ANNEX 7 REPORTS ON STAKEHOLDER MEETINGS

ANNEX 7 REPORTS ON STAKEHOLDER MEETINGS

A7.1 FIRST STAKEHOLDER MEETING

I. INTRODUCTION

In the JICA study project on "Greater Kampala Road Network and Transport Improvement in the Republic of Uganda (GKMA Study)," there are some stakeholder meetings to be held in the Study area to present and discuss among stakeholders on JICA Study Team's outputs of the study.

The first stakeholder meeting mainly focused on presenting the initial findings of the Study on future development of the road network in Kampala city and how it can be improved in the Greater Kampala Metropolitan Area (GKMA) comprising of Kampala City Council (KCC), Kira Town Council, Nansana Town Councils, Entebbe Municipalities, Mukono District and Wakiso District. The meeting was organized by Ministry of Works and Transport (MoWT).with assistance of the JICA Study Team. This one-day meeting was held on the 8th of December 2009 at Grand Imperial Hotel in Kampala.

It was presided over by **The Permanent Secretary, through the Acting Engineer in Chief/Director of Engineering Dr. A.O. Mugisa**, of MoWT,

1. Definition of Stakeholders

In the Study, both MOWT and JICA Study Team agreed the definition of "stakeholders", as follows:

Stakeholders are planning and operational staff of organizations of Steering Committee, NGOs and other resource persons including Professors of universities as well as private sector which is related to transport.

2. Objectives of Stakeholder Meeting

The objectives of the stakeholder meeting are:

(1) To present, to stakeholders, the initial findings of the Study up to that date on the road network and transport system in GKMA.
(2) To discuss among stakeholders the findings of the Study and the solutions of the issue in terms of the traffic, road network and public transport system in the GKMA.

II. WELCOME SPEECH

The chairman called the meeting to order at 10.00 Am and also read out the agenda. To begin with, on behalf of the Ministry of Works and Transport and himself, Mr**. A.O. Mugisa, the Acting Director of Engineering/Engineer in Chief** of the Ministry, welcomed the, the honorable members, the members of Kira, Entebbe, Nansana, KCC, Mukono and Wakiso, representatives of other government agencies and participants from the private sector.

He emphasized the importance of the stakeholder meeting providing the great opportunity for the stakeholders to discuss the findings and future vision of sustainable development in the Study area by JICA Study Team, which fruitfully contributes to the further study.

Finally, he thanked and highly appreciated the efforts of Ministry of Works and Transport and JICA Study Team and in the study and preparation of this meeting.

III. OPENING ADDRESS

Dr. A.O. Mugisa then went ahead to deliver the opening speech on behalf of the Permanent Secretary of MOWT.

He gave a brief background of the study team and the JICA Study Team members, which consists with Nippon Koei Co., Ltd and Eight Japan Engineering Consultants Inc. He informed participants that the study would take 12 months and that having commenced at the end of Oct 2009, and would be completed in October 2010.

Regarding the context of the project, he mentioned that it was conceived about 2 years ago, but had to wait until the National Transport Master plan (NTP) including GKMA was finalized. Therefore any projects that resulted would fit within the framework of the GKMA Master Plan.

Members were told that the study sought to improve;

- Road network infrastructure with focus on
    - Layout or geometry of road network in Kampala city
    - Roads in CBD and suburbs
    - Radial roads, ring roads and by-passes.
    - Intersections or junctions
    - How they interconnect including capacity
- Transport services Management with focus on
    - Traffic congestion
    - Public transport
    - Taxis or Matatsu
    - Boda bodas or bike taxi

- Private cars
- Pedestrians

He went on to tell the participants that the study was premised on consensual decision making at three (3) levels:

1. MoWT and The JICA study team

2. Steering Committee – Consisting of about 20 technical Officers from relevant ministries, agencies and GKMA local governments. It will review the Study team's reports.

3. Key stakeholders – About 100 members on average. One more stakeholder meeting planned.

Finally, he expressed his thanks and requested the participants to share and express opinions, suggestion and recommendation which contribute to the productive meeting and the study in the next phase. He then invited Mr. Seki the JICA Uganda office chief representative to address the members.

GREETINGS

IV. Mr. Seki, the JICA Uganda office, Chief Representative greeted members present, thanking them for their attendance. He proceeded to mention that the traffic congestion in the city had become worsen and that there had been a rapid increase in the number of vehicles on the streets in Kampala city.

It is requested that all the participants to contribute information, data, ideas, suggestions and recommendation and closely and heartedly cooperate with JICA Study Team and wished the stakeholder meeting went smoothly and successfully.

V. PRESENTATIONS

1. **Mr. Hiroki SHINKAI,** the **Team Leader** of the Study Team, introduced himself and the JICA Study Team members..

He then proceeded with his presentation giving the outline of the Study. Main issues highlighted from his presentation included;

- Background and objectives of the study
- Description of the study area
- The work schedule
- Organization of the study team
- Members of the study team
- The steering committee
- Proposed workshops
- Stakeholder meetings
- Basic approach for the study
- Selection of prioritized projects
- Multi-criteria analysis
- Utilization of existing data
- Public Transport plan
- Traffic safety plan
- Earlier realization of the project
- Technology transfer
- The Study flow

After his presentation, he called upon the members in attendance to cooperate with the Study Team so that the objectives of the Study will be realized.

2. **Mr. Shigeru Konda** , **Deputy Team Leader**, who is in charge of **Road Planning**, made a presentation on 'Initial Findings on the Road Network in the Greater Kampala Metropolitan Area' GKMA.

Key points in his presentation were;

- National development plans
- GDP growth at Market prices
- Projected Populations (rural and urban)
- Estimated number of vehicles on the road
- Issues on the road network in GKMA

- Rapid urbanization, spatial development, process of Kampala city 2001
- Traffic conditions and major causes of traffic jam
- Production/attraction/transfer of traffic in Kampala
- Taxi parks and Bus terminal in the CBD
- Major freight terminal locations
- Development scenario (TO Development in GKMA Masterplan and trunk road system)
- GKMP Transport Master Plan (conceptual road component – year 2018)
- GKMP Transport Master Plan (year 2018) including flyover and Dual carriage way (via duct) projects.
- Road and junction improvement projects cooperated by the GOJ and the World Bank.
- Junction improvement projects, which have already assisted by GOJ.

He finalized his presentation with a 'thank you' note.

3. **Mr. Yasushi OHWAKI**, JICA study team member, who in charge of **Public Transport Planning**, gave a presentation to the members and made the following highlights:

- General conditions of taxis
- General condition of boda bodas (bike taxi)
- Basic policy for public transport
- Concept of a public transport corridor.
- Output of the study

In addition, he announced to members that the Study Team intended to carry out a traffic survey from the 5th of January 2010. He added that from data collected in previous surveys, it is conclusive that boda bodas also are contributing to hampering traffic flow in the city since they have rapidly increased in number over the last seven (7) years

4. **Ms. Minako SATO**, the Study Team member, who is in charge of **Environmental and Social considerations,** presented to members a comparison of EIA (Environmental Impact Assessment) guidelines between those used by JICA and those used by GOU. She also presented a schedule and flow showing the EIA process for the study.

She presented;

- Environmental Impact Assessment Policy of GOU and JICA
- EIA and Environmental and social consideration studies

- Definition of ‘screening’
- Levels/Categories of Projects
- Definition of ‘Scoping’
- Public Consultation and stakeholder consultation in GOU and JICA
- Decision making
- EIA flow of Government of Uganda
- EIA flow for Greater Kampala Road Network & Transport Improvement Study.

VI. QUERIES, QUESTIONS AND DISCUSSION AMONG STAKEHOLDERS

Presentation/Discussion	Issues coming up/queries	Response by Study Team member	Supplementation by MoWT	Suggestions or supplementation from participants
Presenter: Dr. A.O. Mugisa (Ag. EIC/EC MOWT)	- Gave members a re-cap of the events up-to that point of the meeting and then invited members to ask questions or give suggestions.			-
Presenter: Mr. Hiroki Shinkai (Team leader of Study team)	- A participant from Kira Town council wanted to know why the study included Kira TC but did not include Kimwanyi.	- Mr. Konda responded that he was aware of the vital role played by access roads and informed the participant that it was within the scope of the study.		- Revision of population figure based on official population census 2008 - Creation of tourism community in the province - Enhancement of market system for community (one product one commune with its market)
Presenter: Mr. Shigeru KONDA, Deputy Team leader and Study Team member for Road Planning I	- A participant wants planners and the study to concentrate also on crucial access roads, 'more of short cut' roads that help to de-congest others but which are often neglected and	- Mr. Konda responded that he was aware of the vital role played by access roads and informed the participant that it was within the scope of the		- Vote of thanks to JICA for the support.

	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. - A participant also wanted to know the time frame for any work and when the 'project' would be expected to start.	study. - He further added that flyovers were among the proposals for the best alternatives to reduce on the level of congestions in the city. - Mr. Konda gave clarification that this was still a feasibility study and also it was still in its initial stages. - He added that GOU should have a strong control on the building system in the CBD area and also restriction on vehicles.		
Presenter: Mr. Yasushi OHWAKI, the Study Team Member in charge of Public Transport Planning	- A member asks why is the study not concentrating on different approach to public transport such as walking etc. - How will the transport industry be managed - Another participant informed that taxis fill the park between 11am – 3pm waiting for peak hrs, which he said was poor space management on the side of park managers.	- Observation was that there are a number of institutional issues such as the power to regulate the transport industry. - KCC, Transport Licensing Board, UNRA, Police area regarded as responsible organization in terms of public transport. - Push investment companies to follow their plan and	- There is Road fund for maintenance of city roads. - MOWT acknowledged that most of the terminals were owned by private organizations. - Regarding Bus Rapid T (BRT) transport, Dr. Mugisa informed that a World Bank funded	- A participant proposed hiring of a foreign firm to run the transport system instead of relying on UTODA. - Government should come up with a public transport system. - Another proposal was that new plans should include pedestrian routes.

	- A student member wanted to if it was possible to have organized terminals, specific routes that taxis could run and taxi.	encourage industrial parks to open up outside the city. - Mr. Ohwaki also mentioned that in order to significantly cut down on the congestion in the city, the taxi terminals would have to be moved outside of the CBD area.	study on BRT and it was already on going and that the JICA study team would cooperate with them.	- Members propose that government should own parks. - Another suggestion was that transport planning and study should focus on the link between land uses and transportation characteristics. - A member have observed and appreciated the role of traffic police however suggested that they should only manage what has been put in place and not completely disregard for example use of traffic signals already installed.
Presenter: Ms. Minako SATO, the Study Team Member, who is in charge of Environmental issues and Social Considerations	- A member from Mukono asked how the Study Team or the Government would propose to handle matters like compensation and displacement.	- Ms. Sato supplemented and said that they were being careful about land acquisition and tenure system. Moreover it would be best to avoid land acquisition and settlement	-	-

		as much as possible - She conceded that for any successful project the community should be involved and that there should be full sensitization.	

VII. KEY POINTS

Ms. MINAKO SATO informed members that there would be another stakeholder meeting to be held sometime in March 2010, on the Draft TOR for EIA for selected projects.

She added that there would also be three (3) Public Consultations in the course of the study so as to get the general opinions and feedback from members of the public.

Finally she reminded members that one of the handouts given out to them contained a questionnaire requiring members to answer. This questionnaire asked about the five (5) worst junctions in terms of traffic jam in the Greater Kampala Metropolitan Area. The questionnaire was to be handed in to the Study Team and the information would greatly assist in the Study.

VIII. RECOMMENDATION AND CLOSING REMARK

Mr. Wandera, the Commissioner for Transport of the MoWT, thanked the Government of Japan and JICA for funding the Study. He wanted to thank the JICA Study Team for the work so far done and also thanked all the participants for attending the 1st stake holder meeting.

In all, he appreciated with the results of the stakeholder meeting and reminded participants of further consideration of the distributed documents in detail and not to forget to attend the second stakeholder meeting.

IX. AGENDA

Agenda of Stakeholder Meeting
First Stakeholder Meeting on the Study for Greater Kampala Road Network and Transport Improvement in the Republic of Uganda.

DATE: 8TH December, 2009

Venue: Hotel Grand Imperial

AGENDA

Time	Activities	Person(s) in charge
09:00 - 09:30	Registration of Participants	JICA Study Team Assistants Staff
09:30 - 09:40	Opening remarks	MOWT Acting Engineer in Chief, Dr. A.O. Mugisa
09:40 - 09:50	Opening Speech	MOWT Mr. Wandera
09:50 - 10:00	Greetings	JICA Uganda office, Chief Representative Mr. Seki
10:00 - 10:10	Presentation of Outline of JICA study	JICA Study Team, Team Leader Mr. Shinkai Hiroki
10:10 - 10:20	Initial findings on the Road Network in the Greater Kampala Metropolitan Area	JICA Study Team, Team Leader Mr. Shigeru KONDA
10:20 - 10:30	Initial findings on the Public Transport system in the Greater Kampala Metropolitan Area	JICA Study Team, Team Leader Mr. Ohwaki
10:30 - 11:00	Coffee and Tea break	All the Participants
11:00 - 11:30	Explanation of the difference of environmental study between GOU and JICA AND presentation of schedule of environmental study in the study.	JICA Study Team, Team Leader Ms. Minako SATO
11:30 - 12:00	Exchange of opinions on JICA study	All the Participants
12:00 – 12:05	Closing remarks	MOWT Commissioner for Transport, Mr. Wandera
12:05 - 13:30	Lunch	All the Participants

X. PICTURES

	
Opening remarks by Dr. A.O. Mugisa Ag. Engineer in Chief/Director of Engineering	*Greetings by Mr. Seki, Chief Representative JICA Uganda.*
	
Mr. Shinkai, the Team Leader giving the Background and outline of the Study.	*Mr.Konda presenting to members the Initial findings on the Road Network in the GKMA*
	
Mr. Ohwaki makes a presentation on the initial findings on the	*Ms. Minako Sato presenting a comparison of the EIA*

Public Transport System in GKMA	*guidelines between GOU and JICA*
	
MoWT's Dr. Mugisa invites members to contribute or ask questions at the end of the presentations by the Study team.	*A participant makes a contribution to the discussion.*
	
Participants consulting their notes.	*A female participant asks a question on public transport planning.*
	
Mr. Konda responds to a question asked to him and gives an illustration.	*A participant makes a contribution regarding Bus Rapid Transport*

	
A participant contributes to the discussion.	*Closing remarks by Mr. Wandera (Comm. Transport MoWT)*

XI. ATTENDANCE LIST

Grand Imperial Hotel, Date: December 08, 2009

No	Name	Position	Institution/Organization
1	Dr. A.O. Mugisa	Ag. Director of Engineering/Engineer in Chief	MOWT
2	Eng. Mwesigwa Samuel	Town Engineer, Kira	Kira Town Council
3	Kyasanku David	Town Clerk, Nansana	Nansana Town Council
4	Ruth Kijambu	Town Clerk, Kampala	Kampala City Council
5	Benon Kajuna	AC/PP	MOWT
6	Yasushi OHWAKI	MEMBER	JICA STUDY TEAM
7	Shigeru KONDA	MEMBER	JICA STUDY TEAM
8	Masayuki OURA	MEMBER	JICA STUDY TEAM
9	Job Mwesigwa	Town Clerk Entebbe	Entebbe Town Council
10	Brian Oketcho	Rep	Ultimate Consult
11	Kagaba Amos	KCC Division Representative	Makindye Division
12	Mukasa Jane S.	For Chairperson	Mukono District
13	Katungi Alex	KACITA Rep	Kampala District
14	Oidu Kizito Franklin	Rep	UEDCL
15	Victor Ocaya	Rep	World Bank
16	Barisara Mwanje	Rep	Arrive Alive Uganda
17	Mpoza Esau	Local Govt.	Wakiso District
18	Yusuke Haneishi		JICA
19	Steven Ajalu		DANIDA
20	Katamba Fred		Mukono District
21	Hamba Ibrahim		KCC Nakawa Division

No	Name	Position	Institution/Organization
22	David S. Luyimbazi		UNRA
23	Freddie Kasirivu		Buganda Land Board
24	Tom Arakawa		JICA/MOWT
25	Kakeeto JM		MOWT
26	Gubya Phoebe	Rep	KCC
27	Edwin Muhumuza		PPDA
28	Damba Emmanuel	Rep	Nansana Town Council
29	Hiroki Shinkai	TEAM LEADER	JICA STUDY TEAM
30	Tetsuo Seki	Chief Representative	JICA Uganda Office
31	Steven Mondo	Rep	KCC Rubaga Division
32	Godfrey Magala	Japanese Projects Desk	MOWT
33	Monica Seruma		MOWT
34	Bonnie Nsambu	Rep	KCC
35	Ian Barret	Rep	IBIS Transport Consultants
36	C. Nyakwebara	Rep	Uganda Investment Authority
37	Dr. Kiggundu Amin	Dean Rep	Makerere University
38	Godfrey Wandera	Rep	MOWT
39	JJembe Edgar	Rep	KCC Nakawa
40	Kivumbi Apollo	Rep	Kira Town Council
41	Waiswa Naluwairo	Principal Electrical Eng.	KCC
42	Ivan Katamba	Rep	KCC
43	Katushabe Winston	Rep	Transport Licensing Board
44	Mutemo Charles	Rep	MoWT

No	Name	Position	Institution/Organization
45	Stephen Kabuye	Mayor	Entebbe Municipality
46	Busulwa Frank	Rep	KACITA
47	Eng. Pande Michael	Rep	Min. of Land Housing Urban Devt.
48	Katsigane Don	Student Eng.	Makerere University
49	Karuma Kagyina	ASST. Commissioner DUR	MOWT
50	Harriet Bibangambah	Rep	GreenWatch
51	Mukiibi Joseph	Rep	Entebbe Municipal Council
52	Kangave John	Rep	Entebbe Municipal Council
53	Matovu Christopher	Rep	Makerere University
54	Shintaro Takano	Representative	JICA Uganda
55	Eva Nambi	Student	Makerere University
56	Elia Kizito	Researcher	Makerere University
57	Jolly Tusiime	Staff	JICA Study team staff
58	Ken Wasswa	Rep	KACITA
59.	Minako SATO	Member	JICA STUDY TEAM
60.	Mugisa Patrick	Staff	JICA study team Asst
61.	Asaba Charles	Staff	JICA study team Asst
62.	Nakalanzi Sandra	Staff	JICA study team Asst

A7.2 SECOND STAKEHOLDER MEETING

I. OPENING ADDRESS (by Representative of MoWT)

Dr**.** A.O. Mugisa, the Acting Engineer in Chief (MoWT), on behalf of the Ministry of Works and Transport (MoWT), warmly welcomed the members and read out the agenda.

II. GREETING (by Chief Representative of JICA)

Mr. Seki, Chief Representative of JICA Uganda Office, greeted the member present and explained outline of the presentations. He said that the Pre-FS projects selected by the Study Team will definitely contribute to the solution of traffic congestion in Kampala City and Japanese government promise the government of Uganda to support the realization of the Project.

III. WELCOME REMARKS and PRESENTATION

Mr. Hiroki SHINKAI, the **Team Leader** of the Study Team, greeted the members present and gave a brief on the outline of the Study including the process of the work done since the beginning of the study. He noted that the Study was conducted assuming that the BRT project is given conditions for the Study because it is a national core project authorized by the Uganda Government.

He then proceeded with his presentation giving the outline of the Study that was taking place. Main issues highlighted from his presentation included;

IV. PRESENTATIONS

Mr. Hiroki SHINKAI, the **Team Leader** of the Study Team, greeted the members present and introduced himself and gave a brief report on how the Study had progressed up to that point and that it was now being concluded.

