
Selected and Comparison of Superstructure Type

Design conditions are as follows:

1. Span length: 20.0m (Maximum)
2. Width for Bridge: 15.0m (average)

Table Comparison of Superstructure

Price level: June 1990

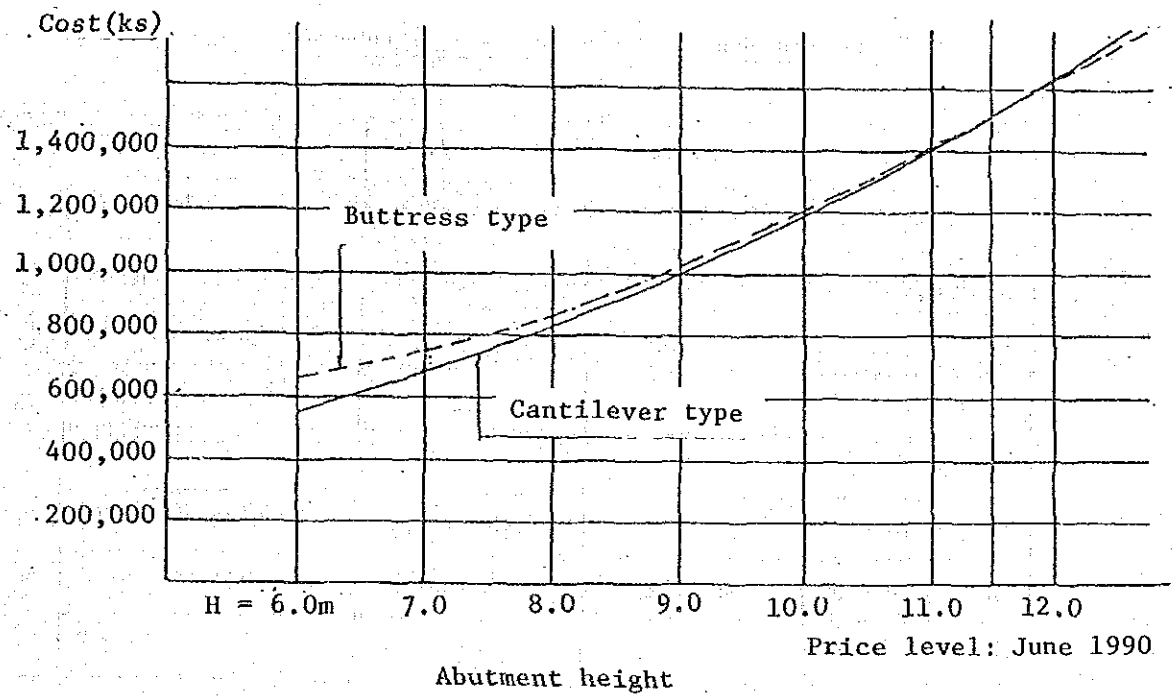
Type	Cross Section	Cost of Rough	Characteristic and Estimate
Reinforced Concrete of T-Girder		6,500 KS/m^2	.Construction period is long ·All staging method ·Structure height is the most high ·Work is easy and experience ESTIAMTE 1.
Reinforced Concrete of Hollow Slab		8,650 KS/m^2	.Construction period is long ·All staging method ·Structure height is higher than PC-T-Girder ·Formwork is complicated ESTIMATE 2.
Prestressed Concrete Pre-tension Type of T-Girder		10,200 KS/m^2	·Construction period is short ·Truck Crane Erection ·Structure height is the most low ESTIMATE 3.

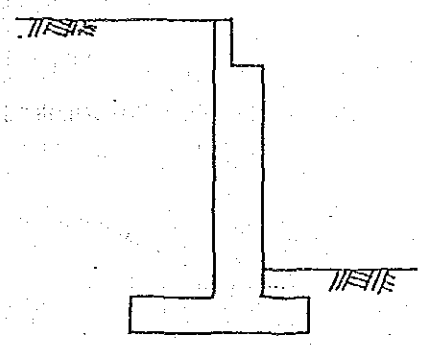
Appendix - F - 2

Selection and Comparison of Abutment Type

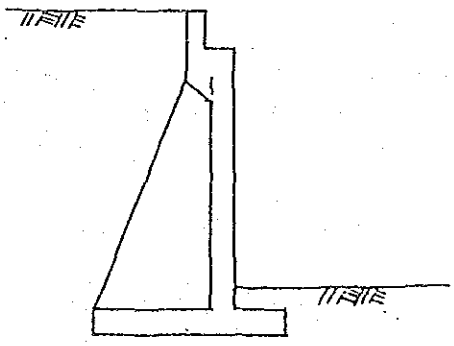
The types of Abutments are selected in consideration of construction height.

(cut fig. from draft and stick)





Cantilever type



Buttress type

Appendix - F - 3(1)

Selection and Comparison of box culvert and bridge

Culverts are planned at the cross point of the Bypass and existing roads or local road. Box culverts are designed in consideration of eacy construction and lower cost than bridge construction cost.

