

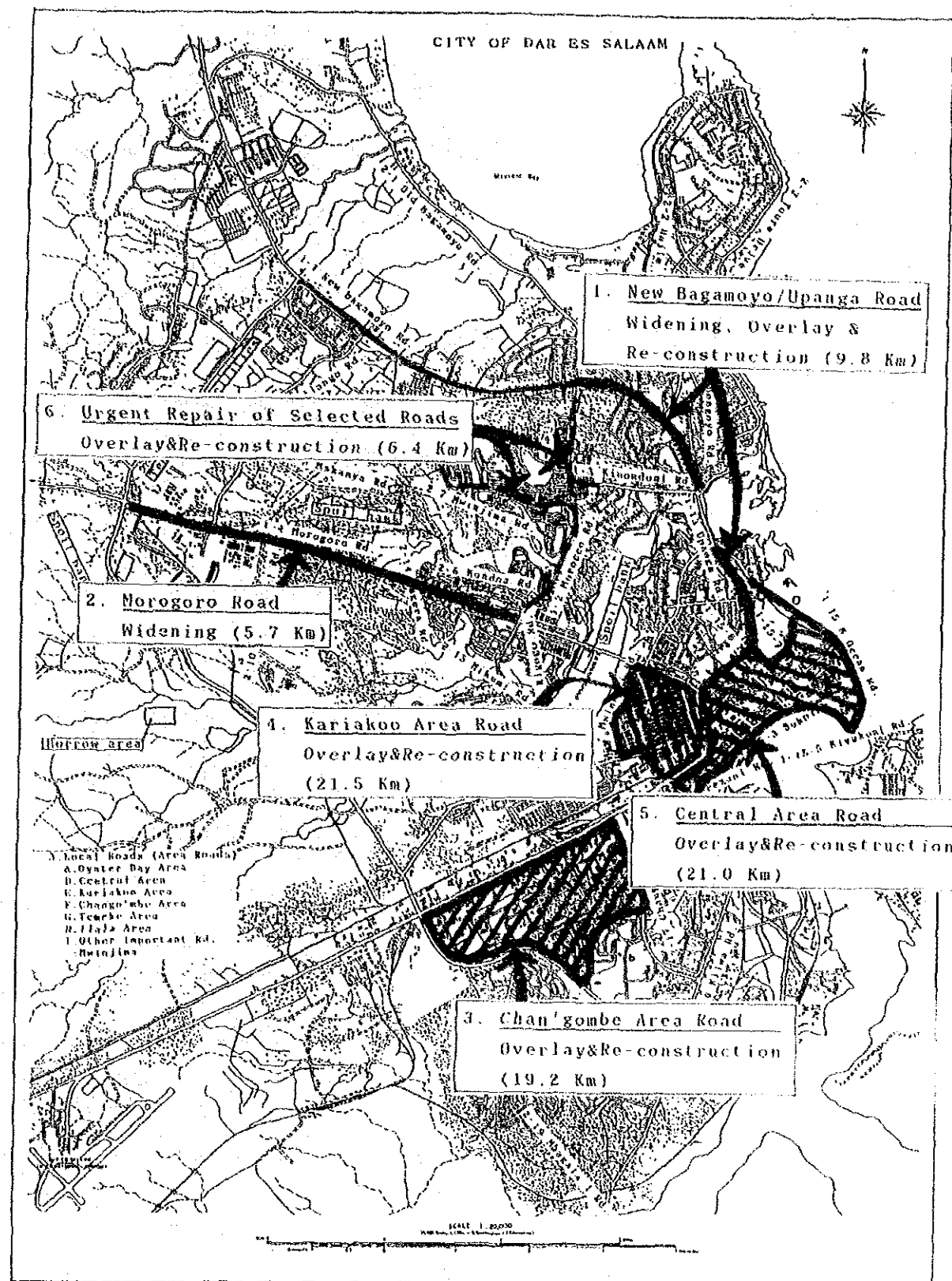
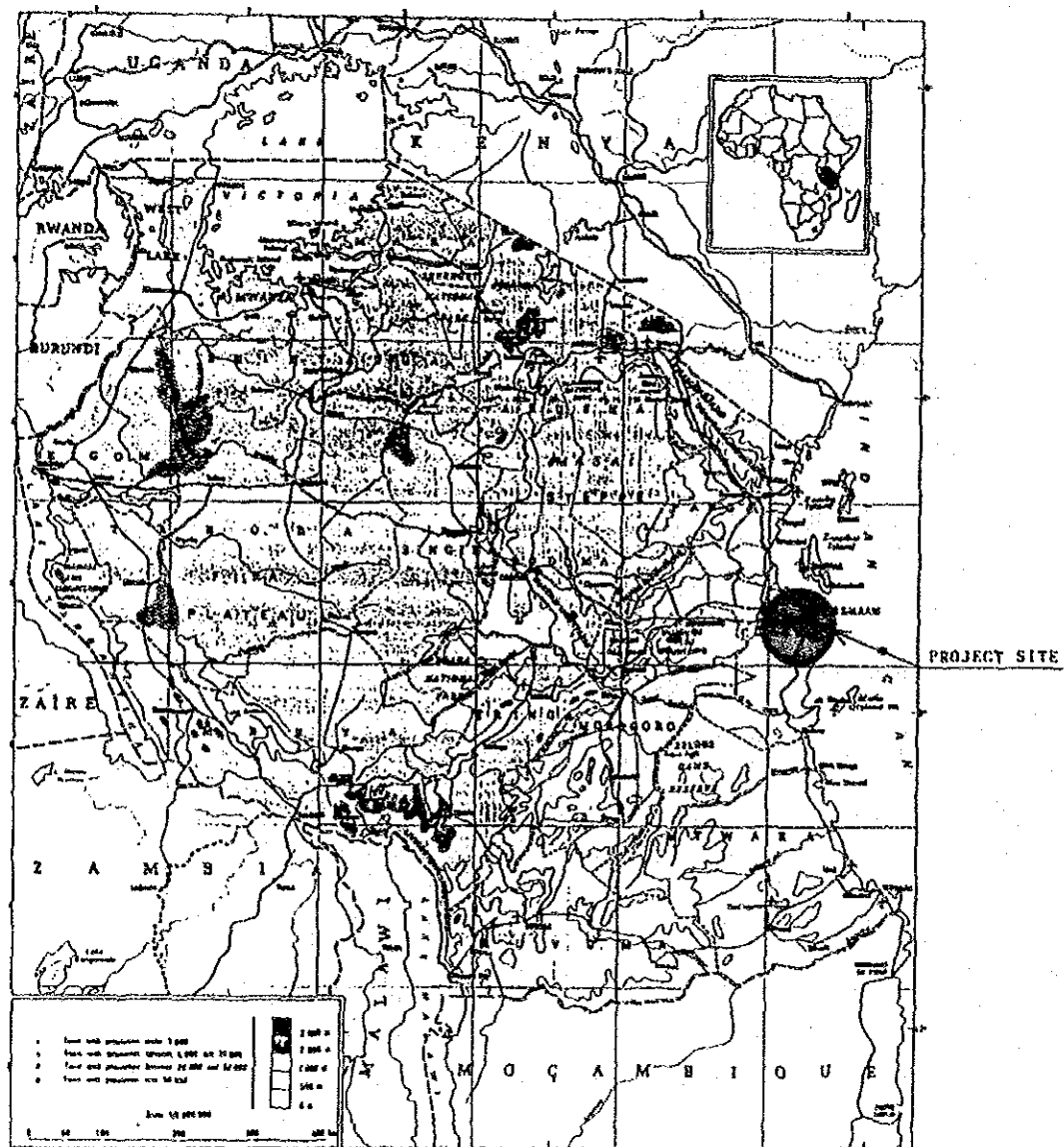
### 5.3.12 Basic Design Drawings

Basic design drawings are presented as follows:

<u>Basic Design of Road Structures</u>	<u>Drawing No.</u>
1. Location Map	No. 1
2. Typical Cross Sections of Area Road	No. 2
3. Central Area Roads	No. 3(1)-3(3)
4. Kariakoo Area Roads	No. 4
5. Chan'gombe Area Roads	No. 5
6. Morogoro Road	
6.1 Plan & Profile	No. 6(1)-6(5)
6.2 Typical Cross Section	No. 6(6)
7. Upanga Road	
7.1 Plan & Profile	No. 7(1)
7.2 Typical Cross Section	No. 7(2)
8. New Bagamoyo Road	
8.1 Plan & Profile	No. 8(1)-(2)
8.2 Typical Cross Section	No. 8(3)
8.3 Overlay and Reconstruction	No. 8(4)

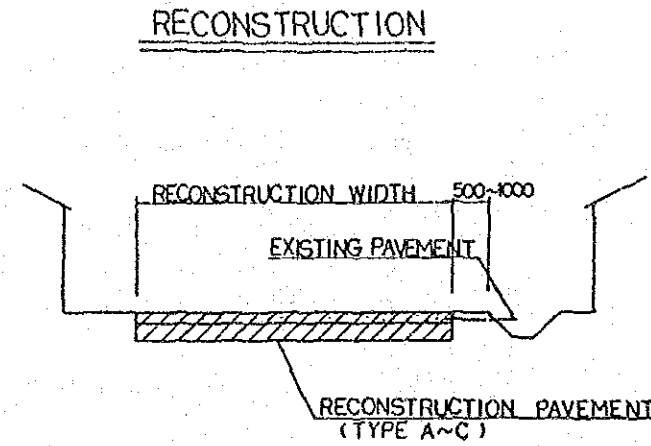
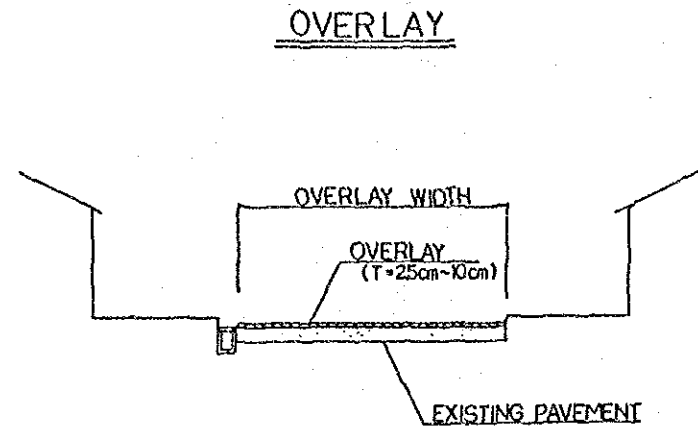
Other major structures including Manzese Bus Bay, Tanganyika Motor Roundabout, Pedestrian Bridge, Lighting Facilities, Intersections, Drainage Structures, Relocation Plan of Utilities, etc are presented in the Appendix 5.5 of this Report.

# LOCATION MAP

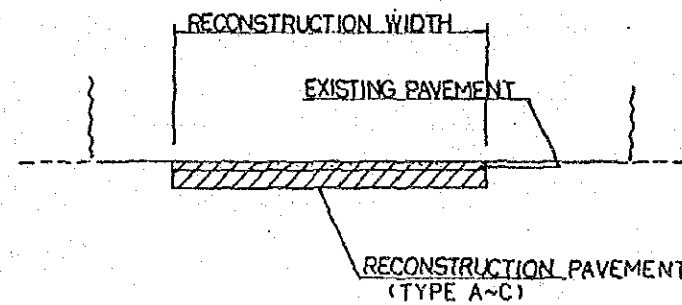
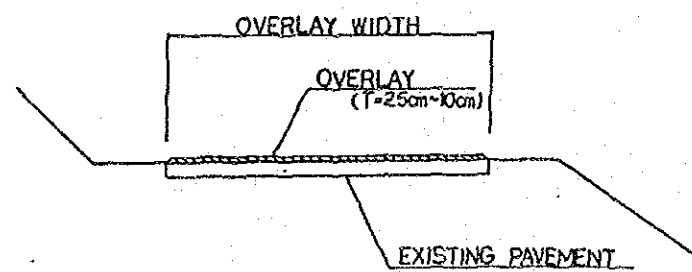
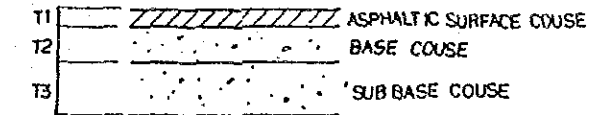


1. AREA ROAD GROUPS TO BE IMPROVED BY OVERLAY AND RECONSTRUCTION

TYPICAL CROSSSECTION OF OVERLAY AND RECONSTRUCTION



PAVEMENT STRUCTURE OF RECONSTRUCTION



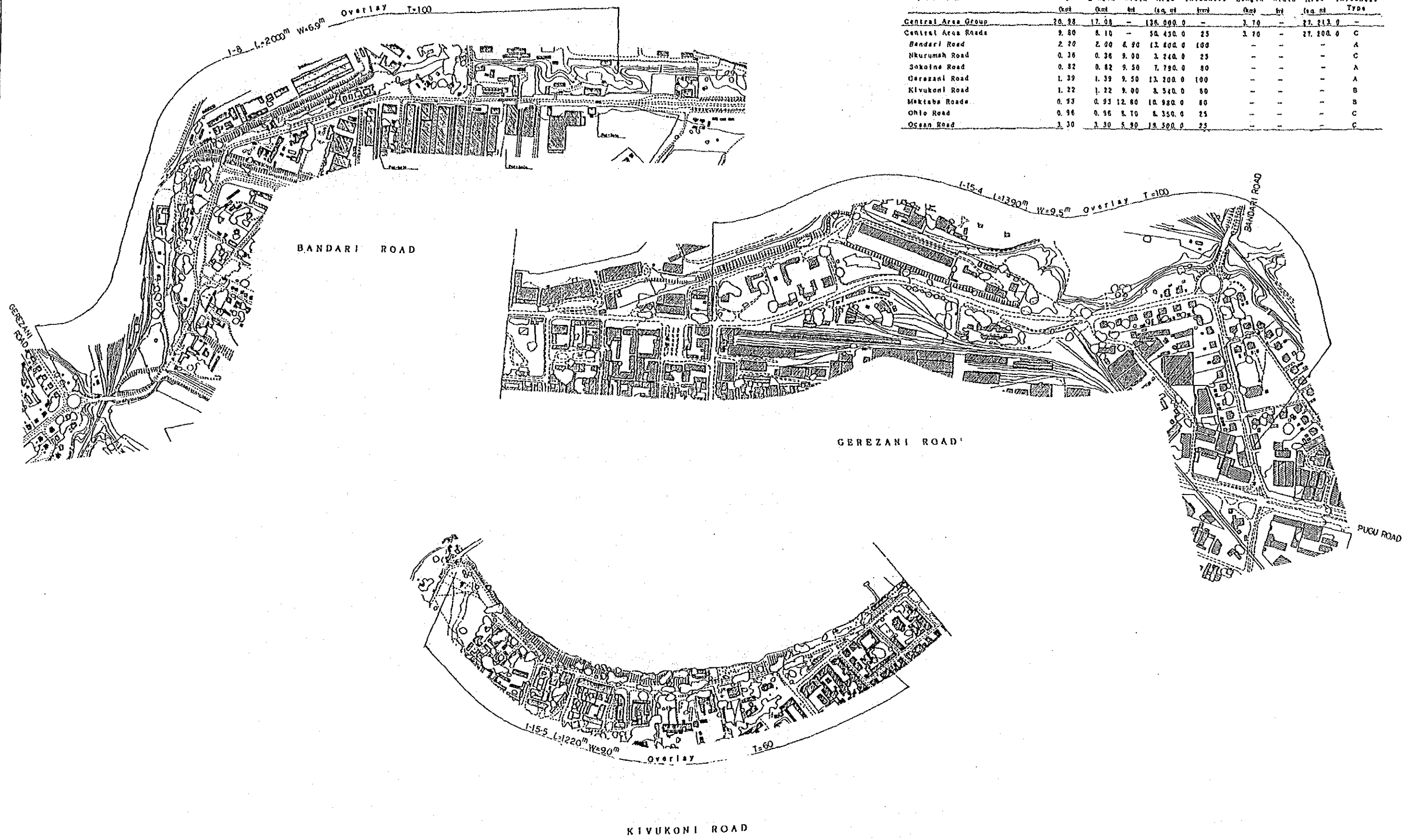
NAME OF EACH COURSES	THICKNESS TYPE (cm)		
	A	B	C
T1	10	7	5
T2	20	20	15
T3	30	30	25



