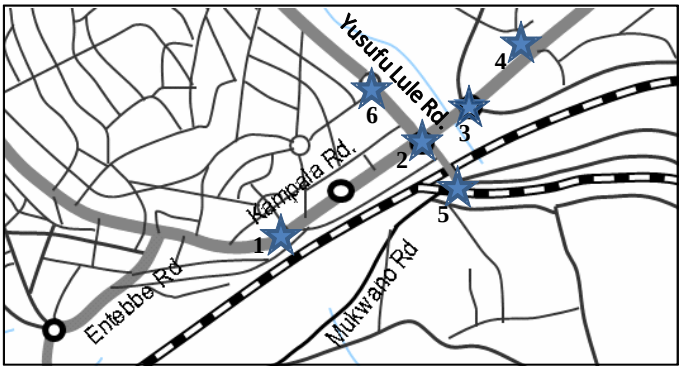
CHAPTER 7 PRELIMINARY DESIGN FOR THE PRE-FEASIBILITY STUDY PROJECTS

7.1 NATURAL CONDITIONS IN THE PROJECT AREA

7.1.1 GEOLOGICAL CONDITIONS

The purpose of the geological survey is to confirm the depth of the bearing layer for flyovers and other geological information for the design of other ancillary facilities. Borehole locations, which are along the proposed flyover plan, including its alternatives, and their results, are shown in Figure 7.1.1 and Table 7.1.1 respectively.



Source: JICA Study Team

Figure 7.1.1 Borehole Locations

Table 7.1.1 Results of N Value at Each Borehole Location

Location / Depth(m)	No.1		No.2		No.3		No.4		No.5		No.6	
1	6	Quaternary sandy silt	10	Quaternary sandy silt	5	Quaternary sandy silt	13	Quaternary sandy silt	6	Quaternary sandy silt	7	Quaternary sandy
2	6		9		11		15		2		10	
3	5		11		14		20		15		18	
4	22		18		19		14		14		11	
5	22	Precambrian phyllite schist (weathered)	25		23		40	Precambrian phyllite schist (weathered)	28		33	Precambrian phyllite schist (weathered)
6	22		26		24		51		22		79	
7	30		25	Precambrian phyllite schist (weathered)	20	Precambrian phyllite schist (weathered)	86		52	Precambrian phyllite schist (weathered)	89	
8	35		45		39		88		26		50	
9	52		40		41		71		28		35	
10	40		127		45		98		13		28	
11			75		60				12		30	
12			21		72				12		23	
13			60		76				22		30	
14			63		114				47			
15			72		58				60			
16			79		69				57			
17			106		66				41			
18			76		156				75			
19			72						55			
20			118						45			

Source: JICA Study Team

7.1.2 HYDROLOGICAL CONDITIONS

Three statistical distribution methods (Gumbel, Lognormal distribution, Log Pearson III) were used to determine 1-day return period rainfall. In this study, the Lognormal distribution method is applied.

Table 7.1.2 One-Day Rainfall Return Period at Kampala Rainfall Station

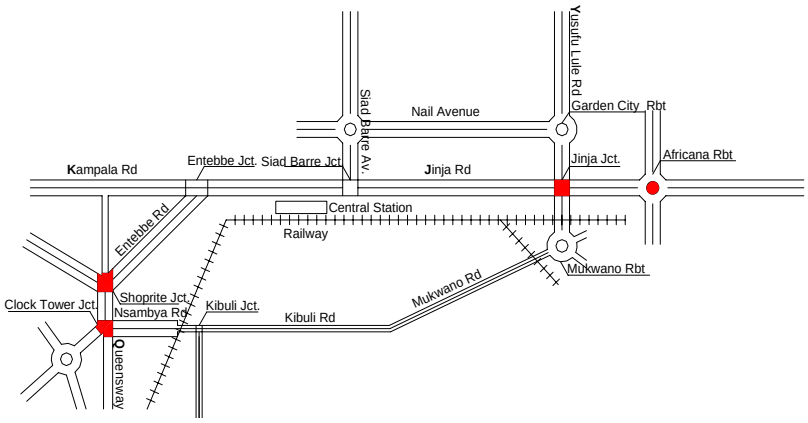
Duration / Method	1 Day Return Period Rainfall(mm)					
	2	5	10	20	50	100
Gumbel	58.0	70.4	78.6	86.4	96.6	104.2
Lognormal	57.8	69.9	78.1	85.9	96.1	103.9
Log. peasonIII	57.0	69.5	78.7	88.3	101.7	112.6

Source: JICA Study Team

7.2 FLYOVER (VIADUCT) PROJECT

7.2.1 ALTERNATIVE PLAN STUDY

The objective of the flyover project is to alleviate serious traffic congestion at the Kampala urban center shown in the following figure. The traffic capacity increase accommodated by the flyovers is one of the best solutions against the traffic congestion at Africana, Jinja, Shoprite and Clock Tower Junctions, as widening of the existing Jinja and Kampala roads are impossible without demolition of many buildings along the road.



Source: JICA Study Team

Figure 7.2.1 Target Area and Junctions in Kampala City Center for Traffic Decongestion

The Study Team recommends application of design speed of 40 km/h for the flyover because the planned flyovers are located in a built-up area. Improvement to a constant high design speed would mean a substantial increase in construction cost with the commensurate increase in affected area. In addition, design speed for other roads without flyover is 50 km/h in accordance with the Road Design Manual in Uganda. Geometric parameters for design speed of 40 km/h and 50 km/h are shown below.

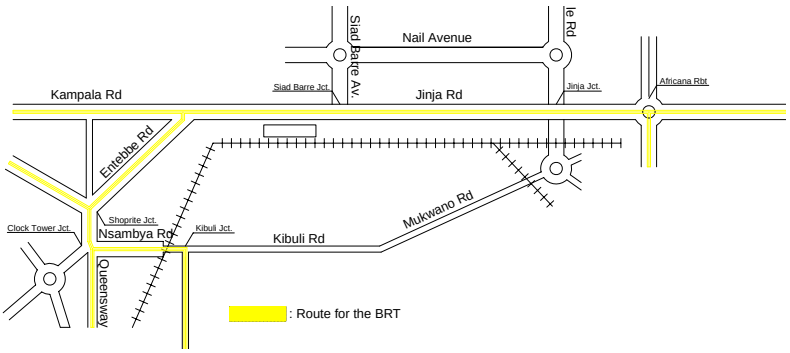
Table 7.2.1 Summary of Applicable Geometric Design Parameters for the Project

Design Element	Unit	Parameter		Remarks
Design Speed	km/h	40	50	Recommended Design Speed for the Flyover
Min. Stopping Sight Distance	m	45	60	Uganda Design Manual
Min. Passing Sight Distance	m	285	345	Uganda Design Manual
Min. Horizontal Curve Radius	m	60	100	Uganda Design Manual
Min. Length of Curve	m	70	80	Japanese Standard: Design Speed x 6sec.
Max. Radius for use of a spiral curve	m	150	290	Uganda Design Manual: $R > V^3/432$
Spirals Lengths	m	R=60→L=53m, R=80→L=40m R=100→L=32m, R=120→L=27m R=150→L=21m	R=100→L=62m, R=150→L=41m R=200→L=31m, R=250→L=25m R=290→L=22m	SATCC 1998: $L=0.0702 \times V^3/(R \times C)$ C: Rate of increase in centripetal acceleration (m/s3); 1<C<3 (1.438 is recommended)
Max. Gradient (desirable)	%	6	6	Uganda Design Manual
Max. Gradient (absolute)	%	8	8	Uganda Design Manual
Crest Vertical Curve stopping	K_{min}	5	9	Uganda Design Manual
Crest Vertical Curve passing	K_{min}	86	126	Uganda Design Manual
Sag Vertical Curve stopping	K_{min}	8	11	Uganda Design Manual
Max. Superelevation (e)	%	4	4	Uganda Design Manual
Normal Cross fall	%	2.5	2.5	Uganda Design Manual
Shoulder Cross fall	%	4	4	Uganda Design Manual

Source: JICA Study Team

In Kampala City, a rapid traffic volume increase has generated some bottleneck points, of which Jinja, Clock Tower, Shoprite Intersection and Africana, Mukwano, Garden City Roundabout are notably located as the main bottleneck points.

The GOU and the World Bank has planed to introduce the BRT in Kampala City. In this Study, two lanes are allocated to the general traffic for each direction. Additionally, the use of Entebbe/Kampala Junction for the general traffic is restricted.

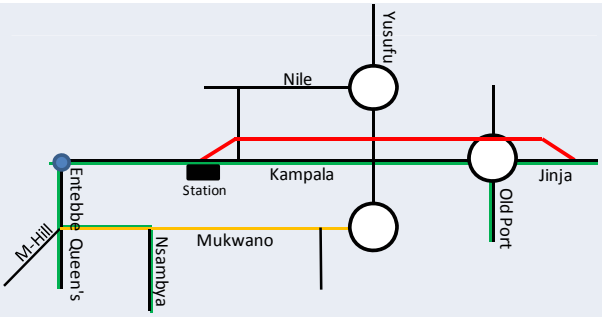
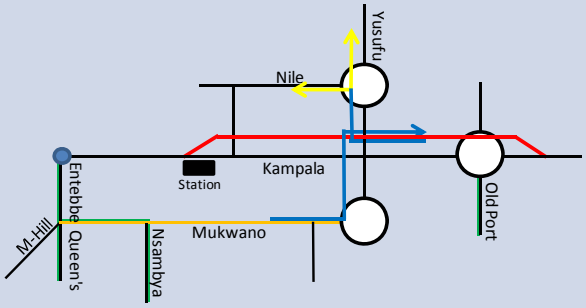
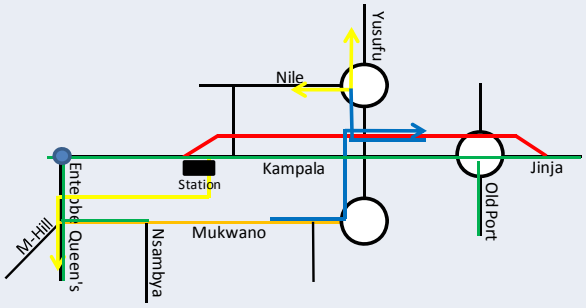


Source: JICA Study Team

Figure 7.2.2 BRT Routes Proposed in BRT Pre-FS Final Report (May 2010)

For these reasons, traffic between the CBD and Jinja Junction will be diverted from Kampala Road to Nile Av.-Yusufu Lule Road and/or Nsambya Road- Mukwano Road. The following alternatives were proposed as scenarios corresponding to the concepts of flyovers above mentioned.

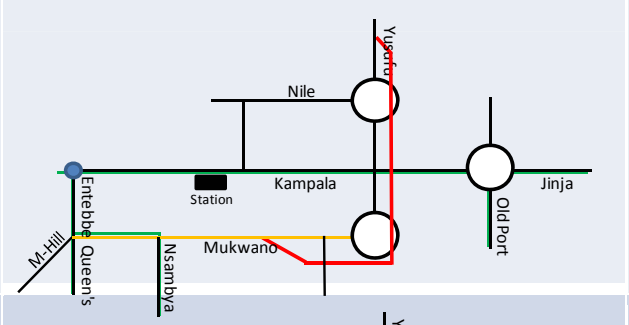
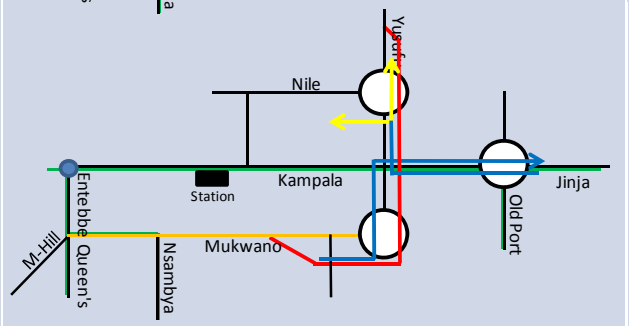
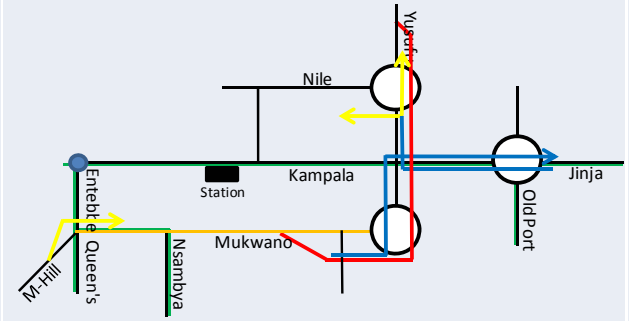
A: Jinja-Kampala-Queen's Way-Yusufu Lule Flyover

Phase	Jinja-Kampala-Yusufu Lule + Kampala-Queen's Way Flyover	
1		Route of J-K Flyover overlaps the BRT Pilot Project Route proposed by WB. Project length: 1,960m Of which Bridge and Retaining Wall Section: 1,560m
2		2-1: J→Y Flyover, M→J Flyover 2-2: Y→N Flyover Project Length: 2,290m Of which Bridge and Retaining Wall Section: 2,085m
3		K-Q Flyover is operated as one-way from north to south and plays a role of bypass for section between Kampala Road to Clock Tower Jct. Project Length: 1,800m Of which Bridge and Retaining Wall Section: 1,740m

Source: JICA Study Team

Figure 7.2.3 Alternative and Options for J-K-Q-Y Flyover

B: Yusufu-Mukwano-Jinja+Clock Tower Flyover

Phase	Yusufu-Mukwano-Jinja + Clock Flyover	
1		In this plan, north-south line (Yusufu Lule Road-Mukwano Road) is supposed as main traffic line and is linked by continuous bridge with 2-lane. Project length: 1,660m Of which Bridge and Retaining Wall Section:1,550m
2		2-1: J→Y Flyover M→J Flyover 2-2: Y→N Flyover Project Length: 2,245m Of which, Bridge and Retaining Wall Section: 2,190m
3		Clock Tower Flyover starts from Mengo Hill Road and lands at before level crossing on Nsambya Rd. Project Length: 550m Of which, Bridge and Retaining Wall Section: 300m

2-way Main Road | 2-way Flyover | 1-way Flyover | BRT Route | No through zone

Source: JICA Study Team

Figure 7.2.4 Alternative and Options for Y-M-J+Q Flyover

7.2.2 EVALUATION OF ALTERNATIVE PLANS

The multi-criteria analysis (MCA) methodology was adopted in deciding which alternative, either J-K-Y+KQ Flyovers or Y-M-J Flyovers + Clock Tower Flyover, has more advantages (Table 7.2.2).

Table 7.2.2 Multi Criteria Analysis Scores

Multi Criteria Analysis (MCA) Results with Weighted Index

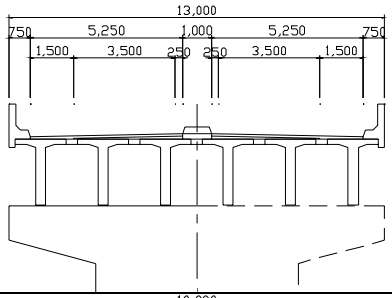
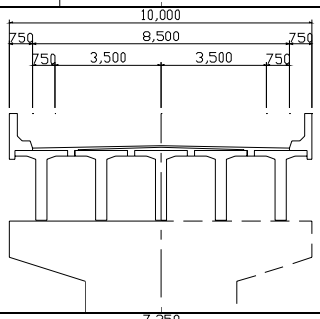
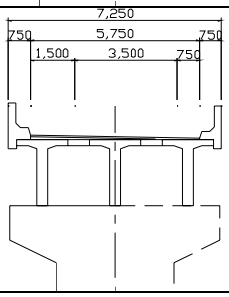
Plan	Project Name	Engineering Factors (Saturation)		Coordination with BRT Plan	Socio-Economic Factors*		Environmental Impacts		Total (MCA Score) (evaluated score with weight)	Order of Priority by MCA	Remarks
		30%		20%	30%		20%				
		(Jinja Jct)	(Clock Tower Jct)		Traffic Volume	Project Cost	Land Acquisition	Resettlement Requirement			
Weight		15.0%	15.0%	20.0%	15.0%	15.0%	10.0%	10.0%	100.0%		
Original Plan in IR-1	J-K-Q-Y Rds Flyover	12.9	13.3	11.4	12.9	7.5	5.0	5.0	68.0	2	Needed to construct with BRT facilities
Alternative Plan in IR-2	Y-M-J Flyover + C Flyover	17.1	16.7	28.6	17.1	22.5	15.0	15.0	132.0	1	

Source: JICA Study Team

7.2.3 ALTERNATIVE STRUCTURE PLANS

Based on the geometric design standards in Uganda and preliminary planning of the projects, the Study Team set out the typical cross sections of the flyover structures as shown in Table 7.2.3.

Table 7.2.3 Typical Cross Section of Flyovers

Typical Cross Section	Description
	**Yusufu Lule and Mukwano Rds Flyover:** Dual carriageway of two lanes, with 1.00 m median strip, and 0.25 m (right side) and 1.50m (left side) shoulder widths. In the future, it is possible to accommodate 3-lane traffic (reversible lane) by removing the median strip.
	**Mukwano – Jinja Rds Flyover,** **Jinja – Yusufu Lule Rds Flyover:** Single carriageway of two lanes and 0.75m shoulder width.
	**Jinja – Yusufu Lule Flyover (branch),** **Nile Avenue Flyover:** One-way Flyover with 1.5m (left side) and 0.75m (right side) shoulder widths.

Source: JICA Study Team

Based on the examined span arrangement and alignment layout, bridge type for each section was selected as shown in the following table.

Table 7.2.4 Result of Bridge Type Selection

Yusufu Lule and Mukwano Rds Flyover

Start	Length (m)	End	Bridge No.	Max. Span Length (m)	Curve Radius (m)	Widening Width (m)	Material Type	Girder Type
0 + -55.00	120.0	0 + 65.00	Access Road (Mukwano Rd side)					
0 + 65.00	120.0	1 + 85.00	YM-1	40.00	---	13.00	PC	T
1 + 85.00	120.0	3 + 5.00	YM-2	40.00	---	13.00	PC	T
3 + 5.00	120.0	4 + 25.00	YM-3	40.00	1,000	13.00 to 23.00	Steel	I
4 + 25.00	435.0	8 + 60.00	YM-4	80.00	160	13.00	Steel	Box
8 + 60.00	120.0	9 + 80.00	YM-5	40.00	---	13.00	PC	T
9 + 80.00	240.0	12 + 20.00	YM-6	90.00	1,000	13.00	(Comparison Study)	
12 + 20.00	120.0	13 + 40.00	YM-7	40.00	1,000	20.25 to 13.00	Steel	I
13 + 40.00	200.0	15 + 40.00	YM-8	40.00	600	13.00	PC	T
15 + 40.00	200.0	17 + 40.00	YM-9	40.00	600	13.00	PC	T
17 + 40.00	110.0	18 + 50.00	Access Road (Yusufu Lule Rd side)					

Mukwano - Jinja Rds Flyover

Start	Length (m)	End	Bridge No.	Max. Span Length (m)	Curve Radius (m)	Widening Width (m)	Material Type	Girder Type
0 + 84.50	264.5	3 + 49.00	MJ-1	60.00	100	10.00	Steel	Box
3 + 49.00	210.0	5 + 59.00	MJ-2	60.00	160	10.00	Steel	Box
5 + 59.00	160.0	7 + 19.00	MJ-3	40.00	---	10.00	PC	T
7 + 19.00	111.0	8 + 30.00	Access Road (Jinja Rd side)					

Jinja - Yusufu Lule Rds Flyover include Yusufu Lule Ramp

Start	Length (m)	End	Bridge No.	Max. Span Length (m)	Curve Radius (m)	Widening Width (m)	Material Type	Girder Type
0 + 0.00	105.00	1 + 5.00	Access Road (Jinja Rd side)					
1 + 5.00	170.00	2 + 75.00	JY-1	60.00	300	10.00	PC	Box
2 + 75.00	68.00	3 + 43.00	JY-2	34.00	160	10.00	Steel	I
3 + 43.00	330.00	6 + 73.00	JY-3	80.00	160	10.00	Steel	Box
6 + 73.00	17.14	6 + 90.14	JY-4	37.00	---	10.00 to 14.50	Steel	I
0 + 0.00	56.86	0 + 56.86						
0 + 56.86	180.50	2 + 37.36	JY-5	55.00	300	7.25	PC	Box

Nile Avenue Ramp

Start	Length (m)	End	Bridge No.	Max. Span Length (m)	Curve Radius (m)	Widening Width (m)	Material Type	Girder Type
0 + 58.00	110.0	1 + 68.00	NA-1	55.00	60	7.25	Steel	Box
1 + 68.00	120.0	2 + 88.00	NA-2	40.00	300	7.25	PC	T
2 + 88.00	110.7	3 + 98.70	Access Road (Nile Avenue side)					

Source: JICA Study Team

7.2.4 EVALUATION OF ALTERNATIVE STRUCTURE PLANS

Comparison study of the structure options was carried out for Bridge No. YM-6 shown in Table 7.2.5, with no restriction in the selection of bridge type.

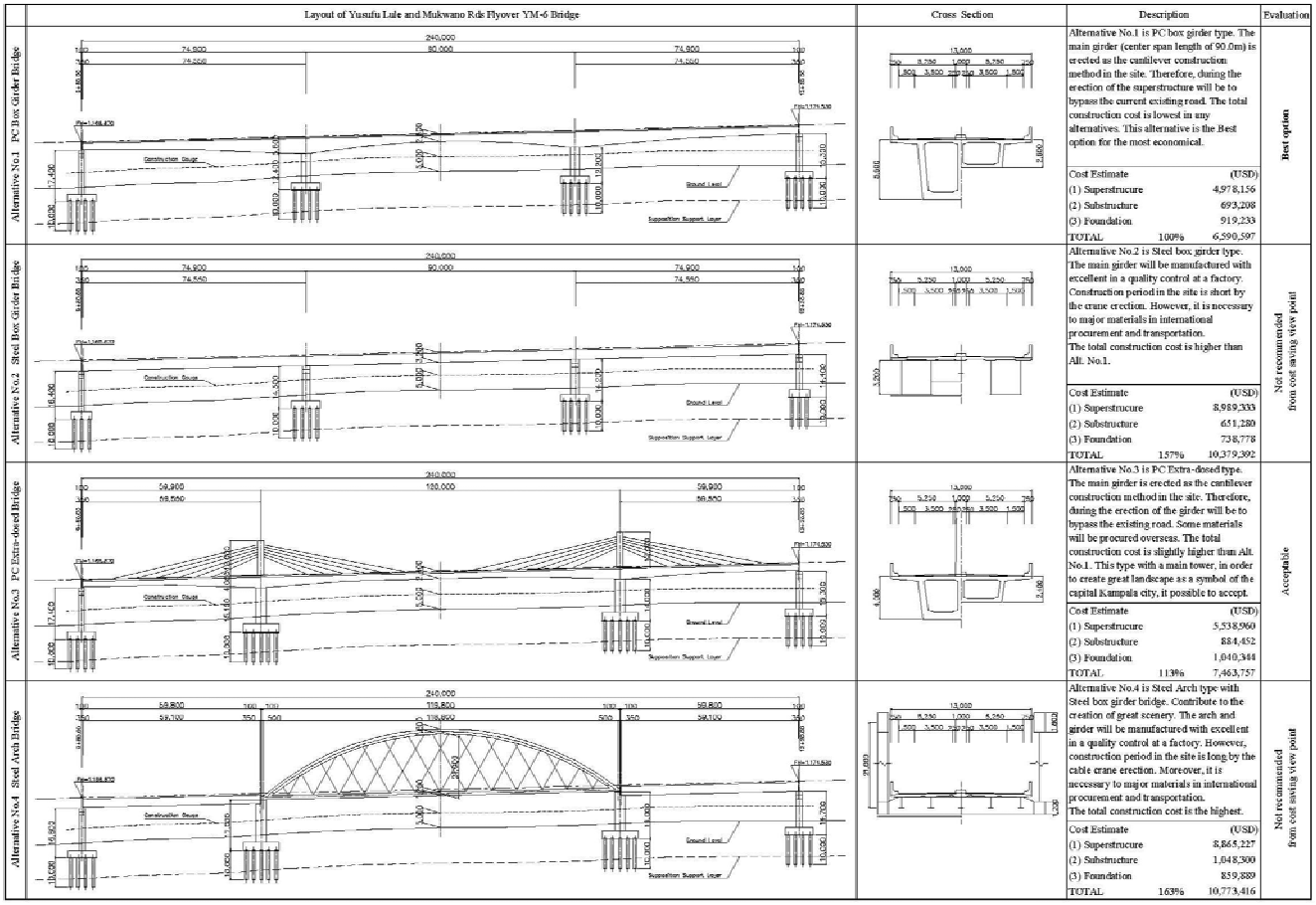
Table 7.2.5 Alternative Bridge Type for Bridge No. YM-6

Alt.1 PC Box Girder Bridge	Alt.2 Steel Box Girder Bridge	Alt.3 PC Extra-dosed Bridge	Alt.4 Steel Arch with Steel Box Girder Bridge
			

Source: JICA Study Team

Result of comparison study is shown in Figure 7.2.5. From the view of economic efficiency, 3-span continuous PC Box Girder Bridge is determined as the best option in this Pre-FS.

However, since this project is realized as the first flyover in Greater Kampala, PC Extra-dosed Bridge with a main tower, of which cost is a few percent more than the total Pre-FS flyover project cost estimate, is also recommended in view of creating a great landscape as a symbol of the capital Kampala City, if the budget allows. The bridge type should be further examined and discussed in the FS stage in a comprehensive manner from the aspects of engineering, economic efficiency, maintenance and so on.



Source: JICA Study Team

Figure 7.2.5 Comparison Table of Bridge No. YM-6

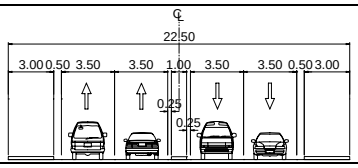
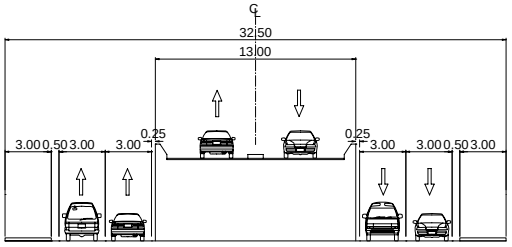
7.3 MUKWANO ROAD WIDENING PROJECT

7.3.1 ALTERNATIVE PLAN STUDY

After introduction of the BRT, Mukwano Road will be the east-west trunk road instead of Kampala/Jinja Roads. The Study Team has proposed the improvement of Mukwano Road including Mukwano Rbt and Nsambya/Kibuli Jct.

The Study Team recommends application of design speed of 50km/h for Mukwano Road, which lies in a built-up area, in accordance with the Road Design Manual in Uganda. Its number of lanes should satisfy the future traffic demand. According to the result of the future traffic demand forecast, vehicle number on Mukwano Road will increase up to 55,700 pcu per day. As a result, four lanes for both directions will be required.

The Study Team set out the typical cross sections of Mukwano Road widening, as shown in the figure below.

Typical Cross Sections	Description
	**Mukwano Road** (Normal section)
	**Mukwano Road** (Flyover section)

Source: JICA Study Team

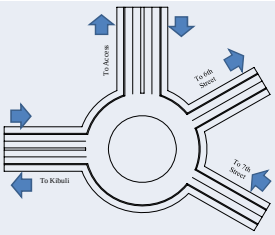
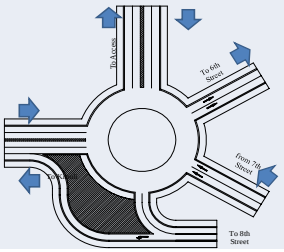
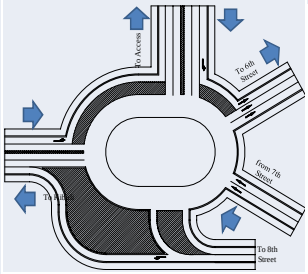
Figure 7.3.1 Typical Cross Sections of Mukwano Road

The two major bottleneck points on Mukwano Road are Mukwano Rbt and Nsambya/Kibuli Jct. The computed capacity of Nsambya/Kibuli Jct. indicates that the intersection is not sufficient against the existing traffic volume. The level of service (LOS) of Mukwano Rbt is categorized as level "D" in the morning.

Given the above mentioned situations, required road functions are defined as follows:

- Widening of Mukwano Roads and part of Nsambya Road from two lanes to four lanes,
- Junction improvement of Mukwano Rbt and Kibuli Jct, and
- Consider minimizing the negative impacts to social environment.

The following alternatives for improvement of Mukwano Rbt are proposed.

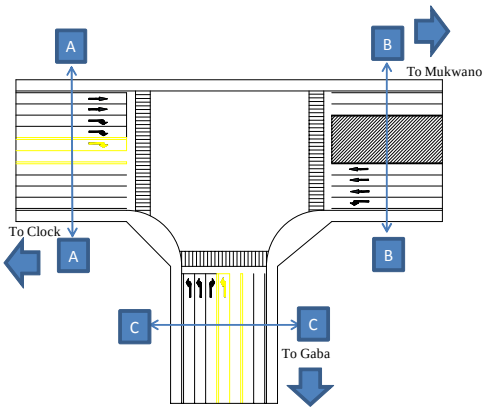
Alt	Configuration	Description
A		1. Change the existing small diameter roundabout of 25 m to a larger diameter (50-60 m) roundabout 2. Reducing the inflow leg to roundabout is an effective measure. From this viewpoint, one-way operation is of 6th street and 7th street is required.
B		In addition to 1 and 2 noted above: 3. T-junction of 8th street is close to Mukwano Rbt and has a large number of traffic. For this situation, existence of T-junction is one factor causing traffic jam at Mukwano Rbt. Hence, it is suggested to combine 8th Road with the new roundabout to eliminate the T-junction.
C		In addition to 1, 2 and 3 noted above: 4. Reduction of the inflow traffic to roundabout is an effective measure. From this viewpoint, critical traffic flows with left turn lanes are removed from the roundabout through a by-pass lane.

Source: JICA Study Team

Figure 7.3.2 Alternative and Options for Mukwano Rbt Improvement

Name of Intersection: Kibuli Junction
Taget Year: 2023
Scale of Intersection: Large (K=3)
Number of Pedestrian: Small (f_L=0.85)

Approach		A from Clock		B from Mukwano		C from Gaba			
		TR	RT	LT	TR	LT	RT		
Number of Lane		2	2	1	3	2	1		
Basic value of saturation flow rate		2000	1800	1800	2000	1800	1800		
Reduction coefficient (Lane width: m)		1.00 3.50	1.00 3.50	1.00 3.50	1.00 3.50	1.00 3.50	1.00 3.50		
Reduction coefficient (Gradient: %)		1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00		
Reduction coefficient (Share of large vehicle: %)		1.00 0.00	1.00 0.00	1.00 0.00	1.00 0.00	1.00 0.00	1.00 0.00		
Reduction coefficient (Share of left turn: %) (E_{LT}) (Effective green time: sec) (Green time for pedestrian: sec) Adjustment coefficient by pedestrian: fl		1.00 - - - - - -	1.00 - - - - - -	1.00 100.00 - - - 0.85	1.00 - - - - - -	1.00 100.00 - - - 0.85	1.00 - - - - - -		
Reduction Coefficient (Share of right turn: %) (Probability of right turn: f) (Effective green time: sec) (No. of right turn for transition time: K)		1.00 - - - -	1.00 - - - -	1.00 - - - -	1.00 - - - -	1.00 - - - -	1.00 - - - -		
Saturation flow ratio		4000	3600	1800	6000	3600	1800		
Traffic volume (pcu/hr)		1418	1281	256	2,221	1,731	418		
(Left turn or Right turn)		-	1281	256	-	1,731	418		
Flow ratio		0.35	0.36	0.14	0.37	0.48	0.23	λi	Σλ
Phase ratio	phase-1	0.35	0.36	-	-	0.24	-	0.36	0.97
	phase-2	-	-	0.14	0.37	-	-	0.37	
	phase-3	-	-	-	-	0.24	0.23	0.24	



Source: JICA Study Team

Figure 7.3.3 Required Configuration and Lane Number of Nsambya/Kibuli Jct.

7.3.2 EVALUATION AND RECOMMENDATION

From the viewpoint of delay time only, effect of Alt.-A seems higher than Alt.-B and C. However negative effect of T-Jct. of 8th street is not included in this delay time (135.1s) as numeric evaluation of negative impact with closed junction is difficult. For this reason, alternatives should be evaluated considering both the delay time and negative impacts of 8th street. As a result, Alt.-C was selected as the most effective improvement plan for Mukwano Rbt.

Table 7.3.1 Change of Saturation and Delay Time by the Improvement

Intersection and Roundabout	Y2010	Y2023		
	Traffic Survey Results	Alt.-A	Alt.-B	Alt.-C
Mukwano Rbt	37.8s	135.1s	230.1s	180.3s
T-jct. of 8th Street	Close Jct. of Mukwano Rbt	Negative effect by T-Jct. of 8th Street remains at Mukwano Rbt.	Negative effect by T-Jct. of 8th Street is solved.	Negative effect by T-Jct. of 8th Street is solved.
Kibuli Jct.	1.34	0.97		

Source: JICA Study Team

LOS of Alt.-C is still categorized as level “F”. As mentioned above, Highway Capacity Manual HCM recommends at least level “C” in urban areas. The most effective measure is to disperse inbound traffic to Mukwano Rbt. Therefore, upgrading (to dual carriageway) of Nsambya/Gaba Road planned in NTMP/GKMK should proceed in conjunction with Mukwano Road Improvement Project.