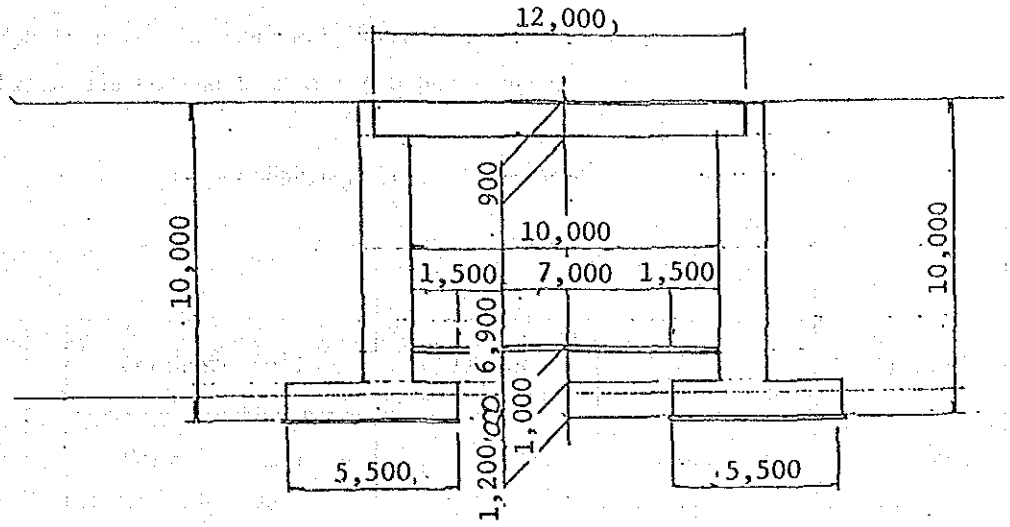
Comparison of Box Culvert and Bridge

		Unit Cost	Materials	Costs
Cost for Box Culvert	Concrete	1,900 KS/m^3	600.6 m^3	1,141,140 KS
	Form	330 KS/m^2	804.8 m^2	265,590 KS
	Reinforcement	20,000 KS/t	60.1 t	1,202,000 KS
	Others	—	—	781,270 KS
	Total	—	—	3,390,000 KS
Cost for Bridge	Superstructure	6,500 KS/m^2	180.0 m^2	1,170,000 KS
	Sub-structure	79,000 KS/m	32.4 m	2,559,600 KS
	Total	—		3,730,000 KS

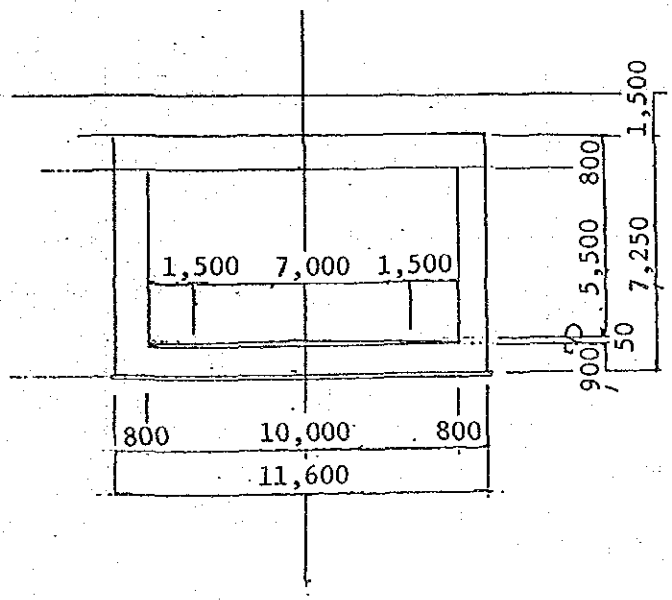
Price level: June 1990

Note: Drawings of the Box culvert and the Bridge are shownw on next page

Appendix - F - 3(2)



Profile for Birdge
(Bridges width = 15.0^{m} inside carriageway)



Cross Section for Box Culvert
(Box culvert length = 15.0^{m} + 0.6 x 2 + 2x
1.5^{m} x 1.5 = 21.0^{m}
(Wing wall length is nto over of 10.0^{m} long)

Appendix - F - 4

Comparison for box-culverts with Over 10.0m width
between one box section and two box section.

Comparison list of One box and two box

		Units Cost	Materials	Cost
	Concrete (m^3)	1.900 ks/m3	386.0	733,400 ks
	Form (m^3)	330 ks/m2	416.6	137,480 ks
	Rainforcement (t)	20,000 ks/t	30.9	618,000 ks
	Others	-	-	371,120 ks
	Total	-	-	1860.000 ks
	Concrete (m^3)	1,900 ks/m3	369.0	701,100 ks
	Form (m^3)	330 ks/m2	547.9	180,810 ks
	Rainforcement (t)	20,000 ks/t	33.2	664,000 ks
	Others	-	-	384,090 ks
	Total	-	-	1930,000 ks

Price level: June 1990

One box culvert work is lower cost and easier than two box culvert work.

Appendix - F - 5

Selection and comparison of piles foundation (for vehicle bridge)

Comparison of sp and ccp (for one abutment ------)

	Materials		Unit Cost	Costs	Remarks
Steel pile,	length of pile	10.0mx18n=180.0m	400ks/m	72,000ks	Works of Pile
	Weight of pile	109kg/mx180mx10 $^{-3}$=19.7t	15,000ks	295,500ks	
	Others	-	-	92,500ks	
	Total	-	-	460,000ks	(2,500ks/m)
Cast in place of concrete pile	Length of pile	10.0mx8n=80.0m	2,000ks	160,000ks	Works of Pile
	Concrete	0.785x80.0x1.05=66.0 m^3	2,200ks	145,200ks	
	Rainfor-cement	0.120t/m^3x66.0=8.0t	20,000ks	160,000ks	
	Others	-	-	114,800ks	
	Total	-	-	580,000ks	(7,500ks/m)

Price level: June 1990

※ 1 Steel pile, - 500mm x 10,000m

※ 2 Cast in place of concrete pile - 1.000m x 10.000m

Because
the s.p are easy construction works safety with good quality and the ccp are expensive more than the sp.

Selection and comparison for high embankment

Comparison list of embankment and bridge

			Material	Unit costs	Costs	Remarks
Cost of Bridges plan		A1	23.0m³	110,000ks/m	2530,000ks	Appendix 7.1.8-2 1650.000ks/15.0m
		P1	767.0m³	7,500ks/m³	5752,500ks	
		P2	697.0m³	7,500ks/m³	5227,500ks	
		A2	23.0m	110,000ks/m	2530,000ks	
		Total	-	-	16,040,000ks	
	Supper Structure		1400.0t	100,000ks/t	140,000,000ks	
	Total				156,000,000ks	
Cost of Embank-ment plan	Box culvert		7100.0m³	8,000ks/m³	56,800,000ks	Apendix 7.18-3(1) 6,250x1.3
	Embankment		350,000.0	135ks/,³	47,250,000ks	
	Total		-	-	104,000,000ks	