# CENTRAL AREA ROADS GROUP TO BE IMPROVED (2)

Quantities of overlay and reconstruction

Name of Roads	Road Length (Kmt)	Overlay			Reconstruction				
		Length (Kmt)	Width (ft)	Area (sq. mt)	Length (Kmt)	Width (ft)	Area (sq. mt)	Thickness (mm)	
Central Area Group	20.38	17.08	-	136,000.0	-	3.79	-	27,213.9	-
Central Area Roads	9.80	8.10	-	50,430.0	25	3.70	-	27,200.0	C
Bandari Road	2.20	2.00	8.90	12,800.0	100	-	-	-	A
Nkurumsh Road	0.36	0.36	9.00	3,240.0	25	-	-	-	C
Sokoins Road	0.82	0.82	9.50	7,790.0	80	-	-	-	A
Gerezani Road	1.39	1.39	9.50	13,200.0	100	-	-	-	A
Kivukoni Road	1.22	1.22	9.00	8,540.0	80	-	-	-	B
Maktabs Roads	0.93	0.93	12.80	10,980.0	80	-	-	-	B
Ohio Road	0.96	0.96	8.70	8,350.0	25	-	-	-	C
Ocean Road	3.30	3.30	5.90	19,500.0	25	-	-	-	C



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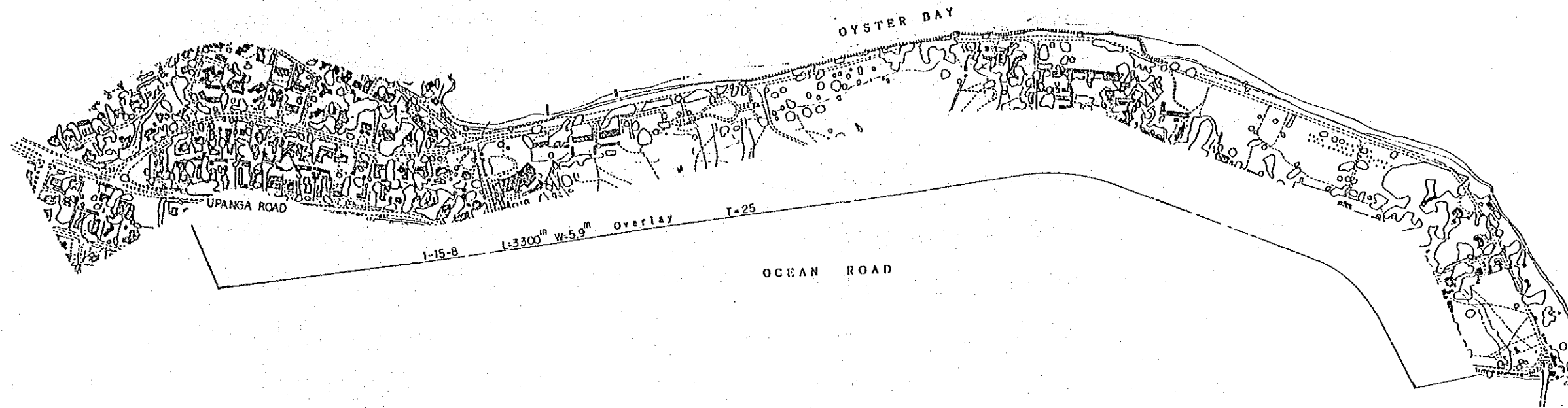
JAPAN INTERNATIONAL  
COOPERATION AGENCY

CENTRAL AREA ROADS GROUP(2)  
OVERLAY AND RECONSTRUCTION.

DATE  
MARCH,  
1991

DRAWING NO  
3(2)

CENTRAL AREA ROADS GROUP TO BE IMPROVED (3)



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JAPAN INTERNATIONAL  
COOPERATION AGENCY

CENTRAL AREA ROADS GROUP(3)  
DATE  
MARCH, 1991  
OVERLAY AND RECONSTRUCTION.

DRAWING NO.  
3(3)

# KARIAKOO AREA ROADS GROUP TO BE IMPROVED



I-3 Quantity of overlay and reconstruction

Link No.	Name of Roads	Overlay				Reconstruction		Type	Re-installation of existing drainage
		Length (km)	Length (km)	Width (m)	Thickness (mm)	Length (km)	Width (m)		
E Kariakoo Area Local Road									
E-5	Twiga Street	0.50	-	-	-	0.50	5.00	C	-
E-12	Kariakoo Street	0.88	0.00	0.00	0	0.88	5.00	C	-
E-15	Mkwana Street	0.89	0.00	-	-	0.89	5.50	C	140
E-17	Tandani Street	1.06	0.00	-	-	1.06	5.00	C	1,060
E-18	Mwanga'she Street	1.06	0.00	-	-	1.06	5.00	C	-
E-20	Mubanda Street	0.55	0.00	-	-	0.55	5.00	C	-
E-22	Mukhichi Street	0.73	0.00	-	-	0.73	5.00	C	-
E-23	Aggrey Street	1.07	0.00	-	-	1.07	5.00	C	-
E-25	Ukara Street	1.20	0.70	8.20	90	0.00	-	-	-
E-26	Kipata Street	0.69	0.00	-	-	0.69	5.00	C	-
E-29	Kiwana Street	0.70	0.00	-	-	0.70	5.00	C	100
E-30	Mbaraka Street	0.38	0.00	-	-	0.38	5.50	C	-
E-31	Kisaraka Street	0.66	0.00	-	-	0.66	5.00	C	-
E-32	Vivanda Street	0.58	0.00	-	-	0.58	5.00	C	-
E-33	Luwaba Street	1.20	0.00	-	-	0.00	-	-	-
E-37	Livingstone Street	1.32	1.32	6.00	90	0.00	-	-	-
E-41	Sikukuu Street	1.46	0.00	-	-	1.46	6.50	C	-
E-41-1	Swahili Street	0.72	0.00	-	-	0.72	7.50	C	-
E-41-2	Swahili Street	0.75	0.00	-	-	0.75	6.50	C	-
E-45-1	Wanyawazi Street	0.76	0.00	-	-	0.76	6.50	C	-
E-45-2	Wanyawazi Street	0.58	0.00	-	-	0.58	6.50	C	-
E-47-1	Kongo Street	0.63	0.00	-	-	0.63	6.00	C	-
E-47-2	Kongo Street	0.36	0.00	-	-	0.36	5.50	C	-
E-47-3	Kongo Street	0.28	0.00	-	-	0.28	5.50	C	-
E-48	Jazwazi Street	0.59	0.69	-	-	0.59	6.50	C	-
E-51	Muheza Street	0.29	-	-	-	0.29	5.00	C	-
Sub Total		15.81	2.07	-	-	15.30	-	-	2,500

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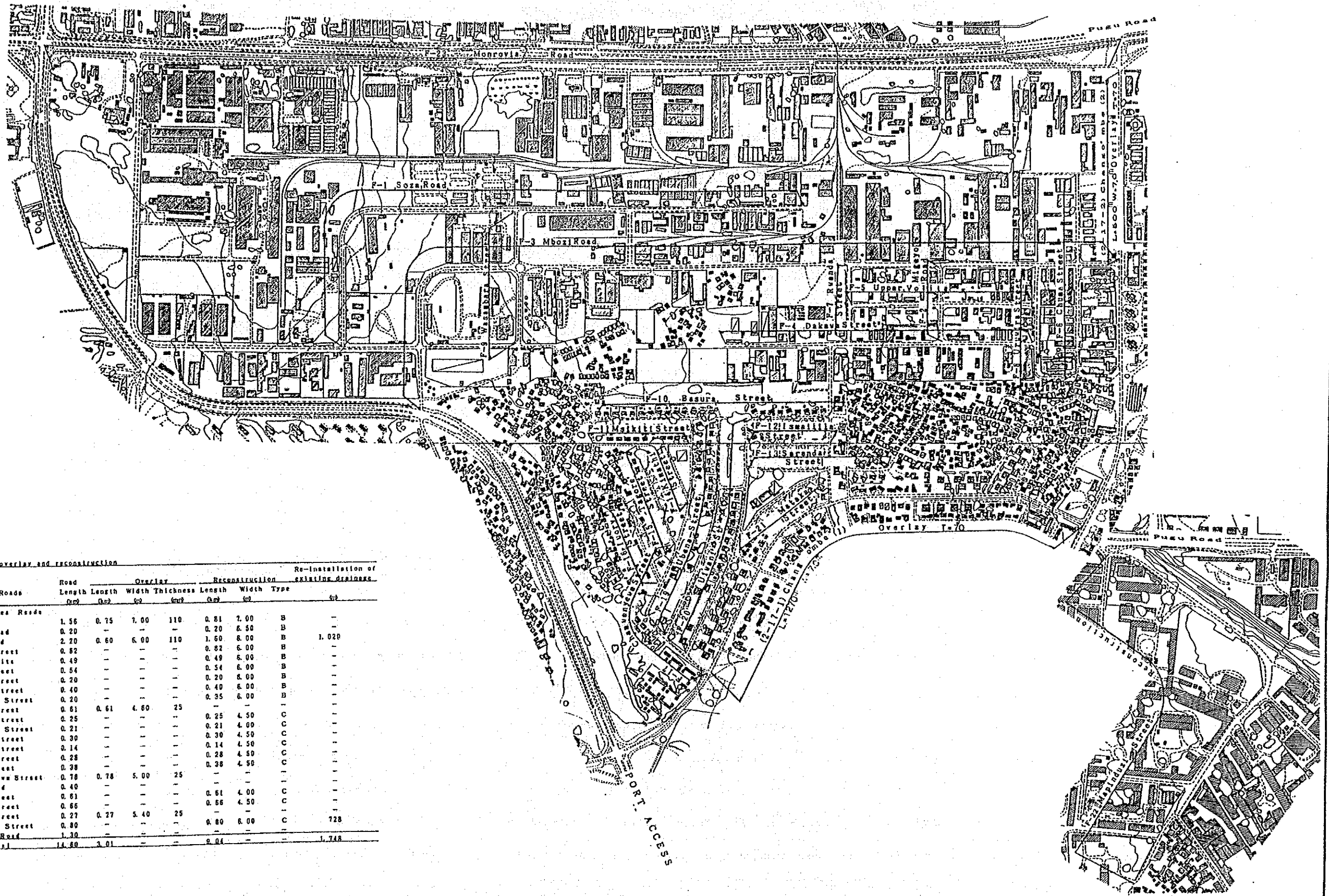
JAPAN INTERNATIONAL  
COOPERATION AGENCY

KARIAKOO AREA ROADS GROUP  
OVERLAY AND RECONSTRUCTION

DATE  
MARCH, 1991

SHEET NO.  
4

CHANGO' MBE AREA ROADS GROUP TO BE IMPROVED



1-5 Quantity of overlay and reconstruction

Link No.	Name of Roads	Overlay			Reconstruction		Type	Re-installation of existing drainage (m)	
		Length (m)	Width (m)	Thickness (cm)	Length (m)	Width (m)			
<b>F. Chango' MBE Area Roads</b>									
F-1	Soza Road	1.56	0.75	7.00	110	0.81	2.00	B	-
F-2	Mizayo Road	0.20	-	-	-	0.20	6.50	B	-
F-3	Mbozi Road	2.20	0.60	6.00	110	1.60	8.00	B	1.020
F-4	Dakawa Street	0.82	-	-	-	0.82	6.00	B	-
F-5	Upper Vitiya	0.49	-	-	-	0.49	6.00	B	-
F-6	Chaka Street	0.54	-	-	-	0.54	6.00	B	-
F-7	Ruvada Street	0.20	-	-	-	0.20	8.00	B	-
F-8	Uruvira Street	0.40	-	-	-	0.40	8.00	B	-
F-9	Wasuhara Street	0.20	-	-	-	0.35	6.00	B	-
F-10	Basura Street	0.61	0.61	4.60	25	-	-	C	-
F-11	Makiti Street	0.25	-	-	-	0.25	4.50	C	-
F-12	Isaillila Street	0.21	-	-	-	0.21	4.00	C	-
F-13	Sazada Street	0.30	-	-	-	0.30	4.50	C	-
F-14	Kisakibi Street	0.14	-	-	-	0.14	4.50	C	-
F-15	Tazara Street	0.28	-	-	-	0.28	4.50	C	-
F-16	Isary Street	0.38	-	-	-	0.38	4.50	C	-
F-17	Chawanyawa Street	0.78	0.78	5.00	25	-	-	C	-
F-18	Mzara Road	0.40	-	-	-	0.61	4.00	C	-
F-19	Ubuu Street	0.61	-	-	-	0.66	4.50	C	-
F-20	Uluani Street	0.66	-	-	-	0.66	4.50	C	-
F-21	Mutaba Street	0.27	0.27	5.40	25	-	-	C	728
F-22	Majidadi Street	0.80	-	-	-	0.80	8.00	C	-
F-23	Monrovia Road	1.30	-	-	-	-	-	-	-
<b>Total</b>		<b>14.80</b>	<b>3.01</b>			<b>9.04</b>			<b>1.748</b>

