BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT
OF
TRAFFIC FLOW IN KAMPALA CITY
IN
THE REPUBLIC OF UGANDA

MARCH 2005

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.
AND
JAPAN ENGINEERING CONSULTANTS CO., LTD.

PREFACE

In response to a request from the Government of the Republic of Uganda, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Traffic Flow in Kampala City in the Republic of Uganda and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to Uganda a study team from September 4 to October 8, 2004.

The team held discussions with the officials concerned of the Government of Uganda, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Uganda from December 11 to December 30, 2004 in order to discuss a draft basic design.

After the additional studies in Japan, a mission was sent to Uganda from February 19 to March 5, 2005 in order to discuss a draft final report, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Uganda for their close cooperation extended to the teams.

March 2005

Kunimitsu Yoshinaga
Vice-President

Japan International Cooperation Agency

March 2005

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of Traffic Flow in Kampala City in the Republic of Uganda.

This study was conducted by Nippon Koei Co., Ltd. and Japan Engineering Consultants Co., Ltd., under a contract to JICA, during the period from August 23, 2004 to March 31, 2005. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Uganda and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

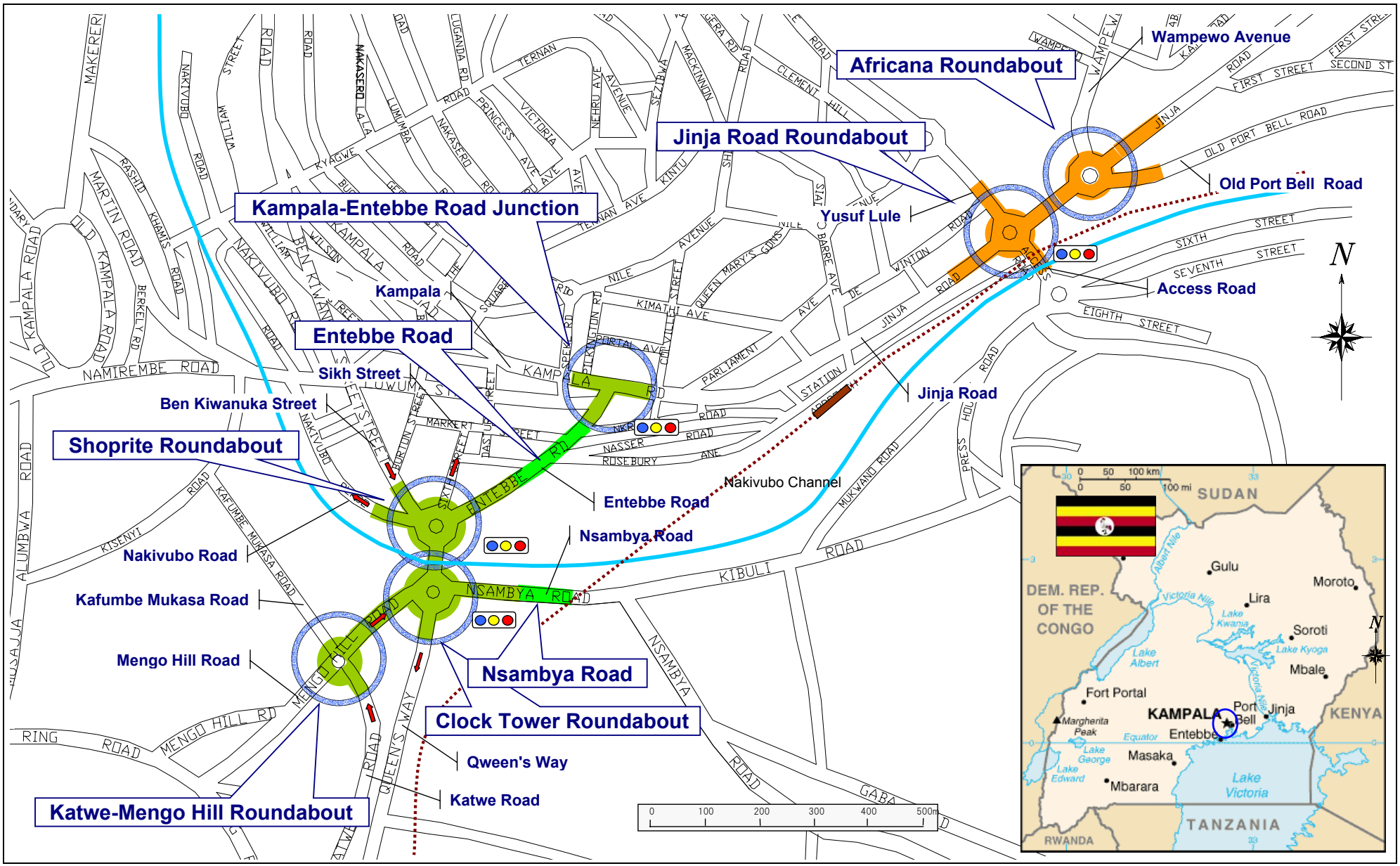
Very truly yours,

Hiroshi Fujisawa

Project Manager

Basic design study team on the Project for Improvement of Traffic Flow in Kampala City in the Republic of Uganda

Nippon Koei Co., Ltd.
and Japan Engineering Consultants Co., Ltd.



