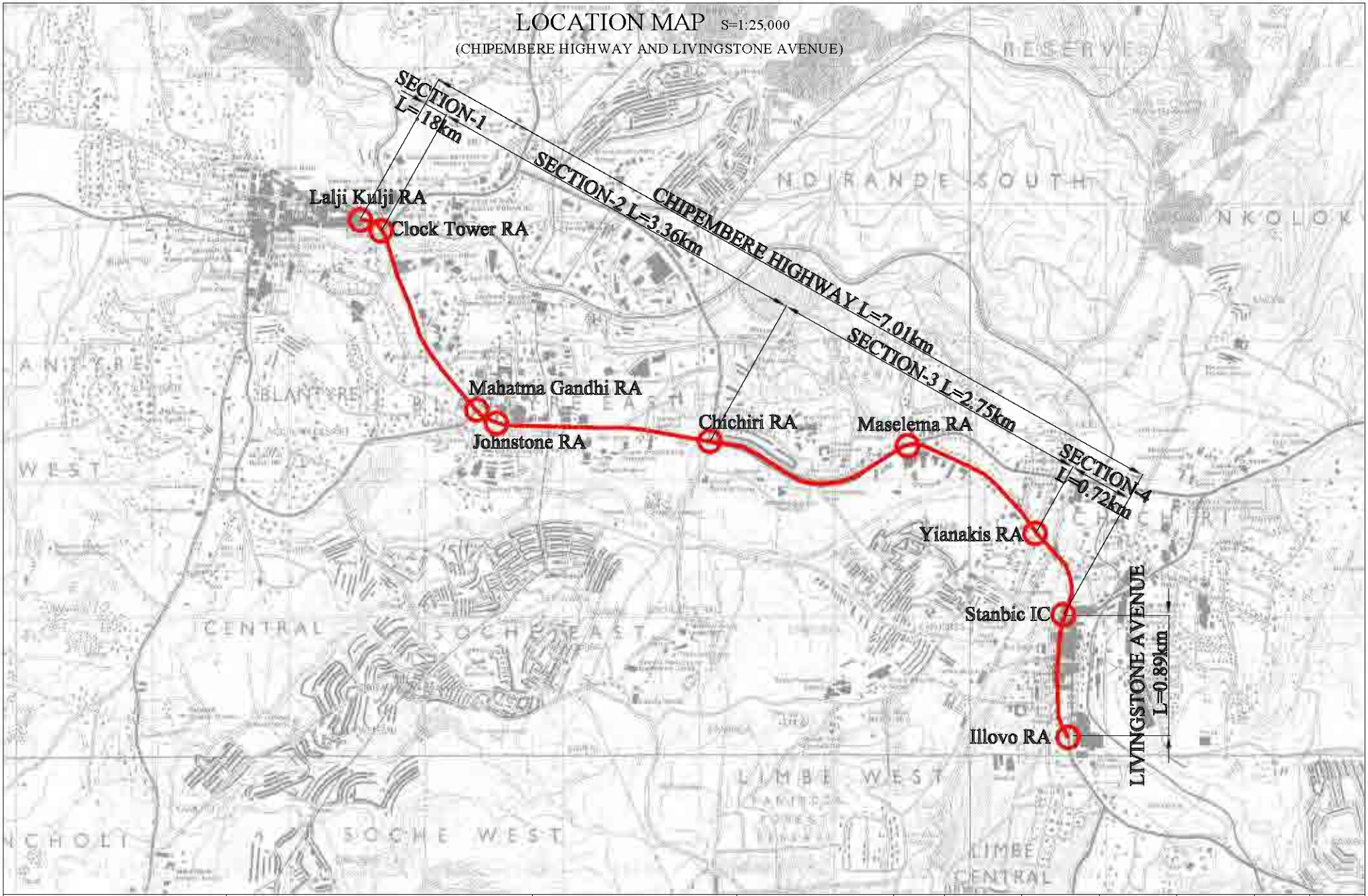
LOCATION MAP S=1:25,000

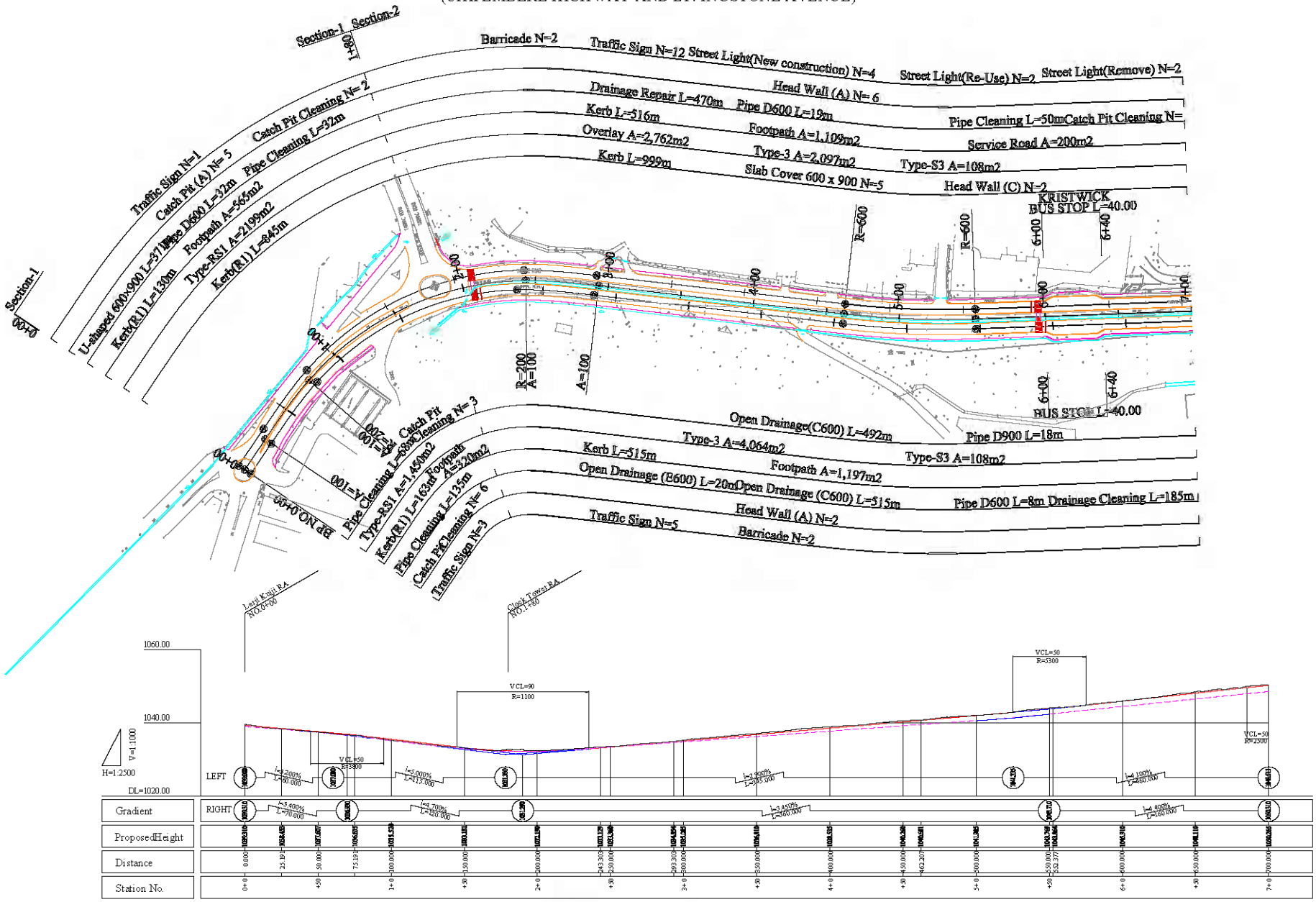
(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)



BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			LOCATION MAP	S=1:25,000		DATE		SUBMITTED	JUN,2007	1/29

PLAN (1) S=1:2500

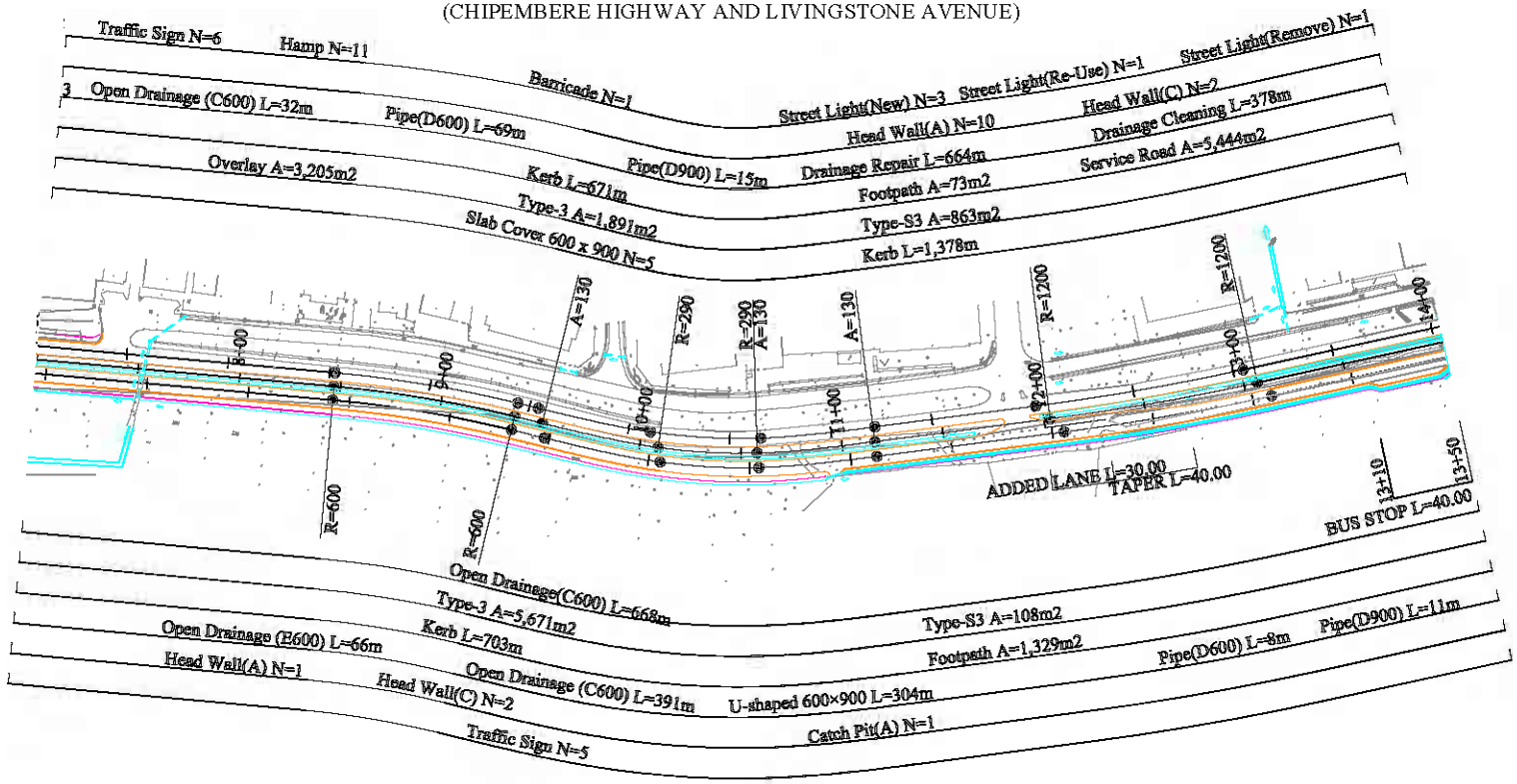
(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

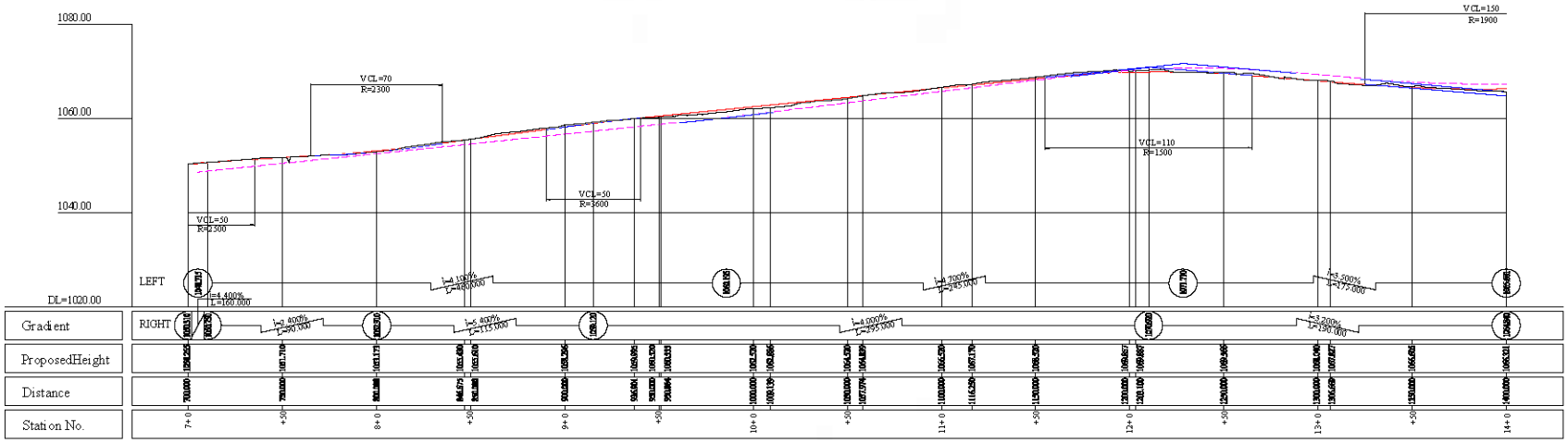


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (1/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 2/29

PLAN (2) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

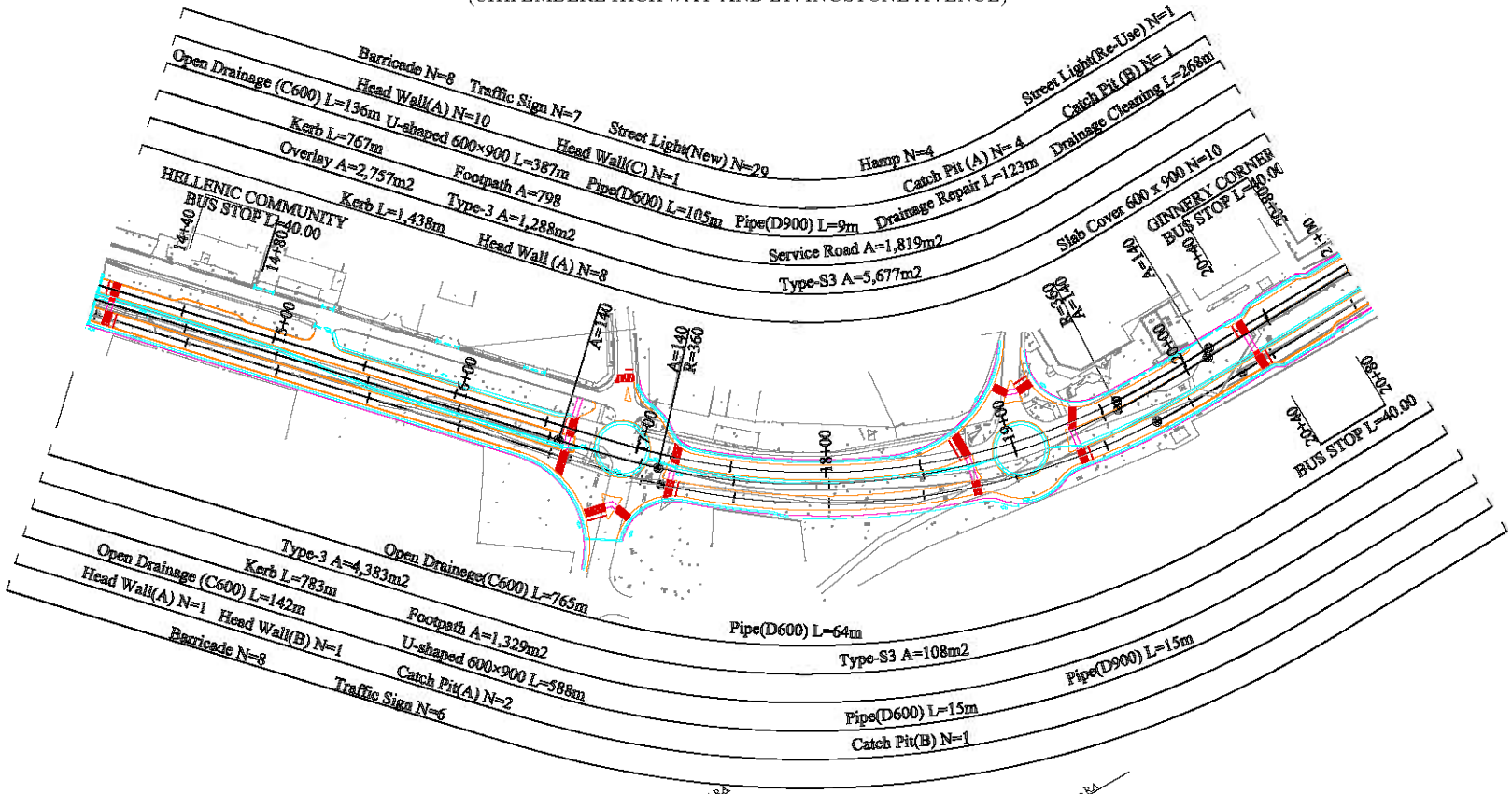


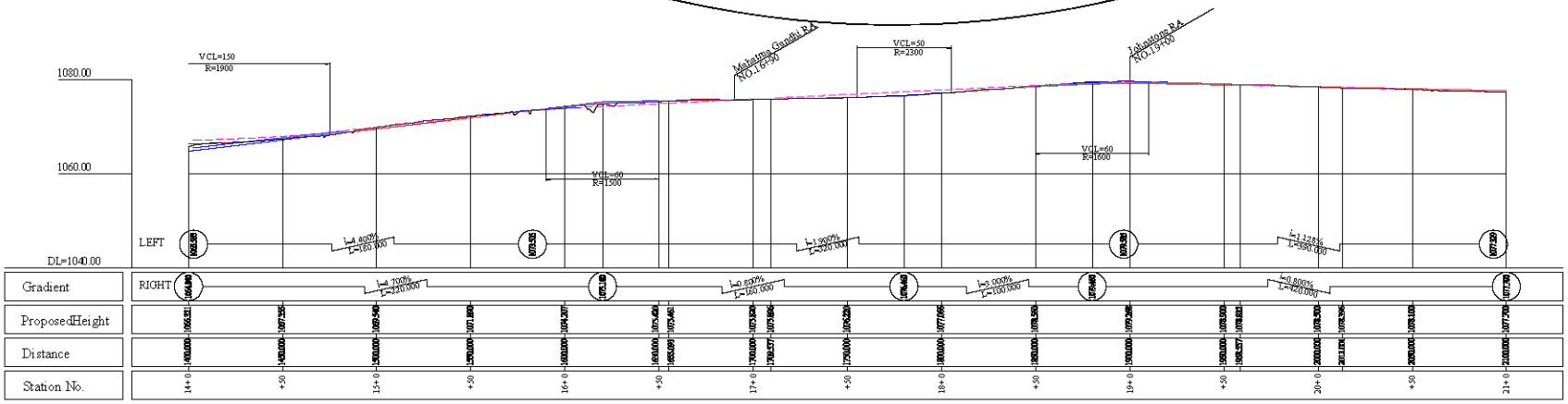


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (2/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 3/29

PLAN (3) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)





BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (3/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 4/29

PLAN (4) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

Barricade N=1 Traffic Sign N=15 Street Light(New) N=11

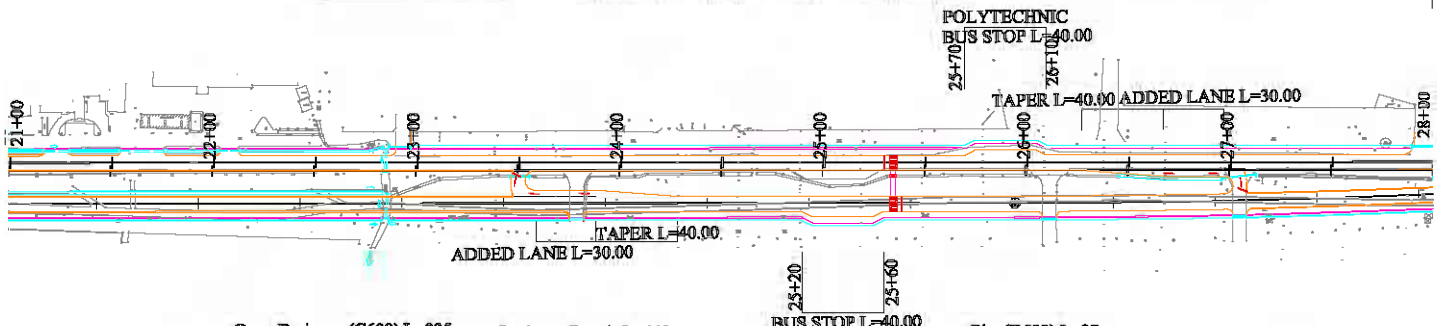
Catch Pit(A) N=6 Head Wall(A) N=5 Head Wall(C) N=1