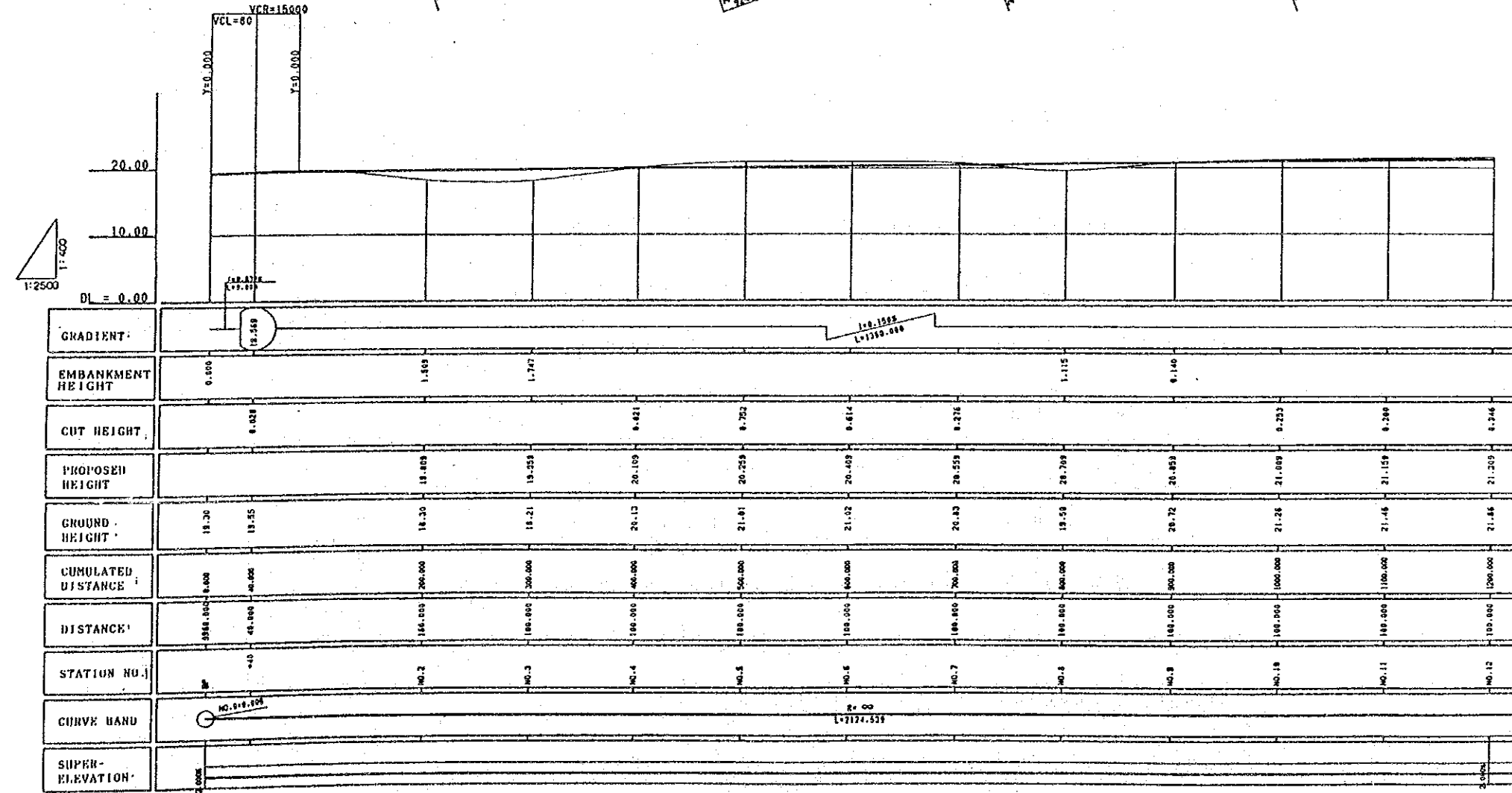
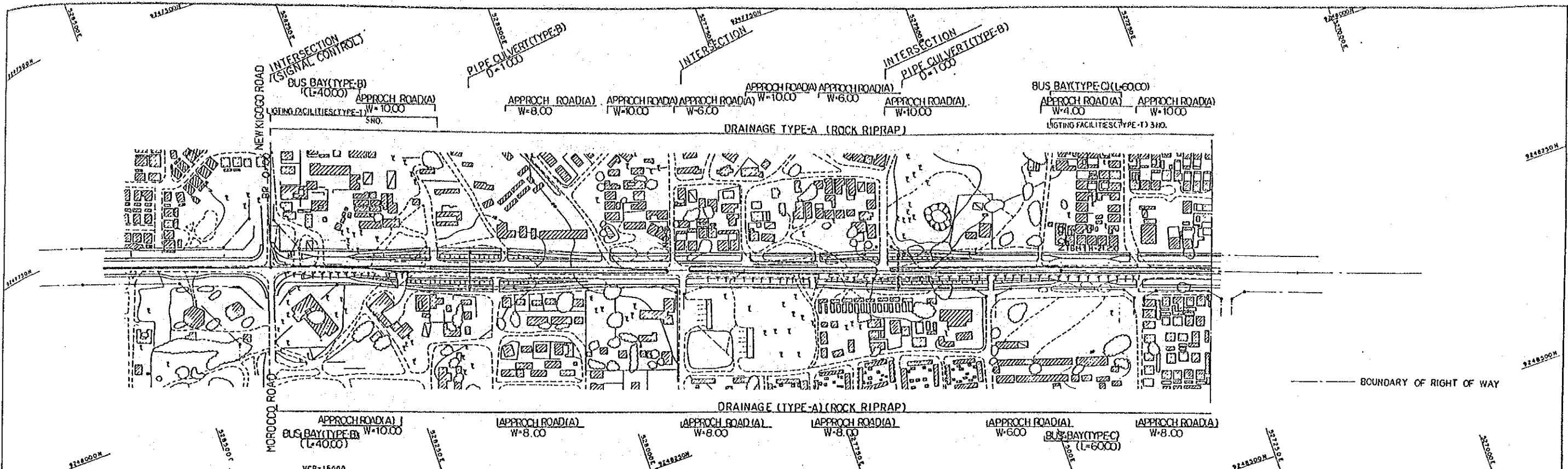
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CHANGO' MBE AREA ROADS GROUP	DATE	DRAWING NO
OVERLAY AND RECONSTRUCTION.	MARCH, 1981	5





GRADIENT	1:2500 DL = 0.00											
EMBANKMENT HEIGHT	0.000	1.503	1.747					1.115	0.140			
CUT HEIGHT	0.000			0.421	0.702	0.614	0.278			0.233	0.249	0.246
PROPOSED HEIGHT		18.403	19.253	20.103	20.253	20.403	20.553	20.703	20.853	21.003	21.153	21.303
GROUND HEIGHT	18.30	18.35	18.30	18.21	20.13	21.01	21.02	20.83	19.58	20.72	21.26	21.46
CUMULATED DISTANCE	0.000	40.000	164.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	1000.000	1200.000
DISTANCE	0.000	40.000	164.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	1000.000	1200.000
STATION NO.	0+0	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10	0+11	0+12
CURVE HAND												
SUPER-ELEVATION												

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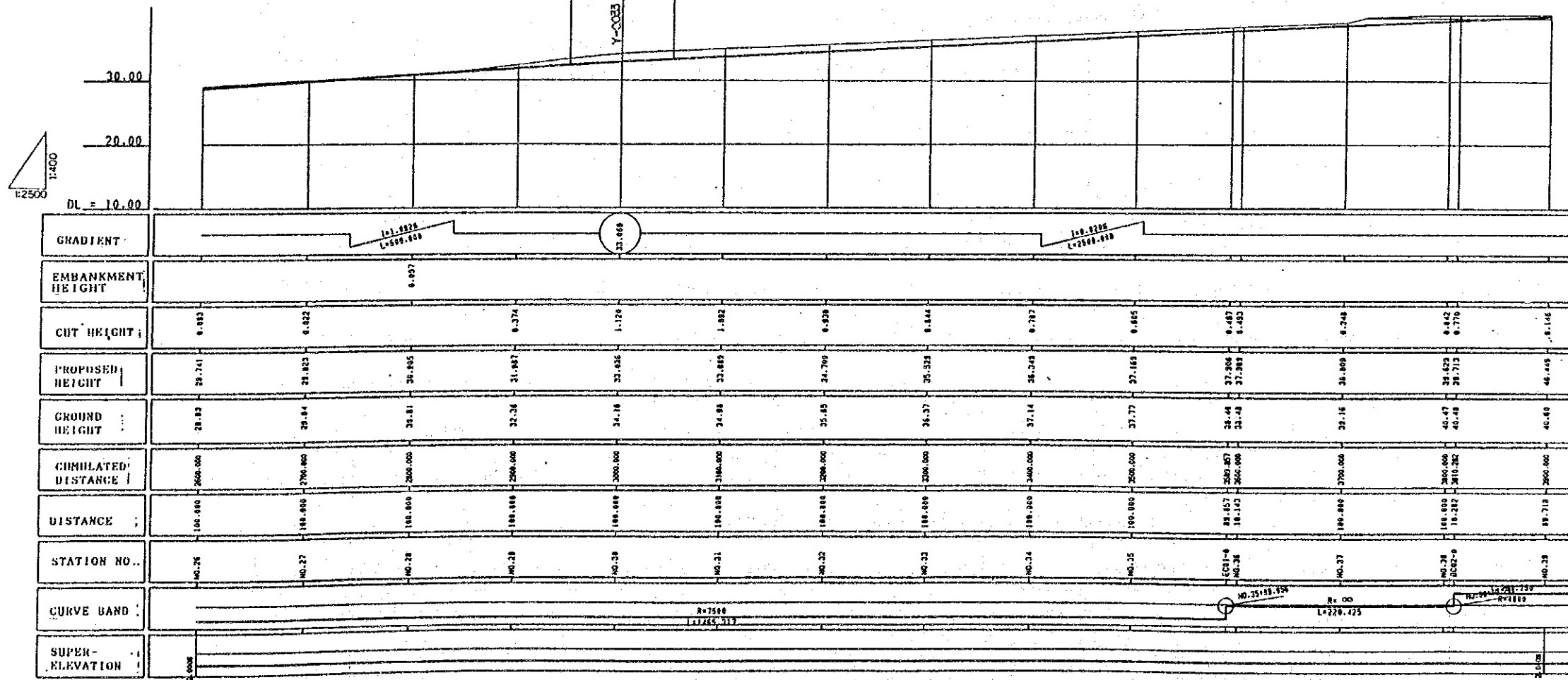
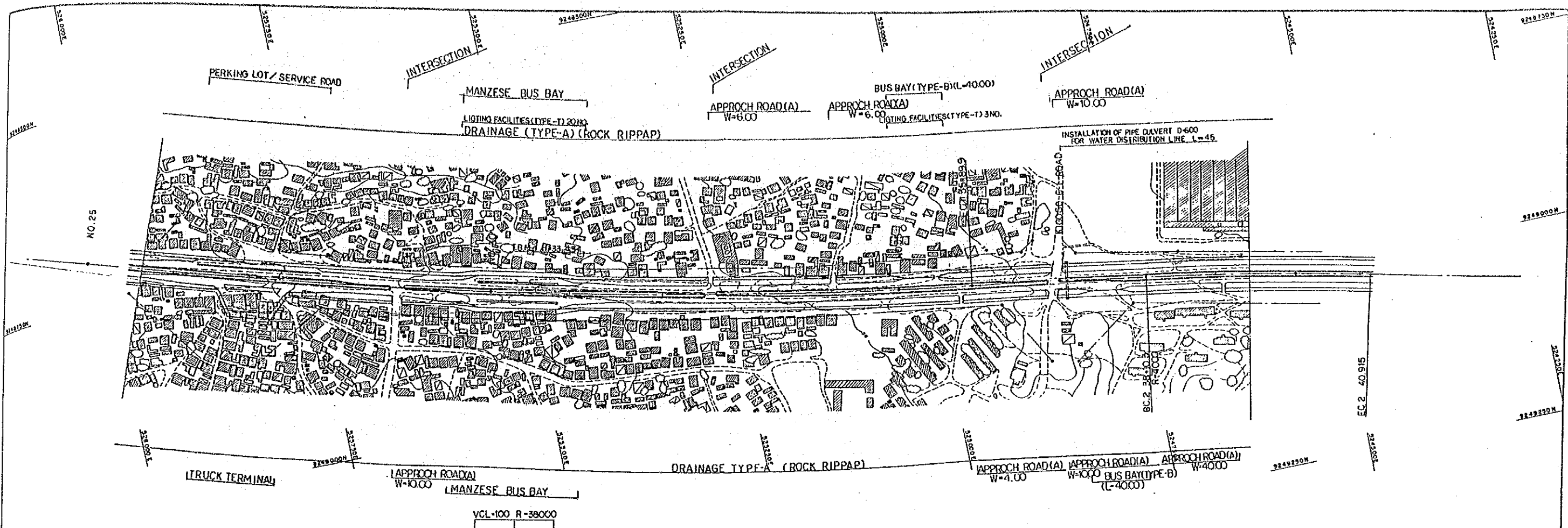
JAPAN INTERNATIONAL  
COOPERATION AGENCY

MOROGORO ROAD  
PLAN AND PROFILE (1)

DATE  
MARCH, 1991

SHEET NO  
6 (1)