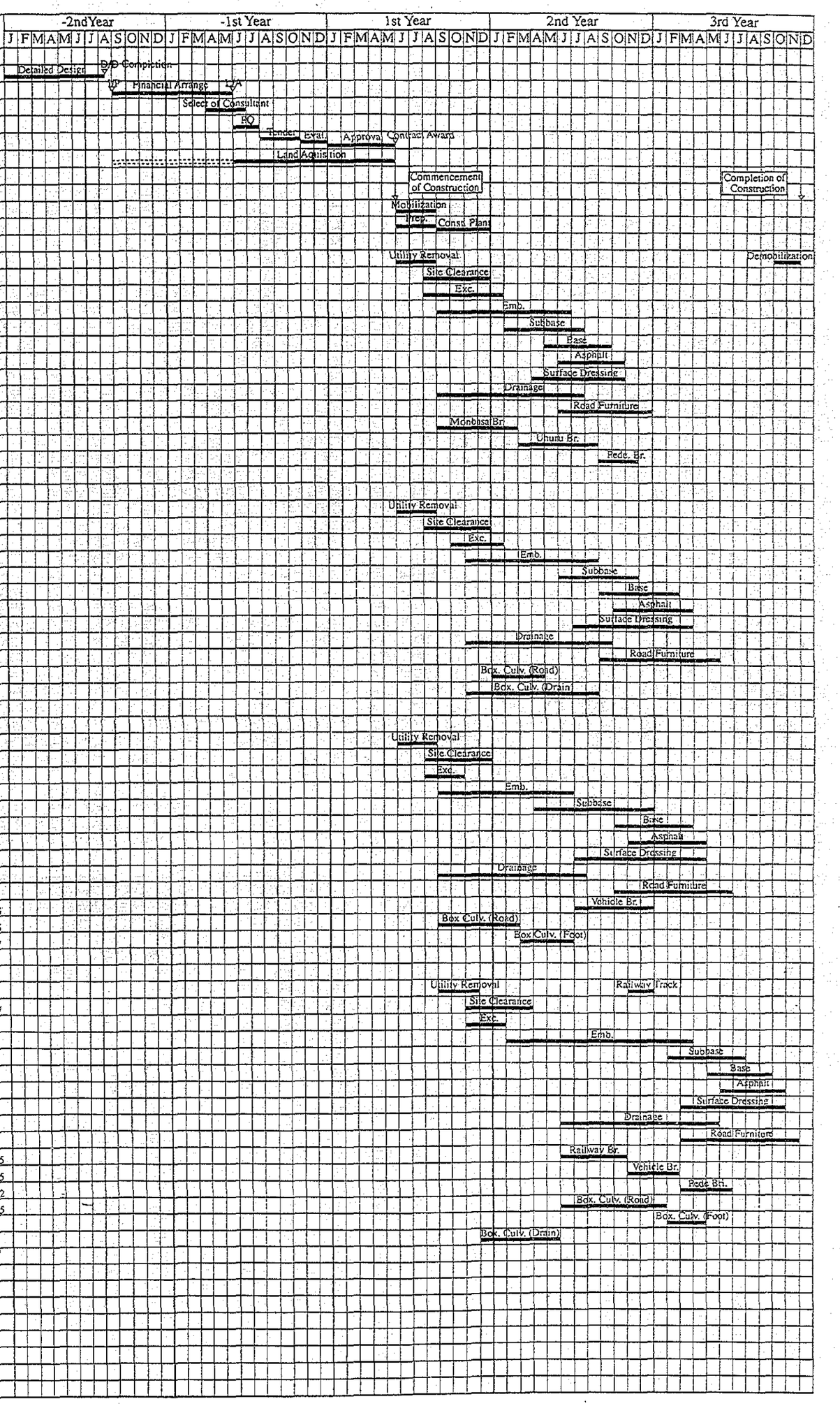
Price level: June 1990

Emabnkment plan are low cost and easy construction works.

APPENDIX - G(Construction Schedule)

APPENDIX–G Construction Schedule for The Nairobi Bypass Project

DESCRIPTION	UNIT	QUANTITY
Detailed Design		
Financial Arrangement		
Prequalification		
Tender and Contract Award		
Land Acquisition and Compensation		
Construction Works		
Mobilization		
Preparatory Works		
Section-1 (CH.0+000-7+300)		
Removal and Alteration		L.S.
Site Clearance	ha	52.4
Excavation (Topsoil, Unsuitable)	m3	161,160
Embankment	m3	399,770
Subbase and Shoulder	m3	41,710
Lean Concrete Base	m3	27,920
Asphalt Concrete	m3	15,270
Surface Dressing	m2	41,590
Drainage Work		L.S.
Road Furniture		L.S.
Bridge Work, Monbasa (1No.)	m	58
Uhuru Monument (1No.)	m	38
Pedestrian (1No.)	m	65
Section-2 (CH.7+300-15+800)		
Removal and Alteration		L.S.
Site Clearance	ha	41.1
Excavation (Topsoil, Unsuitable)	m3	58,550
Embankment	m3	259,370
Subbase and Shoulder	m3	42,610
Lean Concrete Base	m3	28,430
Asphalt Concrete	m3	15,510
Surface Dressing	m2	47,580
Drainage Work		L.S.
Road Furniture		L.S.
Box Culvert for Road (1 No.)	m	49
Box Culvert for Drainage (4 Nos.)	m	234
Section-3 (CH.15+800-21+000)		
Removal and Alteration		L.S.
Site Clearance	ha	30.3
Excavation (Topsoil, Unsuitable)	m3	34,200
Embankment	m3	353,880
Subbase and Shoulder	m3	26,340
Lean Concrete Base	m3	17,460
Asphalt Concrete	m3	9,510
Surface Dressing	m2	29,660
Drainage Work		L.S.
Road Furniture		L.S.
Bridge Work, Vehicle (1 No.)	m	29.5
Box Culvert for Road (2 Nos.)	m	53.5
Box Culvert for Footpath (2 Nos.)	m	54.7
Section-4 (CH.21+000-28+416)		
Removal and Alteration		L.S.
Site Clearance	ha	47.7
Excavation (Topsoil, Unsuitable)	m3	42,190
Embankment	m3	576,860
Subbase and Shoulder	m3	44,240
Lean Concrete Base	m3	28,710
Asphalt Concrete	m3	15,440
Surface Dressing	m2	47,720
Drainage Work		L.S.
Road Furniture		L.S.
Bridge Work, Railway (1 No.)	m	56.5
Vehicle (1 No.)	m	29.5
Pedestrian (1 No.)	m	76.2
Box Culvert for Road (4 Nos.)	m	135.5
Box Culvert for Footpath (2 Nos.)	m	51
Box Culvert for Drainage (1 No.)	m	150



APPENDIX - H(Topographical Survey)

Table 3-1

NAIROBI BYPASS PROJECT
LIST OF FINAL CO-ORDINATES AND HEIGHTS
JANUARY 9th, 1990.