7.4 SHOPRITE AND CLOCK TOWER JUNCTIONS TRAFFIC SAFETY IMPROVEMENT PROJECT

7.4.1 ALTERNATIVE PLAN STUDY

The Study Team has proposed the traffic safety improvement project for both junctions. Shoprite

and Clock Tower Jcts exhibit the worst traffic congestion in Kampala City. The traffic congestion on Kibuye Rbt linked to Clock Tower Jct via Queen's Way and Katwe Road is also very serious. Hence, impacts of the improvement of Shoprite and Clock Tower Jcts to Kibuye Rbt were also considered.

Existing conditions of these junction and/or roundabout were evaluated as follows based on the traffic survey results conducted by the Study Team. From the computed result of saturations and delay time, situation of Shoprite Jct at the morning peak and Kibuye Rbt at the evening peak were undoubtedly chaotic. Calculation result for Clock Tower Jct also indicates that its intersection capacity is not sufficient to accommodate the existing traffic volume.

The following conditions were considered in the improvement plan.

A. Introduction of the BRT (at the time of 2023)

B. Reservation of Clock Tower (Monument)

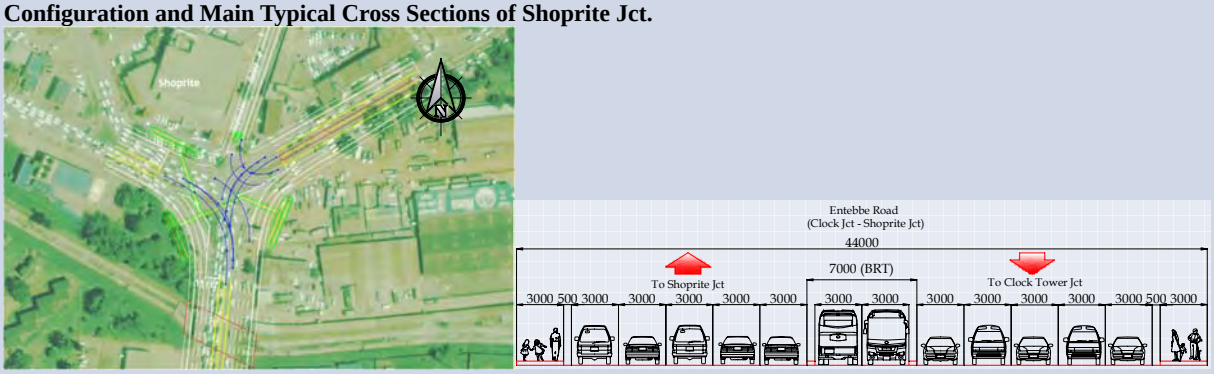
Given above mentioned situations and preconditions, the following concepts were proposed:

- Reduce traffic accidents by segregating vehicles and non-motorized traffic (pedestrians)
- Provide sufficient capacity corresponding to the future traffic demand and flow
- Coordinate with the future plan such as the BRT
- Consider minimizing the negative impacts to social environment

The following three alternatives are proposed based on the improvement concepts and discussion with key stakeholders.

Alternative-1
Current one-way operation on Queen's way and Mengo Hill Road will be continued in the future.

Configuration and Main Typical Cross Sections of Shoprite Jct.



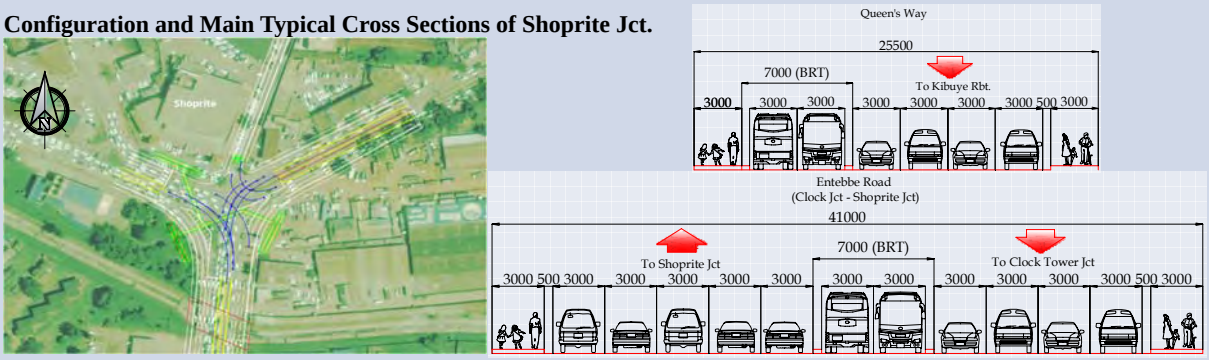
Configuration and Main Typical Cross Sections of Clock Tower Jct.

Source: JICA Study Team

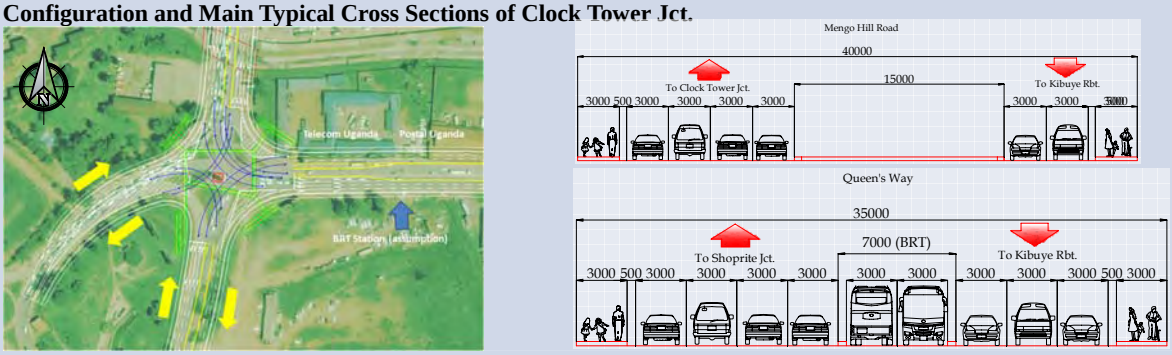
Figure 7.4.1 Shoprite/Clock Tower Jct. Improvement Plan (Alt.-1)

Alternative-2
Current one-way operation on Queen's way and Mengo Hill Road will be changed to two-way for both sides.

Configuration and Main Typical Cross Sections of Shoprite Jct.



Configuration and Main Typical Cross Sections of Clock Tower Jct.

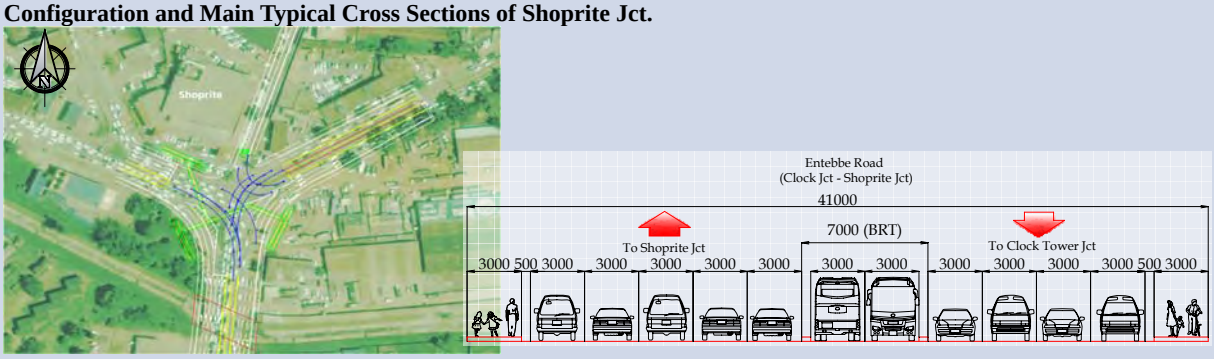


Source: JICA Study Team

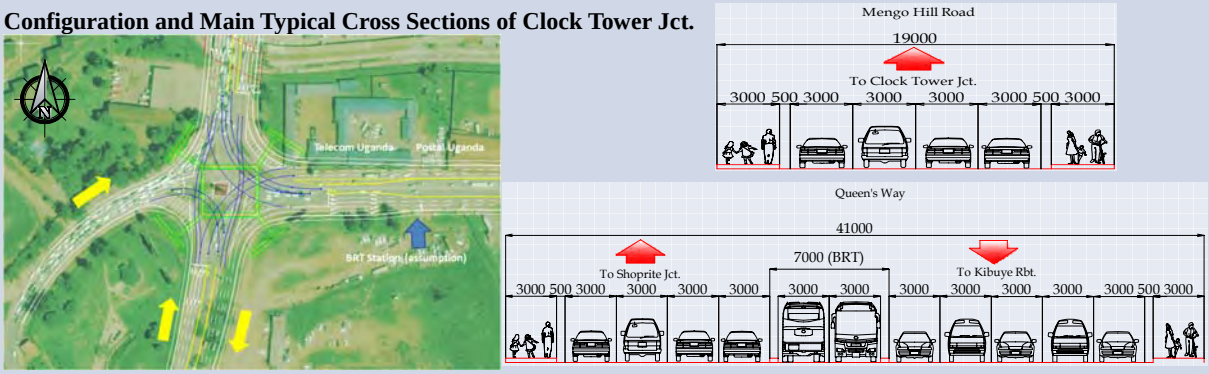
Figure 7.4.2 Shoprite/Clock Tower Jct. Improvement Plan (Alt.-2)

Alternative-3
Current one-way operation on Queen's way will be changed to two-way for both sides in the future. Mengo Hill Road will be continued current one-way operation.

Configuration and Main Typical Cross Sections of Shoprite Jct.



Configuration and Main Typical Cross Sections of Clock Tower Jct.



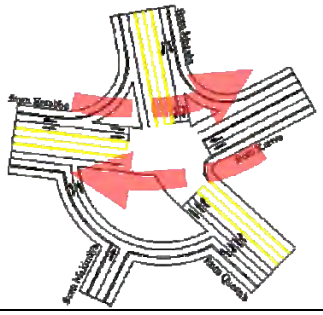
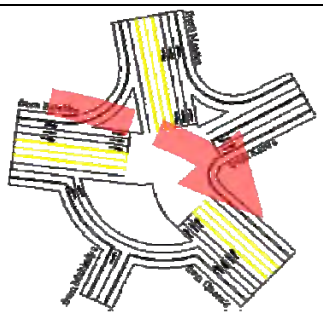
Source: JICA Study Team

Figure 7.4.3 Shoprite/Clock Tower Jct. Improvement Plan (Alt.-3)

This improvement project should make both junctions safer for pedestrian. For this purpose, separation of non-motorized traffic and motorized traffic is a quite effective measure. From above viewpoints and improvement concepts, construction of pedestrian bridges should be included in this improvement project. All pedestrian traffic should use pedestrian bridges with gentle slope.

7.4.2 EVALUATION OF ALTERNATIVE PLANS

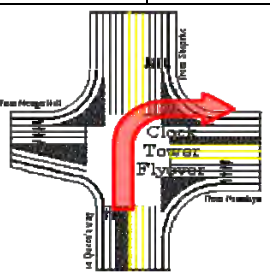
The main objective of the junction improvement is to contribute to the decongestion in the urban area. Such improvement project is evaluated considering the situation of junctions and delay time at roundabouts. However, as traffic congestion at Kibuye Rbt is chaotic, it is also improved from roundabout to junction.

Kibuye	210.4s (1.37*)	1.23	2.20	2.20
Kibuye plus Kibuye Flyover*		0.93	1.47	
				

Note: *: In case that the Kibuye Roundabout is a signalized junction. (Assumption)
Source: JICA Study Team

Given above situations, impacts of Clock Tower Flyover were considered to all alternatives. Consequently, flyover for Alt.-1 has a great effect on smooth traffic flows. On the other hand, flyover for Alt.-2 and 3 also significantly affects decongestion. However, such effects do not achieve smooth traffic operations. This means that investment for the flyover for Alt.-2 and 3 only achieves half the purpose.

Table 7.4.1 Impacts of Clock Tower Flyover

	Y2023		
	Alt.-1	Alt.-2	Alt.3
Saturation without Flyover	0.96	1.63	1.28
Saturation with Flyover	0.65	1.44	0.99
Configuration			
Additional Area (m^2)	5,850m^2	5,450m^2	
Additional Resettlement No.	1 (Public facility)	1 (Public facility)	
Additional Cost (US$)	4,250,000 US$ (100)	6,440,000 US$ (152)	

Source: JICA Study Team

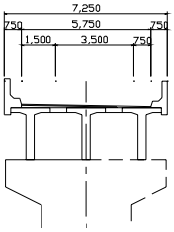
Most evaluations in the above tables indicate that Alt.-1 is an acceptable improvement plan. Therefore, the Study Team recommends applying Alt.-1 as a better improvement plan for Clock Tower and Shoprite junction. The main reasons for such recommendation are the highest effect to smoothness of traffic and low project cost.

Clock Tower Flyover for Alt.-1 will create an additional effect. However, Alt.-1 without Clock Tower Flyover will function adequately up to 2023 (target year) and beyond. Hence, Clock Tower Flyover should be considered at the conjunction with the progress of the BRT plan, after the completion of proposed improvement plan. More study and discussions are required with regards to the functions that should be expected of Katwe Road and Queen's Way, and configuration of the BRT on these road sections.

7.4.3 ALTERNATIVE STRUCTURE PLAN

Based on the geometric design standards in Uganda and preliminary planning of the projects, the Study Team set out the typical cross sections of Flyover projects as shown in Table 7.4.2.

Table 7.4.2 Typical Cross Section of Clock Tower Flyover

Typical Cross Section	Description
	**Clock Tower Flyover:** One-way Flyover with 1.5m (left side) and 0.75m (right side) shoulder width.

Source: JICA Study Team

A span length is predefined by the superstructure type. The table below shows the applicable span lengths for various superstructure types.

Table 7.4.3 Result of Bridge Type Selection

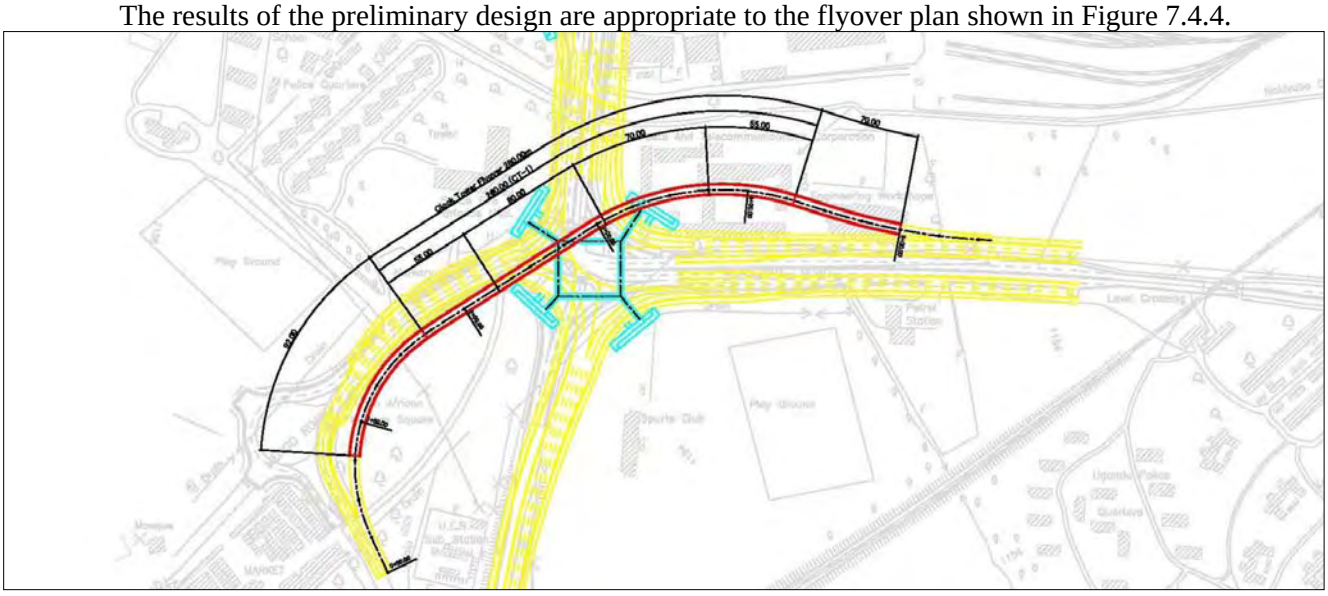
Clock Tower Flyover

Start	Length (m)	End	Bridge No.	Max. Span Length (m)	Curve Radius (m)	Widening Width (m)	Material Type	Girder Type
0 + 78.00	92.0	1 + 70.00	Access Road (Mengo Hill Rd side)					
1 + 70.00	260.0	4 + 30.00	CT-1	80.00	155	7.25	Steel	Box
4 + 30.00	70.0	5 + 0.00	Access Road (Nsambya Rd side)					

Source: JICA Study Team

7.4.4 PRELIMINARY DESIGN FOR THE BEST ALTERNATIVES

The results of the preliminary design are appropriate to the flyover plan shown in Figure 7.4.4.



Source: JICA Study Team

Figure 7.4.4 Preliminary Flyover Plan of Clock Tower Junction

7.5 CONSTRUCTION PLANNING

7.5.1 CONSTRUCTION PLAN

The construction plan consists of two major project components of civil works: i) New construction of the flyover, ii) Widening of the existing road including new construction of the pedestrian bridge and re-setting of traffic signal.

Major components of the project and approximate work quantities are listed in Table 7.5.1.

Table 7.5.1 Major Project Components

DESCRIPTION	UNIT	Pre-FS projects				
		Project 1.1	Project 1.2	Project 1.3	Project 3.7	
		Yusefu Lule - Mukuwano Rds Flyover	Jinjya - Yusefu Lule Rds Flyover and Mukuwano - Jinjya Rds Flyover	Queen's Way - Mukuwano Rd Flyover	Shoprite Jct Traffic Improvement	
					Shoprite Section	Clock tower Section
New construction of the flyover						
1. Bridge work						
Length	m	1,675.00	1,687.00	110.00	-	-
Width	m	13.00	10.00	7.25	-	-
Approach road	m	230.00	325.70	184.00	-	-
Widening of the existing road						
2. Road work						
Length	m	1,304.00	356.00	2,007.00	-	-
Overlay area	m2	19,462.00	4,222.00	11,066.00	5,786.00	12,855.00
Widening area	m2	5,267.00	465.00	24,763.00	4,517.00	11,707.00
Re-setting of traffic signal	pace	-	-	-	1.00	1.00

Source: JICA Study Team

The main works involved in this Project is the flyover construction, which is the first of its kind in Uganda. Construction work for the flyover involves large-scale civil engineering works mainly consisting of steel materials and requiring special flyover bridge construction equipment. The construction process is described as follows:

1) New Construction of the Flyover

Foundation Works

Step-1: Piling Works

Step-2: Sheet Pile Installation

Step-3: Structural Excavation

Substructures

The RC-Portal type pier is planned traversing the existing arterial road which is required to be open to traffic flow even during construction.

Superstructures

PC-I girders are fabricated in the factories (pre-cast). One girder will be fabricated in proper length of segments in the factory and thereafter will be transported and connected to the other girder at the site. After the girder is lifted up on the piers, it will be shifted in a lateral direction and will be set to the right position. Consequently, the next girder will be erected in the same manner.

2) Widening of Existing Road

There are many road construction works in Uganda at the moment. Therefore, the construction equipment and the materials to be used are available including onshore procurement. However, the general control and supervision is necessary because the works have to be done not as isolated components but in parallel and in combination with the other components, which is the

bridge construction.

Step-1 Clearing and grubbing works.
Step-2 Relocation of the Under-ground utilities
Step-3 Construction of the pedestrian way and drainage work etc.
Step-4 Construction of Sub-base and base course
Step-5 Dense Bitumen Binder Course
Step-6 Wearing course

3) Improvement of Existing Road

Step-1 Removal of the traffic safety facilities
Step-2 The machining of the existing road surface
Step-3 Spreading and curing of the tack coat
Step-4 Wearing course
Step-5 Road marking work

4) Construction of Pedestrian Bridges

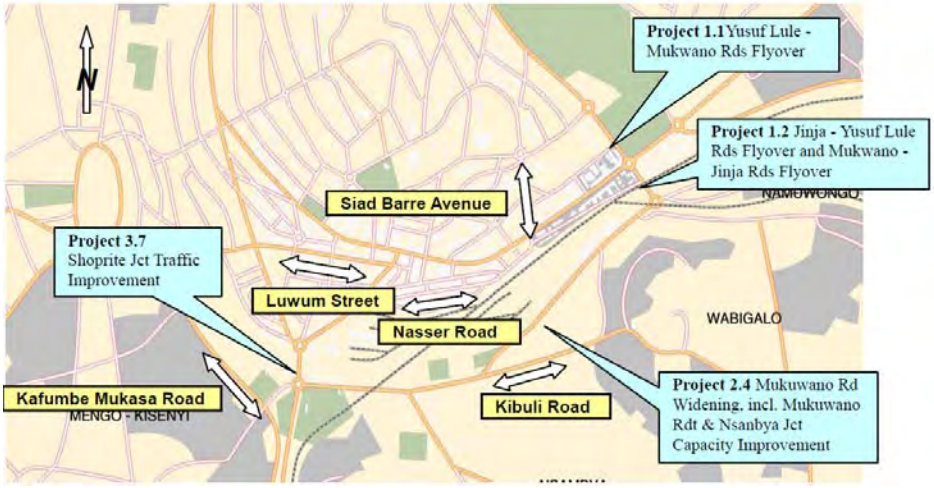
Step-1 Foundation excavation
Step-2 Footing
Step-3 Column
Step-4 Superstructure Works
Step-5 Subsidiary work

5) Re-setting of Traffic Signals

Step-1 Removal of the existing signal
Step-2 Construction of cable duct and cable junction manhole
Step-3 Laying of the cable and Electrical test
Step-4 Election of the signal pole and signal installation and
Step-5 Confirmation of the function and adjustment of the signal timing

7.5.2 TRAFFIC CONTROL DURING CONSTRUCTION

As the projects are located at very busy urban trunk roads in Kampala City, the construction works have to be carried out without interrupting daily traffic. Since the weekday daytime traffic is heavy, major construction works are required to be carried out at night and on weekends. Provision of construction site and diversion roads has been studied as shown in the following figure.



Source: JICA Study Team

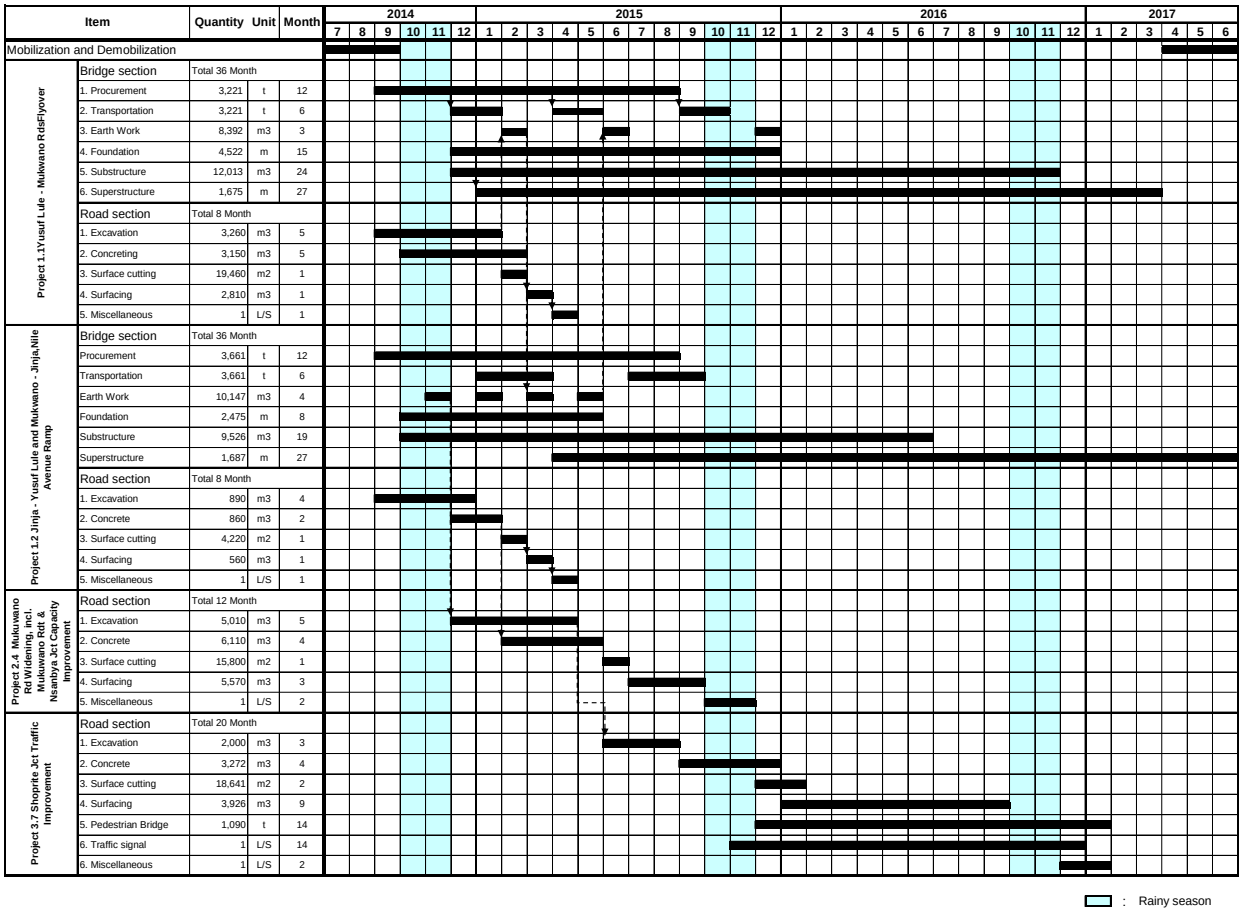
Figure 7.5.1 Plan of Diversion Road

7.5.3 COSTRUCTION SCHEDULE

The Study Team estimated that the required contract period would be about 36 months including mobilization and demobilization, as shown in the following schedule.

Table 7.5.2 Tentative Implementation Schedule

Item		Quantity	Unit	Month
Mobilization and Demobilization				
Project 1.1Yusuf Lule - Mukwano RdsFlyover	Bridge section	Total 36 Month		
	1. Procurement	3,221	t	12
	2. Transportation	3,221	t	6
	3. Earth Work	8,392	m3	3
	4. Foundation	4,522	m	15
	5. Substructure	12,013	m3	24
	6. Superstructure	1,675	m	27
	Road section	Total 8 Month		
	1. Excavation	3,260	m3	5
	2. Concreting	3,150	m3	5
	3. Surface cutting	19,460	m2	1
	4. Surfacing	2,810	m3	1
	5. Miscellaneous	1	L/S	1
Project 1.2 Jinja - Yusuf Lule and Mukwano - Jinja Nile Avenue Ramp	Bridge section	Total 36 Month		
	Procurement	3,661	t	12
	Transportation	3,661	t	6
	Earth Work	10,147	m3	4
	Foundation	2,475	m	8
	Substructure	9,526	m3	19
	Superstructure	1,687	m	27
	Road section	Total 8 Month		
	1. Excavation	890	m3	4
	2. Concrete	860	m3	2
	3. Surface cutting	4,220	m2	1
	4. Surfacing	560	m3	1
	5. Miscellaneous	1	L/S	1
Project 2.4 Mukuwano Rd Widening, incl. Mukuwano Rdt & Nsambya Jct Capacity Improvement	Road section	Total 12 Month		
	1. Excavation	5,010	m3	5
	2. Concrete	6,110	m3	4
	3. Surface cutting	15,800	m2	1
	4. Surfacing	5,570	m3	3
	5. Miscellaneous	1	L/S	2
Project 3.7 Shoprite Jct Traffic Improvement	Road section	Total 20 Month		
	1. Excavation	2,000	m3	3
	2. Concrete	3,272	m3	4
	3. Surface cutting	18,641	m2	2
	4. Surfacing	3,926	m3	9
	5. Pedestrian Bridge	1,090	t	14
	6. Traffic signal	1	L/S	14
	6. Miscellaneous	1	L/S	2



Source: JICA Study Team

7.6 MAINTENANCE PLAN AND COST

Road maintenance activities, which are required after completion of the project, are generally divided into two categories:: Routine Maintenance Work and Periodic Maintenance Work. Each maintenance work consists of the following items:

i) Routine Maintenance Work including;

- Operation cost: Costs for electricity for street lighting, signal operation, etc,
- Clearing cost: Costs for clearing the road and bridge surfaces, drainage facilities, traffic sign boards, traffic devices, trimming/cutting of trees/grass, etc.
- Repair costs: Costs for pavement repair including pot hole patching and crack sealing of AC pavement, re-painting road markings, repair of sign boards, safety devices and traffic control facilities, repair/seal of concrete cracks of bridge decks, handrail, girders, abutment and piers, replacement deck drainage pipe, etc.

ii) Periodic Maintenance including;

- Overlay for AC pavement (every 10 years)

- Repainting of steel girder and replacement of expansion joints of bridge which includes reconstruction of waterproofing of pavement surface, minor repairs of damaged deck girders, etc. (every 15 years)

Taking the above activities into account, the maintenance cost for the Jinja Flyover, Clock Tower Flyover, Mukwano Road Widening and Shoprite and Clock Tower Traffic Improvement projects were estimated (selected alternatives) as shown in Tables 7.6.1 and 7.6.2.

Table 7.6.1 Estimated Maintenance Costs of Each Project

No.	Project Name	Routine Maintenance Cost (M.Sh.)	Periodic Maintenance Cost (M. Sh.)	
		Every Year	Every 10 Years	Every 15 Years
1-1	Jinja Flyover Project	1,930	1,800	61,300
1-2	Clock Tower Flyover	160	0	5,630
2	Mukwano Road Widening Project	330	3,350	0
3	Shoprite & Clock Tower Traffic Improvement Project	260	2,610	0

Source: The Study Team

Table 7.6.2 Estimated Ratio of Maintenance Costs for Construction Cost

No.	Project Name		Construction Cost excluding General Cost (M. Sh.)	Routine Maintenance Cost (Every Year)		Periodic Maintenance Cost (Every 10 Years)		(Every 15 Years)	
				Ratio for A	Amount (M.Sh.)	Ratio for A	Amount (M.Sh.)	Ratio for A	Amount (M.Sh.)
			(A)	(%)	(B)	(%)	(C)	(%)	(D)
1-1	Jinja Flyover Project	Road Sec.	6,005	3.0%	180	30.0%	1,800	-	0
		Bridge Sec.	175,133	1.0%	1,750	-	0	35.0%	61,300
		Total	181,138		1,930		1,800		61,300
1-2	Clock Tower Flyover		16,077	1.0%	160	-	0	35.0%	5,630
2	Mukwano Road Widening Project		11,160	3.0%	330	30.0%	3,350	-	0
3	Shoprite & Clock Tower Traffic Improvement		8,686	3.0%	260	30.0%	2,610	-	0

Source: JICA Study Team

Although currently all Pre-FS roads will be under administration of the KCC, KCC would not be able to maintain the roads due to its small number of engineers and budget. However, the GOU has planned to move the administration of national roads and other urban trunk roads located in the city centre from KCC to UNRA who can employ the staffs with better capacity utilizing its higher level of salary. In addition, EU has conducted capacity building of UNRA, including planning and implementation of maintenance projects.

As to the maintenance budget, the GOU established Uganda Road Fund (URF) in 2008 and it has a duty to finance the implementation of the Annual Road Maintenance Programs that are carried out by UNRA and the other designated road agencies responsible for district, urban and community access roads. Since the current URF is approximately US$ 100 million, it will be sufficient to cover the maintenance cost required for the Pre-FS flyovers.

The Study Team understands that as capacity of UNRA is insufficient for steel structures (bridges) maintenance, development of the maintenance capacity should be incorporated in the project at the implementation stage. The Study Team also recommends that introduction of a performance-based maintenance and management contract (PMMC) would be appropriate for the flyover maintenance reducing life cycle costs, increasing in maintenance efficiency and reducing the government burden.

CHAPTER 8 ROAD TRAFFIC SAFETY PLAN

8.1 SCOPE OF THE STUDY

(1) Study Objectives

The objectives of the Road Traffic Safety Study are as follows:

(i) To develop a Road Traffic Safety Strategic Plan to 2023

(ii) To formulate an Action Plan for Road Traffic Safety in GKMA 2011 – 2015

(2) STUDY AREA AND COVERAGE

Study area of the Road Traffic Safety Study follows study area of the Study, and related local government authorities as stakeholder of the Road Traffic Safety Study are as follows:

1. Kampala City Council
2. Entebbe Municipality
3. Mukono Town Council
4. Kira Town Council (except for Kimwanyi parish)
5. Wakiso Town Council
6. Mukono District (part of Mukono District)
7. Wakiso District (part of Wakiso District)

The Road Traffic Safety Study focus on the road sector, as well as on road-railway crossing.