Open Drainage (C600) L=493m U-shaped 600×900 L=133m Pipe(D600) L=70m Pipe(D900) L=11m

Kerb L=678m Footpath A=1,333m2

Overlay A=3,850m2 Type-3 A=2,848m2 Type-S3 A=108m2

Kerb L=1,346m Head Wall (A) N=3 Head Wall (C) N=2 Slab Cover 600 x 900 N=5



Open Drainage (C600) L=235m Drainage Repair L=448m Pipe(D600) L=27m

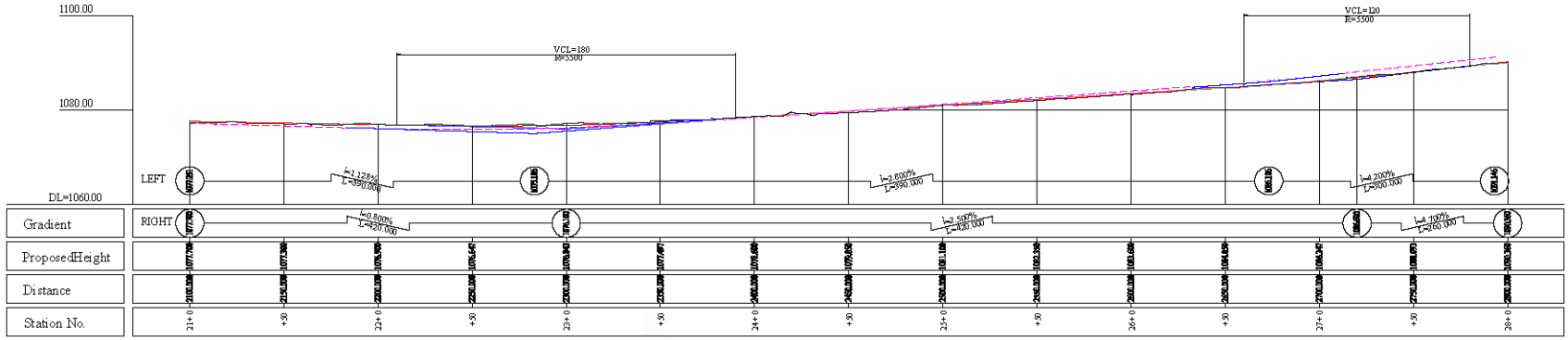
Type-3 A=6,475m2 Type-S3 A=108m2

Kerb L=692m Footpath A=1,583m2

Open Drainage (C600) L=678m Pipe(D600) L=21m Pipe(D900) L=12m

Head Wall(A) N=9 Head Wall(C) N=1

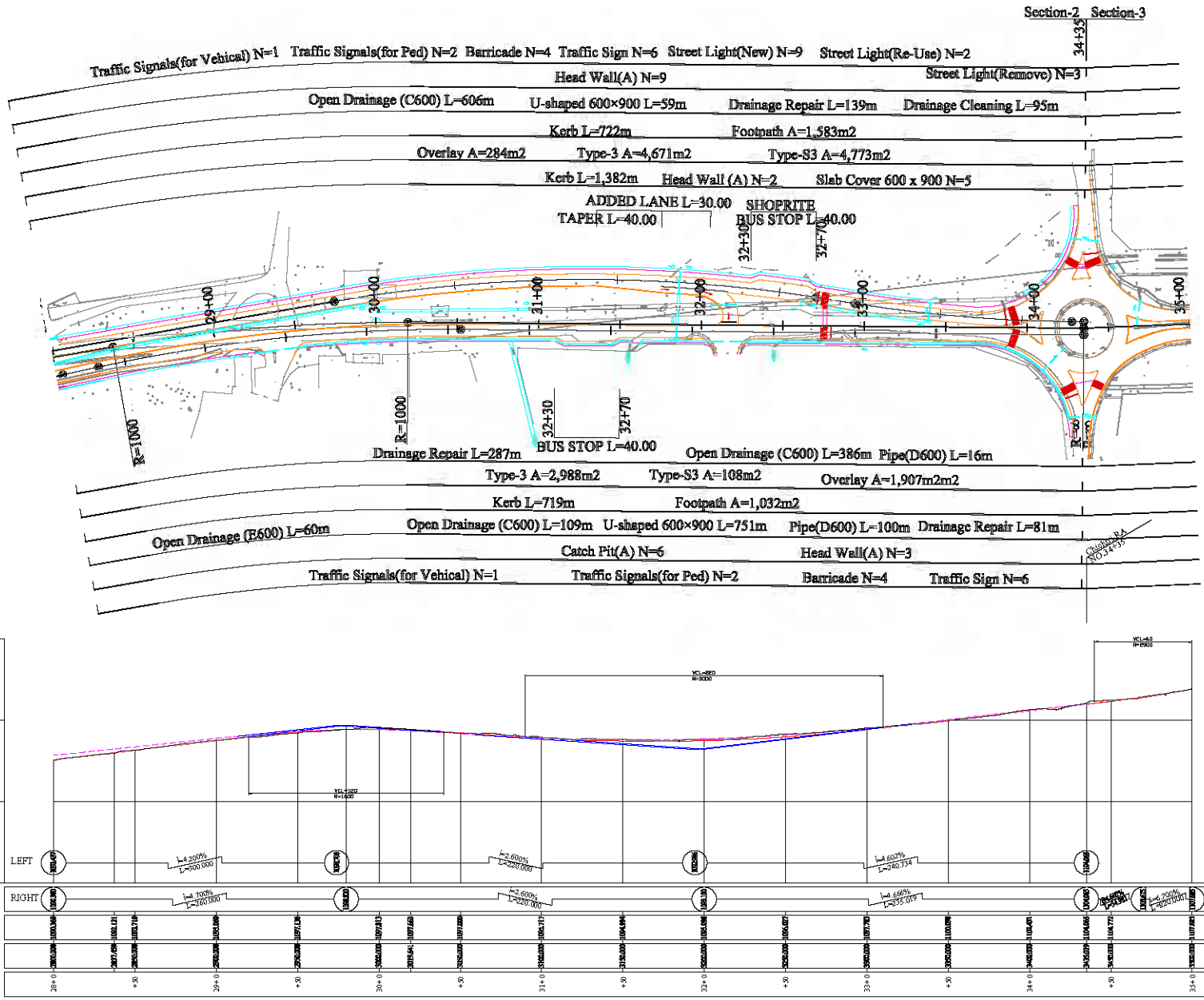
Barricade N=1 Traffic Sign N=9



BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			PLAN (4/12)	S=1:2500		DATE		SUBMITTED	JUN,2007	5/29

PLAN (5) S=1:2500

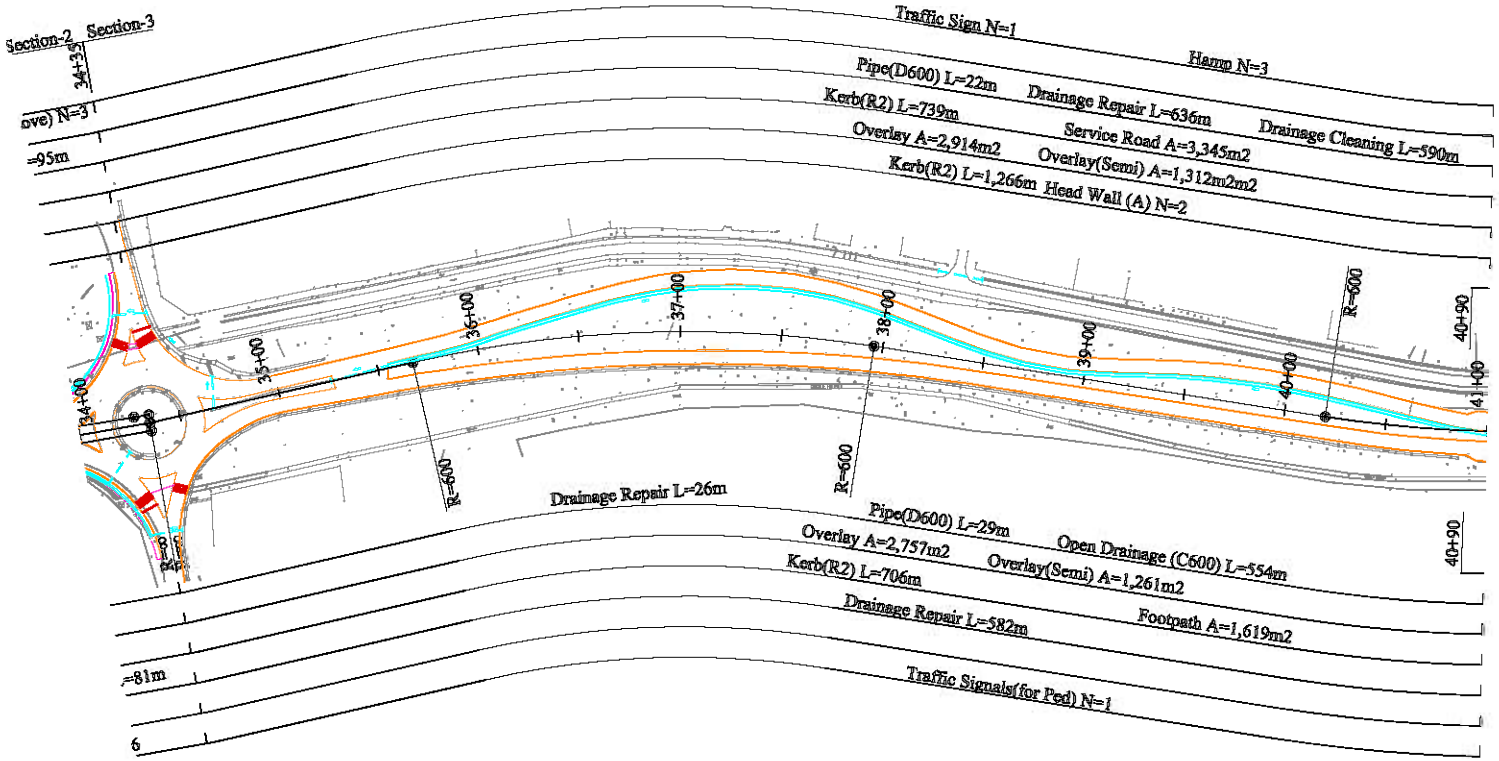
(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

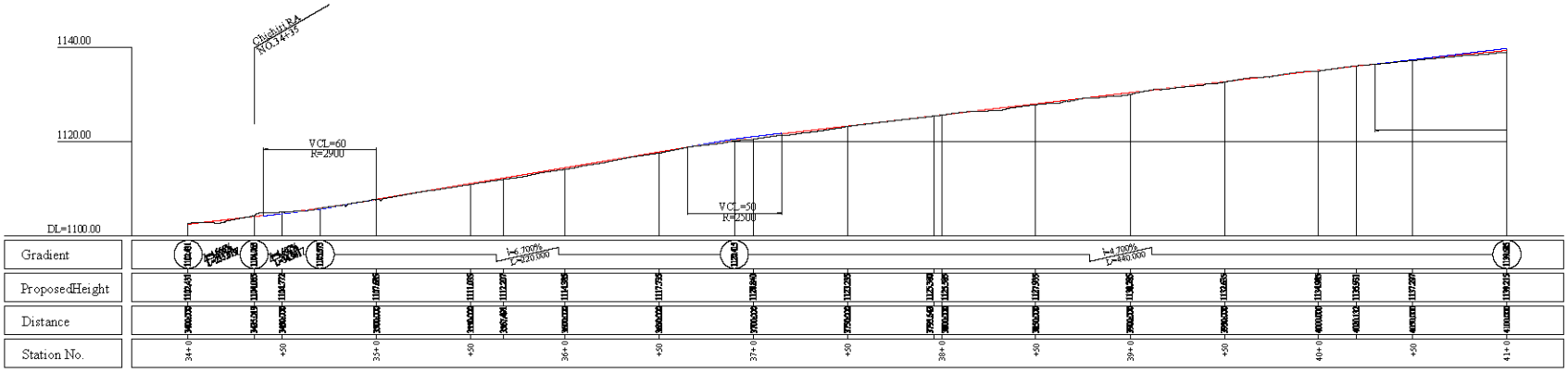


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (5/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 6/29

PLAN (6) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

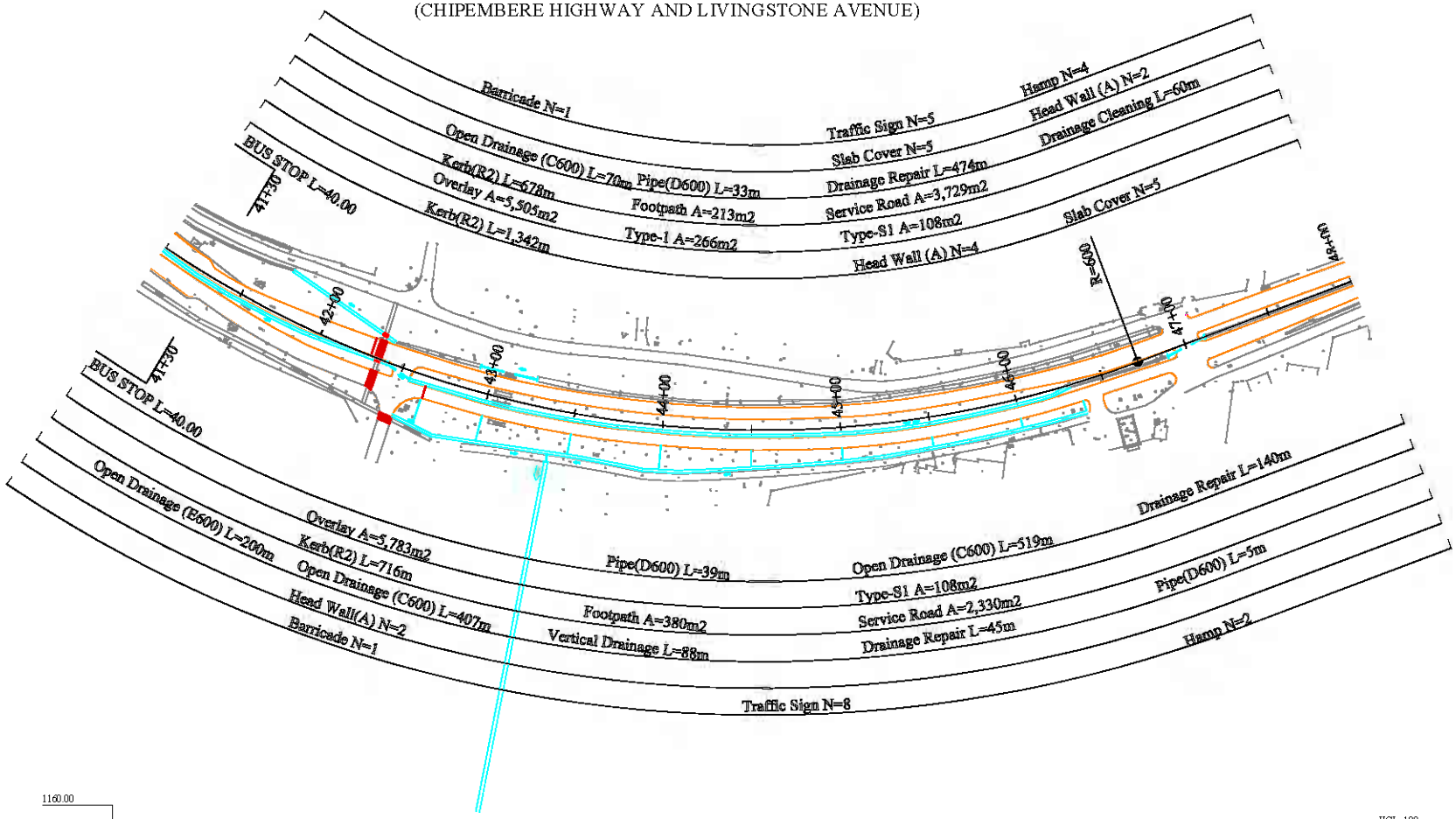


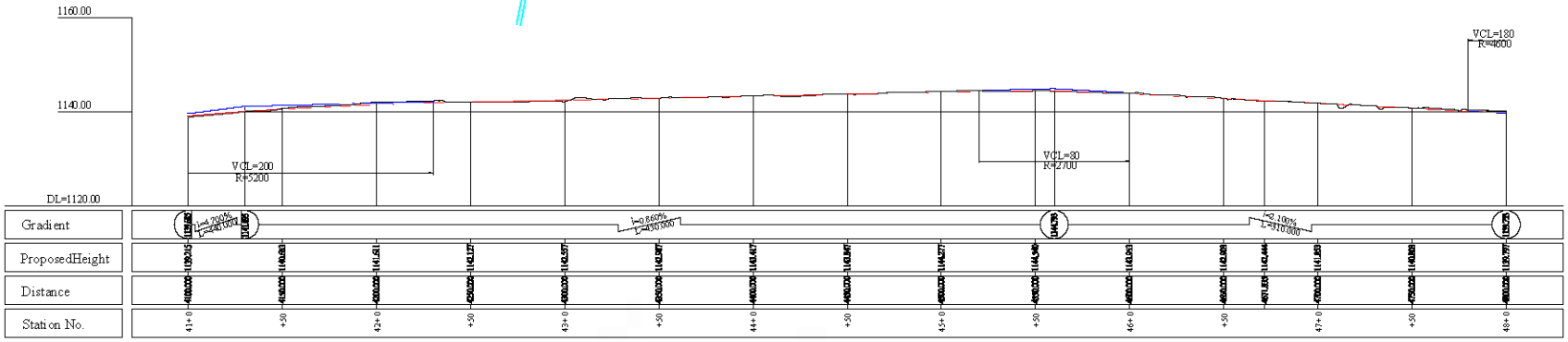


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (6/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 7/29

PLAN (7) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

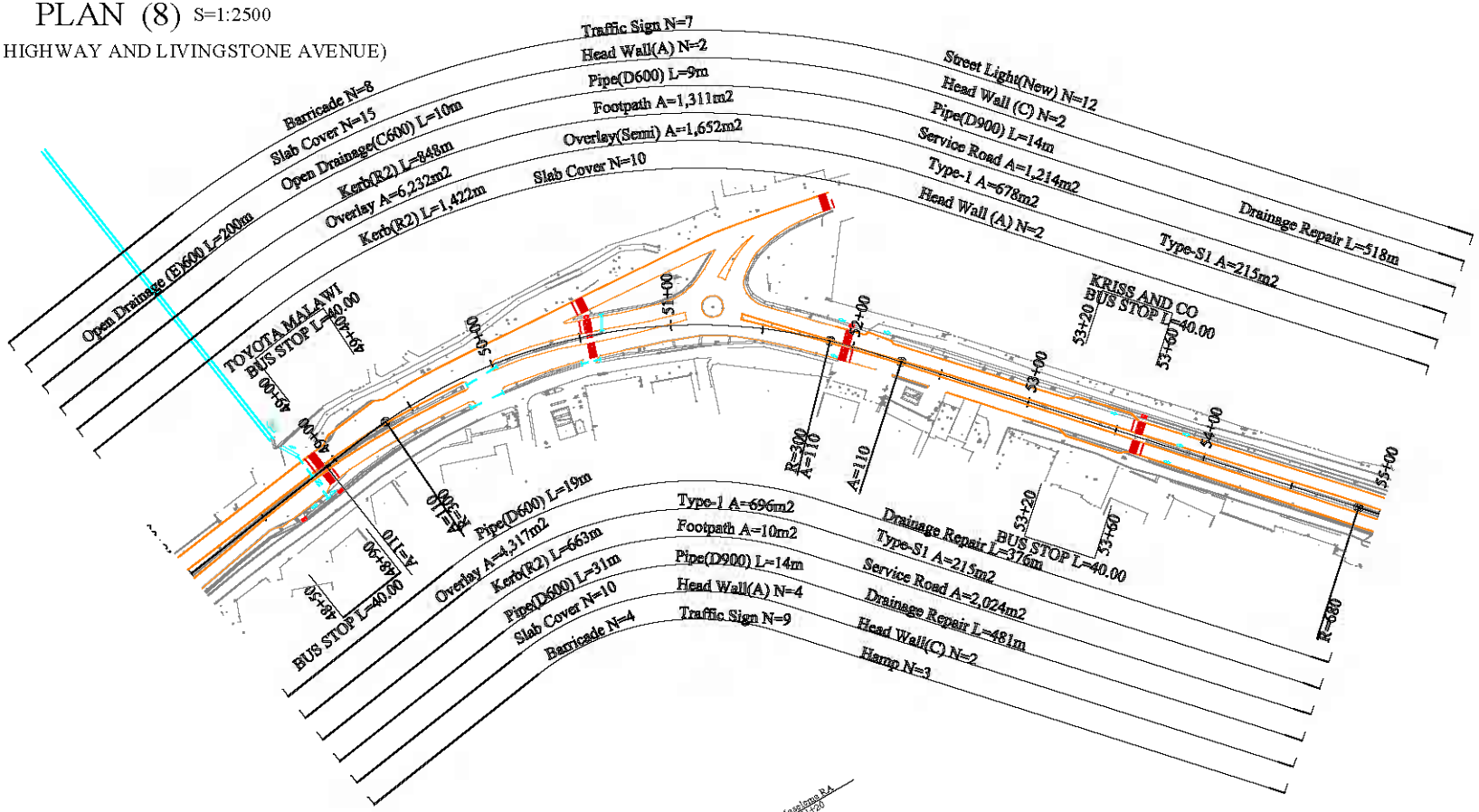


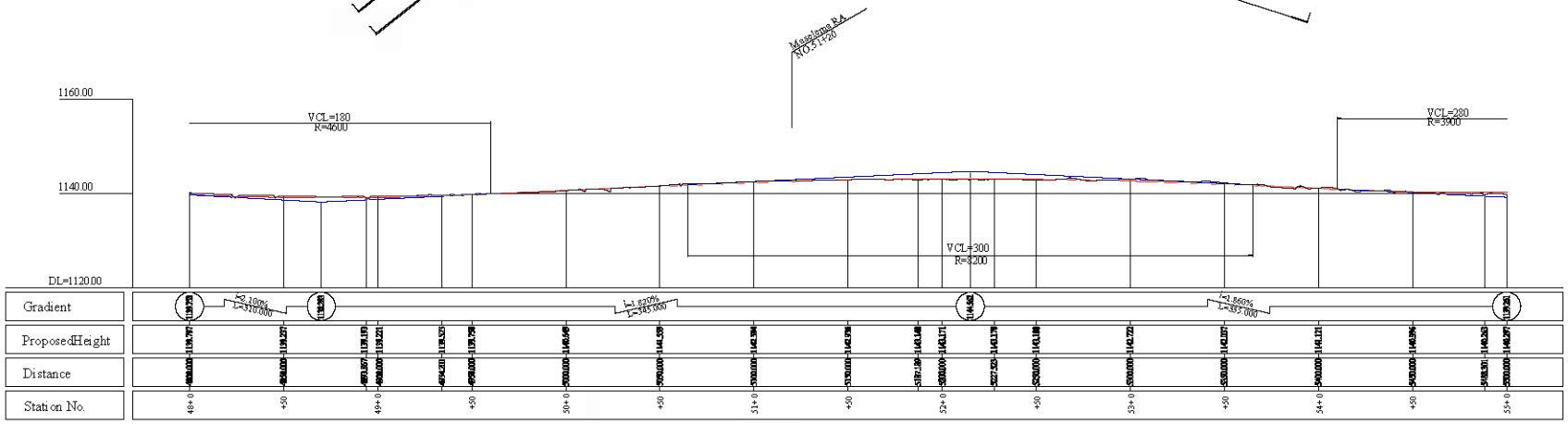


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (7/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 8/29