He then proceeded to give an outline of the Study that was taking place. The following were the highlights of his presentation;

- Outline of the Study
- Objectives of the Study
- Study area
- Overall work schedule
- Short-listed projects for the pre-feasibility study
- Work flow for selected Pre-FS project
- Public Transport Plan including work flow

Mr. Shigeru KONDA, the **Deputy Leader & Road Planning** of the Study team, greeted the members present and introduced himself and gave a brief status report on the stage where the study has reached i.e the candidate projects that have been shortlisted and therein explaining the exclusion of the JKQ as it is not for grant aid for JICA, the need for finalizing the Draft TOR for the EIA.

He then proceeded with his presentation giving the outline of the Study that was taking place. Main issues highlighted from his presentation included;

- Flow of Pre-Feasibility Study for Priority Projects
- Traffic Survey and Traffic Demand Forecasts
- Review of NTMP/ GKMA (2008-2023)
- Challenges (How to Addressing to Traffic Congestion)
- Coordination with Bus Rapid Transit (BRT) Plan
- Future Traffic Flow Simulation in City Center by BRT
- Pre-Feasibility Study for Priority Projects
- Project Cost Estimate
- Recommended Implementation Schedule for Phase I
- Way Forward

Mr. Iwamoto, made a presentation to the members titled, 'Road traffic safety'.

Key points in his presentation were;

- Background and objectives of the study
- Outline of the Strategic Plan
- Safety Development Programs by Sector
- Proposal on Institutional Capacity Improvement Recommendations.

Mr. Mizuno, the Study team member in charge of **Road Planning**, made a presentation to the members titled, 'Traffic Management'.

Key points in his presentation were;

- Scope of traffic management
- Population and registered vehicles
- Parking in the CBD
- Non motorized transport
- Motorcycles
- other road facilities
- Traffic demand management

- Axle load control
- Technical assistance for traffic lights
- Key issues pointed out by the taskforce team and the Study Team
- Suggested traffix management measures by the Task Force Team
- Recommendations by the Study Team

Mr. Mizuno finalized his presentation on traffic management and then also presented on the outline and method of the EIA/ EI study guidelines under GOU and GOJ as highlighted below:

- EIA Guidelines of GOU and JICA
- Comparison of EIA Guidelines between GOU and JICA
- Screening Methodology and Items

Mr. Ohwaki , the Study team member in charge of **Public Transport Planning**, made a presentation to the members titled, 'Public Transport Plan'.

Key points in his presentation were;

- Issues of Public Transport System
- Basic policy of the Public Transport Plan
- Presumption on BRT Network
- Future Public Transport Demand
- Public Transport network Plan
- Bus Operation Plan
- Institution and Regulation

Mr. Muto, the Study team member in charge of **Public Transport Operation**, made a presentation to the participants titled, 'Inter-Urban Bus Terminal Plan and Infrastructure plan'.

Key points in his presentation were;

- Inter-urban Bus Transport
- Infrastructure Plan

V. QUERIES, QUESTIONS AND DISCUSSION AMONG STAKEHOLDERS

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 by Dr. Mugisa	-		-
General introduction and Mr. Konda	- Mrs. Maggie Kigozi (UIA) do the costs for the IUBT include compensation and land acquisition.	- Mr. Muto replied that the initial estimation does not include compensation because exact locations of the proposed locations is not determined.		-
	- UIA's Maggie Kigozi asks if the internal roads and other junctions are going to be looked at. - Asks for more information/more light regarding BRC	- On why select only a few flyovers selected, Mr. Konda replied that other Projects like BRT will work on other areas and says that even then all the junctions can't be done at once.	- Mr. Jeremy Aguma enlightened that BRT works by using large buses and putting them to use separate lanes outside general traffic. - Mentioned that there is a pilot route from Nambole-city centre-bwaise funded by World Bank. He used the aid of a short presentation.	- Mrs. Maggie Kigozi supplemented that there is a flyover proposed at around Namanve.
	- Mr. Kigumba of KCC wanted to know whether the study team has been in contact with KCC	- Mr. konda on the structure plan, said that the current KCC structure plan is not		-

	regarding the development of such infrastructure and plans	workable in Kampala at the moment.		
	- Mr. David MOLG had a query especially regarding mushrooming petrol stations and their significance to congestion.	- Mr. Konda explained to him why i.e. to give input and then to report output.	-	-
Traffic safety plans	- Babara Mwanje (Arive alive) asks about road safety features expected to be seen on the pre-feasibility projects. - Viability of pedestrian bridge (economics of time and distance vs safety)	- Iwamoto says installation of fence to compel pedestrians to use the pedestrian bridges.		-
	- Mr. Charles says there is need for vehicle insurance and issues regarding Third party, etc	- Concurred that there was a need for vehicle insurance.		-
	- Desire (Mukono TC) pedestrian bridges and need for lighting & security on such bridges.	- Mr. konda says lighting will be considered in the Feasibility stage.	-	-
Traffic Management Plan	- Mrs. Maggie asks about the role of the private sector to come in.	- Mr. konda acknowledged the need of the private sector to provide facilities, buses, investment in parking structures e.t.c and the government should also be able to provide assistance.	- The chairman asked when would construction be likely to start because GOU needs some time to include in the budget.	-

	- Mr. Asuman UIA, shall we need a revision of the law(s) regarding traffic	- Mr. Konda explained to him why i.e. to give input and then to report output.	- Mr. Wandera (MOWT) gave more light on BRT & NTP/GKMA and the stage it has reached and the agencies/departments and	-
Environmental considerations.	- Mrs. Phoebe more attention and more light regarding issues like drainage vis a vis environment (mud & dust)	- Mr. Konda said that drainage is an important aspect of road service life and that it cannot be overlooked in design but added that cooperation with authorities and networking with drainage systems like Nakivubo channel were important.		-
Public transport	- Mr….(World bank) on requirement of ROW for widening, should be a process that starts early.	- Mr. Konda answered that ROW is a key issue and that it has been considered.	-	-
	- A participant said that the local communities need more sensitization on the above projects in order to address things like, support & other social issues etc.	- Mr. Muto said it is important and that is one of the reason why public workshops and consultations have been held.	-	-
	- Godfrey Kiseka Town Clerk, wakiso, how does BRT connect to railways. - Also the role of local	- Agreed that the local authorities need to be involved.	- Dr. Mugisa supplemented that this study and that of BRT have at all stages involved the local	-

	governments, and physical planners in Town council needs to be clearly mentioned and officers involved.		governments that fall within GKMA. - On connection to rail of BRT he replied that there were currently no plans.	
	- Town clerk Nansana, why should the west bound terminal be in Nabweru, said that there is more demand in Nansana.	- Mr. Muto there was smaller demand on Hoima road compared to the other upcountry routes that had been selected.	-	-

VI. CONCLUSIONS AND RECOMMENDATIONS

A wrap up of the presentations was given by Mr. Shinkai, the Team leader. On behalf of the study team, he concluded that:

- All projects are economically feasible with high EIRRs of more than 20%.
- He also recommended that Pre-FS projects (Jinja flyover, Mukwano Road Widening and Clock Tower Junctions improvement) should be implemented as one package and completed in the medium term (2018).

VII. CLOSING REMARKS

Mr. Jerry Burton of UNRA made closing remarks on behalf of MOWT. In all, he thanked GOJ through JICA for funding the study adding that he was happy with the presentations and discussions which had been held at the 2nd stakeholder/2nd Workshop.

He personally thanked the study team for the effort that they had put into the study and all efforts to realize the outcomes of the study especially the matter of multi component proposals for traffic safety and management, Public transport and actual road junction improvement projects.

He emphasized the need for high political and government level support.

The chairman then closed the meeting at 1: 30Pm

VIII. AGENDA

THE STUDY ON GREATER KAMPALA ROAD NETWORK AND TRANSPORT IMPROVEMENT IN THE REPUBLIC OF UGANDA

THE 2nd STAKEHOLDER MEETING / THE 2nd WORKSHOP

DATE: 26 AUGUST 2010
VENUE: GRAND IMPERIAL HOTEL

AGENDA:

9.00 – 9.30 Registration

9.30 – 9.40: Opening Address by Representative of MoWT

9.40 – 9.45: Greeting by Chief Representative of JICA Uganda Office (Mr. T. Seki)

9.45 – 10.00: Welcome Remarks and Outline of the Study by Team Leader of JICA Study Team (Mr. Shinkai)

10.00 – 10:40: **Session 1: Pre-Feasibility Study** including;

- Traffic survey and Future Traffic Demand Forecast
- Preliminary Design including Alternative Route and Structure Plans
- Implementation Plan for Priority Projects

(Mr. Konda and Mr. Mizuno)

10.40 – 11.00: Discussion

11.00 – 11.15: Coffee Break

11.15 – 11.40: **Session 2: Road Safety Plan and Traffic Management** including;

- Road Safety Improvement Development and Action Plan
- Traffic Management Plan including Environmental Consideration

(Mr. Mizuno and Mr. Iwamoto)

11.40 – 12.00: Discussion

12.00 – 12.30: **Session 3: Public Transport Plan** including;

- Public Transport Future Traffic Demand
- Public Transport Plan in the Medium and Long Terms
- Infrastructure Plan of Bus Operation

(Mr. Ohwaki and Mr. Muto)

12.30 – 12.50: Discussion

12.50 – 13.00: Conclusion and Recommendations (Team Leader/Mr. Shinkai)

13.00 – 13.10: Closing Remarks and Closing by Representative of MoWT

13.10 – 14.00: Lunch

IX. PICTURES

<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Participants arrive and Register for the stakeholder/Workshop</td><td>Opening remarks by Dr. A.O. Mugisa Ag. Engineer in Chief/Director of Engineering</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Greetings by Mr. Seki, JICA chief Representative in Uganda.</td><td>Mr. Shinkai, the Team Leader giving the Background and outline of the Study.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Mr.Konda presenting to members the Kampala Metropolitan area</td><td>Mrs. Maggie Kigozi of UIA asks a question regarding the proposed Pre-Feasibility flyover projects.</td></tr>
</table>

	
Mr. Jeremy from UNRA supplements/gives explanation to members on BRT	*Mr. Iwamoto presents his paper on Traffic safety plan.*
	
Mr. Mizuno presents on Traffic Management plan and also a comparison of the EIA guidelines between GOU and JICA	*Mr. Muto presents a paper on Public Transport plan (part 1)*
	
Members attentively listening to presentations by the Study team Member	*A participant from asks for a clarification on KCC's structural plan.*

	
A question is asked to Mr. Iwamoto (traffic safety plan)	*Closing remarks by Mr. Jerry Burton of UNRA*

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4	Gitta Ronnie	Student		
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13	Hisashi Muto	Member (Public Transport Operation)	JICA STUDY TEAM	
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27	Masae IIJIMA	PFA	JICA	0775-955925
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29	Boaz Namanya		City Cargo (u) Ltd	0702-509617
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36	Kagwisa James		Ministry of Lands Housing and Urban Devt.	0772-391713
37	Godfrey Magala	Japanese Projects Desk	MOWT	0752-642839
38	Ninsima Louisa	Student	Uganda Christian University, Mukono	0782-076162
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42	Shigeru KONDA	Member (Road Planning I)	JICA STUDY TEAM	
43	Akihiro Sanpei	Member (Traffic Signal maintenance)	JICA STUDY TEAM	
44	Satoshi MIZUNO	Member (Road Planning II/ Traffic Mgt.)	JICA STUDY TEAM	
45	Atuhairwe Stephen	Student	Makerere University	
46	Birungi Joanita	Student	Makerere University	
47	Maggie Kigozi	Executive Director	Uganda Investment Authority	
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57	Kayiwa Jackson	Student	Uganda Christian University Mukono	0771-833522
58	Kawalya Ivan	Student	Makerere University	0757-406351
59	Kawalya Brian	Student	Makerere University	0752-884165
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77	Mutegeki Robert		JICA STUDY TEAM	0772-619368
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90	Arinaitwe Andrew		JICA STUDY TEAM	0702-302146
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ANNEX 8 PRELIMINARY STUDY ON THE KIBUYE ROUNDABOUT IMPROVEMENT

ANNEX 8 PRELIMINARY STUDY ON THE KIBUYE ROUNDABOUT IMPROVEMENT

A8.1 OBJECTIVES OF THE KIBUYE ROUNDABOUT IMPROVEMENT STUDY

The Kibuye Roundabout, where Entebbe Road and Masaka Road meet, is located at the southern and western main entrance of the CBD. This is also located along the international corridor of A109. This intersection was improved using a grant aid of the GOJ in 1998-2000. However, congestion became very serious due to high traffic volume increase recently. The major causes of traffic congestion are as follows:

- Insufficient capacity
- Irregular intersection configuration where five roads (Queen's Way, Katwe Road, Masaka Road, Entebbe Road and Makindye Road) meet at this roundabout. In addition, the Salama Road "T" junction is located approximately 200 m away from the roundabout.
- Kibuye Market and a fuel stand located at the corner of Masaka and Entebbe Roads.
- Railway underpass crossing near the roundabout.

Taking requests from MoWT, the Study Team conducted a preliminary study on the improvement of the Kibuye Roundabout congestion. This is a study to provide results and suggestions for the feasibility study stage.

A8.2 EXISTING ROAD AND ROUNDABOUT CONDITIONS

(1) Existing Road Conditions

Road & Land Use	Road Condition	Outline Map
Queen's Way Residential Area ROW of Railways	● One-way operation ● Single carriageway ● 7.0 m carriageway width	
Katwe Commercial Area Light Industry	● Dual carriageway ● 5.0 – 6. 0 m width (narrow) x 2	
Masaka Light Industry Commercial and Kibuye Market	● Single carriageway ● 7.0 m carriageway width	
Entebbe Residential Area	● Dual carriageway ● 7.0 m carriageway x 2	
Makindye Residential Area	● Single carriageway ● 6.0 m carriageway width	

Figure A8.2.1 Existing Road and Roundabout Conditions

(2) Existing Roundabout Condition (Level of Service)

Both non-interrupted and interrupted flow sections exist on road. The former means high class roads (i.e. highway) which are applied an access control, while the latter means low class roads which are provided access to each road. Traffic congestion and delay on interrupted flow sections are usually caused by the existence of an intersection and/or a roundabout. According to the Highway Capacity Manual (HCM), the level of service (LOS) for a roundabout is determined by the computed or measured control delay* and defined for each lane. LOS is not defined for the intersection as a whole. LOS criteria are given in the table below.

Table A8.2.1 Level-of-Service Criteria for Roundabouts

Level of Service (LOS)	Average Control Delay* (s/veh)
A	0 - 10
B	10 - 15
C	15 - 25
D	25 - 35
E	35 - 50
F	>50

Note: *Delay: Defined as a time lag between non-interrupted flow (case of no interrupting facilities such as intersection) and interrupted flow.

The Study Team computed LOS based on existing traffic volume. In the morning peak hour (7:00 to 8:00), LOS of Entebbe Road and Masaka Road were categorized into level "F". The average of LOS with all legs was also categorized into level "F". In the evening peak hour (18:00 to 19:00), the situation of traffic jam becomes worse. LOS of Entebbe Road, Masaka Road, Queen's Way and Makindye Road were categorized into level "F". The average of intersection delay with all legs was about three times compared to that of morning peak hour. HCM recommends at least level "C" in urban areas.

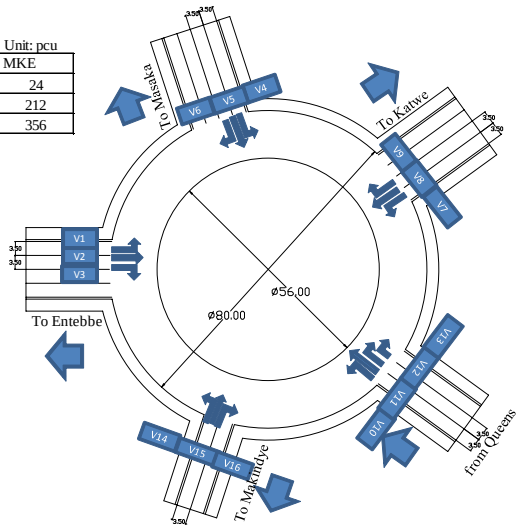
Name of Roundabout: Kibuye Roundabout (No.3)
Peak Hour: 7:00 - 8:00 (Weekday : Average of 2days survey)

Unit: pcu

	EE		MSE		KE		QE		MKE	
LT: Left Turn	V1	106	V4	365	V7	60	V10	120	V14	24
TH: Through	V2	1138	V5	75	V8	111	V11	391	V15	212
RT: Right Turn	V3	146	V6	142	V9	97	V12	171	V16	356
							V13	38		

Entry Flow	Entry Volume		
V_{EL}	106 + 589	=	695
V_{ER}	146 + 549	=	695
V_{MSL}	75 + 216	=	291
V_{MSR}	142 + 149	=	291
V_{KL}	60 + 74	=	134
V_{KR}	97 + 37	=	134
V_{QL}	120 + 240	=	360
V_{QR}	171 + 38 + 151	=	360
V_{MK}	24 + 212 +356	=	592

Conflicting Flow	Conflicting Flow (Vc)		
Vce	V9+V12+V13+V15+V16	=	874
Vcms	V2+V3+V13+V16	=	1678
Vck	V3+V5+V6	=	363
Vcq	V3+V5+V6+V7+V8+V9	=	631
Vmk	V6+V8+V9+V12+V13	=	559



	EEL	EER	MSEL	MSER	KEL	KER	QEL	QER	MKE
Entry Volume: puc/hr	695	695	291	291	134	134	360	360	592
Conflicting Flow	874	874	1678	1678	363	363	631	631	559
Critical Capacity: pcu/hr	560	560	272	272	887	887	697	697	744
V/C ratio	1.241	1.241	1.071	1.071	0.151	0.151	0.516	0.516	0.796
Control delay*: sec/veh	141.4	141.4	110.8	110.8	4.8	4.8	10.5	10.5	20.9
LOS	F	F	F	F	A	A	B	B	C
Approach control delay	141.4		110.8		4.8		10.5		20.9
Intersection delay	61.8								
95th% queue: veh	26.64	26.64	11.72	11.72	0.53	0.53	2.99	2.99	8.18

*15-min analysis: T=0.25

Figure A8.2.2 LOS at Kibuye Roundabout (Peak Hour in the Morning)

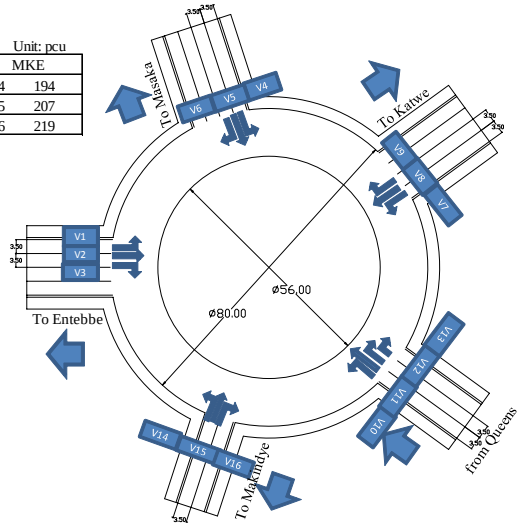
Name of Roundabout: Kibuye Roundabout (No.3)
Peak Hour: 18:00 - 19:00 (Weekday : Average of 2days survey)

Unit: pcu

	EE		MSE		KE		QE		MKE	
LT: Left Turn	V1	142	V4	324	V7	261	V10	213	V14	194
TH: Through	V2	1336	V5	167	V8	147	V11	639	V15	207
RT: Right Turn	V3	238	V6	366	V9	127	V12	218	V16	219
							V13	42		

Entry Flow	Entry Volume		
V_{EL}	142 + 716	=	858
V_{ER}	238 + 620	=	858
V_{MSL}	324 + 105	=	429
V_{MSR}	167 + 262	=	429
V_{KL}	147 + 121	=	268
V_{KR}	127 + 141	=	268
V_{QL}	213 + 343	=	556
V_{QR}	218 + 42 + 296	=	556
V_{MK}	194 + 207 + 219	=	620

Conflicting Flow	Conflicting Flow (Vc)		
Vce	V9+V12+V13+V15+V16	=	813
Vcms	V2+V3+V13+V16	=	1835
Vck	V3+V5+V6	=	771
Vcq	V3+V5+V6+V7+V8+V9	=	1306
Vmk	V6+V8+V9+V12+V13	=	900



	EEL	EER	MSEL	MSER	KEL	KER	QEL	QER	MKE
Entry Volume: puc/hr	858	858	429	429	268	268	556	556	620
Conflicting Flow	813	813	1835	1835	771	771	1306	1306	900
Critical Capacity: pcu/hr	592	592	236	236	615	615	380	380	547
V/C ratio	1.450	1.450	1.817	1.817	0.435	0.435	1.464	1.464	1.133
Control delay*: sec/veh	226.6	226.6	414.1	414.1	10.3	10.3	245.0	245.0	101.7
LOS	F	F	F	F	B	B	F	F	F
Approach control delay	226.6		414.1		10.3		245.0		101.7
Intersection delay	210.4								
95th% queue: veh	41.11	41.11	29.52	29.52	2.20	2.20	29.18	29.18	20.46

*15-min analysis: T=0.25

Figure A8.2.3 LOS at Kibuye Roundabout (Peak Hour in the Evening)

Note: The traffic flow and volume at Kibuye Roundabout is based on the traffic survey carried out on June 18 (Friday) and 21 (Monday), 2010.