CODE	***EASTING** (+200000)	**NORTHING** (+9800000)	***LEVEL****
SKP208	37160.303	43205.245	
148S1	52026.266	83726.885	
149S3	84419.099	37592.788	
MOPW	56490.096	57364.593	
GPS1	60946.236	53415.415	1648.599
GPS2	60639.094	54149.494	1644.480
GPS3	59472.319	53843.127	1650.351
GPS4	57866.100	53711.443	1660.514
GPS5	57063.168	53332.157	1672.057
GPS6	56327.426	52387.354	1672.905
GPS7	52814.211	54860.721	1717.574
GPS8	55049.057	53631.474	1695.195
GPS9	54157.287	53486.473	1732.642
GPS10	53634.063	54471.271	1733.044
GPS11	52208.094	54220.610	1778.072
GPS12	50058.514	54167.892	1800.340
GPS13	48570.932	53750.968	1813.396
GPS14	47793.309	54526.174	1820.990
GPS15	46736.217	55302.201	1833.654
GPS16	46758.834	56297.407	1833.600
GPS17	44964.278	56763.386	1868.323
GPS18	44207.333	56470.600	1871.945
GPS19	42728.000	57518.327	1882.005
GPS20	41925.753	57445.685	1928.685
GPS21	41591.445	58722.993	1944.511
GPS22	40730.946	59298.008	1982.868
GPS23	39618.007	59475.235	1996.787
GPS24	39158.270	59994.496	2004.893
GPS25	39674.039	60801.212	1994.339
GPS26	40176.264	61634.559	2015.038
GPS27	39967.373	62527.591	2035.958
GPS28	40600.315	63648.927	2021.931
GPS29	41043.705	64649.869	1983.374
GPS30	40030.368	64620.369	2059.522
GM31	40368.877	63612.292	2028.199
PP1	40569.073	63880.600	2030.747
PP2	40128.560	62877.024	2032.007
PP3	39762.207	61109.509	2010.411
PP4	39602.333	60250.726	1994.551
PP5	40560.352	59041.224	1985.014
PP6	41737.166	58012.801	1937.608
PP7	42246.519	57593.122	1888.121
PP8	43391.550	56925.577	1885.319
PP9	45245.424	56056.396	1860.437
PP10	46319.266	55780.759	1838.960
PP12	48794.540	54204.783	1816.554
PP13	49327.728	53579.952	1807.581
PP14	50646.691	53924.709	1788.897
PP15	52682.969	54400.725	1750.640

Table 3-2

PP16	54214.814	54009.325	1713.543
PP17	55937.773	52896.208	1682.821
PP18	57540.879	53027.076	1666.277
PP19	58818.595	53259.733	1656.841
PP20	60027.747	53435.913	1649.505
GA001	60324.885	53779.251	1649.020
GA002	60220.293	53643.577	1648.768
GA003	60165.508	53486.272	1650.643
GA005	59832.975	53390.927	1650.372
GA006	59676.294	53365.350	1650.973
GA007	59521.489	53322.483	1651.635
GA008	59353.821	53270.560	1652.321
GA009	59194.180	53227.533	1653.624
GA010	59010.921	53190.375	1654.903
GA012	58667.346	53123.479	1657.330
GA013	58492.425	53089.110	1658.692
GA014	58325.188	53065.198	1659.886
GA015	58143.985	53042.723	1661.327
GA016	57953.321	53064.309	1662.787
GA017	57701.615	53003.360	1665.153
GA018	57328.398	52932.049	1667.894
GA019	57097.110	52929.679	1669.883
GA020	56890.195	52880.645	1671.000
GA021	56681.386	52870.655	1672.594
GA022	56437.518	52833.767	1675.637
GA023	56169.948	52837.079	1681.584
GA024	55611.502	52805.455	1682.424
GA025	55379.684	52768.641	1687.702
GA026	55243.559	52751.820	1696.572
GA027	55116.378	52759.266	1703.870
GA028	55029.081	52829.212	1707.488
GA029	54980.565	52913.182	1709.846
GA030	54956.255	53018.062	1710.562
GA031	54939.570	53092.424	1710.529
GA032	54904.495	53157.219	1711.417
GA033	54896.387	53206.616	1709.999
GA034	54897.216	53305.516	1707.517
GA035	54872.016	53354.751	1705.708
GA036	54911.256	53519.805	1697.517
GA037	54683.802	53644.073	1709.317
GA038	54595.467	53738.312	1710.615
GA039	54480.262	53815.018	1712.084
GA040	54373.847	53872.753	1712.253
GA042	54140.457	54110.973	1715.374
GA043	54054.574	54190.627	1715.254
GA044	53986.120	54347.289	1717.365
GA045	53901.468	54406.940	1721.882
GA046	53479.571	54495.076	1738.957
GA047	53207.996	54433.980	1741.711
GA048	52967.607	54452.208	1740.186
GA049	52881.037	54408.141	1747.673
GA050	52757.991	54470.752	1740.797
GA053	52523.476	54524.424	1750.889
GA054	52440.304	54542.786	1757.929
GA055	52306.720	54588.979	1752.843