PLAN (8) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

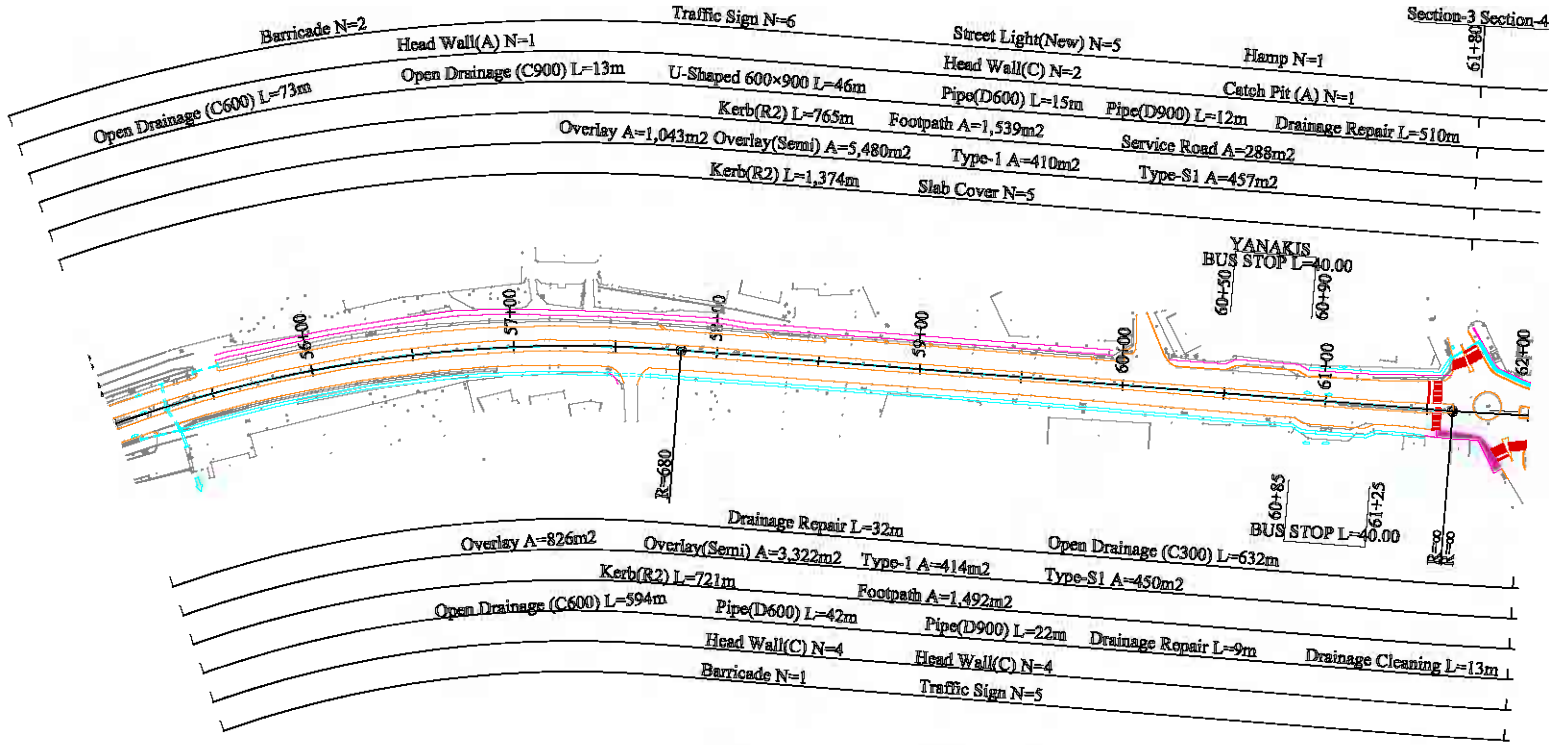


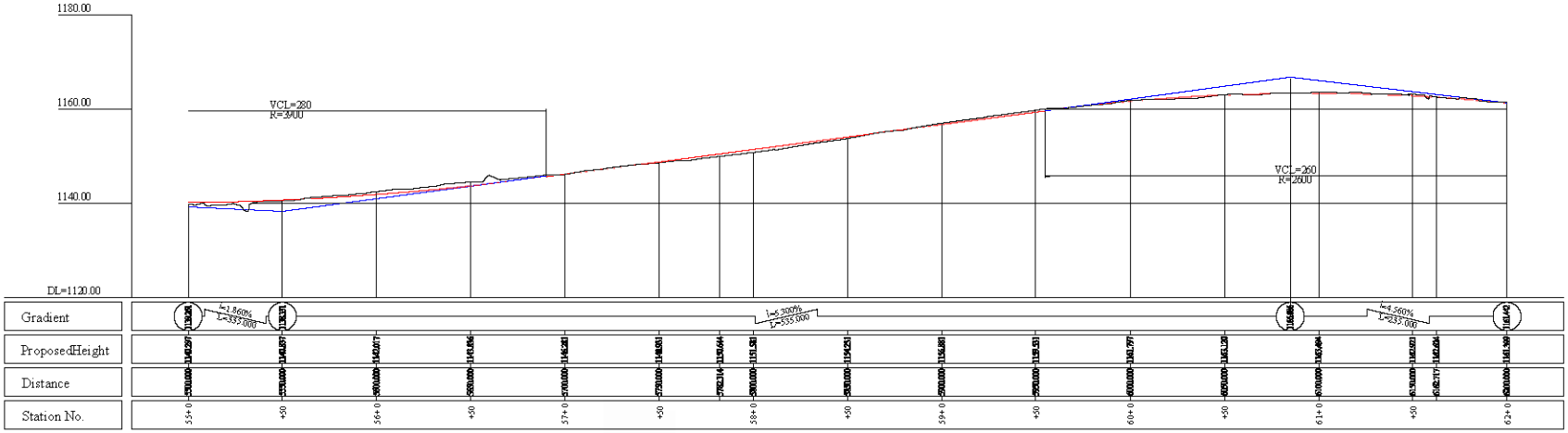


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE / SHEET NO
			PLAN (8/12)	S=1:2500		DATE		SUBMITTED	JUN,2007 / 9/29

PLAN (9) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

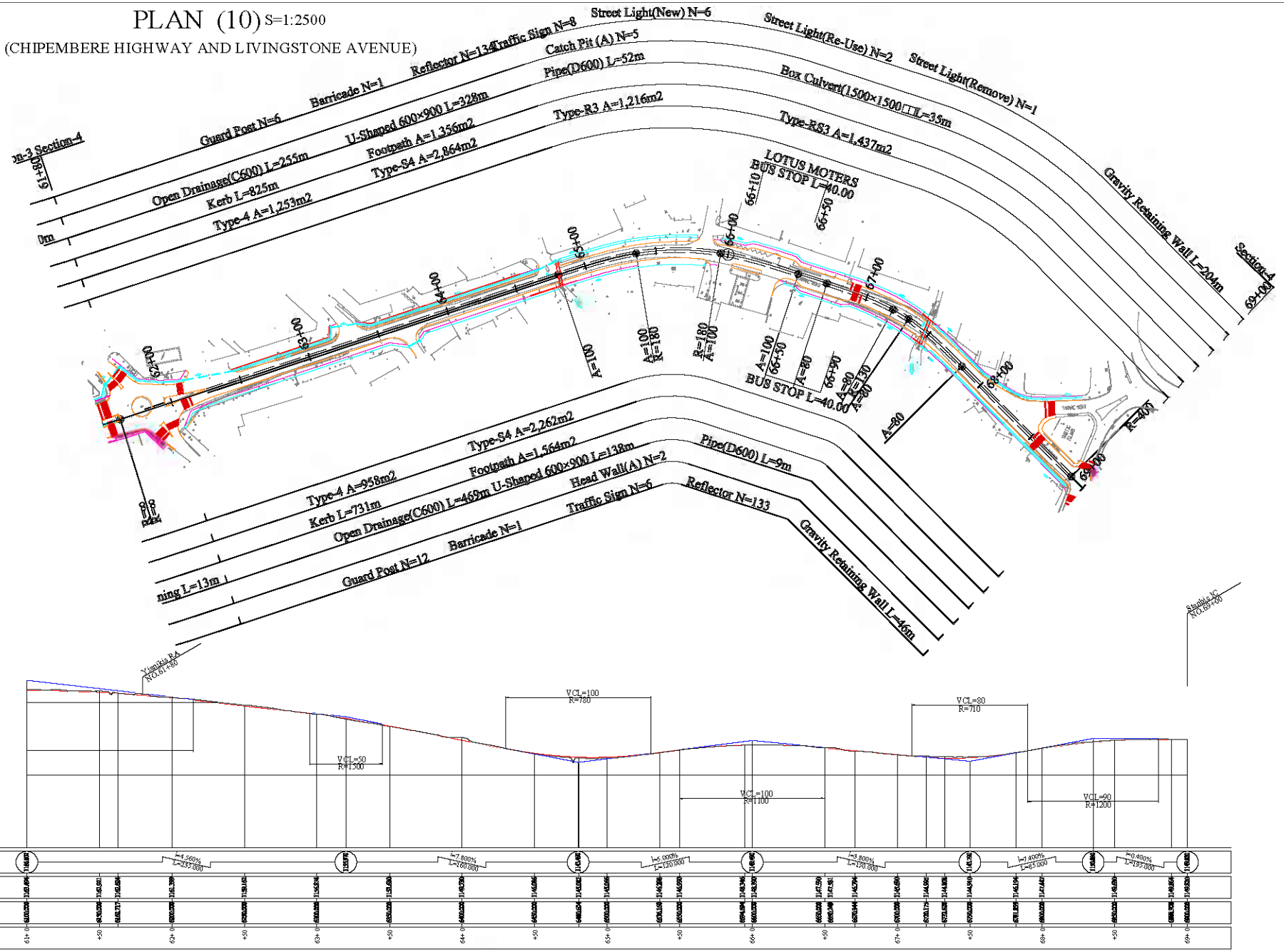




BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (9/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 10/29

PLAN (10) S=1:2500

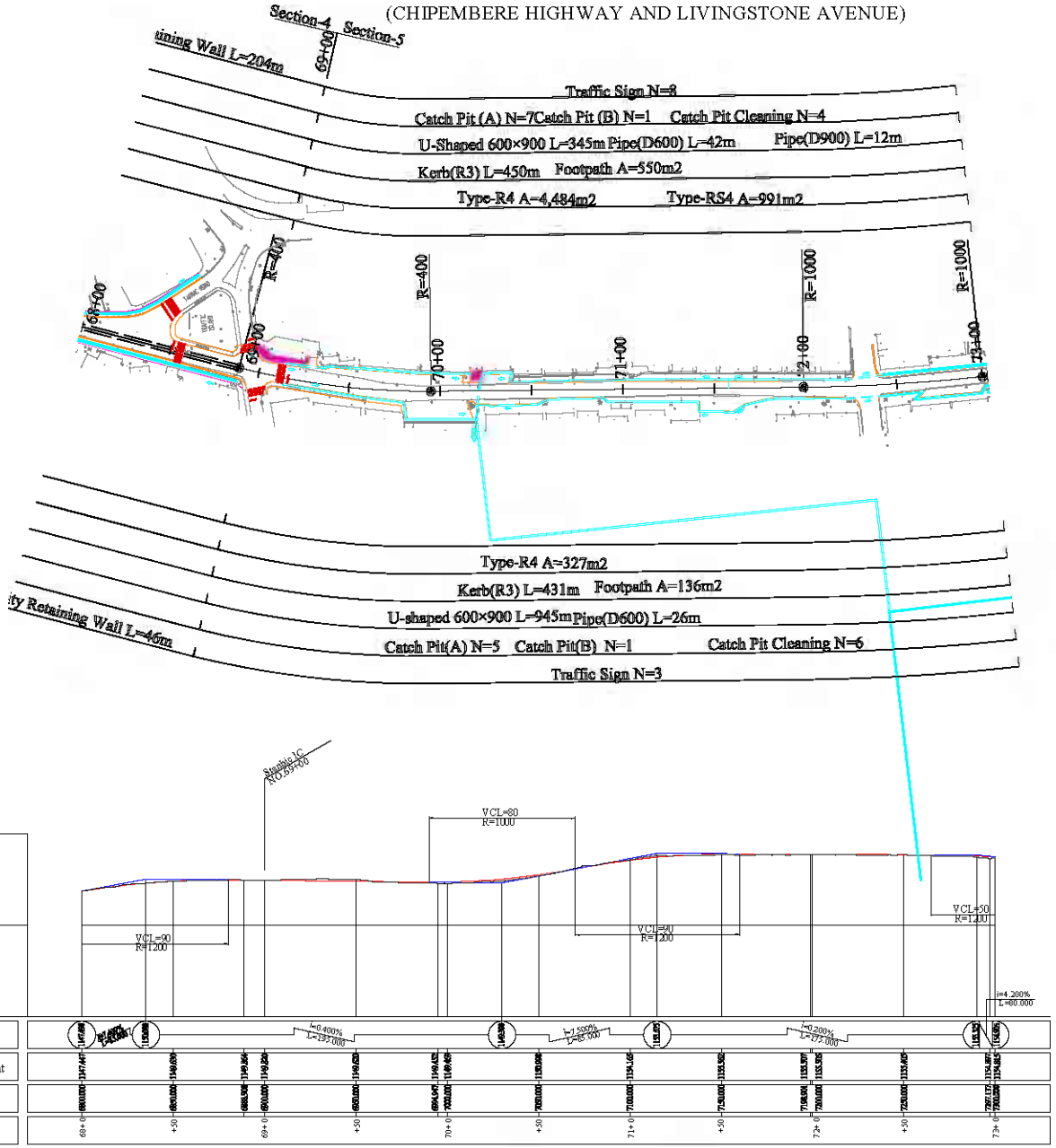
(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)



BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (10/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 11/29

PLAN (11) S=1:2500

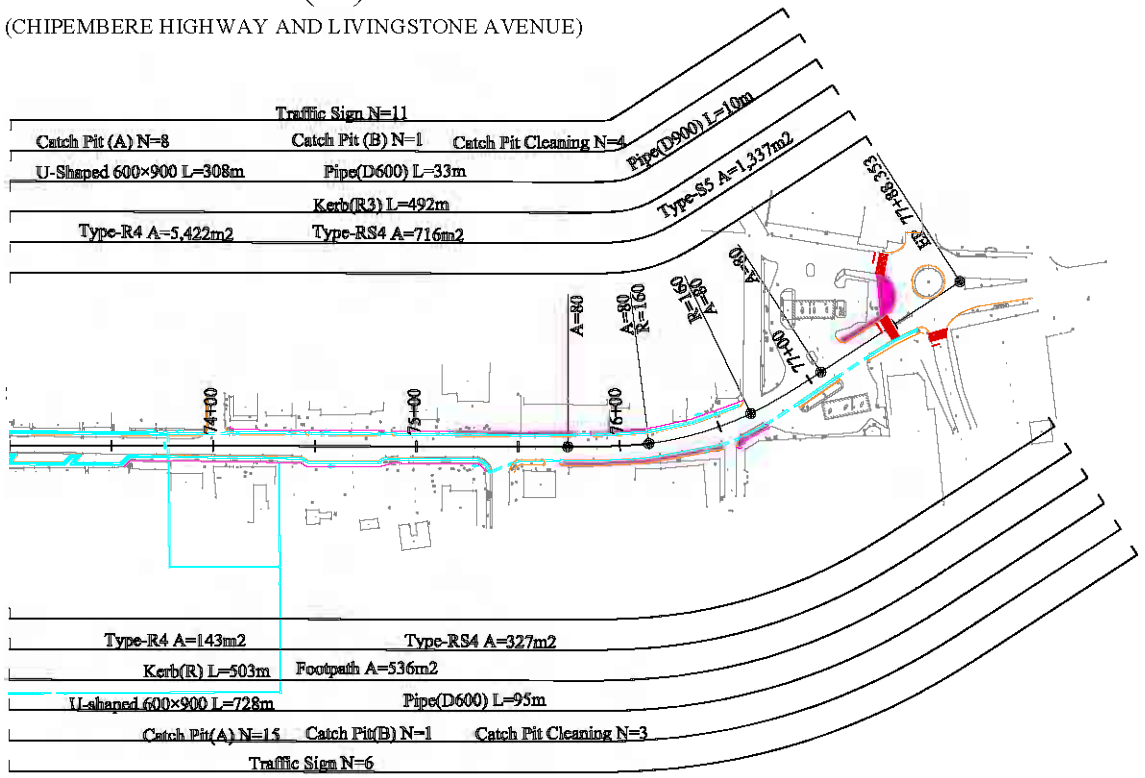
(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)

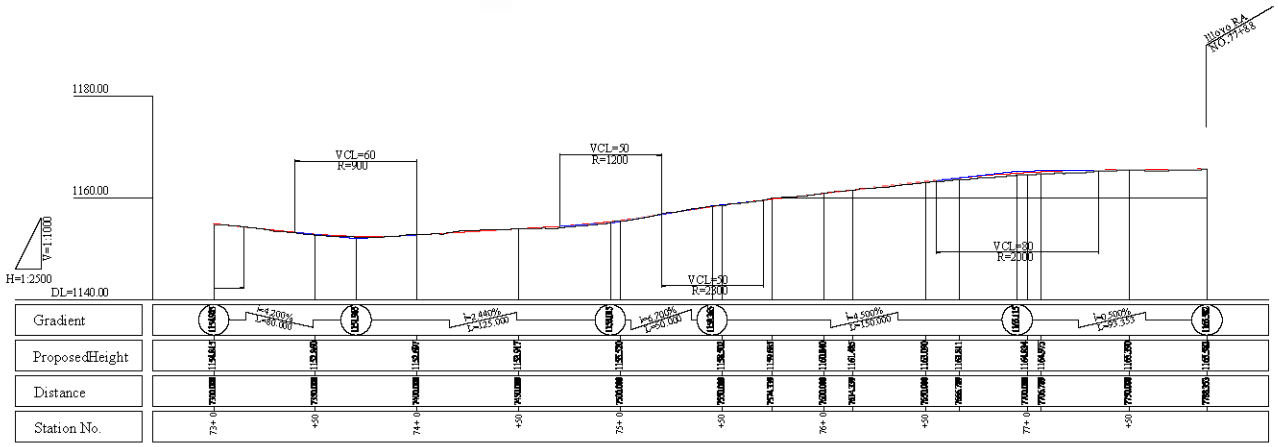


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (11/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 12/29