A8.3 ALTERNATIVES AND OPTIONS FOR IMPROVEMENT

(1) Concept of Improvement

There are generally four types of junctions, namely non-signalized intersection, signalized intersection, roundabout and signalized roundabout. The improvement of junction should be analyzed through the following steps with traffic volume increase.

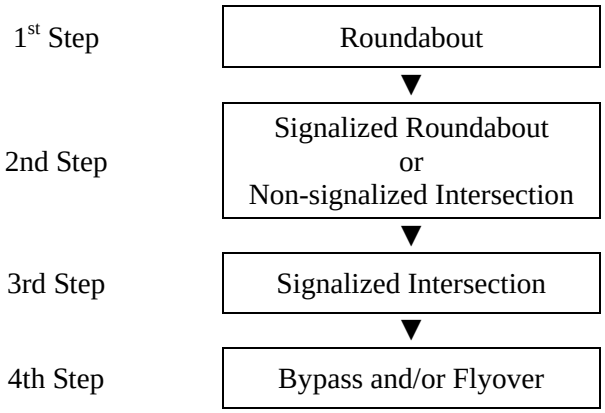


Figure A8.3.1 Steps for Junction Improvement

Since the configuration of Kibuye Roundabout is categorized in the 1st step, analysis should be started from the 2nd step.

In addition, as discussed in this report, the BRT will be introduced on Masaka Road, Entebbe Road, Queen's Way (and/or Katwe Road) in the near future. Hence, both improvement of the existing chaotic situation and the future traffic flow in consideration of BRT should be addressed.

(2) Improvement Responding to the Existing Condition

For the first trail, the possibility of signalized roundabout is checked in accordance with the above mentioned flow for junction improvement. A signalized junction is normally evaluated by use of saturation degree, as follows:

Table A8.3.1 Evaluation of Signalized Junction by Saturation Degree

Saturation Degree	Situation
0.8 > S	Desirable Situation
0.8 ≤ S ≤ 1.0	Acceptable Situation
1.0 < S	Capacity Shortage (Bottleneck)

In case that the existing roundabout is controlled by traffic signals, the result of computation of the saturation degree is 1.37, as follows:

Name of Intersection: Kibuye Roundabout
Peak Hour: 18:00 - 19:00 (Weekday : Average of 2days survey)
Scale of Intersection: Large (K= -)
Number of Pedestrian: Small (f_L= -)

Approach		A		B		C		D	E			
		from Masaka Rd		from Katwe Rd		from Queens		Makindye	From Entebbe			
		LT	RT	LT+TR	TR+RT	LT	TR+RT	LT+TR+RT	LT+TR	TR+RT		
Number of Lane		1	1	1	1	1	1	1	1	1		
Basic value of saturation flow rate		2000	2000	2000	2000	2000	2000	2000	2000	2000		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Lane width: m)		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Gradient: %)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of large vehicle: %)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of left turn: %)		-	-	-	-	-	-	-	-	-		
(E_{LT})		-	-	-	-	-	-	-	-	-		
Reduction Coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of right turn: %)		-	-	-	-	-	-	-	-	-		
(Probability of right turn: f)		-	-	-	-	-	-	-	-	-		
Saturation flow ratio		2000	2000	2000	2000	2000	2000	2000	2000	2000		
Traffic volume (pcu/hr)		429	429	268	268	556	556	620	858	858		
(Left turn or Right turn)		-	-	-	-	-	-	-	-	-		
Flow ratio		0.21	0.21	0.13	0.13	0.28	0.28	0.31	0.43	0.43	λi	Σλ
Phase ratio	phase-1	0.21	0.21	-	-	-	-	-	-	-	0.21	
	phase-2	-	-	0.13	0.13	-	-	-	-	-	0.13	
	phase-3	-	-	-	-	0.28	0.28	-	-	-	0.28	1.37
	phase-4	-	-	-	-	-	-	0.31	-	-	0.31	
	Phase-5	-	-	-	-	-	-	-	0.43	0.43	0.43	

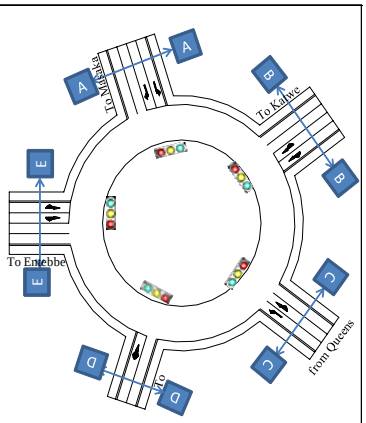


Figure A8.3.2 Computed Result of Saturation Degree (Signalized Roundabout)

This result indicates that analysis should move to the next step because control by signalized roundabout is impossible.

In the next step, the existing roundabout is converted to a signalized intersection. In this case, no additional ROW is required. The result of computation of the saturation degree is 0.76, as follows:

Name of Intersection: Kibuye Roundabout
Peak Hour: 18:00 - 19:00 (Weekday : Average of 2days survey)
Scale of Intersection: Large (K=3)
Number of Pedestrian: Small (f_L=0.85)

Approach		A from Masaka Rd		B from Katwe Rd		C from Queens Rd			D from Entebbe	
		LT	RT	TR	RT	LT	TR	RT	LT	TR
Number of Lane		1	1	1	1	1	2	1	1	2
Basic value of saturation flow rate		1800	1800	2000	1800	1800	2000	1800	1800	2000
Reduction coefficient (Lane width: m)		1.00 (3.25)	1.00 (3.25)	1.00 (3.5)	1.00 (3.25)	1.00 (3.5)	1.00 (3.5)	1.00 (3.25)	1.00 (3.5)	1.00 (3.5)
Reduction coefficient (Gradient: %)		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)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Reduction coefficient (Share of left turn: %)		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
(E_{LT})		-	-	-	-	-	-	-	-	-
(Effective green time: sec)		-	-	-	-	-	-	-	-	-
(Green time for pedestrian: sec)		-	-	-	-	-	-	-	-	-
Adjustment coefficient by pedestrian: fl		0.85	-	-	-	0.85	-	-	0.85	-
Reduction Coefficient (Share of right turn: %)		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
(Probability of right turn: f)		-	-	-	-	-	-	-	-	-
(Effective green time: sec)		-	-	-	-	-	-	-	-	-
(No. of right turn for transition time: K)		-	-	-	-	-	-	-	-	-
Saturation flow ratio		1800	1800	2000	1800	1800	4000	1800	1800	4000
Traffic volume (pcu/hr)		324	533	408	127	852	218	42	142	1336
(Left turn or Right turn)		324	533	-	127	852	-	42	142	-
Flow ratio		-	0.30	0.20	0.07	-	0.05	0.02	-	0.33
Phase ratio	phase-1	-	-	-	-	-	0.05	-	-	-
	phase-2	-	0.30	-	-	-	-	0.02	-	-
	phase-3	-	-	0.20	-	-	-	-	-	0.33
	phase-4	-	-	-	0.07	-	-	-	-	-

λi	Σλ
0.05	0.76
0.30	
0.33	
0.07	

Note: Connectable road from Makindye road is only Entebbe road. And Connectable road to Makindye is only Queen's wway.

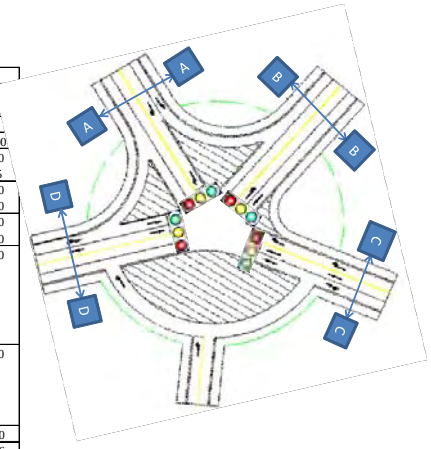


Figure A8.3.3 Computed Result of Saturation Degree (Signalized Intersection)

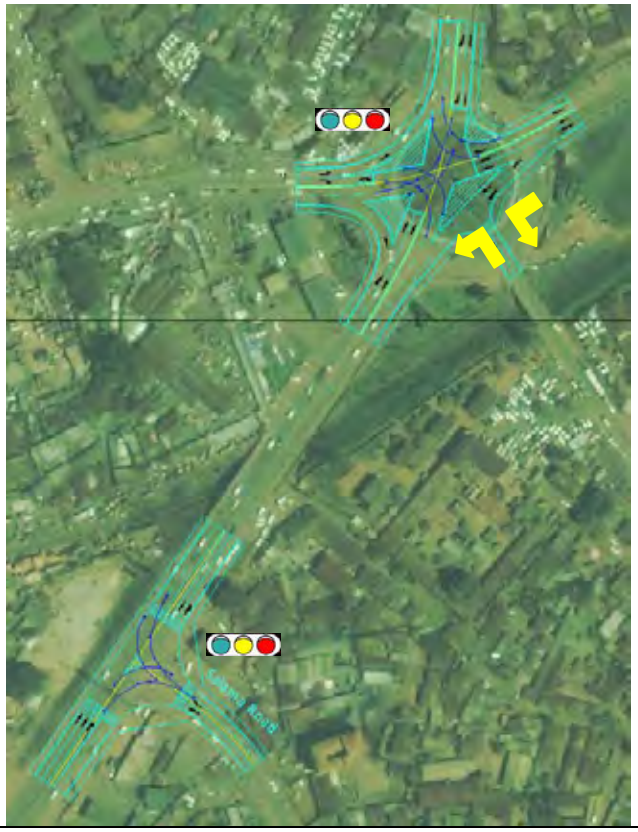
This result indicates that control by means of a signalized intersection is an efficient way for alleviating the chaotic traffic jam. However, note that this result is derived under the following assumptions and conditions.

The control of the existing 5-leg by traffic signal has trouble from the viewpoint of intersection capacity, signal operation and traffic safety. Therefore, the following regulation is imposed for Makindye Road:

- Inflow to Makindye Road is only from Queen's Way.
- Outflow from Makindye Road is only to Entebbe Road.

Instead of this regulation, **Salama Intersection is improved together with Kibuye Roundabout** to secure alternative routes for the existing traffic flow and circulation.

Note: This is planned based on the assumption that a BRT station is not located near the Salama Road Junction.



With the conditions mentioned above, both conversion of the existing configuration and view of traffic management, including the improvement of Salama Intersection, are required for the decongestion of Kibuye Roundabout.

(3) Improvement Responding to Future Traffic Demand

The BRT will be introduced on Masaka Road, Entebbe Road, Queen's Way (and/or Katwe Road) in the near future. Consequently, future traffic flow and circulation will be dramatically changed by some regulation for BRT operation. Future traffic demand is forecasted as the premise for the introduction of BRT in this Study. Hence in this sub-chapter, the improvement of Kibuye intersection (after introduction of BRT) is addressed based on following conditions:

- BRT is introduced on Masaka Road, Entebbe Road and Queen's way.
- BRT station is located at the inflow side of Queen's Way.
- Forecast year is 2023.

In addition to the precondition mentioned above, the following two scenarios were considered:

Scenario-1: Existing one-way operation on Queen's Way will be kept up in the future.

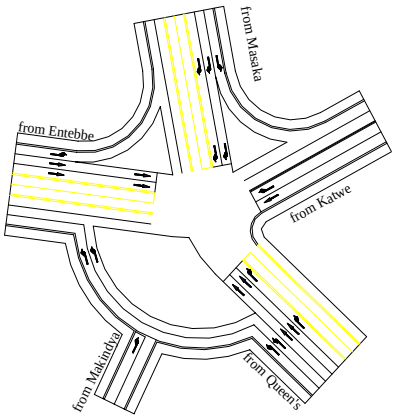
Scenario-2: Existing one-way operation on Queen's Way will be changed to two-way operation for both sides in the future.

The results of the computation are as follows:

Scenario-1: One-way operation case of Queen's way

Name of Intersection: Kibuye Roundabout
Year: 2023 with the BRT
Scale of Intersection: Large (K=3)
Number of Pedestrian: Large (f_L=0.50)

Approach		A		B		C			D			
		from Masaka Rd		from Katwe Rd		from Queens Rd			from Entebbe Rd			
		LT	RT	TR	RT	LT	TR	RT	LT	TR		
Number of Lane		1	2	1	1	2	2	1	1	2		
Basic value of saturation flow rate		1800	1800	2000	1800	1800	2000	1800	1800	2000		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Lane width: m)		3.25	3.25	3.5	3.25	3.5	3.5	3.25	3.5	3.5		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Gradient: %)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of large vehicle: %)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of left turn: %)		-	-	-	-	-	-	-	-	-		
(E_{LT})		-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-		
(Green time for pedestrian: sec)		-	-	-	-	-	-	-	-	-		
Adjustment coefficient by pedestrian: fl		0.50	-	-	-	0.50	-	-	0.50	-		
Reduction Coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of right turn: %)		-	-	-	-	-	-	-	-	-		
(Probability of right turn: f)		-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-		
(No. of right turn for transition time: K)		-	-	-	-	-	-	-	-	-		
Saturation flow ratio		1800	3600	2000	1800	3600	4000	1800	1800	4000		
Traffic volume (pcu/hr)		1437	1321	645	289	1478	725	0	1875	2094		
(Left turn or Right turn)		1437	1321	-	289	1478	-	0	1875	-		
Flow ratio		-	0.37	0.32	0.16	-	0.18	0.00	-	0.52	λi	Σλ
Phase ratio	phase-1	-	-	-	-	-	0.18	-	-	-	0.18	1.23
	phase-2	-	0.37	-	-	-	-	0.00	-	-	0.37	
	phase-3	-	-	0.32	-	-	-	-	-	0.52	0.52	
	phase-4	-	-	-	0.16	-	-	-	-	-	0.16	



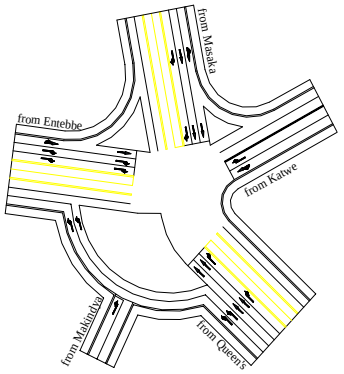
Note: Connectable road from Makindye road is only Entebbe road. And Connectable road to Makindye is only Queen's wway.

Figure A8.3.4 Computed Result of Saturation Degree (Scenario-1)

Scenario-2: Two-way operation case of Queen's way

Name of Intersection: Kibuye Roundabout
Year: 2023 with the BRT
Scale of Intersection: Large (K=3)
Number of Pedestrian: Large (f_L=0.50)

Approach		A			B		C			D				
		from Masaka Rd			from Katwe Rd		from Queens Rd			from Entebbe Rd				
		LT	TR	RT	LT+TR	RT	LT	TR	RT	LT	TR	RT		
Number of Lane		1	2	1	1	1	2	2	1	1	1	2		
Basic value of saturation flow rate		1800	2000	1800	2000	1800	1800	2000	1800	1800	2000	1800		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Lane width: m)		3.25	3.25	3.25	3.25	3.25	3.5	3.5	3.25	3.5	3.5	3.25		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Gradient: %)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of large vehicle: %)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of left turn: %)		-	-	-	-	-	-	-	-	-	-	-		
(E_{LT})		-	-	-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-	-	-		
(Green time for pedestrian: sec)		-	-	-	-	-	-	-	-	-	-	-		
Adjustment coefficient by pedestrian: fl		0.50	-	-	0.50	-	0.50	-	-	0.50	-	-		
Reduction Coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of right turn: %)		-	-	-	-	-	-	-	-	-	-	-		
(Probability of right turn: f)		-	-	-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-	-	-		
(No. of right turn for transition time: K)		-	-	-	-	-	-	-	-	-	-	-		
Saturation flow ratio		1800	4000	1800	2000	1800	3600	4000	1800	1800	2000	3600		
Traffic volume (pcu/hr)		570	1555	1174	402	163	1922	1079	0	1285	1369	1716		
(Left turn or Right turn)		570	-	1174	3	163	1922	-	0	1285	-	1716		
Flow ratio		-	0.39	0.65	0.20	0.09	-	0.27	0.00	-	0.68	0.48	λi	Σλ
Phase ratio	phase-1	-	0.39	-	-	-	-	0.27	-	-	-	-	0.39	2.20
	phase-2	-	-	0.65	-	-	-	-	0.00	-	-	-	0.65	
	phase-3	-	-	-	0.20	-	-	-	-	-	0.68	-	0.68	
	phase-4	-	-	-	-	0.09	-	-	-	-	-	0.48	0.48	



Note: Connectable road from Makindye road is only Entebbe road. And Connectable road to Makindye is only Queen's wway.

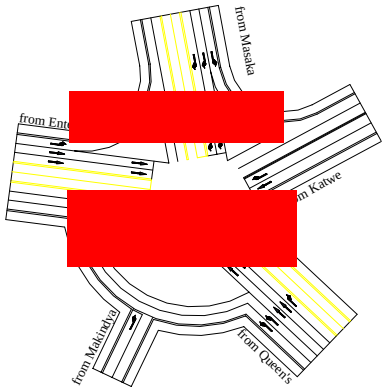
Figure A8.3.5 Computed Result of Saturation Degree (Scenario-2)

From the computed results, Kibuye Intersection might revert back to a bottleneck point because saturation degrees were 1.23 and 2.20 under Scenario-1 and Scenario-2, respectively. In such case, increasing traffic capacity by means of flyover construction is one of effective measures for decongestion. Generally, flyovers should be built on the critical direction (more traffic flow). From this viewpoint, a flyover for Scenario-1 should be built between Entebbe Road and Katwe Road for both directions. On the other hand, the flyover for Scenario-2 should be built between Entebbe Road and Queen's Way for only one direction with 2-lane.