8.2 CURRENT TRAFFIC SAFETY SITUATIONS AND ISSUES

(1) Road Traffic Accidents in Uganda

In 2008, there were 20,522 road traffic accidents which resulted to 2,488 fatalities and 13,753 injuries. The road traffic accidents increased rapidly from 1990 to 2007, with an annual increase rate of 7.8%. During this 17-year period, the number of fatalities has increased 3.6 times. In terms of fatalities to rate of population, Uganda's figure is 8.0 per 10,000 persons. In terms of fatalities to motorized vehicles including motorcycle, Uganda's figure is 65 per 10,000 vehicles and ranked one of the worst among African countries. In comparison, fatalities in Japan are 0.45 per 10,000 persons and 0.63 per 10,000 motorized vehicles in 2007.

Table 8.2.1 Road Traffic Accident in Uganda (1990-2008)

Year	Accidents				Fatalities				Injuries			
	No.	Growth Rate (%/yr.)	No. per 10,000 persons	No. per 10,000 vehicles	No.	Growth Rate (%/yr.)	No. per 10,000 persons	No. per 10,000 vehicles	No.	Growth Rate (%/yr.)	No. per 10,000 persons	No. per 10,000 vehicles
1990	5,674	-	-	-	788	-	-	-	3,460	-	-	-
1995	11,638	15.5	6.1	-	1,538	14.3	0.8	-	7,693	17.3	4.0	-
2000	14,384	4.3	6.4	-	1,678	1.8	0.7	-	10,213	5.8	4.5	-
2005	19,783	6.6	7.5	709.1	2,034	3.9	0.8	72.9	12,275	3.7	4.6	440.0
2006	18,092	-8.5	6.6	572.5	2,172	6.8	0.8	68.7	12,158	-1.0	4.4	384.7
2007	20,413	12.8	7.2	533.0	2,807	29.2	1.0	73.3	14,073	15.8	5.0	367.4
2008	20,522	0.5	6.9	436.6	2,488	-11.4	0.84	52.9	13,753	-2.3	4.6	292.6

Source: Traffic Accident Report, Uganda Police Force (accident data); Statistical Abstract 2009, UBOS (population data); MOWT (vehicle data)

By road user category on fatal accident, 38% of traffic accidents victims were pedestrians, 32% were passengers and 13% were motorcyclists. Major road traffic accident victims are vulnerable road users and passengers on public transport. Various accident causes are found in road infrastructure environment, vehicle driving and quality, and road user's awareness. About 64% of

the traffic accidents are caused by careless and reckless driving.

(2) Economic Loss caused by the Road Traffic Accident

ESCAP provides formula to estimate economic costs of road accidents when expressed as a percentage of GDP roughly and the losses due to road traffic accidents in Uganda in 2008 are estimated roughly as 2.90 % of GDP.

(3) Traffic Safety Issues

1) Intersectional Issues

Despite the GOU and donors efforts towards eradicating serious traffic situations, the traffic safety situation has not improved yet. There are a lot of issues to be addressed in road traffic safety. The most significant and current overall intersectoral issue is how to establish an appropriate institutional mechanism for sustainable development and implementation of traffic safety policies which will be flexible enough to adapt to demand of future economic development and increase in rate of motorization. Crucial inhibiting factors are human and financial resource development, as well as organizational strengthening.

2) Infrastructure/Traffic Management

Rapid motorization and insufficient road capacity/network are the main causes of the present traffic congestions being experienced. Although congestion may be one of the causes of a traffic accident, the main cause of a traffic accident however is human error, particularly reckless driving and ignoring of traffic rules and regulations. While improvement of the human errors will be addressed by the education and enforcement sectors, it is equally important that appropriate geometric design and safety facilities, as well as sufficient information, be provided to minimize, if not totally avoid, the human errors. At present, UNRA is improving the black spots as an urgent countermeasure to avoid future traffic accidents. However, there are some factors which hinder smooth project implementation such as lack of accident data and budgetary constraints.

3) Transport Operation

Three areas will be discussed in this subsector: licensing system, vehicle inspection and transport operation. With regards to the licensing system, training and testing system for more than 4-wheel vehicles requires a much longer training program and stricter testing procedure. In relation to the licensing system, lack of training and testing centers is crucial problem. The vehicle inspection system in Uganda has not generally improved, and there is still no technical inspection regulation. In addition, the database on vehicle registration, which is very important information for enforcement, is still limited since there is still no network communication that can link databases. Serious traffic accidents are frequently reported involving Boda-boda and buses traveling.

4) Enforcement

Enforcement capacity is still not adequate to meet the increasing traffic demand and traffic law violations. Lack of enforcement facilities and equipment is also limiting the effectiveness of the enforcement efforts. Given such limitations, strategic enforcement planning based on traffic accident and violation data will be required. Data would show that the major cause of traffic accident is still human error. Thus, traffic safety education's main thrust should be how to increase peoples' level of awareness and consciousness on traffic rules and regulations. But education in itself may not be enough to change peoples' road traffic behavior, thus, effective traffic enforcement also becomes indispensable. People observe that new roads kill more people, thus this implies that facility development will also not be enough to ensure traffic safety. After

facility improvement, preservation of traffic safety will very much depend on sustainable and effective enforcement activities. As already mentioned, while traffic enforcement has been increasing rapidly due to increase in volume of traffic, capacity and capability of the traffic police has yet to be upgraded. In addition, traffic enforcement is not only faced with lack in facilities and equipment but also lacks in planning capacity as well as human and financial resources.

Traffic accident and enforcement data is one of the basic data information not only for traffic enforcement but also for engineering improvement and traffic safety education program. However, the database is not yet developed at present.

5) Education and Information Campaign/Propaganda

It is important to have proper coordination with home/community and other social institutions be ensure effectiveness of traffic safety education programs. In other developed countries, importance of traffic safety education for the very young children as a future road user is strongly emphasized. Another issue faced by traffic safety education and campaign subsector is organizational constraints, wherein there is no clear allocation of responsibilities on activities, particularly those outside of the school.

6) Medical Emergency

Development of the medical emergency system is one among the important factors of a post-accident measure to save peoples' life. Emergency Medical Center has not developed. Moreover, the usage of the service in current hospitals is very limited because of the poor facilities and lack of ambulance vehicles. Current situation of the medical emergency system is still very poor. In general, insurance system is not yet well functional. As there is still limited coverage, some of traffic accident victims cannot cover their own medical expenses.

8.3 SECTORAL TRAFFIC SAFETY DEVELOPMENT STRATEGIC PLAN AND PROGRAM

(1) Formulation of Mission Statement for Road Traffic Safety

The Strategic Plan study recommends that the mission statement adopted by the Government of Uganda for road traffic safety is **"**Traffic Accident-Free Society with Engaged Hearts & Minds".

(2) Establishment of Goals and Target

The following two targets will be proposed for the road traffic safety strategic plan:

1) To reduce the number of fatalities into half (based on 2007 figures) by the year 2023 referring to the Declaration of the 4th African Road Safety Conference held in 2007 in Accra. The Implementation of the Strategic Plan should ensure that by 2023, traffic accidents will cease to be a serious and crucial social concern. This can be validated by the above reduction rate of absolute number of fatalities. A careful analysis shows that this target corresponds to three other equivalences:

   - the fatalities rate per 100,000 population less than 5.0%;
   - the fatalities rate per 10,000 vehicles is less than 36.5%
   - a reduction of 4.2% in traffic accidents per year against previous year, in terms of the absolute number of fatalities.

2) To strengthen the capability and functions of the organizations involved in road traffic safety and to develop new organizations and rules/regulations necessary to ensure sustainability of traffic safety measures.

(3) Basic Strategies for the Traffic Safety Measures

Basic strategies will be discussed in two areas, Basic Planning Policies and Implementation Strategies.

Basic Planning Policies

1) Covering the three elements of Person, Vehicle and Road Traffic Environment, five (5) measure areas are identified for implementation of effective and efficient traffic safety measures.

   (i) Development of Safe Road Traffic Environment

   (ii) Enhancement of Safe Driving and Safety in Vehicles

   (iii) Effective and Efficient Traffic Control and Enforcement

   (iv) Enhancement of Traffic Safety Education and Awareness Campaign

   (v) Development of Medical Emergency Countermeasures

2) All necessary institutions and database shall be established within this strategic plan period, including establishment of new laws and regulations and database for scientific analysis.

3) Responsible organizations in government shall establish necessary units/departments/committees for traffic safety development in their respective organizations. For financial resource development, a new mechanism with private sector involvement was examined during this strategic plan period.

Implementation Strategies

1) In order to promote comprehensive traffic safety measures, the appropriate environment and mechanisms shall be enhanced and developed, which can be referred to as the 4Cs (communication, cooperation, collaboration, and coordination) among traffic safety stakeholders.

2) Priority will be given to human resource development rather than on investing on advanced technologies. However, introduction of the practical and reasonable advanced technology for GKMA shall be periodically enhanced and upgraded.

(4) Focus Areas for the Achievement of the Plan's Targets

Emphasis was given on the following six (6) areas:

   (i) Accident involving vulnerable road users

   (ii) Traffic accidents involving PSV (Boda-boda, Minibus)

   (iii) Black-spot and Black-section on Trunk Highways

   (iv) Traffic accident and congestion in the CBD areas

   (v) Accidents involving young population (or beginning drivers)

   (vi) Caring for traffic accident victims

(5) Sectoral Traffic Safety Development Strategic Plan and Program

1) Development of Safe Road Traffic Environment

Target of the sector is to establish a holistic traffic safety policy of improving all elements of traffic safety (person, vehicle and road environment) with close linkage to and upgrading of level of safety and comfort of road traffic. Sector planning strategy was examined as follows to achieve above target based on basic strategies discussed in the previous section:

(i) To improve road physical conditions (road structure and geometric) to provide safe and comfortable driving environment;

(ii) To improve traffic control and management devices to provide safety guidance to the drivers and road users;

(iii) To develop effective measures in line with road functions and traffic conditions (accidents and demand) with scientific approach;

(iv) To promote comprehensive measures for the focus target and areas such as black spot, school zone, residential areas, etc.

(v) To improve institutions (organization, rules and regulations, R&D, database, etc.) to ensure sustainable road safety environmental development; and

(vi) To ensure sustainable human and financial resources development.

The following 7 priority programs are examined for the Strategic Plan based on the sector target:

(i) Black Spot Improvement Program

(ii) Road Safety Audit System Development Program

(iii) Road Traffic Safety Facility Enhancement Program

(iv) Vulnerable Road User Accident Prevention Program

(v) Traffic Safety Performance Monitoring and Maintenance Program

(vi) Urban Road Traffic Safety Plan Development Program

(vii) R&D, Human Resource Development Program

2) Enhancement of Safe Driving and Safety Vehicles

Target of the sector is to develop strict and comprehensive driver and vehicle management system to enhance the social responsibility of the road users and operators. Sector planning strategy was examined as follows to achieve above target based on basic strategies discussed in the previous section:

(i) To improve driver's safety awareness as a responsible member of vehicle society;

(ii) To develop driving standard and vehicle standard to clarify social responsibilities of drivers and vehicle owners;

(iii) To develop continuous training and management system for each category of drivers;

(iv) To develop integrated vehicle management system (vehicle registration, vehicle inspection) to create safe and sustainable traffic safety society; and

(v) To ensure sustainable human and financial resources development.

The following 5 priority programs are examined for the Strategic Plan based on the sector target:

(i) License Renewal System Development Program

(ii) Driver Training and Testing System Development Program

(iii) Vehicle Registration System Development Program

(iv) Vehicle Inspection System Development Program

(v) Organizational and Resource Development Program

3) Effective and Efficient Traffic Control and Enforcement

Target of the sector is to eradicate violations that are causing these traffic accidents, which were identified from the traffic accident analysis. Sector planning strategy was examined as follows to achieve above target based on basic strategies discussed in the previous section:

(i) To develop coordinated traffic regulation planning and implementation system among concerned agencies

(ii) To promote efficient and effective traffic law enforcement activities which would be widely supported by people, with definite goals by carrot and stick

(iii) To develop human resource in combination with applications of modern science and technology

The following 6 priority programs are examined for the Strategic Plan based on the sector target:

(i) Traffic Safety Guidance for Young and Vulnerable Road User Program

(ii) Strengthening and Intensifying Traffic Law Enforcement Program

(iii) Coordination among Concerned Agencies Responsible for Traffic Safety Countermeasures Program

(iv) Recording and Evaluation of Traffic Safety Guidance and Enforcement Activities Program

(v) Human Resource Development on Traffic Safety Guidance and Enforcement Program

(vi) Preparation and Development of Equipment for Traffic Safety Guidance and Enforcement Program

4) Enhancement of Traffic Safety Education and Awareness Campaign

Target of the sector is to create traffic safety culture in the society of Uganda. Despite it being a rather ambitious and time-and resources-consuming plan, this vision is regarded as attainable through efficient participation and cooperation of every concerned agency. Sector planning strategy was examined as follows to achieve above target based on basic strategies discussed in the previous section:

(i) To provide traffic safety educational practice for pre-school children

(ii) To expand traffic safety education for primary up to university students

(iii) To promote community involvement in traffic safety education

(iv) To develop organization and institutional framework

The following 5 priority programs are examined for the Strategic Plan based on the sector target:

(i) Traffic Safety Educational Practice Program for Pre-school Children Program

(ii) Traffic Safety Education for Primary to University Students Program

(iii) Community Involvement Program

(iv) Organizational and Institutional Framework Development Program

(v) Enhancement of Awareness Campaign Program

5) Development of Medical Emergency Countermeasure

Target of the sector is to develop efficient and enhanced post-accident system focusing on road accident casualties to reduce death and injury severity. Sector planning strategy was examined as follows to achieve above target based on basic strategies discussed in the previous section:

(i) To establish an effective pre-hospital service system in the selected national/municipal roads

(ii) To strengthen capability of the emergency services units in selected localities

(iii) Ensure resources (manpower, equipment, medical conditions) to regularly fulfill effective emergency services

The following 3 priority programs are examined for the Strategic Plan based on the sector target:

(i) Development of Pre-hospital Care Program

(ii) Training Health Workers for Emergency System Program

(iii) Capacity Development for Disaster and Mass Casualty Accident Program

(6) Institution and Resource Development Strategies

In order to ensure the sustainability of the traffic safety policy and to continue effective and efficient countermeasures, it is necessary to develop (1) institutional infrastructure, (2) human resource and (3) financial resource.

(1) Institutional Enhancement Program

• Establishment of NRSA

• Traffic safety department/unit in the concerned agencies

• Legalization of NRSA and traffic safety master plan

(2) Research and Development Program

• Traffic safety center development

• Traffic safety database development

(3) Resources Development Program

• Traffic safety foundation development

• Traffic safety human resource development

8.4 TRAFFIC SAFETY ACTION PLAN

(1) Introduction

Action Plan (2011-2015) involves the first phase implementation period of the proposed traffic safety measures in the Strategic Plan. This Action Plan is important to ensure smooth and successful implementation of the proposed measures.

(2) Basic Principles for Measures Selection of the Action Plan

Basic Principle No. 1: The “4Es” and “Stakeholders” approaches should guide the planning and

implementation of measures indicated in this Action Plan. The active participation of the whole political system is one of the most important conditions for the success of this Action Plan.

Basic Principle No. 2: The Action Plan should be integrated with all related existing orientations, policies, plans of the government.

Basic Principle No. 3: The selected measures should be ensured under a strong leadership and with adequate financial and human resources.

(3) Objectives of the Action Plan

- To provide a system of fundamental measures to initiate effectively the traffic accidents and as a first-step, to reduce these accidents.

- To formulate desirable conditions to reduce continuously the losses by traffic accidents, both in human and material resources.

- To enhance knowledge, creating self-awareness of law implementation for road users, particularly for vehicle conductors.

- To improve the management activities of transport mode quality.

- To strengthen the capacity for the legal enforcement forces of traffic safety.

(4) Action Program and Investment

Table 8.4.1 shows total cost of the Five-Year Action Program which is estimated at USD113 million. About 39% of the total investment is for engineering improvement and 30% is for transport management, and about 9% is for traffic enforcement improvement, including equipment procurement. Medical emergency improvement share approximately 12% of the total respectively. Those investments are mainly for the hardware improvement such as safety facilities, communication system, among others.

Table 8.4.1 Cost Estimation for Action Plan

	Traffic Safety Program	Annual Investment Plan					Total
		1	2	3	4	5	
Road Infrastructure	(i) Black Spot Improvement Program	0.4	0.9	0.7	0.1	0.1	2.2
	(ii) Road Safety Audit System Development Program	0.4	0.6	0.2	0.2	0.2	1.6
	(iii) Highway Traffic Safety Facility Enhancement Program	0.9	4.4	6	7	3.5	21.8
	(iv) Vulnerable Road User Accident Prevention Program	0	0.5	1	1	0.5	3
	(v) Traffic Safety Project Monitoring and Maintenance Program	0	0	0.5	0.1	0.1	0.7
	(vi) Urban Road Traffic Safety Plan Development Program	0.7	2.9	3.1	1.3	1.2	9.2
	(vii) R&D, Human Resources Development Program	0.3	2.2	2	1	0.2	5.7
	Sub-Total	2.7	11.5	13.5	10.7	5.8	44.2
Transport Management	(i) License Renewal System Development Program	2.5	0.9	1.4	1	1.5	7.3
	(ii) Driver Training and Testing System Development Program	8	0.4	4.9	1.9	0.1	15.3
	(iii) Vehicle Registration System Development Program	1	0.1	0.5	1	1.3	3.9
	(iv) Vehicle Inspection System Development Program	5	0.02	0.5	0.5	1.5	7.52
	(v) Organizational and Resource Development Program	0	0.1	0.1	0.3	0.3	0.8
	Sub-Total	16.5	1.52	7.4	4.7	4.7	34.82
Traffic Enforcement	(i) Traffic Safety Guidance for Young and Vulnerable Road Users Program	0	0	0.5	0.5	0.5	1.5
	(ii) Strengthening and Intensifying Traffic Law Enforcement Program	0	0	1.4	1.4	1.4	4.2
	(iii) Coordination among Concerned Agencies Responsible for Traffic Safety Countermeasures Program	0	0.1	0.4	0.4	0	0.9
	(iv) Recording and Evaluation of Traffic Safety Guidance and Enforcement Activities Program	0	0.3	0.4	0.1	0	0.8
	(v) Human Resource Development on Traffic Safety Guidance and Enforcement Program	0	0.1	0.2	0.6	0.6	1.5
	(vi) Preparation and Development of Equipment for Traffic Safety Guidance and Enforcement Program	0	0.1	0.5	0.5	0.02	1.12
	Sub-Total	0	0.6	3.4	3.5	2.52	10.02
Traffic Safety Education	(i) Traffic Safety Educational Practice Program for Pre-school Children Program	0	0.4	0.4	0.4	0	1.2
	(ii) Traffic Safety Education for Primary to University Students Program	0	0.3	0.3	0.3	0	0.9
	(iii) Community Involvement Program	0	0	0	0.2	0.2	0.4
	(iv) Organizational and Institutional Framework Development Program	0.1	0.6	0.5	0.3	0.1	1.6
	(v) Enhancement of Awareness Campaign Program	0	0.2	0.6	0.6	0	1.4
	Sub-Total	0.1	1.5	1.8	1.8	0.3	5.5
Medical Emergency	(i) Development of Pre-hospital Care Program	1	1.5	1.5	2.5	2	8.5
	(ii) Training Health Workers for Emergency System Program	0.3	0.3	0.5	0.5	0.1	1.7
	(iii) Capacity Development for Disaster and Mass Casualty Accident Program	0	0.7	0.7	1	1	3.4
	Sub-Total	1.3	2.5	2.7	4	3.1	13.6
Institution	National Road Safety Agency	1.2	1	0.3	0.2	0.1	2.8
	Traffic Safety Research and Development Center	0.3	0.3				0.6
	Traffic Safety Foundation	0.3	1.2				1.5
	Sub-Total	1.8	2.5	0.3	0.2	0.1	4.9
Grand Total (USD million)		22.4	20.12	29.1	24.9	16.52	113.04

Source: JICA Study Team

8.5 IMPLEMENTATION PLAN

(1) Major Findings

Major findings of the Study are summarized as follows:

1) Smooth economic development has brought rapid increase in the rate of motorization. As of 2008, a total of 470,000 vehicles are registered across the country, 50% of which are motorcycles.

2) The road traffic accidents increased rapidly from 1990 to 2007, with an annual increase rate of 7.8%. During this 17-year period, the number of fatalities has increased 3.6 times. The numbers of accidents, fatalities and injuries have reached 20,413, 2,807 and 14,073, respectively, which increased economic losses to approximately 2.9% of the

GDP. Fatality rate still remains at a critical level of 52.9 per 10,000 motorized vehicles.

3) Causes of the traffic accidents are intricately intertwined between physical situation and human errors as well as mixed traffic and reckless driving behaviors. Many traffic accidents have occurred on the main trunk roads, of which 38% of total fatalities are pedestrians. The major causes of accidents are careless driving and reckless driving.

4) The GOU has undertaken numerous countermeasures as well as enlisted the support, assistance and cooperation of international donors to alleviate one of the most pressing social problems in the country at present, which is traffic safety. While some of the countermeasures are implemented in the country, there are still further needs to develop safe driving behaviors among traffic participants in the country.

5) Urgent traffic safety issues have been addressed by the different sectors, such as black spot improvements for the engineering sector, dissemination of school traffic safety education for the education sector, and development of the 119 system for the emergency sector. However, these efforts are still on the pilot stages and only in very limited areas.

6) Traffic Safety Strategic Plan and its Action Plan have been developed. The Strategic Plan is aimed at developing traffic safety development policies and strategies toward 2023 while the Action Plan will be the implementation program of the proposed Strategic Plan policies and strategies for the next five years (2011-2015).

7) The proposed Action Plan is an integration of different sectoral programs into a comprehensive program, namely: Transport Engineering, Transport Operation, Traffic Enforcement, Traffic Safety Education Development, Medical Emergency and Institutional Improvement.

(2) Implementation Plan

The proposed Strategic Plan will be a basic policy and guideline for the government. The Strategic Plan and Action Plan include the comprehensive measures, and the following are some of the major recommendations to facilitate key institutional setup of the strategic traffic safety plan:

- Traffic Safety Human Resource Development Project in Kampala
- Comprehensive Vehicle Management System Development Project
- Project for the Study on Development of Traffic Control Device Integration and Traffic Surveillance System

1) Traffic Safety Human Resource Development Project in Kampala

Background

"4Cs (communication, cooperation, collaboration, and coordination)" approach proposed as one of "Implementation Strategies" on "Basic Strategies for the Traffic Safety Measures", among traffic safety stakeholders are key institutional function to implement traffic safety strategic plan effectively and efficiently. Besides, "4Es" approach is proposed as "Basic Principle" for action plan measures selection.

This project is proposed to take above traffic safety principles into practical traffic safety activities as integrated project of following action programs for coordination and human resource development:

Development of Safe Road Traffic Environment

(vii) R&D, Human Resources Development Program

Efficient Traffic Control and Enforcement Development Plan

(iii) Coordination among Concerned Agencies Responsible for Traffic Safety Countermeasures Program

Traffic Safety Education in School Development Plan

(iv) Organizational and Institutional Framework Development Program

This project is intended to improve following current inter-sectoral problems through mutual project implementation among traffic safety concerned agencies towards effective and efficient implementation of traffic safety strategic plan.

- Unclear administrative responsibility on traffic safety-related issues among concerned agencies
- Insufficient coordination and cooperation system on traffic safety measures implementation among concerned agencies
- Insufficient capacity on traffic safety measures planning and implementation in concerned agencies
- Lack of traffic safety-related ability of concerned staff in responsible agencies

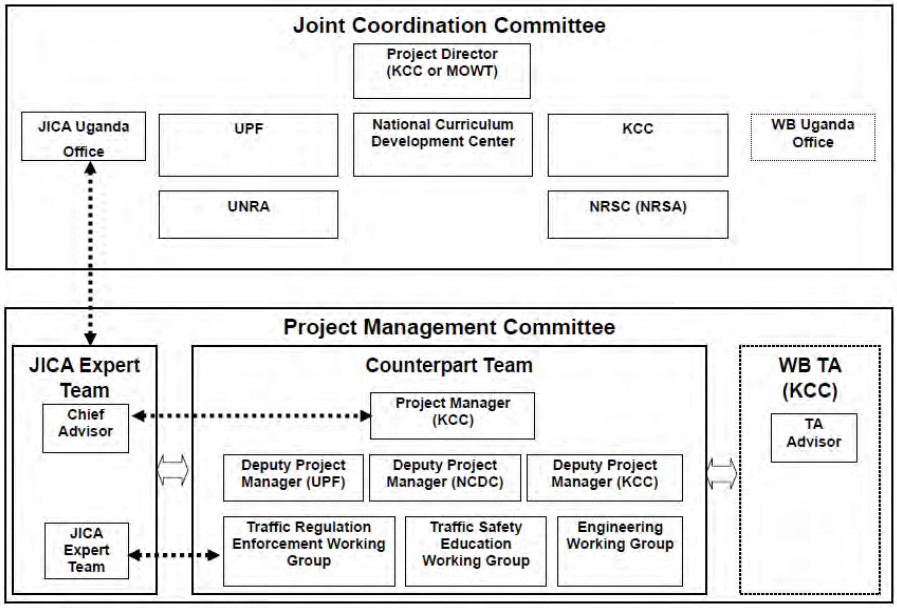
Project Objective

- Improvement of traffic safety measures in Kampala

Objectives (Output)

- To establish a system for planning, implementation and evaluation of comprehensive traffic safety measures in Kampala.
- To improve abilities of traffic policemen of Kampala Traffic Police Division for traffic enforcement.
- To improve abilities of traffic inspectors of KCC for traffic enforcement.
- To improve abilities of officers of KCC for traffic management and road facilities.
- To improve abilities of officers of National Curriculum Development Center (NCDC) for traffic safety education.

Implementation Structure



Source: JICA Study Team

Figure 8.5.1 Project Implementation Structure

Implementation Plan:

- JICA Technical Cooperation Project (3 years: 2011-2013)
- Traffic safety specialist (engineering, enforcement, education, etc.), OJT, Equipment provision

2) Comprehensive Vehicle Management System Development Project

Background

Two action plans named "(iii) Vehicle Registration System Development Program" and "(iv) Vehicle Inspection System Development Program" are proposed as driver and vehicle sector development program based on the following sector planning strategy on "Enhancement of Safe Driving and Safety Vehicles":

(ii) To develop driving standard and vehicle standard to clarify social responsibilities of drivers and vehicle owners

(iv) To develop integrated vehicle management system (vehicle registration, vehicle inspection) to create safe and sustainable traffic safety society

This project is proposed as initial setup stage for above mentioned action plan programs to provide practical planning suggestion for smooth implementation of the action plan programs towards development of new vehicle registration and inspection system with improvement following current problems:

- Defective vehicle management system (suspended compulsory vehicle inspection system, defective check system of insuring)
- Inefficient vehicle management system due to lack of coordinated communication system among concerned organizations (database, etc.)

・ Lack of "benefit principle" perspective on traffic safety funding

Objectives

・ Development of vehicle inspection standard (TLB, UNBS)

・ Development of coordinated vehicle management system (URA, UNBS)

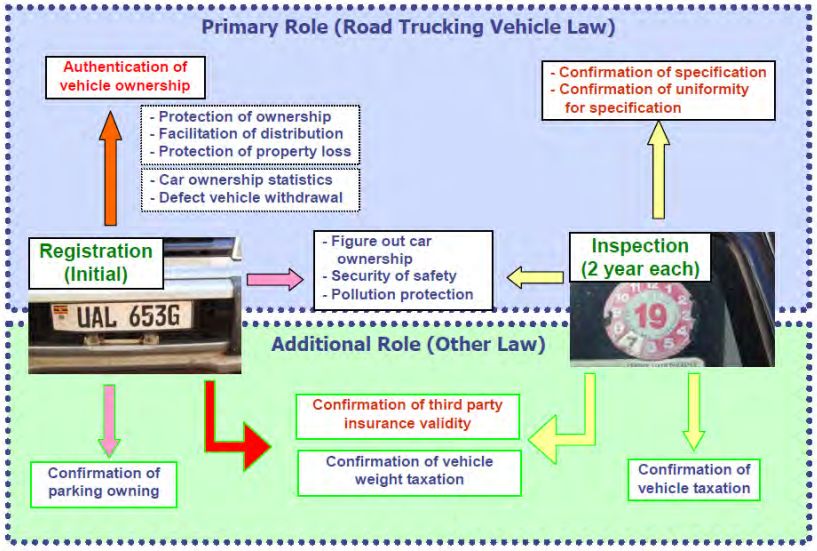
・ Formulation of framework to promote vehicle inspection system privatization (TLB)

・ Development of new vehicle taxation system (URA)

Implementation Plan

・ Technical Cooperation for Development Planning (1 year: 2011-2012)

・ Vehicle management institution specialist, vehicle taxation specialist, etc.



Source: JICA Study Team

Figure 8.5.2 Proposed Vehicle Registration and Inspection System

3) Project for the Study on Development of Traffic Control Device Integration and Traffic Surveillance System

Background

An action plan named "(iii) Highway Traffic Safety Facility Enhancement Program, (3), c) Traffic signal and control system development" is proposed as engineering sector development program based on the following sector planning strategy on "Development of Safe Road Traffic Environment":

(ii) To improve traffic control and management devices to provide safety guidance to the drivers and road users;

This project is proposed as a pilot scheme for the above mentioned action plan to transfer planning, design, and operational technology on the integrated traffic surveillance system. In addition to that, it is intended to make the road improvement projects which include traffic signals installation more effective towards achievement of following issues:

- Capacity expansion of existing independent traffic lights to meet future traffic demand
- Area traffic control and its surveillance system is necessary to meet motorization development
- Optimization of traffic safety resource (traffic police, equipment)

Objectives

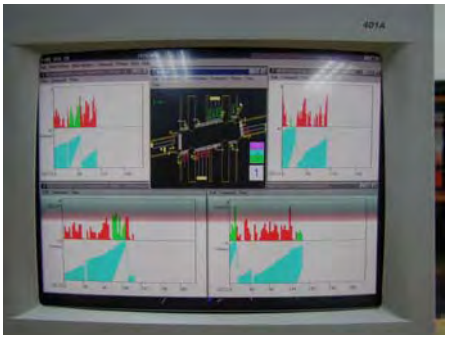
- Pilot project for advanced and coordinated traffic lights operation (KCC, UPF)
- Development of strategy for introduction of area traffic surveillance system based on the result of the pilot project (KCC, UPF)
- Development of efficient traffic police resource management system (UPF)

Implementation Plan

- Technical Cooperation for Development Planning
- Traffic safety specialist (traffic engineer, electric engineer, enforcement specialist, etc.)

Traffic Control Center

Traffic Monitor



Auto-Traffic Light Controller

Network Traffic Light with Traffic Detector

Source: JICA Study Team

Figure 8.5.3 Example of Area Traffic Control System

CHAPTER 9 PUBLIC TRANSPORT PLAN

9.1 MAJOR FINDINGS ACQUIRED BY TRAFFIC SURVEY

(1) Traffic Flow

1) Traffic Volume of Minibus

The total traffic volume counted is highest on Entebbe Road, the second on Jinja Road and the third on is Makerere Hill Road. Meanwhile, minibus volume is highest on Entebbe Road, the second on Jinja Road and the third on Hoima Road. (Table 9.1.1)

Table 9.1.1 Traffic Count Result (Minibus)

Survey Point	Road Name	Minibus	Other Vehicle	Total	Composition of Minibus
No.1-1	Port Bell	1,748	9,145	10,893	16.0%
No.1-2	Jinja	8,129	15,568	23,697	34.3%
No.1-3	Kira	4,433	15,632	20,065	22.1%
No.1-4	Gayaza	3,954	6,546	10,500	37.7%
No.1-5	Bombo	3,547	8,963	12,510	28.4%
No.1-6	Sir. Apollo Kaggwa	2,616	5,550	8,166	32.0%
No.1-7	Makerere Hill	3,005	17,640	20,645	14.6%
No.1-8	Hoima	6,344	5,013	11,357	55.9%
No.1-9	Masaka	5,144	6,814	11,958	43.0%
No.1-10	Natete	2,262	10,073	12,335	18.3%
No.1-11	Entebbe	9,150	19,640	28,790	31.8%
No.1-12	Gaba	4,187	11,211	15,398	27.2%

Note: Motorcycle is excluded
Source: JICA Study Team

2) O-D Traffic Volume of Minibus

Desire lined of minibus vehicle is shown in the following figure. The concentration into the Kampala City center (zone 1) is dominant and among the incoming movement towards city center, movement from Kampala City (zone 2 –zone 5) is very large. Outside the Kampala City area, traffic from adjacent zones such as Kira (zone 14), Kyandondo (zone 15), Nangabo (zone 16) and Nabuweru (zone 17) is also large. Except for the adjacent zones, movement from Entebbe (zone 9) is conspicuous.