PLAN (12) S=1:2500

(CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE)



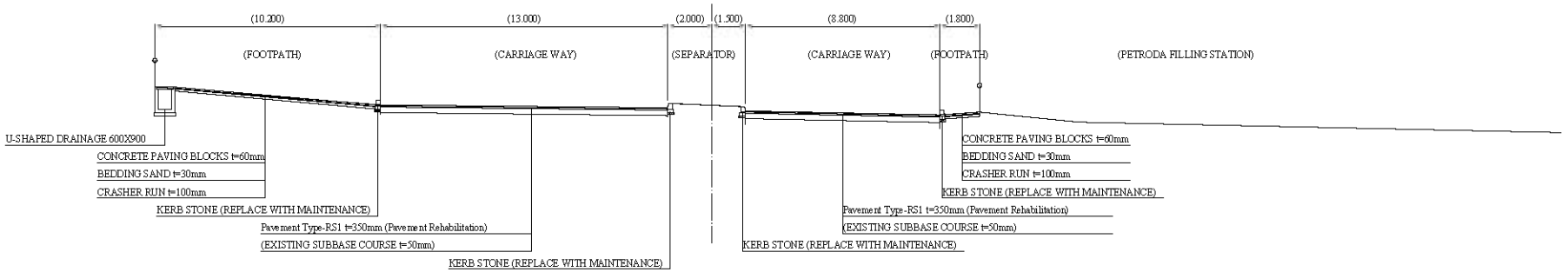


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE PLAN (12/12)	SCALE S=1:2500	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 13/29

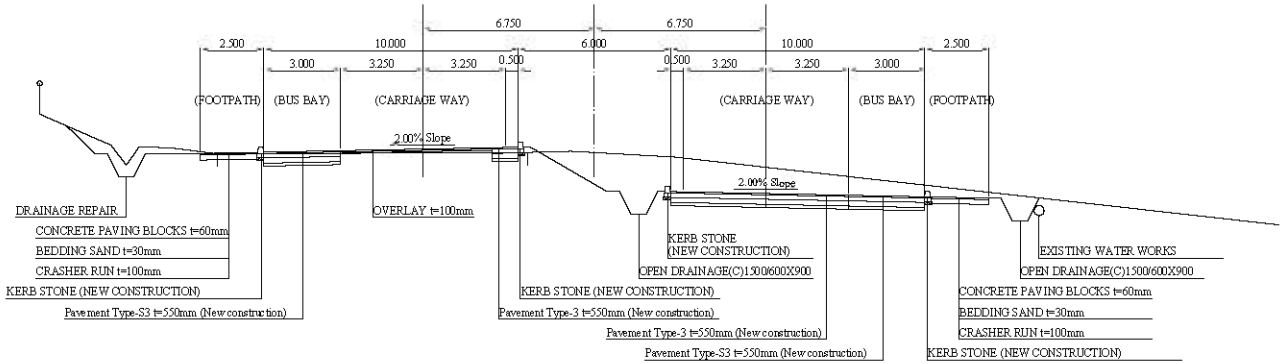
Typical-Cross-Section(1) S=1:200

(CHIPEMBERE HIGHWAY)

Between Larji kulji RA and Clock Tower RA (SECTION 1)
1+00



Between Clock Tower RA and Chichiri RA (SECTION 2)
6+20(KRISTWICK BUS LAY BYE)



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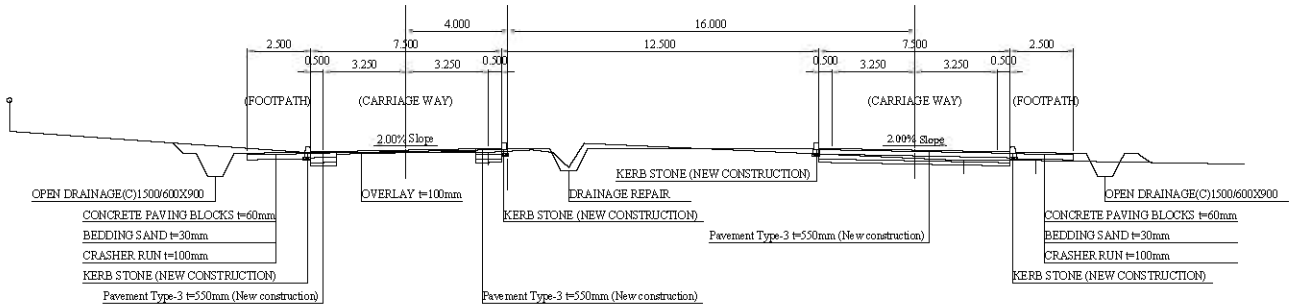
BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE Typical-Cross-Section(1)	SCALE S=1:200	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 14/29

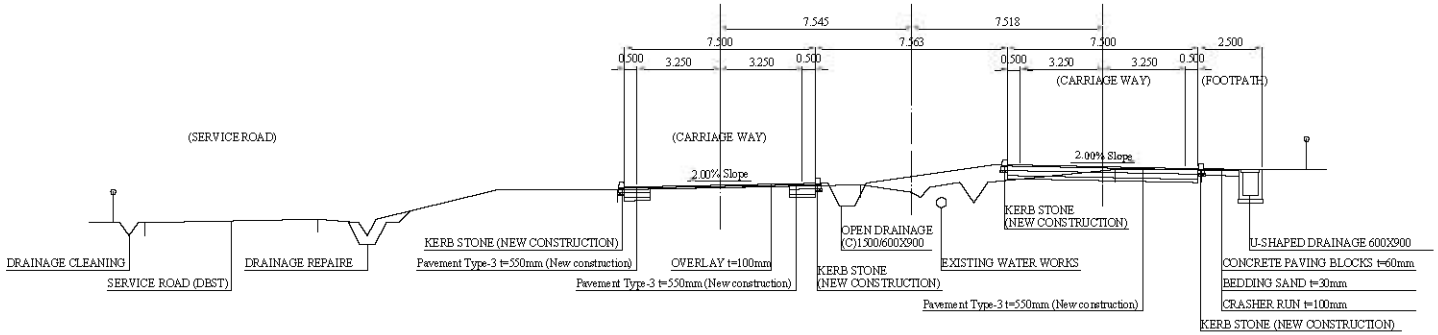
Typical-Cross-Section(2) S=1:200

(CHIPEMBERE HIGHWAY)

Between Clock Tower RA and Chichiri RA (SECTION 2)
23+40



Between Clock Tower RA and Chichiri RA (SECTION 2)
12+60

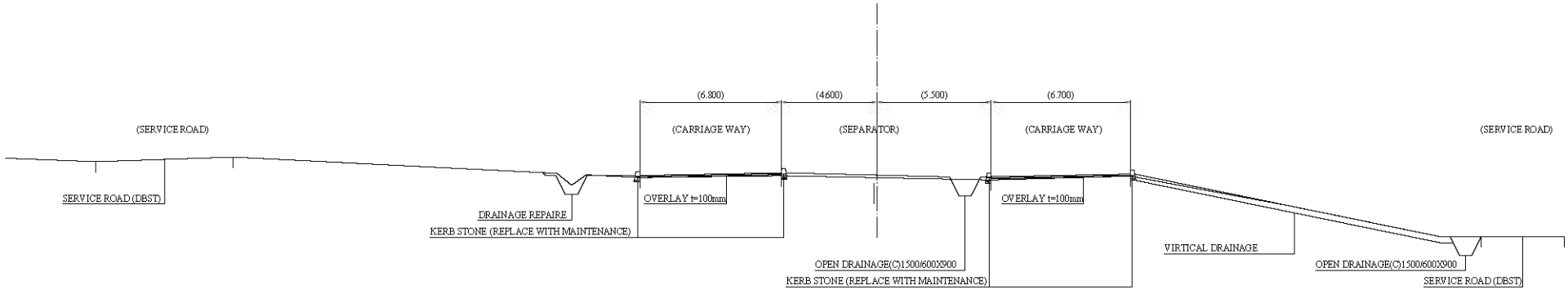


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			Typical-Cross-Section(2)	S=1:200		DATE		SUBMITTED	JUN,2007	15/29

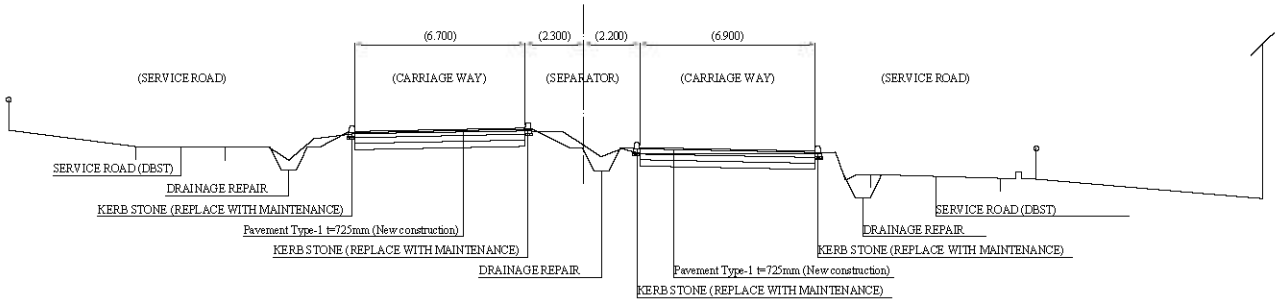
Typical-Cross-Section(3) S=1:200

(CHIPEMBERE HIGHWAY)

Between Chichiri RA and Yianikis RA (SECTION 3)
44+00



Between Chichiri RA and Yianikis RA (SECTION 3)
54+00

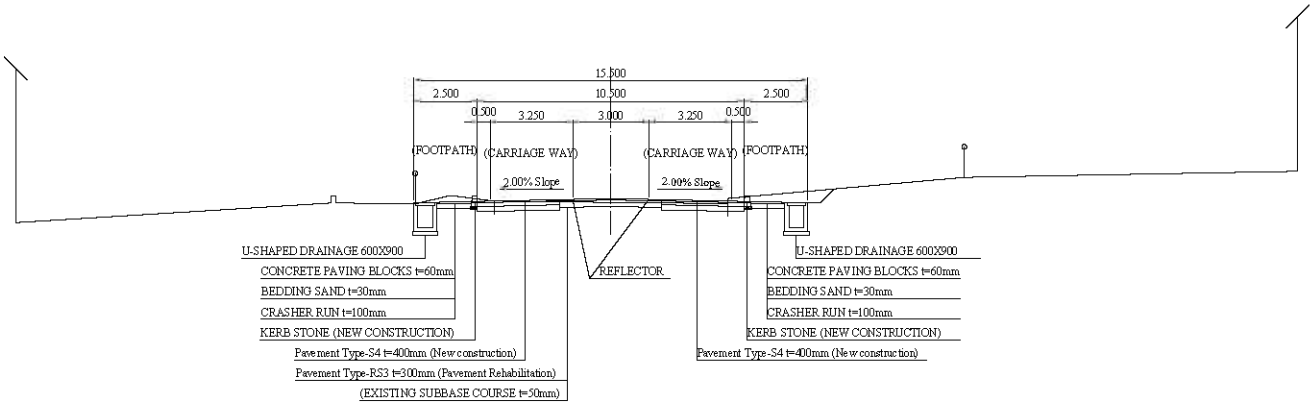


BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			Typical-Cross-Section(3)	S=1:200		DATE		SUBMITTED	JUN,2007	16/29

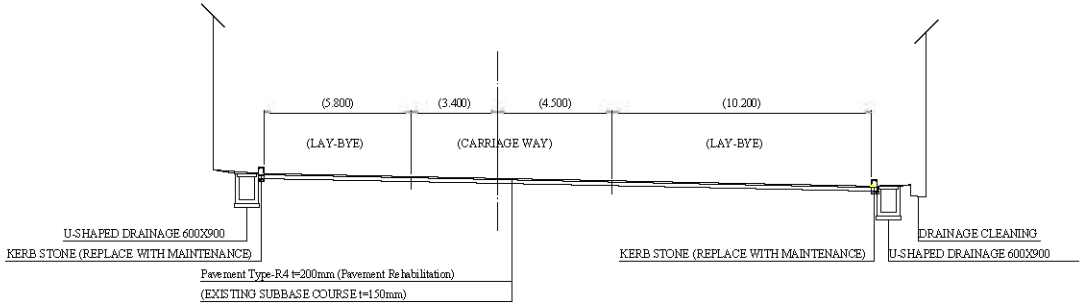
Typical-Cross-Section(4) S=1:200

(CHIPEMBERE HIGHWAY)

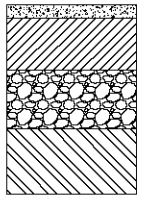
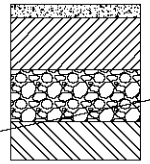
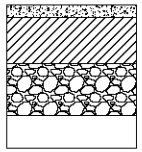
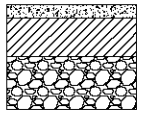
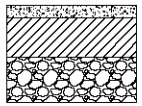
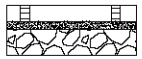
Between Yianikis RA and Stanbic IC (SECTION 4)
63+50

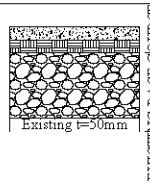
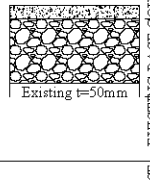
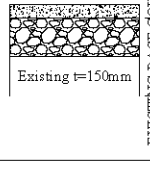
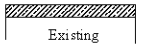


(LIVINGSTONE AVENUE)
Between Stanbic IC and Illovo RA (SECTION 5)
70+00



BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	CHIPEMBERE HIGHWAY AND LIVINGSTONE AVENUE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			Typical-Cross-Section(4)	S=1:200		DATE		SUBMITTED	JUN,2007	17/29

Type	Total thickness	Pavement Structure (New construction)
Type-1 (Type-S1) Section-3	Design CBR 3%～4% 725mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) BASE COURSE (Cemented Stabilization) t=200mm UPPER SUBBASE COURSE (Cemented Stabilization) t=225mm LOWER SUBBASE COURSE t=250mm
Type-2 (Type-S2) Section-1	Design CBR 5%-7% 600mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) BASE COURSE (Cemented Stabilization) t=200mm UPPER SUBBASE COURSE (Cemented Stabilization) t=200mm LOWER SUBBASE COURSE t=150mm
Type-3 (Type-S3) Section-2	Design CBR 5%-7% 550mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) BASE COURSE (Cemented Stabilization) t=175mm UPPER SUBBASE COURSE (Cemented Stabilization) t=200mm LOWER SUBBASE COURSE t=125mm
Type-4 (Type-S4) Section-4	Design CBR 15%-29% 400mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) BASE COURSE (Cemented Stabilization) t=150mm UPPER SUBBASE COURSE (Cemented Stabilization) t=200mm
Type-5 (Type-S5) Section-5	Design CBR 15%-29% 375mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) BASE COURSE (Cemented Stabilization) t=150mm UPPER SUBBASE COURSE (Cemented Stabilization) t=175mm
Footpath	190mm	 CONCRETE PAVING BLOCKS t=60mm BEDDING SAND t=30mm CRASHER RAN t=100mm

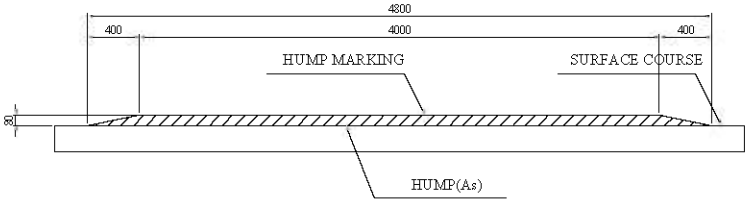
Type	Total thickness	Pavement Structure (Rehabilitation)
Type-R1 (Type-RS1) Section-1	For Construction 350mm For Design 400mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) ASPHALT BINDER COURSE(Hot Mix Asphalt) t=50mm Partial reconstruction BASE COURSE (Cemented Stabilization) t=250mm EXISTING BASE COURSE(existing material) t=50mm
Type-R2 (Type-RS1)	100mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) ASPHALT BINDER COURSE(Hot Mix Asphalt) t=50mm
Type-R3 (Type-RS3) Section-4	For Construction 300mm For Design 350mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) Partial reconstruction BASE COURSE (Cemented Stabilization) t=250mm EXISTING BASE COURSE(existing material) t=50mm
Type-R4 (Type-RS4) Section-5	For Construction 200mm For Design 350mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) Partial reconstruction BASE COURSE (Cemented Stabilization) t=150mm EXISTING BASE COURSE(existing material) t=150mm
Overlay (Overlay-S) Section-2 Section-3	100mm	 ASPHALT SURFACE COURSE(Hot Mix Asphalt) t=50mm (SEMI FLEXIBLE PAVEMENT t=50mm) ASPHALT BINDER COURSE(Hot Mix Asphalt) t=50mm
Service Road	mm	 DBST

NOTES: 1."TYPE-S*" INDICATE THE SEMI FLEXIBLE PAVEMENT

BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE: PAVEMENT STRUCTURE	SCALE: SHOWN	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED / DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED / SUBMITTED	DATE: JUN.2007	SHEET NO: 18/29

PAVEMENT WORK STRUCTURE

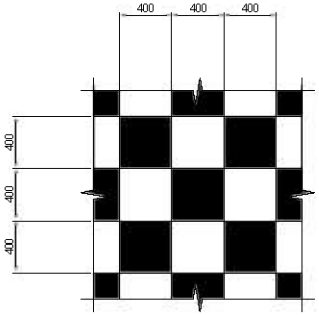
HUMP S=1:40



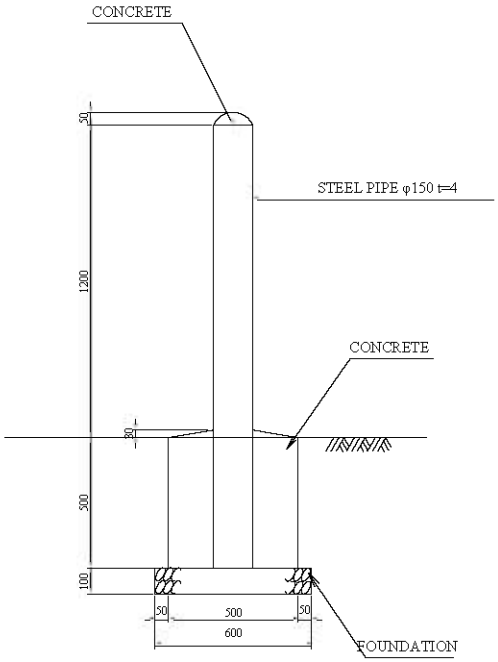
MATERIALS LIST PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
ASPHALT		t	5.045	
MARKING		m	97.600	W=0.150m

HUMP MARKING S=1:40



BARRICADE S=1:20

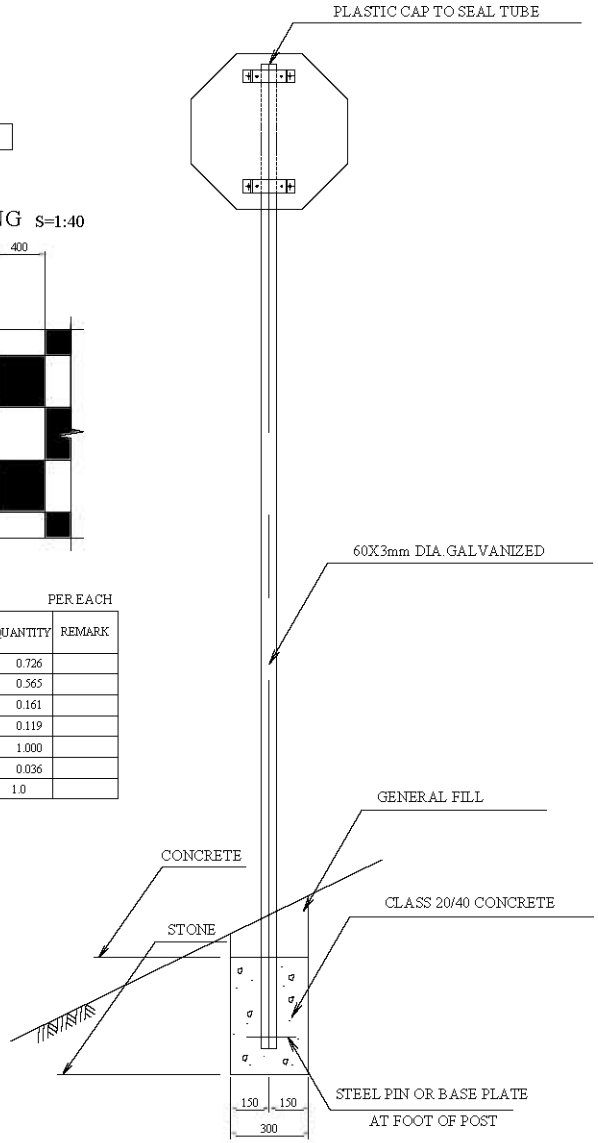


MATERIALS LIST PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	0.726	
FILLING		cu.m	0.565	
SURPLUS SOILS		cu.m	0.161	
CONCRETE	σck=18MPa	cu.m	0.119	
FORM		sq.m	1.000	
FOUNDATION		cu.m	0.036	
STEEL PIPE	φ150 t=4	no.	1.0	