Improvement effects by flyover construction with respect to the saturation degree are shown on the following figures.

Name of Intersection: Kibuye Roundabout
Year: 2023 with the BRT
Scale of Intersection: Large (K=3)
Number of Pedestrian: Large (f_L=0.50)

Approach		A		B		C			D			
		from Masaka Rd		from Katwe Rd		from Queens Rd			from Entebbe Rd			
		LT	RT	TR	RT	LT	TR	RT	LT	TR		
Number of Lane		1	2	1	1	2	2	1	1	2		
Basic value of saturation flow rate		1800	1800	2000	1800	1800	2000	1800	1800	2000		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Lane width: m)		3.25	3.25	3.5	3.25	3.5	3.5	3.25	3.5	3.5		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Gradient: %)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of large vehicle: %)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of left turn: %)		-	-	-	-	-	-	-	-	-		
(E_{LT})		-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-		
(Green time for pedestrian: sec)		-	-	-	-	-	-	-	-	-		
Adjustment coefficient by pedestrian: fl		0.50	-	-	-	0.50	-	-	0.50	-		
Reduction Coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of right turn: %)		-	-	-	-	-	-	-	-	-		
(Probability of right turn: f)		-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-		
(No. of right turn for transition time: K)		-	-	-	-	-	-	-	-	-		
Saturation flow ratio		1800	3600	2000	1800	3600	4000	1800	1800	4000		
Traffic volume (pcu/hr)		1437	1321	-555	289	1478	725	0	1875	894		
(Left turn or Right turn)		1437	1321	-	289	1478	-	0	1875	-		
Flow ratio		-	0.37	-0.28	0.16	-	0.18	0.00	-	0.22	λi	Σλ
Phase ratio	phase-1	-	-	-	-	-	0.18	-	-	-	0.18	0.93
	phase-2	-	0.37	-	-	-	-	0.00	-	-	0.37	
	phase-3	-	-	0.00	-	-	-	-	-	0.22	0.22	
	phase-4	-	-	-	0.16	-	-	-	-	-	0.16	
Flyover				1200						1200		



Note: Connectable road from Makindye road is only Entebbe road. And Connectable road to Makindye is only Queen's wway.

Figure A8.3.6 Computed Result of Saturation Degree (Scenario-1 with Flyover)

Name of Intersection: Kibuye Roundabout
Year: 2023 with the BRT
Scale of Intersection: Large (K=3)
Number of Pedestrian: Large (f_L=0.50)

Approach		A			B		C			D				
		from Masaka Rd			from Katwe Rd		from Queens Rd			from Entebbe Rd				
		LT	TR	RT	LT+TR	RT	LT	TR	RT	LT	TR	RT		
Number of Lane		1	2	1	1	1	2	2	1	1	2	1		
Basic value of saturation flow rate		1800	2000	1800	2000	1800	1800	2000	1800	1800	2000	1800		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Lane width: m)		3.25	3.25	3.25	3.25	3.25	3.5	3.5	3.25	3.5	3.5	3.25		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Gradient: %)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of large vehicle: %)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Reduction coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of left turn: %)		-	-	-	-	-	-	-	-	-	-	-		
(E_{LT})		-	-	-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-	-	-		
(Green time for pedestrian: sec)		-	-	-	-	-	-	-	-	-	-	-		
Adjustment coefficient by pedestrian: fl		0.50	-	-	0.50	-	0.50	-	-	0.50	-	-		
Reduction Coefficient		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
(Share of right turn: %)		-	-	-	-	-	-	-	-	-	-	-		
(Probability of right turn: f)		-	-	-	-	-	-	-	-	-	-	-		
(Effective green time: sec)		-	-	-	-	-	-	-	-	-	-	-		
(No. of right turn for transition time: K)		-	-	-	-	-	-	-	-	-	-	-		
Saturation flow ratio		1800	4000	1800	2000	1800	3600	4000	1800	1800	4000	1800		
Traffic volume (pcu/hr)		570	1555	1174	402	163	1922	1079	0	1285	1369	-684		
(Left turn or Right turn)		570	-	1174	3	163	1922	-	0	1285	-	1716		
Flow ratio		-	0.39	0.65	0.20	0.09	-	0.27	0.00	-	0.34	-0.38	λi	Σλ
Phase ratio	phase-1	-	0.39	-	-	-	-	0.27	-	-	-	-	0.39	1.47
	phase-2	-	-	0.65	-	-	-	-	0.00	-	-	-	0.65	
	phase-3	-	-	-	0.20	-	-	-	-	-	0.34	-	0.34	
	phase-4	-	-	-	-	0.09	-	-	-	-	-	0.00	0.09	
Flyover												2400		

Note: Connectable road from Makindye road is only Entebbe road. And Connectable road to Makindye is only Queen's wway.

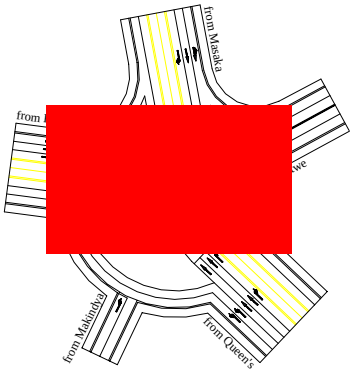


Figure A8.3.7 Computed Result of Saturation Degree (Scenario-2 with Flyover)

In the case of Kibuye Intersection, the flyover connecting Entebbe Road and Katwe Road is the most effective measure. Note that control of the existing 5-leg by traffic signal has a problem from the viewpoint of intersection capacity as previously mentioned. These computations are based on the following preconditions:

- Inflow to Makindye Road is only from Queen's Way.
- Outflow from Makindye Road is only to Entebbe Road.

Instead of this regulation, **Salama Intersection is improved together with Kibuye Roundabout** to secure alternative routes for existing traffic flow and circulation.

Figure A8.3.8 Image for Improvement of Kibuye Roundabout in 2023

However, the flyover should be a separated bridge to avoid conflict with BRT. In addition, the area along Entebbe Road and Katwe Road is built-up. For this reason, a large number of resettlements and substantial compensations will become necessary, especially along Katwe Road.

Given these situations, it is concluded that the Kibuye Roundabout Flyover Plan for traffic decongestion should be forwarded to the feasibility study stage in conjunction with the BRT Plan and land acquisition plan.

A8.4 RECOMMENDATIONS

(1) Dual Carriageway with Railway Viaduct in NTMP/GKMA

NTMP/GKMA planned a dual carriageway with railway viaduct (the original plan). The viaduct starts just before Africana Roundabout on Jinja Road and crosses over MoWT Central Workshop and railway lines to Jinja and Port Bell. Then, it runs along Mukwano Road, Nsambya Road and Queen's Way, and then ends before Kibuye Roundabout. The objective of the project aims to relieve congestion in the city center. However, since the viaduct starts at Jinja Road and ends before Kibuye Roundabout along Queen's Way and the direct through-traffic between Jinja Road and Queen's Way is not considerable, its effectiveness would also be limited. Thus, it is expected to absorb traffic from Yusufu Lule Road, Gaba Road and Mengo Hill Road.

(2) Kibuye Roundabout Improvement as a Part of Jinja Rd – Kibuye Rbt Viaduct in NTMP/GKMA

Since no BRT concept plan was studied in NTMP/GKMA, the original viaduct plan had not yet considered the influence of BRT, especially at Jinja and Africana Junctions (BRT Lines A1 and A2) and between Clock Tower and Kibuye Roundabout (BRT Lines B1 and B2).

Taking the above condition into account, the Study Team has planned a modified viaduct plan to overcome the disadvantages of the original plan. The recommended concepts to reduce project costs and at the same time, keeping better functions and ensuring coordination with the BRT plan are as follows:

- A combination of flyovers and at-grade sections (refer to Figures A8.4.1 and A8.4.2)

  ① Mukwano Road – Jinja Road Right Turn Ramp Flyover

  ② Mukwano / Kibuli / Nsambya Road Widening (at grade)

  ③ Clock Tower Flyover (Queen's Way – Nsambya / Mukwano Roads Right Turn Flyover)

  ④ Widening of Queen's Way (dual carriageway of six or eight lanes)

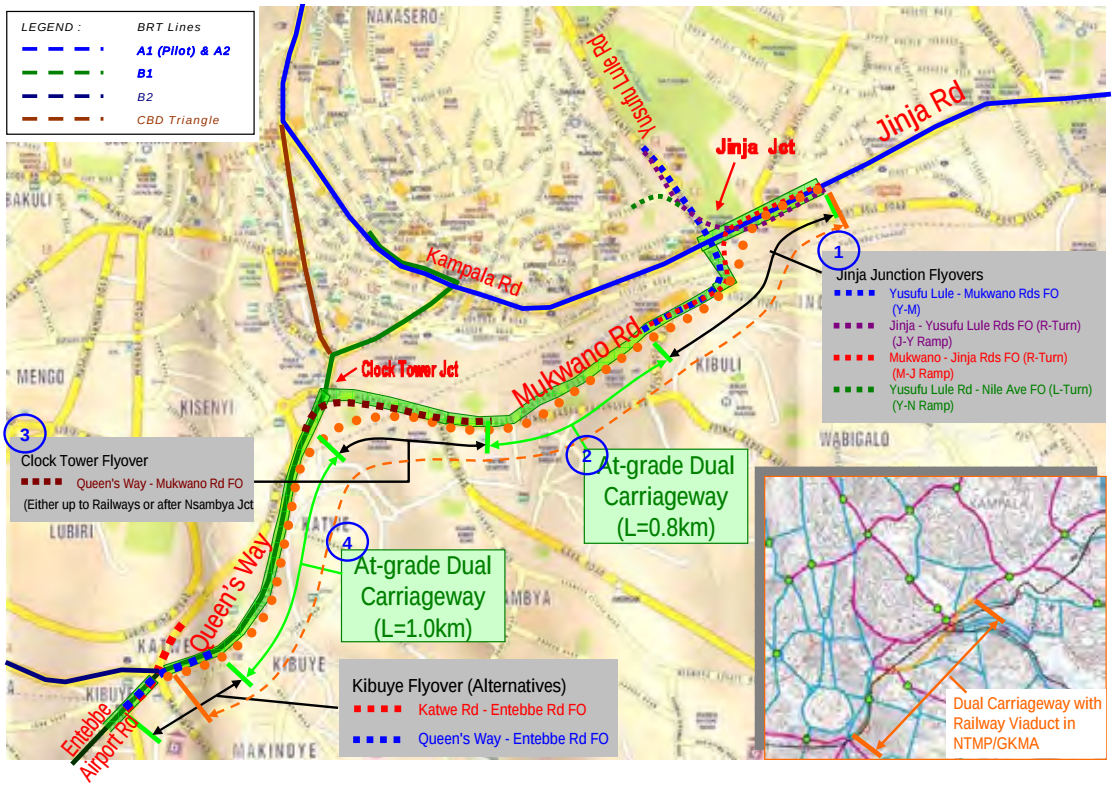


Figure A8.4.1 Alternative Plan for Dual Carriageway with Railway Viaduct Plan

- Flyover on Kibuye Roundabout between Katwe Road (or Queen's Way) and Entebbe Road as studied in this annex. It should be noted that the resettlement requirement is very large for the implementation of this plan since it also needs a dedicated line for BRT B1.

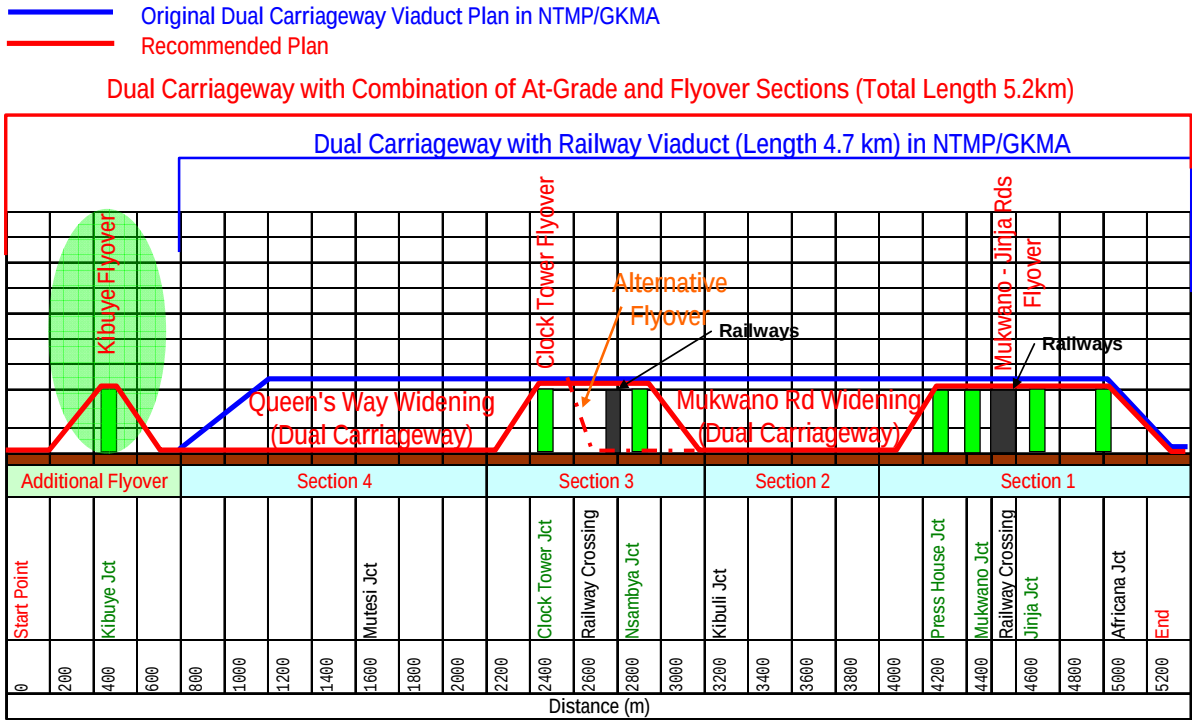


Figure A8.4.2 Alternative Plan (Profile) for Dual Carriageway with Railway Viaduct Plan

The Study Team suggests the widening of Queen's Way from two to six or eight lanes, including

two dedicated lanes for BRT, using the railways' ROW. Katwe Road is too narrow to accommodate BRT and it should thus be used as an urban service road.

(3) Feasibility Study on Kibuye Roundabout Flyover

The Study Team has concluded from this preliminary study that a flyover is required when introducing BRT routes B1 and B3 which pass on this roundabout in order to relieve congestion and at the same time support 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.

Moreover, the Study Team has concluded that the flyover between Entebbe Road and Katwe Road is more advantageous with respect to engineering aspects as compared with the flyover between Entebbe Road and Queen's Way. Since these are deeply related with the urban policy and transport sector, further study and discussions are required at the feasibility study stage on:

- BRT routes B1 and B2: Which road will be used for BRT, whether Queen's Way or the narrow Katwe Road, and where should BRT stations be located.

- What functions should be given to Queen's Way and Katwe Road, and the widening of Queen's Way in relation with the Kibuye Junction Flyover plan.

- Since there are many houses required for resettlement, EIA including public consultations are required.

ANNEX 9 NATURAL CONDITIONS SURVEY DATA

ANNEX 9 NATURAL CONDITIONS SURVEY DATA

A9.1 BORING SURVEY

(1) Survey Location

The location of the boring points is along the Jinja road, Kampala road, Mukwano road and Yusuf Lule road which are planning to be a candidate location for flyover.

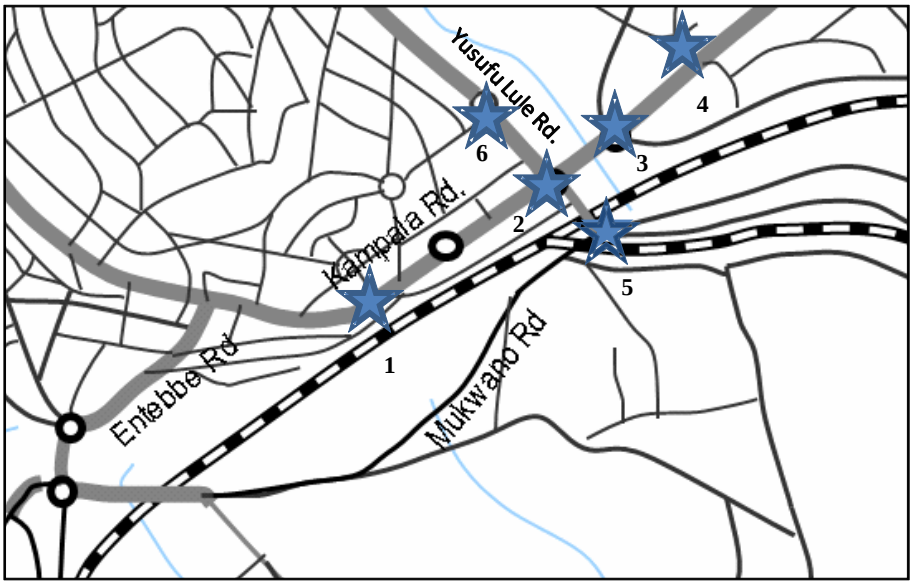


Figure A9.9.1 Location Map of the Boring Point

Table A9.1.1 Detail Location and Survey Date

No.	Location	Latitude	Longitude	Survey Date
1	Railway station park	454100	34905	28/04/2010
2	Jinja junction	454675	35327	23/04/2010
3	Africana R.A.	454906	35481	17/04/2010
4-1*	Cemetery-1	455080	35624	23/04/2010
4-2	Cemetery-2	455080	35625	26/04/2010
5	Mukwano Rb	454811	35121	20/06/2010
6	Garden City Rb	454485	35534	23/06/2010

*note: The first drilling terminated at 3m because the possibly hard gravel hit and was not able to continue drilling. Then second point was located 1m from the first drilling point and drilled til 10m.