(2) Trip Characteristics

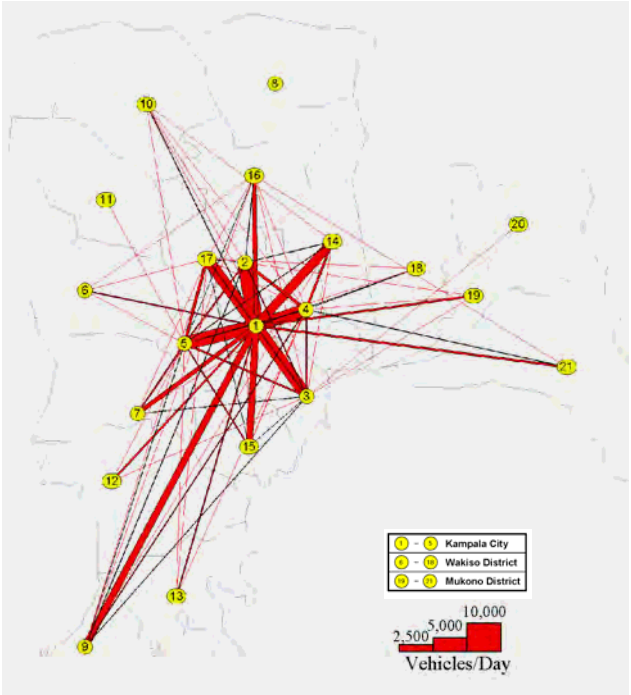
1) Trip Purpose of Minibus Passenger

For the minibus passengers, proportion of home and other related trips is highest. Office and business trips are the second highest. Shopping and hospital trips are rather low.

2) Trip Length of Minibus Passenger

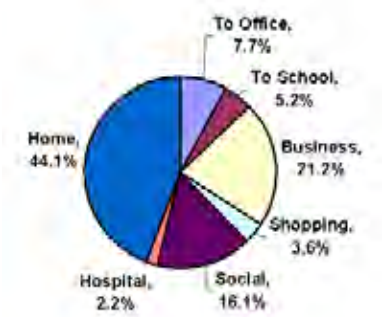
Travel time of minibus passenger is most frequently between 30 and 60 minutes. However, trips taking more than 120 minutes are also frequent.

The average time is approximately 70 minutes. It is pointed out that minibus is used for trips of various distances except for walking distance.



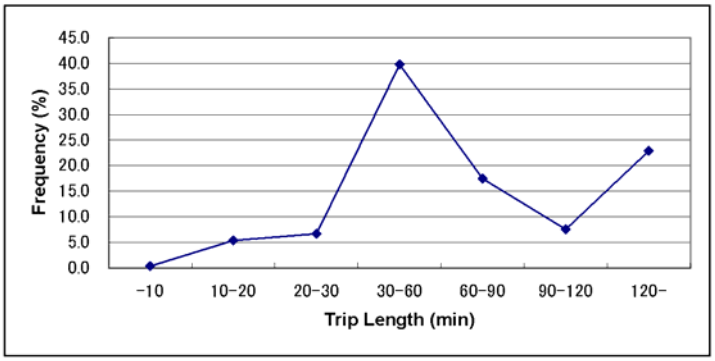
Source JICA Study Team

Figure 9.1.1 O-D Distribution of Minibus



Source: JICA Study Team

Figure 9.1.2 Trip Purpose of Minibus Passenger



Source: JICA Study Team

Figure 9.1.3 Trip Length Distribution (Minibus)

(3) Driver's Conditions

1) Type of Business of Minibus Driver

Most minibus drivers are employed by the owner of the minibuses. Only 15% of drivers own and operate their minibuses.

2) Working Hour, Trip Frequency and Daily Collection

Average working hour of minibus drivers is 16.1 hour/day and trip frequency is 5.0 times/day. Average travel time for one trip (from origin to destination) is 3.22 hours.

Source: JICA Study Team

Figure 9.1.4 Type of Minibus Drivers – Employed or Independent

9.2 ISSUES TO BE SOLVED FOR PUBLIC TRANSPORT SYSTEM

9.2.1 OPERATION METHOD OF BUS AND MINIBUS SERVICES

1) Bus

- Buses are a high capacity collective mode of transport for medium and long distance journey with well established boarding points, routes, intermediate stops and timetable.
- The traffic congestion in the bus terminals within the CBD hampers the operation of buses.
- Even more, large inter-urban buses accelerate the congestion in the central area.
- Inter-urban bus terminals inside the city center are too small and many passengers are waiting outdoor for a long time.

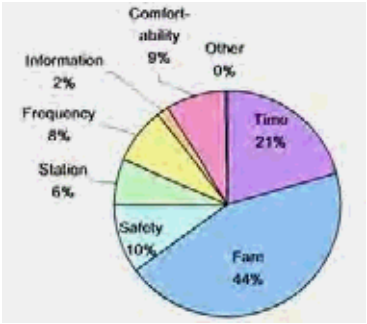
2) Minibus

The main problems are pointed out as follows;

- Low capacity minibus accelerates traffic congestion on the streets and in the parks.
- Road traffic congestion in the operational route.
- Taxi parks are always congested and waste much time for loading
- No fixed fare, route and timetable
- Improve drivers' and conductors' maneuver for safe and comfortable trip
- Review vehicle inspection system and licensing system

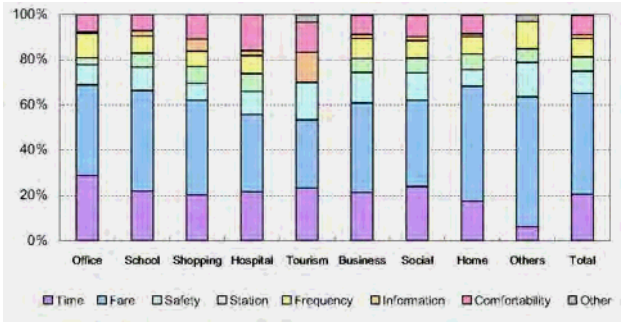
9.2.2 USERS OPINION ON PUBLIC TRANSPORT SERVICES

The results of the questionnaire about the passenger's demand for minibus shows that 45% of the answers are cheaper fare, 21% for speeding up the travel, 12% for safety driving and 9% for comfortable vehicle.



Source: JICA Study Team

Figure 9.2.1 Minibus Passengers' demand



Source: JICA Study Team

Figure 9.2.2 Minibus Passengers' Demand by Trip Purpose

9.3 BASIC POLICY OF THE PUBLIC TRANSPORT PLAN

Long-term and medium-term target years are defined as 2023 and 2018, respectively.

(1) Objectives of Public Transport Improvement

The objectives of the public transport improvement are as follows:

- To provide a reliable and stable public transport service which meets the increasing volume of passenger demand and diversification of needs of passengers
- To harmonize with other road transport modes and to secure the safety of road traffic and public transport
- To protect the interest of public transport industry properly and promote a sound evolution of the public transport industry

(2) Premise to Establish Strategy

For the establishment of the long-term and medium-term strategies for the public transport, the following premises are given to each transport mode.

a) Introduction of BRT is the priority project in the transport sector of GKMA. Therefore, in this study, the strategy of the public transport is established in harmony with the BRT project and its implementation.
b) Since the number of passengers of minibus is very small and the transport efficiency is low, the minibus shall be replaced gradually by large bus, medium bus and BRT as recommended by NTMP/GKMA.
c) Bus is one of the public transport modes and it is necessary for it to be operated on fixed route and fixed time. Therefore, operation method of present minibus without route and timetable shall be gradually abolished.

(3) Objectives of Each Public Transport Development

a) BRT

- BRT will be introduced to enhance modal shift from passenger cars and minibuses to mass transit by provision of rapid and comfortable transport mode.

b) Large Bus

- Minibus will be replaced by large bus of approximately 50-60 passengers to improve the transport efficiency and to alleviate traffic congestion.
- Large bus system will be introduced to prepare the BRT on the route where BRT will be operated but not be yet operating at present or to complement the BRT on the route where BRT will not be operated.

- Large bus system will be administered by an integrated operating entity which will enable the operation by fixed route, fixed schedule and fixed fare, as approved by the authority.

c) Medium bus

- Since the existing minibuses are not efficient in terms of transport capacity and inferior in terms of comfort of passengers, medium size buses with 25 to 30 passenger capacity will replace the minibuses for the feeder routes of the BRT and large bus.
- Operation of medium bus will be limited to the areas which the BRT and large buses will not cover.
- Medium bus will be operated with fixed schedule and fixed fare, which are controlled by the licensing authority.

d) Inter-urban bus

- Inter-urban bus will be connected closely to the BRT and the large bus to unite the whole country to GKMA.

f) Terminal

- To facilitate passengers' mobility by connecting the BRT and large bus routes with other transport modes, the terminals will be developed. These terminals will become the base station for operation of public service vehicles.
- Terminals will alleviate the concentration in the city center terminals by relocating them outside the city center.

(4) Long-term and Medium-term Strategies

The following table shows the development strategy of public transport in each phase including the long long-term (2030) which is the target year of the BRT.

Table 9.3.1 Development Strategy of Public Transport

	Present	Near Future	Medium-term (2018)	Long-term (2023)	Long long-term (2030)
BRT		Pilot route	Pilot route	Pilot route	All the planned route completed
Large Bus			Selected Primary Route Selected BRT Tributary route	Primary route BRT Tributary Route	
Medium Bus			Selected collectoer route Feeder for BRT and large bus	Collector route Feeder for BRT and large bus (completed)	Collector route Feeder for BRT and large bus
Minibus		Shift to BRT Pilot Route	Shift to BRT, Large bus, Medium bus	Shift to BRT, Large bus, Medium bus completed insaide the urban area	Rural Area Remained
Boda-boda			Prohibition on BRT and large bus route	Prohibition on BRT and large bus route	Prohibition on BRT and large bus route
Terminal			Development along BRT and large bus route	Development along BRT and large bus route (completed)	Development along BRT and large bus route
Institution			Framework completed	Framework completed	Framework completed

Source: JICA Study Team

9.4 PRESUMPTION ON BRT NETWORK

BRT development progress in long-term and medium-term is presumed for setting the premise of the transport demand forecast.

(1) Long-term BRT Network:

The presumed long-term BRT network in 2023 consists of arterial routes such as Bombo-Jinja route (A1), Gayaza route (A2), Kira route (A3) and Entebbe route (B1).

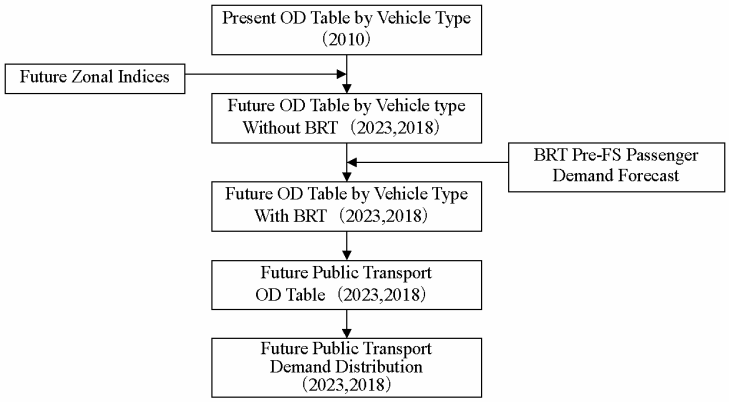
(2) Medium-term BRT Network:

The presumed medium-term BRT network consists of Bombo-Jinja route (A1) and Entebbe route (B1).

9.5 FUTURE PUBLIC TRANSPORT DEMAND

9.5.1 METHODOLOGY FOR PUBLIC DEMAND FORECAST

Based on the O-D table by vehicle type acquired from traffic survey conducted by the Study Team, future public transport demand is forecasted by the following method.



Source: JICA Study Team

Figure 9.5.1 Method for Public Transport Demand Forecast

9.5.2 FUTURE DEMAND FOR PUBLIC TRANSPORT

1) Total Volume of Public Transport Passenger

The total volume of public transport passengers are forecasted as shown in the following table. Growth rates per annum are 3.8 % in 2010-2018 and 4.1 % in 2018-2023. Growth rate will become higher in 2018-2023 due to the progress of the BRT development.

Table 9.5.1 Future Bus Passenger Demand

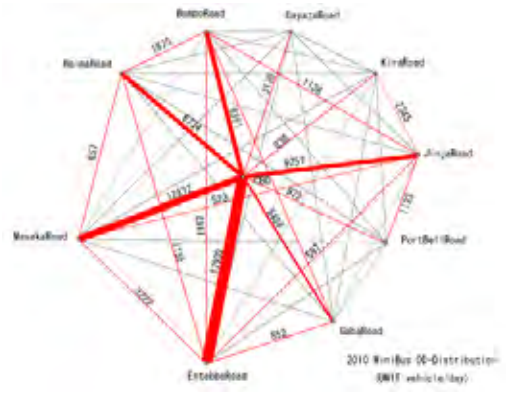
	2010	2018		2023	
	Passenger Volume in thousand	Passenger Volume in thousand	Growth Rate per Annum 2010-2018	Passenger Volume in thousand	Growth Rate per Annum 2018-2023
BRT	0	508	-	942	13.1%
Other Public Transport	959	781	-2.5%	630	-4.2%
Total	959	1,289	3.8%	1,572	4.1%

Source: JICA Study Team

2) Desire Line

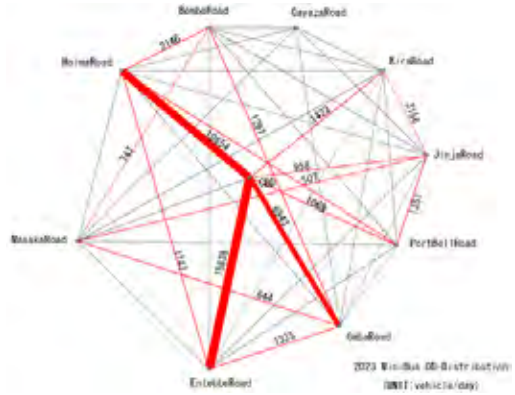
The following figure shows the present and future desired lines of public transport passenger. In these figures, estimated future BRT passenger is excluded and traffic zones are combined with the arterial road direction. After introduction of the BRT, passenger demand decreases from city center towards Jinja road direction, Bombo Road direction and Gayaza Road direction in 2023.

In the long-term, the figure shows that public transport demand has large volume in Gaba Road direction and Entebbe Road direction.



Unit: x10 Passengers / Day
Source: JICA Study Team

Figure 9.5.2 Public Transport Desire Line in 2010



Unit: x10 Passengers / Day
Source: JICA Study Team

Figure 9.5.3 Public Transport Desire Line in 2023 Excluding BRT

9.6 PUBLIC TRANSPORT NETWORK PLAN

9.6.1 LONG-TERM NETWORK PLAN

(1) Large Bus Network

Large bus network is established based on the following standpoint.

- BRT route not developed but planned in long long-term (2030) will be serviced by large bus system as the BRT tributary route. Large bus system is also introduced in the area not covered by BRT route or long long-term BRT network. The service area of BRT is defined 1.0 km radius from bus station along the BRT route. Examining the service area of BRT and large bus network, the following routes are selected as the large bus route.

Table 9.6.1 BRT & Large Bus Development in the Long-term

	Route		Total Length km *	Net Length km *
	Route No.	Name		
BRT	A1	Jinja Road	21.9	21.9
	A1	Bombo Road	7.2	7.2
	A2	Gayaza Road	5.9	2.4
	A3	Kira Road	5.0	2.5
	B1	Entebbe Road	37.6	37.1
	B3	Masaka Road	9.7	6.5
	BRT Total		87.3	77.6
BRT Tributary Route	A4	Hoima Road	9.2	7.2
	B3	Gaba Road	10.8	9.3
	B4	Port Bell Road	10.6	8.3
	BRT Tributary Total		30.6	24.8
Large Bus Route	D1	Natete Route	8.1	5.9
	D2	Munyonyo Route (A)	7.1	3.8
	D3	Munyonyo Route (B)	11.2	4.1
	D4	Sentema Route	7.1	7.1
	D5	Kiwatule Route	11.4	6.4
	D6	Kigowa Route	10.7	5.6
	Large Bus Total		55.6	32.9
Total			173.5	135.3

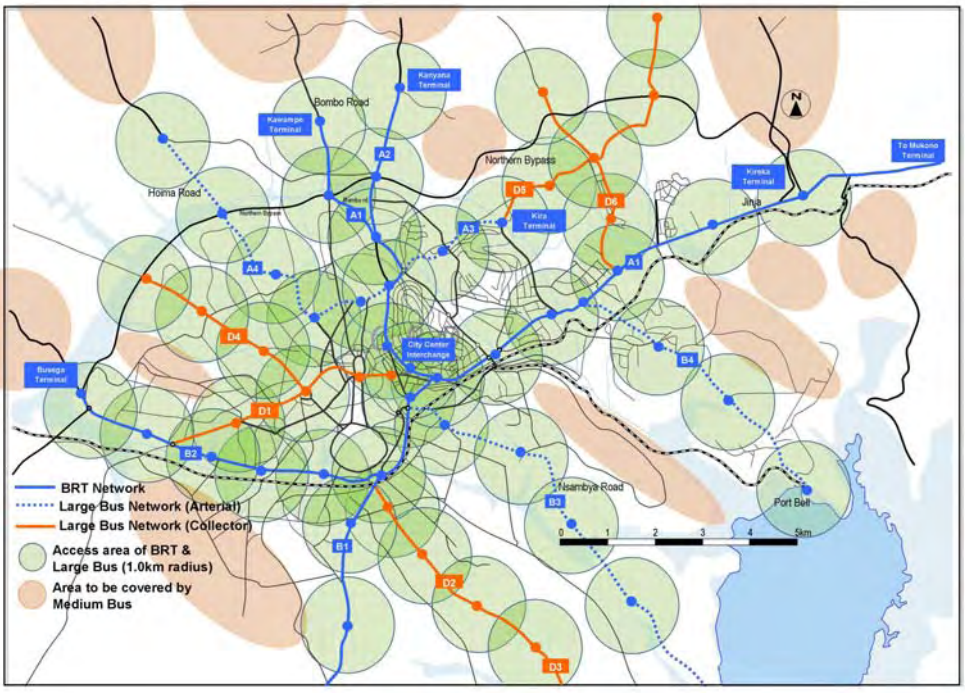
Length: by JICA Study Team
* Total Length includes overlapping length with other BRT route or BRT route. Net Length does not include overlapping length.

Source: JICA Study Team

Figure 9.6.1 Large Bus Network in the Long-term

(2) Medium Bus Network

- Minibuses will be replaced by medium buses gradually and until the end of the long-term, all minibuses shall be replaced by medium buses. Medium bus is prohibited to operate on the BRT routes and large bus routes. Licensing of medium bus is area-based and operation area is limited to the area stated in the license.



Source: JICA Study Team

Figure 9.6.2 BRT & Large bus Network Cover Area and Medium bus Operation Area in Long-term

9.6.2 MEDIUM-TERM NETWORK PLAN

(1) Large Bus Network

As development in the medium-term is the initial stage to accomplish the development of the long-term network, fundamental condition will be arranged for the introduction of large bus system. Therefore, a pilot route is selected from the long-term BRT network and large bus network.

Table 9.6.2 BRT and Large Bus Development in the Medium-term

	Route		Total Length km *	Net Length km *
	Route No.	Name		
BRT	A1	Jinja Road	21.9	21.9
	A1	Bombo Road	7.2	7.2
	B1	Entebbe Road	37.6	37.1
	BRT Total		66.7	66.2
BRT Tributary Route	A2	Gayaza Road	5.9	2.4
	A3	Kira Road	5.0	2.5
	B2	Masaka Road	9.7	6.5
	B3	Gaba Road	10.8	9.3
	Arterial Total		30.6	20.7
Large Bus Route	D1	Natete Road	8.1	8.1
	D2	Munyonyo Route (A)	7.1	3.3
	D3	Munyonyo Route (B)	11.2	4.1
	Collector Total		26.4	15.5
Total			123.7	102.4

Length: by JICA Study Team
* Total Length includes overlapping length with other BRT route or BRT route. Net Length does not include overlapping length.

(2) Medium Bus Network

As in the long-term, the areas not covered by the BRT system and large bus system will be serviced by medium bus or minibus.

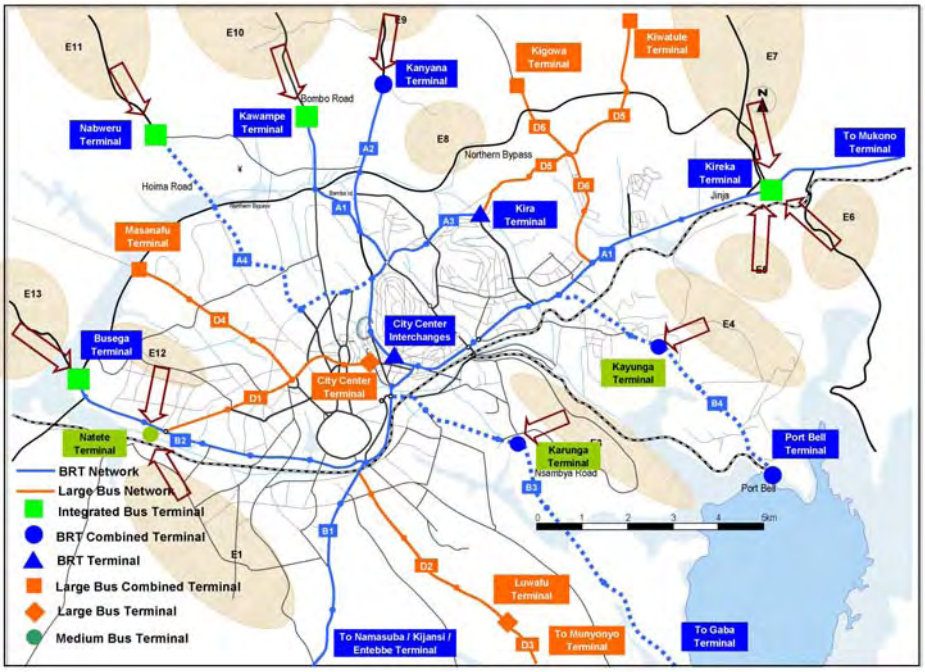
9.6.3 BUS TERMINAL PLAN

Terminals facilitate passengers' mobility by connecting the BRT and the large bus routes with that of the other transport modes. Intermodal mutual transfers are necessary as the function of the terminal. The type of terminals and the function of each terminal are shown in Table 9.6.4. Planned location of terminals in the long term is shown in Figure 9.6.5. Detailed conditions of terminals related to BRT are not clear. Thus, terminal plan excludes terminals related to BRT.

Table 9.6.3 Terminal Type and Functions

Type of Terminal		Terminal Name	Long-term	Medium-term	Transport Mode	Facility
Integrated Terminal		-Kawampe Terminal (BRT route) -Kanyana Terminal (BRT route) -Kireka Terminal (BRT route) -Busega Terminal (BRT tributary route) -Nabweru Terminal (BRT tributary route)	○	○ ○ ○ ○	-BRT / BRT tributary route -Medium Bus -Inter-urban Bus -Passenger Car -Boda-Boda	-BRT Terminal / BRT Tributary Bus Terminal **-Inter-urban Bus Terminal** -Medium Bus Terminal -Passenger Car Park **-Market / Shops**
BRT Terminal	BRT Combined Terminal	-Port Bell Terminal -Gaba Terminal -Karunga Terminal -Kayunga Terminal	○ ○	○ ○	-BRT / BRT tributary route -Medium Bus -Passenger Car -Boda-boda	-BRT Terminal / BRT Tributary Bus Terminal -Medium Bus Terminal -Passenger Car Park
	BRT Terminal	-City Center Interchange -Kira Terminal		○ ○	-BRT -Large Bus	-BRT Terminal
Large Bus Terminal	Large Bus Combined Terminal	-Masanafu Terminal -Kiwatule Terminal -Kigowa Terminal -Munyonyo Terminal	○ ○ ○	○	-Large Bus -Medium Bus -Passenger Car -Boda-boda	**-Large Bus Terminal** **-Medium Bus Terminal** **-Passenger Car Park**
	Large Bus Terminal	-City Center Terminal -Luwafu Terminal		○ ○	-Large Bus	**-Large Bus Terminal**
Medium Bus Terminal		-Natete Terminal		○	-BRT / BRT tributary Route / Large Bus -Medium Bus	**-Medium Bus Terminal**

Bold: Terminal facilities planned in this study Source: JICA Study Team



Source: JICA Study Team

Figure 9.6.3 Bus Terminal Plan in the Long-term

9.7 INTER-URBAN BUS TRANSPORT

Relocation of existing Inter-urban Bus Terminals (IUBT) is a very important subject for the decongestion of the traffic concentration in the city center. Four IUBTs are proposed outside the Northern Bypass Road and along the radial trunk roads such as Jinja Road, Bombo Road, Hoima Road and Masaka Road.

Source: JICA Study Team

Figure 9.7.1 Proposed Locations of Inter-urban Bus Terminals

The required function of the proposed IUBT is not only to provide passenger transit services but also to provide transport for shopping and other services. Each of the proposed IUBT shall be equipped with terminal and parking facilities for each access transport mode as well as a ticket office, passenger's waiting room, public toilet, shops and public market as shown in Figure 9.2.

The estimated construction cost for the major integrated IUBT such as the Kawampe and Kireka terminals will be around UShs 13 billion (USD 5.8 million). The cost for the Busega Terminal will be UShs 15 billion (USD 7 million USD). The cost for the Nabweru Terminal will be UShs 7.5 billion (USD 3.4 million). The grand total will become UShs 48.6 billion (USD 22 million).

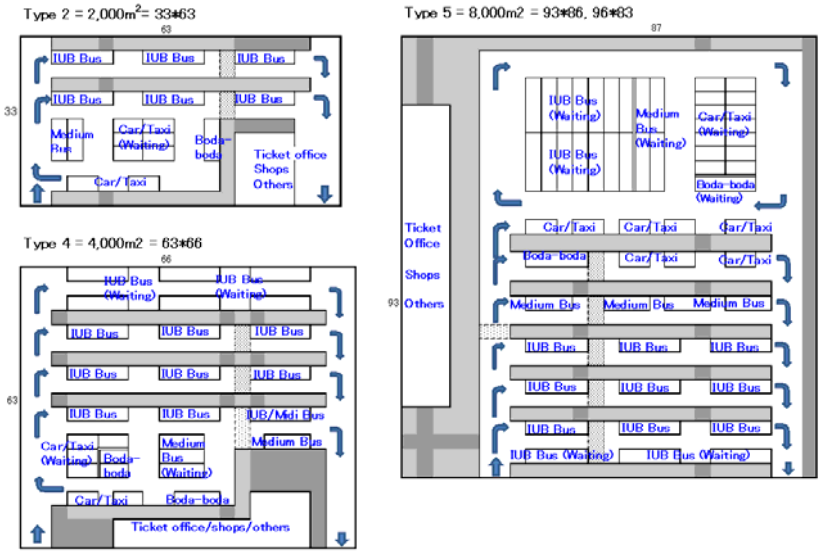
The total construction cost of the four IUBT is estimated as 48.6 billion shillings (22.1 million USD). It is recommended that even though the total construction cost does not involve a small amount, the effect of the project in terms of decongesting traffic and creation of new sub-center will bring considerable benefits toward the future city development and expansion.

Table 9.7.1 Proposed Areas, Construction Cost and Implementation Schedule of IUBT

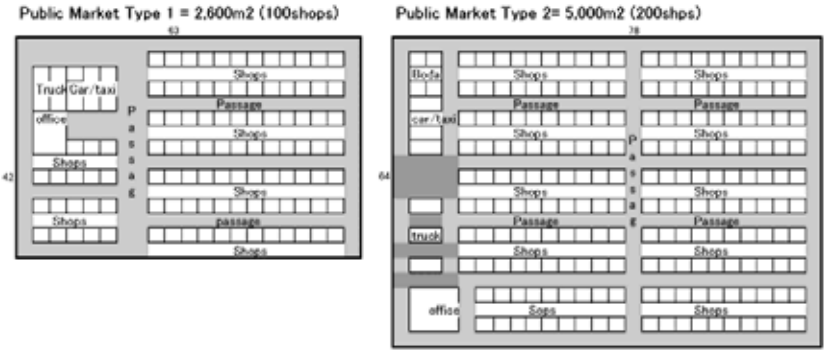
Middle/ Long Term Period		Middle Term Period			Midd. Total	Long Term	Long Total	Grand Total
Direction		North	East	Southwest		West		
Name of Location		Kawampe/ Bombo Rd	Kireka/ Jinja Rd	Busega Masaka Rd		Nabweru Hoima Rd		
Terminal	Type of Terminal	Type 4	Type 4	Type 5	-	Type 2	-	-
	Required Area (m2)	4,000	4,000	8,000	16,000	2,000	2,000	18,000
	Construction Cost (million Ushs)	3,842	3,842	6,378	14,061	2,323	2,323	16,384
	- do- (thousand USD)	1,746	1,746	2,899	6,392	1,056	1,056	7,447
Market	Type of Public Market	Type 2	Type 2	Type 2	-	Type 1	-	-
	Required Area (m2)	5,000	5,000	5,000	15,000	2,600	2,600	17,600
	Construction Cost (million Ushs)	9,012	9,012	9,012	27,035	5,186	5,186	32,221
	- do- (thousand USD)	4,096	4,096	4,096	12,289	2,357	2,357	14,646
Total	Required Area (m2)	9,000	9,000	13,000	31,000	4,600	4,600	35,600
	Construction Cost (million Ushs)	12,853	12,853	15,390	41,096	7,508	7,508	48,605
	- do- (thousand USD)	5,842	5,842	6,995	18,680	3,413	3,413	22,093

Source: JICA Study Team

IUBT Terminal



Public Market



Source: JICA Study Team

Figure 9.7.2 Typical Layout Plans of IUBTs and Public Markets

9.8 BUS OPERATION PLAN

The operation plan is established for large bus routes. BRT and BRT tributary routes are excluded.

9.8.1 BUS OPERATION PLAN

(1) Large Bus Operation Plan

1) Total Passenger and Peak Hour Passenger

The following table shows the future passenger demand on large bus routes.

Table 9.8.1 Future Passenger Demand on Large Bus Routes

Route		No. of Passengers in 2023 ('000)	No. of Passengers in 2018 ('000)	Peak hour Passengers in one direction in 2023	Peak hour Passengers in one direction in 2018
No.	Name				
D1	Natete Route	12	13	540	590
D2	Munyonyo Route (A)	99	85	4,460	3,830
D3	Munyonyo Route (B)	21	11	950	500
D4	Sentema Route	4	not yet operated	180	not yet operated
D5	Kiwatule Route	54	〃	2,430	〃
D6	Kigowa Route	42	〃	1,890	〃

Source: JICA Study Team

2) Bus Operation

Considering road condition and flexibility of the operation, passenger capacity of large bus is determined to be 50-60. Loading factor or occupancy rate of large bus is set to be 0.85. The following table shows the daily and peak hour operation of large bus.

Table 9.8.2 Daily and Peak Hour Operation

Route		2023		2018	
No.	Name	Peak Hour Operation	Daily Operation	Peak Hour Operation	Daily Operation
D1	Natete Route	12	144	13	156
D2	Munyonyo Route (A)	95	1,189	82	1,021
D3	Munyonyo Route (B)	20	252	11	132
D4	Sentema Route	4	48	Not yet operated	
D5	Kiwatule Route	52	649	〃	
D6	Kigowa Route	40	504	〃	

Source: JICA Study Team

Table 9.8.3 Necessary Fleet

Route		2023	2018
D1	Natete Route	12	13
D2	Munyonyo Route (A)	85	73
D3	Munyonyo Route (B)	28	14
D4	Sentema Route	4	Not operated
D5	Kiwatule Route	69	〃
D6	Kigowa Route	51	〃

Source: JICA Study Team

(2) Effect to Road Traffic

In this section, effect of the shift from minibus to large bus is calculated and the effect to the road is clarified. The calculation is done on all six routes. Assuming that passengers are carried by minibuses, the total number of minibus and large bus (both in pcu) are calculated by applying ten passengers for a minibus and 46.8 passengers for a large bus.

Table 9.8.4 Comparison of Number of Minibus and Large Bus on Large Bus Routes (2023)

(Assuming passengers are carried by minibus)

Total number of large bus On 6 routes	pcu Conversion factor	Total number of large bus in pcu	Total number of minibus on 6 routes	pcu Conversion factor	Total number of minibus in pcu	Decreased number of vehicles in pcu
5,573	2.40	13,375	26,054	1.15	29,962	16,587

Source: JICA Study Team

9.8.2 FINANCIAL ANALYSIS

(1) Financial Analysis

Balance sheet of all six bus routes is estimated in a single year and effective measures for improving the financial condition are proposed.

Two measures are considered for the improvement of financial condition of bus operation. One is to ease the tax burden and the other is to increase the fare. Balance sheets of the following three cases are calculated in consideration of these measures.

Table 9.8.5 Cases for Financial Analysis

Case	Condition
Case 1	Current import tax, current minibus fare level - Bus fare is a level of present minibus, 120shillings per kilometer. - Base fare is 500 shillings according to the fare frequency of present minibus. - Taxes are based on the laws of Uganda.
Case 2	Import tax exemption, current minibus fare level - Bus fare is the same level of Case 1) - Import duty (25%) among import taxes will be exempted.
Case 3	Import tax exemption, raising fare - Bus fare is raised in 10%. - Base fare is 600 shillings following the raising of bus fare - Import duty (25%) will be exempted.