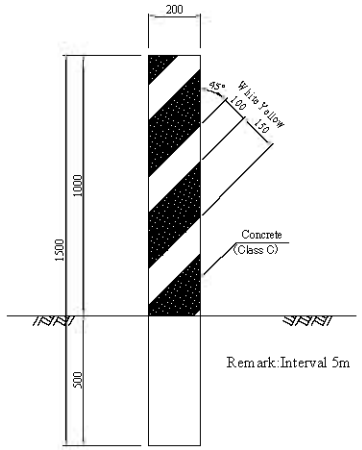
SIGN POST S=1:20

TYPE 1



Guard Post (Draft) S=1:20

Side View



MATERIALS LIST PER 100EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
CONCRETE	σck=18MPa	cu.m	6.000	
FORM		sq.m	98.000	
REINFORCED	D10	kg	371.840	
PAINT	WHITE	sq.m	32.000	
	YELLOW	sq.m	48.000	

MATERIALS LIST PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY		REMARK
			TYPE 1	TYPE 2	
EXCAVATION		cu.m	0.486	0.486	
FILLING		cu.m	0.446	0.446	
SURPLUS SOILS		cu.m	0.040	0.040	
SIGN	ALUMINIUM PLATE	nos.	1.0	2.0	
SEAL TUBE	PLASTIC CAP	nos.	1.0	1.0	
STEEL PIPE	GALVANISED t=60×3mm×3.2m	nos.	1.0	1.0	
STEEL PIN	GALVANIZED	nos.	1.0	1.0	
CONCRETE	σck=18MPa	cu.m	0.041	0.041	
FORM		sq.m	0.054	0.054	
FIXING BRACKET		nos.	2.0	3.0	
STIFFENING MATERIAL	ANGLE AND PREFORM FLANGE	nos.	1.0	1.0	

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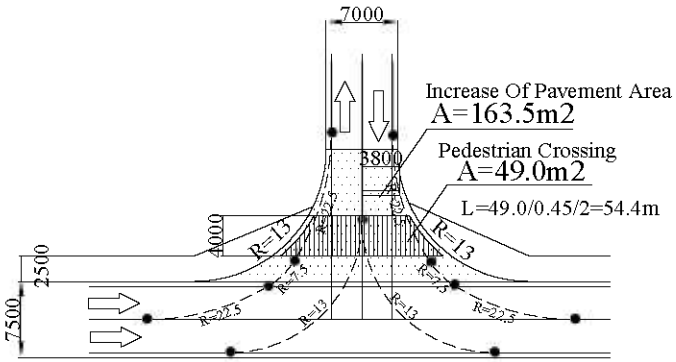
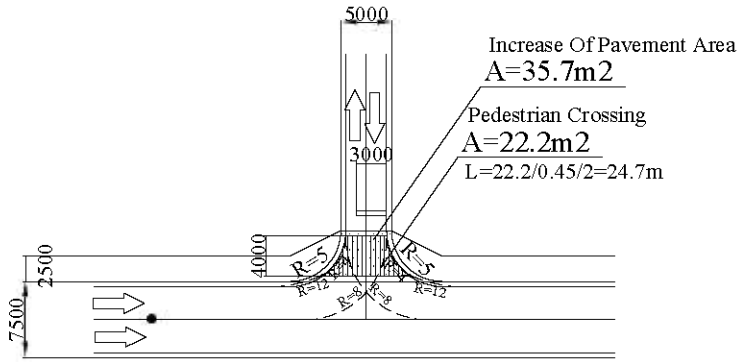
BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			PAVEMENT WORK STRUCTURE	SHOWN		DATE		SUBMITTED	JUN.2007	19/29

Approach Road Structure

Approach-(L) W=7.00



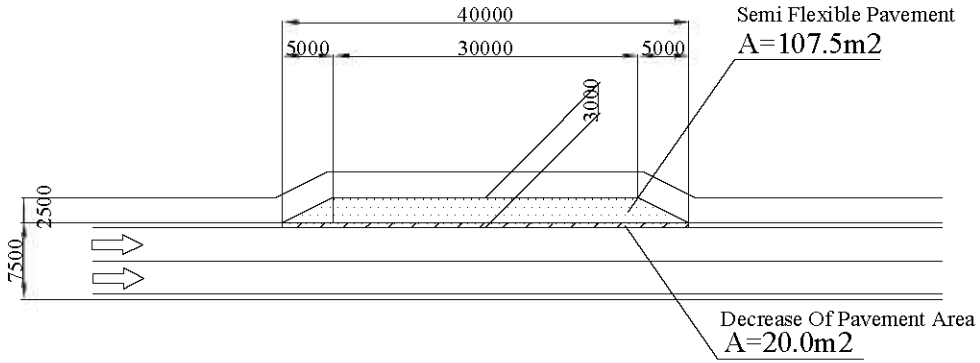
Approach-(S) W=5.00



MATERIALS LIST — PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY AP(L)W=7.0m	QUANTITY AP(S)W=5.0m	REMARKS
Pavement	Area	Sq.m	163.5	35.7	
Road Marking	Stop Line	m	3.8	3.0	Full LIne W=0.45
	Pedestrian Crossing	m	43.3	24.7	Full LIne W=0.45

Bus Stop



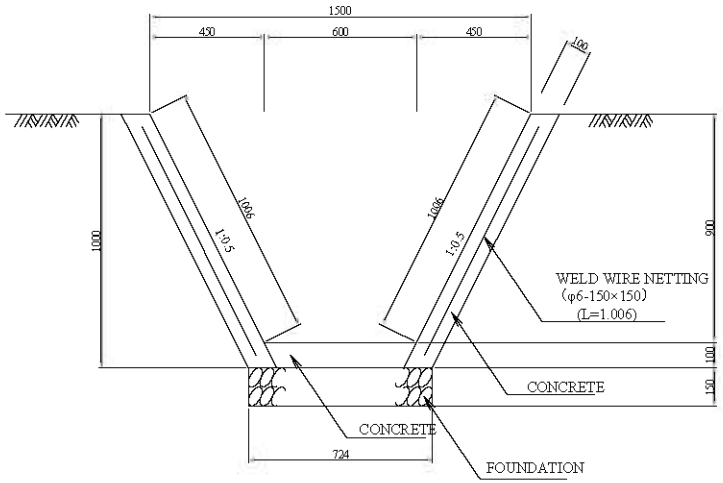
MATERIALS LIST — PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY Bus Stop	QUANTITY 撤去	REMARKS
Semi Flexible Pavement		Sq.m	107.5	-107.5	
Pavement		Sq.m	-20.0		

BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			APPROACH ROAD STRUCTURE	1:500		DATE		SUBMITTED	JUN,2007	20/29

DRAINAGE STRUCTURE(1)

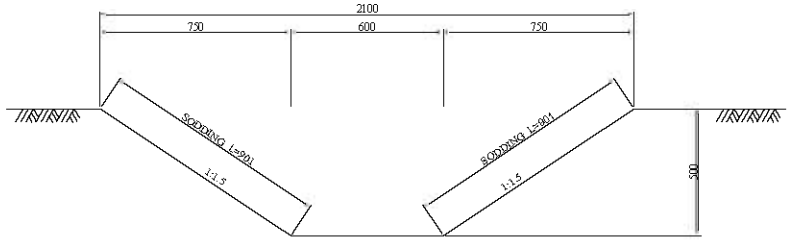
OPEN DRAINAGE (C)1500/600X900 S=1:20



MATERIALS LIST PER 100m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cum	133.260	
SURPLUS SOILS		cum	133.260	
PREPARATION FOR SLOPE		sq.m	223.600	
CONCRETE	ock=18MPa	cum	27.900	
FORM		sq.m	223.600	
FOUNDATION		cum	10.860	
REINFORCED	f 6-150×150 WELD WIRE NETTING	kg	615.672	

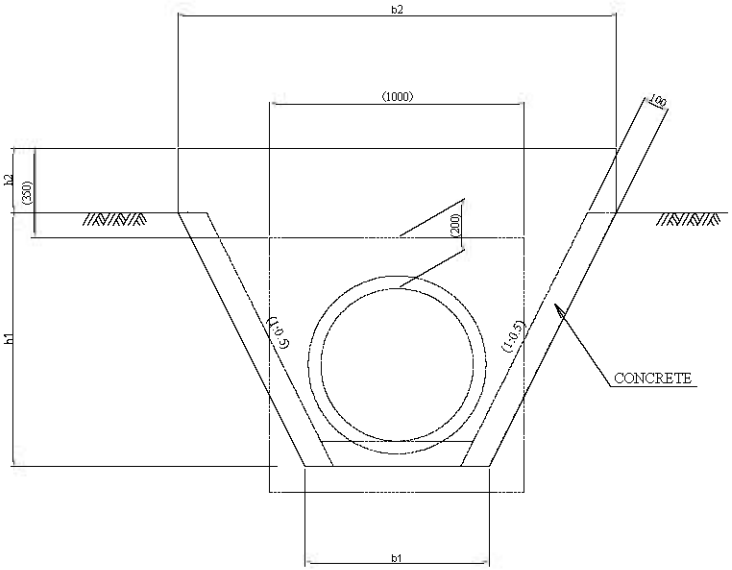
OPEN DRAINAGE S=1:20



MATERIALS LIST PER m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cum	0.675	
SURPLUS SOILS		cum	0.675	
SODDING		sq.m	1.802	

HEAD WALL S=1:20



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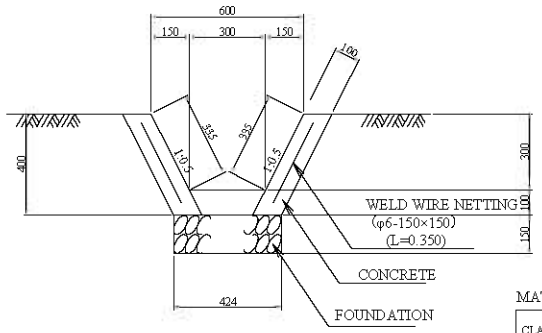
BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			DRAINAGE STRUCTURE (1/7)	SHOWN		DATE		SUBMITTED	JUN,2007	21/29

DRAINAGE STRUCTURE(2)

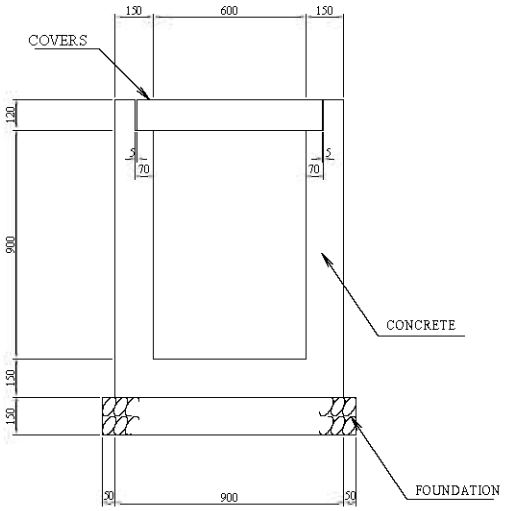
OPEN DRAINAGE (C)600/300X300 S=1:20



MATERIALS LIST PER 100m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	31.320	
SURPLUS SOILS		cu.m	31.320	
PREPARATION FOR SLOPE		sq.m	89.400	
CONCRETE	σck=18MPa	cu.m	11.460	
FORM		sq.m	89.400	
FOUNDATION		cu.m	6.360	
REINFORCED	T6-150×150	kg	214.200	

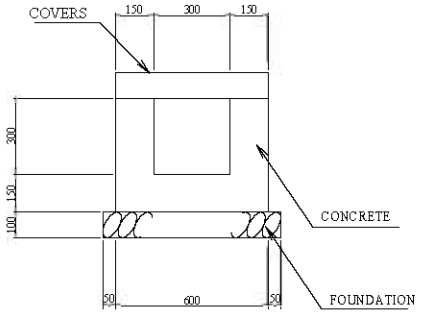
U-SHAPED DRAINAGE S=1:20



MATERIALS LIST PER m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	2.851	
FILLING		cu.m	1.648	
SURPLUS SOILS		cu.m	1.203	
CONCRETE	σck=18MPa	cu.m	0.424	
FORM		sq.m	4.380	
FOUNDATION		cu.m	0.150	

U-SHAPED (300) S=1:20



MATERIALS LIST PER m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	0.660	
FILLING		cu.m	0.320	
SURPLUS SOILS		cu.m	0.340	
CONCRETE	σck=18MPa	cu.m	0.180	
FORM		sq.m	1.500	
FOUNDATION		cu.m	0.070	

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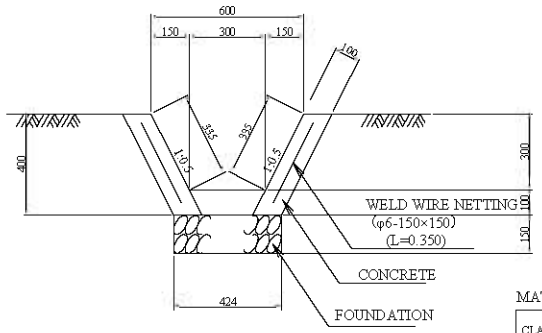
BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE / SHEET NO
			DRAINAGE STRUCTURE (2/7)	SHOWN		DATE		SUBMITTED	JUN,2007 / 22/29

DRAINAGE STRUCTURE (3)

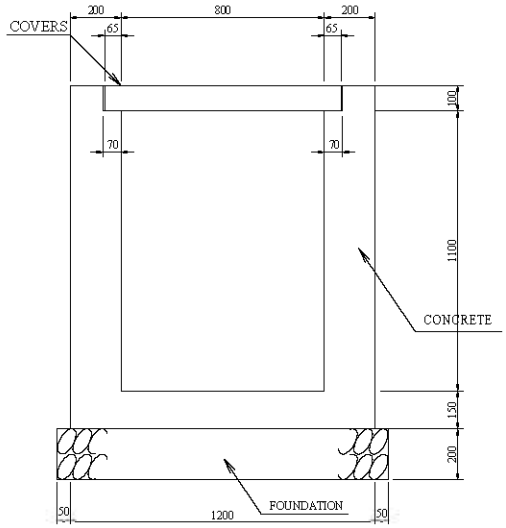
VERTICAL DRAINAGE (C)600/300X300 S=1:20



MATERIALS LIST PER 100m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	31.320	
SURPLUS SOILS		cu.m	31.320	
PREPARATION FOR SLOPE		sq.m	89.400	
CONCRETE	σck=18MPa	cu.m	11.460	
FORM		sq.m	89.400	
FOUNDATION		cu.m	6.360	
REINFORCED	T6-150×150	kg	214.200	

CATCH PIT(A) 800X800X1100 S=1:20



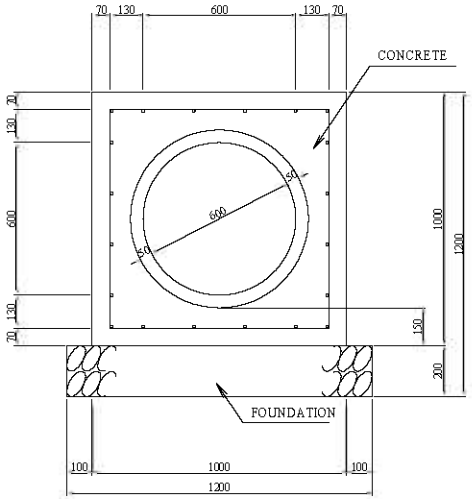
MATERIALS LIST PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	10.246	
FILLING		cu.m	7.964	
SURPLUS SOILS		cu.m	2.282	
CONCRETE	σck=18MPa	cu.m	0.987	
FORM		sq.m	10.000	
FOUNDATION		cu.m	0.338	
COVER		sheet	2	

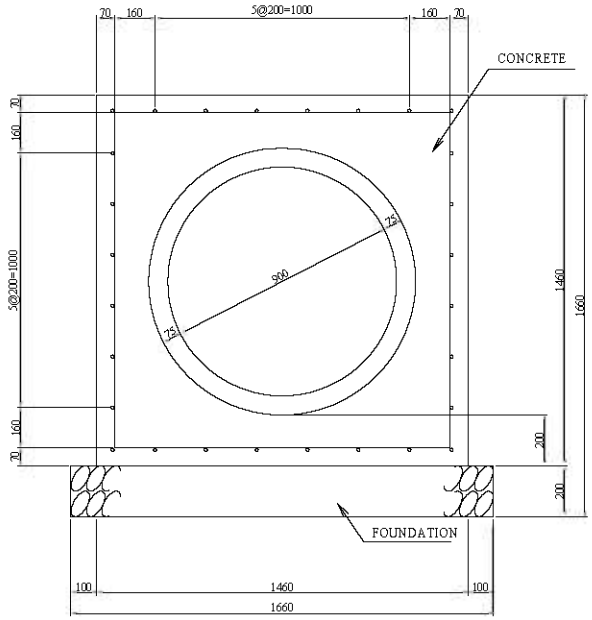
BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE DRAINAGE STRUCTURE (3/7)	SCALE SHOWN	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 23/29

DRAINAGE STRUCTURE (4)

PIPE CULVERT D600 S=1:20



PIPE CULVERT D900 S=1:20



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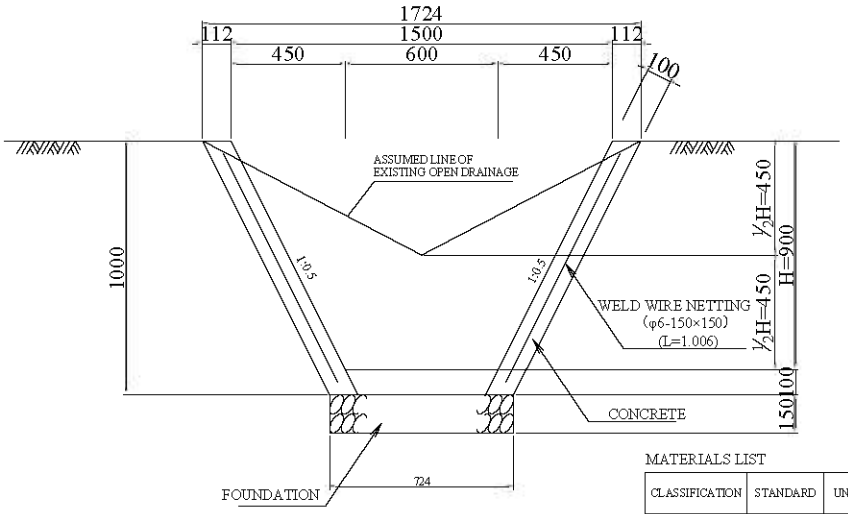
BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE DRAINAGE STRUCTURE (4/7)	SCALE SHOWN	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 24/29

DRAINAGE STRUCTURE (5)

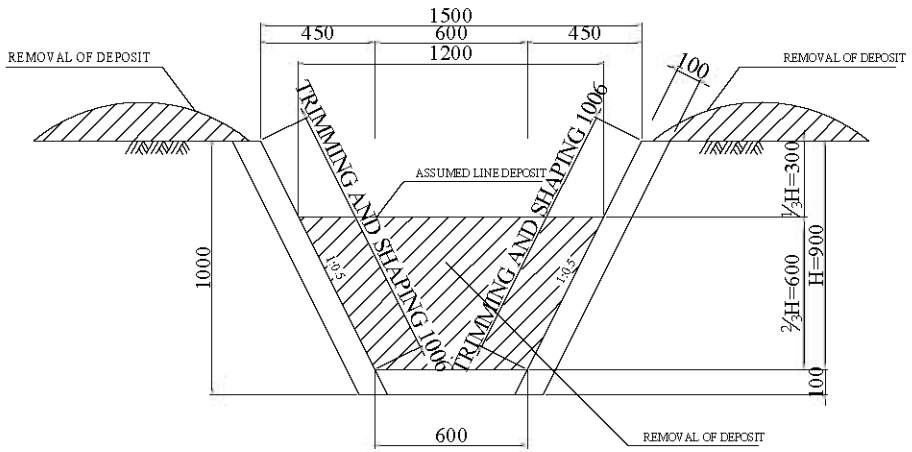
DRAINAGE REPAIR S=1:20



MATERIALS LIST PER 10m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	9.447	
SURPLUS SOILS		cu.m	9.447	
PREPARATION FOR SLOPE		sq.m	22.360	
CONCRETE	σck=18N/mm2	cu.m	2.790	
FORM		sq.m	22.360	
FOUNDATION		cu.m	1.086	
REINFORCED WELD WIRE MESH	Φ6-150×150	kg	61.567	