The details of the Drilling machine and the tools for SPT which is used for geological survey are as follows:

[Drilling machine]
Model: Mobile Drilling machine (manufacturer: United States)
Type: Truck mounted top drive drilling rig (rotary type)
Capacity: 50m depth at 93mm diameter

Drilling diameter: Approximately 80mm
Drilling rod: Auger bit and rod L=1,500mm (per rod)

[Tools for SPT]
Type of hammer dropping: Automatic fall device
Drive rod: O.D. =65mm L=3,000mm (per rod)
Split sampler: O.D. =50mm L=500mm

(2) Boring Logs

GEOLOGICAL SURVEY FOR THE GREATER KAMPALA ROAD NETWORK AND TRANSPORT IMPROVEMENT PROJECT

SITE: RAILWAY STATION

SAMPLING	SPT RECORD		GROUND Water level	Elevation (Meters)	Depth (Meters)	Profile (meters)	Material description		
			No water	1164.59			Hardness/ Dimension	Color	Soil/ Roack Quality
					1		Lateritic	Brown	Clay
SPT 1	N= 6								
					2		Very Soft	Brown	clay
SPT 2	N= 6								
					3		Very Soft	Brown	clay
SPT 3	N= 5								
					4		Granular	Brown	clay
SPT 4	N= 22								
					5		Soft	Brown	clay
SPT 5	N= 22								
					6		Soft/ Mica	Brown/ Whitish	clay
SPT 6	N= 32								
					7		hard mica	yellowish while	Clay
SPT 7	N= 30								
					8		Soft/ Mica	yellowish Brown	Clay
SPT 8	N= 35								
					9		Silty	yellowish Brown	weathered rock
SPT 9	N= 52								
					10		Sandy	yellowish Brown	weathered rock
SPT 10	N= 65								
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENGY						Date Started		2010/4/26
CONTRAC	M&E ASSOCIATES LIMITED						Date Comp		2010/4/28
PROJECT	Greater Kampala Road Network and Transport Improvement						Logged by		Bogere Livingstone
LOCATION	Railway Station – Kampala						Orientation		Vertical

Figure A9.9.2 Boring Data for Railway Station

GEOLOGICAL SURVEY FOR THE GREATER KAMPALA ROAD NETWORK AND TRANSPORT IMPROVEMENT PROJECT

SITE: JINJA ROAD JUNCTION

SAMPLING	SPT RECORD		GROUND Water level	Elevation (Meters)	Depth (Meters)	Profile (meters)	Material description		
			1146.43	1149.43			Hardness/ Dimension	Color	Soil/ Roack Quality
					1		Fine clay	Reddish, grey	clay
SPT 1	N= 5				2		Fine clay	Brown	clay
SPT 2	N= 11				3		Fine clay	Brown	clay
SPT 3	N= 14				4		Fine clay	Whitish	clay
SPT 4	N= 19				5		Fine clay	Whitish	clay
SPT 5	N= 23				6		hard mica	Whitish	clay
SPT 6	N= 24				7		hard mica	yellowish white	Mica clay
SPT 7	N= 20				8		hard mica	yellowish white	Mica clay
SPT 8	N= 39				9		hard mica	yellowish white	Mica clay
SPT 9	N= 41				10		hard mica	yellowish white	Mica clay
SPT 10	N= 45				11		hard mica	yellowish white	Mica clay
SPT 11	N= 60				12		hard mica	yellowish white	Mica clay
SPT 12	N= 72				13		hard mica	yellowish white	Mica clay
SPT 13	N= 76				14		hard mica	Reddish, greyish	Mica clay
SPT 14	N= 114				15		hard mica	Reddish, greyish	Mica clay
SPT 15	N= 58				16		hard mica	Reddish, greyish	Mica clay
SPT 16	N= 69				17		hard mica	Reddish, greyish	Mica clay
SPT 17	N= 66				18		hard mica	Reddish, greyish	Mica clay
SPT 18	N= 158								
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENGY						Date Started		2010/4/19
CONTRAC	M&E ASSOCIATES LIMITED						Date Comp		2010/4/23
PROJECT	Greater Kampala Road Network and Transport Improvement						Logged by		Bogere Livingstone
LOCATION	Jinja Road Junction – Kampala						Orientation		Vertical

Figure A9.9.3 Boring Data for Jinja Road Jct.

GEOLOGICAL SURVEY FOR THE GREATER KAMPALA ROAD NETWORK AND TRANSPORT IMPROVEMENT PROJECT

SITE: AFRICANA JUNCTION

SAMPLING	SPT RECORD	GROUND Water level	Elevation (Meters)	Depth (Meters)	Profile (meters)	Material description		
		1148.43	1149.83			Hardness/ Dimension	Color	Soil/ Roack Quality
				1		Fine clay	Brow n	clay
SPT 1	N= 10							
				2		Fine clay	Brow n	clay
SPT 2	N= 9							
				3		Fine clay	Brow n	clay
SPT 3	N= 11							
				4		Fine clay	Whitish	clay
SPT 4	N= 18							
				5		Fine clay	Whitish	clay
SPT 5	N= 25							
				6		hard mica	Whitish	clay
SPT 6	N= 26							
				7		hard mica	yellow ish w hile	clay
SPT 7	N= 25							
				8		hard mica	yellow ish w hile	clay
SPT 8	N= 45							
				9		hard mica	yellow ish w hile	clay
SPT 9	N= 40							
				10		hard mica	yellow ish w hile	clay
SPT 10	N= 127							
				11		hard mica	yellow ish w hile	clay
SPT 11	N= 75							
				12		hard mica	yellow ish w hile	clay
SPT 12	N= 21							
				13		hard mica	yellow ish w hile	clay
SPT 13	N= 60							
				14		hard mica	Reddish, greyish	clay
SPT 14	N= 63							
				15		hard mica	Reddish, greyish	clay
SPT 15	N= 72							
				16		hard mica	Reddish, greyish	clay
SPT 16	N= 79							
				17		hard mica	Reddish, greyish	clay
SPT 17	N= 76							
				18		hard mica	Reddish, greyish	clay
SPT 18	N= 76							
				19		hard mica	Reddish, greyish	clay
SPT 19	N= 72							
				20		hard mica	Reddish, greyish	clay
SPT 20	N= 118							

CLIENT	JAPAN INTERNATIONAL COOPERATION AGENGY	Date Started	2010/4/15
CONTRACTOR	M&E ASSOCIATES LIMITED	Date Comp	2010/4/17
PROJECT	Greater Kampala Road Network and Transport Improvement	Logged by	Bogere Livingstone
LOCATION	Africana Junction – Kampala	Orientation	Vertical

Figure A9.9.4 Boring Data for Africana Rbt

GEOLOGICAL SURVEY FOR THE GREATER KAMPALA ROAD NETWORK AND TRANSPORT IMPROVEMENT PROJECT

SITE: Cemetry (a)

Hard rock intercepted at 3 meters stopping further drilling

SAMPLING	SPT RECORD		GROUND Water level	Elevation (Meters)	Depth (Meters)	Profile (meters)	Material description		
			No water	1164.59			Hardness/ Dimension	Color	Soil/ Roack Quality
					1		Lateritic	Brown	Clay
SPT 1	N= 11								
					2		Fine	Red Brown	clay
SPT 2	N= 14								
					3		Fine	Brown	clay
SPT 3					4				
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENGY						Date Started		2010/4/23
CONTRACTOR	M&E ASSOCIATES LIMITED						Date Comp		2010/4/23
PROJECT	Greater Kampala Road Network and Transport Improvement						Logged by		Bogere Livingstone
LOCATION	Cemetry Site on Jinja road (site a) – Kampala						Orientation		Vertical

GEOLOGICAL SURVEY FOR THE GREATER KAMPALA ROAD NETWORK AND TRANSPORT IMPROVEMENT PROJECT

SITE: Cemetry (b)

SAMPLING	SPT RECORD		GROUND Water level	Elevation (Meters)	Depth (Meters)	Profile (meters)	Material description		
			No water	1164.59			Hardness/ Dimension	Color	Soil/ Roack Quality
					1		Lateritic	Brown	Clay
SPT 1	N= 13								
					2		Fine	Red Brown	clay
SPT 2	N= 15								
					3		Fine	Brown	clay
SPT 3	N= 20								
					4		Silty	Brown	clay
SPT 4	N= 12								
					5		micaceous	Yellowish Brown	clay
SPT 5	N= 40								
					6		Soft/ Mica	Brown/ Whitish	clay
SPT 6	N= 51								
					7		Silty	yellowish brown	Clay
SPT 7	N= 86								
					8		Silty	yellowish Brown	Clay
SPT 8	N= 88								
					9		Granular	yellowish Brown	weathered rock
SPT 9	N= 71								
					10		Granular	Brown	weathered rock
SPT 10	N= 98								
CLIENT	JAPAN INTERNATIONAL COOPERATION AGENGY						Date Started		2010/4/23
CONTRAC	M&E ASSOCIATES LIMITED						Date Comp		2010/4/26
PROJECT	Greater Kampala Road Network and Transport Improvement						Logged by		Bogere Livingstone
LOCATION	Cemetry Site on Jinja road (site b) – Kampala						Orientation		Vertical

Figure A9.9.5 Boring Data for Cemetery (Jinja Road)

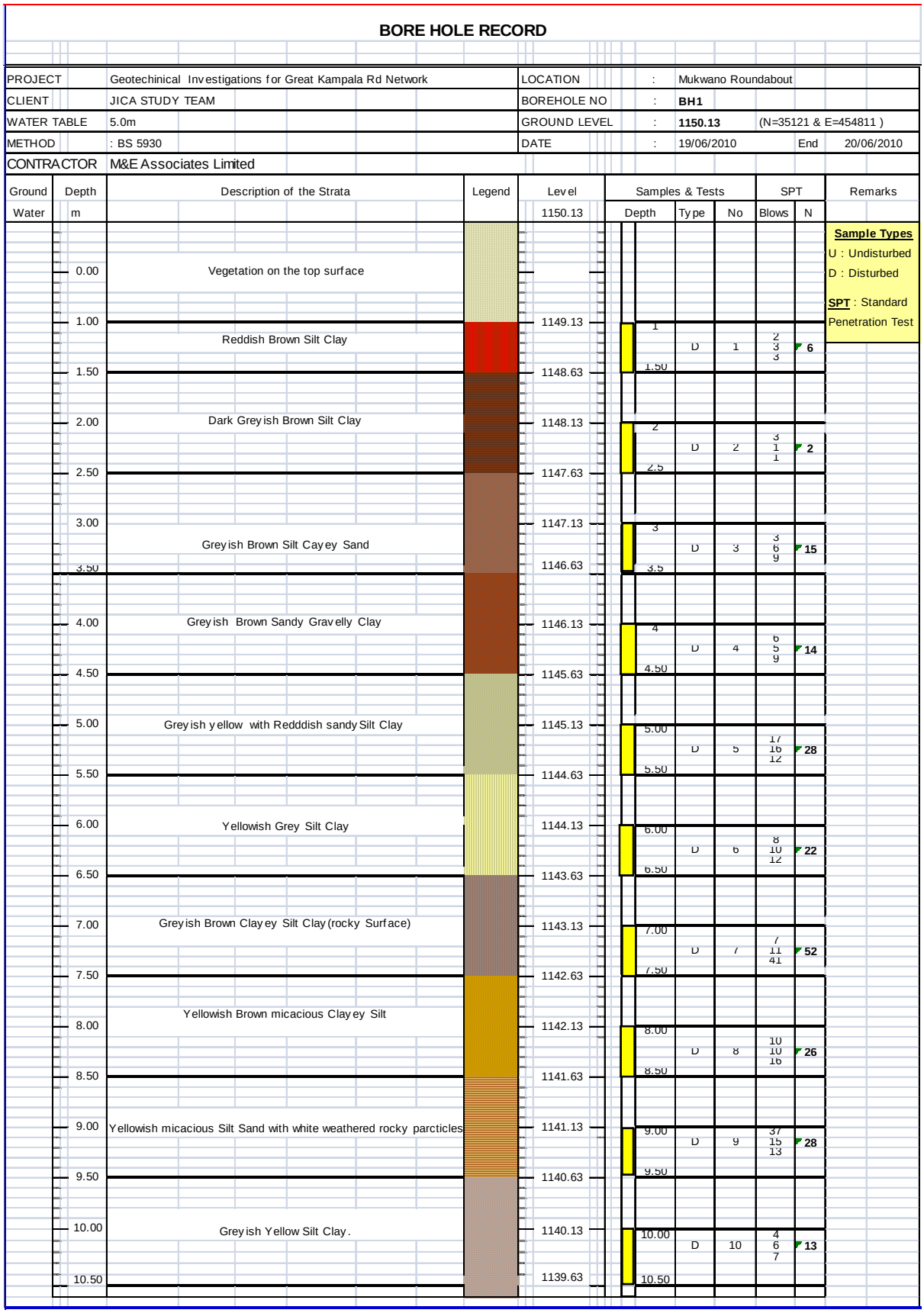


Figure A9.9.6 (1) Boring Data for Mukwano Rbt (0.0m to 10.0m)

BORE HOLE RECORD

PROJECT	Geotechinical Investigations for Great Kampala Rd Network		LOCATION	:	Mukwano Roundabout		
CLIENT	JICA STUDY TEAM		BOREHOLE NO	:	**BH1**		
WATER TABLE	5.0m		GROUND LEVEL	:		(N= & E=)	
METHOD	: BS 5930		DATE	:	19/06/2010	End	20/06/2010
CONTRACTOR	M&E Associates Limited						

Ground Water	Depth m	Description of the Strata	Legend	Level	Samples & Tests Depth	Type	No	SPT Blows	SPT N	Remarks
	10.80	Yellowish Grey Sandy Silt Clay								**Sample Types** U : Undisturbed D : Disturbed **SPT** : Standard Penetration Test
	11.00			-11.00	11.0	D	11	4 5 7	**12**	
	11.50	Greyish Yellow Silt Clay		-11.50	11.50					
	12.00	Greenish Yellow Clayey Silt		-12.00	12	D	12	5 6 6	**12**	
	12.50			-12.50	12.5					
	13.00	Greenish Yellow Clayey Silt		-13.00	13	D	13	5 9 13	**22**	
	13.50			-13.50	13.5					
	14.00	Dark Greyish Yellow with Green Sandy Clayey Silt		-14.00	14	D	14	15 20 27	**47**	
	14.50			-14.50	14.50					
	15.00	Greyish yellow Silt Clay		-15.00	15.00	D	15	16 23 37	**60**	
	15.50			-15.50	15.50					
	16.00	Dark Greyish yellow Clayey Silt		-16.00	16.00	D	16	23 25 32	**57**	
	16.50			-16.50	16.50					
	17.00	Greyish Yellow Clayey Silt		-17.00	17.00	D	17	13 17 24	**41**	
	17.50			-17.50	17.50					
	18.00	Greyish Yellow with Black Clayey Silt		-18.00	18.00	D	18	12 36 39	**75**	
	18.50			-18.50	18.50					
	19.00	Very Hard Surface of greish Yellow with Black Clayey Silt		-19.00	19.00	D	19	20 55 >50	**55**	
	19.50			-19.50	19.50					
	20.00	Very hard Surface of Clayey Silt with some cobbles\Stone particles		-20.00	20.00	D	20	50 45 >50	**45**	
	20.50			-20.50	20.50					

Figure A9.9.6 (2) Boring Data for Mukwano Rbt (10.0m to 20.5m)

BORE HOLE RECORD

PROJECT	Geotechinical Investigations for Great Kampala Rd Netw or	LOCATION	:	Nakumatt Junction tow ards Jinja Rd	
CLIENT	JICA STUDY TEAM	BOREHOLE NO	:	**BH2**	
WATER TABLE	5.5m	GROUND LEVEL	:	(N= & E=)	
METHOD	: BS 5930	DATE	:	23/06/2010	End 23/06/2010
CONTRACTOR	M&E Associates Limited				

Ground Water	Depth m	Description of the Strata	Legend	Level	Samples & Tests Depth	Type	No	SPT Blow s	SPT N	Remarks
	0.00									**Sample Types** U : Undisturbed D : Disturbed **SPT** : Standard Penetration Test
	0.30	Vegetation on top Surface.		-0.30						
	1.00	Reddish Clay		-1.00	1.00	D	1	5 4 3	**7**	
	1.50	Dark Brow n Slit Clay w ith some Gravel particle.		-1.50	1.50					
	2.00			-2.00	2.00	D	2	3 5 5	**10**	
	2.50	Dark Brow n Silt Clay		-2.50	2.50					
	3.00			-3.00	3.00	D	3	6 9 9	**18**	
	3.50	Reddish Brow n w ith Yellow ish Silt Clay		-3.50	3.50					
	4.00			-4.00	4.00	D	4	3 4 7	**11**	
	4.50	Reddish silty clay, stiff		-4.50	4.50					
	5.00			-5.00	5.00	D	5	11 17 16	**33**	
	5.50	Yellow ish Red Sandy Silt Clay		-5.50	5.50			6		
	6.00			-6.00	6.00	D	6	19 29 50	**79**	
	6.50	Yellow ish Red Sandy Silt Clay		-6.50	6.50					
	7.00			-7.00	7.00	D	7	21 39 50	**89**	
	7.50	Yellow ish Red Sandy Silt Clay		-7.50	7.50					
	8.00			-8.00	8.00	D	8	34 50 >60	**50**	
	8.50	Yellow ish Red Silt Clay		-8.50	8.50					
	9.00			-9.00	9.00	D	9	17 17 18	**35**	
	9.50			-9.50	9.50					

Figure A9.9.7 (1) Boring Data for Garden City Jct. (0.0m to 10.0m)

BORE HOLE RECORD

PROJECT	Geotechinical Investigations for Great Kampala Rd Network	LOCATION	:	Nakumatt Junction towards Jinja Rd	
CLIENT	JICA STUDY TEAM	BOREHOLE NO	:	**BH2**	
WATER TABLE	5.5m	GROUND LEVEL	:	**1158.06**	(N=35534 & E=454485)
METHOD	: BS 5930	DATE	:	23/06/2010	End 23/06/2010
CONTRACTOR	M&E Associates Limited				

Ground Water	Depth m	Description of the Strata	Legend	Level	Samples & Tests Depth	Type	No	SPT Blows	SPT N	Remarks
				1158.06						**Sample Types** U : Undisturbed D : Disturbed **SPT** : Standard Penetration Test
	9.80	Yellowish Red silt Clay		1148.26						
	10.00			1148.06	10.00					
		Reddish yellow with Greyish Silt Clay				D	10	12 13 15	**28**	
	10.50			1147.56	10.50					
		Reddish Yellow micacious Sandy Silt								
	11.00			1147.06	11.00					
						D	11	10 13 17	**30**	
	11.50			1146.56	11.50					
		Reddish Yellow micacious Sandy Clayey Silt								
	12.00			1146.06	12.00					
						D		7		
							12	10 13	**23**	
	12.50			1145.56	12.50					
	13.00	Yellowish Pink micaceous Sandy Clayey Silt		1145.06	13.00					
								7		
						D	13	12 18	**30**	
	13.50			1144.56	13.50					

Figure A9.9.7 (2) Boring Data for Garden City Jct. (10.0m to 13.5m)