Source: JICA Study Team

Table 9.8.6 Financial Analysis of Three Cases

	No.	D1	D2	D3	D4	D5	D6
	Route Name	Natete Route	Munyonyo Route (A)	Munyonyo Route (B)	Sentema Route	Kiwatule Route	Kigowa Route
	Base year	2018			2023		
Case 1	Operating Revenue	1,382	8,303	1,466	391	7,288	5,413
	Operation Cost	1,261	7,112	1,372	335	6,731	4,960
	Net Profit	122	1,165	94	52	557	454
	Profit Rate (Profit/Revenue)	8.9%	14.0%	6.4%	13.5%	7.6%	8.4%
Case 2	Operating Revenue	1,382	8,303	1,466	391	7,288	5,413
	Expenses Total	1,200	6,779	1,307	321	6,416	4,727
	Net Profit	176	1,343	158	60	872	674
	Profit Rate (Profit/Revenue)	12.8%	16.2%	10.8%	15.4%	12.0%	12.4%
Case 3	Operating Revenue	1,554	9,539	1,634	440	8,123	6,045
	Expenses Total	1,200	6,779	1,307	321	6,416	4,727
	Net Profit	296	2,083	282	95	1,456	1,116
	Profit Rate (Profit/Revenue)	19.1%	22.3%	17.2%	21.5%	17.9%	18.5%

Unit: thousand USD
Source: JICA Study Team

(2) Estimation of Financial IRR (Munyonyo Route)

Financial IRR is analyzed to verify the effectiveness of the proposed measures. Munyonyo Route (A) is selected for the analysis.

1) Precondition

In the analysis, the following items are supposed to be the basic preconditions:

- Import tax exemption is the basic condition for the analysis.
- Annual traffic increase rate from 2010 is 1.51% based on the traffic demand forecast.
- Analysis period is eight years according to the operation life of large bus.
- According to the composite consumer price index from the Statistical Abstract of Uganda Bureau of Statistics, annual price index is set to be 9.37%, which is the average of all items from 2004 to 2008.
- 7.36% is applied as the annual large bus fare raising increase rate which is also based on the transport and communication price index from the Statistical Abstract

The assumed cases for analysis are shown in the next table. Lending interest rate in Case 1 is assumed at 22% based on the present lending rate. It is set to be 17% in Case 2, presuming the establishment of the fund for the bus business as proposed in previous section. In both Case 1 and Case 2, three cases with different levels of bus fare are examined.

Table 9.8.7 Cases for IRR Estimation

	Lending interest rate	Fare
Case 1-A	22%	Present minibus level
Case 1-B	22%	5% raising from minibus level
Case 1-C	22%	10% raising from minibus level
Case 2-A	17%	Present minibus level
Case 2-B	17%	5% raising from minibus level
Case 2-C	17%	10% raising from minibus level

Source: JICA Study Team

2) Result of Calculation

In Case 1-C and Case 2-C, IRR rates exceed more than 10%. It is verified that both measures of reduction of interest rate and raising fare are effective to improve the financial condition of bus operating entities.

Table 9.8.8 Result of IRR Estimation in Six Cases

	Condition		Financial IRR
	Interest rate	Supposed average fare per person in UGX	
Case 1-A	22%	676	-11.9%
Case 1-B	22%	719	3.1%
Case 1-C	22%	762	13.0%
Case 2-A	17%	676	-5.0%
Case 2-B	17%	719	7.4%
Case 2-C	17%	762	16.5%

Source: JICA Study Team

(3) Conclusion

a) Bus business cannot operate stably without assistance from the government.

b) Necessary measures by the government to support large bus industries are;

- Import tax exemption for the large bus body
- Establishment of funds with low interest rate through government financing for the bus operating entities

c) Measures to be tackled by bus operating industries are;

- It is reasonable to raise the fare from the minibus level because large bus system provides higher service level such as fixed time, fixed route and fixed fare.
- But it is also necessary to make efforts toward provision of refined and comfortable services

for passengers.
- Application of proper fare system is necessary to keep the profitability of bus routes where passenger demand is less.

9.9 INFRASTRUCTURE PLAN

The plans for bus infrastructures consist of bus terminal plans and bus lay-by plans on the proposed large and medium size bus routes.

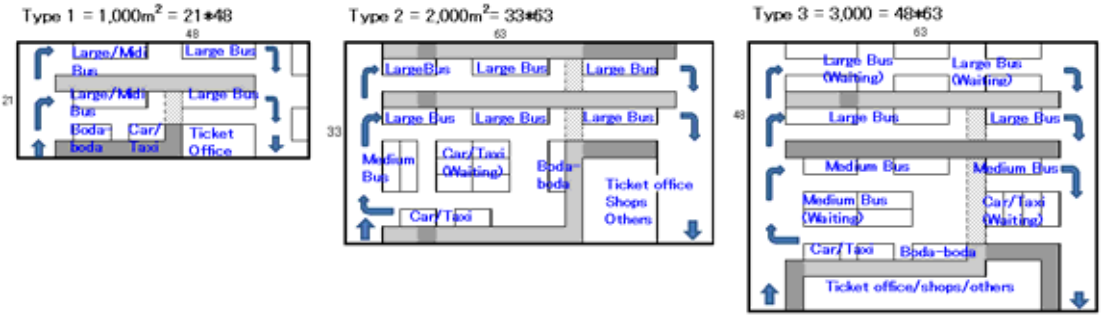
(1) Bus Terminal Plan

A total of seven bus terminals are proposed at the transfer points of BRT, large bus, medium bus and passenger cars for the exclusion of parking at the roadside and the convenience of passengers. Masanafu, Munyonyo and City Center terminals are to be small size terminals (Type 1) with a required area of 1,000m2, Kiwatule, Kigowa and Natete terminals are to be medium size terminals (Type 2) with a required area of 2,000 m^2, and Luafu terminal is to be a large size terminal (Type 3) with a required area of 3,000m2. Location of these terminals are shown in Figure 9.6.3. The total construction cost is estimated to be UShs 13.7 billion (USD 6.2 million USD). The typical layout plans for each medium and small size terminal are shown as Figure 9.9.1.

Table 9.9.1 Proposed Areas and Construction Costs foe Medium and Small Bus Terminals

Name of Terminal	Masanafu	Kiwatule	Kigowa	Munyonyo	City Center	Lufau	Natete	Grand Total
Name/No. of Bus Route	Sentema Route/ D4	Kiwatule Route/ D5	Kigowa Route/ D6	Munyonyo B/ D3	Sentema & Natete/ D4, D1	Munyonyo A/ D2	Natete Route/ D1	
Type of Terminal	Type 1	Type 2	Type 2	Type 1	Type 1	Type 3	Type 2	-
Required Area (m2)	1,000	2,000	2,000	1,000	1,000	3,000	2,000	12,000
Construction Cost (mil shs)	1,302	2,323	2,323	1,302	1,302	2,828	2,323	13,703
-Do- (000 USD)	592	1,056	1,056	592	592	1,286	1,056	6,229

Source: JICA Study Team



Source: JICA Study Team

Figure 9.9.1 Proposed Layout Plan for Medium and Small Bus Terminals

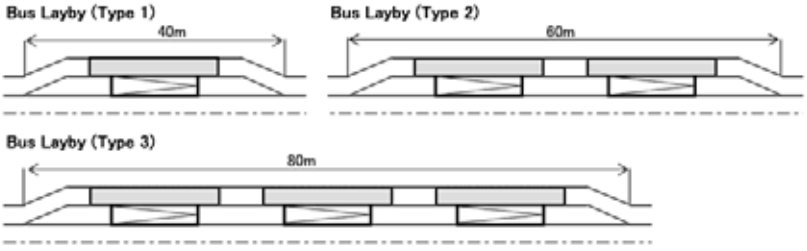
(2) Bus Lay-by

Bus lay-by is a basic facility for the stable operation of bus transport. Approximate interval of lay-by will be around 4-500 m. The detailed location of each bus lay-by shall depend on the detail condition of the route. Typical size of bus lay-by is assumed from the amount of passenger demand in each bus route. The expected total number of bus lay-bys is 122 places along the total 36.7 km length of bus routes.

Table 9.9.2 Total Number and Construction Cost of Bus Lay-by Improvement by Routes

Route name	2023 Daily Passengers thousand/day	Type of Lay-by	Route Distance exclude BRT Route (km)	Number of bus lay-by	Unit Construction Cost (million shs)	Total Construction Cost (million shs)
Natete Route	12	Type 1	5.9	20	61	1,220
Munyonyo A	99	Type 2	3.8	10	90	900
Munyonyo B	21	Type 1	7.9	28	61	1,708
Sentema Route	4	Type 1	7.1	24	61	1,464
Kiwatule Route	54	Type 1	6.4	22	61	1,342
Kigowa Route	42	Type 1	5.6	18	61	1,098
Total	232	-	36.7	122	-	7,732

Source: JICA Study Team



Source: JICA Study Team

Figure 9.9.2 Typical Layout Plan of Bus Lay-by

(3) Implementation Plan

The proposed implementation plan of the improvement of the bus infrastructures including IUBT facilities consist of two stages. A total of UShs 51.5 billion (USD 23.4 million) will be invested during the medium term period and UShs 17.4 billion (USD 7.9 million) will be invested during the long term period.

Compared to the total amount of USD 1,380.4 million for the NTMP/GKMA from 2008 to 2023, the expected total amount of bus infrastructures in the GKMA occupies 2.2% of the NTMP/GKMA total amount. The investment in bus infrastructure plays the most important role among the national transport items in terms of mass passenger transport for both inter-urban and intra-urban transportation.

Table 9.9.3 Implementation Plan of Intra-urban Bus Infrastructure Development

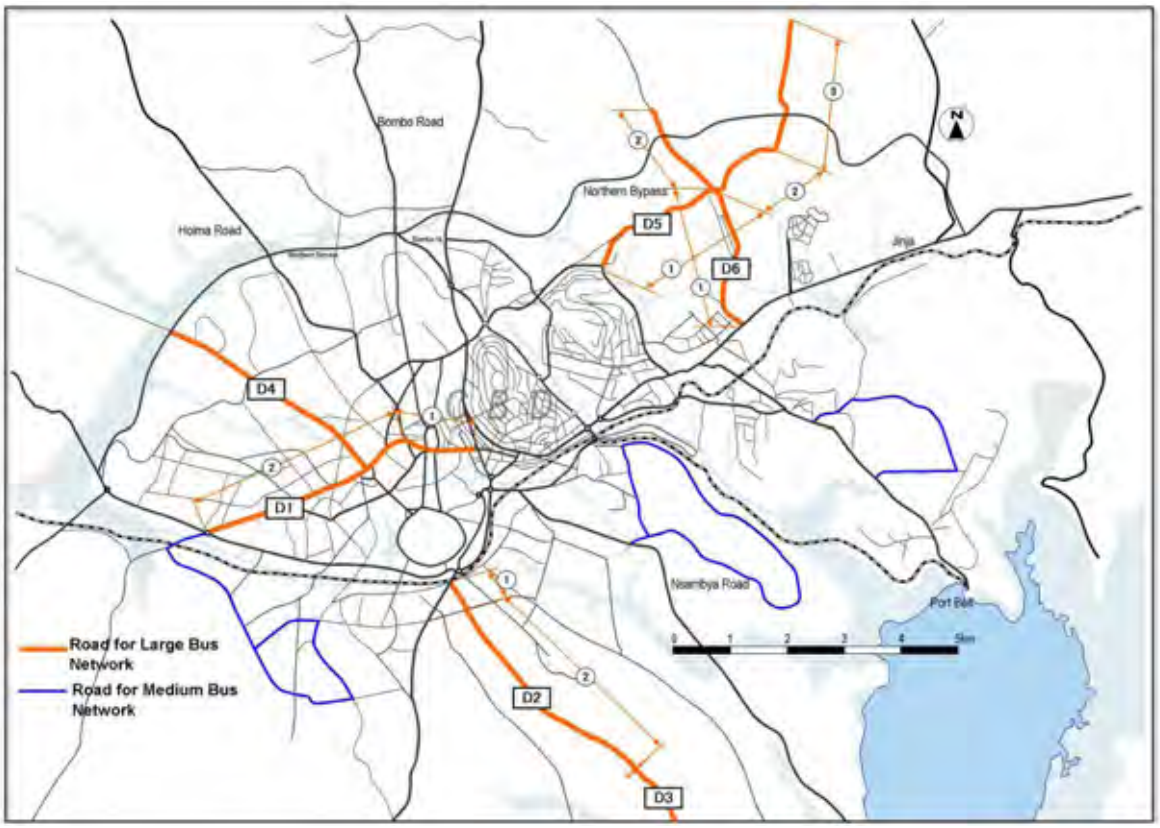
Middle Term Long Term	Middle Term Period								Long Term Period							
Type of Facility	Intra-urban Bus Facility					Inter-urban Bus Terminal			Intra-urban Bus Facility					Inter-urban Bus Terminal		
	Bus Terminal			Bus Lay-by					Bus Terminal			Bus Lay-by				
	Location	Type	Cost (million sillings)	Type	Cost (million sillings)	Location	Type	Cost (million sillings)	Location	Type	Cost (million sillings)	Type	Cost (million sillings)	Location	Type	Cost (million sillings)
(1) Intra-urban Bus Operation Route																
D1: Nobete Route	Nobete	Type 2	2,323	Type 1	1,220											
D2: Manyonyo Route (A)	Lusibi	Type 3	2,828	Type 2	900											
D3: Manyonyo Route (B)	Manyonyo	Type 1	1,702	Type 1	1,684											
D4: Semiema Route									Masanafu	Type 1	1,302	Type 1	1,488			
D5: Kiwaatule Route									Kiwaatule	Type 2	2,323	Type 1	1,348			
D6: Kigowa Route									Kigowa	Type 2	2,323	Type 1	1,322			
D1: Nobete & D4: Semiema	City Center	Type 1	1,302													
(2) Inter-urban Bus Operation Route																
East Bound Terminal						Kireka	Type 4	3,842								
East Bound Market							Type 2	9,012								
North Bound Terminal						Kawempe	Type 4	3,842								
North Bound Market							Type 2	9,012								
West Bound Terminal														Nabweru	Type 2	2,323
West Bound Market															Type 1	5,186
Southwest Bound Terminal						Busega	Type 5	6,370								
Southwest Bound Market							Type 2	9,012								
Total in million shillings			7,755		3,804			41,998			5,948		2,928			7,509
	52,657								17,385							
Total in million USD			3.5		1.7			18.7			2.7		1.8			3.4
	23.9								7.9							

Source: Study Team

(4) Road Improvement for Large Bus Operation

The roads for the operation of large bus are evaluated, and necessary measures to enhance smooth operation of large buses are proposed. Necessary cost is included in NTMP/GKMA.

1) Target Roads



Source: JICA Study Team

Figure 9.9.3 Target roads for evaluation and Proposal

2) Evaluation and Proposal

Natete Route D1-1	
Proposed improvements	- Improvement is scrutinized through the improvement of whole network within the city center. - Improvement of taxi park is proposed in the infrastructure plan for public transport.
Natete Route D1-2	
Proposal for improvement	- This road was developed through Japanese grant aid in April, 2004. - Improvement in long long-term is proposed
Munyonyou Route (A) D2-1	
Proposed improvements	- Improvement of Kibue Junction is proposed in this study. - In the long-term, trunk road covering the area between Entebbe and Gaba Roads is required. - Improvement method for the whole area shall be subject to further study.
Cross section proposed	Dual carriageway
Munyonyou Route (A) D2-2	
Proposed improvement	Road improvement method for the whole area shall be subject to further study.
Cross section proposed	Dual carriageway
Munyonyou Route (B) D3	
Proposed improvement	Improvement to accommodate two lanes is required.
Cross section proposed	Single carriageway
Sentema Route D4	
Proposed improvements	- Development of trunk road is required to enhance development of the town along the road. - Different route shall be selected to avoid steep hills. - Development of two lane road is necessary.
Cross section proposed	Single carriageway
Kiwatule Route D5-1	
Proposal for improvement	Development of four lane road is required.
Cross section proposed	Dual carriage way
Kiwatule Route D5-2	
Proposed improvement	Development of four lane road is required.
Cross section to be introduced	Dual carriageway
Kiwatule Route D5-3	
Proposed for improvement	Improvement by two lanes is required.
Cross section proposed	Single carriageway
Kigowa Route D6-1	
Proposal for improvement	Development by four lanes is required.
Cross section proposed	Dual carriage way
Kigowa Route D6-2	
Proposed for improvements	- Improvement by two lanes is required. - Improvement of intersection is required.
Cross section proposed	Single carriageway

9.10 INVESTMENT PLAN

The following table is a summary of the investment plan required to achieve the targets of the Public Transport Plan.

Table 9.10.1 Summary of Investment Plan

Description	Investment Cost (million Ushs)	
	Mid-term (2018)	Long-term(2023)
1. Procurement Cost of Large Bus		
Total (1)	22,112	27,400
2. Infraqstructure Cost for Large Bus Operation		
2-1 Bus Terminal Cost	7,755	5,948
2-2 Bus Lay-by	3,804	3,928
Total (2)	11,559	9,876
3. Inter-urban Bus Terminal (N. Bound, W. Bound, SW. Bound and E. Bound)		
Total (3)	41,098	7,509
Ground Total (1)+(2)+(3) (million Ushs)	74,769	44,785
Equivalent to Million USD	33.99	20.36

Source: JICA Study Team

9.11 INSTITUTION AND REGULATION

9.11.1 INSTITUTION AND REGULATION

(1) Establishment of Bus Fund

Establishment of fund is recommended to assist the bus operating entities. The government shall finance the fund or introduce an international financing partner for the fund.

(2) Unified Operator of Public Transport

Operating industries of large buses will be led to organize a few unified operation entities from the current large number of operators. Subsequently, it will become possible to adjust the integrated timetable.

(3) Reinforcement of Public Transport Section in MoWT

In order to strengthen the organization in terms of licensing, and to induce investments for bus operators, authority and in extent of governance of the public transport section in MoWT shall be reinforced.

(4) Import Tax Exemption of Bus Body

As articulated in Section 9.8, import tax exemption of bus body is requested for the reduction of the burden of purchasing bus body. It will help in improving the financial condition of bus operators.

(5) Institution for Infrastructure

The infrastructure of public transport such as the terminals and the bus lay-by should be the part of the road. The development and maintenance should be conducted as for the road because the terminal and bus lay-by contribute toward the reduction of traffic congestion on the road. Therefore, the resources for the development and maintenance of road will be invested to the infrastructure for public transport.

(6) Resources for Infrastructure Development

The government needs to obtain assistance from donors to develop large scale bus terminal such as the integrated terminal. Other small scale terminals will be developed by the government from the budget for road development.

(7) Institution and Financing of Market

The market and surrounding area will be developed simultaneously by the same investor. If the bus terminal and public market become the focal place of commercial activities, there will naturally be demand for commercial development in the surrounding area. The investor can then gain the profit from such development. The government shall select a corporation through proposal, give permission and assist the corporation in the acquisition of land and necessary procedure.

9.11.2 REALIZATION OF PUBLIC TRANSPORT PLAN

The followings are the proposal for the realization of public transport plan.

1) Introduction of Large Bus

a) Direction to the public transport section in MoWT

b) Establishment of bus fund

c) Direction to bus operating company

2) Development of Terminal

The following procedure is recommended for the development of bus terminal:

a) Recognition of responsible organization in the government

b) Technical cooperation for the organization

c) Implementation of feasibility study

d) Implementation of development

9.11.3 ENVIRONMENTAL AND SOCIAL CONSIDERATION FOR PUBLIC TRANSPORT

Since the Study covered only formulation of conceptual model for the public transport plan, and since the proposed locations of bus terminals are subject to the specific plan of BRT project, environmental study such as IEE was not carried out for the public transport plan. Therefore, in the feasibility study for the public transport plan proposed in the previous section, appropriate environmental and social consideration should be conducted. The essential subjects to be analyzed are the following two points.

a) Impact by the Large Bus operation

Present minibus operators, drivers and passengers are the most affected PAPs by the reformation of public transport system. Introduction of BRT will give an enormous impact to those PAPs. Introduction of large Bus will also give a heavy impact to those people. Therefore the stake holder meetings which will be conducted by the BRT Feasibility Study will give significant lessons. Based on those lessons, environmental and social consideration shall be implemented in the feasibility study proposed in the previous section.

b) Impact by the development of terminals

This study proposed basic concept, function and distribution of terminals but exact location of each terminal is not yet decided. In the proposed feasibility study which will decide the location of terminals, necessary procedure for the environmental and social consideration shall be carried out.

CHAPTER 10 TRAFFIC MANAGEMENT PLAN

10.1 CURRENT CONDITION AND KEY ISSUES FOR TRAFFIC MANAGEMENT

(1) Traffic Congestion and Key Issues

The current population of Kampala City and GKMA is 1.5 million and 2.5 million, respectively, and these are increasing at 4-5% per annum. The population of GKMA is estimated to reach 4.5 million in 2023 and approximately 9-10 million in 2040. One of the serious problems which GKMA has been facing is traffic congestion especially in the morning and evening peak periods, caused by not only inadequate capacity of the road network, but also the lack of traffic management. Both road capacity increase and traffic management are main pillars for alleviation of traffic congestion. As hereinafter defined, some related agencies in GKMA have already started a countermeasure of traffic congestion by traffic management. It is therefore, after review of current situations, some countermeasures by traffic management were proposed in this study.

The key agencies for traffic management and enforcement for Kampala City are MoWT, KCC, UPF, MoLG and UNRA. These agencies formed a joint task force (Task Force) by their own initiative and prepared short-term (1-2 years) and medium-term (3-5 years) low-cost measures that will address the worsening traffic situation in Kampala City. The Task Force studied critical locations and causes of traffic jams in general and specific ways. The Task Force compiled major findings, general measures for traffic management, specific measures by junction/road section, public transport measures, required costs for implementation and action plans for implementation into a report of the "Strategy for the Improvement of Traffic Flow in Kampala" in December 2009.

(2) Parking in the City Center

Kampala is the capital city and the business/commercial center of Uganda. However, activities of the Central Business District (CBD) have been obstructed by legal and illegal on-street parking. Even trunk roads like Jinja Road and Luwum Street in the CBD (photographs below) are occupied by private and business cars because there are very few off-street parking spaces and facilities. The existing spaces and facilities are only for the use of public transport and tenants/customers for large office buildings and shopping malls.

On-street Legal Parking on Jinja Road (at both curbing)

On-street Legal Parking on Luwum Street (at center and both curbs)

Source: JICA Study Team

Figure 10.1.1 On-Street Parking in the CBD

The traffic problem has been further aggravated by the absence of adequate off-street parking facilities at traffic generation and attraction areas. The shortage of proper parking spaces has resulted in motorists parking wherever a vehicle can physically fit, including prohibited zones

close to busy junctions. The GOU should therefore establish a concrete parking policy, strategy, system and facility addressing the current situation to reduce serious traffic congestion in the CBD area. As a CBD parking study is planned under TSDP, it should address the above issues and recommendations.

(3) Non Motorized Transport (NMT)

Significant pedestrian and vehicle flows are concentrated in and around shopping centers, markets and commercial areas, with three taxi parks located in the CBD downtown area. Of 116 km of the principal roads surveyed in KUTIP, over 60% of the network had no footpath (sidewalk) on either side. Where footpaths are provided, these are narrow and in poor condition, and only at one side. In addition, as these are often taken over by commercial purposes and vendors, building construction and illegal parking, pedestrians are forced back into the carriageway. More consideration and priority should be given to pedestrians, especially at the busy CBD downtown area.

Other unique NMT in Kampala are bicycle taxis (boda-bodas) operated on major streets and roads where road slopes are gentle. Since the drivers and users belong to the poor class, consideration is required to compromise with their daily life and conflict with vehicles while reducing accident risks.

Shoprite Junction

Queen's Way near Clock Tower

Source: JICA Study Team

Figure 10.1.2 Mixed Traffic of NMT (Boda Boda) and Motorcycles on Trunk Roads

There are several pedestrian bridges on major roads. However, these are not popular and rarely used since their facilities are in poor condition (e.g., steep steps), and no public culture to use such facilities. However, as well-designed pedestrian bridges are convenient and effective for reducing accident risks, it is recommended to provide pedestrian bridges which have gentle access slopes like on the Northern Bypass (photographs below), at strategic points of trunk roads.

Exiting Pedestrian Bridge at Nakawa on Jinja Road

Exiting Pedestrian Bridge on Northern Bypass

Source: JICA Study Team

Figure 10.1.3 Recommended Type of Pedestrian Bridge (Right)

(4) Motorcycles

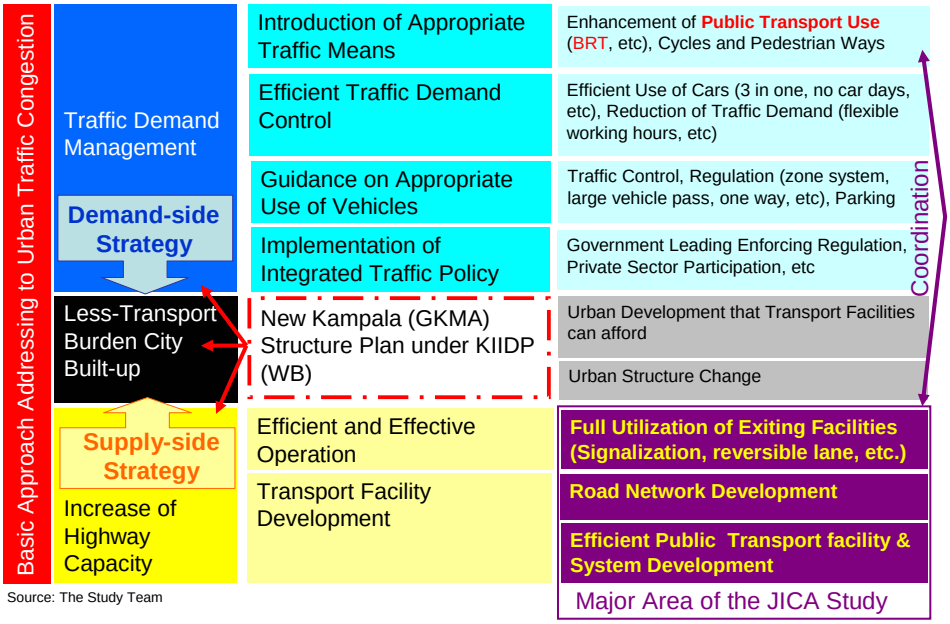
About 50% of registered vehicles on roads are motorcycles, which is 30% of all traffic. The number of registered motorcycles increased by over 30% from 2007 to 2008. Most of the motorcycles operated in Kampala are motorcycle taxis (boda-bodas), which are quite different from other South Asia countries.

These motorcycle-taxis are running among cars and weaving left and right. This situation heightens the risk for accidents, especially for passengers on rear seats, and disturbs smooth vehicle flows. The Study Team recommends a new regulation that motorcycle taxis should run only on the left side of the carriageway and prohibit their operation on the trunk arterial roads in the city center.

10.2 BASIC APPROACHES AND APPLICATION OF TRAFFIC DEMAND MANAGEMENT

(1) Integrated Traffic Management

To effectively address traffic congestion, employing all available strategies and means is required. New infrastructure projects remain a core element of comprehensive transportation improvement programs ("**supply-side strategy**"). Supplementing these "supply-side" approaches are a broad array of "**demand-side strategy**" intended to make existing transportation facilities work better. Figure 10.2.1 shows the "Concept of Integrated Traffic Demand Management" approaches, which the Study Team suggested, with its relationship on the on-going studies by JICA and the World Bank. The JICA Study has mostly covered the increase of highway capacity and the development of efficient public transport facility and system which coordinates with the BRT.



Source: JICA Study Team

Figure 10.2.1 Concept of Integrated Traffic Demand Management and its Relationship with the Studies

An integrated traffic demand management and development of less transport burden urban structures are required, as no metropolitans and cities can afford continuous huge investments on providing sufficient transport infrastructures to meet the increased transport pressure. **Strong political will and understanding of all stakeholders and people are required**

for its realization.

MoLG, in conjunction with MoLHUD and KCC, will conduct a study on the update of the Kampala Structure Plan established in 1994 under KIIDP for the next ten years. The Study Team recommends such plan should cover long-term aspects for 25 years (or Vision 2035), or 30 years as in the NDP. Even BRT could not accommodate traffic demand when the population of GKMA reaches to approximately six million after 2030, unless one area concentration of the current urban structure is strategically changed. The **Long-Long Term Integrated Urban Development Plan, including development of new towns, and strategies are required to accommodate the increasing population**.

(2) Traffic Demand Management recommend by a JICA Expert of MoWT

A JICA Technical Advisor to MoWT, T. Arakawa, submitted a report on "An Emergency Measure for Traffic Congestion in Kampala City" in 2009 based on his experience in Japan and observation in Kampala. **The best solution is the coordinated combination of these two ways**:

Capacity Increase of Existing Road Facilities:

1) Remove obstacles from congested routes (illegal on-street parking and legal street vending)

2) Promotion of utilization of the Northern Bypass (advertisements on advantage for use of the bypass)

3) Proper control of traffic signals (wiser use of existing traffic signals rather than traffic police control irrespective of signals)

Traffic Demand Control:

1) Flexible business hours (change to different working hours by factory and office to ease commuting congestion). This measure needs no additional cost but it needs the cooperation and initiative of business associations.)

2) Flexible school starting date (some school already adopted this measure and the Ministry of Education should encourage all schools to participate in this initiative)

3) Diversion of road traffic to other modes (Utilization of existing railways resuming passenger train operation)

Arakawa concluded that the implementation of the above measures require the strong leadership of the concerned authorities who will commit to prioritizing the welfare of the public and road users.

10.3 COOPERATION OF INTERNATIONAL DEVELOPMENT PARTNERS

Development partners play an important role in financing road development projects, maintenance programs and various capacity development programs. Development partners currently playing active roles for the road sector include EU, World Bank, AfDB, NDF, JICA, BADEA and DFID. MoWT, with other concerned ministries and agencies, and these development partners, hold periodic Sector Working Group Meetings to share knowledge and discuss on various issues.

The on-going projects in cooperation with the development partners related with the traffic management and enforcements in GKMA/Kampala City are as listed in the following table.

Table 10.3.1 On-Going Project related with the Traffic Management and Enforcement

The World Bank		EU	DFID
KIIDP	TSDP		TSDP
• Drainage system improvement • Traffic management (area traffic management, Jct signalization, etc) • Road maintenance and upgrading	• BRT Pilot Project FS & DD • CBD parking study • Bicycle path master plan study		
Support to KCC: • Organization development and governance • Human resources management • Urban planning (Update of Kampala Structure Plan and GIS)	Support to MoWT: • Set up Transport Master Plan Office • Transport Sector Data Management System • Start up MTRA • Establishment of MATA Support to UNRA: • Axle load control • Monitoring and evaluation of UNRA projects • Investment of up-to-date system • Other technical areas Various Studies: • Traffic accident black spots study and road safety audit • Cost estimate unit study • Environmental and social impact studies	• Capacity building of UNRA	• Cofinance of TSDP (The WB) for capacity develop-ment of MoWT & UNRA

Note: KIIDP (Kampala Institutional and Infrastructure Project), TSDP (Transport Sector Development Project)
Source: JICA Study Team

KCC is the key administrator in terms of traffic management of GKMA, especially in the city center. The World Bank has assisted organizational and human resources development of KCC under KIIDP. However, its capacity seems to be still weak in terms of funding, human resources and incentives.

10.4 AXLE LOAD CONTROL

Currently, MoWT made a decision about axle load control policy. The Directorate of Operation of UNRA, which moved its function from MoWT in 2008, is responsible for operation, control axle overloading, and enhancement of road safety. In order to increase the longevity of the road network and reduce overall transport costs, UNRA is looking at drawing up a comprehensive axle load control strategy. This strategy will look into the re-organization of UNRA's axle load operations and also put in place an investment plan for rolling out axle load control assets.

In FY 2006/07, a total of 215,412 vehicles were weighed under the Axle Load Control Project financed by the World Bank, of which 8,310 vehicles were recorded as overloaded. According to an EU report, although the maximum Gross Vehicle Mass (GVM) is limited to 56 tons by regulation, some truck owners pay bribes and carry over 80 tons.

To address the above situation, the Government installed fixed weighbridges at Mbarara and Busia Kenya borders, and mobile weighbridges on the highways of Kampala-Masaka-Mutukula, Kampala-Mubende-Fort Portal, Iganga-Malaba, and Tororo-Mbale.

The key issue for effective overloading prevention is accountability and transparency in axle and gross weight control operations. The main objective of weighbridge stations should be to educate the vehicle owners and drivers not to repeat overloading. At the same time, strict corruption prevention is also required to enforce axle load limit regulation. The Study Team recommends the introduction of a computer-assisted system, which has become more popular in developing countries, at strategic weighing stations like at the Kenyan borders (Malaba and Busia) and Jinja Bridge.

10.5 TECHNICAL ASSISTANCE FOR TRAFFIC SIGNAL OPERATION AND MAINTENANCE IN KAMPALA CITY

(1) Present Condition of Signalized Junctions and Maintenance

Traffic signals are essential facilities to control and regulate traffic flows at junctions under appropriate operations. Traffic signals also contribute to traffic safety for both pedestrians and vehicles.

Junctions subjected in this survey consisted of three bulb types and six LED types. At some bulb type junctions, the traffic signals were not functioning because the light bulbs have burned out. This situation is hazardous for road users.

Table 10.5.1 Outline of Facilities for Traffic Signals

No.	Jct. Name	Year	Operation	Lamp	Power Voltage	UPS	Remarks
1	Wandegeya	1998	Operating	Bulb	AC240V	No	*1,*3
2	Port Bell	1998	Operating	Bulb	AC240V	No	*1,*2
3	Natete	1998	Resumed	Bulb	AC240V	No	*1
4	Bakuli	2002	Operating	LED	AC100V	No	*1
5	Kibuli	2002	Not operating	LED	AC100V	No	*2
6	Clock Tower	2005	Operating	LED	AC100V	Yes	*2
7	Shoprite	2005	Operating	LED	AC100V	Yes	*1,*2
8	Jinja	2005	Operating	LED	AC100V	Yes	
9	Kampala/Entebbe	2005	Operating	LED	AC100V	Yes	

*1: A few lamps do not light. (New bulbs have already requested from vendor)
*2: Signals for pedestrians are damaged by traffic accidents.
*3: Controller is made in Uganda.
Source: JICA Study Team

Overall, traffic signals are not visible due to grim lenses. In addition, some hoods of the traffic signals for pedestrians are required for repair or change due to deformation and/or disrepair.