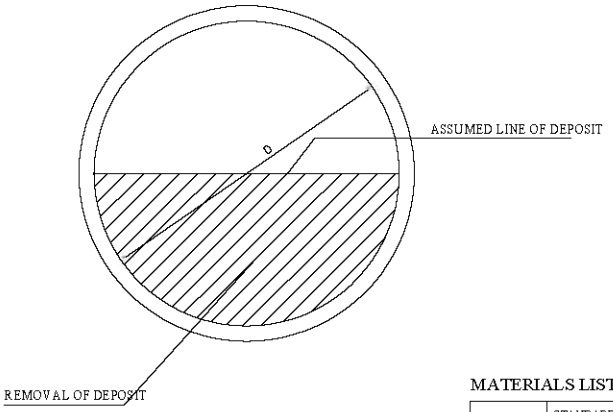
CLEANING OF EXISTING OPEN DRAINAGE S=1:20



MATERIALS LIST PER 10m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
REMOVAL OF DEPOSIT		cu.m	5.400	
TRIMMING AND SHAPING		sq.m	20.120	

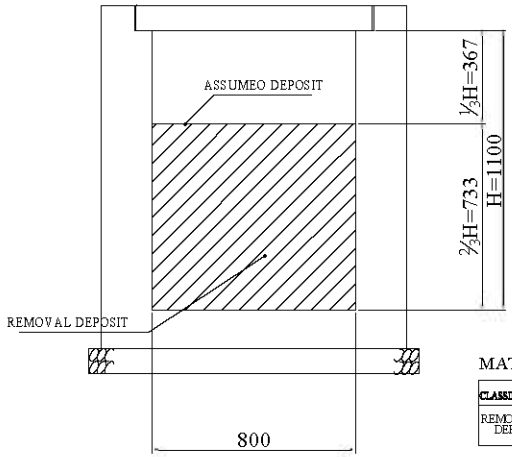
CLEANING OF EXISTING PIPE CULVERT S=1:20



MATERIALS LIST PER 10m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARKS
REMOVAL OF DEPOSIT	D 600	cu.m	1.414	

CLEANING OF EXISTING CATCH PIT S=1:20



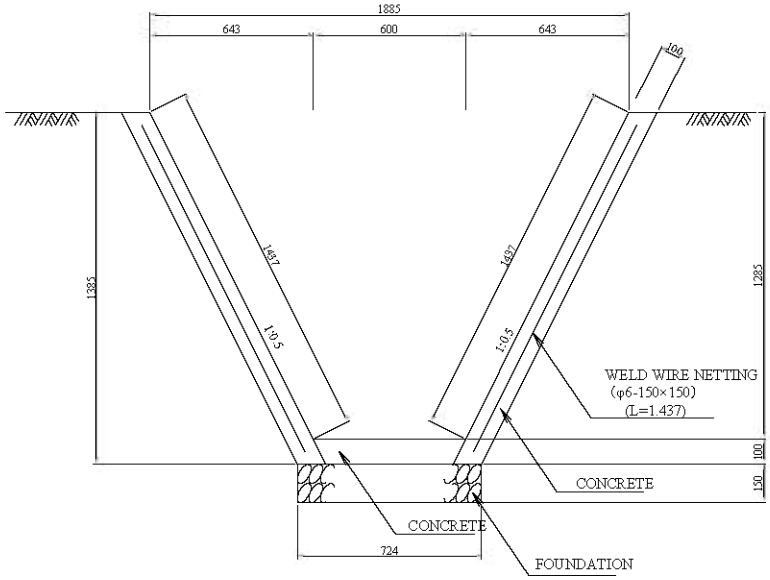
MATERIALS LIST PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARKS
REMOVAL OF DEPOSIT	800X800X1100	cu.m	0.469	

BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE: DRAINAGE STRUCTURE (5/7)	SCALE: SHOWN	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED / DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED / SUBMITTED	DATE: JUN,2007	SHEET NO: 25/29

DRAINAGE STRUCTURE (6)

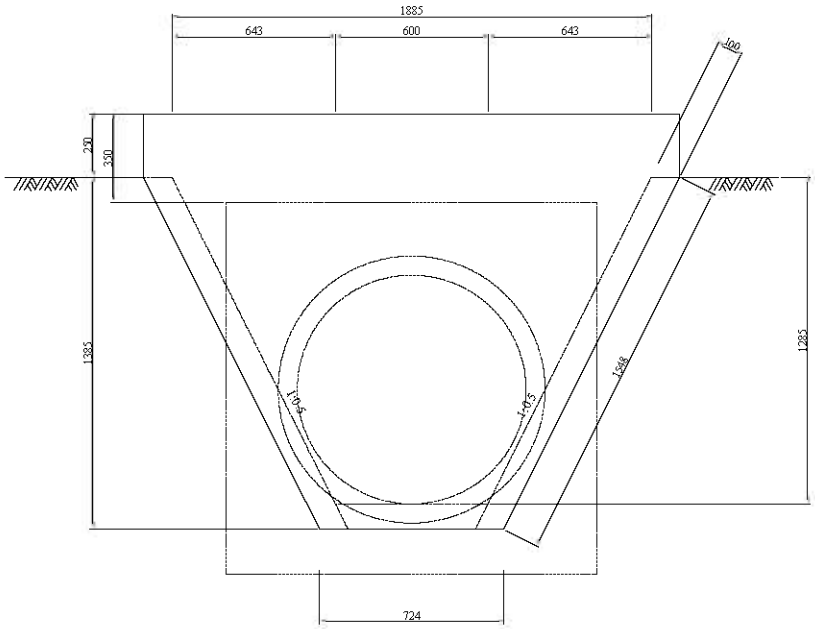
OPEN DRAINAGE (C) 1885/600X1285 S=1:20



MATERIALS LIST PER 100m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cum	207.045	
SURPLUS SOILS		cum	207.045	
PREPARATION FOR SLOPE		sq.m	309.600	
CONCRETE	σck=18MPa	cum	36.524	
FORM		sq.m	309.600	
FOUNDATION		cum	10.860	
REINFORCED	f6-150×150 WELD WIRE NETTING	kg	879.444	

HEAD WALL TYPE-C S=1:20



MATERIALS LIST PER 10EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cum	12.752	
FILLING		cum	7.847	
SURPLUS SOILS		cum	4.905	
CONCRETE	σck=18MPa	cum	4.632	
FORM		sq.m	46.049	
REINFORCED	f6-150×150 WELD WIRE NETTING	kg	36.995	

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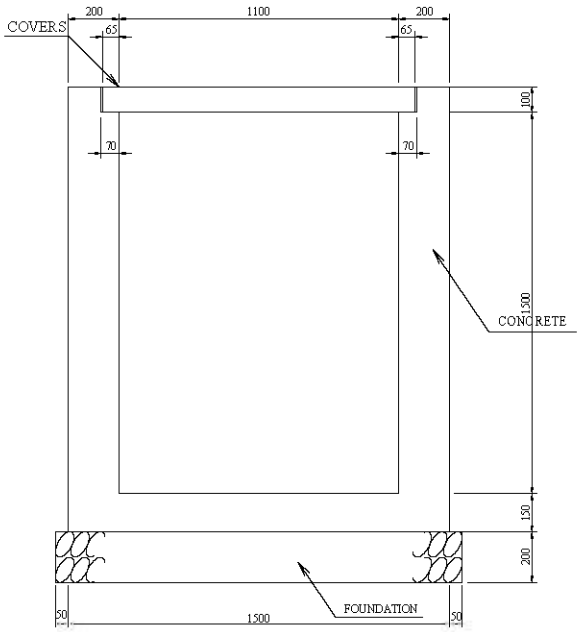
BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE DRAINAGE STRUCTURE (6/7)	SCALE SHOWN	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED DATE	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED SUBMITTED	DATE JUN,2007	SHEET NO 26/29

DRAINAGE STRUCTURE (7)

CATCH PIT (B)1100X1100X1500 S=1:20



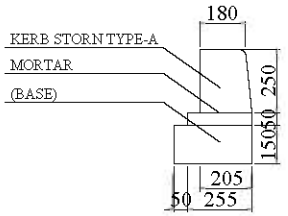
MATERIALS LIST PER EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	19.056	
FILLING		cu.m	14.607	
SURPLUS SOILS		cu.m	4.449	
CONCRETE	ock=18MPa	cu.m	1.734	
FORM		sq.m	17.100	
FOUNDATION		cu.m	0.512	
COVER		sheet	2	

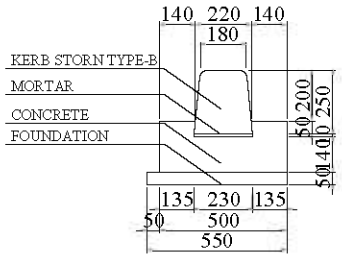
COVER S=1:20

KERB STONE S=1:20

Type A



Type B

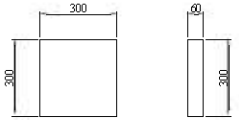


MATERIALS LIST PER 100m

CLASSIFICATION	STANDARD	UNIT	QUANTITY		REMARK
			TYPE-A	TYPE-B	
FOUNDATION		cu.m	-	2.750	
CONCRETE	ock=18MPa	cu.m	-	8.645	
FORM		sq.m	-	40.000	
MORTAR	1:3	cu.m	1.275	0.230	
KERB STONE	TYPE-A	nos	163.934	-	
	TYPE-B	nos	-	163.934	

PRECAST UNITS

CONCRETE PAVING BLOCKS S=1:20

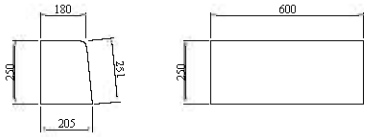


MATERIALS LIST PER 100EACH

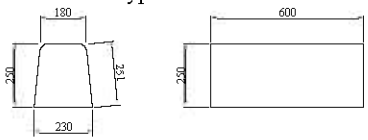
CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
CONCRETE		cu.m	0.540	
FORM		sq.m	16.200	

KERB STONE S=1:20

Type A



Type B



MATERIALS LIST PER 100EACH

CLASSIFICATION	STANDARD	UNIT	QUANTITY		REMARK
			TYPE-A	TYPE-B	
CONCRETE	ock=18MPa	cu.m	2.888	3.075	
FORM		sq.m	51.985	54.170	

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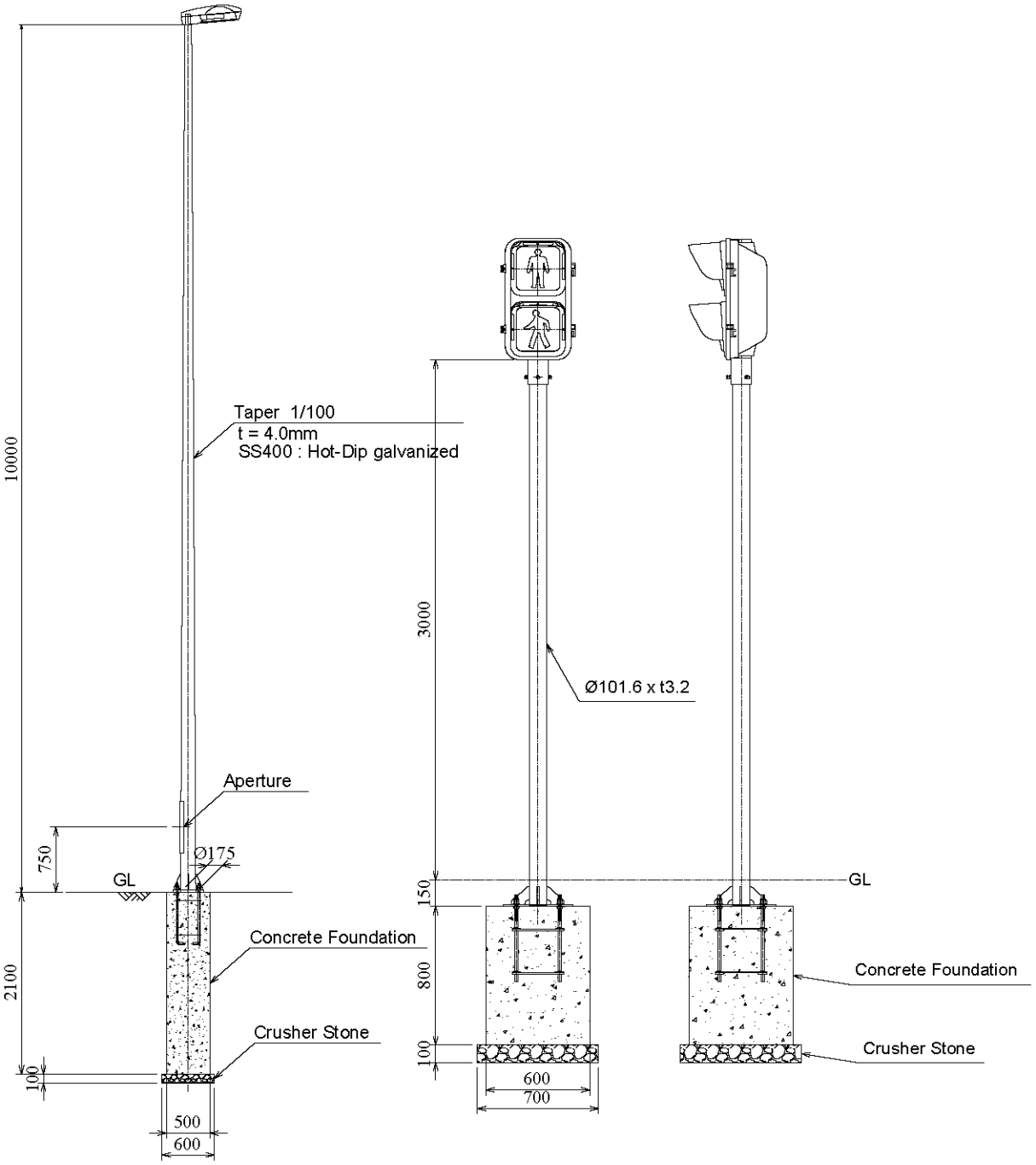
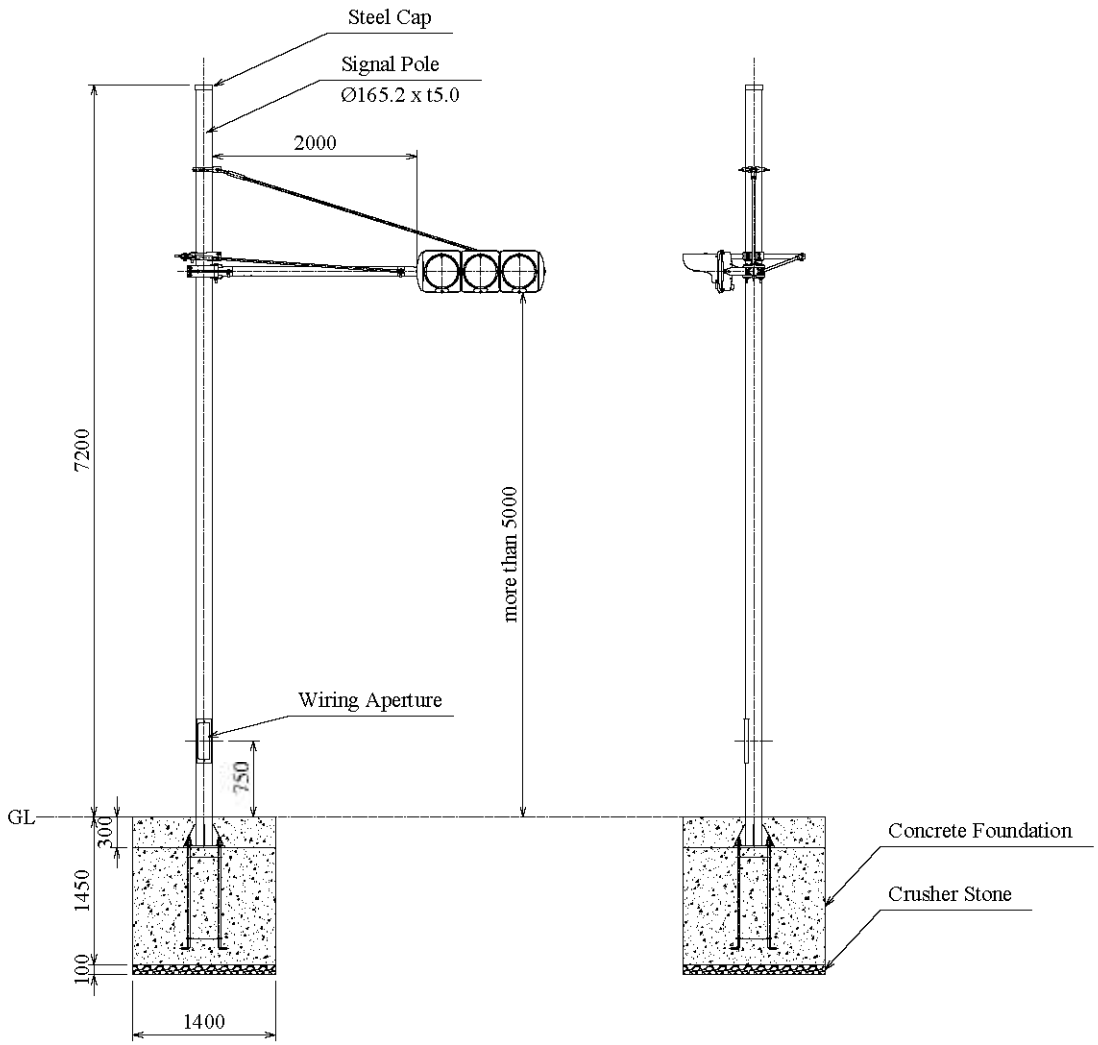
			DRAINAGE STRUCTURE (7/7)	SHOWN		DATE		SUBMITTED	JUN,2007	27/29



Detail of Street Light (S = 1/50)

Pedestrian Pole (S=1/25)

BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE	STREET LIGHT & PEDESTRAIN SIGNAL	SCALE SHOWN
			APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	
				BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	DATE
			PREPARED CHECKED	SUBMITTED	DATE JUN.2007
					SHEET NO 28/29



Signal Pole (S=1/50)

BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	THE BASIC DESIGN STUDY ON THE PROJECT FOR THE IMPROVEMENT OF BLANTYRE CITY ROADS IN THE REPUBLIC OF MALAWI	JAPAN ENGINEERING CONSULTANTS CO.,LTD	STRUCTURE	SCALE	BLANTYRE CITY ASSEMBLY THE REPUBLIC OF MALAWI	APPROVED	JAPAN ENGINEERING CONSULTANTS CO.,LTD	PREPARED CHECKED	DATE	SHEET NO
			SIGNAL	SHOWN		DATE		SUBMITTED	JUN,2007	29/29

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

（1） Execution Principles

On the assumption that the Project will be carried out through the Japanese Grant Aid scheme, the execution principles are described as follows:

- Local workers, equipment and materials should be effectively managed to their maximum efficiency in order to create employment opportunities, stimulate technology transfer and contribute to the revitalization of the regional economy.
- A close liaison system among MLGRD, the Blantyre City Assembly (BCA), the Consultant and contractors should be created.
- A realistic work plan should be formulated in due consideration of the rainy and dry seasons in Malawi, the period required to procure equipment and materials and the introduction of an appropriate construction method.
- A construction management system should be formulated under close collaboration with the Blantyre City Assembly (BCA).
- The Japanese Contractor should procure construction materials and machinery in accordance with the corresponding contractual agreement documentation.
- The Contractor should construct a camp yard in a lot to be provided by the Blantyre City Assembly (BCA) that is free of charge and may carry out construction work.
- Relocation and removal of public utilities (such as electricity, telephone and telecommunications, water supply and sewerage) should be implemented by the Blantyre City Assembly (BCA) prior to the commencement of the construction work.
- The BCA should coordinate the program with local residents and administrators of public facilities under cooperation with the Consultant and builders.
- Due to distinct rainy and dry seasons, a construction schedule should be formulated taking into consideration different conditions in place. In this sense, earth work shall not be carried out during the rainy season.
- Special attention should be given to safety measures during the construction work.

（2） Procurement Policy

In Malawi, most construction materials are imported from South Africa and are available within Malawi except traffic signals and lighting poles despite their slightly higher cost. Construction machinery is also available in Malawi through leasing companies. Accordingly, construction materials and equipment will be procured within Malawi in principle, except traffic signals and lighting poles.

2-2-4-2 Implementation Conditions

In case of implementing the Project, working conditions, social environment, onsite conditions and material and equipment procurement conditions should be taken into account.

（1） Respect of Working Standards

The Contractor should obey the Malawian Labor Code and attempt to hire workers. Under the Malawian Labor Code, the following duties are prescribed:

- Basic working hour: 8 hours a day, 48 hours a week
- Overtime allowance: Time wage × 1.5 in the case of working over 8 hours
  Time wage × 2.0 in the case of working on holidays
- Travel expenses / housing allowance: Appropriate travel expenses and housing allowance
- Paid leave: 18 days annually in the case of working 6 days a week, and 15 days annually in the case of working 5 days a week
- Retirement allowance: 2-week portion in the case of less than 10 years of service, 4-week portion in the case of more than 10 years service
- Maternity leave system: 8 weeks every 3-years
- Tax obligations: Workers shall be obliged to pay income taxes.