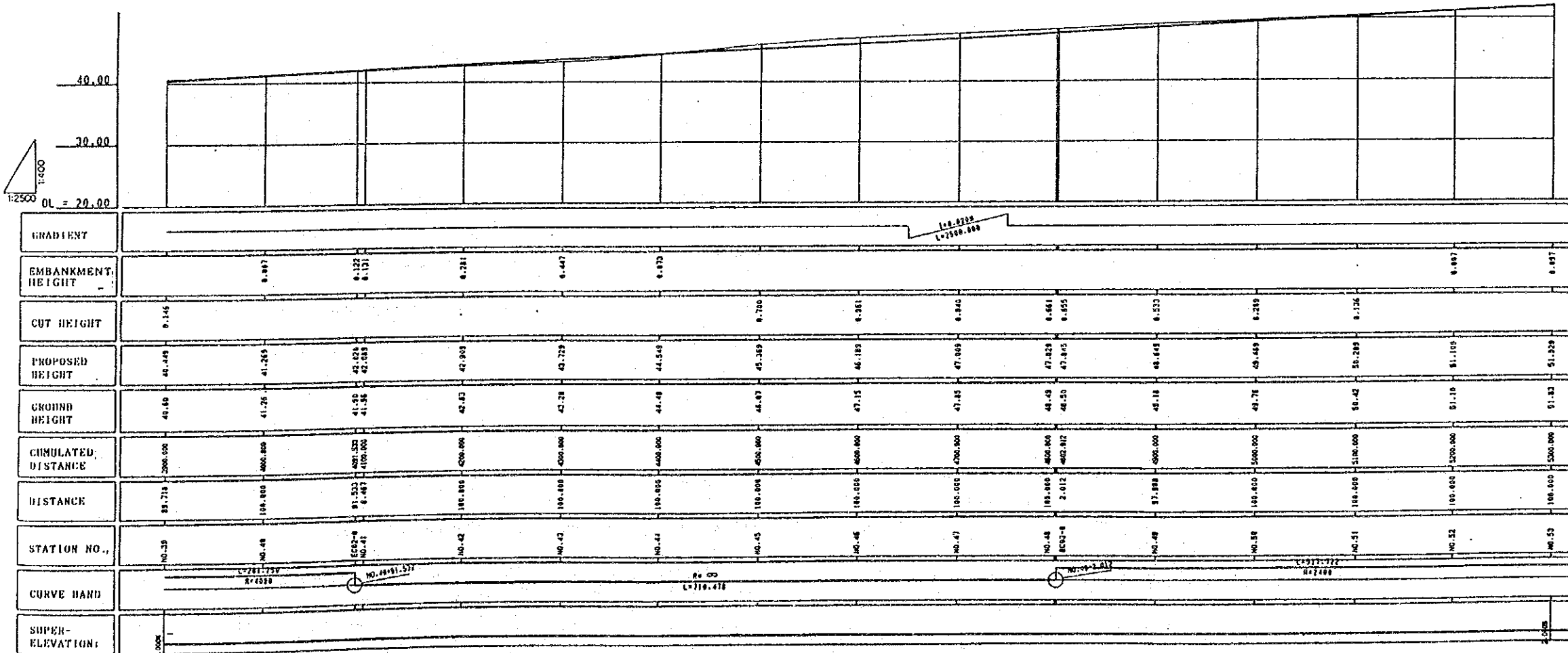
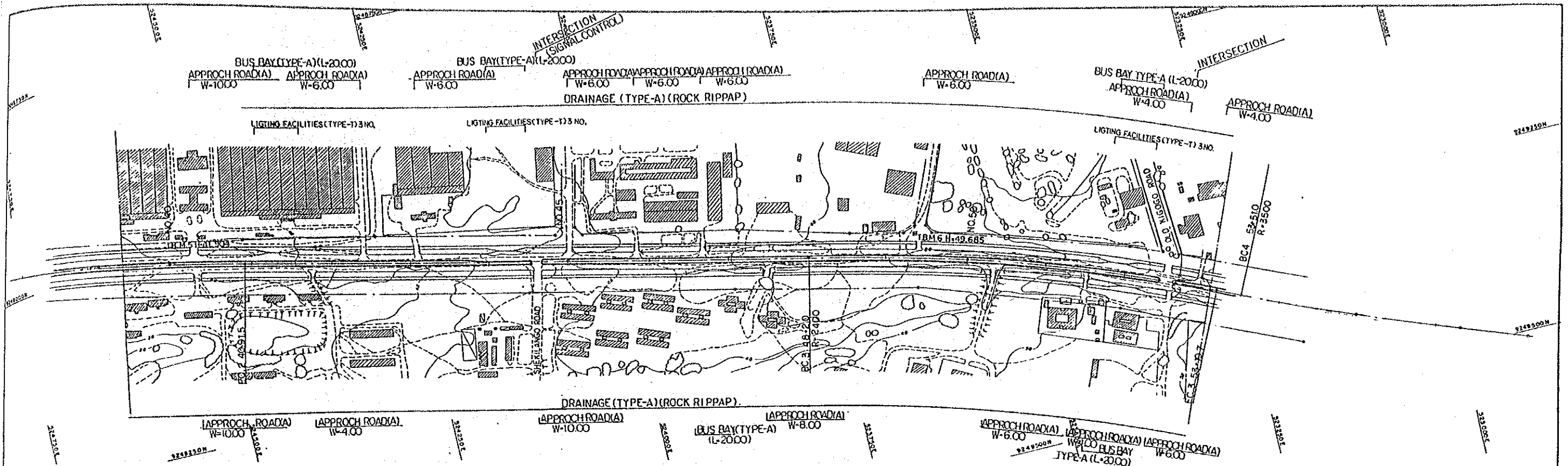


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MOROGORO ROAD  
PLAN AND PROFILE (3)  
DATE MARCH, 1991  
SHEET NO 6(3)



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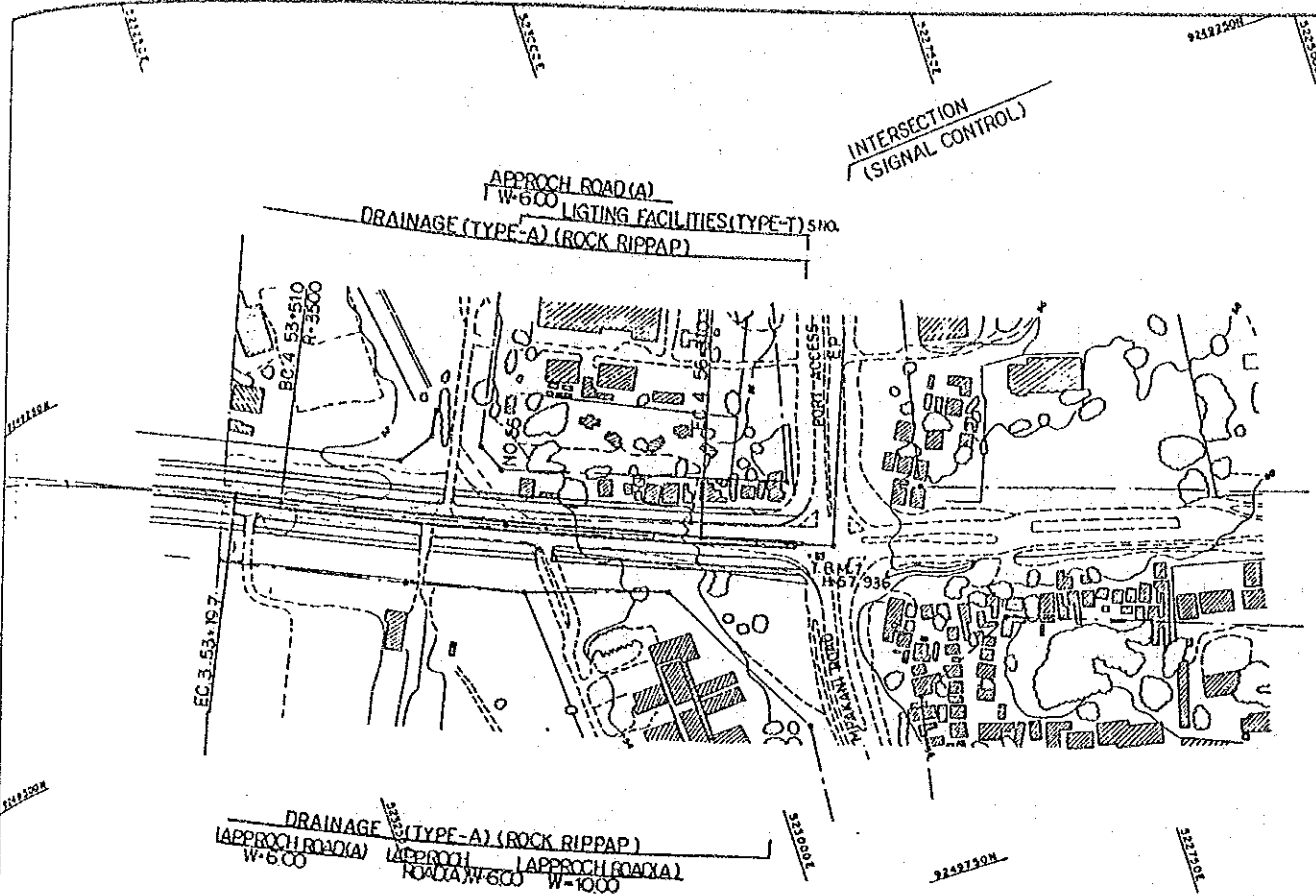
BASIC DESIGN STUDY  
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ROAD IMPROVEMENT AND MAINTENANCE IN DAR ES SALAAM

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MOROGORO ROAD  
PLAN AND PROFILE (4)

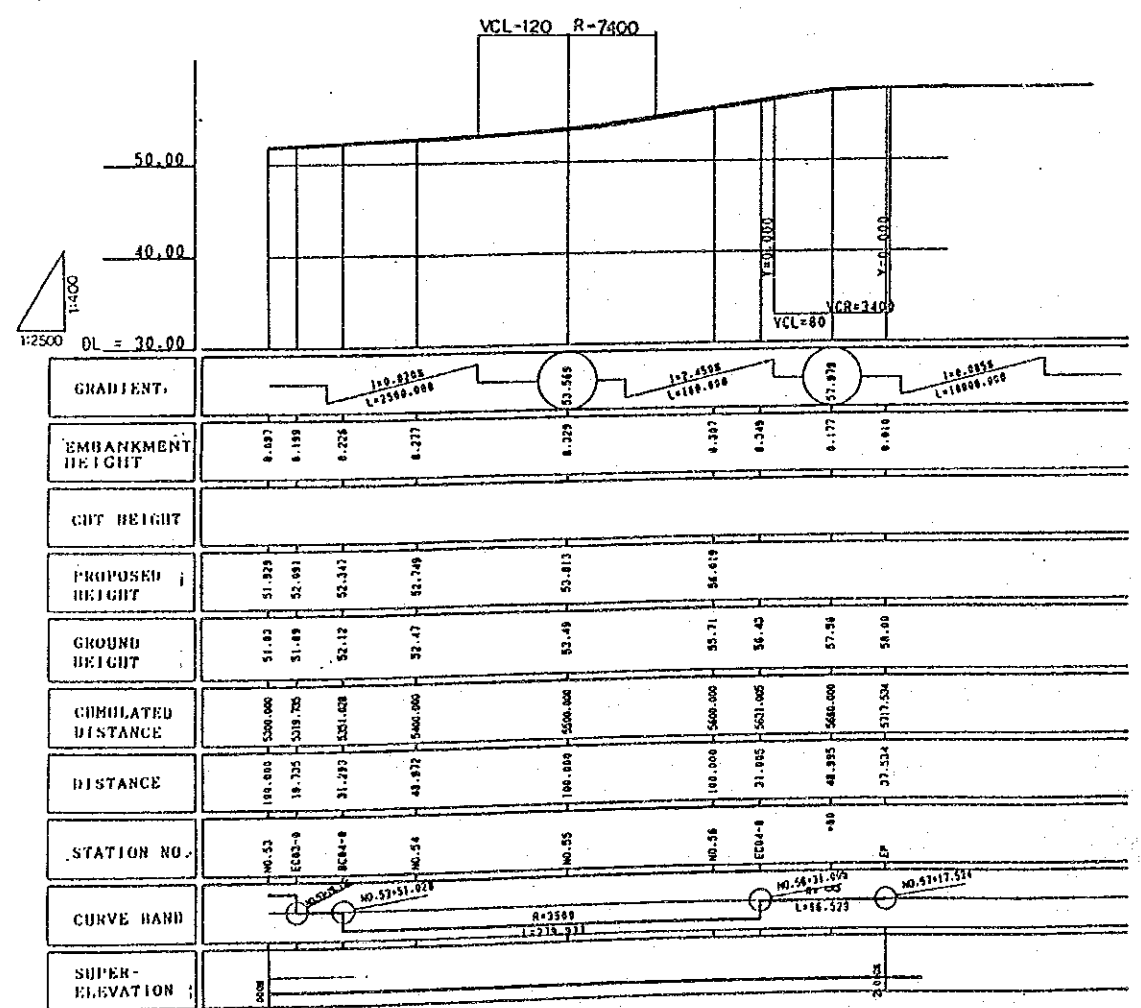
DATE  
MARCH, 1991

SHEET NO  
6(4)



LIST OF BENCH MARK  
MOROGORO ROAD

LOCATION	NO.	HEIGHT
0+30.0	T. B. M. 1	19.834
10+10.0	T. B. M. 2	21.250
20+20.0	T. B. M. 3	25.353
30+10.0	T. B. M. 4	33.434
40+20.0	T. B. M. 5	41.904
49+30.0	T. B. M. 6	49.685
57+10.0	T. B. M. 7	57.936



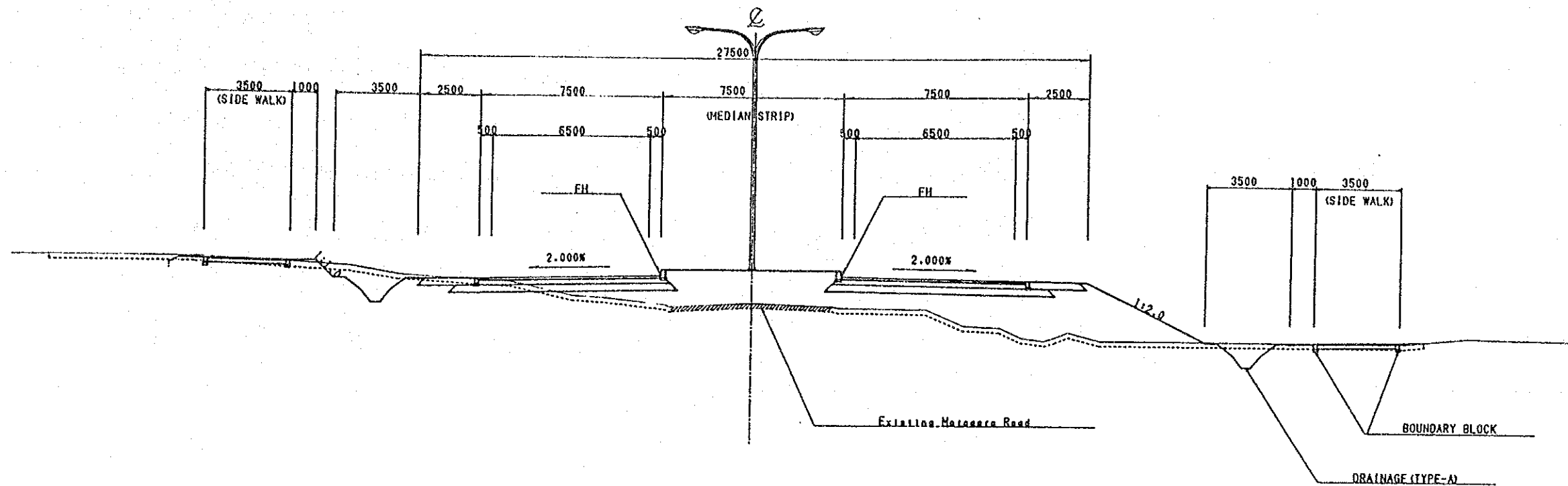
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MOROGORO ROAD	DATE	SHEET NO.
PLAN AND PROFILE (5)	MARCH, 1991	6(5)

TYPICAL CROSS SECTION OF MOROGORO ROAD S=1:100



PAVEMENT STRUCTURE  
S=1:10

CARRIAGEWAY

Asphaltic Surface Course	1=50	100
Binder course	1=50	100
Base course C.B.R. > 80%		200
Subbase Course C.B.R. > 30%		300
Subgrade C.B.R. 8%		