A9.2 RAINFALL DATA

Monthly rain fall (1974-2009)

year \ month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
1974	75.5	45.1	71.2	125.2	82.9	86.1	165.4	60.4	72.0	57.8	76.8	30.2	948.60
1975	36.9	79.2	125.1	100.2	109.3	108.5	35.7	81.0	141.1	83.1	57.7	62.0	1019.80
1976	47.7	140.8	167.5	186.7	90.3	88.7	27.0	80.0	146.6	88.3	125.8	73.9	1263.30
1977	102.5	0.0	188.5	169.9	153.8	105.7	0.0	163.6	46.6	119.1	0.0	84.7	1134.40
1978	8.3	124.1	119.7	186.4	206.9	62.3	54.2	123.6	88.8	160.3	187.4	129.3	1451.30
1979	78.2	127.5	169.6	153.6	154.4	84.3	58.5	46.4	50.8	58.2	148.7	90.7	1220.90
1980	36.1	27.2	162.8	214.5	105.1	98.7	41.7	149.4	163.5	97.0	255.7	71.5	1423.20
1981	73.3	37.9	103.2	76.8	200.8	29.8	50.9	77.7	181.5	132.8	32.9	143.6	1141.20
1982							no data						
1983	52.5	10.0	64.5	108.2	108.7	72.1	80.9	81.1	181.4	135.3	127.0	70.6	1092.30
1984	19.4	7.6	73.2	0.0	55.7	31.6	33.7	92.3	33.6	61.1	256.8	74.9	739.90
1985	123.8	15.5	106.3	137.2	188.9	20.4	61.1	50.8	68.1	77.2	152.5	7.6	1009.40
1986	18.1	24.5	99.2	111.4	219.8	33.0	44.8	1.6	49.3	59.6	153.4	112.2	926.90
1987	78.9	7.3	19.6	191.6	72.6	96.3	47.0	98.6	85.6	111.9	131.6	88.9	1029.90
1988	105.5	42.7	161.5	307.4	37.7	53.9	101.6	150.4	135.1	93.4	124.4	113.8	1427.40
1989	19.2	83.6	106.3	97.7	174.1	51.1	36.0	58.6	93.4	178.7	228.0	162.5	1289.20
1990	76.4	18.5	221.9	0.0	94.3	19.9	35.0	103.0	109.8	92.1	135.5	121.6	1028.00
1991	39.2	64.7	86.6	328.3	142.8	56.2	19.3	77.4	103.3	194.6	202.6	96.6	1411.60
1992	55.8	33.4	54.1	161.0	120.3	82.4	83.9	90.8	0.0	0.0	85.4	83.4	850.50
1993	46.6	23.3	154.3	129.7	167.9	77.4	22.7	17.0	134.0	128.2	40.6	28.0	969.70
1994	33.2	43.6	26.6	161.5	74.6	34.4	70.1	92.3	86.0	221.2	169.5	101.0	1114.00
1995	6.7	46.0	166.4	198.9	188.6	32.4	89.7	42.4	152.9	128.5	0.0	0.0	1052.50
1996	131.1	14.4	168.5	83.8	286.1	51.8	65.9	31.6	124.3	62.4	114.5	42.4	1176.80
1997	115.6	59.7	85.9	228.5	90.1	64.1	14.3	98.2	119.8	169.2	250.8	279.6	1575.80
1998	158.1	80.6	265.6	209.7	73.8	18.7	25.6	87.5	222.3	157.5	49.5	17.6	1366.50
1999	80.5	48.3	156.3	153.9	147.7	97.6	112.6	174.1	185.2	253.0	230.9	47.7	1687.80
2000	50.9	56.8	101.6	176.8	84.6	84.3	29.4	78.4	61.9	230.2	54.0	77.3	1086.20
2001	105.2	63.7	136.2	205.3	153.0	52.6	100.2	132.0	229.1	138.0	102.2	73.3	1490.80
2002	57.8	65.4	151.8	192.7	78.9	87.6	26.9	36.6	140.5	188.2	268.3	141.3	1436.00
2003	61.3	46.5	68.4	192.7	116.7	86.4	120.2	198.5	43.8	143.6	154.6	182.2	1414.90
2004	131.6	96.2	55.6	216.5	24.6	64.0	15.9	86.9	173.2	206.1	206.6	178.8	1456.00
2005	22.6	32.3	98.1	120.1	188.5	54.0	94.9	183.6	72.5	189.1	120.1	2.0	1177.77
2006	81.3	28.5	93.7	132.0	139.9	18.9	29.9	143.3	85.5	96.2	338.4	217.7	1405.26
2007	127.7	65.0	47.5	65.3	122.6	108.4	141.8	119.9	244.6	289.6	144.4	101.2	1577.99
2008	124.6	65.4	283.6	173.7	89.4	52.0	37.2	111.7	119.1	122.6	90.1	106.1	1375.49
2009	116.2	71.8	40.9	88.8	107.5	29.0	22.3	108.6	126.5	120.5	179.9	76.9	1088.90
Average	71.4	51.3	120.1	153.9	127.2	62.7	57.0	95.1	116.3	132.7	142.8	94.0	1224.6

1-day maximum rainfall (mm)

month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1974	18.1	20.5	20.2	30.5	18.0	47.6	58.3	39.8	18.7	28.0	17.0	12.3
1975	11.2	17.5	47.5	24.4	19.6	39.0	8.2	24.5	20.4	19.4	21.0	28.8
1976	16.0	31.8	54.4	34.2	15.0	52.1	9.3	27.4	38.6	21.7	27.0	39.1
1977	50.6	0.0	54.5	31.9	51.0	49.0	0.0	50.5	16.6	20.5	0.0	28.3
1978	4.0	51.3	51.6	46.5	52.2	17.0	13.4	51.4	32.5	37.6	28.2	38.8
1979	25.3	45.9	52.5	50.9	31.3	43.5	16.7	17.1	19.0	21.5	36.1	19.4
1980	27.5	8.2	51.3	45.5	43.0	48.3	13.0	51.0	47.5	28.2	51.9	29.0
1981	34.2	17.2	23.4	25.3	42.9	16.5	20.8	30.0	32.0	30.0	16.8	38.1
1982	No data											
1983	40.5	3.2	22.0	39.6	41.8	42.2	37.0	37.5	51.6	31.9	35.0	28.5
1984	8.0	2.0	34.0	0.0	12.6	15.8	13.5	37.5	18.6	17.3	34.6	15.6
1985	39.5	15.5	45.0	37.8	47.0	6.2	29.0	21.6	24.8	30.0	41.5	2.0
1986	10.3	10.6	23.4	27.2	39.0	15.8	19.7	1.6	18.4	12.4	33.0	47.0
1987	30.5	4.2	3.6	36.4	22.8	43.7	25.0	46.7	18.5	21.4	55.5	48.2
1988	44.0	15.5	31.0	64.4	20.8	23.8	49.5	50.5	43.2	15.6	19.4	37.6
1989	11.0	59.3	22.0	25.4	50.0	15.1	19.0	19.6	35.2	29.4	56.5	39.0
1990	20.1	9.4	38.9	0.0	26.5	5.8	21.0	48.5	37.8	21.0	45.6	40.0
1991	25.2	21.8	26.7	54.4	22.2	26.7	7.7	25.0	62.7	68.0	56.2	34.1
1992	34.0	13.6	28.3	36.6	50.8	21.0	22.7	33.2	0.0	0.0	26.0	24.3
1993	22.2	17.7	50.0	40.3	43.2	15.1	20.7	6.7	78.3	40.5	19.8	12.7
1994	17.0	25.7	17.7	50.5	36.4	18.7	26.0	31.0	22.1	69.3	36.0	33.6
1995	6.7	30.0	61.6	60.0	47.6	14.1	36.2	42.4	32.5	35.5	0.0	0.0
1996	54.4	5.5	55.0	30.4	110.0	30.5	44.9	10.0	30.1	21.0	25.4	12.0
1997	37.0	28.7	36.0	42.3	39.5	24.3	5.5	27.2	47.0	42.5	35.2	57.3
1998	47.0	28.4	61.3	50.1	13.5	7.3	9.4	23.5	46.1	39.4	22.7	6.4
1999	30.0	40.5	28.0	51.1	28.5	38.8	30.0	45.8	34.5	51.8	25.0	11.9
2000	29.2	31.5	47.2	36.8	26.3	32.5	12.5	21.3	30.0	90.3	17.5	13.5
2001	27.7	32.7	55.4	30.0	34.0	13.0	39.5	57.0	54.5	26.7	23.0	50.0
2002	17.0	35.0	60.0	42.5	48.5	38.2	10.2	16.0	30.0	36.0	59.9	55.0
2003	12.0	20.6	20.2	72.0	22.5	27.3	42.0	54.5	28.0	38.0	60.0	45.0
2004	54.4	50.2	14.0	53.5	9.0	47.0	14.0	28.6	42.3	42.0	53.0	46.4
2005	16.4	21.0	25.8	43.4	47.2	21.0	44.2	63.0	17.6	41.0	36.0	2.0
2006	22.5	7.3	27.7	46.0	30.6	4.0	13.6	42.0	32.8	15.0	62.0	86.0
2007	54.0	28.2	16.4	18.0	47.0	33.4	63.4	30.2	54.1	65.9	35.4	47.8
2008	37.2	23.6	77.0	27.0	35.8	34.3	22.0	35.7	31.7	35.5	32.9	32.0
2009	30.0	23.6	13.3	14.6	24.0	20.2	12.0	48.7	32.0	22.1	51.4	19.7

A9.3 WIND SPEED AND DIRECTION

KAMPALA
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MONTHLY MEAN WIND SPEED IN KNOTS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999												
0600Z												
1200Z												
2000	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	3.5	3.7	3.5	3.4	3.2	3.6	3.0	3.1	4.5	3.5	3.1	3.8
1200Z	5.7	6.4	6.8	5.2	5.1	5.5	5.0	4.1	4.8	4.2	4.4	4.7
2001	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	**2.8**	**2.1**	**2.9**	**3.3**	**3.2**	**3.2**	**3.0**	4.0	3.8	3.9	1.6	2.2
1200Z	5.1	3.7	4.1	4.6	4.7	3.8	4.7	4.1	4.6	3.7	2.7	2.6
2002	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	1.8	3.1	2.5	2.6	3.5	2.8	2.9	3.9	3.8	2.8	2.9	3.6
1200Z	2.9	3.1	3.1	3.3	3.5	3.5	3.7	3.9	4.6	4.6	3.6	3.5
2003	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	2.3	3.9	3.1	3.0	2.9	2.2	2.5	3.3	3.3	3.3	2.9	2.3
1200Z	4.3	5.7	4.6	4.7	3.8	3.2	3.6	4.4	3.8	4.3	4.1	4.4
2004	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	3.2	2.8	2.6	2.8	2.4	2.5	3.6	3.9	3.6	3.1	2.4	3.3
1200Z	4.6	5.3	3.9	3.9	4.8	6.5	6.0	5.5	4.4	5.0	4.9	5.5
2005	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	3.9		3.3	3.7	2.8	2.6	3.9	3.3	3.2		2.7	3.7
1200Z	7.4		7.5	5.2	4.7	4.6	5.5	4.5	3.8		4.6	5.1
2006	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	4.3	3.3	2.6	3.2	2.7	3.4	3.3	3.4	3.9	3.3	2.9	2.4
1200Z	4.8	6.2	4.3	5.4	3.7	5.7	6.4	6.3	5.1	4.4	3.9	5.2
2007	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	3.4	3.5	3.6	3.6	3.5	3.3	3.0	2.6	2.9	3.0	3.5	3.1
1200Z	4.8	4.7	7.0	4.5	4.5	4.4	4.3	4.2	3.9	4.8	4.7	5.7
2008	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	3.1	3.0	3.2	2.8	2.8	3.3	2.9	2.4	3.9			3.2
1200Z	4.7	5.8	5.7	4.1	5.4	4.4	5.0	3.8	5.1			5.9
2009	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0600Z	3.7	4.2	3.1	5.1	3.0	3.6	3.4	2.9	2.8	3.9	3.3	1.6
1200Z	6.3	5.8	6.0	6.7	5.4	5.3	4.5	4.2	4.1	4.8	4.7	3.2

Average knot

2000-2009	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
09:00 AM	3.2	3.3	3.0	3.4	3.0	3.0	3.1	3.3	3.6	3.3	2.8	2.9
03:00 PM	5.1	5.2	5.3	4.8	4.6	4.7	4.9	4.5	4.4	4.5	4.2	4.6

Average m/s

2000-2009	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
09:00 AM	1.6	1.7	1.6	1.7	1.5	1.6	1.6	1.7	1.8	1.7	1.4	1.5
03:00 PM	2.6	2.7	2.7	2.4	2.4	2.4	2.5	2.3	2.3	2.3	2.2	2.4

Source : JICA Study, 2010

ANNEX 10 PROJECT EVALUATION

ANNEX 10 PROJECT EVALUATION

A10.1 VEHICLE OPERATING COST (VOC) BY JICA STUDY ON NEW NILE BRIDGE PROJECT AND VOC DATA BY RED

The following tables are basic VOC data presented in the JICA New Nile Bridge Feasibility Study (2009 prices) and the data of RED Model (2008). Fuel and lubricant costs of JICA data were escalated/ updated to 2010 prices.

Table A10.1.1 Vehicle and Depreciation Cost by Vehicle Type

Items	Sedan	Mini Bus	Large Bus	Truck	Trailer	Motorcycle
Economic Vehicle Cost (US$)	18,343	28,870	77,412	71,250	109,700	2431
Residual Value (US$)	1,834	2,887	7,741	7,125	10,970	243
Vehicle Life (Year)	8	7	10	10	10	6
Depreciation Amount (US$/ year)	2,064	3,712	6,967	6,413	9,873	365
Average Running (Km/ year)	37,500	40,000	60,000	55,000	60,000	16,667
Depreciation Cost (US$/ km)	0.055	0.093	0.116	0.117	0.165	0.022

Source: The Feasibility on the Construction of a New Bridge across River Nile at Jinja, Final Report, October 2009, JICA

Table A10.1.2 Fuel and Lubricant Cost by Vehicle Type

Items	Sedan	Mini Bus	Large Bus	Truck	Trailer	Motorcycle
Fuel Type Used	Petrol	Petrol	Diesel	Diesel	Diesel	Petrol
Fuel Costs (US$/ Liter)	0.8859	0.8859	0.7892	0.7892	0.7892	0.8859
Fuel Consumption Rate (L/ km)	0.14	0.15	0.30	0.30	0.30	0.02
Lubricant Costs (US$/ 1 time)	12.48	15.60	85.07	131.86	131.86	6.24
Distance between Lubricant Changes (km)	10,000	7,500	8,000	10,000	10,000	5,000
Fuel Cost per km (US$/ km)	0.124	0.133	0.237	0.237	0.237	0.018
Fuel Cost per Year (US$/ year)	4,650.7	5,315.1	14,205.0	13,021.2	14,205.0	295.3
Lubricant Cost per Year (US$/ year)	46.8	83.2	638.0	725.2	791.2	20.8

Source: The Feasibility on the Construction of a New Bridge across River Nile at Jinja, Final Report, October 2009, JICA

Table A10.1.3 Tire Cost by Vehicle Type

Items	Sedan	Mini Bus	Large Bus	Truck	Trailer	Motorcycle
Tire Cost (US$/ unit)	221.16	173.28	485.64	803.70	2348.40	30.78
Running Kilometers (km)	40,000	40,000	50,000	50,000	50,000	20,000
Tire Cost per 1000 km (US$/ 1000 km)	5.53	4.33	9.71	16.07	46.97	1.54
Tire Cost per Year (US$/ year)	207.3	173.3	582.8	884.1	2818.1	25.7

Source: The Feasibility on the Construction of a New Bridge across River Nile at Jinja, Final Report, October 2009, JICA

Table A10.1.4 Maintenance and Insurance Costs by Vehicle Type

Items	Sedan	Mini Bus	Large Bus	Truck	Trailer	Motorcycle
Maintenance - Spare Parts (US$/ year)	136.2	263.0	774.1	591.4	910.5	21.8
Maintenance - Labor (US$/ year)	107.9	161.8	313.8	313.8	313.8	13.3
Sub-Total (Maintenance Cost)	244.1	424.8	1087.9	905.2	1224.3	35.1
Insurance Cost (US$/ year)	496.0	613.0	580.0	357.0	357.0	328.0

Source: The Feasibility on the Construction of a New Bridge across River Nile at Jinja, Final Report, October 2009, JICA

Table A10.1.5 VOC Data by RED Model (2008), Paved & Rolling

Paved(x) rolling(b)

	Car	Pickup	Small Bus	Large Bus	Light Truck	Medium Truck	Heavy Truck	Artic. Truck	VOC weighted	
iri	USD per Km									
bx04	0.25	0.34	0.23	0.66	0.39	0.58	1.06	1.59	**0.33**	good
bx10	0.34	0.47	0.26	0.76	0.51	0.77	1.34	2.01	**0.44**	fair
bx18	0.53	0.73	0.35	1.03	0.72	1.09	1.76	2.71	**0.64**	poor
bx25	0.71	0.97	0.47	1.39	0.92	1.39	2.17	3.38	**0.84**	x_poor
Composition	**20.4**	**34.5**	**28.2**	**1.7**	**6.3**	**6.4**	**1.9**	**0.6**	**100.00**	

Source: UNRA

A10.2 COST BENEFIT STREAM BY PRE-FS PROJECT

The cost benefit cash flows for calculation of evaluation indicators (EIRR, B/C and NPV) by Pre-FS project are shown below.

Table A10.2.1 Cost Benefit Stream (Jinja Flyover Project)

Jinja Flyover (Unit: US$ Million)

No.	FY	ECONOMIC COST			ECONOMIC BENEFIT			B-C
		Investment	O & M	Total	VOC Saving	TTC Saving	Total	
	2010			0.00			0.00	0.00
	2011			0.00			0.00	0.00
	2012	0.710		0.71			0.00	-0.71
	2013	3.390		3.39			0.00	-3.39
	2014	24.998		25.00			0.00	-25.00
	2015	32.780		32.78			0.00	-32.78
	2016	24.998		25.00			0.00	-25.00
1	2017		0.739	0.74	0.753	20.382	21.135	20.40
2	2018		0.739	0.74	0.598	21.433	22.031	21.29
3	2019		0.739	0.74	0.444	22.484	22.928	22.19
4	2020		0.739	0.74	0.289	23.535	23.824	23.09
5	2021		0.739	0.74	0.134	24.587	24.721	23.98
6	2022		0.739	0.74	-0.020	25.638	25.617	24.88
7	2023		0.739	0.74	-0.175	26.689	26.514	25.78
8	2024		0.739	0.74	-0.175	26.689	26.514	25.78
9	2025		0.739	0.74	-0.175	26.689	26.514	25.78
10	2026		0.739	0.74	-0.175	26.689	26.514	25.78
11	2027		1.428	1.43	-0.175	26.689	26.514	25.09
12	2028		0.739	0.74	-0.175	26.689	26.514	25.78
13	2029		0.739	0.74	-0.175	26.689	26.514	25.78
14	2030		0.739	0.74	-0.175	26.689	26.514	25.78
15	2031		0.739	0.74	-0.175	26.689	26.514	25.78
16	2032		24.212	24.21	-0.175	26.689	26.514	2.30
17	2033		0.739	0.74	-0.175	26.689	26.514	25.78
18	2034		0.739	0.74	-0.175	26.689	26.514	25.78
19	2035		0.739	0.74	-0.175	26.689	26.514	25.78
20	2036		0.739	0.74	-0.175	26.689	26.514	25.78
Total		86.88	38.94	125.81	-0.25	511.70	511.45	385.64

EIRR	20.7%
B/C (*)	1.70
NPV (*)	34.126

(*): Discount Rate = 12%

Source: JICA Study Team

Table A10.2.2 Cost Benefit Stream (Clock Tower Flyover Project)

Clock Tower Flyover (Unit: US$ Million)

No.	FY	ECONOMIC COST			ECONOMIC BENEFIT			B-C
		Investment	O & M	Total	VOC Saving	TTC Saving	Total	
	2010			0.000			0.000	0.00
	2011			0.000			0.000	0.00
	2012			0.000			0.000	0.00
	2013			0.000			0.000	0.00
	2014			0.000			0.000	0.00
	2015			0.000			0.000	0.00
	2016			0.000			0.000	0.00
	2017	0.000	0.000	0.000			0.000	0.00
	2018	0.000	0.000	0.000			0.000	0.00
	2019	0.004	0.000	0.004			0.000	0.00
	2020	0.214	0.000	0.214			0.000	-0.21
	2021	3.280	0.000	3.280			0.000	-3.28
	2022	3.420	0.000	3.420			0.000	-3.42
1	2023		0.061	0.061	-0.255	2.976	2.722	2.66
2	2024		0.061	0.061	-0.255	2.976	2.722	2.66
3	2025		0.061	0.061	-0.255	2.976	2.722	2.66
4	2026		0.061	0.061	-0.255	2.976	2.722	2.66
5	2027		0.061	0.061	-0.255	2.976	2.722	2.66
6	2028		0.061	0.061	-0.255	2.976	2.722	2.66
7	2029		0.061	0.061	-0.255	2.976	2.722	2.66
8	2030		0.061	0.061	-0.255	2.976	2.722	2.66
9	2031		0.061	0.061	-0.255	2.976	2.722	2.66
10	2032		0.061	0.061	-0.255	2.976	2.722	2.66
11	2033		0.061	0.061	-0.255	2.976	2.722	2.66
12	2034		0.061	0.061	-0.255	2.976	2.722	2.66
13	2035		0.061	0.061	-0.255	2.976	2.722	2.66
14	2036		0.061	0.061	-0.255	2.976	2.722	2.66
15	2037		0.061	0.061	-0.255	2.976	2.722	2.66
16	2038		2.217	2.217	-0.255	2.976	2.722	0.50
17	2039		0.061	0.061	-0.255	2.976	2.722	2.66
18	2040		0.061	0.061	-0.255	2.976	2.722	2.66
19	2041		0.061	0.061	-0.255	2.976	2.722	2.66
20	2042		0.061	0.061	-0.255	2.976	2.722	2.66
Total		6.918	3.374	10.291	-5.092	59.526	54.434	44.142