（2） Environmental Conservation During Construction Period

Assuming current environmental conservation standards, with respect to factors for environmental pollution such as coarse particulates and muddy water discharged through the digging of pits, disposal of surplus soil, landfill construction or pavement work, construction will be carried out in conformity with Malawian and Japanese legislation on pollution control. Recommendations on environmental conservation during construction work have also been made in the environment impact assessment report (EIA report), and a construction plan that takes this into consideration will be prepared.

（3） Onsite Guards

Under the Project, construction work will be carried out in the city center. Therefore, the Blantyre City Assembly (BCA) is required to provide with special guards in order to ensure the safety of construction-related personnel and prevent theft of materials at night.

（4） Respect of Local Customs

The number of working days shall be determined in line with Malawian religious customs. National holidays in Malawi are listed as follows.(Some are changeable by year.)

- January 1: New Year’s Day
- January 15: Chilembwe Day
- March 3: Martyrs Day
- April 6 to 9: Easter, Good Friday and Easter Monday
- May 1: Labor Day
- June 14: Freedom Day
- July 6: Republic Day
- October 8: Mothers' Day
- October 13: End of Ramadan
- December 25: Christmas Day
- December 26: December Boxing Day

（5） Effective Use of Tax Exemption System

A value-added tax (VAT) has been introduced in Malawi and the VAT is refunded after the completion of a project, even for an aid project. However, the big problem is that it takes a long time to obtain the refund. Therefore, related authorities are required to incorporate the amount of refund into the national budget of the following fiscal year in advance so that refund procedures can be implemented promptly after the completion of the Project.

（6） Safe Execution of Traffic Opening

The Project will be carried out during regular daytime traffic hours. Special attention should be thus paid not only to vehicles, but also workers and pedestrians. It is therefore essential to obtain the cooperation of the Malawian Police Service (MPS) and the Blantyre City Assembly (BCA) so that an execution plan may be formulated by deploying full-service police personnel.

On the other hand, apart from the above-mentioned full-service police personnel, the contractor should use traffic guards in order to ensure traffic safety during construction work.

2-2-4-3 Scope of Work

In the case of implementing the Project, undertakings to be taken by the Government of Japan and the Government of Malawi are outlined below.

（1） Undertakings to be taken by the Japanese side

- Facility construction shown in “3-1 Outline of the Project” and “3-2-2 Basic Plan” (hereinafter referred to as Basic Plan)
- Construction of above-mentioned drainage facilities to secure a correct drainage

system

- Construction of traffic safety facilities for the above
- Construction of temporary facilities such as camp yards and offices
- Procurement of road construction materials and machinery as shown in “Basic Plan”
- Transportation of construction materials and equipment from third countries
- Safety control and its measures related to the work implementation
- Preparation of tender and contract documents, and work supervision of construction as shown in “Basic Plan”

（2） Undertakings to be taken by the Malawian Side

- Removal and relocation of utilities including electricity, telephone and telecommunications, water supply and sewerage
- Provision of land
- Support for smooth procedures for customs clearance of materials and equipment to be procured from Japan and third countries
- Provision of yards for temporary facilities (construction of offices, installation of materials stock yard and asphalt plant) at no cost
- Arrangement of supervising personnel and security of their offices, travel mode and expenses
- Opening of a bank account at an authorized foreign exchange bank in Japan (B/A)
- Issuance of Authorization to Pay (A/P)
- Supply of conveniences for disembarkation and stay of third-country personnel
- Acquisition of approvals and permissions necessary for implementation of the Project
- Exemption from national taxes and other financial surcharges imposed by the Government of Malawi

2-2-4-4 Consultant Supervision

（1） Consultancy Services

1) Implementing Services

In case of concluding the Exchange of Notes (E/N) pertaining to the Project under the Japanese Grant Aid between the Government of Japan and the Government of Malawi, and based on a written recommendation issued by JICA, the Consultant will conclude a consultancy agreement to render tender assistance and work supervision with the Blantyre City Assembly (BCA). This is to be done in accordance with the scope and

procedures of the Japanese Grant aid scheme. Major services including a consultancy agreement are listed as follows:

ⅰ) Stage of Preparation of Tender Documents

By preparing the corresponding construction contract documents based on the Study Report, the following contents should be approved by BCA:

- Design drawings
- Quantity calculation and estimation review
- Construction planning
- Tender documents

ii) Stage of Construction Tendering

BCA will implement the concerned tendering activities with the assistance of the Consultant. The Consultant will assist BCA by rendering the following services:

- Invitation to tender
- Prequalification
- Tender briefing session and onsite briefing session
- Tender evaluation
- Contract negotiation

iii) Stage of Work Supervision

In reply to a construction contract verified by the Government of Japan, the Consultant will issue an order for the commencement of the construction to a contractor and the beginning of work supervision. During the implementation of work supervision tasks, the Consultant will report directly to the BCA, the Japanese Embassy and the local JICA office, among other concerned authorities, on the construction progress. At the same time, the contractor will carry out clerical work related to the work progress, quality, safety and payment and recommend technical improvement, among other required activities.

2) Implementation System

ⅰ) Implementation System of Tender Document Preparation and Tendering Assistance

As the tendering assistance will include preparation of tender documents by the Consultant, the following matters should be taken into account since the Project will be carried out through the Japanese Grant Aid scheme:

- A contract should conform to international standards.
- Malawian project specifications should be sufficiently taken into account.
- Personnel involved the Basic Design should be selected for services.

The personnel who prepare tender documents and those individuals who assist with tendering should be those involved in the Basic Design and who are thoroughly familiar with the design contents. Major staff and roles expected to be necessary are described as follows:

- Chief Consultant: Overall services related to the supervision in general of the detailed design, tendering and construction
- Road Engineer: Based on the components of the Basic Design, compilation at the time of a detailed design and placing of orders for construction, preparation of technical specifications and assistance for tendering
- Material Engineer: Quality survey and testing related to materials such as aggregates, landfill and asphalt
- Facility Design Engineer: Work for detailed design of structures and drainage facilities
- Electric Equipment Engineer: Work for detailed design related to traffic signals and lighting facilities
- Construction planning and cost estimation: Preparation of documents when placing orders for construction, preparation of prequalification documents and assistance with tendering

ii) Implementation System of Work Supervision

A road engineer who has experience with the Japanese Grant Aid scheme will be dispatched as a full-time work supervisor. In addition to this, the chief consultant will be dispatched at every stage of construction for operational coordination. The role of the engineer, necessary at each stage of the work, may be described as follows:

- Technical support: Operational coordination for smooth implementation of work and technical control
- Resident (full-time) engineer: Daily management and process control
- Road and material engineers: Material testing of materials for landfill aggregates for pavement and concrete, and supervision and guidance with respect to road pavement technology such as quality control, mixing and intensity on asphalt concrete and concrete, among others.
- Structural engineer: Countermeasures for differences in design, such as box

culverts, drainage facilities and ancillary facilities

- Electric equipment engineer: Countermeasures for differences in design of signals and lighting facilities

(2) Facility Construction Work

1) Temporary Construction

After receiving the order for commencement of construction, the Contractor will immediately begin mobilization of construction machinery and materials and recruit the corresponding staff. In line with this, the Contractor will secure a temporary yard on a lot to be provided by BCA at no cost and set up temporary offices and stockyards.

Since public electricity will be mainly used for construction work, generators will be added for emergencies and power shortages. The public water supply will be used for drinking water, while well water will be used for construction.

2) Permanent Work

Chipembere Highway and Livingstone Avenue, both related to this Project, are inter-city trunk roads that are important economically and socially. Consequently, although it will be difficult to block traffic completely, it will also be problematic to install detours due to the limited available land in place. Accordingly, while ensuring that traffic safety during construction work remains as the highest priority, each side should be implemented alternately. Therefore, it is essential that construction work advances by placing an emphasis on the above-mentioned traffic safety and the environment of local residents. In addition, generally speaking, construction work will be done during the daytime. However, it may be necessary to carry out construction work at night on occasions. Construction work for the target roads shall conform to the following principles:

i) Chipembere Highway

- Each side will be executed alternately, while securing the current two-lane traffic on one side.
- Any existing service roads will be effectively used for carrying materials in and out or for detours.
- If it is difficult to construct temporary roads due to severe land restrictions. Consequently, construction sections will be divided by intersection or access roads, while nearby roads will be used as detours.

ii) Livingstone Avenue

- Each side will be executed alternately, while securing the current one-lane traffic on one side.
- Since there are no service roads on Livingstone Avenue, and it is also difficult to improve a temporary road due to land restrictions, if the avenue becomes unavoidably blocked, the construction sections will be divided by an access road to secure a detour. A more efficient construction method will be thus examined.

The city of Blantyre has a tropical savanna climate and counts on a distinct dry season between April and October and a rainy season between November and March. Generally speaking, there are no heavy rains or strong winds that invite storm or flood damage, so it is a relatively mild climate. Even during the rainy season it usually never rains throughout the whole day.

Although earthwork such as excavation and landfill should be avoided during the rainy season, construction of structures such as drainage channels and manufacturing of secondary concrete products are expected to be relatively unaffected. Consequently, in the work plan, earthwork will be mainly carried out during the dry season, while structures will be constructed mainly during the rainy season.

3) Construction Supervision

To effectively utilize local contractors under the Project, the Japanese Contractor should possess sufficient quality control and schedule control. Accordingly, in case of formulating an execution plan, sufficient quality should be secured by carefully conducting an interim inspection and schedule control with respect to construction work to be assumed by local contractors. A Japanese full-time engineer will be posted to carry out this work.

4) Traffic Control During Construction

The target roads are regarded as the principal roads in the city of Blantyre and are extremely important socially and economically. Consequently, it will be difficult to stop traffic entirely on them. Construction work will be executed by providing two lanes on one side of the existing four-lane road or one lane on the existing two-lane road alternately. Consequently, in addition to measures for traffic safety, the contractor will need to obtain police cooperation by appointing the corresponding personnel.

2-2-4-5 Quality Control Plan

Since quality control during construction has a relevant impact on structural performance, safety and durability of pavement and structures, appropriate control by work item should be taken at each stage. With reference to the American Association of State Highway and Transportation Officials (AASHTO), since independent road design standards have been prepared in Malawi, quality control will be also taken in conformity with control standards and testing methods.

Table 2.16 Finished Work Quality Standards (Draft)

Construction	Work Item	Item	Reference Value	Remark
Earthwork	Roadbed Preparation	Planned height	+2cm to -5cm	20m interval
		Width	Not less than design value	
	Roadbed	Planned height	±3cm	
		Difference in distortion of planned height between 2 points within 20m	Within 2cm	
Pavement Work	Surface Course	Finished thickness	90% of design value	
		Width	Not less than design value	
		Width	Not less than design value	
		Distortion of finished design side	±4mm	
		Difference in distortion of finished design side between 2 random points	Not more than 4mm	
		Surface smoothness	Not more than 1.3mm	
		Skid resistance	Not less than BPN60	200m interval
Foundation Work	Spread Foundation	Bottom ground level	Not more than design value	4m mesh
Concrete Structure	Base・Side Wall・Slab, etc.	Planned height	±5cm	
		Thickness	±75mm or ±3%	
		Plane position	±30mm	
		Cross-section size	-30mm to +10mm	

Table 2.17 Quality Control Standards (Draft)

Construction	Target Item	Inspection・Control Testing, etc.	Inspection and Testing Time
Earthwork Filled Ground, Sub-grade	Material Control	Geotechnical test of landfill materials ・Soil grain ratio / moisture contents / grain size / liquid state ・Plastic limit / compacting / dry density / CBR test	Prior to execution
	Daily Management	Landfill execution test ・Compacting density control (sand replacement method, etc.)	Immediately after execution Once a day per layer at execution spot
Pavement	Material Control	Asphalt mixture test ・Marshall test Asphalt emulsion test ・General physical test (mill sheet) ・Specific gravity	Prior to execution
	Daily Management	Surface course ・Filler screening test ・Filler moisture content test ・Aggregate screening test ・Marshall test ・Wheel tracking test ・Compacting test ・Field permeability test Asphalt emulsion application ・Application amount test	Prior to execution Once a day per layer at execution spot
Concrete Work	Batcher Plan	Weighing equipment, mixing performance	Prior to execution
	Material	Cement, water ・Inspection through standard certificate Fine aggregate, coarse aggregate test ・Grain size / specific gravity / moisture absorption / unit weight / waterproof alkali aggregate reaction	Prior to execution and when changing materials
	Concrete Standard Test	Mixture will be decided by implementing test mixing. ・Slump air volume temperature test specimen intensity	Prior to execution
	Daily Management	Fresh concrete ・Air volume / slump / temperature	First 5 units, after that, very 50m^3, when preparing test specimen
		Concrete placement Construction method, joint spacing, curing, removing laitance	Witness inspection during concrete placement
		Concrete test specimen ・Test specimen compressive strength test ・Preparation of concrete control drawings	Preparation of test specimen once a day 7 days and 28 days after placement
Reinforcement	Material	Confirmation by mill sheet ・Quality / tensile test / bending test	Prior to execution
	Installation Inspection Daily Inspection	Inspection of assembled items Measure size or length of body, lap and covering, confirm the fix, cold joint point	Prior to concrete work Inspection of all items for every placement

2-2-4-6 Procurement Plan

Malawi is a landlocked country in which all imported and exported goods are transported from the Port of Durban in South Africa, Dar es Salaam Port in Tanzania and the Beira Port in Mozambique. Most construction materials are imported from South Africa and are, this way, available in Malawi. Consequently, construction materials will generally be procured in Malawi, except for special materials such as traffic signals and lighting poles. However, a study on control system for traffic signal and street lighting in South Africa has concluded that traffic safety levels do not appear adequate due to the positioning of bulbs at low height from ground resulting in an unstable system and poor visibility. Twelve spare bulbs (15%) would be included in expectation of damage during conveyance.Therefore, procurement from Japan would be considered for control system of traffic signal and street lighting.

Construction machinery related to road construction is locally available in Malawi. Since there are several rental companies that rent construction machinery and equipment in Malawi, there have been no specific operating problems, so reliability has increased. On the other hand, since there is no reliable asphalt plant in Malawi, and considering that pavement work represents the largest part of the Project, construction materials are in shortage, even in South Africa, due to the preparation of the 2010 FIFA World Cup. As the reliability of the asphalt plants available has a significant influence on construction progress in general, an appropriate plant will be procured from Japan.

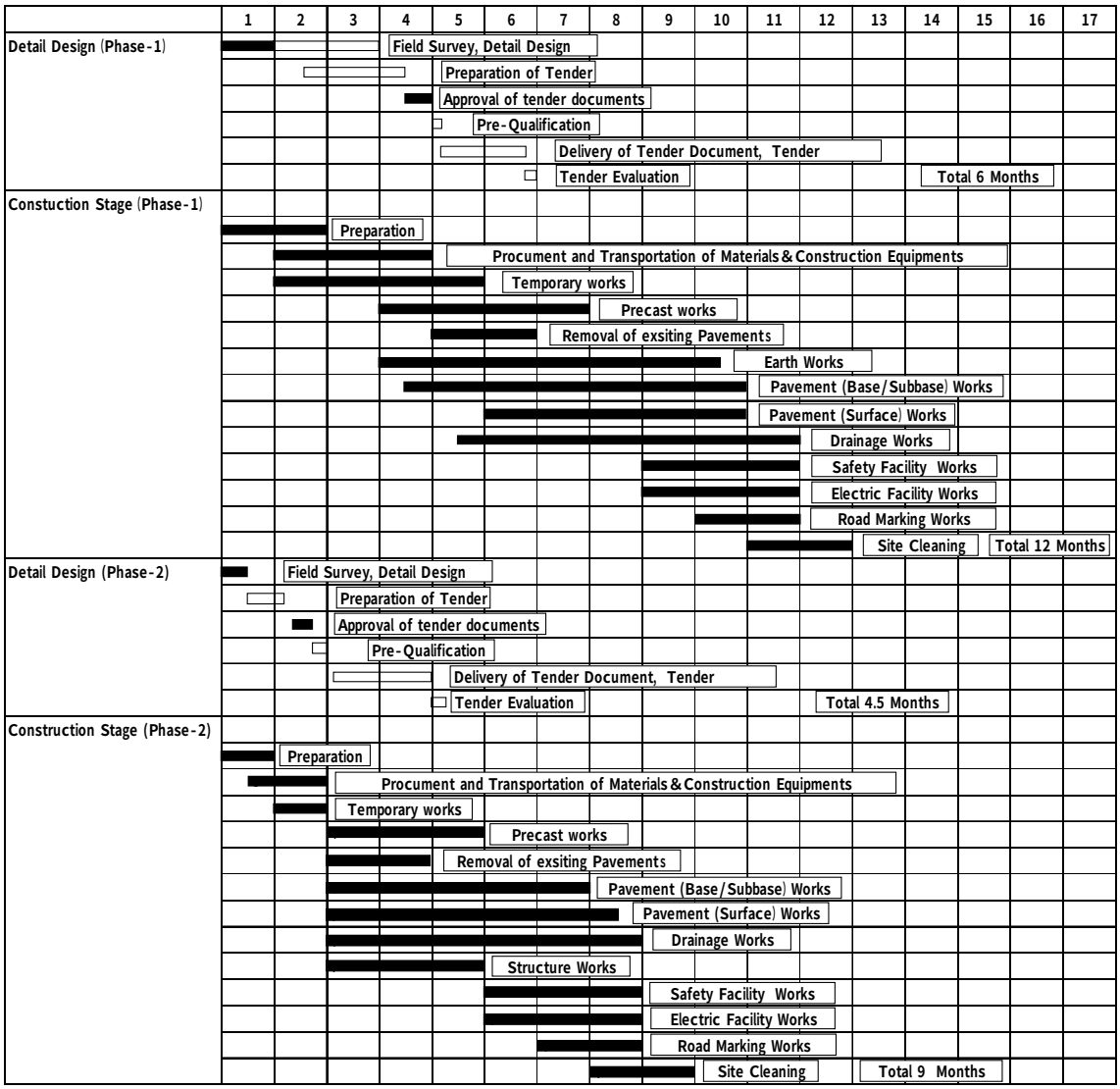
Table 2.18　Source of Procurement of Construction Materials and Machinery

Item	(Local) Malawi Local Procurement	(Third Country) Procurement from South Africa	Procurement from Japan
Cement	○		
Reinforcing bar (for structures)	○		
Straight-run asphalt	○		
Asphalt emulsion(Tack Coat, Prime Coat)	○		
Coarse aggregate	○		
Fine aggregate	○		
Timber molding box	○		
Timber	○		
Gasoline	○		
Light and heavy oil, etc.	○		
Marking paint	○		
Bulldozer (15t,32t)	○		
Back hoe (0.45m^3 ,0.8m^3)	○		
Tractor shovel (2.1m^3)	○		
Stabilizer (W=2.0m,D=0.4m)	○		
Dump truck (2t to 10t)	○		
Truck crane (20t)	○		
Truck (4t)	○		
Motor braider (W=3.1m)	○		
Macadam (three-wheel roller (10t to 20t)	○		
Pneumatic tire roller (8t to 20t)	○		
Vibration roller (0.8t to 1.1t)	○		
Asphalt fissure (2.4m to 6.0m)	○		
Emulsion spray vehicle (2.0kl)	○		
Road sprinkler (3.8kl)	○		
Rammer/tamper (60kg to 100kg)	○		
Line marker (80kg～120kg)	○		
Asphalt plant (40t/hr)	(○)	(○)	○
Signal and street light pole		○	○
Signal and street light facilities			○

2-2-4-7 Implementation Schedule

The Project will be divided into two phases, since a single year of construction work is considered problematic due to the total amount of construction quantity. The first phase will be the section between Larji Kulji Roundabout (Beginning Point) and Chichri Roundabout, while the second phase will be the section between Chichri Roundabout and Illovo Roundabout (End Point). Table 2.19 shows the implementation schedule in accordance with the Japanese Grant Aid Guidelines:

Table 2.19 Implementation Schedule



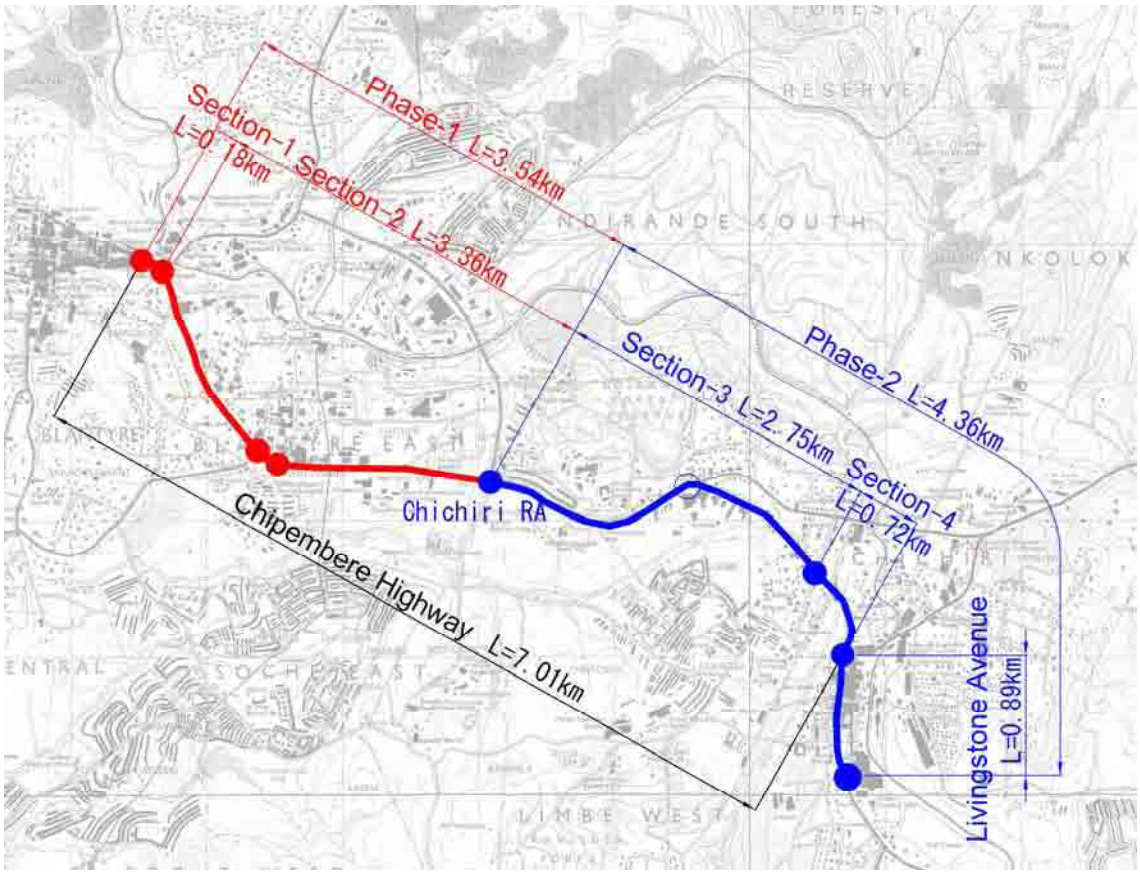


Figure 2.15　Work section of each phases

2-3 Obligations of Recipient Country

Undertakings required from the recipient country are described as follows:

(1) Securing of Land

The Blantyre City Assembly (BCA) should secure land for roads until the end of September 2007. The road reserve shall be for a total 60-meter width in the section between Clock Tower Roundabout and Yianakis Roundabout, and for a 24-meter width in the section between Yianakis Roundabout and Stanbic Roundabout. Due to the said relatively broad width, resettlement of private land shall not be necessary. However, there are parking lots, offices, billboards or fences …situated on the road lots that should be removed.