Traffic signal facilities have been maintained by the electrical department of KCC. According to KCC staff, frequency of routine maintenance is as follows:

- Cleaning of control room: one time per week (by air blower)
- Refuel: one time every few days
- Cleaning of lens of traffic signals: one time per one to three months
- Check of bulbs: every half year (all bulbs (green, yellow, red) are changed as needed)

However from the results of the field survey, routine maintenance works mentioned above are not executed as scheduled.

(2) Adequate Maintenance Plan

Periodic maintenance is absolutely imperative for continued utilization of traffic signals. A responsible organization should establish the necessary maintenance items such as periodic inspection of facilities, supply of consumable goods, etc. These items should be managed and recorded.

- Periodic Inspection for Facilities

Each facility should be inspected and monitored periodically. In case that an inspector finds out about failures of some kind, that facility should be immediately repaired or changed for prevention of traffic disturbance. Inspection works should be executed in accordance with the "Maintenance Manual" and recorded in the "Check Sheet for Inspection Work". Record items include the date, inspection items, and inspection results. This check sheet should be filed and

kept in trust.

- Emergency Maintenance

In case of emergency events such as failure due to a traffic accident, that facility should be immediately brought back to good condition responding to the damage situations and local circumstance.

The most important matters are that causes of the damage are specified and prevented from re-occurrence.

- Necessary Equipments and Tools

Before inspection, the inspectors should confirm the necessary number of tools, equipments and vehicles. In addition, the inspector should do operation check for measurement instruments. At the site, working spaces should be clearly marked off by use of signage, fence, etc for ensuring the safety of road users.

Spare parts which are required to be changed periodically and/or facilities which can disturb operation should be stocked based on the list of spare parts and materials. After the spare parts and/or materials are used, their number should be immediately brought back to the same number as required. These activities should be recorded in the consumption list and analyzed statistically. The responsible person should review the necessary stock numbers based on this statistics.

Furthermore, the drawings for each junction should be prepared and updated based on the change. Revised date and contents should be recorded in the drawings, and this revised drawing should be used as the latest version.

(3) Technical Transfer for Operation and Maintenance

The training session intended for KCC staff regarding the functions of traffic signals, planning and maintenance had been held. Lessons on oil change and filter cleaning for AEG had been carried out at the field site as on-the-job training.

At the same time, the Study Team created the "Manual for Planning & Maintenance of Traffic Signals" for future works relevant to traffic signals. In addition to this manual, the operation manual for the existing facilities was also reviewed and improved.

10.6 RECOMMENDATIONS

(1) Traffic Management

The Study Team recommends implementation of the various measures in the "Strategy for the Improvement of Traffic Flow in Kampala in December 2009" suggested by the **Task Force of MoWT, KCC, UPF, MoLG and UNRA as these can be accomplished at relatively low costs** while waiting for the introduction of permanent measures like BRT and flyovers.

(2) Traffic Demand Management for GKMA / Kampala City Environment

The "demand-side strategy and measures" are more important to address the traffic demand management since availability of budget is insufficient and land acquisition is difficult for the road facilities to meet the rapidly increasing traffic demand. Private sector participation and initiative is one of the key issues for the implementation of measures. It is considered that dispatch of a team of advisors, long-term and short-terms experts specialized in traffic management is necessary to assist in the establishment of the committee and its operation.

(3) Development of Pedestrian-Friendly Walkways (Footpaths)

Although "walking" is one of the dominant and most economical modes of transport, the current walkway facilities are very poor. The Study Team recommends conducting a walkway development master plan study with cooperation of the development partners. The study should cover walkways (footpaths) inventory, including width, condition, utility poles and other obstructions, for KCC roads of about 600 km, pedestrian flow survey (volume, OD), walkway development plan, including skywalks (pedestrian bridges) and implementation plan preparation.

(4) Parking in the CBD / City Center

The Study Team suggests the: 1) maximum use of existing car parking spaces and facilities in the city center to minimize on-street parking, 2) increasing on-street car parking fee in order to pressure parking users; 3) establishment of car park sharing scheme; and 4) introduction of parking guide system to maximize parking space utilization and reduce traffic congestion caused by drivers looking for vacant parking spaces.

Since parking control would not be much effective unless provided with an alternative parking system and facilities, and/or alternative convenient public transport means, the Study Team also recommends the following:

- Construction of car parking complexes at vacant lands, including railway yards, in the city center without sacrificing green spaces and parks.
- Underground parking should also be considered with participation of the private sector (PPP).
- Redevelopment of the open markets of Owino and Nakasero in the city center – providing parking facilities at the basement.
- Moving old and new taxi parks outside the city center, and to construct combined facilities for parking and commercial purposes as part of the downtown redevelopment.

(5) Traffic Signal Operation and Maintenance in Kampala City

- Change of the signal lights from bulb type to LED type and enhancement of the power supply system are recommended. Advantages of the LED type are: a) reduction of maintenance cost, b) reduction of operation cost by energy saving, and c) upgrading of visibility.
- Systematic purchase of spare parts and tools is recommended. These spare parts are not effectively used because essential tools for maintenance and repair are not sufficient. Hence, systematic purchase is required for effective maintenance.
- Accumulation of know-how and continuous training are necessary for the establishment of a sustainable maintenance system. Hence, constant follow-up by an expert or the dispatch of an expert to KCC is recommended.
- Signalization for four priority junctions in Kampala City is currently in progress under KIIDP. However, as the current number of traffic lights is less than the actual requirements for both traffic volume (management) and safety, the Study Team suggests a signalization plan and program.
- NTMP/GKMA has planned the improvement of approximately 60 major junctions, including signalization. However, the change from stand-alone signals to area- and line-controlled signalization is required for the establishment of workable traffic control systems.

CHAPTER 11 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

11.1 BASIC APPROACHES FOR ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

(1) Basic Approaches

The environmental and social considerations in this Study are conducted in accordance with the environmental guidelines of both GOU and JICA. According to the "Minutes of Meeting on Scope of Works for the Study" in 2007, the Uganda side is responsible for the environmental and social considerations. The Study Team assisted the initiative of MoWT in activities related to environmental and social considerations. "The JICA Guidelines for Environmental and Social Considerations, April 2004," "Guidelines for EIA in Uganda, 1997 (NEMA)" and "Environmental Impact Assessment Guidelines for Road Projects, MoWT (MoWHC), 2007" were referred to.

The Initial Environmental Examination (IEE in the JICA guideline) was conducted for screening and initial environmental evaluation of the long list of projects for selection of shortlist (priority) projects as candidates for the Pre-FS. According to the screening in the IEE, an Environmental Impact Assessment (EIA) will be required for the Pre-FS projects in the FS stage and/or in the detailed design stage. ***However, as this is a pre-feasibility study, the Study covers project briefing, screening and scoping, in the environmental guidelines of NEMA/MoWT, of Pre-FS Projects to recommend the required EIStudy /EIA Study items and scopes in the next FS and/or detailed design stages.***

(2) Environmental Laws and Guidelines of GOU

The most supreme organization related to environmental administrations in Uganda is the National Environmental Management Authority (NEMA). The following are the environmental-related laws and regulations in Uganda.

- The National Environmental Statute (Cap 153) of 1995
- **Guidelines for EIA in Uganda, 1997, NEMA**
- The Environmental Impact Assessment Regulations, Gazette #28 of 1998
- The National Environment (Conduct and Certification of Environmental Practitioner), Regulations (# 85) of 2003
- The National Environment (Audit) Regulation
- **EIA Guideline for Road Projects, 2007, MoWT (MoWHC)**
- The National Environment (Wetlands, River Banks and Lake Shores Management), Regulations (#3) of 2000
- Water Act (Cap 152) of 1997
- The Mining Act of 2003
- The National Forestry and Tree Planting Act, 2003

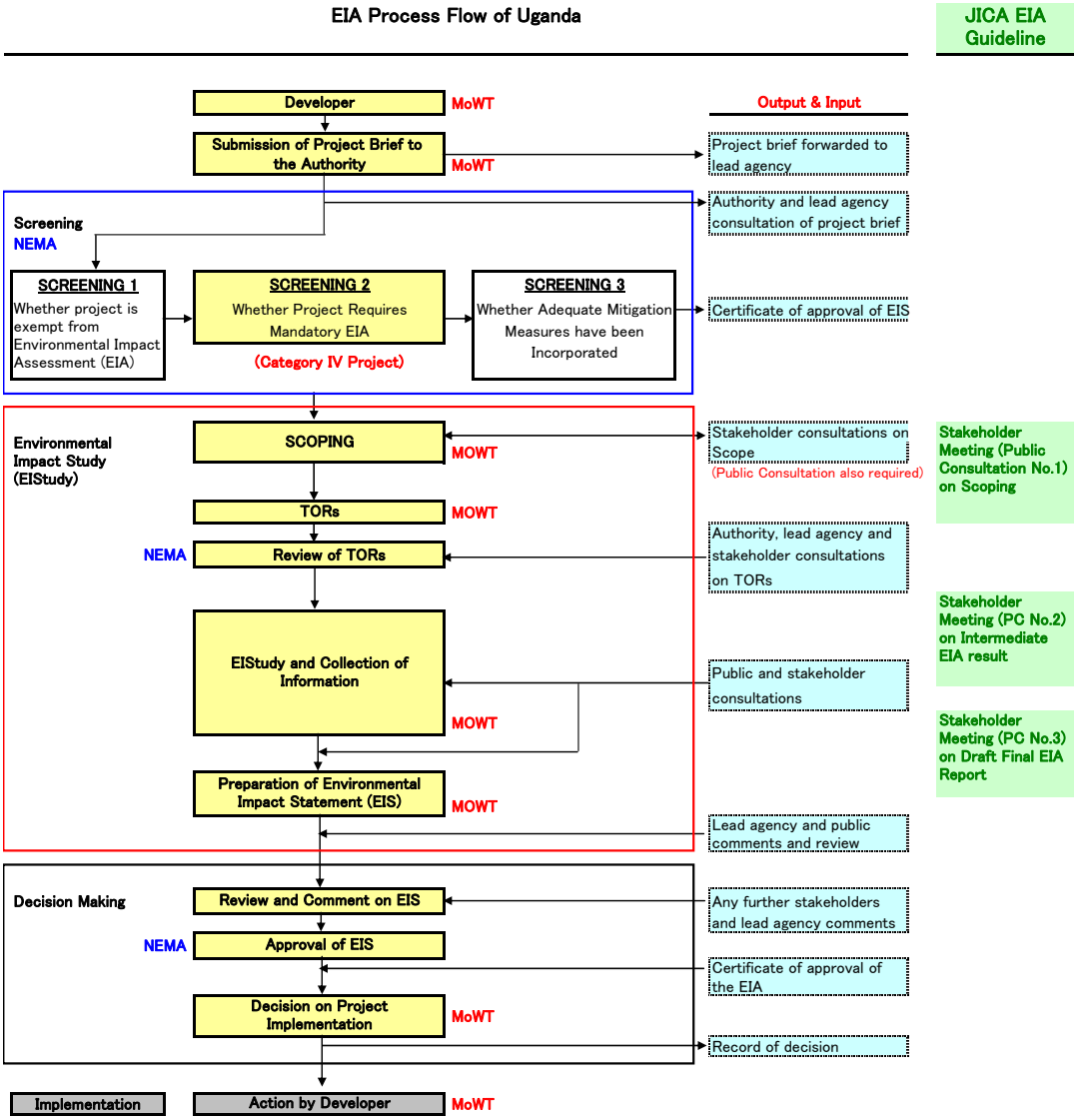
11.2 COMPARISON BETWEEN EIA GUIDELINES OF GOU AND JICA

There are no substantial differences about policy, definition and contents of the EIA between the guidelines of GOU and JICA, except in the objectives. *The objectives of the JICA guidelines are*

to encourage the recipient governments (recipient countries of Japanese ODA) to take appropriate considerations of environmental and social factors as well as to ensure that JICA's support for and examination of environmental and social factors are conducted accordingly.

As the terminology of EIA level study in the JICA Guideline is almost same as Environmental Impact Study (EIStudy) in Uganda, it is hereinafter referred to as "***EIStudy/EIA Study***" or "***EIA Study***" in this report. It seems that the proposed Pre-FS projects will be categorized into "IV" according to the MoWT Environmental Guideline and Category B (or Category A) in the JICA Guideline. Hence, it requires an EIStudy in the MoWT Guideline and EIA level study in the JICA Guideline at their FS and/or detailed design stages.

Figure 11.2.1 shows a flow chart of the EIA process of GOU and stakeholder meeting (public consultation) requirements in the JICA guideline. The developer shall be referred to as MoWT. To satisfy both guidelines, two stakeholder meetings and three public consultations (hearing) are required during the FS.



Source: The Study Team, based on Guidelines for EIA in Uganda, 1997 and EIA Guidelines for Road Projects, MoWT, 2007
Note: Process Flow required for the Pre-FS Projects

Figure 11.2.1 Flow Chart of EIA Process of GOU and JICA

11.3 SCREENING FOR PRE-FS LONG LIST OF PROJECTS

(1) Screening for Pre-FS Long List of Projects in Interim Report I

The Study Team studied screening items (check list for environmental impacts identification) in the environmental guidelines of Uganda and JICA, and confirmed that there are no substantial differences between these two guidelines. The Study Team designed the screening matrix (Initial Environmental Examination in the JICA Guideline) for assessment of the Pre-FS long list projects to meet the items of both guidelines.

Of the four components of the long lists projects, the components first, second and third were subjected to implementation in the short (by 2013) to medium-term (by 2018), and component 4 in the long-term (by 2023). The environmental screening was conducted for the short to medium-term projects since the objective of short listing is to select candidate projects for the Official Development Assistance of GOJ in the short to medium-term.

The Study Team conducted screenings for environmental and social consideration on the Pre-FS long list projects based on the site reconnaissance survey, preliminary planning and satellite maps to identify environmental and social impacts. The following table shows screening (assessment) criteria adopted by the Study Team. Both negative and positive impacts were assessed with four levels.

Special attention was paid to land acquisition and resettlement requirements as these are the most critical issues when project is implemented in the urban area. These two items were considered in the multi criteria analysis for the selection of short-listed projects from among those in the long list.

Negative Impact	Positive Impact	Overall Impact
A- ; Significant	A+ ; Significant	A ; Significant
B- ; Minor	B+ ; Minor	B ; Minor
C- ; Negligible	C+ ; Negligible	C ; Negligible
D- ; Unknown	D+ ; Unknown	D ; Unknown

(2) Screening for Pre-FS Long List of Projects

Taking the latest development of BRT study, the Study Team has reviewed the sub-projects of the long list projects identified. The sub-projects in the initial long list but located on the BRT pilot project routes were omitted from the long list as their improvement, including road widening and junction improvement, shall be undertaken during the BRT FS/detailed design. The Study Team also reviewed requirements for widening of Makerere Hill Road from four-lane dual carriageway to six-lane carriageway road as BRT is introduced on this route. The preliminary estimated cost, land acquisition and resettlement were revised.

Table 11.3.1 shows a summary of the negative and positive screenings for 13 projects in the revised long list projects.

Table 11.3.1 Summary of Screenings (IEE) for Pre-FS Long List of Projects

Item / Description		Project No												
		Flyover			Road Widening with Junction Improv				Individual Junction Improvement					
		1.1	1.2	1.3	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4	3.6	3.7
Socio-economic Environment														
1	Migration of populations/ involuntary resettlement	B-	B-	B-	A-	B-	C	A-	B-	B-	B-	B-	A-	B-
2	Land acquisition	B-	B-	B-	A-	A-	B-	A-	B-	B-	B-	B-	B-	B-
3	Land use and local resources	B+/B-	B+/B-	B+/B-	C	C	C	C	C	C	C	C	C	C
4	Impact on local economy	A+	B+	B+	A+/A-	A+/B+	B+	A+/A-	B+/B-	C	B+/B-	C	B-	A+/B+
5	Social institutions	C	C	C	C	C	C	C	C	C	C	C	C	B-
6	Existing Social infrastructure and services	B+/B-	B+/B-	B+/B-	B+/B-	B+/B-	C	B+/B-	B+/B-	C	C	C	B-	B+/B-
7	Vulnerable people	B+	B+	B+	B+	B+	C	B+/B-	B+/B-	C	C	C	B-	B+
8	Equality in development process	C	C	C	C	C	C	C	C	C	C	C	C	C
9	Conflict in development process	C	C	C	C	C	C	C	C	C	C	C	C	C
10	Gender	C	C	C	C	C	C	C	C	C	C	C	C	C
11	Children's rights	C	C	C	B-	C	B-	C	C	C	C	C	C	C
12	Cultural heritage	B-	B-	A-	C	C	C	C	C	C	C	C	C	B-
13	Infectious diseases/public health	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-
14	Traffic jam	A+/A-	A+/A-	A+/A-	A+/A-	A+/A+	A+/B-	A+/A-	A-/B+	A-/B+	A-/B+	A-/B+	A-	A+/A-
15	Traffic accident	B+/B-	B+/B-	B+/B-	B+/B-	B+/B-	B-	B+/B-	B-	B+/B-	B+/B-	B+/B-	B+/B-	A+/B-
16	Agriculture	C	C	C	C	C	C	C	C	C	C	C	C	C
17	Livestock	C	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment														
18	Geography	C	C	C	C	C	C	C	C	C	C	C	C	C
19	Geology	C	C	C	C	C	C	C	C	C	C	C	C	C
20	Soil erosion	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-
21	Fauna	B-	C	C	C	C	C	C	C	C	C	C	C	C
22	Flora	B-	C	C	B-	B-	C	B-	C	C	C	C	C	C
23	Ground water	C	C	C	C	C	C	C	C	C	C	C	C	C
24	Water resources	B-	B-	B-	C	B-	C	C	C	C	C	C	B-	B-
25	Coastal environment (Victoria Lake)	C	C	C	C	C	C	C	C	C	C	C	C	C
26	Oceanographic changes (Victoria Lake)	C	C	C	C	C	C	C	C	C	C	C	C	C
27	Protected areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28	Drainage and flood	C	C	C	C	C	B+	C	C	C	C	C	C	C
29	Localized climatic changes	C	C	C	C	C	C	C	C	C	C	C	C	C
30	Global warming	A+	A+	A+	B+	B+	C	A+	B+	B+	B+	B+	C	B+
Pollution														
31	Air	A+/B-	A+/B-	A+/B-	A+/B-	A+/B-	B-	A+/B-	B+/B-	B+/B-	B+/B-	B+/B-	B-	A+/B-
32	Water	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-
33	Soil	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-
34	Solid waste	A-	A-	A-	A-	A-	A-	A-	B-	B-	B-	B-	B-	B-
35	Noise and vibration	A-	A-	A-	A-	A-	A-	A-	B-	B-	B-	B-	B-	B-
36	Large scale ground settlement	C	C	C	C	C	C	C	C	C	C	C	C	C
37	Emanating odor	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-	B-
38	Water bottom/sludge	C	C	C	C	C	C	C	C	C	C	C	C	C

Source: JICA Study Team

11.4 SCOPING FOR PRE-FS SHORT LIST PROJECTS

(1) Outline of Pre-FS Short List Projects

It was agreed that three projects subjected to Pre-FS from among the recommended five short-listed projects. Preliminary designs have been conducted for these Pre-Fs projects.

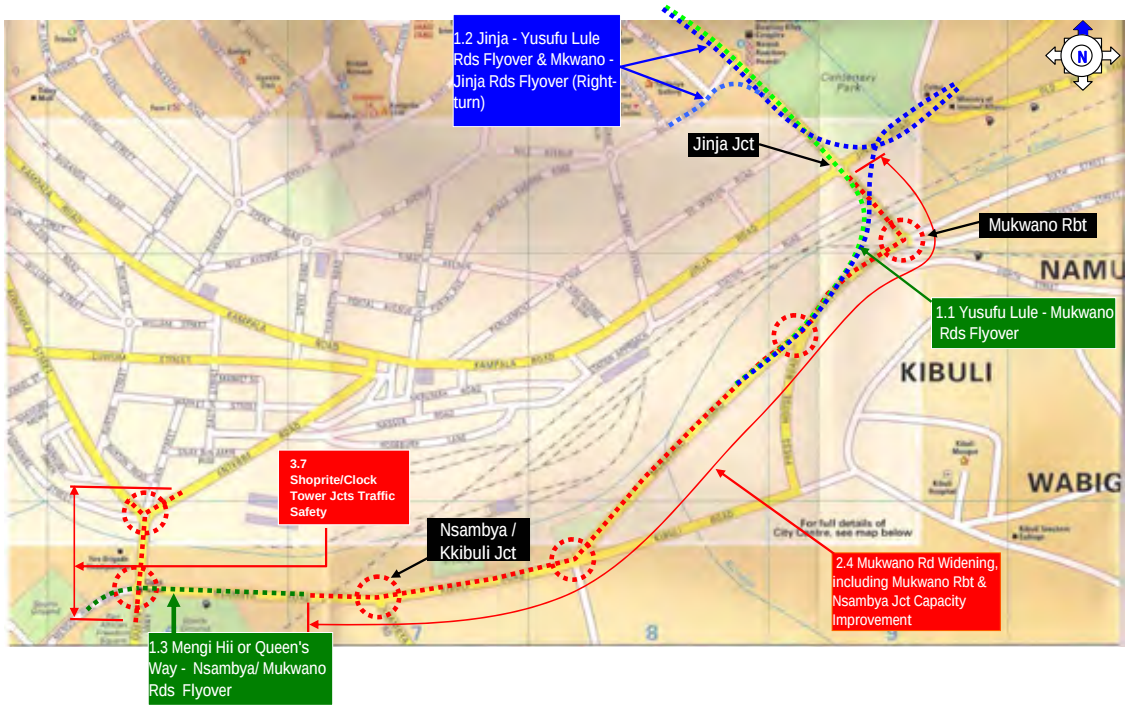
Only IEE (screening) will be conducted. Although the Study will mainly cover project briefing and screening, it will also include part of the scoping required for the FS and/or detailed design stage. The target projects subject to scoping for the EIStudy (full EIA) are shown in the following table and Figure 11.4.1.

Table 11.4.1 Pre-FS Projects subjected to the EIStudy (EIA Study)

Project No	Project Name	Basic Project Concept			Implementation Period
		Project Length (km)	Box-culvert Name (works)	Carriageway & Number of Lanes & Junction Improvement	
1 * (1.1)	･Yusufu Lule - Mukwano Rds Flyover	1.7	Nakivubo Channel (Widening)	Dual Carriageway (1-lane for each direction)	Medium Term (2013-2018)
(1.2)	･ Jinja - Yusufu Lule Rds Right-turn Flyover	1.1	Kitante Channel	One-way 2-lanes	Medium Term (2013-2018)
	･ Mukwano - Jinja Rds Right-turn Flyover	0.8	Kitante Channel	One-way 1-lane	Medium Term (2013-2018)
	･ Yusufu Lule - Nile Avenue Rds Left-turn Flyover	0.4		One-way 1-lane	Medium Term (2013-2018)
(1.3)	Mengo Hill - Mukwano Rds Flyover (over Clock Tower)	0.6		Dual Carriageway (1-lane for each direction)	Long-term (2018-2023)
2 (2.4)	Mukwano Rd Widening, including Mukwano Rbt and Nsambya Jct Capacity Improvement	1.8	Nakivubo Channel (Widening)	Dual Carriageway (Add. 2 lanes) & Mukwano Rbt and Nsambya Jct improvement	Medium Term (2013-2018)
3 (3.7)	Shoprite & Clock Tower Jcts Traffic Safety Improvement	Two Junctions	Nakivubo Channel (Widening)	Pedestrian Bridges and Separated Left-turn Lanes	Medium Term (2013-2018)

Note: * The flyovers in Interim Report I were modified to the above in Interim Report II (refer to Section 6.6).

Source: JICA Study Team



Source: JICA Study Team

Figure 11.4.1 Location Map of Short List Projects subjected to the EIStudy/EIA Study

(2) Preliminary Alternative Plan Study

The Study Team has studied the preliminary alternative plans including "no project alternative (zero-option)" for pre-FS projects. The results are as follows:

Project No	Project Name	Preliminary Alternatives		Preliminary Evaluation
1.1	Yusufu Lule - Mukwano Rds Flyover	(1)	Flyover between Yusufu Lule Rd and Mukwano Rd	Best plan on technical aspects to support BRT plan (pilot route) and minimize traffic congestion
		(2)	Widening of Existing Rd from 4 lanes to 8 lanes	• Conflict with the BRT on Jinja – Kampala Rds • Requirement of more resettlement
		(3)	No project alternative (zero-option)	• Unbearable congestion on Jinja Jct and Africana Rbt • Conflict with the BRT on Jinja – Kampala Rds
1.2	Jinja - Yusufu Lule Rds Right-turn Flyover	(1)	Flyover from Jinja Rd to Yusufu Lule Rd (right-turn)	Best plan on technical aspects to support BRT plan (pilot route) and minimize traffic congestion
		(2)	Widening of Existing Rd	Conflict with the BRT on Jinja – Kampala Rds
		(3)	No project alternative (zero-option)	• Unbearable congestion on Jinja Jct and Africana Rbt • Conflict with the BRT on Jinja – Kampala Rds
	Mukwano - Jinja Rds Right-turn Flyover	(1)	Flyover from Mukwano Rd to Jinja Rd (right-turn)	Best plan on technical aspects to support BRT plan (pilot route) and minimize traffic congestion
		(2)	Widening of Existing Rd	Conflict with the BRT on Jinja – Kampala Rds
		(3)	No project alternative (zero-option)	• Unbearable congestion on Jinja Jct and Africana Rbt • Conflict with the BRT on Jinja – Kampala Rds
	Yusufu Lule - Nile Avenue Rds Left-turn Flyover	(1)	Flyover from Mukwano Rd to Jinja Rd (Right-turn)	Best plan on technical aspects to support BRT plan (pilot route) and minimize traffic congestion
		(2)	No project alternative (zero-option)	• Unbearable congestion on Nile Avenue Rbt • Conflict with the BRT at Jinja Jct
1.3	Mengo Hill - Mukwano Rds Flyover (over Clock Tower) Or Clock Tower – Mukwano Rd Flyover Right-turn over Clock Tower	(1)	Flyover from Mengo Hill Rd to Nsambya Rd	• Best plan on technical aspects to support BRT plan (pilot route) and minimize traffic congestion at Clock Tower Jct
		(2)	Flyover from Queen's Way to Nsambya Rd (Right-turn)	• Further study will be required for development of Queen's Way for both BRT and the general traffic
		(3)	Extension of above flyover up to after Nsambya Jct, by crossing over the railways line	• Further study will be required for development of the future railway re-operation to Kasese and/or introduction of passenger trains between Kampala city center and for Busega
		(4)	Widening of Existing Rd and Junctions	• Conflict with the BRT at Clock Tower Jct
		(5)	No project alternative (zero-option)	• Unbearable congestion on Nile Avenue Rbt • Conflict with the BRT at Clock Tower Jct
2 (2.4)	Mukwano Rd Widening, including Mukwano Rbt and Nsambya Jct Capacity Improvement	(1)	Road widening from 2 lanes to 4 lanes	Best alternative on environmental aspects (less resettlement requirements) and cost
		(2)	No project alterative (zero-option)	As severe traffic congestion continues, this alternative will give high negative impacts on both national and regional economy.

Project No	Project Name	Preliminary Alternatives		Preliminary Evaluation
3 (3.7)	Shoprite & Clock Tower Jcts Traffic Safety Improvement	(1)	• Pedestrian bridge construction • Additional lane construction	Best alternative on traffic safety improvement and environmental aspects (less resettlement requirements) by segregating vehicles and non-motorized traffic
		(2)	Flyover construction over Shoprite and Clock Tower Jcts	• Technically best plan • High cost • Construction would not be feasible as it cause too much congestion during construction • A flyover will be planned between Mengo Hill Rd – Mukwano Road crossing over Clock Tower to minimize new traffic congestion by BRT.
		(3)	No project alterative (zero-option)	As high traffic accidents and severe traffic congestion continues, this alternative will give high negative impacts on both the national and regional economy.

Source: JICA Study Team

The above alternative plans should be reviewed and reevaluated at the feasibility study and detailed design stage.

(3) Scoping of Project

The EIA Study Area should include the project sites in Figure 11.4.1 and their vicinity, which where influenced directly or indirectly by the Pre-FS projects. The EIA Study area shall also cover expected borrow pits, quarries and expected camp sites of the contractors.

The items subjected to EIA study should be those of which impacts are assessed as significant or minor (A+, A-, B+, B-) in the screening (IEE). The following are specific negative and positive impacts to be addressed in the EIA Study in the FS and/or detailed design stages.

Project No	Project	Positive Impacts	Negative Impacts
1.1 & 1.2	Yusufu Lule - Mukwano Rds Flyover & Right-Turn Flyovers	1) Support of the BRT pilot project to minimize new traffic congestion at Jinja Jct 2) Positive impact on national and regional economic activities for CBD and Kampala Industrial area 3) Traffic jam will be improved by cars and railways 4) Positive impact on global warming by reducing carbon dioxide (CO2)	1) Land acquisition of part of Electoral Commission, part of MoWT Central Mechanical Workshop and private lands 2) Resettlement 3) Water sources including Nakivubo channel and Kitante channel 4) Traffic jam during construction 5) Utilities relocation may be required
1.3	Mengo Hill - Mukwano Rds Flyover (over Clock Tower) Or Clock Tower – Mukwano Rd Flyover Right-turn over Clock Tower	1) Support of the BRT project (B1, B3) to minimize new traffic congestion at Clock Tower Jct 2) Positive impact on national and regional economic activities for the CBD and commercial center 3) Due to the above positive impact, vulnerable people, in particular, the project would contribute to poverty reduction 4) Traffic jam will be improved at Clock Tower Jct 5) Positive impact on global warming by reducing carbon dioxide (CO_2)	1) Land acquisition of government and private land 2) Resettlement 3) Water sources including Nakivubo channel might be affected by the project 4) Traffic jam during construction 6) Utilities relocation may be required

Project No	Project	Positive Impacts	Negative Impacts
2 (2.4)	Mukwano Road Widening	1) Positive impact on regional economic activities, which includes Kibuli market and industrial area 2) Due to the above positive impact, vulnerable people, in particular, the project may contribute to poverty reduction 3) Traffic jam will be improved 4) Positive impact on global warming by reducing carbon dioxide (CO_2)	1) Land acquisition (government and private) required 2) Resettlement 3) There is a loss of trees along side of Mukwano road 4) Water sources including Nakivubo channel and Kayunga channel, wet land might be affected by the project 5) Traffic jam during construction 6) Utilities relocation may be required 7) Small business (gardening plant) along road sides
3 (3.7)	Shoprite & Clock Tower Traffic Safety Improvement	1) Traffic accident will be reduced 2) Traffic jam will be improved 3) Positive impact on local economic activities, which includes St.Balikuddembe Market and CBD / commercial center 4) Employment of poor people in Kisenyi and Katwe during construction 5) Positive impact on global warming by reducing carbon dioxide (CO2)	1) Land acquisition (mostly government land)required 2) Resettlement 3) Access to sports ground, Hindu temple and Shoprite shopping mall may be affected 4) A view of Clock Tower may be affected 5) Traffic jam during construction 6) Utilities relocation may be required

Source: JICA Study Team

(4) Land Acquisition and Resettlement Requirements

The Study Team estimated the land acquisition and resettlement requirements based on the preliminary design drawings and site reconnaissance survey. About 6.14 ha of government-owned land and 2.59 ha of private land, and resettlement are required for the implementation of the Pre-FS projects (Table 11.4.2). The government (or public) land acquisition includes part of the MoWT Central Mechanical Workshop, Electoral Commission, Telecommunication, Postal Office, National Railways and parks.

Table 11.4.2 Estimated Land Acquisition and Resettlement Requirements

Project No.	Project Name	Land Acquisition Estimate				Resettlement				
		ROW to be acquired (Private Land)	Secured ROW (Government Land)		Total Area of Land required	Number of Buildings			Resettlement	Remarks
						Private	Government	Total		
		(ha)	(ha)	(%)	(ha)	(number)	(number)	(number)	(household)	
1.1 (Phase 1)	Yusufu Lule - Mukwano Rds Flyover	0.11	0.41	79%	0.52	0	1	1	1	Government (Railways, Electoral Commission, Park)
1.2 (Phase 1)	Jinja - Yusufu Lule Rds Flyover & Mukwano - Jinja Rds Flyover	0.65	1.85	74%	2.50	2	9	11	17	Private and Government (MoWT, MoLHUD, Electoral Commission, Park)
1.3 (Phase 3)	Mengo Hill - Mukwano Rds Flyover (over Clock Tower) or Clock Tower - Mukwano Rd Flyover	0.00	0.60	100%	0.60	0	4	4	4	Park
2.4	Mukwano Rd Widening	1.19	2.75	70%	3.94	2	7	9	15	Private & Government (Railways Quarters, Police Quarters)
3.7	Shoprite & Clock Tower Jcts Traffic Safety Improvement	0.64	0.53	45%	1.17	0	4	4	4	Private & Government (Railways, Telecommunications, Post Office)
Total		2.59	6.14	70%	8.73	4	25	29	41	

Source: The Study Team

The Study Team estimated the number of households as one household per government building and four households per private house or building. The compensation should also include cost for illegal occupation of the land. Furthermore, it is necessary to confirm that compensation shall be made at market prices which are not subject to depreciation in EIStudy/EIA Study to be conducted in FS or Detailed Design stage.