Table 3-3

GA057	52145.781	54510.298	1769.115
GA058	52142.848	54444.265	1775.886
GA059	52178.696	54360.157	1775.725
GA060	52097.979	54349.195	1778.962
GA061	51907.622	54324.778	1785.802
GA062	51891.552	54376.251	1783.082
GA063	51885.713	54421.192	1779.261
GA064	51870.242	54484.493	1769.257
GA065	51850.451	54530.704	1758.668
GA066	51820.828	54496.492	1765.346
GA067	51771.626	54490.826	1766.680
GA068	51744.275	54465.285	1771.158
GA069	51664.337	54453.746	1771.659
GA070	51603.666	54444.832	1770.897
GA071	51574.845	54441.335	1768.709
GA072	51548.616	54444.897	1767.495
GA073	51506.393	54449.427	1766.615
GA074	51463.656	54468.966	1764.605
GA075	51415.920	54469.024	1764.968
GA076	51388.178	54443.231	1767.025
GA077	51360.256	54400.341	1775.176
GA078	51313.203	54374.721	1776.702
GA079	51266.601	54382.324	1771.087
GA080	51226.337	54372.924	1771.587
GA081	51232.799	54331.788	1780.217
GA082	51241.942	54245.008	1791.437
GA083	51248.645	54190.040	1797.469
GA084	51257.959	54139.844	1800.257
GA085	51265.075	54068.078	1800.001
GA086	51185.771	54077.915	1798.128
GA087	51071.685	54043.007	1797.737
GA088	50911.508	54041.349	1798.493
GA089	50819.678	53962.340	1792.159
GA091	50607.819	53803.021	1791.156
GA092	50512.133	53736.316	1793.319
GA093	50400.026	53726.183	1796.452
GA094	50303.682	53709.437	1796.841
GA095	50178.498	53695.872	1798.162
GA096	50034.832	53668.305	1800.926
GA097	49913.063	53653.458	1801.504
GA098	49777.556	53622.047	1803.897
GA099	49617.083	53595.384	1805.831
GA100	49483.456	53575.182	1806.791
GA102	49193.061	53545.364	1809.282
GA103	49060.487	53535.637	1810.687
GA104	48937.178	53561.177	1810.520
GA105	48793.757	53625.107	1813.039
GA106	48708.424	53676.302	1813.322
GA107	48638.417	53860.139	1808.176
GA108	48687.761	53960.318	1802.202
GA109	48716.602	54023.067	1801.436
GA110	48758.676	54129.546	1812.741
GA112	48652.624	54202.177	1817.965
GA113	48581.574	54196.354	1816.284
GA114	48471.472	54212.780	1818.114

Table 3-4

GB001	48405.736	54230.099	1821.672
GB002	48258.323	54284.187	1821.571
GB003	48144.758	54302.980	1824.873
GB004	48025.622	54325.430	1826.736
GB005	47900.073	54411.555	1822.409
GB06	47656.861	54600.378	1824.982
GB07	47520.056	54646.847	1828.197
GB08	47398.230	54711.327	1824.263
GB09	47266.080	54710.457	1823.123
GB10	47205.822	54769.267	1823.503
GB11	47134.968	54815.249	1822.103
GB12	47176.322	54884.665	1820.848
GB13	47210.921	54963.402	1828.574
GB14	47246.190	55049.439	1828.383
GB15	47282.592	55124.032	1825.999
GB16	47311.984	55195.318	1827.070
GB17	47338.769	55258.084	1829.320
GB17a	47277.414	55257.615	---------
GB18	47189.899	55247.085	1827.633
GB19	47030.111	55233.268	1828.866
GB20	46863.804	55272.359	1832.313
GB21	46715.466	55305.772	1834.265
GB22	46786.560	55351.976	1833.024
GB23	46899.474	55393.200	1825.557
GB24	46891.944	55586.505	1830.905
GB25	46855.606	55659.050	1835.198
GB26	46695.600	55635.259	1837.551
GB27	46589.983	55617.805	1834.043
GB28	46523.018	55628.659	1835.345
GB29	46522.982	55696.419	1839.885
GB30	46513.238	55769.430	1838.649
GB31	46185.281	55783.563	1839.690
GB32	46090.790	55753.489	1840.347
GB33	45975.234	55822.020	1842.650
GB34	45816.880	55875.617	1844.494
GB35	45694.643	55931.002	1845.387
GB36	45603.496	55960.911	1849.972
GB37	45527.669	55935.588	1854.566
GB38	45460.747	55923.802	1853.210
GB39	45316.159	56019.285	1854.186
GB40	45078.051	56091.434	1869.403
GB41	44947.577	56135.003	1877.948
GB42	44896.012	56210.584	1881.009
GB43	44692.317	56332.855	1876.663
GB44	44655.951	56189.756	1875.686
GB45	44578.253	56192.092	1876.075
GB46	44480.528	56254.651	1874.448
GB47	44384.708	56296.929	1867.445
GB48	44293.117	56406.059	1870.703
GB49	44235.234	56528.498	1881.219
GB50	44250.514	56578.622	1883.020
GB51	44108.411	56651.137	1879.567
GB52	44020.067	56705.410	1880.926
GB53	43932.418	56771.925	1882.366
GB54	43755.723	56807.647	1875.076