Photo 2.6 Fences or billboards are subject to removal.

In relation to structures subject to removal, Shire Bus Lines Ltd., counting on a large office located along Chipembere Highway, has not submitted any claim for compensation due to relocation. One reason for this may be that other offices are available at other locations.

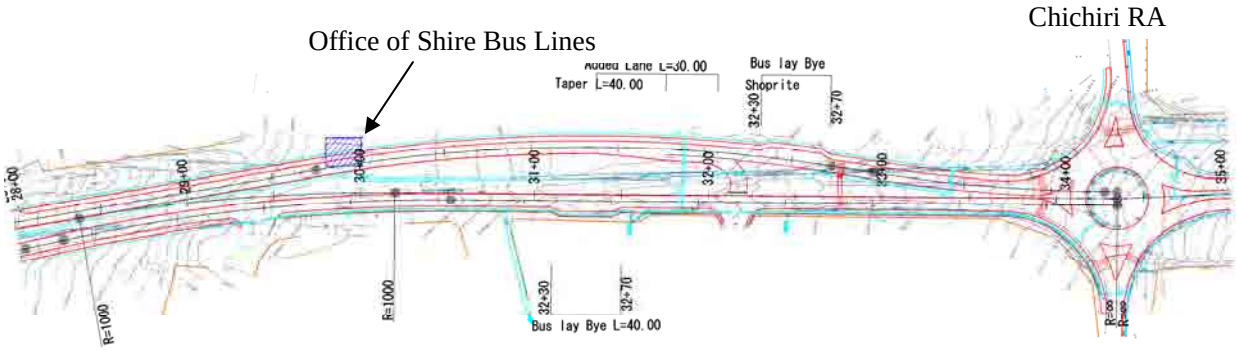


Figure 2.16 Location Map of the Shire Bus Lines Ltd

(2) Securing Public Peace and Order

The BCA should secure public peace and order for the consultant and contractors during the implementation of the Project with the cooperation of the Malawian Police Service

(MPS).

（3） Securing of Construction Yard

The BCA is expected to provide necessary yard space for construction, specifically municipal land as shown in Figure-2.17 The area of the land concerned is 30,000 m^2 (300 m × 100 m), which is judged to be sufficient by the contractors and the consultant for placing the corresponding asphalt plant, stock yard and offices.

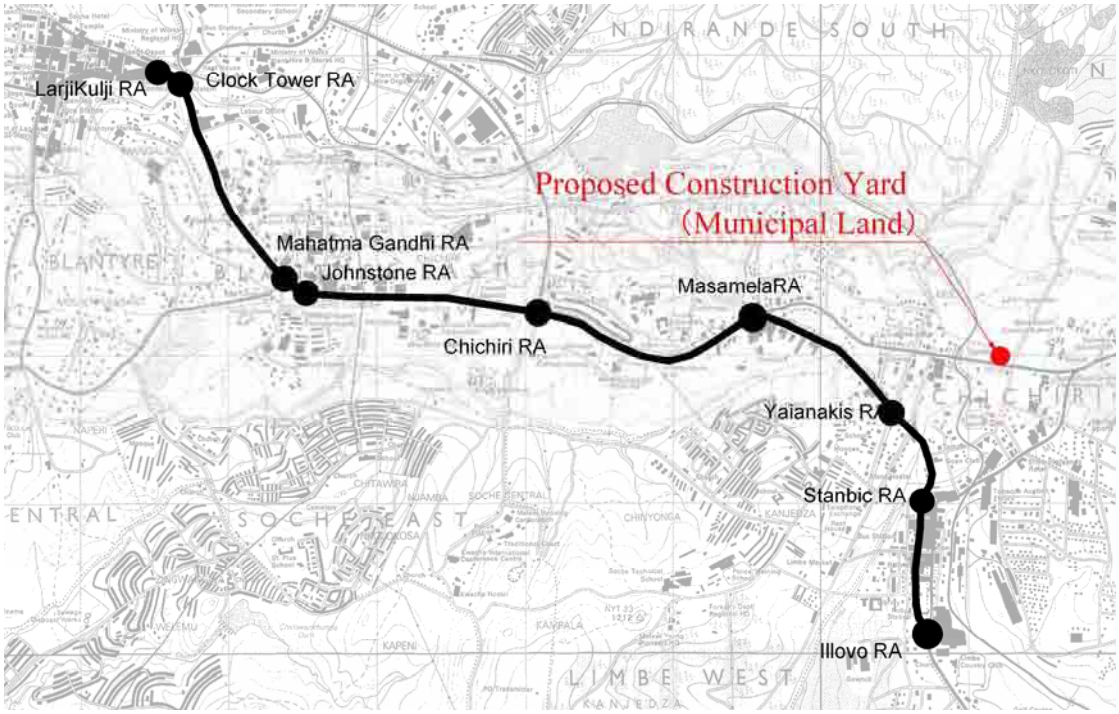


Figure 2.17 Proposed Construction Yard (Municipal Land)

（4） Social and Environmental Considerations

From the results of an initial environment examination (IEE) at the time of the preliminary study in accordance with JICA Guidelines on Environmental and Social Considerations, although involuntary resettlement did not arise, it was classified as Category B in due consideration of the impact of construction work during the implementation stage.

Accordingly, when the Blantyre City Assembly confirmed the need for implementation of an environment impact assessment (EIA) to the Department of Environment Affairs in Malawi, it was judged to be “necessary”. In response, the Blantyre City Assembly prepared an EIA report and submitted it to the Malawian Department of Environmental Affairs. Consequently, the EIA report was approved and permission to implement the Project was obtained. In the EIA report, tree planting and afforestation at the locations where land is to be improved through the construction work were indicated as undertakings to be taken by the client.

A stakeholders' meeting was held to explain the Project to concerned parties and consent

was obtained.

（5） Removal and Relocation of Public Facilities and Securing its Cost

As public facilities such as electricity, telephone and communications, and water supply are installed along Chipembere Highway and Livingstone Avenue, those that will have an affect on the construction work should be removed or relocated. In addition, fences or trees located within road lots should be removed, and the Blantyre City Assembly should include the cost for this in its budgetary planning.

（6） Tax Exemption on Purchasing of Materials

As the Project will be carried out through the Japanese Grand Aid Scheme, the purchasing of materials and equipment will fall under tax exemption. The recipient government should support the undertaking of prescribed procedures for smooth tax exemption.

（7） Bank Arrangement (B/A) to Authorized Foreign Exchange Bank and Issuance of Authorization to Pay (A/P)

The Government of Malawi should bear service charges for necessary procedures in opening an account at an authorized foreign exchange bank in Japan (Banking Arrangement: B/A) and issuing authorization to pay (A/P).

（8） Support for Acquisition of Other Approvals and Permissions

The Government of Malawi should contribute to make the following approvals and permissions required under the Project available:

- Entry into, and stay in Malawi of foreigners, Japanese included
- Approval and permission required for the implementation of the Project
- Others

（9） Regulations on Overloaded Vehicles

One of the design conditions of the Project is 8.2ｔ maximum axle load (weight) limit. Based on the findings of an axle load survey at the project site, it is apparent that 37% of the vehicles measured exceeded this figure. Excessive axle weight hastens the breakdown of pavement and it should be repaired before it reaches the designed lifespan. Consequently, illegal vehicles should be adequately controlled. After explaining this to the Malawian side, they understood its importance and reached agreement on the necessity to implement this during the operation stage.

2-4 Project Operation Plan

Maintenance operations following the completion of the Project will be as shown as bellow:

1) Regular maintenance work (implemented by BCA)

- Road cleaning and drainage cleaning

  Road and drainage cleaning is necessarily to be done frequently in order to prevent pavement from deteriorating. In particular, if water remained on the surface during rainy seasons, damage levels in the pavement would likely accelerate. Therefore, the said cleaning is to be carried out at least twice a year, before and after the rainy season.

- Street lighting bulb exchange

  Street light bulbs have to be exchanged whenever they blow out.

2) Periodic maintenance work in the fifth year after opening (implemented by NRA)

Deterioration of pavement by aging is likely to appear as potholes. This shall be repaired.

3) Periodic maintenance work in the tenth year after opening (implemented by NRA)

The asphalt surface is presumably to deteriorate by volatility of asphalt for aging. Consequently, flow and rutting on surface would likely appear resulting in decreasing levels of driving comfort and safety. Therefore, a single layer overlay becomes necessary. Since semi-flex pavement is excelling to stand against flow and transformation of the surface, it shall be excluded from the overlay area.

In order to execute the maintenance operations mentioned above, BCA is to secure an adequate budget and reasonable levels of personnel. The number of engineers at the road section of BCA is 19 at present, while the number has been running down recently. Therefore, it is preferable to keep this current number of engineers at least. Requesting the Malawi Government to secure an adequate maintenance budget in the next five-year program (from 2012 to 2017) shall also be required.

2-5 Expenses by Malawian Side and Cost of Operation

2-5-1 Expenses to be Taken by the Malawian Side

Undertakings to relocate public facilities and electric wires associated with the construction and the relocation of fences and trees along the roads will be taken by the recipient government.

Table 2.20 Estimated Cost for Removal and Relocation of Public Facilities

Relocation Item	Unit	Quantity	Relocation Unit Cost (MK)	Cost	
Electricity (Overhead Wires)	m	1,131	1,770	2,001,870MK	(14,638USD)
Electricity (Electric Poles)	piece	35	10,000	350,000MK	(2,559USD)
Electricity (Underground Cables)	m	528	2,042	1,078,176MK	(7,884USD)
Telephone & Communications (Underground Cables)	m	1,212	3,420	4,145,040MK	(30,310USD)
Telephone & Communications (Communications Poles)	piece	3	10,000	30,000MK	(219USD)
Water Supply (Buried Pipes)	m	936	7,767	7,269,912MK	(53,160USD)
Total				14,874,998MK (108,770USD) → Approx. ¥12,800,000	

Table 2.21 Quantity and Estimated Cost for Removal and Relocation of Fences and Trees

Relocation Item	Unit	Quantity	Relocation Unit Cost (MK)	Cost	
Fence Removal Work	m	107	2,100	224,700MK	(1,643USD)
Tree Removal Work (Large-diameter Trees)	piece	170	3,500	597,000MK	(4,365USD)
Existing Lighting Poles Relocation Work	piece	14	80,000	1,120,000MK	(8,190USD)
Total				1,941,700MK (14,198USD) → Approx. ¥1,700,000	

In the implementation of the Project, necessary expenses to be taken by the Malawian side are estimated to be 16.8 million MK (approximately ¥14.5 million), which is equivalent to 8.7% (194 million MK) of the development budget of the Blantyre City Assembly (FY2005). It has been confirmed that the Malawian side will take appropriate budgetary steps.

Conditions for Cost Estimation

1) Date of Estimation: December 2006
2) Exchange Rate: 1US = ¥117.61, 1MK = ¥0.86
3) Implementation Period: The detailed design and a period of equipment procurement and installation are shown in implementation schedule and are divided into two phases at each site.
4) Other: The Project will be implemented in accordance with the Japanese Grant Aid Scheme.

2-5-2 Operation and Maintenance Cost

The necessary operation and maintenance cost after handing over is as follows:

Table 2.22 Annual Maintenance Cost After In-service

	Quantity	Unit Cost	Annual Maintenance Cost
Road Cleaning Cost	124,000 m^2 x 2 times	8 MK/m^2	1,984,000 MK (About ¥1,700,00)
Drainage Cleaning Cost	24,000 m x 2 times	10 MK/m^2	480,000 MK (About ¥420,000)
Bulb Exchange	10%/year x 85 poles	14,000 MK each	119,000 MK (About ¥100,000)
Total			2,583,000 MK (About ¥2,220,000)

For repairing potholes and overlay five and ten additional years respectively after handing over shall be required.

Table 2.23 Maintenance Cost After 10 Years in Service (2009-2019)

Implementation Agency	Items	Quantity	Unit Cost	Ten Years Maintenance Cost
BCA	Road Cleaning (Twice a year)	10 Year	JPY 1,700,000 /Year	JPY 17,000,000
	Drainage Cleaning (Twice a year)	10 Year	JPY 420,000 /Year	JPY 4,200,000
	Street Light Bulb Exchange	10 Year	JPY 100,000 /Year	JPY 1,000,000
NRA	Pothole Repair (Fifth year)	1,370 m^2	JPY 2,033/m^2	JPY 2,800,000
	Overlay (10^{th}×3cm thickness)	97,000 m^2	JPY 854/m^2	JPY 83,000,000
Total				JPY 108,000,000 (About USD 91,000)

Note: Area for pothole repair is estimated as 1% of the total area exclusive of semi-flex pavement

Road cleaning, drainage cleaning and street light bulb exchange would be implemented by BCA. However, since the road would be improved and newly constructed, it is expected that the burden for the road maintenance cost which is used for the existing Chipembere Highway and Livingstion Avenue would comparatively diminish. The annual budget of BCA investing for road maintenance is approximately JPY 12.4 million (2006). Consequently, it is judged that there are no specific matters in operation of the above mentioned maintenance works after service begins. Hereafter, BCA is expected to secure continuously a maintenance budget for the same amount as for the year 2006, as well as execute smoothly the maintenance works.

Furthermore, since the Government of Malawi (National Roads Authority) is the implementing agency for pot hole repair and overlaying to be carried out in the 5^{th} and 10^{th} years, such funds should be incorporated into the following five-year plan. In the current five-year plan until FY2010, approximately ¥650 million (for five years) has been appropriated. It appears that the budget is to be expended from fuel tax revenue. According to the Road

Sector Program (under deliberation) prepared in 2006, 1.814 billion MK (¥1.45 billion) from fuel taxes is expected for FY2005 and 2006 and 2.055 billion MK (approximately ¥1.65 billion) is estimated annually. In the five-year plan on investment in the road sector (06/07 to 10/11), 201 million MK (¥160 million) is budgeted for periodical maintenance of roads in the city of Blantyre.

Under such circumstances, if the budget can be secured and used as scheduled, it should be possible to secure the necessary budget for periodical maintenance.

Chapter 3
Project Evaluation and Recommendations

3-1 Project Effects

The project is expected to resolve chronic traffic congestion faced by Blantyre City. In addition, the following effects will also be achieved through the development of Chipembere Highway and Livingstone Avenue.

(1) Direct Effects

1) Smoother flow on key traffic areas

The findings of a traveling speed survey at peak times during the week (6 to 7 o'clock in the morning, 5 to 6 o'clock in the evening) and off-peak time (9 to 11 o'clock in the morning) are as follows.

- Peak time: 28km/h in the morning
  24km/h in the evening
  26km/h in average
- Off-peak time: 47km/h in average

The cause of this is probably due to a lack of lane space required (2 lanes) for the volume of traffic, mini buses that stop in the main lanes at bus lay bys, and inappropriate signal cycle at roundabouts. As a result, traffic is congested and moves at 20km/h. After the Project is completed, the traffic congestion problem will have been addressed and the average speed will rise to 50km/h, even at the peak times.

2) Frequency of traffic difficulties such as recurrent flooding will be reduced.

Stay of rain water on road surfaces which occurs 95 days annually (rainy days with over 1mm a day) on lower sections of roads will be significantly reduced.

3) The number of traffic accidents resulting from traffic congestion will be reduced.

Of the 533 traffic accidents that occurred in 2005, 90% (approximately 480 cases) were caused by traffic congestion. Therefore, by smoothing traffic flow, installing street lights, and improving roundabouts through the implementation of the Project, the number of accidents caused by traffic congestion will be reduced.

(2) Indirect Effects

1) By addressing the problem of traffic congestion, the carrying capacity of physical distribution will be improved. In addition, the amount of exhaust gases will be reduced and lessening its impact on the environment.
2) By improving the reliability of road traffic, the convenience for local residents who

utilize trunk roads will be improved.

3) The maintenance cost for the targeted roads will be reduced from 857 million MK/annually to 259 million MK/annually.
4) By improving road traffic flow, regional development and the industrial functions of the city will be improved, the economy will be revitalized, and accessibility to social services such as medical and educational institutions will also be improved.

3-2 Recommendations

3-2-1 Recommendations to be Taken by the Recipient Country

The following is a list of undertakings to be taken by the Malawian side in the implementation of the Project.

(1) To improve and repair the exiting urban facilities (such as the water supply and sewage pipes, power transmission and distribution lines, and telephone lines)
(2) To install detours at necessary sections
(3) To take necessary budgetary steps at an appropriate time for tax exemption of equipment and materials to be imported, and to carry out procedures for refunding of value-added tax (VAT)
(4) To remove and relocate facilities, structures and trees, etc. to be affected
(5) To secure a disposal yard for waste materials such as removed asphalt
(6) To ensure safety around construction sites and at temporary facilities during the construction period
(7) To inform local residents through explanations and PR activities to neighboring residents in advance, and to deal with any complaints or claims received
(8) To collect and to specify any information on buried structures in advance to the Malawian side (if a buried structure not specified in advance is damaged, the contractor will exempt from any responsibility.)
(9) To coordinate with authorities responsible for traffic regulations in advance during the construction period
(10) To ensure that procedures for the entry and stay of construction-related personnel (Japanese nationals and third-country nationals) are completed smoothly
(11) To provide necessary lots for a stock yard or asphalt plant
(12) To vegetate the open land caused by the construction
(13) To regulate overloaded vehicles

3-2-2 Technical Cooperation and Coordination with Other Donors

The activities of other donors involved in Blantyre City, as the project site, are described as

follows.

- National Roads Authority (NRA)

  Since a Blantyre bypass road connecting M1 and M2 is planned, this project is scheduled to be implemented over a period of five years in accordance with the plan of the National Roads Authority (NRA). After the completion of the bypass, some of the traffic volume on Chipembere Highway will be diverted, and so the Project also deems this to be a planning condition.

- European Union (EU)

  Since tendering for Road Repair and Maintenance Construction (22 routes, 30.5km in total) for roads located within Blantyre City has been completed, a construction contract is about to be concluded. Although Chipembere Highway and Livingstone Avenue, the proposed routes of the Project, were included, it was concluded that Japanese would repair these routes.

- World Bank (WB)

  The World Bank is repairing a total 11.3km of three routes in Blantyre City (Kenyatta Road, Makata Industrial Park Road, and Churchill Road). The total construction cost for these three routes will be $18.06 or $3.93 million/km. However, the project is primarily for heavy vehicle traffic. In the case of Makata Industrial Park Road alone, which is similar to the targeted Chipembere Highway and Livingstone Avenue at this time, it is $6.72 million/km. Although one year has just elapsed since in-service of Makata Industrial Park Road began, flow marks or cracks in the pavement on inclined sections have been observed, so the road is already showing signs of wear and tear.