SIDE WALK

Asphaltic Surface Course		40
Base course C.B.R. > 80%		160

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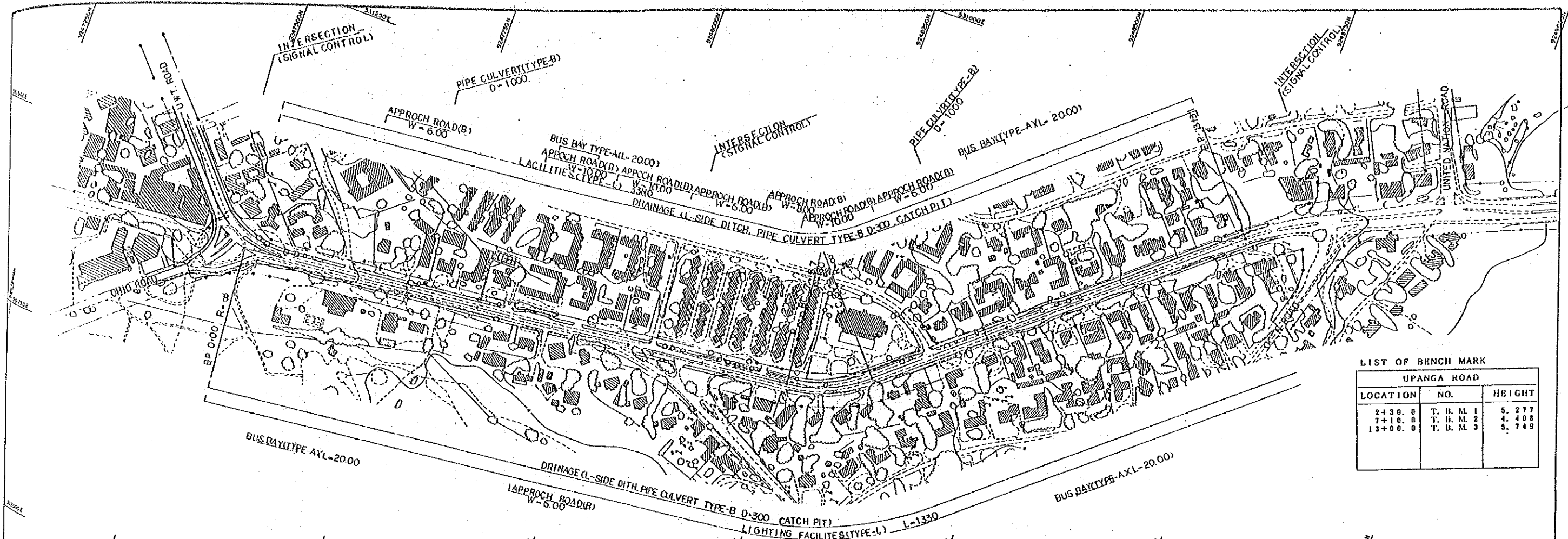
BASIC DESIGN STUDY  
ON  
ROAD IMPROVEMENT AND MAINTENANCE IN DARES SALAAM

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MOROGORO ROAD  
TYPICAL CROSS SECTION

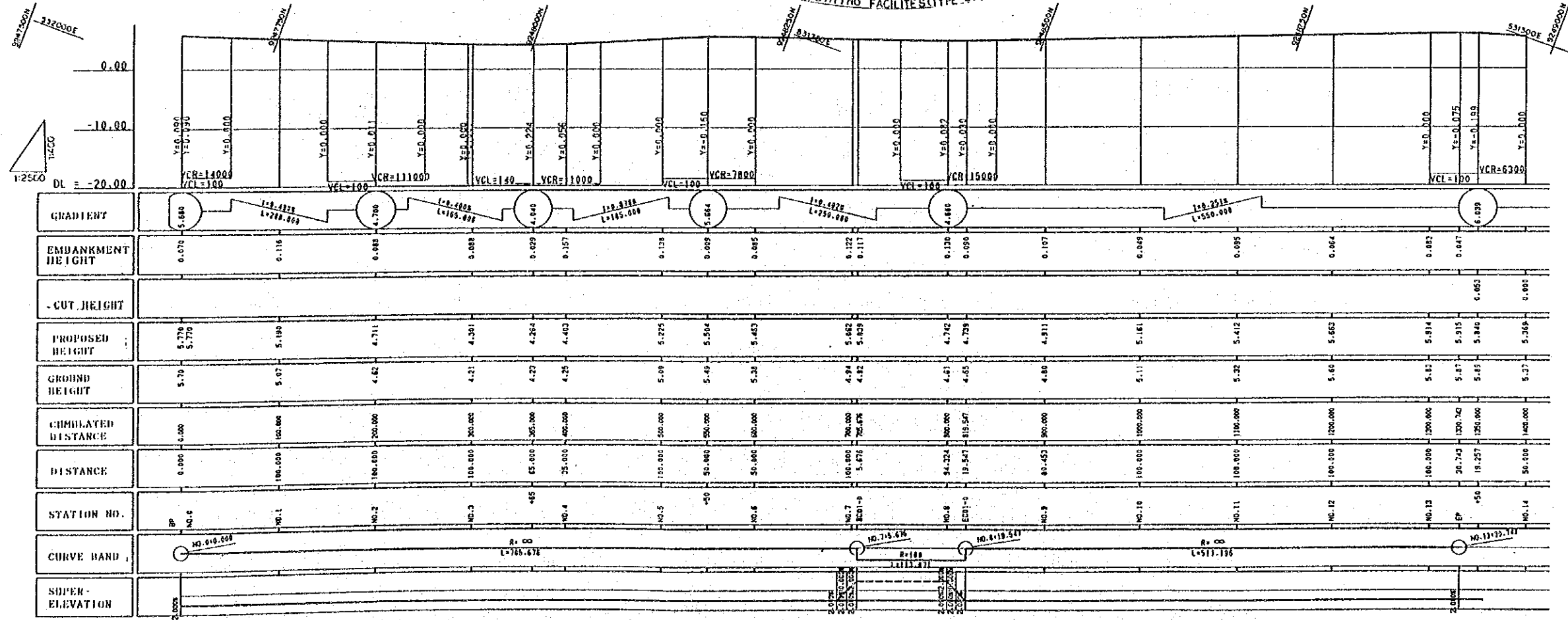
DATE  
MARCH, 1991

DRAWING NO.  
6(6)



LIST OF BENCH MARK  
UPANGA ROAD

LOCATION	NO.	HEIGHT
2+30.0	T. B. M. 1	5.277
7+10.0	T. B. M. 2	4.408
13+00.0	T. B. M. 3	5.749



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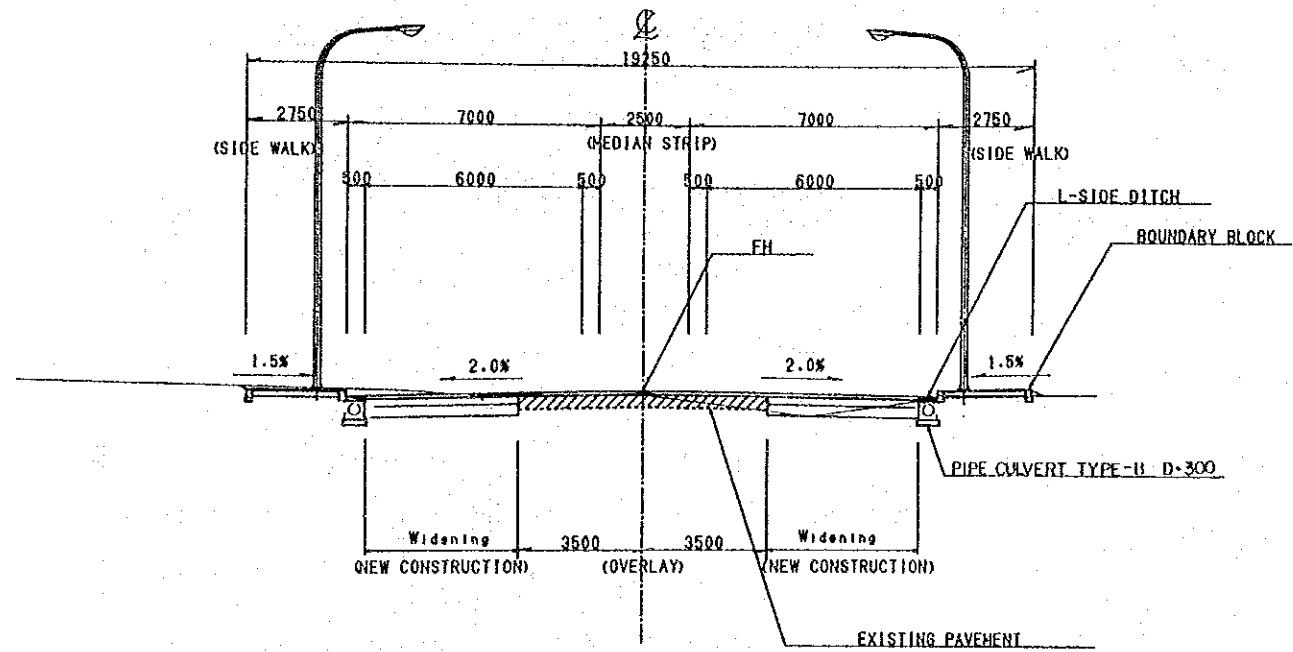
UPANGA ROAD  
PLAN AND PROFILE

DATE  
MARCH, 1991

SHEET NO.  
7(1)

# TYPICAL CROSS SECTIONS OF UPANGA ROAD

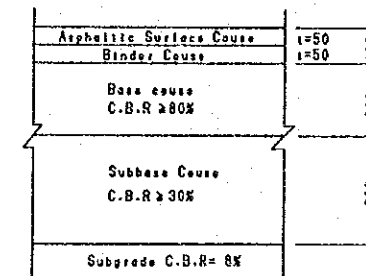
S=1:100



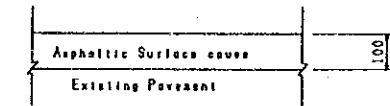
## PAVEMENT STRUCTURE S=1:10

### CARRIAGEWAY

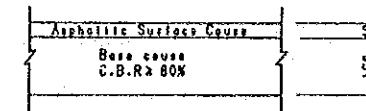
(NEW CONSTRUCTION)



(OVERLAY)



### SIDE WALK



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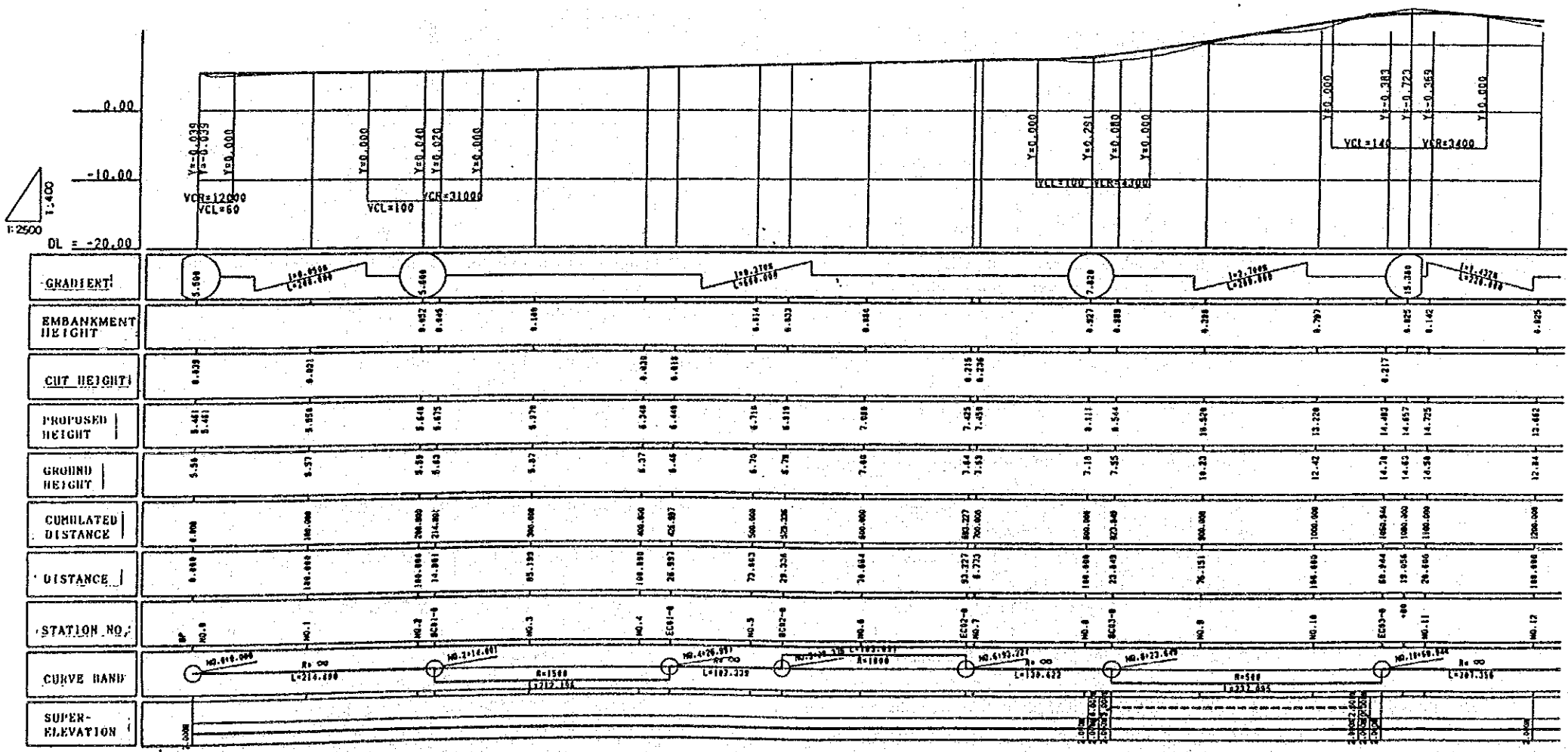
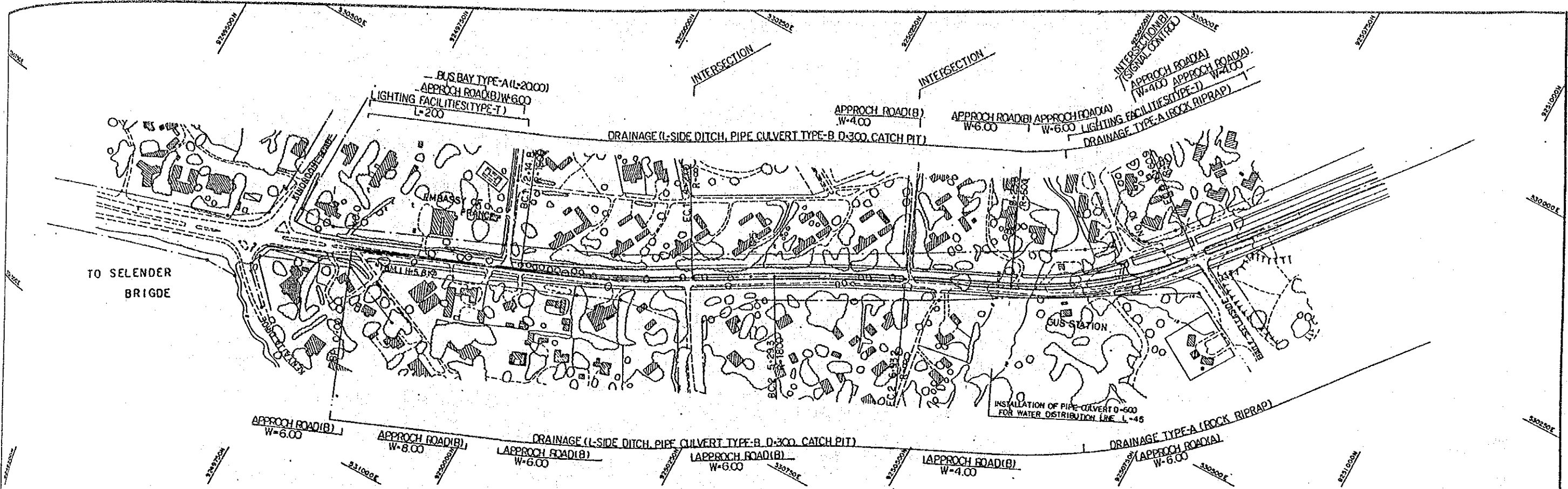
BASIC DESIGN STUDY  
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ROAD IMPROVEMENT AND MAINTENANCE IN DARES SALAAM