LOCATION MAP

THE PROJECT FOR IMPROVEMENT OF TRAFFIC FLOW IN KAMPALA CITY IN THE REPUBLIC OF UGANDA

PERSPECTIVE VIEW OF THE IMPROVED CLOCK TOWER AND SHOPRITE JUNCTION

PERSPECTIVE VIEW OF THE IMPROVED JINJA ROAD JUNCTION

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Abbreviations

A/P	Authorization to Pay
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
ADF	African Development Fund
ADT	Average Daily Traffic
AVR	Automatic Voltage Regulator
B/A	Banking Arrangement
BADEA	Arab Bank of Economic Development in Africa
BS	British Standard
CBR	California Bearing Ratio
CIF	Cost, Insurance, Freight
DANIDA	Danish International Development Agency
DBST	Double Bituminous Surface Treatment
DCP	Dynamic Cone Penetration
DHV	Design Hour Volume
E/N	Exchange of Notes
EC	European Commission
EIA	Environmental Impact Assessment
EIR	Environmental Impact Research
ESAL	Equivalent Single-Axle Load
EU	European Union
FOB	Free on Board
GDP	Gross Domestic Product
GNP	Gross National Product
GOU	Government of Uganda
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
KCC	Kampala City Council
KDMP	Kampala Drainage Master Plan
KUTIP	Kampala Urban Traffic Improvement Plan
LED	Light Emitting Diode
MOFPED	Ministry of Finance, Planning and Economic Development
MOLG	Ministry of Local Government
MOLWE	Ministry of Land, Water and Environmental
MOWHC	Ministry of Works, Housing and Communications
NCRP	Nakivubo Channel Rehabilitation Project
NEMA	National Environmental Management Agency
NSSF	National Social Security Fund
NWSC	National Water and Sewerage Corporation
PCU	Passenger Car Unit
PEAP	Poverty Eradication Action Plan
PIP	Public Investment Plan
PSI	Present Serviceability Index
PSR	Present Serviceability Rating
RAFU	Road Agency Formation Unit
ROW	Right of Way
RSDP	Ten Year Road Sector Development Programme
UEB	Uganda Electric Board
UEDCL	Uganda Electric Distribution Company Ltd.
UEGCL	Uganda Electric G Company Ltd.
UETCL	Uganda Electric Transportation Company Ltd.
UPS	Uninterruptible Power System
Ushs	Uganda Shilling
UTL	Uganda Telephone Ltd.
WB	World Bank

Summary

The Republic of Uganda (hereinafter called "Uganda") has, since the beginning of the Musebeni Government, implemented the structural adjustment policy positively aiming at macroeconomic stabilization by concrete ways such as reduction of the number of civil servants and liberalization of the agricultural market. To activate economic activities within this framework, Uganda has determined the development targets in the Public Investment Plan (PIP), 1996/1997-1998/1999 with the support of the World Bank and IMF since 1987.

To achieve the determined national targets, the Ministry of Transport and Public Works (hereinafter called "MOWHC") formulated in the 1996 a "Ten-Year Road Sector Development Programme (RSDP1), 1996/97-2005/2006". In the year 2000, MOWHC formulated a "RSDP2, 5–years Rolling Plan, 2001/02-2010/11" on the basis of reviewed RSDP1, and is now implementing the more concrete targets.

In addition, a draft "Poverty Eradication Action Plan (PEAP)" was drawn up in 1997 with the support of the World Bank, and was revised in 2000. Following are 4 important factors defined in PEAP:

- Improvement of the economic system:
  Junction improvements will solve traffic congestion and strengthen transportation, thus activate economy.
- Appropriate autonomy and safety:
  Junction improvements will reduce traffic accidents and thus ensure life safety.
- Income growth of people who live in difficulty:
  Junction improvements will provide all people with the road service equally.
- Improvement of the living standard.
  Junction improvements will provide all people with the road service equally.

Kampala City, which is the center of politics, administration, manufacturing industry, commerce, and distribution in Uganda, has the following problems for a long time:

- How to solve the drastic growth of car accidents (10.3 /1000 persons) caused by the rapid growth of car possession rate since 1997 (10% /year)
- How to drain without sufficient drainage systems the flood water on the roads and junctions due to the hilly location of Kampala city.

Eighty percent of the working population in Kampala city engage in the 2nd industry or 3rd industry, which is a typical urban working structure. The working places are concentrated mainly in the city center; while housing areas are located in the suburbs. This condition generates severe traffic flow between the city center and the suburbs during the commuting time.

In addition, the present condition of the road network in Kampala city causes traffic congestion. Especially, congestion is very severe on the roads connected to trunk roads such as Clock Tower, Kibuye, Jinja Roads, and the Wandegeya Junction. The 6 roads which radiate in all directions from the city center form the road network in Kampala city with the Jinja and Masaka Roads being the international roads, however, all traffic must pass through the city center because there are no ring diversion roads to bypass the city center and suburbs.