Table 3-5

GB55	43573.501	56858.211	1885.805
GB56	43387.852	56892.940	1882.963
GB57	43298.500	56944.840	1885.668
GB58	43191.774	56993.016	1883.960
GB59	43135.476	56963.310	1884.333
GB60	43085.964	56902.895	1886.130
GB61	43024.284	56879.737	1888.019
GB62	42953.936	56854.808	1886.774
GB63	42904.167	56834.061	1882.024
GB64	42863.738	56894.374	1884.738
GB65	42747.978	56950.470	1878.118
GB66	42659.770	57059.024	1879.062
GB67	42556.068	57204.668	1881.184
GB68	42444.810	57306.000	1882.704
GB69	42314.909	57426.532	1885.156
GB70	42078.021	57651.965	1911.550
GB71	42150.938	57848.615	1925.394
GB72	42009.217	57980.181	1924.265
GB73	41876.932	58053.647	1931.849
GB74	41593.794	58143.131	1945.276
GB75	41466.568	58275.599	1954.727
GB76	41378.623	58376.785	1955.871
GB77	41233.507	58393.085	1961.734
GB78	41146.328	58488.513	1961.951
GB79	41022.562	58572.419	1965.088
GB80	40930.994	58669.636	1972.375
GB81	40840.347	58764.702	1976.713
GB82	40780.811	58891.735	1977.434
GB83	40706.506	58977.707	1978.607
GB84	40671.366	58944.946	1979.703
GB85	40518.263	59129.664	1985.429
GB86	40413.103	59190.292	1986.607
GB87	40298.251	59344.040	1989.714
GB88	40252.779	59399.051	1986.802
GB89	40081.308	59442.139	1979.581
GB90	39917.158	59522.842	1987.169
GB91	39775.477	59627.822	1988.058
GB92	39693.743	59721.073	1980.326
GB93	39607.361	59822.959	1978.685
GB94	39547.207	59942.093	1987.950
GB95	39475.111	60011.424	1995.682
GB96	39467.177	60095.162	1994.503
GB97	39621.212	60448.352	1995.175
GB98	39566.705	60504.784	1996.540
GB99	39579.757	60683.054	2000.190
GB100	39657.365	60893.397	1999.868
GB101	39751.447	60992.869	2006.904
GB102	39798.437	61250.048	2014.453
GB103	39799.922	61381.189	2013.848
GB104	39791.934	61521.428	2010.569
GB105	39803.133	61667.124	2005.574
GB106	39909.913	61799.052	2010.100
GB107	39963.918	61840.218	2022.444
GB108	40017.395	61847.357	2023.719
GB109	40035.130	61940.699	2025.448

Table 3-6

GB110	40059.096	62237.979	2024.851
GB111	40069.348	62503.186	2031.205
GB112	40089.687	62670.296	2033.945
GB113	40138.397	63085.058	2030.534
GB114	40175.862	63257.738	2030.022
GB115	40229.278	63388.811	2029.178
GB116	40307.843	63520.801	2028.703
GB117	40431.215	63742.319	2038.099
GB118	40599.364	63971.748	2029.465
GB119	40718.408	63774.534	----------