(5) Method of the EIStudy / EIA Study

Natural condition survey for water quality, air, noise and vibration survey should be conducted as listed in Table 11.4.3. Traffic survey of 24-hour count by vehicle type should be required together with these natural environmental surveys to identify relations with traffic significance.

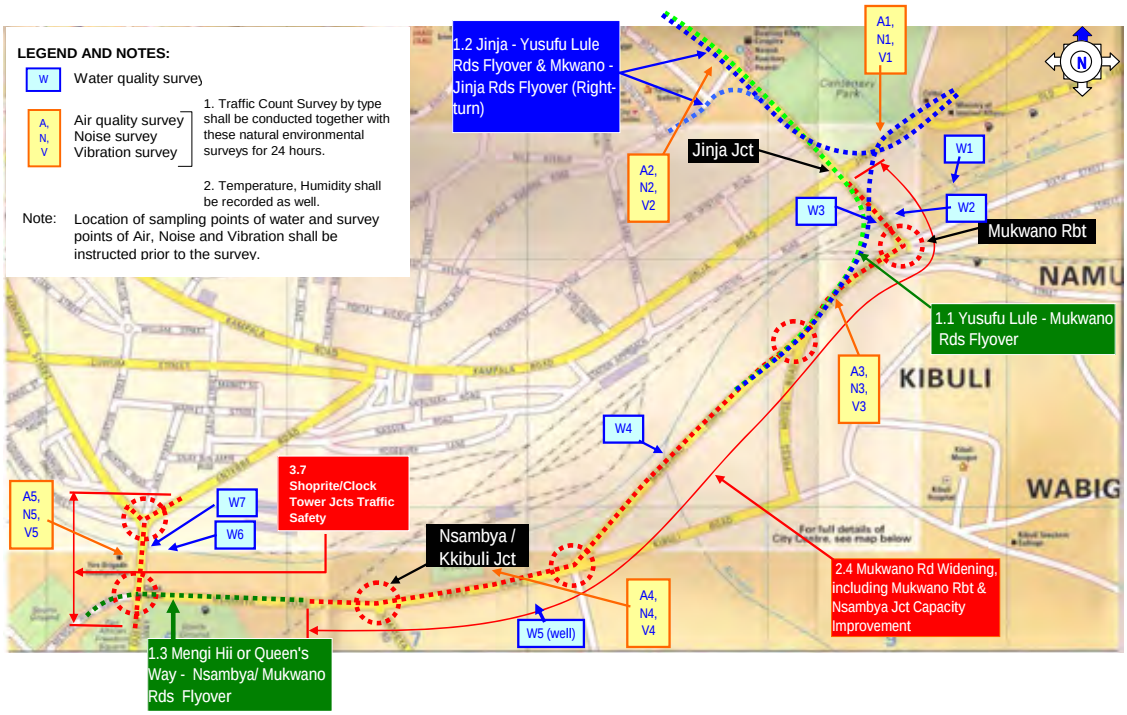
Table 11.4.3 Estimated Quantity of Water Quality, Air, Noise and Vibration Survey

Project No	Project Name	Project Length (km)	Water Quality		Air, Noise and Vibration Survey			
					Air	Noise	Vibration	Location
			Survey ID No.	Location	Survey ID No.	Survey ID No.	Survey ID No.	
1.1&1.2	Yusufu Lule - Mukwano Rds Flyover & Right-Turn Flyovers	4.0	W1	Kitante Channel	A1	N1	V1	Near Nile Avenue Rbt
			W2	Outlet of Drainage Pipe	A2	N2	V2	Centenary Park
			W3	Nakivubo Channel (Access Rd)	A3	N3	V3	Near Mukwano Rbt
1.3	Mengo Hill - Mukwano Rds Flyover (over Clock Tower) or Clock Tower - Mukwano Rd Flyover	0.6	W3	Nakivubo Channel (Access Rd)	A5	N5	V5	Fire Brigade HQS
			W6	Nakivubo Channel (Entebbe Rd)				
2 (2.4)	Mukwano Rd Widening	1.8	W3	Nakivubo Channel (Access Rd)	A3	N3	V3	Near Mukwano Jct
			W4	Kayunga River / Nakivubo Channel	A4	N4	V4	Near Clinic
			W5	A well at Kibuli				
3 (3.7)	Shoprite & Clock Tower Jcts Traffic Safety Improvement	2 Junctions	W6	Nakivubo Channel (Entebbe Rd)	A5	N5	V5	Fire Brigade HQS
			W7	Outlet of Drainage Pipe				
	Total		7 (14 samples)		**5**	**5**	**5**	

Notes: 1. The above are estimated quantities and may subject to minor change depending on site condition and project requirements.
2. Exact location of sampling points of water and survey points of Air, Noise and Vibration shall be instructed prior to the survey.
3. Two (2) samples per location shall be obtained for water quality tests. Sampling shall be made in the dry season and at least 25 hours after a rain.
4. 24-hours survey for air, noise and vibration, at week days, no-raining days and no strong windy days. (Traffic Count Survey by type shall be conducted together with these natural environmental surveys for 24 hours).
5. Weather, Temperature, Humidity shall be recorded as well.

Source: JICA Study Team

Figure 11.4.2 shows locations of the water quality test samplings and on-site survey points of air, noise and vibration. The exact locations should be decided prior to commencement of the survey during the EIA study in the FS and/or detailed design stages.



Source: JICA Study Team

Figure 11.4.2 Location Map of Water Quality, Air, Noise and Vibration Surveys for Pre-FS Projects

Recommended major items for the socio-economic environment survey are migration of population/ involuntary resettlement, land acquisition, impact on local economy/ economic activities, social infrastructure, institutions and services, vulnerable people/ poverty, cultural heritage, infectious disease/ public health, traffic jam and traffic accident. The corresponding methodology meanwhile for said survey is presented in Chapter 11 of the main report.

11.5 PREPARATION OF TERMS OF REFERENCE (TOR) FOR THE EISTUDY/EIA STUDY

MoWT is primarily responsible for environmental and social considerations. The Study Team recommends to MoWT to prepare the draft TOR in accordance with the scoping of the project and methods in Section 11.4 prior to the EIA Study, which would be conducted independently or as a part of the FS, for public consultation and approval of NEMA.

The scope of the EIStudy/EIA Study should cover a wide range of activities during the pre-construction, construction and post-construction phases which might cause negative and/or positive impacts on the natural and socio-economic environments. The items of the EIStudy/EIA should include those of which impacts are assessed as significant or minor (A+, A-, B+, B-) in the screening.

The EIA consultant should arrange and assist MoWT in holding two or three public consultations (public hearing) in accordance with the guidelines of NEMA and international development partners during the EIStudy/EIA.

Through the EIStudy/EIA Study, the EIA consultant should identify and recommend mitigation measures to eliminate or minimize negative impacts, and maximize positive impacts during the pre-construction, construction and post-construction phases of the project. The EIA consultant should also formulate comprehensive environmental management and monitoring plans.

It should be noted that the new JICA Guidelines for Environmental and Social Considerations (April, 2010) shall be adopted in the feasibility study to be conducted as the next step of the project.

11.6 LAND ACT AND REGULATIONS

Since the Study anticipates requirement of land acquisition and involuntary resettlement, in this section, land statutes, laws, land tenure system, and land acquisition and resettlement process in GOU will be examined. In Uganda, apart from the Constitution, two types of sources of land law are included in Act and regulations; namely statutory laws and customary laws. Moreover, there is a common law which is not written but administered by the High Court of Uganda.

11.7 STAKEHOLDER MEETING (SHM) AND PUBLIC CONSULTATION (PC)

Regulation 12 of the Environment Impact Assessment Regulations 1998 of GOU requires the developer to take all measures necessary to seek the views of the people in the communities which may be affected by the project. Public consultation requirements are stipulated in the environmental guidelines of NEMA and international development partners. MoWT (THE developer) needs to hold two SHM during the EIStudy/EIA Study. The JICA Environmental Guideline requires the recipient governments to consult with local stakeholders through means that induce reasonably broad public participation, in order to consider environmental and social factors in the way most suitable to local situations and to reach an appropriate consensus.

Note: In this Study, Public Consultation means all the stakeholders including affected people and communities. Stakeholder meeting means all the technical persons and organizations/entities including ministries and district government staff.

Two stakeholder meetings were scheduled during this Pre-FS. Public consultations will be held during the FS and detailed design stage.

The main objectives of the first stakeholder meeting are to disclose information about environmental and social consideration at the earliest stages of the cooperation project of GOJ and to obtain opinions and suggestions from stakeholders which shall be reflected in the Study.

The MoWT in collaboration with the Study Team organized the first stakeholder meeting on the 8 December 2009 at the Grand Imperial Hotel in Kampala. A total of 62 persons from various stakeholders, MoWT, JICA and the Study Team have participated in the meeting. The main topics are the presentation outline and schedule of the Study, and the initial findings of the Study on key issues and future development of the road network in GKMA and public transport.

The second stakeholder meeting was held on August 26 2010 at the Grand Imperial Hotel in Kampala to inform and consult on the Draft Final Report of Pre-FS. The participants invited to the first stakeholder meeting were also invited for the second stakeholder meeting.

A total of 94 persons from various stakeholders, MoWT, JICA and the Study Team participated in the meeting. The meeting was presided over by the Acting Engineer in Chief/Director of Engineering of MoWT.

The main topics were the results of Pre-FS, road safety plan, traffic management plan and public transport plan.

Summaries of discussion at 1st stakeholder meeting and 2nd stakeholder meeting are presented in Table 11.7.1 and Table 11.7.2, respectively.

Table 11.7.1 Summary of Discussions at 1st Stakeholder Meeting

Field of Query/ Discussion	Issues coming up/queries	Response by Study Team member	Supplementation by MoWT	Suggestions or supplementation from participants
Presentation 1 Mr. Shinkai (Team Leader)				• Revision of population figure based on the official population census 2008 • Creation of tourism community in the province • Enhancement of market system for community (one product, one commune with its market)
Presentation 2 Mr. Konda, Deputy Team Leader/Road Planning I	• Wants planners and the Study to concentrate also on crucial access roads 'more of short cut' roads that help to decongest others but which are often neglected and are usually impassable. • Regarding flyovers in some areas, he was not so sure of the effectiveness especially since he had not yet seen the impact of the Northern Bypass. • Wants to know the time frame for any work, and when the 'project' would be expected to start.	• Access roads play vital roles they are within the scope of the Study. • Flyovers were among the proposals for the best alternatives to reduce on the level of congestions in the city. • The Study was still a Pre-FS, and also it was still in its initial stage. • The Govt should have a strong control on the building system in the CBD area and also restriction on vehicles.		
Presentation 3 Mr. Ohwaki, Public Transport Planning	• Why isn't the Study concentrating on different approaches to public transport such as walking, etc? • How will the transport industry be managed? • Taxis fill the park between 11–3 pm waiting for peak hrs, which is caused by the poor space management of the park managers. • Wants to know if it is possible to have organized terminals, specific routes where	• Observation was that there are a number of institutional issues such as the power to regulate the transport industry. • KCC, Transport Licensing Board, URA, Police are stakeholders in public transport. • It is necessary to push investment companies to follow their plan and encourage industrial parks to open up outside the city. • In order to significantly cut down on the congestion in the city, the taxi terminals should be moved outside of the	• Road fund is for maintenance of roads. • MoWT acknowledged that most of the terminals were owned by private organizations. • Regarding BRT, World Bank funded Pre-FS was already on going and the JICA study team would cooperate together with them.	• Proposes hiring a foreign firm to run the transport system instead of relying on UTODA. • Govt should come up with a new public transport system. • Another proposal was that new plans should include pedestrian routes. • Proposes that the govt should own the parks. • Another suggestion was that transport planning, and the study should focus on the link

Field of Query/ Discussion	Issues coming up/queries	Response by Study Team member	Supplementation by MoWT	Suggestions or supplementation from participants
	taxis operate.	CBD area.		between land use and transport itself. • Traffic police should only manage what has been put in place and should not completely disregard traffic signals already installed.
Presentation 4 Ms. Sato, Environmental issues and Social Considerations	• How did the Study Team or the Govt propose to handle matters like compensation and resettlement?	• Land acquisition should be done carefully and it would be best and easier to avoid the land acquisition and resettlement. • For the success of the project, the community should be involved and there should be full sensitization.		

Source: JICA Study Team

Table 11.7.2 Summary of Discussions at 2nd Stakeholder Meeting

Field of Query/ Discussion	Issues coming up/queries	Response by Study Team member	Supplementation by MoWT	Suggestions or supplementation from participants
General	• Gave members a re-cap of the presentations			
General introduction	• Do the costs for the IUBT include compensation and land acquisition?	• The initial estimation does not include compensation because exact locations of the proposed locations are not determined.		
	• Are the internal roads and other junctions are going to be looked at? • Asked for more information/more light regarding BRT	• Other Projects like BRT will work on other areas and all the junctions can't be done at once.	• BRT works by using large buses and putting them to use separate lanes outside general traffic. • There is a pilot route from Nambole-city centre - Bwaise funded by World Bank.	• There is a proposal on the flyover at around Namanve.
	• Has the study team been in contact with KCC regarding the development of such infrastructure and plans?	• Yes, but the current KCC structure plan is not considered workable in Kampala at the moment.		
	• Do petrol stations give influence to the congestion?	• Yes, appropriate regulations on the petrol station may be necessary.		
Traffic safety plans	• What kind of road safety measures are expected to be installed for the Pre-FS projects? • Viability of pedestrian bridges (increase of time and distance vs. safety)	• Segregation of pedestrians from vehicle traffic is an effective traffic safety measure and pedestrian bridge is proposed to be installed at Shoprite and Clock Tower Junctions.		
	• There is a need for enhancement of vehicle insurance such as third party, etc.	• Agree. Vehicle insurance system should be enhanced.		
	• There is a need for lighting & security on such bridges.	• Lighting should be considered in the feasibility study stage.		
Traffic Management Plan	• What is the role of the private sector?	• Acknowledged the need for the private sector to provide facilities, buses, investment in parking structures etc. and the government should also provide assistance.		
	• Is there a need for revision of the law(s) regarding traffic management?	• There is a room of revising the current regulations on the street parking, etc.		

Field of Query/ Discussion	Issues coming up/queries	Response by Study Team member	Supplementation by MoWT	Suggestions or supplementation from participants
Environmental considerations.	• Give more attention and more light to the issues of drainage and environment (mud & dust)	• Drainage is an important aspect of road service and it cannot be overlooked in design and cooperation with authorities and networking with the existing drainage systems like Nakivubo channel are important.		
Public transport	• ROW acquisition for widening should be a process that starts early.	• ROW is a key issue and that it has been considered.		
	• The local communities need more sensitization on the above projects in order to address things like, support & other social issues etc.	• It is important and that is one of the reasons why public workshops and consultations have been held.		
	• How does the BRT connect to railways? • Role of the local governments and physical planners and officers involved in town council need to be clearly mentioned.	• Agreed that the local authorities need to be involved.	• Regarding connection to the rail of BRT, there are currently no plans. • This study and BRT Pre-FS have, at all stages, involved the local governments that fall within GKMA.	
	• Why should the west bound terminal be in Nabweru? There is more demand in Nansana.	• There is smaller demand on Hoima Road compared to the other upcountry routes that had been selected.		

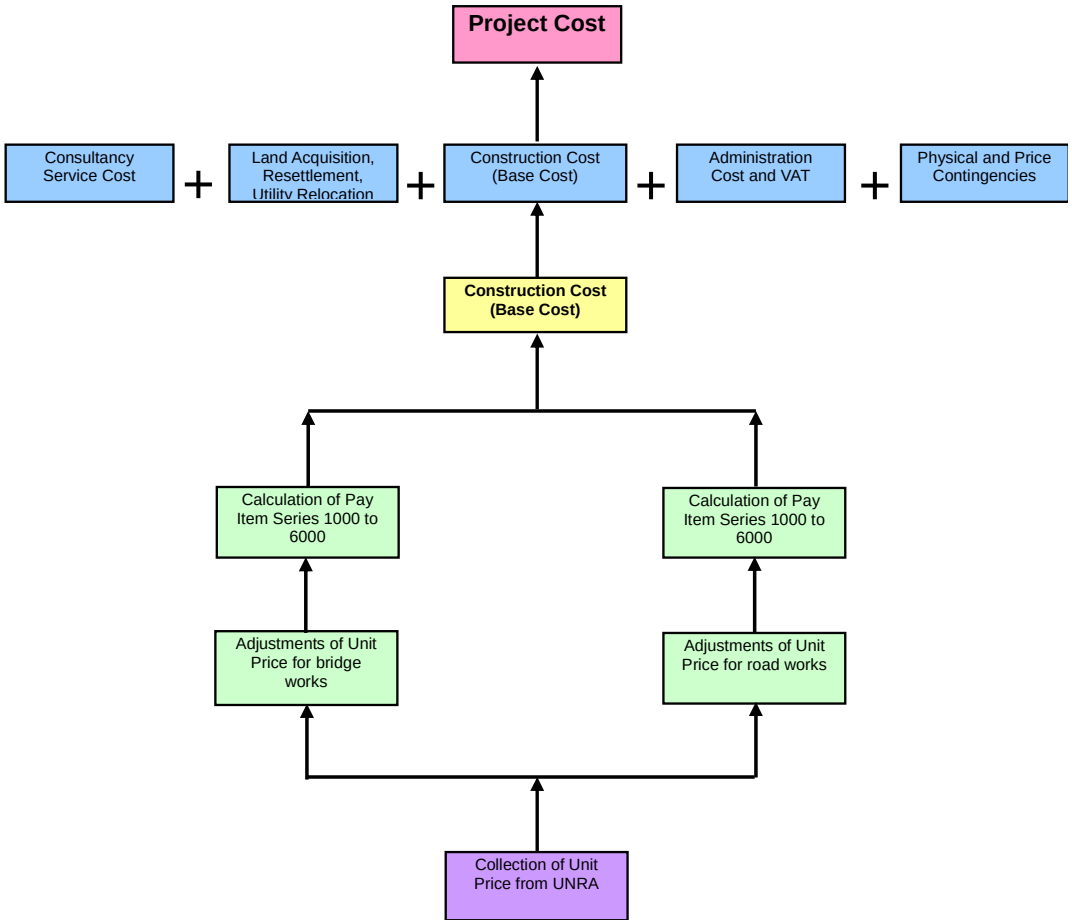
Source: JICA Study Team

CHAPTER 12 COST ESTIMATE, IMPLEMENTATION PLAN AND PROJECT EVALUATION

12.1 COST ESTIMATE

(1) Methodology of Cost Estimate

The estimate of the Project Cost is based on the results of preliminary design of Pre-FS projects, quantity estimation and unit prices established by the Study Team. Figure 12.1.1 shows a diagram of the Project cost estimation.



Source: JICA Study Team

Figure 12.1.1 Method of Diagram of Project Cost Estimation

(2) Establishment of Unit Prices

For establishment of unit prices of major pay items, the average unit prices were derived from the unit prices contracted in 14 on-going projects and two completed projects under MoWT and/or UNRA. Thereafter, these unit prices were converted to the June 2010 prices using escalation adjustment factors (CPI).

As there is no experience yet of flyover construction work similar to the Pre-FS projects in Kampala, the Study Team has established the unit prices applied for the cost estimation of the flyover bridges construction based on the Northern Bypass Project (UNRA), Northern Bypass Road Bridge at Kyebando Road Project, the feasibility study on the construction of a new bridge across River Nile at Jinja, and flyover projects in other countries.

(3) Construction Cost (Base Cost 2010)

Major quantities of road and flyover bridge works were computed from the preliminary design of the Pre-FS projects. The construction cost (base cost) was estimated using the quantities and unit prices in the foregoing sections. The total base cost, excluding Project No. 1.3, Clock Tower Flyover, was estimated at USh 220.6 billion as summarized in the following table.

Table 12.1.1 Summary of Base Cost of Pre-FS Projects

Base Cost — Unit: Ushs

ITEM	DESCRIPTION	UNIT	Pre-FS projects					
			Project 1.1	Project 1.2	Project 1.3	Project 2	Project 3	
			Jinja Junction Main Flyover (Yusufu Lule - Mukwano Rds)	Jinja Junction Ramp Flyover (Jinja - Yusefu Lule Rds and Mukuwano - Jinja Rds)	Clock Tower Flyover	Mukwano Rd Widening (Dual Carriageway, 4 lanes)	Shoprite & Clock Tower Jcts Traffic Safety Improvement	
							Shoprite Section	Clock Tower Section
SERIES 1000	**GENERAL**							
		L/S	10,047,500,433	7,595,370,228	1,426,893,991	1,086,996,999	294,115,227	551,930,205
SERIES 2000	**DRAINAGE**							
	Road section	L/S	2,713,718,730	739,666,510		5,299,809,590	808,855,893	2,071,109,604
	Bridge section	L/S						
SERIES 3000	**EARTHWORKS AND PAVEMENT**							
	Road section	L/S	883,825,683	184,592,329		2,420,616,163	287,251,950	693,486,181
	Bridge section	L/S	161,645,464	195,453,954	87,369,262			
SERIES 4000	**BITUMINOUS LAYERS AND SEALS**							
	Road section	L/S	1,145,288,980	229,545,950		2,174,156,690	424,611,788	992,704,537
	Bridge section	L/S	351,474,247	272,890,230	59,364,780			
SERIES 5000	**ANCILLARY ROADWORK'S**							
	Road section	L/S	91,748,720	16,952,480		370,390,480	145,900,826	398,424,905
	Bridge section	L/S	1,557,452,072	2,694,235,253	1,509,437,670			
SERIES 6000	**STRUCTURES**							
	Road section	L/S				895,160,546	1,353,043,075	1,510,909,327
	Bridge section	L/S	96,251,934,748	73,647,877,141	12,993,663,926			
Sub-Total (Series 2000 to Series 6000)			103,157,088,644	77,981,213,847	14,649,835,638	11,160,133,469	3,019,663,532	5,666,634,554
Construction Costs			**113,204,589,077**	**85,576,584,075**	**16,076,729,629**	**12,247,130,468**	**3,313,778,759**	**6,218,564,759**
			198,781,173,152		**16,076,729,629**	**12,247,130,468**	**9,532,343,517**	
Construction Cost (Base Cost)	General :		10,047,500,433	7,595,370,228		1,086,996,999	294,115,227	551,930,205
	Road Section Cost :		4,834,582,113	1,170,757,269		11,160,133,469	3,019,663,532	5,666,634,554
	Bridge Section Cost:		98,322,506,531	76,810,456,578		0	0	0
	Total:		**113,204,589,077**	**85,576,584,075**		**12,247,130,468**	**3,313,778,759**	**6,218,564,759**

Exchange Rates: 1.0 US$ = UShs 2,271.94 = 88.44 JP Yen, as of 30th June 2010

Civil Works Base Cost (Excluding Project No. 1.3, Clock Tower Flyover) : 220,560,647,138

Source: JICA Study Team

The base cost for the Clock Tower Flyover construction is estimated at USh 16.1 billion and it will be implemented as part of the Phase 2 project.

(4) Operation and Maintenance Cost

Road maintenance activities, which are required after completion of the project, are divided into two categories: Routine Maintenance Work and Periodic Maintenance Work. The operation and maintenance costs are as shown in Table 12.1.2.

Table 12.1.2 Estimated Maintenance Costs of Each Project

No.	Project Name	Routine Maintenance Cost (Million UShs)	Periodic Maintenance Cost (Million UShs)	
		Every Year	Every 10 Years	Every 15 Years
1-1	Yusufu Lule - Mukwano Roads Flyover	1,930	1,800	61,300
1-2	Jinja - Yusufu Lule Roads Flyover and Mukwano - Jinja Roads Flyover			
1-3	Clock Tower Flyover	160	-	5,630
2	Mukwano Road Widening	330	3,350	-
3	Shoprite and Clock Tower Junctions Traffic Safety Improvement	260	2,610	-

Source: JICA Study Team

(5) Consultancy Services Cost

The consultancy services cost for detailed design, procurement assistance and construction supervision for implementation of the Pre-FS Projects is estimated at 8.50% of the civil works cost.

(6) Other Costs (Land Acquisition, Resettlement, Utility Relocation, Administration and Tax and Duty)

According to the preliminary design and site reconnaissance survey, the Pre-FS projects require an aggregate total area of about 8.73 ha of land. Most are public lands (MoWT, Electoral Commission, URC, etc) but it needs 2.59 hectares of private land acquisition. The total cost of land acquisition is estimated to be about UShs 10.6 billion as shown in Table 12.1.3.

Table 12.1.3 Estimated Cost of ROW Acquisition (Private Land)

Project No.	Name of Place	Unit	Area (ha)	Amount
Project 1.1	Yusefu Lule - Mukuwano Rds Flyover	U.Shs	0.11	449,844,120
Project 1.2	Jinjya - Yusefu Lule Rds Flyover and Mukuwano - Jinjya Rds Flyover	U.Shs	0.65	2,658,169,800
Project 1.3	Clock Tower Flyover	U.Shs	0.00	0
Project 2	Mukuwano Rd Widening, incl. Mukuwano Rdt & Nsanbya Jct Capacity Improvement	U.Shs	1.19	4,866,495,480
Project 3	Shoprite & Clock Tower Jcts Traffic Safety Improvement	U.Shs	0.64	2,617,274,880
Total		**U.Shs**	**2.59**	**10,591,784,280**

Source: JICA Study Team

Based on the results of the site reconnaissance surveys, there are about nine buildings/houses and 41 households affected by the implementation of the Pre-FS projects. The estimated total compensation cost for these buildings and resettlement is about UShs 0.2 billion, as shown in Table 12.1.4.

Table 12.1.4 Estimated Cost of Compensation for Affected Buildings and Households

Project No.	Name of Place	Unit	Building	Household	Amount (U.Shs)	
Project 1.1	Yusefu Lule - Mukuwano Rds Flyover	U.Shs	0	1		4,000,000
Project 1.2	Jinjya - Yusefu Lule Rds Flyover and Mukuwano - Jinjya Rds Flyover	U.Shs	2	17	16,000,000	68,000,000
Project 1.3	Clock Tower Flyover	U.Shs	0	4		16,000,000
Project 2	Mukuwano Rd Widening, incl. Mukuwano Rdt & Nsanbya Jct Capacity Improvement	U.Shs	2	15	16,000,000	60,000,000
Project 3	Shoprite & Clock Tower Jcts Traffic Safety Improvement	U.Shs	0	4		16,000,000
Total		**U.Shs**	**4**	**41**	**196,000,000**	

Source: JICA Study Team

There are no informal settlers within the project-affected area. As relocation of utilities is the responsibility of each agency, its cost was not included in the project cost estimation.

The cost of project administration is estimated at 2.0% of the estimated total project cost. Value Added Tax (VAT) of 18 % is not applied for the Pre-FS projects in accordance with "VALUE ADDED TAX ACT (2005), CAP. 349. 19 Exempt Supplies (1)".

(7) Project Cost Estimates

The physical and price contingencies were estimated considering the following:

Table 12.1.5 Summary of Price and Physical Contingencies

Category	Currency	Civil Works	Consultancy Services	Land Acquisition /Compensation / Administration
Price Contingency	FC	3.0% / annum	3.0% / annum	-
	LC	11.0% / annum	-	11.0% / annum
Physical Contingency	FC/LC	10.0 %	5.0%	10.0%

Source: JICA Study Team

The following foreign and local currency components were applied by category. These components were determined referring to the past project implementation but the foreign component is a bit higher since the project involves mostly flyover construction.

Category	Civil Works	Consultancy Services
FC	80%	80%
LC	20%	20%

Source: JICA Study Team

Exchange Rates of the "Bank of Uganda" on 30th June 2010 are adopted for the cost estimation:

"US$1.00 = UShs 2,272.0"

Adding the physical and price contingencies, consultancy services, land acquisition & resettlement and administration costs to the base cost, the total project cost for the Jinja Junction Flyovers, Mukwano Road Widening, and Shoprite & Clock Tower Junctions Traffic Safety Improvement has been estimated at UShs 353.5 billion or US$155.6 million as presented in the following table.

Table 12.1.6 Project Cost Estimate for the Jinja Junction Flyovers, Mukwano Road Widening, and Shoprite & Clock Tower Junctions Traffic Safety Improvement

Category	Cost in UShs (billion)				Cost equivalent to US$ (million)			
	Base Cost	Price Escalation	Physical Contingency	Total	Base Cost	Price Escalation	Physical Contingency	Total
Civil Works	220.56	58.62	27.92	307.10	97.08	25.80	12.29	135.17
Consultancy Services for DD & CS	18.75	4.20	1.15	24.10	8.25	1.85	0.51	10.61
Land Acquisition & Resettlement	10.77	3.23	1.40	15.40	4.74	1.42	0.62	6.78
Administration Cost	5.00	1.32	0.61	6.93	2.20	0.58	0.27	3.05
Value Added Tax (No VAT)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	255.08	67.37	31.08	353.53	112.27	29.65	13.68	155.60

Notes: 1. Currency Exchange Rate US$1.00 = UShs 2,272 as of 30th June 2010.
2. Construction starts in the 1st quarter of 2014/15 and complete in 3 years.

Source: JICA Study Team

The project cost for the Clock Tower Flyover Project has been estimated at UShs 34.9 billion or US$15.4 million as in the following table.

Table 12.1.7 Project Cost Estimate for Clock Tower Flyover Construction

Category	Cost in UShs (billion)				Cost equivalent to US$ (million)			
	Base Cost	Price Escalation	Physical Contingency	Total	Base Cost	Price Escalation	Physical Contingency	Total
Civil Works	16.08	12.68	2.88	31.64	7.08	5.58	1.27	13.93
Consultancy Services for DD & CS	1.37	1.02	0.12	2.51	0.60	0.45	0.05	1.10
Land Acquisition & Resettlement	0.02	0.03	0.00	0.05	0.01	0.01	0.00	0.02
Administration Cost	0.35	0.27	0.06	0.68	0.15	0.12	0.03	0.30
Value Added Tax (No VAT)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	17.81	14.01	3.06	34.88	7.84	6.17	1.35	15.35

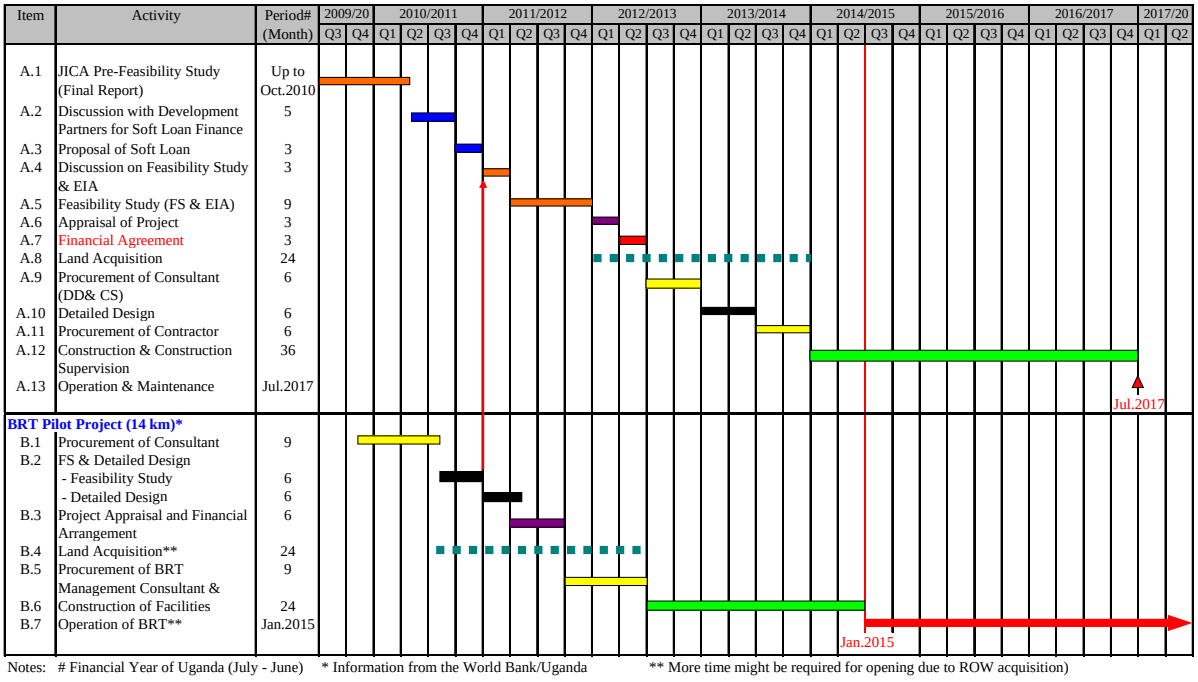
Notes: 1. Currency Exchange Rate US$1.00 = UShs 2,272 as of 30th June 2010.
2. Construction starts in the 1st quarter of 2021/2 and complete in 2 years.