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UPANGA ROAD  
TYPICAL CROSS SECTION

DATE	SHEET NO.
MARCH, 1991	7(2)





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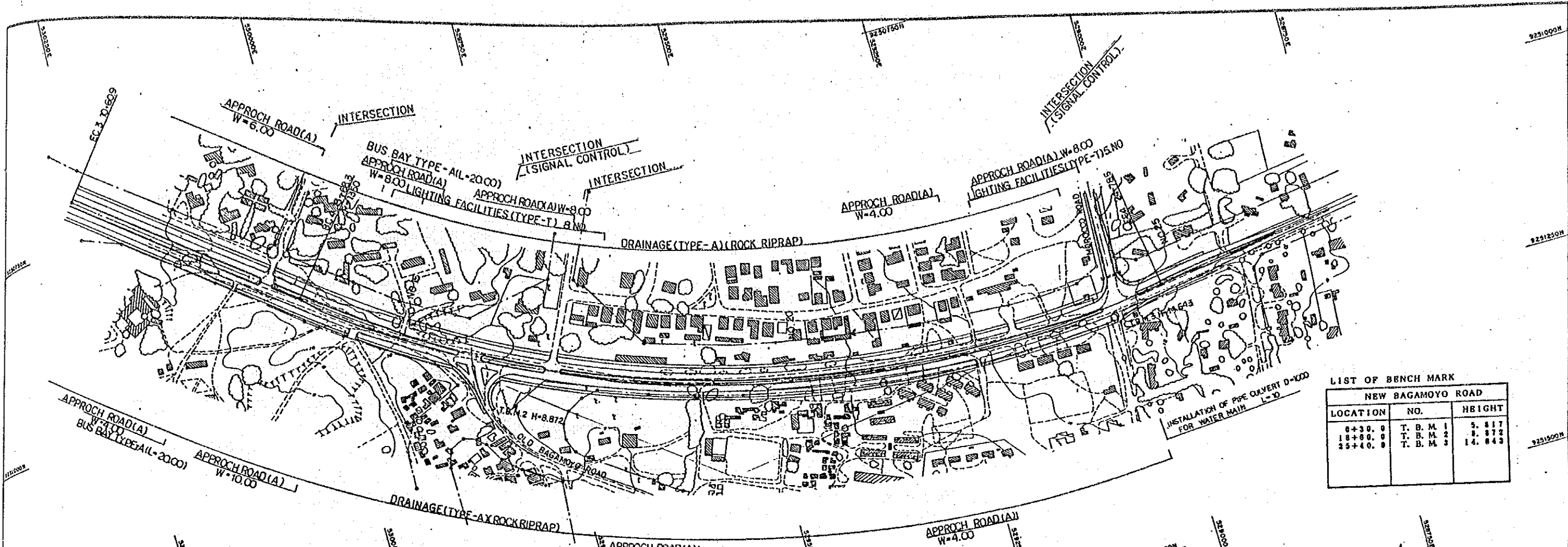
BASIC DESIGN STUDY  
ON  
ROAD IMPROVEMENT AND MAINTENANCE IN DAR ES SALAAM

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NEW BAGAMOYO ROAD  
PLAN AND PROFILE (1)

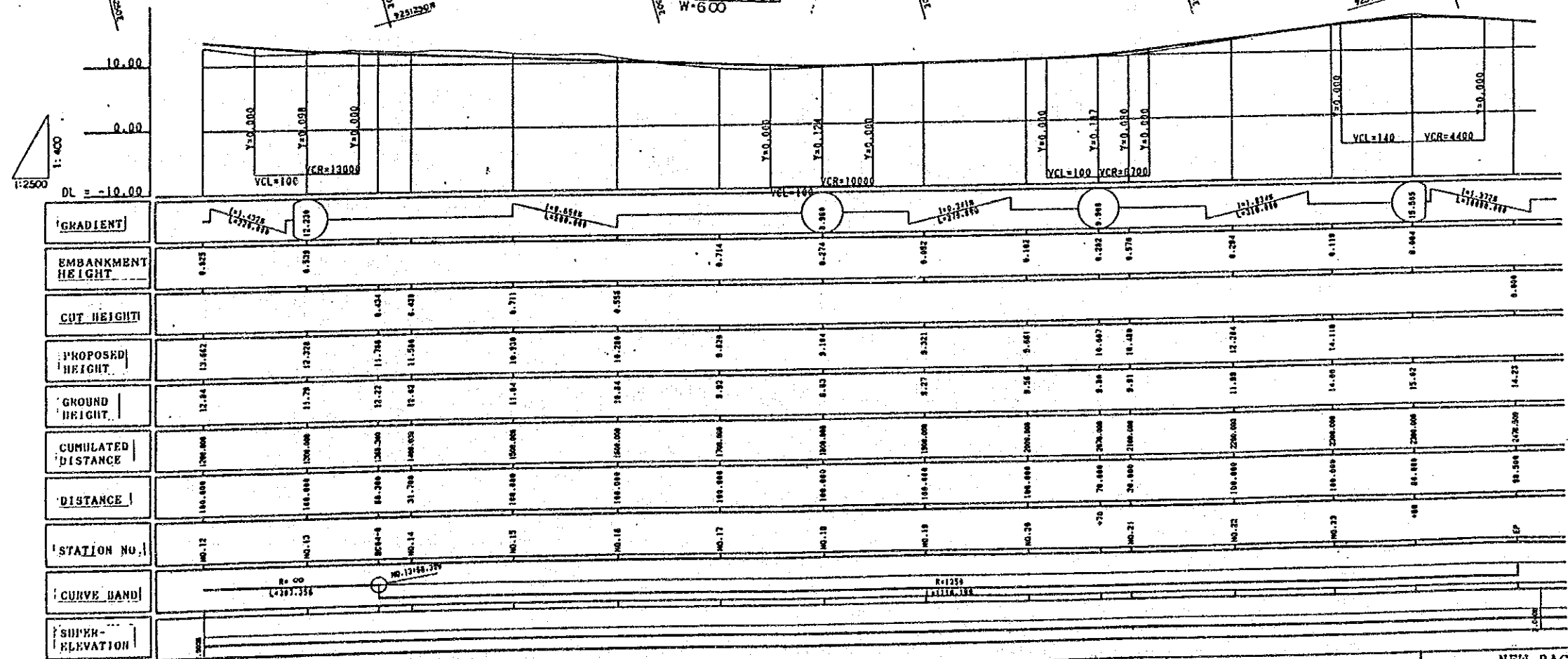
DATE  
MARCH,  
1991

SHEET NO.  
8(1)



LIST OF BENCH MARK  
NEW BAGAMOYO ROAD

LOCATION	NO.	HEIGHT
0+30.0	T. B. M. 1	5.817
18+60.0	T. B. M. 2	8.872
25+40.0	T. B. M. 3	14.843



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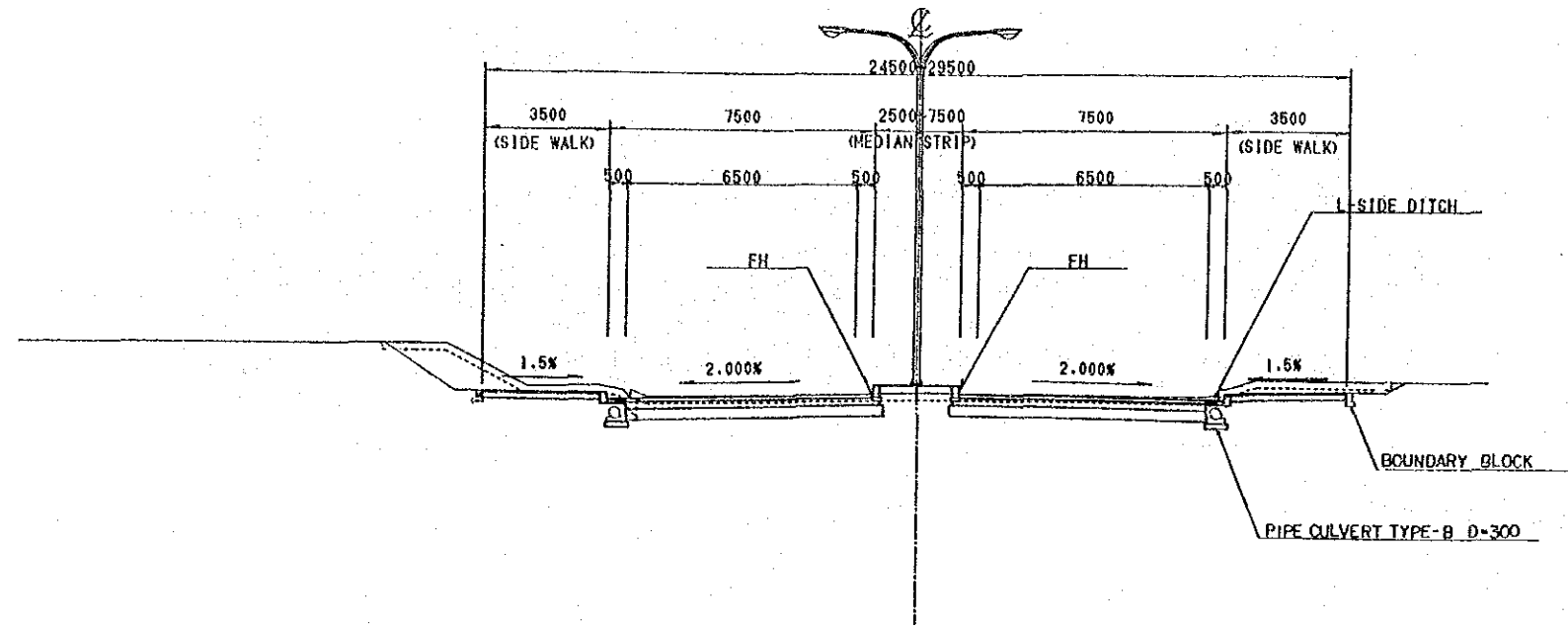
NEW BAGAMOYO ROAD  
PLAN AND PROFILE (2)

DATE  
MARCH, 1991

SHEET NO.  
8(2)

TYPICAL CROSS SECTIONS OF NEW BAGAMOYO ROAD  
S=1:100

(No. 0+00~No. 9+00)



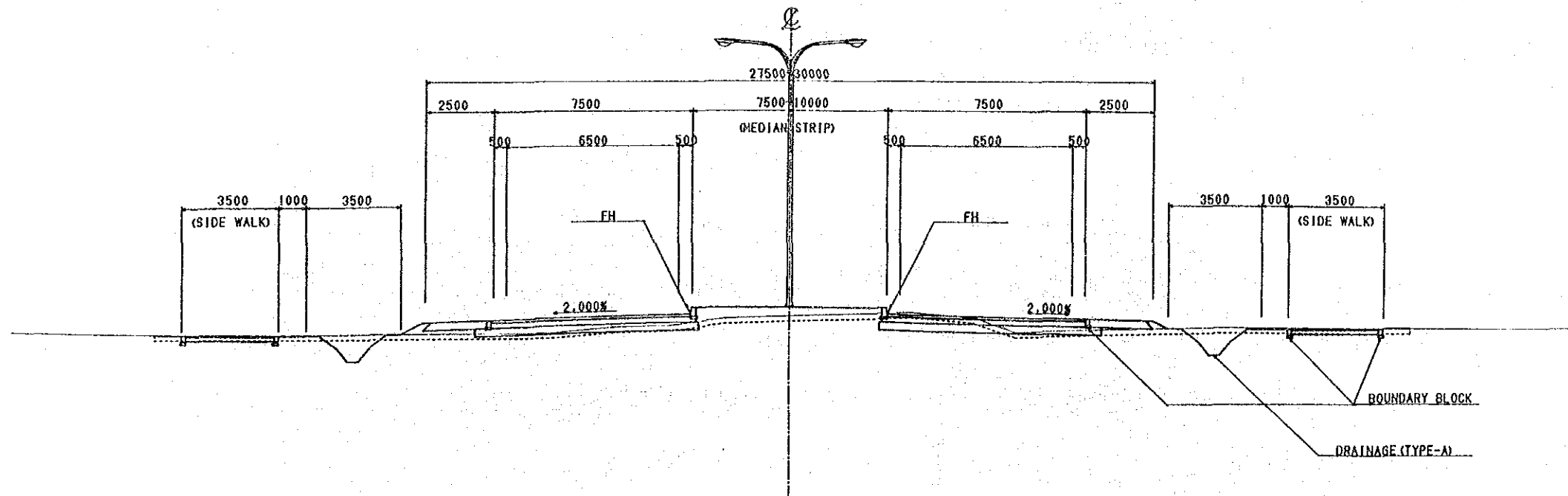
PAVEMENT STRUCTURE  
S=1:10

Asphaltic Surface Course	1=50	100
Binder Course	1=50	
Base course C.B.R ≥ 80%		200
Subbase Course C.B.R ≥ 30%		300
Subgrade C.B.R = 8%		

SIDE WALK

Asphaltic Surface Course		160
Base course C.B.R ≥ 80%		

(No. 9+00~25+00)



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JAPAN INTERNATIONAL  
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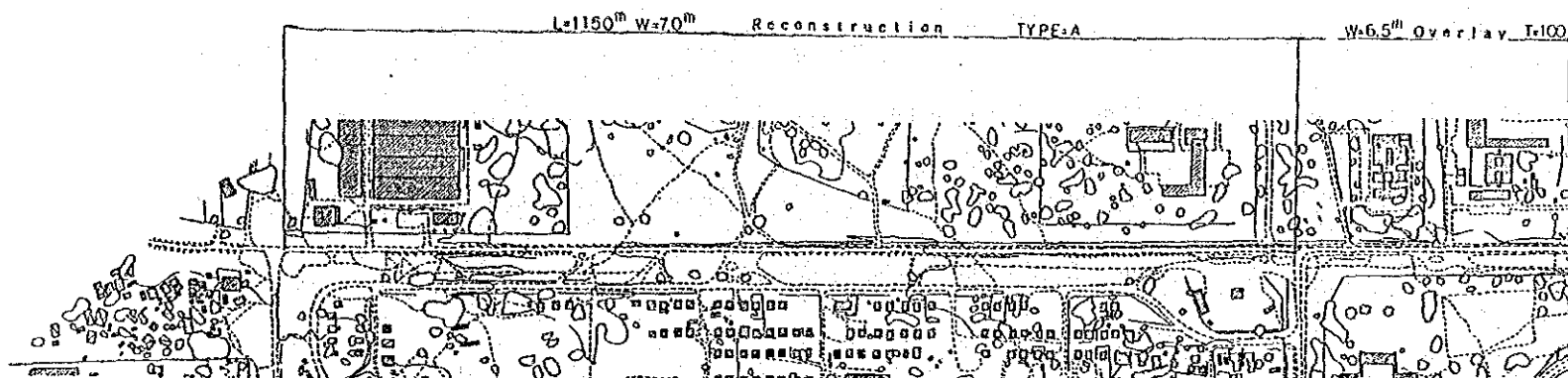
NEW BAGAMOYO ROAD  
TYPICAL CROSS SECTION