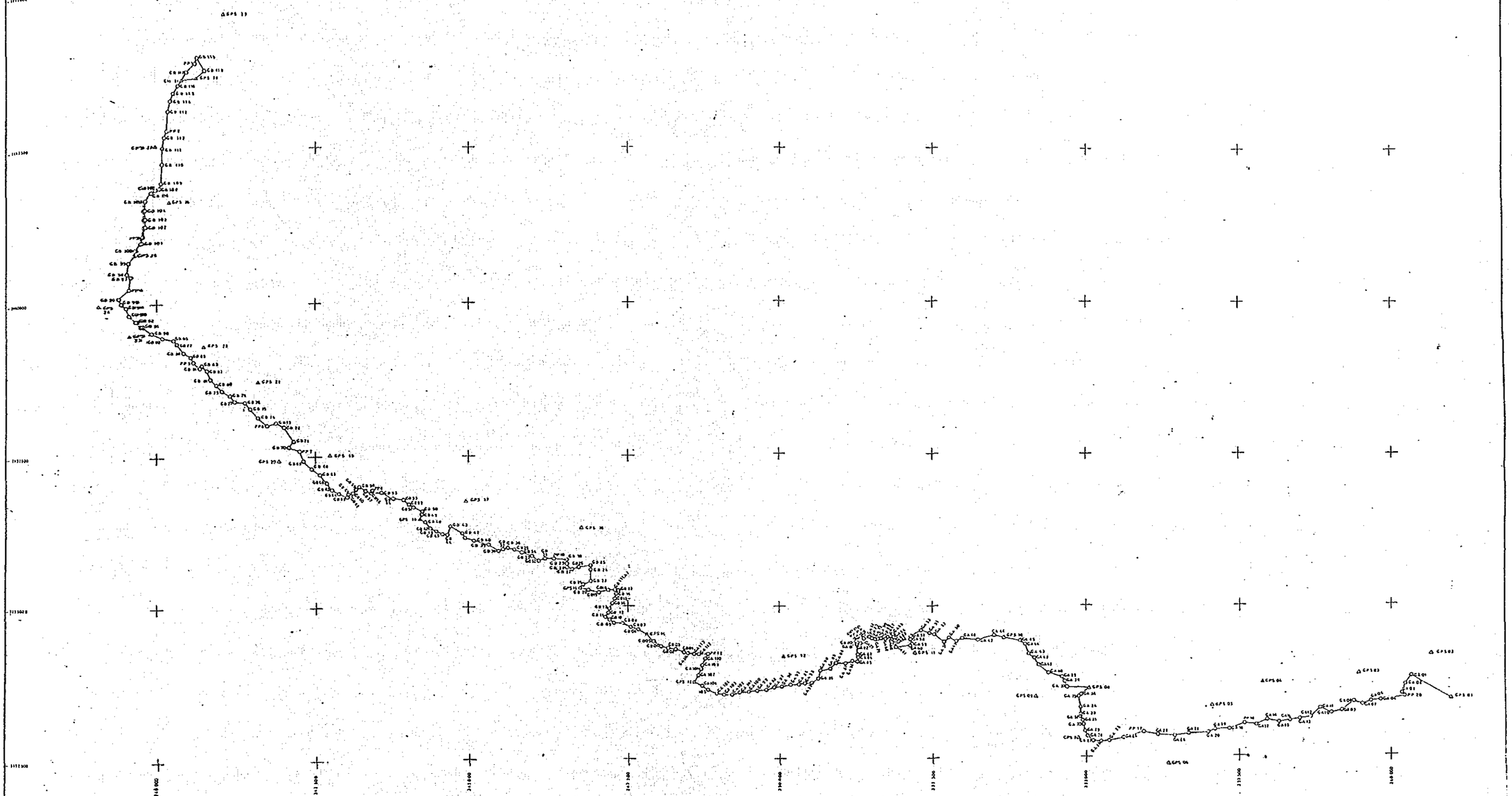


Figure 3-1

LEGEND

△ GPS POINT

○ TRAVERSE POINT

NAIROBI BYPASS PROJECT
REPUBLIC OF KENYA

SCALE 1:25000	Date 09-01-90
DATUM UTM ZONE 37E	DWG. No. C38/01

HORIZONTAL CONTROL POINTS

Surveyed by GEOMAPS Surveying and Mapping

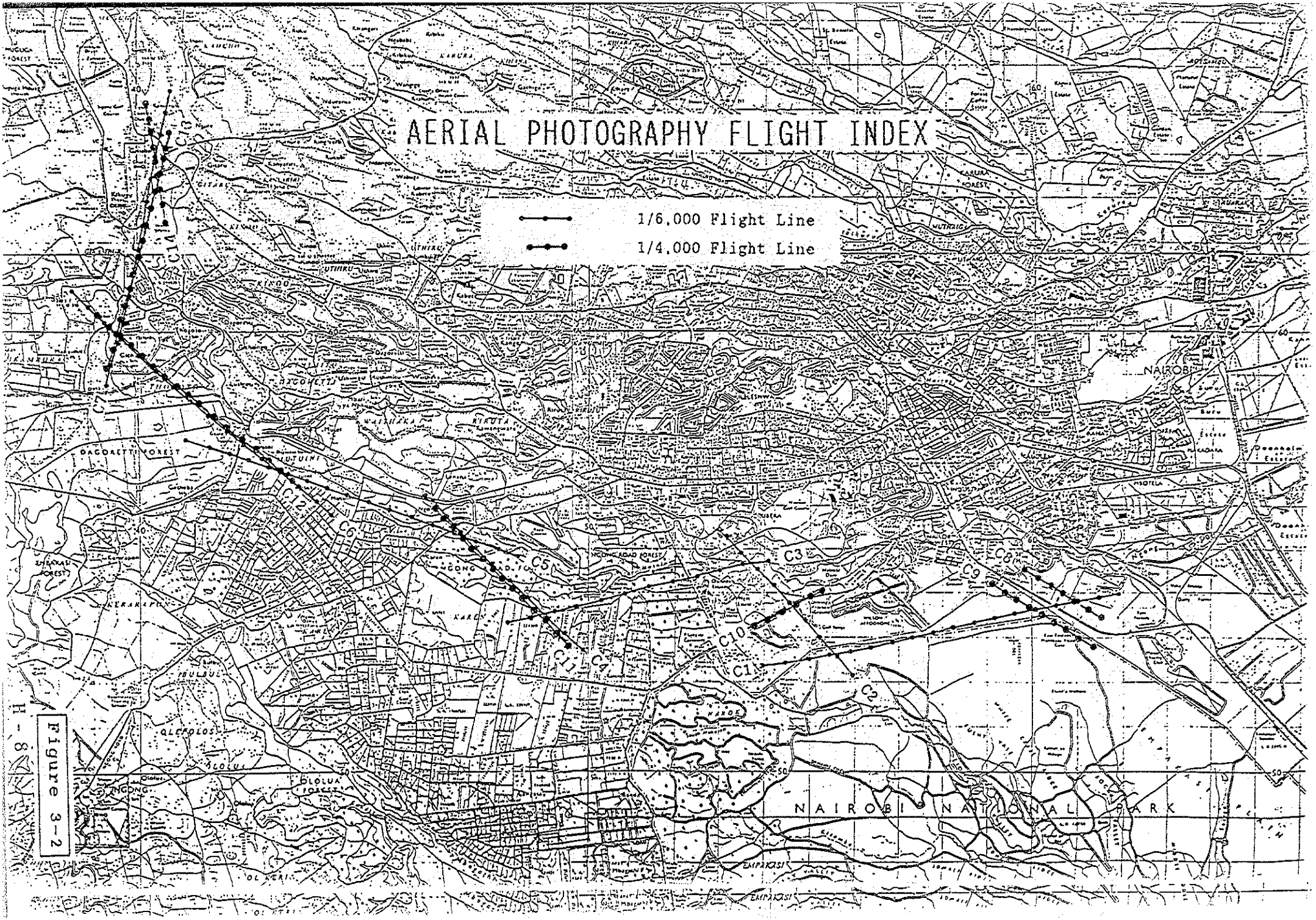

AERIAL PHOTOGRAPHY FLIGHT INDEX
1/6,000 Flight Line
1/4,000 Flight Line
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
NAIROBI
NAIROBI NATIONAL PARK
DAGORETTI FOREST
KIKUYU
KAREN
LANGATA
KIBERA
RIRUTA
UTHIRU
KAMUKUNJI
EMPAKASI
OLOLUA
OLOLUA FOREST
OLE POLOS
NGONG
NGONG ROAD FOREST
KAREN ROAD FOREST
KAMURA FOREST
KIKUYU FOREST