EIRR	32.4%
B/C (*)	2.49
NPV (*)	2.786

(*):Discount Rate = 12%

Source: JICA Study Team

Table A10.2.3 Cost Benefit Stream (Mukwano Road Widening Project)

Mukwano Road Widening (Unit: US$ Million)

No.	FY	ECONOMIC COST			ECONOMIC BENEFIT			B-C
		Investment	O & M	Total	VOC Saving	TTC Saving	Total	
	2010			0.00			0.00	0.00
	2011			0.00			0.00	0.00
	2012	1.110		1.11			0.00	-1.11
	2013	1.270		1.27			0.00	-1.27
	2014	1.539		1.54			0.00	-1.54
	2015	2.029		2.03			0.00	-2.03
	2016	1.539		1.54			0.00	-1.54
1	2017		0.126	0.13	-0.970	6.612	5.642	5.52
2	2018		0.126	0.13	-0.898	6.656	5.758	5.63
3	2019		0.126	0.13	-0.826	6.701	5.875	5.75
4	2020		0.126	0.13	-0.754	6.745	5.991	5.86
5	2021		0.126	0.13	-0.682	6.790	6.108	5.98
6	2022		0.126	0.13	-0.610	6.834	6.224	6.10
7	2023		0.126	0.13	-0.538	6.879	6.341	6.21
8	2024		0.126	0.13	-0.538	6.879	6.341	6.21
9	2025		0.126	0.13	-0.538	6.879	6.341	6.21
10	2026		0.126	0.13	-0.538	6.879	6.341	6.21
11	2027		1.282	1.28	-0.538	6.879	6.341	5.06
12	2028		0.126	0.13	-0.538	6.879	6.341	6.21
13	2029		0.126	0.13	-0.538	6.879	6.341	6.21
14	2030		0.126	0.13	-0.538	6.879	6.341	6.21
15	2031		0.126	0.13	-0.538	6.879	6.341	6.21
16	2032		0.126	0.13	-0.538	6.879	6.341	6.21
17	2033		0.126	0.13	-0.538	6.879	6.341	6.21
18	2034		0.126	0.13	-0.538	6.879	6.341	6.21
19	2035		0.126	0.13	-0.538	6.879	6.341	6.21
20	2036		0.126	0.13	-0.538	6.879	6.341	6.21
Total		7.49	3.68	11.17	-12.27	136.64	124.37	113.20

EIRR	38.8%
B/C (*)	4.32
NPV (*)	15.823

(*): Discount Rate = 12%

Source: JICA Study Team

Table A10.2.4 Cost Benefit Stream (Shoprite/ Clock Tower Traffic Improvement Project)

Shoprite/ Clock Tower Traffic Safety Improvement (Unit: US$ Million)

No.	FY	ECONOMIC COST			ECONOMIC BENEFIT			B-C
		Investment	O & M	Total	VOC Saving	TTC Saving	Total	
	2010			0.00			0.00	0.00
	2011			0.00			0.00	0.00
	2012	0.59		0.59			0.00	-0.59
	2013	0.72		0.72			0.00	-0.72
	2014	1.21		1.21			0.00	-1.21
	2015	1.58		1.58			0.00	-1.58
	2016	1.21		1.21			0.00	-1.21
1	2017		0.099	0.10	0.225	0.221	0.446	0.35
2	2018		0.099	0.10	0.172	0.725	0.896	0.80
3	2019		0.099	0.10	0.119	1.228	1.347	1.25
4	2020		0.099	0.10	0.066	1.731	1.797	1.70
5	2021		0.099	0.10	0.013	2.234	2.247	2.15
6	2022		0.099	0.10	-0.040	2.738	2.698	2.60
7	2023		0.099	0.10	-0.093	3.241	3.148	3.05
8	2024		0.099	0.10	-0.093	3.241	3.148	3.05
9	2025		0.099	0.10	-0.093	3.241	3.148	3.05
10	2026		0.099	0.10	-0.093	3.241	3.148	3.05
11	2027		1.000	1.00	-0.093	3.241	3.148	2.15
12	2028		0.099	0.10	-0.093	3.241	3.148	3.05
13	2029		0.099	0.10	-0.093	3.241	3.148	3.05
14	2030		0.099	0.10	-0.093	3.241	3.148	3.05
15	2031		0.099	0.10	-0.093	3.241	3.148	3.05
16	2032		0.099	0.10	-0.093	3.241	3.148	3.05
17	2033		0.099	0.10	-0.093	3.241	3.148	3.05
18	2034		0.099	0.10	-0.093	3.241	3.148	3.05
19	2035		0.099	0.10	-0.093	3.241	3.148	3.05
20	2036		0.099	0.10	-0.093	3.241	3.148	3.05
Total		5.30	2.88	8.19	-0.75	54.25	53.50	45.31

EIRR	22.3%
B/C (*)	2.21
NPV (*)	4.069

(*): Discount Rate = 12%

Source: JICA Study Team

Table A10.2.5 Cost Benefit Stream

(Combination of Jinja Flyover, Mukwano Road Widening and Shoprite/ Clock Tower Traffic Improvement Projects)

Project (1-1/1-2)+(2)+(3) (Unit: US$ Million)

No.	FY	ECONOMIC COST			ECONOMIC BENEFIT			B-C
		Investment	O & M	Total	VOC Saving	TTC Saving	Total	
	2010	0.00	0.00	0.00			0.00	0.00
	2011	0.00	0.00	0.00			0.00	0.00
	2012	2.41	0.00	2.41			0.00	-2.41
	2013	5.38	0.00	5.38			0.00	-5.38
	2014	27.74	0.00	27.74			0.00	-27.74
	2015	36.39	0.00	36.39			0.00	-36.39
	2016	27.74	0.00	27.74			0.00	-27.74
1	2017		0.96	0.96	-0.429	28.214	27.785	26.82
2	2018		0.96	0.96	-0.391	29.216	28.825	27.86
3	2019		0.96	0.96	-0.352	30.217	29.865	28.90
4	2020		0.96	0.96	-0.313	31.218	30.905	29.94
5	2021		0.96	0.96	-0.275	32.219	31.945	30.98
6	2022		0.96	0.96	-0.236	33.221	32.984	32.02
7	2023		0.96	0.96	-0.198	34.222	34.024	33.06
8	2024		0.96	0.96	-0.198	34.222	34.024	33.06
9	2025		0.96	0.96	-0.198	34.222	34.024	33.06
10	2026		0.96	0.96	-0.198	34.222	34.024	33.06
11	2027		3.71	3.71	-0.198	34.222	34.024	30.31
12	2028		0.96	0.96	-0.198	34.222	34.024	33.06
13	2029		0.96	0.96	-0.198	34.222	34.024	33.06
14	2030		0.96	0.96	-0.198	34.222	34.024	33.06
15	2031		0.96	0.96	-0.198	34.222	34.024	33.06
16	2032		24.44	24.44	-0.198	34.222	34.024	9.59
17	2033		0.96	0.96	-0.198	34.222	34.024	33.06
18	2034		0.96	0.96	-0.198	34.222	34.024	33.06
19	2035		0.96	0.96	-0.198	34.222	34.024	33.06
20	2036		0.96	0.96	-0.198	34.222	34.024	33.06
	Total	99.67	45.50	145.17	-4.77	663.41	658.65	513.48

EIRR	22.6%
B/C (*)	1.88
NPV (*)	50.349

(*): Discount Rate = 12%

Source: JICA Study Team

Table A10.2.6 Cost Benefit Stream (Combination of All Projects)

All projects (Unit: US$ Million)

No.	FY	ECONOMIC COST			ECONOMIC BENEFIT			B-C
		Investment	O & M	Total	VOC Saving	TTC Saving	Total	
	2010	0.00	0.00	0.00			0.00	0.00
	2011	0.00	0.00	0.00			0.00	0.00
	2012	2.41	0.00	2.41			0.00	-2.41
	2013	5.38	0.00	5.38			0.00	-5.38
	2014	27.74	0.00	27.74			0.00	-27.74
	2015	36.39	0.00	36.39			0.00	-36.39
	2016	27.74	0.00	27.74			0.00	-27.74
1	2017	0.00	0.96	0.96	-0.604	27.981	27.377	26.41
2	2018	0.00	0.96	0.96	-0.391	29.216	28.825	27.86
3	2019	0.00	0.96	0.97	-0.177	30.450	30.273	29.31
4	2020	0.21	0.96	1.18	0.037	31.685	31.722	30.54
5	2021	3.28	0.96	4.24	0.250	32.920	33.170	28.93
6	2022	3.42	0.96	4.38	0.464	34.154	34.618	30.23
7	2023	0.00	1.02	1.02	0.677	35.389	36.066	35.04
8	2024	0.00	1.02	1.02	0.677	35.389	36.066	35.04
9	2025	0.00	1.02	1.02	0.677	35.389	36.066	35.04
10	2026	0.00	1.02	1.02	0.677	35.389	36.066	35.04
11	2027	0.00	3.77	3.77	0.677	35.389	36.066	32.30
12	2028	0.00	1.02	1.02	0.677	35.389	36.066	35.04
13	2029	0.00	1.02	1.02	0.677	35.389	36.066	35.04
14	2030	0.00	1.02	1.02	0.677	35.389	36.066	35.04
15	2031	0.00	1.02	1.02	0.677	35.389	36.066	35.04
16	2032	0.00	24.50	24.50	0.677	35.389	36.066	11.57
17	2033	0.00	1.02	1.02	0.677	35.389	36.066	35.04
18	2034	0.00	1.02	1.02	0.677	35.389	36.066	35.04
19	2035	0.00	1.02	1.02	0.677	35.389	36.066	35.04
20	2036	0.00	1.02	1.02	0.677	35.389	36.066	35.04
21	2037	0.00	0.06	0.06	0.677	35.389	36.066	36.01
22	2038	0.00	2.22	2.22	0.677	35.389	36.066	33.85
23	2039	0.00	0.06	0.06	0.677	35.389	36.066	36.01
24	2040	0.00	0.06	0.06	0.677	35.389	36.066	36.01
25	2041	0.00	0.06	0.06	0.677	35.389	36.066	36.01
26	2042	0.00	0.06	0.06	0.677	35.389	36.066	36.01
Total		106.58	48.87	155.46	13.12	894.19	907.31	751.85

EIRR	23.0%
B/C (*)	2.01
NPV (*)	59.421

(*): Discount Rate = 12%

Source: JICA Study Team

A10.3 SENSITIVITY ANALYSIS BY PRE-FS PROJECT

Detailed results of sensitivity analysis are presented below:

Table A10.3.1 Sensitivity Analysis (Jinja Flyover)

Jinja Flyover

			Project Cost			
			Base Case	10% Increase	15% Increase	20% Increase
Economic Benefit	Base Case	EIRR	20.7%	19.0%	18.2%	17.5%
		B/C	1.70	1.54	1.47	1.41
		NPV	34.126	29.219	26.765	24.311
	10% Decrease	EIRR	18.8%	17.2%	16.4%	15.7%
		B/C	1.53	1.39	1.33	1.27
		NPV	25.806	20.898	18.444	15.991
	15% Decrease	EIRR	17.8%	16.2%	15.5%	14.8%
		B/C	1.44	1.31	1.25	1.20
		NPV	21.646	16.738	14.284	11.831
	20% Decrease	EIRR	16.8%	15.2%	14.5%	13.9%
		B/C	1.36	1.23	1.18	1.13
		NPV	17.486	12.578	10.124	7.670

Note: Discount Rate = 12%

Source: JICA Study Team

Table A10.3.2 Sensitivity Analysis (Clock Tower Flyover)

Clock Tower Flyover

			Project Cost			
			Base Case	10% Increase	15% Increase	20% Increase
Economic Benefit	Base Case	EIRR	32.4%	29.7%	28.5%	27.4%
		B/C	2.49	2.26	2.16	2.07
		NPV	2.786	2.598	2.505	2.411
	10% Decrease	EIRR	29.4%	26.9%	25.8%	24.7%
		B/C	2.24	2.03	1.95	1.87
		NPV	2.320	2.133	2.039	1.945
	15% Decrease	EIRR	27.9%	25.5%	24.4%	23.4%
		B/C	2.11	1.92	1.84	1.76
		NPV	2.087	1.900	1.806	1.712
	20% Decrease	EIRR	26.3%	24.0%	22.9%	22.0%
		B/C	1.99	1.81	1.73	1.66
		NPV	1.854	1.667	1.573	1.479

Note: Discount Rate = 12%

Source: JICA Study Team

Table A10.3.3 Sensitivity Analysis (Mukwano Road Widening)

Mukwano Road Widening

			Project Cost			
			Base Case	10% Increase	15% Increase	20% Increase
Economic Benefit	Base Case	EIRR	38.8%	36.6%	35.6%	34.6%
		B/C	4.32	3.92	3.75	3.60
		NPV	15.823	15.345	15.107	14.868
	10% Decrease	EIRR	36.3%	34.2%	33.3%	32.3%
		B/C	3.88	3.53	3.38	3.24
		NPV	13.763	13.286	13.047	12.809
	15% Decrease	EIRR	35.1%	33.0%	32.0%	31.1%
		B/C	3.67	3.34	3.19	3.06
		NPV	12.733	12.256	12.018	11.779
	20% Decrease	EIRR	33.7%	31.7%	30.8%	29.9%
		B/C	3.45	3.14	3.00	2.88
		NPV	11.704	11.227	10.988	10.749

Note: Discount Rate = 12%

Source: JICA Study Team

Table A10.3.4 Sensitivity Analysis (Shoprite/ Clock Tower Traffic Improvement)

Shoprite/ Clock Tower Traffic Safety Improvement

			Project Cost			
			Base Case	10% Increase	15% Increase	20% Increase
Economic Benefit	Base Case	EIRR	22.3%	20.9%	20.3%	19.7%
		B/C	2.21	2.01	1.92	1.84
		NPV	4.069	3.733	3.565	3.397
	10% Decrease	EIRR	20.8%	19.5%	18.9%	18.3%
		B/C	1.99	1.81	1.73	1.66
		NPV	3.326	2.990	2.822	2.654
	15% Decrease	EIRR	20.0%	18.7%	18.1%	17.6%
		B/C	1.88	1.71	1.63	1.57
		NPV	2.955	2.619	2.451	2.283
	20% Decrease	EIRR	19.2%	17.9%	17.3%	16.8%
		B/C	1.77	1.61	1.54	1.47
		NPV	2.583	2.247	2.079	1.911

Note: Discount Rate = 12%

Source: JICA Study Team

Table A10.3.5 Sensitivity Analysis (Combination of Jinja Flyover, Mukwano Road Widening and Shoprite/Clock Tower Traffic Safety Projects)

Project (1-1/1-2)+(2)+(3)

			Project Cost			
			Base Case	10% Increase	15% Increase	20% Increase
Economic Benefit	Base Case	EIRR	22.6%	20.8%	20.0%	19.2%
		B/C	1.88	1.71	1.63	1.57
		NPV	50.349	44.628	41.768	38.907
	10% Decrease	EIRR	20.6%	18.9%	18.1%	17.4%
		B/C	1.69	1.54	1.47	1.41
		NPV	39.593	33.872	31.012	28.151
	15% Decrease	EIRR	19.6%	17.9%	17.2%	16.5%
		B/C	1.60	1.45	1.39	1.33
		NPV	34.215	28.494	25.634	22.774
	20% Decrease	EIRR	18.5%	16.9%	16.2%	15.5%
		B/C	1.50	1.37	1.31	1.25
		NPV	28.837	23.117	20.256	17.396

Note: Discount Rate = 12%

Source: JICA Study Team

Table A10.3.6 Sensitivity Analysis (Combination of All Projects)

All projects

			Project Cost			
			Base Case	10% Increase	15% Increase	20% Increase
Economic Benefit	Base Case	EIRR	23.0%	21.3%	20.5%	19.8%
		B/C	2.01	1.82	1.74	1.67
		NPV	59.421	53.513	50.559	47.605
	10% Decrease	EIRR	21.1%	19.4%	18.7%	18.0%
		B/C	1.81	1.64	1.57	1.50
		NPV	47.571	41.663	38.709	35.754
	15% Decrease	EIRR	20.1%	18.5%	17.8%	17.1%
		B/C	1.70	1.55	1.48	1.42
		NPV	41.646	35.738	32.783	29.829
	20% Decrease	EIRR	19.1%	17.5%	16.8%	16.2%
		B/C	1.60	1.46	1.40	1.34
		NPV	35.721	29.812	26.858	23.904

Note: Discount Rate = 12%

Source: JICA Study Team

A10.4 RESULTS OF ECONOMIC EVALUATION FOR SCENARIO 2

The results of economic evaluation of Scenario 2 are shown below: All the projects except for Project 3 (Shoprite/ Clock Tower Traffic Safety Project) are economically feasible. Only the project 3 is not feasible in contrast to the Scenario 1. One of the reasons of this is the difference of traffic volumes of minibuses coming/ going to the CBD from/to the west direction of the Shoprite/ Clock Tower junctions which are to be diverted to BRT and long distance large buses reducing number minibuses more than those of Scenario 1 in 2023.