DATE	SHEET NO.
MARCH, 1981	8(3)

# NEW BAGAMOYO ROAD GROUPS TO BE IMPROVED

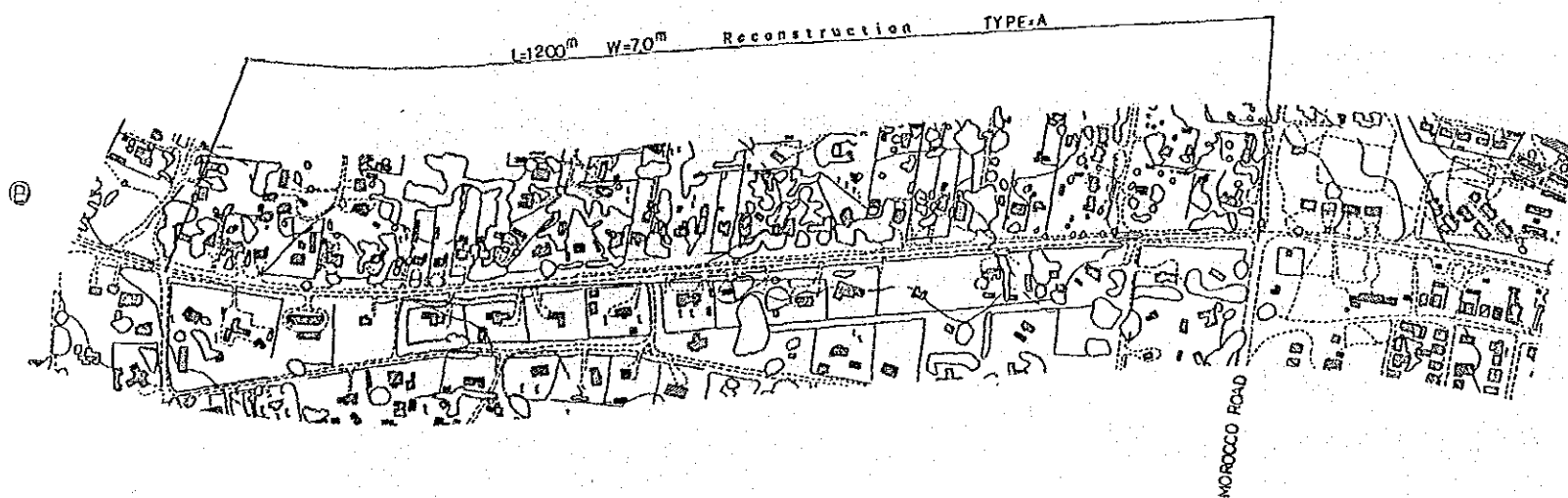
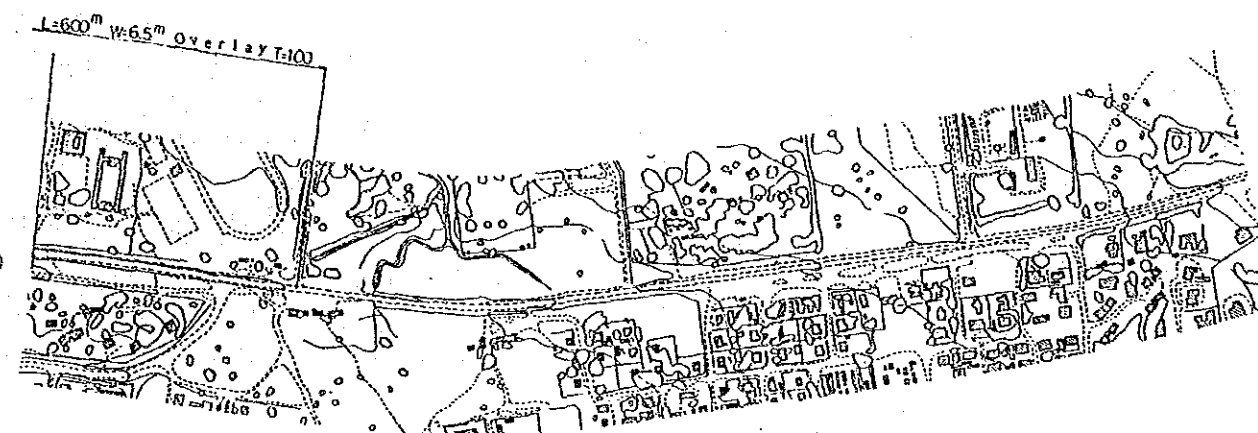
I-1 Quantity of overlay and reconstruction

Link No.	Name of Roads	Overlay			Reconstruction		
		Length (km)	Width (km)	Thickness (mm)	Length (km)	Width (km)	Type
<b>Total New Bagamoyo Road</b>		<b>9.79</b>	<b>0.90</b>	<b>-</b>	<b>2.58</b>	<b>-</b>	<b>-</b>
	Upanga Road	1.86	0.30	6.00	0.23	6.00	C
	New Bagamoyo Road	7.93	0.60	-	2.35	-	-
	-Up to Morocco Junc.	3.53	0.00	-	0.00	-	-
	-Beyond Morocco Junc.	4.40	0.60	6.50	2.35	7.00	A



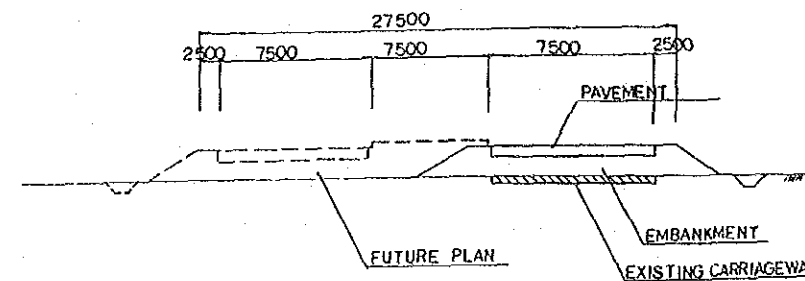
MPAKANI ROAD

NEW BAGAMOYO ROAD



MOROCCO ROAD

TYPICAL CROSS SECTION FOR RECONSTRUCTION SECTIONS ON NEW BAGAMOYO ROAD CONSIDERING FUTURE WIDENING



THE UNITED REPUBLIC OF TANZANIA  
DAR ES SALAAM CITY COUNCIL

BASIC DESIGN STUDY  
ON  
ROAD IMPROVEMENT AND MAINTENANCE IN DAR ES SALAAM

JAPAN INTERNATIONAL  
COOPERATION AGENCY

NEW BAGAMOYO ROAD  
OVERLAY AND RECONSTRUCTION

DATE	SHEET NO.
MARCH, 1981	8(4)



## 5.4 Major Work Quantities

Work quantities were calculated on the basis of the basic design drawings attached in subparagraph 5.3.12.

Summary of Major work items is presented in Table 5.3 and unit quantity of each improvement measures are as shown in Appendix 5.6.

## 5.5. Construction Plan and Method

### 5.5.1 Conditions Considered in the Construction Plan and Method

The construction plan and method has been studied taking into consideration the following conditions:

#### (1) Implementation of the Project

In consideration of the fact that the Project will be executed under the grant aid from the Japanese Government, construction plan will be studied and prepared in line with the conditions and procedure of Japan's grant aid programme.

#### (2) Work Components of the Project

The Project consists of the following work components:

Category A: Improvement of Road Structures

A-1: New Bagamoyo/Upanga Road

A-2: Morogoro Road

A-3: Chan'gombe Area Road

A-4: Kariakoo Area Road

A-5: Central Area Road

Category B: Urgent Repair for Selected Roads of Morocco,  
Kinondoni and Mwinjuma Roads

Category C: Provision of Road Maintenance Equipment

#### (3) Natural Conditions

The rainy season in the project area is from April to September and the maximum monthly rainfall average 600 mm. The earthwork and pavement work will be affected by rains so that

Table 5.3 (1) Project Principal Features

NAME OF ROADS	Section of		Principal Measures							
	Total Length (km)	Maintenance Level (km)	(1) Overlay (km)	(2) Reconstruction (km)	(3) Widening (km)	(4) Drainage Structure (km)	(5) Bus bay (Nos.)	(6) Inter-Section (Nos.)	(7) Lighting (Nos.)	(8) Signal
LOT A-1 New Bagamoyo Road	9.3	2.5	0.9	2.6	3.9	0.2	19	4	91	8
- Up to Morocco J.	3.5	1.0	0.0	0.0	2.5	0.1	3	3	25	4
- Beyond Morocco J.	4.4	1.5	0.6	2.4	0.0	0.0	12	0	0	0
- Upanga Road	1.9	0.0	0.3	0.2	1.3	0.0	4	1	66	4
LOT A-2 Morogoro Road (Up to Port Ac. J.)	5.7	0.0	0.0	0.0	5.7	0.2	13	2	48	3
LOT A-3 Chang'ombe Area Road	19.2	5.4	4.8	9.0	0.0	0.0	0	0	0	0
- Chang'ombe Area Local Rd.	14.6	2.6	3.0	9.0	0.0	0.0	0	0	0	0
- Chang'ombe Road	4.6	2.8	1.8	0.0	0.0	0.0	0	0	0	0
LOT A-4 Kariakoo Area Road	21.5	2.5	3.7	15.3	0.0	0.0	0	0	0	0
- Kariakoo Area Local Road	19.8	2.5	2.0	15.3	0.0	0.0	0	0	0	0
- Msimbazi Road	1.7	0.0	1.7	0.0	0.0	0.0	0	0	0	0
LOT A-5 Central Area Road	21.0	0.2	17.1	3.7	0.0	0.0	0	0	0	0
- Central Area Local Road	9.8	0.0	6.1	3.7	0.0	0.0	0	0	0	0
- Bandari Road	2.2	0.2	2.0	0.0	0.0	0.0	0	0	0	0
- Nkrumah Road	0.4	0.0	0.4	0.0	0.0	0.0	0	0	0	0
- Sokoine Road	0.8	0.0	0.8	0.0	0.0	0.0	0	0	0	0
- Gerezani Road	1.4	0.0	1.4	0.0	0.0	0.0	0	0	0	0
- Kivukoni Road	1.2	0.0	1.2	0.0	0.0	0.0	0	0	0	0
- Maktaba Road	0.9	0.0	0.9	0.0	0.0	0.0	0	0	0	0
- Ohio Road	1.0	0.0	1.0	0.0	0.0	0.0	0	0	0	0
- Ocean Road	3.3	0.0	3.3	0.0	0.0	0.0	0	0	0	0
LOT B Urgent Repair	6.4	0.4	3.5	2.6	-	-	12	8	-	-
- Morocco Road	3.6	-	2.8	0.8	-	-	12	8	-	-
- Kinondoni Road	0.7	0.4	-	0.4	-	-	-	-	-	-
- Mwinjima Road	2.2	-	0.7	1.4	-	-	-	-	-	-
Total	83.6	10.9	30.0	33.2	9.6	0.4	32	14	139	11

Table S.3(2) Major Work Quantities

Item No.	Description	Unit	Quantity					Lot A-5	Lot B
			Total	Lot A-1 Upanga New Baga.	Lot A-2 Morogoro	Lot A-3 Chango'mbe	Lot A-4 Kariakoo		
<b>1. Earth Works</b>									
E-1	Clearing and removal of unsuitable materials	sq.m	307,000	101,000	206,000	0	0	0	
E-2	Waste excavation common rock	cu.m	122,000	22,000	51,000	13,000	24,000	7,000	
E-3	Waste excavation borrowed material	cu.m	2,000	2,000	0	0	0	0	
E-4	Embankment excavate material	cu.m	56,000	23,000	33,000	0	0	0	
E-5	Removal of existing pavement	cu.m	31,000	10,000	21,000	0	0	0	
E-6	Clearing and flushing of existing drainage	cu.m	51,000	5,000	10,000	12,000	14,000	3,000	
E-7	Installation of bus stop roof	lin.m	3,000	0	25	0	0	0	
E-8	Miscellaneous	No.	62	0	0	0	0	12	
E-9	Miscellaneous	I.S.	0	0	0	0	0	0	
<b>2. Pavement Works</b>									
P-1	Temporary Road	sec.	9	5	4	0	0	0	
P-2	Sub-base course pavement	cu.m	100,000	23,000	31,000	13,000	21,000	5,000	
P-3	Base course pavement	cu.m	65,000	15,000	20,000	9,000	13,000	4,000	
P-4	Shoulder pavement	cu.m	10,000	2,000	8,000	0	0	0	
P-5	Prime coat	sq.m	357,000	80,000	95,000	51,000	84,000	20,000	
P-6(A)	Asphalt pavement t=25.00mm	ton	6,125	125	0	0	0	0	
P-6(B)	Asphalt pavement t=30.60mm	ton	4,000	0	0	0	0	0	
P-6(C)	Asphalt pavement t=35.70mm	ton	11,000	0	0	0	0	0	
P-6(D)	Asphalt pavement t=40.80mm	ton	7,000	0	0	0	0	0	
P-6(E)	Asphalt pavement t=45.90mm	ton	4,000	0	0	0	0	0	
P-6(F)	Asphalt pavement t=50.100mm	ton	75,000	20,000	21,000	5,000	10,000	8,000	
P-7	Sidewalk	sq.m	69,000	27,000	40,000	0	0	0	
P-8	Kurb stone	lin.m	17,000	5,000	12,000	0	0	0	
P-9	Boundary block	lin.m	45,680	14,000	31,000	0	0	680	
P-10	Miscellaneous	I.S.	0	0	0	0	0	0	
<b>3. Drainage Works</b>									
D-1	Side riprap drainage	sq.m	11,000	2,000	9,000	0	0	0	
D-2(A)	Side flume drainage 300 x 300	lin.m	0	0	0	0	0	0	
D-2(B)	Side flume drainage 400 x 500	lin.m	390	390	0	0	0	0	
D-3	L-shaped side ditch	lin.m	8,680	6,000	2,000	0	0	680	
D-4	Catch pit	nos.	229	134	70	0	0	25	
D-5	Man hole	nos.	22	14	8	0	0	0	
D-6	Pipe culvert, Type A	lin.m	1,208	208	1,000	0	0	0	
D-7(A)	Pipe culvert, Type B	lin.m	4,000	4,000	0	0	0	0	
D-7(B)	Pipe culvert, Type B	lin.m	2,795	795	2,000	0	0	0	
D-7(C)	Pipe culvert, Type B	lin.m	453	271	182	0	0	0	
D-8	Re-installation of existing drainage	lin.m	5,740	0	0	2,000	3,000	740	
D-9	Miscellaneous	I.S.	0	0	0	0	0	0	
<b>4. Road Lighting</b>									
L-1	Lighting fixture with taper pole L type	nos.	65	65	0	0	0	0	
L-2	Lighting fixture with taper pole Y type	nos.	73	25	48	0	0	0	
L-3	Miscellaneous	I.S.	0	0	0	0	0	0	
<b>5. Traffic Signal</b>									
S-1	Traffic Signal	lin.m	11	8	3	0	0	0	
S-2	Miscellaneous	I.S.	0	0	0	0	0	0	
<b>6. Pedestrian Bridge</b>									
B-1	Pedestrian Bridge	nos.	1	0	1	0	0	0	
<b>7. Others</b>									
O-1	Relocation of utilities Telephone Line	lin.m	11,000	5,000	6,000	0	0	0	
O-2	Relocation of utilities Water supply valb	nos.	4	4	0	0	0	0	
O-3	Relocation of utilities power supply	lin.m	16,000	5,000	11,000	0	0	0	



annual workable days were determined taking into account the above rainy season, Sunday and holidays as shown below:

- Earthwork                    228 days/year
- Pavement Works            216 days/year
- Drainage Works            252 days/year

(4) Natural Material Sources

Coarse aggregate to be used in concrete and asphalt pavement is assumed to be obtained from the Mikese area and fine aggregate is from the Mpiji River deposit which is located at a distance of 140 km away from Dar es Salaam. Rock materials for base and sub-base course pavement and soil materials to be used for road embankment are assumed to be obtained from the Kunduchi area and Port Access area respectively.