Figure 3-2

ADJOINING SHEET INDEX

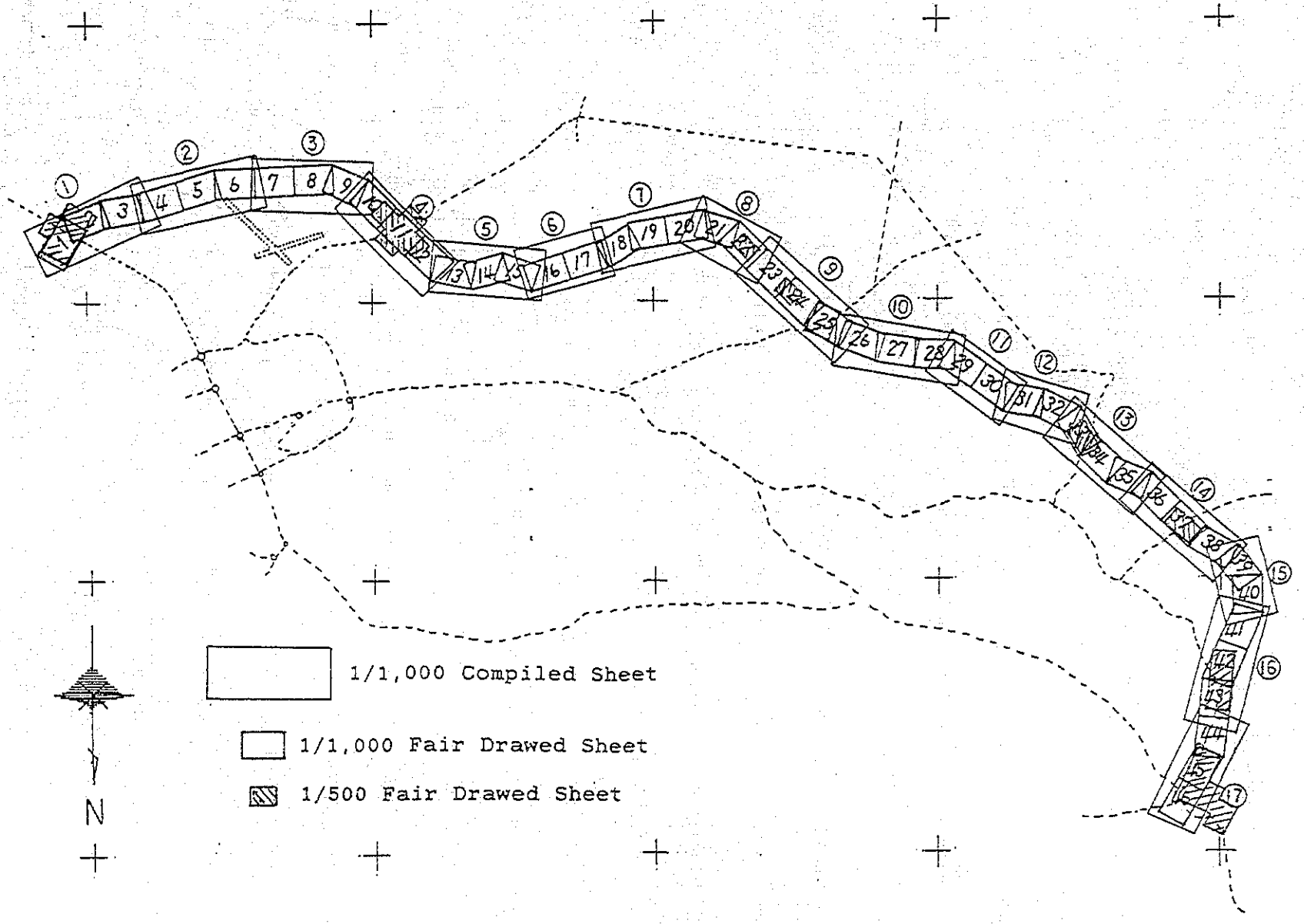


Figure 3-3

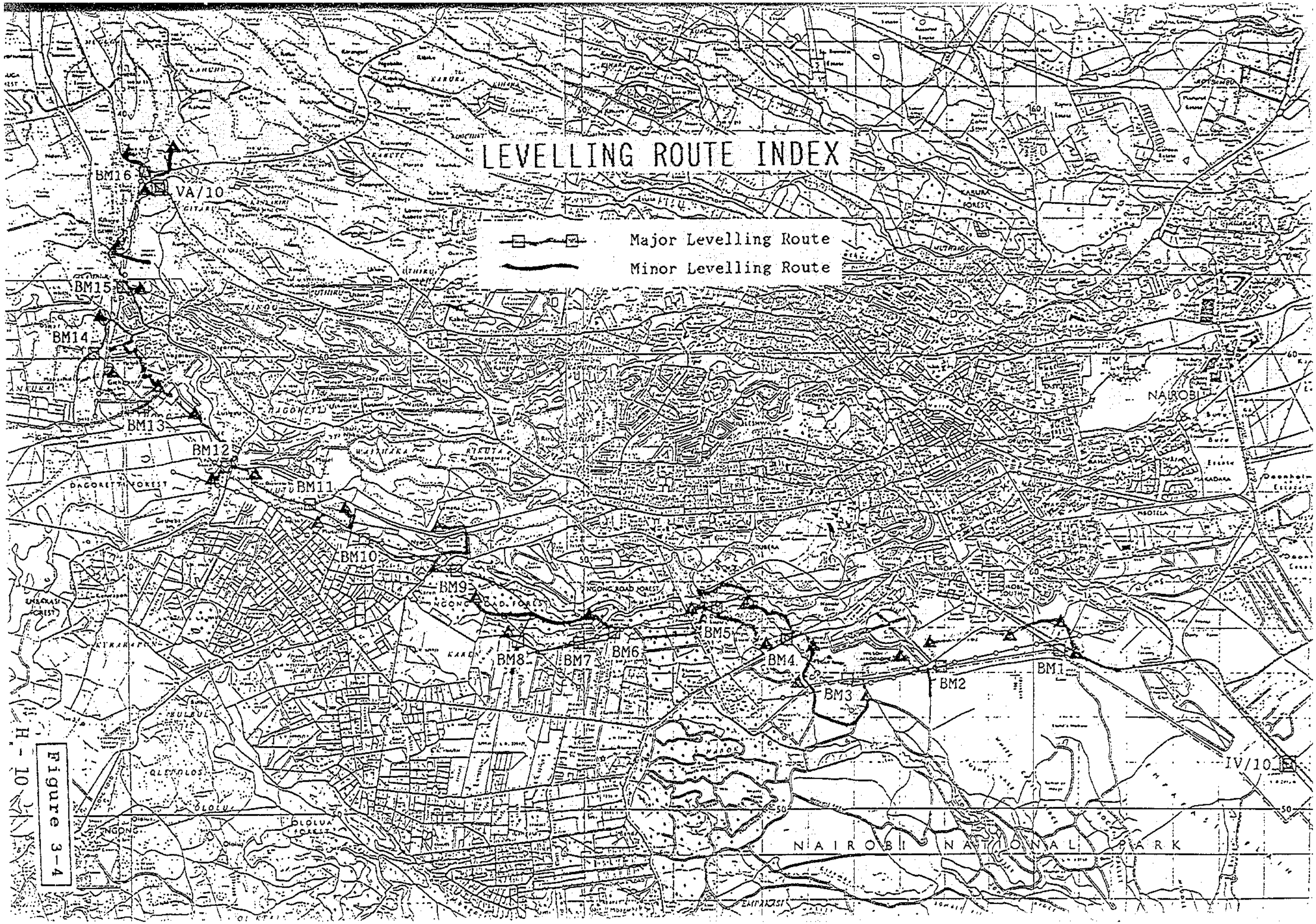

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Figure 3-4