Source: JICA Study Team

12.2 PROJECT IMPLEMENATION PLAN

(1) Implementation Schedule

The Pre-FS projects are recommended to be implemented in two phases on aspects of their urgency and large investment cost. Phase 1 will be the implementation of Jinja Junction Flyovers, Mukwano Road Widening and Shoprite & Clock Tower Junction Traffic Safety Improvement Projects at the earliest appropriate timing. As these three projects are related to each other, it is better to implement them as one package. Since the traffic capacity of Clock Tower Junction will become sufficient through the improvement of its intersection in Phase 1, the project implementation of Phase 2, Clock Tower Flyover, could be undertaken approximately 6-7 years later. Figure 12.2.1 shows the project implementation schedule for Phase 1 projects.



Notes: # Financial Year of Uganda (July - June) * Information from the World Bank/Uganda ** More time might be required for opening due to ROW acquisition)

Source: JICA Study Team

Figure 12.2.1 Project Implementation Schedule for Phase 1 Project (Jinja Jct Flyover, Mukwano Road Widening and Shoprite & Clock Tower Jcts Traffic Safety Improvement)

If available budget is limited, the Phase 1 projects can be implemented in 2 stages; Stage 1 for Project No.1.1 (Yusufu Lule – Mukwano Roads Flyover), Project 2.4 (Mukwano Road Widening) and Project No.3.7 (Shoprite & Clock Tower Junction Traffic Safety Improvement) and Stage 2 for Project 1.2 (Jinja – Yusufu Lule Roads and Mukwano – Jinja Roads Right-turn Flyovers).

Other possibility is implementation of the Phase 1 projects with co-finance of two international development partners; Stage 1 (Projects No.1.1, No.2.4 and No.3.7) for a co-financer and Stage 2 (Project 1.2) for other financers. The Mukwano Road Widening and Shoprite & Clock Tower Junctions Traffic Safety Improvement projects could be implemented prior to the Jinja Junction Flyover if availability of the budget is difficult. Further study should be made at the FS stage.

(2) Financing Plan

The total project cost for implementation of the Pre-FS projects (Phase 1) has been estimated at US$157 million, including price escalation and physical contingency. Since the project cost is very large, the Pre-FS projects are envisaged to be financed by the GOU and a soft loan from international development partners.

Table 12.2.1 Financing Plan for Pre-FS Project, Phase 1

Category	GOU		Development Partners			Total	% of External Finance
	FC	LC	FC	LC	Sub-Total		
Civil Works		36.11	99.06		99.06	135.17	73.3%
- Base Cost		19.42	77.66		77.66	97.08	
- Price Contingency (Escalation)		13.41	12.39		12.39	25.80	
- Physical Contingency		3.28	9.01		9.01	12.29	
Consultancy Services			7.87	2.73	10.61	10.61	100.0%
- Base Cost			6.60	1.65	8.25	8.25	
- Price Contingency (Escalation)			0.90	0.95	1.85	1.85	
- Physical Contingency			0.37	0.13	0.51	0.51	
Land Acquisition & Resettlement		6.78			0.00	6.78	0.0%
Administration Cost		3.05			0.00	3.05	0.0%
Value Added Tax (No VAT)	0.00	0.00	0.00	0.00	0.00	0.00	
Total	0.00	45.94	106.93	2.73	109.67	155.60	70.5%
(% to the total project cost)	0.0%	29.5%	68.7%	1.8%	70.5%	100.0%	
Note: Currency Exchange Rate	US$ 1.00=	UShs	2,272				
	UShs 1.00=	US$	0.000440				

Source: JICA Study Team

(3) Project Implementation Agency

All Pre-FS roads are currently under administration of KCC. However, since the trunk roads of KCC, which connect to the national roads, will be transferred from KCC to MoWT/UNRA in the near future, all Pre-FS roads, except Nile Avenue and Shoprite Junction, shall be part of the UNRA's National Road Network.

Therefore, management and supervision of the feasibility study of Pre-FS roads will be transferred from MoWT to UNRA. Though Nile Avenue and Shoprite Junction would still remain under administration of KCC, UNRA should also manage these road and junction as part of the Phase 1 program at the feasibility study and project implementation stages. KCC should remain as one of the key members of Steering Committee for the Feasibility Study.

12.3 PROJECT EVALUATION

(1) Methodology for Economic Evaluation

In this evaluation, the following two types of economic benefits were estimated quantitatively:

- Savings in Vehicle Operating Cost (VOC)
- Savings in Passenger Travel Time Cost (TTC)

An analysis on the qualitative effect of traffic safety improvement through the Shoprite/Clock Tower Traffic Safety Improvement project was conducted separately.

The following four projects were selected for the pre-feasibility study as explained in the short list project evaluation:

Table 12.3.1 Evaluated Projects

No.	Project Name	Planned Opening Year	Years for Traffic Demand Forecast
1-1/1-2	Jinja Flyover Project	2017	2018, 2023
1-3	Clock Tower Flyover Project	2023	2023
2	Mukwano Road Widening Project	2017	2018, 2023
3	Shoprite/ Clock Tower Junction Traffic Safety Improvement Project	2017	2018, 2023

Source: JICA Study Team

The economic benefits were estimated based on the "With and Without Project" comparison method. The "With Project" situation means that one of the target projects (Pre-FS projects) is implemented independently and/or combined projects are implemented, and the "Without Project" situation is that no target projects are implemented.

(2) Economic Costs

The project investment costs consist of the construction cost (civil works), land acquisition and compensation cost, consulting services cost, and administration cost. The economic costs were obtained by deducting transfer items such as import duties and taxes from the financial costs at market prices. A factor of 0.87 was applied to convert the financial costs into economic costs, (only to the civil work costs). Neither the shadow exchange rate nor the shadow wage rate was necessary.

The maintenance costs consist of the routine maintenance cost for every year and periodical maintenance cost timed at 10 years and 15 years after construction and opening to traffic. These costs were also converted into economic costs applying the above conversion factor.

(3) Economic Benefits

1) Vehicle Operating Cost

In this Pre-Feasibility Study, the unit VOC data by the JICA Study on the New Nile Bridge Project was applied after updating the fuel cost into 2010 prices. The effects of using the VOC data of RED Model (Road Economic Decisions) were analyzed in a sensitivity analysis.

2) Travel Time Cost of Passengers

According to the interview survey of minibus passengers conducted by the Study Team in January 2010, an average monthly income of minibus passengers whose trip purposes were business and going to office (to work) was calculated at 821,000 Shs/month. Considering 194 hours of working time per month, the time cost of minibus passengers for work trip has been estimated at 4,232 Shs/hour (= 1.86 US$/ hour). The proportion of time value of non-work trips was taken at 25% of work trip (1.86 US$ x 25% = 0.47 US$/hour) as proposed by the "Procedural Guide 2006".

On the other hand, the travel time cost for passenger car (sedan) was assumed to be 1.6 times (60% higher) that for minibus passengers. This was decided referring to the welfare indicators by "Uganda National Household Survey 2005/06". The travel time values adopted are shown below:

Table 12.3.2 Estimation of Travel Time Costs

Vehicle Type	Travel Time Value (2010) (US$/ hour/ person)		Trip Purpose Composition (*)		Weighted Average Value (US$/hr/person)	Average No. of passengers (*)	Time Value by Vehicle Type (2010) (US$/hr/vehicle)
	Work	Non-work	Work	Non-work			
Car	2.98	0.75	56.3%	43.7%	2.00	2.35	4.71
Mini bus	1.86	0.47	28.9%	71.1%	0.87	10.36	9.01
Large bus	1.86	0.47	28.9%	71.1%	0.87	39.88	34.67
Motorcycle	1.86	0.47	28.9%	71.1%	0.87	1.16	1.01

Source: JICA Study Team
Note: (*): From the results of traffic survey by JICA Study Team.

Future travel time values were assumed to grow with the same rate of real per capita GDP.

3) Benefits of Flyovers (Benefit of Reducing Time Delay at Junctions)

In order to grasp the economic cost of delay at existing junctions/roundabouts, the results of delay time analysis at main junctions (Africana Rbt., Garden City Rbt., Mukwano Rbt., and Clock Tower Junction) were incorporated into the benefit estimation, separately from the results of traffic assignment simulations.

(4) Economic Evaluation and Sensitivity Analysis

Cost-benefit cash flow analyses were carried out under the following pre-conditions:

1) Price Level	: 2010 prices
2) Evaluation Period	: 20 years after opening year
3) Residual Values	: No residual values were counted.
4) Opportunity Cost of Capital (Discount Rate)	:12%

Source: JICA Study Team

The sensitivity analyses were done based on the following alternative cases:

1) Project costs increase by: +10%, +15%, and +20%
2) Project benefits decrease by: -10%, -15%, and -20%
3) Combinations of all the above
4) Unit time values (US$/hour/vehicle): reduced by 20%
5) Unit VOC values (US$/km/vehicle): values of RED

The results of the economic evaluation and sensitivity analyses are summarized in Table 12.3.3.

The results indicate that all projects and all evaluation cases are economically feasible with values of Economic Internal Rate of Return (EIRR) higher than the opportunity cost of capital (> 12%), Benefit/Cost Ratio (B/C) higher than unity (>1.0) and positive values of Net Present Value (NPV) (> 0).

Table 12.3.3 Results of Economic Evaluation and Sensitivity Analyses

No.	Project Name	Base Case			Sensitivity Analysis (EIRR), against Base Case				
		EIRR	B/C (*)	NPV (*)	Cost +10% Benefit -10%	Cost +15% Benefit -15%	Cost +20% Benefit -20%	Unit Time Value -20%	Unit VOC = RED 2008
1-1/1-2	Jinja Flyover Project	20.7%	1.70	34.126	17.2%	15.5%	13.9%	16.9%	20.6%
1-3	Clock Tower Flyover Project	32.4%	2.49	2.786	26.9%	24.4%	22.0%	26.3%	27.6%
2	Mukwano Road Widening Project	38.8%	4.32	15.823	34.2%	32.0%	29.9%	33.8%	32.4%
3	Shoprite & Clock Tower Traffic Safety Improvement Project	22.3%	2.21	4.069	19.5%	18.1%	16.8%	19.6%	20.4%
	Combination of Project (1-1)+(2)+(3)	22.6%	1.88	50.349	18.9%	17.2%	15.5%	18.6%	21.7%
	Combination of All Projects (1-1)+(1-2)+(2)+(3)	23.0%	2.01	59.421	19.4%	17.8%	16.2%	19.6%	22.3%

Source: JICA Study Team
Note: (*): Discount Rate = 12%, NPV: in US$ Million

The results of sensitivity analyses show the robustness of the economic feasibility of the projects. Even if the project costs go up by 20% and economic benefits go down by 20% simultaneously, all projects will maintain values of EIRR higher than the opportunity cost of capital (> 12%). Furthermore, even when the unit time values are estimated at 20% lower than the base case, all projects are still economically feasible. Regarding the change of unit UOC values, no significant differences are observed between the base case and RED case.

(5) Socio-Economic Benefits and Contribution to Mitigation of Global Warming

The Pre-FS projects will contribute to various socio-economic benefits, global warming and regional peace enhancement. Table 12.3.4 shows a summary of these benefits by category and degree.

Table 12.3.4 Contribution of Pre-FS Project

Project No	Project Name	International Corridor Road (A109)	Improvement of Traffic Congestion	Air Pollution	Global Warming (CO2 Reduction)	Traffic Safety	Sustainability of National Economy (CBD)	Support of Regional Economy Development	Reduction of Poverty
1.1 & 1.2	Jinja Junction Flyovers	Yes	Very High Positive Benefit	Very High Positive Benefit	High Positive Benefit	High Positive	Very High Positive Benefit	Positive Benefit	Positive Benefit
2.4	Mukwano Rd Widening	A109 Bypass*	High Positive Benefit	Positive Benefit	Positive Benefit	No Change	High Positive Benefit	High Positive Benefit	High Positive Benefit
3.7	Shoprite & Clock Tower Jcts Traffic Safety Improvement	Yes	High Positive Benefit	Very High Positive Benefit	High Positive Benefit	Very High Positive	High Positive Benefit	High Positive Benefit	Very High Positive Benefit

Note: Mukwano Road is a bypass of the Kampala city center section of A109 (International Corridor)

Source: JICA Study Team

The projects will contribute to realization of socio-economic impacts in various aspects, such as reduction of traffic accidents, promotion of urban/regional/national economic development, contribution to strengthening the international corridor, poverty alleviation, and creation of better urban environment through reduction of air pollution and mitigating global warming (CO_2).

CHAPTER 13 CONCLUSIONS AND RECOMMENDATIONS

13.1 CONCLUSIONS

13.1.1 ROAD NETWORK IMPROVEMENT

(1) Serious Traffic Congestion in NTMP/GKMA

The population of GKMA was estimated at 2.5 million in 2008 and it is projected to reach 4.5 million in 2023. The traffic congestion at major junctions and trunk roads in GKMA, especially in Kampala City, became very serious due to the combined effects of rapid urbanization, national economic growth and high traffic increase, poor road network, low quality of roads, etc. It is one of the urgent key issues to be addressed in order to achieve sustainable national and regional economic development.

(2) Review of Road Network Improvement in NTMP/GKMA

The Study Team has reviewed NTMP/GKMA and recommended that the following additional road networks should be included in the master plan of NTMP/GKMA in addressing the current urban expansion of GKMA.

1) Improvement of Gaba Road and Kira - Old Kira Road as radial trunk roads
2) Planned expressway from Kampala to Entebbe International Airport
3) Elevated Urban Ring Expressway (Viaduct) along the Inner Ring Road in the long-long term plan

(3) Selection of Short-List Projects

A Pre-FS of BRT had been conducted in November 2009 in cooperation with the World Bank, which was in parallel with this Study. Its final report was submitted in May 2010. The introduction of BRT is one of the national core projects in the National Development Plan (2010/11–2014/15). The Study Team finally selected the following shortlist projects for the Pre-FS, which support or coordinate with the BRT plan.

Short-listed Projects for Pre-FS		
1	1.1	Jinja Junction Main Flyover (Yusufu Lule – Mukwano Roads Flyover)
	1.2	Jinja Junction Ramp Flyover (Jinja – Yusufu Lule Roads Flyover and Mukwano – Jinja Roads Flyover)
	1.3	Clock Tower Flyover
2	Mukwano Road Widening to a Dual Carriageway Highway (4 lanes)	
3	Shoprite and Clock Tower Junctions Traffic Safety Improvement	

Source: JICA Study Team

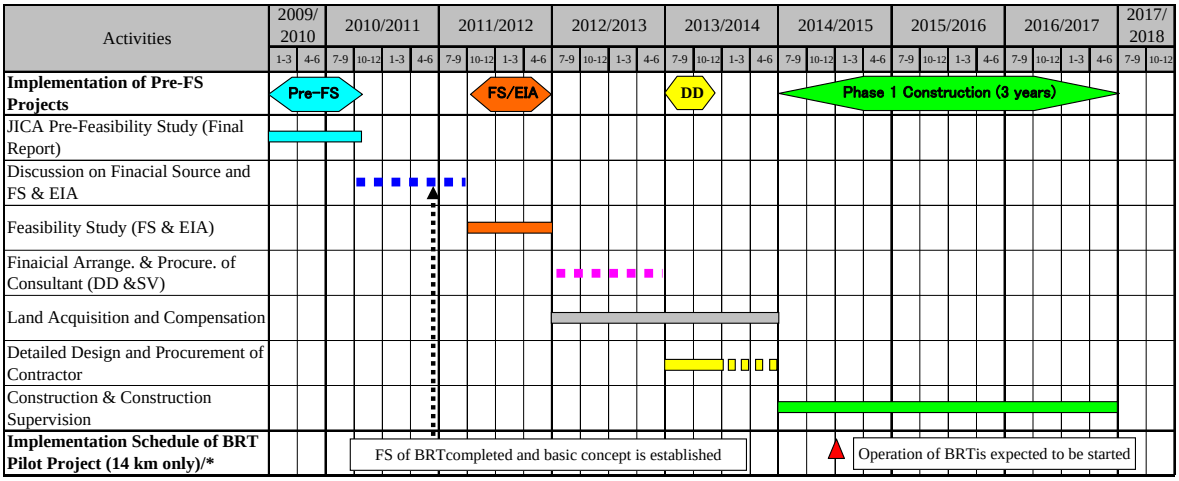
The Study Team has conducted the Pre-FS and preliminary designs of the short list projects so as not to conflict with the BRT plan, especially with the BRT pilot project.

According to the interview survey (conducted by the Study Team) on junctions with the worst traffic congestion, over 90% replied that the traffic congestion at Shoprite and Clock Tower Junctions is most serious. The Study Team has established the Shoprite and Clock Tower Junctions Safety Improvement Plan, which addresses to both pedestrian safety and traffic decongestion. Approximately 48,000 pedestrians daily, and over ten million per year would use these planned pedestrian bridges with gentle access slopes.

(4) Project Implementation

The Study Team has planned to implement the Pre-FS projects in two phases. Phase 1 includes implementation of three projects (as one package): Jinja Junction Flyovers, Mukwano Road Widening, and Shoprite and Clock Tower Junctions Traffic Safety Improvement. Phase 2 includes implementation of Clock Tower Flyover Construction. Since the traffic capacity of this junction would become sufficient by its at-grade intersection improvement in Phase 1, Phase 2 could be undertaken approximately 6-7 years later.

Based on the above, the Study Team has prepared a tentative implementation plan for Phase 1 projects, as shown below.



Notes: # Financial Year of Uganda (July - June) * Information from the World Bank/Uganda

Source: JICA Study Team

Figure 13.1.1 Implementation Schedule of the Pre-FS Projects

(5) Project Cost Estimate

The total construction cost including price escalation and physical contingency was estimated at UShs 336.3 billion or US$148.0 million. Construction cost of Phase 1 is estimated at UShs 307.2 billion or US$135.2 million as shown in the following table.

Table 13.1.1 Construction Cost Estimate (Base Cost at Year 2010)

Items of the Project Cost	Cost in Ushs (billion)				Cost equivalent to US$ (million)			
	Base cost	Price Escalation	Physical Contingency	Total	Base cost	Price Escalation	Physical Contingency	Total
Phase 1: 2014 - 2017 (3 Years)								
1 Jinja Flyover	220.6	58.6	27.9	307.2	97.1	25.8	12.3	135.2
1-1 Jinja Junction Main Flyover (Yusufu Lule - Mukwano Roads Main Flyover)	113.1	30.0	14.3	157.5	49.8	13.2	6.3	69.3
1-2 Jinja Junction Ramp Flyover (Jinjya - Yusuful Lule and Mukwano - Jinja Roads)	85.7	22.7	10.8	119.2	37.7	10.0	4.8	52.5
2 Mukwano Road Widening to 4 lanes	12.3	3.2	1.5	17.1	5.4	1.4	0.7	7.5
3 Shoprite & Clock Tower Jcts Traffic Safety Improvement	9.5	2.5	1.2	13.3	4.2	1.1	0.5	5.8
Total of Phase 1	**220.6**	**58.6**	**27.9**	**307.2**	**97.1**	**25.8**	**12.3**	**135.2**
Phase 2: 2020 - 2023 (3 Years)								
1-3 Clock Tower Flyover	16.1	10.4	2.6	29.1	7.1	4.6	1.2	12.8
Total (Phase 1+Phase 2)	236.7	69.0	30.6	336.3	104.2	30.4	13.5	148.0

Note: (1) Exchange rate: US$ 1.00 = UShs 2,272 as of 30th June, 2010
(2) Annual Price Escalation was assumed at 3.0% annum for Foregin and 11% annum for Local currency component.

Source: JICA Study Team

The project cost, including consultancy services, price and physical contingencies, land acquisition and compensation and administration, for Phase 1 projects has been estimated at UShs 353.5 billion or US$155.6 million as shown in the following table.

Table 13.1.2 Summary of Project Cost Estimate (Phase 1 only)

Items of the Project Cost	Cost in Ushs (billion)				Cost equivalent to US$ (million)			
	Base cost	Price Escalation	Physical Contingency	Total	Base cost	Price Escalation	Physical Contingency	Total
1. Construction Cost	220.6	58.6	27.9	307.2	97.1	25.8	12.3	135.2
2. Consultancy Servvices for DD and SV	18.7	4.2	1.1	24.1	8.3	1.9	0.5	10.6
3. Land Acquisition & Resettlement	10.8	3.2	1.4	15.4	4.7	1.4	0.6	6.8
4. Administration Cost	5.0	1.3	0.6	6.9	2.2	0.6	0.3	3.1
5. Value Added Tax (No VAT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	255.1	67.4	31.1	353.5	112.3	29.7	13.7	155.6

Note: (1) Annual Price Escalation was assumed at 3.0% annum for Foregin and 11% annum for Local currency component.
(2) Consultancy Services for Detailed Desgin and Constrcution Supervision was estimated at 8.5% of Construction Cost.
(3) Foreign and Local Currency Portions was esimated at 68.9% and 31.3% resepctively.

Source: JICA Study Team

(6) Environmental and Social Considerations

The Initial Environmental Examination (IEE in the JICA Guidelines 2004) was conducted by the Study Team for screening and initial environmental evaluation purposes for Pre-FS projects. The EIStudy/EIA shall be required for the Pre-FS projects subject to approval of NEMA of the GOU in the FS stage (and/or in the detailed design stage), prior to project implementation.

(7) Project Evaluation

Economic analysis has resulted in a favorable economic feasibility (EIRR>20%) for each Pre-FS project. These projects would also support the BRT pilot project operation. Therefore, these projects should be forwarded on to the next feasibility stage at the earliest date possible.

The projects will contribute to the realization of socio-economic impacts on various aspects, such as traffic accident reduction, promotion of urban/regional/national economic development, contribution to strengthening the international corridor, poverty reduction, and creation of a better urban environment through reduction of air pollution and mitigation of global warming (CO2).

13.1.2 ROAD TRAFFIC SAFETY

(1) Target of Traffic Safety Strategic Plan

Road traffic accidents increased rapidly from 1990 to 2007 at an annual ratio of 7.8%. This is in line with the increase of vehicle population and traffic volume. The rate of fatalities with respect to motorized vehicles in Uganda is 65 persons per 10,000 vehicles, which ranks as one of the worst African countries.

The Study Team has established two targets of Traffic Safety Strategic Plan, as follows:

- To reduce the number of fatalities into half (based on 2008 figures) by the year 2015.
- To strengthen the capacity and function of the organizations involved in road safety and rules /regulations to ensure implementation and sustainability of traffic safety measures.

(2) Basic Planning Policies and Strategies

To achieve the above two targets, the following basic planning policies and implementation Strategies should be discussed:

1) Policies should cover three basic elements, i.e., person, vehicle and road environment.

2) All necessary institutions and database should be established within the strategic plan period, including new laws and regulations.

3) The appropriate environment and mechanisms should be enhanced and developed, which can be referred to as the 4Cs (communication, cooperation, collaboration and coordination) for the traffic safety stakeholders.

4) Priority will be given to human resource development rather than investing on advanced technologies.

(3) Traffic Safety Action Plan (2011-2015)

The Study Team has recommended the Traffic Safety Action Plan, which is composed of capacity enhancement/development of traffic safety institutions for 2011-2015.

13.1.3 PUBLIC TRANSPORT IMPROVEMENT

(1) Shift from Minibus to Large Bus

The total number of minibuses counted outside the city center is about 51,000 vehicles per 12 hours, which accounts for 30% of all type of vehicles. Hence it is inevitable to shift from minibuses to large buses for the alleviation of traffic congestion. To this end, supplying stable and comfortable public transport which meets passenger demand is the most expected measure for improving public transport.

(2) BRT Pre-FS

BRT Pre-FS was conducted as the advanced step for the realization of the concept of BRT which was articulated in NTMA/GKMA. Pre-FS established the overall development plan of eight routes on nine arterial roads in GKMA. All routes are expected to be operational in 2030. However, the implementation schedule of each route has not yet been decided, except for the pilot route on Jinja-Bombo road. Therefore, it is decided that this study covers areas and routes which will not be covered by the BRT project.

(3) Large Bus Introduction

The objectives of public transport improvement are as follows:

- To provide reliable and stable public transport service which meets the increasing volume of passenger demand and diversification of needs
- To harmonize with other transport modes on road, and to secure the safety of road traffic and public transport
- To properly protect the interest of the public transport industry and to promote its sound evolution

Since the number of passengers of a minibus is very small and its transport efficiency is low, minibuses shall gradually be replaced by medium and large buses, and BRT.

1) Large bus network

Five routes of large buses are planned in the area where BRT will not cover, and where passenger demand will concentrate. Among the five routes, Natete route and Munyonyo route are recommended to be operated in the medium-term of 2018. The other three routes, Sentema route,

Kiwatule route and Kiguwa route, will be operated in the long-term of 2023.

Since bus is one of public transport modes, it is necessary for buses to be operated on fixed routes in fixed times by fixed fares. Large bus systems will be administered by integrated operation entities which enable the operation of the said condition.

2) Medium bus network

Operation of medium buses will be limited in the area where BRT and large buses will not cover. Minibuses will gradually be replaced by medium buses until the end of the long-term, wherein all minibuses are replaced by medium buses.

For passenger transfer from medium bus to BRT and/or large bus, terminals will be developed along BRT and large bus routes.

(4) Improvement of Inter-Urban Bus

Relocation of existing inter-urban bus terminals (IUBT) is very important for the decongestion of traffic concentration into the city center. Four IUBTs are proposed outside the Northern Bypass Road and along radial trunk roads such as Jinja road, Bombo Road, Hoima Road and Masaka Road. The required function of the proposed IUBT is not only for passenger transit but also for functions such as shopping and other services. Therefore IUBT and incidental facilities are expected to be the focal place of the surrounding area and sub-center of GKMA.

The total construction cost of the four IUBT is estimated as UShs 48.6 billion (USD 22.1 million). Even though the total construction cost is of sizeable amount, the effect of the project in relation to decongestion and creation of new sub-centers will bring considerable benefits toward future city development and expansion.

(5) Infrastructure Development for Public Transport

A total of nine bus terminals are proposed at transfer points of BRT, large buses, medium buses and passenger cars, which aims for exclusion of parking at the roadside and convenience of passengers. Kiwatule, Kigowa and Luwafu, Natete and Karunga terminals are medium size terminals with more than an area of 2,000 m2. The others are smaller terminals requiring an area of 1,000 m2.

The total construction cost for the bus terminals will become UShs 17.3 billion (USD 7.9 million).

(6) Institution for Enhancement of Shift to Large Bus and Medium Bus

According to the financial analysis for large bus operation, financial IRR indicated more than 12% based on the following conditions:

- Import tax is exempted.
- Fund for bus operators is established with low interest rate of 17%.
- Bus fare is raised at least 5% from current minibus fare.

Following the result of analysis, exemption of import tax and establishment of bus fund by financing from the government are recommended to be introduced.

(7) Institution for Infrastructure Development for Public Transport

Infrastructures of public transport such as terminals and bus lay-bys should be part of the road.

Moreover, its development and maintenance should be conducted because terminals and bus lay-bys contribute toward the reduction of traffic congestion. Therefore, resources for the development and maintenance of roads shall be invested on infrastructures for public transport. The authorities in charge of road will be responsible for the development of infrastructures for public transport.

The government needs to obtain assistance from donors to develop large scale bus terminals such as the integrated terminal. Other small scale terminals will be developed by the government from the budget for road development.

(8) Realization of Public Transport Plan

The followings are the proposed for the realization of public transport plan:

1) Introduction of Large Bus
   - Direction and advise to the public transport section in MoWT
   - Establishment of bus fund
   - Direction and advise to bus operating companies
2) Development of Terminal
   - Recognition of responsible organizations in the government
   - Technical cooperation to the organization
   - Implementation of feasibility study
   - Implementation of development

13.1.4 TRAFFIC MANAGEMENT

(1) Major Issues in Traffic Management

The following are major issues identified by the Study Team in relation to the traffic management of Kampala City:

1) Lack of integrated traffic management strategy and plan due to inadequate coordination among various government and private organizations, the availability of personnel at key positions, and no workable plan/policy on capacity enhancement;
2) Inappropriate walkways due to poor condition of roads and/or illegal parking, and illegal facilities on roads. In addition, most road markings for traffic safety guidance and traffic flow control are also missing or already have disappeared;
3) Shortage of parking spaces corresponding to parking demand in the city center due to absence of building standards such as for ensuring o frontage area for the parking
4) Inadequate maintenance system for traffic signals due to insufficient capacity for operation and maintenance.

(2) Proposed Actions

The Study Team advises the GOU to take the following actions:

1) Implementation of measures in accordance with the “Strategy for the Improvement of Traffic Flow in Kampala in December 2009” as recommended by the Task Force. These measures could be executed at relatively low costs while waiting for the implementation of permanent measures like BRT and flyovers.

2) Introduction of traffic demand management approach and strategies in cooperation with international development partners since availability of budget is insufficient and land acquisition is difficult in providing sufficient road facilities which could meet the rapidly increasing traffic demand.

3) Development and upgrade of pedestrian friendly walkways (or footpaths) in the CBD and other city centers in conjunction with road development and rehabilitation works.

4) Establishment of building standards ensuring parking spaces. In addition, introduce car park sharing scheme and parking guide system to maximize utilization of existing parking spaces.

5) Establishment of overall signalization plan and programs, including systematic installation and maintenance plans for new traffic signals.

13.2 RECOMMENDATIONS

13.2.1 ROAD NETWORK IMPROVEMENT

(1) Earlier Implementation of Pre-FS Projects

The Study Team recommends that both governments concerned should hold meetings soon after completion of the Study to discuss on how and when the GOJ could assist the implementation of the Pre-FS projects, including a feasibility study as a forward stage, based on results of the Study.

(2) Phased Implementation of Pre-FS Projects

The Study Team recommends implementation of Pre-FS projects in two phases, as follows:

Phase 1: Jinja Junction Flyovers, Mukwano Road Widening and Shoprite and Clock Tower Junctions Traffic Safety Improvement in the mid-term by 2018, **as one package**.

Phase 2: Clock Tower Flyover Project in the long-term by 2023. Since the traffic capacity of Clock Tower Junction will remain sufficient for about 6-7 years through the intersection improvement in Phase 1, this phase could be initiated after said period.

The Study Team also recommends that Mukwano Road Widening and Shoprite and Clock Tower Junctions traffic safety improvement Projects could be implemented prior to Jinja Junction Flyovers if availability of budget is limited.

(3) Feasibility Study on Kibuye Junction Flyover

The Study Team has conducted a preliminary design for Kibuye Junction congestion improvement, taking on the requests of MoWT into consideration. The Study Team has concluded that a flyover is required when introducing BRT routes B1 and B3 which pass on this junction to relieve congestion while supporting BRT operation.

The Study Team recommends that a feasibility study of BRT route B1, Kampala – Kajansi section, should include Kibuye Junction Flyover plan and Queen's Way widening or it should be conducted as part of the feasibility study of Jinja Junction Flyover package.

(4) Follow-up Survey for BRT Pilot Project

The Study Team conducted Pre-FS and preliminary design of priority projects taking into

consideration the latest information on the BRT plan and pilot project. However, its basic concept might be changed through public consultations or the coming feasibility study and detailed design of the BRT pilot project and it would affect the basic scheme and designs of Pre-FS projects in this Study.

The Study Team, therefore, recommends conducting the follow-up survey to monitor progress of BRT FS and DD, and to discuss on the technical issues which might affect the implementation of Pre-FS projects.

13.2.2 ROAD TRAFFIC SAFETY

To achieve the target of the strategic traffic safety plan as well as to facilitate the Traffic Safety Action Plan (2011-2015), the following three development programs should be implemented at the earliest occasion:

1) Traffic Safety Human Resource Development Project

2) Comprehensive Vehicle Management System Development Project

3) Project for the Study on Development of Traffic Control Device Integration and Traffic Surveillance System

13.2.3 PUBLIC TRANSPORT IMPROVEMENT

(1) Vigorous Propulsion by the Government

BRT will be introduced to GKMA and bring about drastic change to the transport situation. In order to achieve this opportunity, the impact of BRT shall be enlarged and mobility of citizens shall be improved. For this purpose, the reinforcement of organization related to public transport in the government is required for its staff and operations.

(2) Assistance by International Agencies

Uganda is inexperienced when it comes to the development of public terminals. At present, terminal standards have not been prepared, and resources are considered to be limited. Assistance by developed countries is required in technical aspects and resources.

(3) Introduction of Person Trip Survey

In the Study, movement of vehicles and passengers were captured by roadside interview surveys and also minibus terminal interview surveys. However, in order to grasp the whole movement of people which is the source of traffic, it is necessary for person trip surveys conducted at home. Modal shift from passenger car to public transport is solely able through the analysis of results of person trip surveys. Thus, the introduction and implementation of person trip surveys are recommended.

(4) Establishment of Bus Fund

Establishment of bus fund is recommended to secure a necessary finance for launching new body for bus operation. The GOU shall finance or introduce the international financial partners to the fund.

(5) Introduction of Electric Bus

For carbon dioxide reduction, the Study Team recommends that the introduction of electric bus

to the BRT system should be examined.

13.2.4 TRAFFIC MANAGEMENT IMPROVEMENT

The Study Team recommends three development programs, as follows:

1) Introduce development and enhancement programs for both administrative and engineering capacities aimed at effective traffic management, which includes traffic demand management in cooperation with international development partners.

2) Systematic and early installation of traffic signals on major junctions based on traffic volume, safety and site condition.

3) Change from current stand-alone signals to an area, and also line controlled signalization system corresponding to increase of traffic signals in the future.