The location of proposed quarry sites and borrow pits are shown in Appendix 5.7.

(5) Public Supply to be used for the Project

Since the capacity of electric and water supply is limited in the City, it might be necessary to install the diesel generators and water plant for the construction purpose at the contractor's temporary camps and sites. Radio communication facilities will also be required.

5.5.2 Construction Plan and Method

(1) Construction Package

The Project will be divided into the five (5) components for Category A, one (1) each component for Category B and C as shown below:

- Category A: Lot A-1; Improvement of New Bagamoyo/Upanga Road  
              Lot A-2; Morogoro Road  
              Lot A-3; Chan'gombe Area Road  
              Lot A-4; Kariakoo Area Road  
              Lot A-5; Central Area Road
- Category B: Lot B-1; Urgent Repair for Selected Road of

Morocco, Kinondoni and Mwinjuma Roads  
Category C: Lot C-1; Provision of Road Maintenance Equipment

(2) Detailed Design

Immediately after the Exchange of Note (E/N), the consultant will enter into a contract with DCC on the consultancy services, hold close discussion with DCC on the detailed design work and then carrying it out. At the same time, DCC will undertake such works as land acquisition and house compensation and removal, etc, which are to be executed by the Tanzania side.

The detailed design work will be undertaken by the consultant either in Tanzania or in Japan. The DCC's approval will be needed for the detailed design documents before tendering. The work items of detailed design required for implementation of the project are summarized below:

1) Study and Survey

- Discussion and arrangements on the detailed design with the Government of Tanzania based on the basic design.
- Detailed survey of the construction sites
- Review of the site conditions of construction to be necessary for the preparation of detailed design, cost estimate and construction plan.

2) Detailed Design and Preparation of Tender Documents

- Detailed design and preparation of tender drawings
- Preparation of documents of tendering
- Confirmation of construction cost based on the detailed design
- Approval of the detailed design and tender documents by the Government of Tanzania

(3) Construction Supervision

After signing of the construction contract, the consultant's representative will go the construction site to arrange the start of construction. The consultant's chief engineer will be posted at the construction site during the period required for supervision services.

The consultant's chief engineer will coordinate all construction related matters with the concerned agencies and official of the Project including the Government of Tanzania, the Embassy of Japan and JICA in Tanzania.

The principal activities to be carried out by the consultant are given below:

- 1) Assistance Services in Tendering and Contracting
    - To assist in prequalification of tenderers, tendering, evaluation of tenders and drafting of contract.
  - 2) Examination of Approval of Shop Drawings
    - To inspect, examine and approve shop drawings, samples, catalogues, etc. and inspect equipment at the manufacturer's plant, if any.
  - 3) Inspection of Construction Works
    - To ensure that construction complies with the contract in terms of schedule, construction methods and quality, and inspect and approve all field works.
  - 4) Approval of Payment
    - To approve payment claimed by the contractor based on the progress of the work.
  - 5) Reporting
    - To prepare regular progress reports on all matters concerning construction and submit them to the Government of Tanzania and Japanese Government.
  - 6) Handing Over of Completed Works
    - To handover to the Government of Tanzania the completed works after inspection and examination of the works after confirmation of fulfillment of all contractual obligations. Upon acceptance of the works by the Government of Tanzania, the consultant people will be discharged.
- (4) Traffic Management during the Construction
- The main purpose of the Project is to improve the existing

roads by widening, overlay and reconstruction of pavement, but not construct a new road. Therefore, special attention should be paid to the traffic management so that the construction should not interfere traffic flow on the existing roads.

Temporary diversion with a traffic signal devices should be provided properly during the construction of New Bagamoyo, Upanga and Morogoro Roads. A part-time traffic suspension would be unavoidable during the construction of area road due to the difficulty of provision of temporary detour.

(5) Temporary Facilities

Contractor's office as well as the consultant's office should be constructed in the same area of contractor's temporary camp site for the smooth operation of the Project.

Warehouses, workshops, repair shops, laboratories, motor pool yards, materials stock yards, medical clinic labour camps if necessary, should be provided at the construction site.

5.5.3 Procurement Plan of Materials and Equipment

(1) Procurement of Materials and Equipment

It was planned that the construction materials should be procured in Tanzania as far as possible. However, materials which would be difficult in respect to quality as well as procurement in Tanzania will be procured from Japan.

1) Construction Materials

Materials available in Tanzania are fuel and oil, cement, aggregate materials, timber except plywood, etc. Though local products of reinforcing bars, asphalt bitumen, are available in the country, the output is not enough for a large quantity of procurement, and the price is on high side comparing with Japan's products.

These materials, therefore, will be imported from Japan. Traffic control devices, street lighting columns and

metal plate floor for pedestrian bridge will also be imported from Japan.

2) Construction Equipment

All equipment and their ancillary equipment and spare parts required will be procured from Japan, since there are not procurable in Tanzania. One (1) Asphalt plant with a 30 ton/hr in capacity and (2) movable crushing plant shall also be imported from Japan.

Unit costs of materials, equipment and labour to be used in the Project are summarized in Appendix 5.8 through 5.10.

(2) Transportation of Equipment

Cargo from Japan for this project will be landed at Dar es Salaam Port and then delivered to the construction site.

Marine transportation of cargos from Japan to Dar es Salaam takes one and half months, so that the transportation period for cargos from Japan to the site is estimated to be two (2) months taking into account the procurement and loading in Japan, unloading and customs formalities at Dar es Salaam Port and delivery to the construction site.

#### 5.5.4 Organization for Project Execution

The executing agency of the Project is the Dar es Salaam City Council (DCC) under the Ministry of Regional Administration and Local Government. The DCC will be authorized to execute the following work items for the implementation of the Project.

- 1) Execution of all construction management,
- 2) Execution of contracts for consultancy service for construction,
- 3) Approval of design,
- 4) Tendering and evaluation of tenders,
- 5) Approval of all payments,
- 6) Administration of all contracts,
- 7) Acceptance of completed works, and
- 8) Liaison and coordination with other government agencies.

The representative of the DCC will be the City Engineer. For successful and smooth implementation of the Project, DCC will appoint the Project Manager and establish the Project Office under the direct supervision of City Engineer. Operational works pertaining to the Project will be actually taken in charge by this office.

The responsibilities for the project works among the Government of Tanzania, Japanese Consultant and Japanese Contractor is summarized as follows:

- The Government of Tanzania will be responsible for the land acquisition and house compensation prior to commencement of construction by the contractor. Also responsible for relocation and protection of the existing public utilities, such as telephone cable, electric pole and wire, water main, etc. The Government of Tanzania will also be responsible for ordering of design, supervision and construction works, taking necessary arrangement of payment and taking-over of the completed road structures.

- The Japanese Consultant, recommended by JICA and entrusted by the Government of Tanzania, will be responsible for the implementation of the detailed design, tendering in cooperation with the client in selecting the contractor, supervision of the construction works, approval of payments, inspection for taking-over of the completed road structures.
- The Japanese Contractor, after contract signing, will be responsible for improvement of road structures including widening, overlay and re-construction, urgent repair of pot-holes in accordance with the contract documents. Also responsible for hand-over the completed road structures to the Government of Tanzania.

#### 5.5.5 Undertakings of the Tanzanian Government

(1) For the implementation of the Project, the Government of Tanzania will undertake the following:

##### 1) Construction Works

- Land acquisition,
- Land lease for temporary works, if any,
- House compensation and their removal,
- Relocation and protection of the existing utilities which might be affected by the construction of road

##### 2) Administration Works

- To furnish data necessary for detailed design
- To bear commission for the banking services based on the Banking Arrangement,
- To ensure prompt unloading, tax exemption and customs clearance at the port of disembarkation in Tanzania for the equipment, materials and vehicles required for the project,
- To ensure tax exemption for the consultant and the contractor engaged in the project execution.
- To issue visa, traffic certificates and other certificates necessary for the execution of the project to the consultant and the contractor.

- To ensure contractual payments to the consultant and the contractor,
- To bear expenses required for proper and effective maintenance after completion of the project, and
- To bear all the expenses necessary for the execution of the project other than those to be borne by the grant aid.

(2) Local funds to be Required

The Government of Tanzania has to arrange the local funds to be used for the relocation of public utilities as well as for operation of the project office which will be organized and constructed at Ilala site depot

Required amounts are estimated as follows:

	Unit: Thousand Tshs.				
	Disbursement Schedule				
	1st	2nd	3rd	4th	Total
Compensation for Land and House Removal	5,000	15,000	-	-	20,000
Administration and Operation Cost of Project Office at Ilala Site Depot	7,000	5,000	6,000	5,000	23,000
Total	12,000	20,000	6,000	5,000	43,000

5.5.6 Implementation Schedule

A tentative implementation schedule including all those activities discussed above is illustrated in Fig.5.4.

The Project is planned to be implemented in four (4) years as follows:

- (1) 1st Year: Detailed Design (Lot A-1, Lot A-5 and Lot B-1) Tendering and Construction of;
- Lot A-5: Central Area Road
  - Lot B-1: Urgent Repair of Selected Road of Morocco, Kinondoni and Mwinjuma



- Lot C-1: Provision of Road Maintenance Equipment
- (2) 2nd Year: Review of Cost Estimate for Lot A-1  
Tendering and Construction of;
  - Lot A-1: New Bagamoyo/Upanga Road
- (3) 3rd Year: Detailed Design (Lot A-2, Lot 3 and Lot 5)  
Tendering and Construction of;
  - Lot A-2: Morogoro Road
- (4) 4th Year: Review of Cost Estimate for Lot A-3 and A-4  
Tendering and Construction of;
  - Lot A-3: Chan'gombe Area Road
  - Lot A-4: Kariakoo Area Road

## CHAPTER 6 PROJECT EVALUATION



## CHAPTER 6 PROJECT EVALUATION

### 6.1 Economic Feasibility and Expected Social Impacts

First of all, the project cost required for each of the road improvement and rehabilitation projects are economically reviewed in the relation with the expected amounts of benefit produced by each of the projects so as to ascertain the economic feasibility of the projects from view point of national economy. Second, the socio-economic impacts of the project roads are analysed so as to clarify the role of project roads for the realization of better socio-economic condition in the city of Dar es Salaam and its surrounding areas.

#### a) Economic Feasibility

As the results of the cost review on the Vehicle Operation Cost saving and Time Cost saving, the benefit from the project was established through the standard procedure of benefit calculation referring with the Feasibility study made by JICA in July, 1990.

The project cost for the evaluation case were converted into economic cost through the deduction of tax and duty according to the implementation schedule of the project. Annual outlays for maintenance cost throughout the project life were reviewed, in which periodic overlay was assumed in every seven years since the opening of the project roads.

As the results of the economic analysis on this project, three economic indicators which consist of Benefit/Cost Ratio (B/C), Net Present Value (NPV) and Internal Rate of Return (IRR) were applied for the economic evaluation of the project and it is concluded that the Project is technically and economically feasible with very high economic indicators as shown

below:

Economic Indicators of the Project

Benefit/Cost at 10% discount rate	= 2.25
Net Present Value at 10% discount rate	= 6,065 M.Tsh.
Internal Rate of Return(IRR)	= 25.4%

As it is generally known that Time Cost Saving is controversial in nature to count as one of the benefits from the project, especially, in the transportation infrastructure construction project in developing countries in Africa, economic evaluation which excluded Time Cost Saving Benefit from the total benefit was conducted to evaluate the effect. Results are shown below and it is also concluded that the project is feasible even if the Time Cost Saving Benefit is out of consideration.

Economic Indicators Excluding Time Cost Saving Benefit

Benefit/Cost at 10% discount rate	= 2.03
Net Present Value at 10% discount rate	= 4,997 M.Tsh.
Internal Rate of Return(IRR)	= 23.1%

b) Direct Benefits

Direct benefits summing up the savings in Vehicle Operation Cost and Time Cost are expected to be large. An annual benefit derived from the project in 2000 is estimated to be Tsh. 2,000 million and total amount over 15 years after completion of the project would be Tsh. 30,000 million.

c) Socio-economic Impacts Expected

In addition to the above direct benefits, the Project is expected to bring about great indirect effects on the surrounding areas of the project as follows:

- Acceleration of land-use development on the surrounding areas of New Bagamoyo and Morogoro Roads.

- Promotion of intensive land-use in Kariakoo, Chang'ombe, Central and Mwinjuma areas where they are specialized in commercial, industry, business and residential uses respectively.
- Realization of functional hierarchy among roads, that is, New Bagamoyo road functioning as arterial road, Morogoro road as inter-regional arterial road and area road as feeder road.
- Enhancement of urban amenity by separating pedestrians from vehicles and decrease of traffic accidents.
- Stimulation of regional economy by strengthening of inter-sector economic activities as well as by that of inter-region.
- Incentive role for the succeeding road development Projects, such as improvement of intersections and traffic signals on the roads in downtown areas of the city.

c) People and Area Affected by the Project

The Project will exert an influence on a large majority of people and area in Dar es Salaam as shown below:

- Total number of population that will benefit directly from the Project is estimated to be 540,000 people or 40% of the whole population of Dar es Salaam City (1.3 million).
- Total number of population that will benefit indirectly from the Project would be estimated to be 880,000 people or 65 % of the city population.
- Area that will benefit from the project would cover the whole urbanized areas of Dar es Salaam City.