Table A10.4.1 Economic Evaluation of Scenario 2

No.	Project Name	EIRR	B/C (*)	NPV (*)
1-1/1-2	Jinja Flyover Project	21.6%	1.81	39.617
1-3	Clock Tower Flyover Project	25.0%	1.89	1.665
2	Mukwano Road Widening Project	41.4%	5.56	21.750
3	Shoprite & Clock Tower Traffic Safety Improvement Project	N.A.	0.46	-1.813
	Combination of Projects (1-1)+(2)+(3)	23.2%	1.97	55.476
	Combination of All Projects	23.8%	2.12	66.073

Note: (*): Discount Rate = 12%
NPV: in US$ Million

A10.5 TRAFFIC ACCIDENT RECORDS OF CLOCK TOWER AND SHIPRITE JUNCTIONS (2009)

Table A10.5.1 Traffic Accident Record at Shoprite Junction (2009)

SHOPRITE TRAFFIC ACCIDENT RECORD (2009)

Date	TAR Booking	Type of Vehicle	Damage	Nature of Accident	Victims	Cause
2009/3/1	13/09	Light Omnibus	Slight	Minor	Nil	Careless
2009/3/1	13/09	Light Omnibus	Slight	Serious	2M/A-Pax	Reckless
2009/4/1	19/09	Light Omnibus	Slight	Minor	1M/A-Rider	Careless
2009/5/1	24/09	Light Omnibus	Slight	Serious	1F/A-Pedstrian	Careless
2009/9/1	50/09	Light Omnibus	Slight	Serious	1M/A	Careless
2009/8/1	64/09	Light Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
2009/11/1	72/09	2motorcars	Slight	Minor	Nil	Careless
2009/11/1	76/09	2motorcycles	Slight	Serious	2M/A-Riders	Careless
13/1/2009	78/09	motorcar	Slight	Serious	1F/A-Pedstrian	Careless
17/1/2009	95/09	2Light Omnibus	Slight	Minor	Nil	Careless
16/1/2009	100/09	Light Omnibus&motorcycle	Slight	Serious	1M/A-Pax	Careless
20/1/2009	115/09	motorcycle	Slight	Serious	1F/A-Pedstrian	Careless
23/1/2009	141/09	Light Omnibus&motorcycle	Slight	Minor	Nil	Careless
27/1/2009	163/09	Light Omnibus& pick up	Slight	Minor	Nil	Careless
28/1/2009	167/09	Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
31/1/2009	187/09	2Omnibus	Slight	Serious	1F/A-Pedstrian	Careless
2009/2/2	192/09	Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
2009/3/2	202/09	motorcar	Slight	Serious	1M/A	Careless
2009/7/2	215/09	motorcar	Slight	Minor	Pedstrian	Careless
2009/4/4	229/09	2Omnibus	Slight	Minor	Nil	Careless
2009/11/2	254/09	Lorry& omnibus	Slight	Minor	Nil	Careless
2009/11/2	256/09	motorcar	Slight	Serious	1M/A	Careless
2009/2/2	265/09	Pickup&omnibus	Slight	Minor	Nil	Careless
2009/12/2	262/09	motorcycle	Slight	Serious	1M/A-Pedstrian	Careless
17/2/2009	296/09	2motorcycles	Slight	Minor	Nil	Careless
23/2/2009	342/09	Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
20/2/2009	346/09	Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
27/2/2009	366/09	Omnibus	Slight	Serious	1F/A-Pedstrian	Careless
14/2/2009	383/09	Pickup	Slight	Minor	Nil	Careless
2009/3/3	397/09	Lorry& omnibus	Slight	Serious	1M/A-Pax	Careless
2009/4/3	405/09	motorcycle	Slight	Minor	Nil	Careless
2009/7/3	424/09	2motorcycle	Slight	Serious	1M/A-Pax	Careless
2009/9/3	454/09	Omnibus&bicycle	Slight	Serious	1M/A-Pedstrian	Careless
2009/12/3	451/09	Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
18/3/2009	471/09	Omnibus & Coaster	Slight	Minor	Nil	Careless
27/3/2009	521/09	motorcycle	Slight	Serious	1M/A-Pax	Careless
31/3/2009	540/09	motorcar & motorcycle	Slight	Serious	1F/A-Pax	Careless
2009/2/4	546/09	motorcycle	Slight	Serious	1M/A-Pedstrian	Careless
2009/2/4	550/09	Omnibus&bicycle	Slight	Serious	1M/A-Pedstrian	Careless
2009/10/4	595/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
2009/11/4	598/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
15/04/09	615/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
20/04/2009	638/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
2009/3/5	714/09	2Omnibus	Slight	Minor	Nil	Careless
2009/4/5	716/09	2Omnibus	Slight	Minor	Nil	Careless
2009/9/5	745/09	Omnibus	Slight	Serious	Nil	Careless
2009/11/5	751/09	Omnibus& motorcar	Slight	Serious	Nil	Careless
16/5/2009	784/09	Pickup&motorcycle	Slight	Minor	Nil	Careless
17/5/2009	786/09	2Omnibus	Slight	Minor	Nil	Careless
21/05/2009	808/09	Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
24/5/2009	824/09	2Pickups	Slight	Minor	Nil	Careless
29/5/2009	845/09	Omnibus& motorcycle	Slight	Serious	1M/A-Rider	Careless
2009/2/6	871/09	Omnibus&bicycle	Slight	Serious	1M/A-Pedstrian	Careless
31/5/2009	888/09	Omnibus& motorcycle	Slight	Minor	Nil	Careless
2009/3/6	946/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
15/6/2009	954/09	motorcar	Slight	Serious	1F/Pedstrian	Careless

Source: Uganda Police Force

Table A10.5.1 Traffic Accident Record at Shoprite Junction (2009), Continued

Date	TAR Booking	Type of Vehicle	Damage	Nature of Accident	Victims	Cause
16/6/09	957/09	Motorcycle& pickup	Slight	Serious	1M/A-Rider	Careless
16/6/09	958/09	2Omnibus & motorcar	Slight	Minor	Nil	Careless
15/6/09	1015/09	P/up&M/car	Slight	Minor	Nil	Careless
27/6/09	1028/09	P/up&omnibus	Slight	Minor	Nil	Careless
29/6/09	1036/09	2Omnibus	Slight	Minor	Nil	Careless
29/6/2009	1067/09	2motorcars	Slight	Minor	Nil	Careless
2009/4/7	1075/09	P/up&M/car	Slight	Minor	Nil	Careless
2009/9/7	1078/09	2motorcars	Slight	Minor	Nil	Careless
2009/12/7	1080/09	Omnibus	Slight	Serious	1M/Pedstrian	Careless
18/7/2009	1099/09	P/up&omnibus	Slight	Minor	Nil	Careless
2009/12/7	1123/09	Omnibus	Slight	Serious	1M/Pedstrian	Careless
17/7/2009	1053/09	motorcycle	Slight	Serious	1M/Pedstrian	Careless
20/7/2009	1175/09	motorcycle & motorcar	Slight	Light	Nil	Careless
21/7/2009	1180/09	motorcar	Slight	Light	1M/A-Pedstrian	Careless
23/7/2009	1194/09	Lorry& motorcycle	Slight	Serious	Mpax	Careless
31/7/2009	1239/09	M/C&M/C	Slight	Minor	Nil	Careless
2009/1/8	1245/09	Omnibus	Slight	Serious	1M/A-Rider	Careless
2009/6/8	1284/09	Omnibus	Slight	Serious	1M/Pedstrian	Careless
28/8/2009	1542/09	motorcycle & motorcar	Slight	Serious	1Fpax	Careless
16/9/2009	1548/09	motorcycle & bicycle	Slight	Minor	1M/A-Rider	N.A
19/9/2009	1567/09	Omnibus& motorcar	Slight	Serious	2M/A pedstrians	Careless
19/9/2009	1566/09	Omnibus	Slight	Serious	1M/Pedstrian	Careless
21/9/2009	1574/09	Lorry&motorcycle	Slight	Serious	1M/A-Rider	Careless
23/9/2009	1591/09	Omnibus& Lorry	Slight	Serious	Nil	N.A
24/9/2009	1598/09	motorcar	Slight	Serious	1Fpax	Careless
28/9/2009	1425/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
2009/1/9	1453/09	motorcycle	Slight	Serious	1F/Pedstrian	Careless
2009/2/9	1457/09	motorcycle	Slight	Serious	1M/Pedstrian	Careless
2009/5/9	1469/09	2Omnibus	Slight	Minor	Nil	Careless
2009/5/9	1471/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
2009/5/9	1475/09	Omnibus	Slight	Serious	1Fpax	Careless
2009/5/9	1489/09	motorcar	Slight	Minor	Nil	after cause
13/9/2009	1523/09	2Omnibus	Slight	Minor	Nil	Careless
18/9/2009	1556/09	P/up&Pedstrian&m/bus	Slight	Serious	1Fpax	Careless
19/9/2009	1566/09	Light omnibus&pedstrian	Slight	Serious	1M/Pedstrian	Careless
19/9/2009	1569/09	Light omnibus&M/car	Slight	Serious	2M/Pedstrian	Careless
21/9/2009	1574/09	Lorry&Motorcycle	Slight	Minor	Nil	Careless
23/9/2009	1591/09	Lorry&omnibus	Slight	Minor	Nil	Careless
24/9/2009	1598/09	P/up& Pedstrian	Slight	Serious	1F/Pedstrian	Reckless
25/9/2009	1604/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
27/9/2009	1630/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
14/10/2009	1701/09	Omnibus& pedstrian	Slight	Serious	1M/Pedstrian	Careless
15/10/2009	1704/09	motorcycle & 2motorcars	Slight	Serious	Nil	Careless
16/10/2009	1713/09	Lorry &pedstrian	Slight	Serious	1M/Pedstrian	Careless
17/10/2009	1717/09	motorcycle & motorcar	Slight	Minor	Nil	Reckless
17/10/2009	1722/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
28/10/2009	1782/09	motorcycle &Pedstrian	Slight	Serious	1M/Pedstrian	Reckless
29/10/2009	1792/09	Omnibus& pedstrian	Slight	Serious	1M/Pedstrian	N.A
30/10/2009	1797/09	motorcycle & motorcar	Slight	Serious	1M/Pedstrian	Careless
2009/8/11	1849/09	Lorry&Motorcycle	Slight	Serious	1M/Pedstrian	Careless
2009/12/11	1773/09	motorcycle & motorcar	Slight	Minor	Nil	Careless
14/11/2009	1889/09	M/C&perdstrian	Slight	Serious	1M/Pedstrian	Careless
14/11/2009	1892/09	P/up&M/car	Slight	Minor	Nil	Reckless
22/11/2009	1925/09	M/C&light goods	Slight	Minor	Nil	Careless
13/11/2009	1934/09	motorcycle & motorcar	Slight	Serious	1M/A-Rider	Careless
14/11/2009	1940/09	motorcycle & motorcar	Slight	Minor	Nil	Careless
19/11/2009	1967/09	M/C& 2omnibuses	Slight	Minor	Nil	Careless
2009/7/12	2014/09	3Omnibus	Slight	Minor	Nil	Careless
13/12/2009	2041/09	Omnibus& motorcar	Slight	Minor	Nil	Careless
14/12/2009	2042/09	Lorry&omnibus	Slight	Minor	Nil	Careless
16/12/2009	2060/09	Omnibus& dual purpose	Slight	Minor	Nil	Careless
18/12/2009	2076/09	Light Gas vehicle&M/C	Slight	Minor	Nil	Careless
22/12/2009	2098/09	3motorcars	Slight	Minor	Nil	Careless
22/12/2009	2100/09	Omnibus& pedstrian	Slight	Serious	Nil	Careless
22/12/2009	2101/09	2M/Cars	Slight	Minor	Nil	Careless
25/12/2009	2116/09	2M/Cars	Slight	Serious	Nil	Careless
28/12/2009	2122/09	Omnibus& pedstrian	Slight	Serious	1M/Pedstrian	Careless

Source: Uganda Police Force

Table A10.5.2 Traffic Accident Record at Clock Tower Junction (2009)

CLOCK TOWER TRAFFIC ACCIDENT RECORD (2009)

Date	TAR Booking	Type of Vehicle	Damage	Nature of Accident	Victims	Cause
2009/7/1	13/09	M/car	Slight	Minor	Nil	Reckless
2009/12/1	13/09	M/cycle	Slight	Serious	1F/A-Pax	Reckless
16/1/2009	16/09	M/cycle	Slight	Minor	Nil	Careless
13/1/2009	16/09	Dual purpose/M.car	Slight	Minor	Nil	Careless
13/1/2009	18/09	M/cycle	Slight	Serious	M/Rider	Reckless
17/1/2009	30/09	2M/cycle	Slight	Minor	Nil	Careless
19/1/2009	61/09	M/car	Slight	Serious	1M/A-Pedstrian	Careless
24/1/2009	79/09	2motorcycles/M/cart	Slight	Serious	Nil	Careless
26/1/2009	149/09	motorcar& omnibus	Slight	Minor	Nil	Careless
2009/5/1	211/09	M/car	Slight	Serious	1F/Pedstrian	Careless
2009/7/2	240/09	M/car & omnibus	Slight	Minor	Nil	Careless
15/2/2009	211/09	M/car	Slight	Serious	1F/Pedstrian	Careless
19/2/2009	240/09	motorcar& omnibus	Slight	Minor	Nil	Careless
23/2/2009	352/09	2motorcycles/M/cart	Slight	Serious	M/Rider	Careless
27/2/2009	364/09	2M/cars	Slight	Minor	Nil	Careless
28/2/2009	369/09	2M/cars	Slight	Minor	Nil	Careless
2009/1/3	379/09	Omnibus	Slight	Serious	1M/A-Pedstrian	Careless
2009/1/3	381/09	2M/cars	Slight	Minor	Nil	Careless
2009/3/3	387/09	M/car& M/cycle	Slight	Serious	M/Rider	Careless
2009/2/3	394/09	2M/cycle	Slight	Serious	1M/Pax	Careless
2009/7/3	430/09	2Omnibus	Slight	Minor	Nil	Careless
2009/10/3	441/09	Omnibus	Slight	Minor	Nil	Careless
18/3/2009	478/09	Omnibus& M/car	Slight	Minor	Nil	Careless
26/3/2009	512/09	P/up&M/car	Slight	Minor	Nil	Careless
26/3/2009	513/09	2M/cars	Slight	Minor	Nil	Careless
30/3/2009	538/09	Omnibus	Slight	Minor	1M/Pedstrian	Careless
2009/3/4	560/09	M/car	Slight	Minor	Nil	Careless
20/4/2009	644/09	M/cycle	Slight	Minor	Nil	Careless
21/4/2009	645/09	Omnibus& M/car	Slight	Minor	Nil	Careless
23/4/2009	660/09	Omnibus& M/car	Slight	Minor	Nil	Careless
23/4/2009	661/09	M/car	Slight	Minor	Nil	Careless
2009/1/5	701/09	Omnibus/M/C	Slight	Minor	Nil	Careless
2009/3/5	713/09	Omnibus	Slight	Serious	1F/Mpedstrians	Careless
2009/9/5	743/09	2Omnibus	Slight	Minor	Nil	Careless
2009/10/5	747/09	M/cycle	Slight	Serious	M/Rider	Careless
17/5/2009	787/09	M/car& bicycle	Slight	Minor	Nil	Careless
25/5/2009	829/09	2M/cars	Slight	Minor	Nil	Careless
28/5/2009	836/09	P/up car	Slight	Minor	Nil	Careless
28/5/2009	837/09	M/cycle	Slight	Serious	1M/Pax	Careless
2009/1/6	864/09	M/car	Slight	Minor	Nil	Careless
2009/8/6	912/09	P/up&M/car	Slight	Minor	Nil	Careless
2009/10/6	926/09	M/C & M/Cycle	Slight	Minor	Nil	Careless
18/6/2009	917/09	2M/cars	Slight	Minor	Nil	Careless
18/6/2009	973/09	2M/cycles	Slight	Serious	1M/Pedstrian	Careless
21/6/2009	988/09	M/car	Slight	Serious	1M/Pedstrian	Careless
21/6/2009	989/09	M/car	Slight	Serious	1M/Pedstrian	Careless

Source: Uganda Police Force

Table A10.5.2 Traffic Accident Record at Clock Tower Junction (2009), Continued

Date	TAR Booking	Type of Vehicle	Damage	Nature of Accident	Victims	Cause
22/6/2009	1002/09	2M/cycles	Slight	Serious	M/Rider	Careless
23/6/2009	1004/09	M/cycle	Slight	Serious	1M/Pedstrian	Careless
25/6/2009	1014/09	P/up& Omnibus	Slight	Minor	Nil	Careless
25/6/2009	1017/09	Omnibus& M/car	Slight	Minor	Nil	Careless
13/6/2009	1033/09	M/car	Slight	Minor	Nil	Careless
30/6/2009	1042/09	P/up&M/car	Slight	Minor	Nil	Careless
2009/3/7	1069/09	2M/cars	Slight	Minor	Nil	Careless
2009/2/7	1070/09	M/car	Slight	Minor	Nil	Careless
2009/8/7	1093/09	Omnibus& M/car	Slight	Minor	Nil	Careless
2009/10/7	1107/09	2Omnibuses	Slight	Minor	Nil	Careless
2009/10/7	1112/09	M/car&Trailer	Slight	Minor	Nil	Careless
13/7/09	1124/09	Omnibus& M/cycle	Slight	Serious	M/Rider	Careless
13/7/09	1015/09	Omnibus& M/car	Slight	Minor	Nil	Careless
13/7/09	1128/09	Omnibus& M/car	Slight	Minor	Nil	Careless
18/7/09	1058/09	M/cycle	Slight	Serious	1M/Pedstrian	Careless
18/7/2009	1165/09	M/C & M/Cycle	Slight	Minor	Nil	Careless
2009/7/8	1287/09	P/up& Omnibus	Slight	Minor	Nil	Careless
2009/9/8	1300/09	P/up& Omnibus	Slight	Minor	Nil	Careless
2009/9/8	1319/09	Omnibus& M/cycle	Slight	Serious	1M/Pax	Careless
2009/11/8	1325/09	M/cycle	Slight	Serious	1F/Jpedstrians	Careless
2009/12/8	1326/09	Omnibus& M/car	Slight	Minor	Nil	Careless
2009/12/8	1337/09	2Omnibuses	Slight	Minor	Nil	Careless
17/8/2009	1361/09	M/car	Slight	Serious	1M/Pedstrian	Careless
26/8/2009	1411/09	Omnibus& M/car	Slight	Minor	Nil	Careless
25/7/2009	1206/09	2Omnibuses7 m/c	Slight	Minor	Nil	Careless
31/7/2009	1247/09	Omnibus& M/cycle	Slight	Minor	Nil	Careless
2009/7/8	1288/09	2Mcycles	Slight	Minor	Nil	Careless
2009/4/8	1289/09	M/Car& Trailer	Slight	Minor	Nil	Careless
2009/8/8	1304/09	Omnibus& M/car	Slight	Minor	Nil	Careless
2009/11/8	1324/09	Omnibus& M/car	Slight	Minor	Nil	N.A
17/8/2009	1391/09	M/cycle	Slight	Serious	1F/A pedstrians	Careless
29/8/2009	1431/09	M/C & M/Cycle	Slight	Serious	1F/A pedstrians	Careless
31/8/2009	1434/09	Omnibus& M/cycle	Slight	Minor	Nil	Careless
31/8/2009	1447/09	M/cycle	Slight	Serious	1M/A pedstrians	N.A
31/82009	1452/09	M/cycle	Slight	Serious	1M/A pedstrians	Careless
17/8/2009	1555/09	M/C & M/Cycle	Slight	Minor	Nil	Careless
26/9/2009	1612/09	Dual purpose/M.car	Slight	Minor	Nil	Careless
28/9/2009	1616/09	M/car&Lorry	Slight	Minor	Nil	Careless
29/9/2009	1618/09	2M/cars	Slight	Serious	Nil	Careless
29/9/2009	1623/09	Omnibus& pedstrian	Slight	Serious	3Mpedstrians	Careless
2009/3/10	1647/09	2M/cars	Slight	Minor	Nil	Careless
2009/5/10	1654/09	M/car	Slight	Serious	1M/Pax	after cause
2009/5/10	1659/09	Omnibus& Pedstrian	Slight	Serious	1M/A pedstrians	Careless
16/10/2009	1556/09	M/cycle & Pedstrian	Slight	Serious	1M/Pax	Careless
29/10/2009	1729/09	2Dual purpose m/c	Slight	Minor	Nil	Careless
31/10/2009	1800/09	M/car/Pavement	Slight	Minor	Nil	Careless
2009/11/11	1863/09	Omnibus& pedstrian	Slight	Minor	1M/Pax	Careless
16/11/2009	1908/09	M/Car&Omnibus	Slight	Minor	Nil	Careless
25/11/2009	1946/09	M/cycle & Pedstrian	Slight	Serious	1F/Pedstrian	Reckless
26/11/2009	1947/09	2M/cars	Slight	Minor	Nil	Careless
30/11/2009	1068/09	Dual purpose/omnibus	Slight	Minor	Nil	Careless
2009/1/12	1979/09	2Omnibuses	Slight	Serious	Nil	Careless
2009/1/12	2031/09	Omnibus&M/C	Slight	Serious	M/Rider	Careless
15/12/2009	2052/09	Omnibus& pavement	Slight	Minor	Nil	Careless
16/12/2009	2062/09	M/cycle & Pedstrian	Slight	Serious	1M/A pedstrians	Reckless
21/12/2009	2093/09	M/cycle & Pedstrian	Slight	Minor	Nil	Careless
26/12/2009	2121/09	2M/cars	Slight	Minor	Nil	Reckless

Source: Uganda Police Force