Under such circumstance, the Kampala City Council (hereinafter called "KCC") positively implemented the "Kampala Urban Traffic Improvement Plan (KUTIP)" from 2001 to 2003 with a loan extended by the World Bank. This master plan only focuses on the improvement of traffic condition. For improvement of drainage, the following 2 projects were implemented from 2001 to 2003: Nakibuvo Channel Rehabilitation Project (NCRP) and Kampala Drainage Master Plan (KDMP).

On the other hand, the Government of Uganda (hereinafter called "GOU") requested the Government of Japan in April 1995 to provide a Grant Aid for the study on "Improvement of Trunk Roads at Kampala Urban Interface Sections" for alleviating traffic congestion in Kampala City. In response to the request, JICA conducted the Master Plan (M/P) Study and Feasibility Study (F/S) from December 1996 to November 1997 with the following purposes:

- M/P is aimed at improving the road network in Kampala City by the target year 2015; and
- F/S is aimed at basic designing short-term urgent projects, which should be implemented by the year 2005.

According to the Study results, traffic congestion in Kampala City is caused mainly by insufficient traffic capacity of junctions, frequent flooding of road sections, and damage of pavement.

GOU requested in December 1997 that Package 1 and Package 2 be taken up for implementation under Japan's Grant Aid, however, as a result of negotiation between the two governments, further study for Package 1 only was conducted by JICA from April 1998 to September 1998. The Exchange of Note (hereinafter called "E/N") for this package was concluded between the two governments in November 1998. The detailed design of the Project was carried out from December 1998 to April 1999, and the construction started in July 1999 and finished in March 2000.

Subsequently, study for Package 2 also was conducted by JICA from March 2002 to August 2002. The E/N for the Natete Road only was concluded in November 2002, and the construction started in April 2003 and finished in March 2004. The E/N for the Gaba Road was concluded in June 2003, and the construction finished in March 2005.

On the other hand, KCC, recognizing the importance of alleviating traffic congestion in the city center through such above-mentioned projects, successfully implemented KUTIP from 2001 to 2003 with a loan extended by the World Bank.

Against this background, GOU requested the Government of Japan for the study on "Improvement of Traffic Flow in Kampala City" under Grand Aid. The Project aims at alleviating the severest traffic congestion in the Kampala City center by harmonizing the improvement plans proposed in KUTIP and JICA's studies in and out of the city center. In response to the request, JICA conducted the study on "Improvement of Traffic Flow in Kampala City" from August 2004 to March 2005.

JICA dispatched the study team in September 2004 and December 2004. The primary goal of the Project is the restoration of the present site which is the basic concept of Japan's Grant Aid. According to the Study results, the road improvement plan was drawn up with a view of shortening the construction period and reducing the construction/maintenance cost; therefore, the trunk roads in Kampala City will have sufficient functions. The draft final report for the project was submitted and explained to the Ugandan side from the end of February to early March 2005.

The Project is a part of RSDP1 aiming at improving domestic trunk roads The Ugandan Road Design Manual (MOWHC, November 1994, hereinafter called "Road Design Manual") was adopted as much as possible, and the following are basic policies:

- To design appropriate lane formation and road width on the junctions without extra land expropriation on the basis of the present traffic volume,
- To increase the traffic capacity of bottle-neck junctions in order to improve the traffic flow,
- To include the Nsambya Road (length: 200m), which is additionally requested, into the Project and connect with the Kibuli Junction, which is already improved, in order to increase the project effect,
- To install mounded-up sidewalks, pedestrian barriers, bus bays, road signs and road marking on the roads to ensure safety,
- To install traffic signals which have emergency back-up systems, so as to ensure the stable power supply during blackouts in Kampala City,
- To install side ditches, pipe culverts, open drainages and etc. in order to improve the drainage condition in Kampala city, so as to ensure stability of road structure,
- To design the economical pavement structure in consideration of the existing road pavement conditions, such as to replace only surface course where sub-base course is recyclable.
- To reduce the construction cost by hiring local contractors, procuring local materials and equipments, and adopting appropriate construction method.

Based on the above design policy, the facility scale is as shown in the following table:

Item	Contents / Scale
Improvement of 6 existing junctions and 2 roads	1. Clock Tower Roundabout 2. Shoprite Roundabout 3. Katwe-Mengo Hill Roundabout 4. Kampala-Entebbe Road Junction 5. Jinja Road Roundabout 6. Africana Roundabout 7. Nsambya Road 8. Entebbe Road
Improvement of Junction Lane Number and Lane Width	In principle, the lane number and lane width are designed to be at least larger than those at the present; however, the geometric structure of junctions and roads is reviewed on the basis of present traffic volume recorded by actual traffic survey in September 2004. Left turn, straight lane, and right turn lanes will be installed at signal junctions. The road width will be 3.25m for right turn lanes and 3.5m for others, in principle.
Pavement Work	Surface course will be asphalt concrete (AC) same as at the present, and the required thickness is estimated from the future traffic volume (10 years after the completion of the Project).
Sidewalk	The basic road width is determined for two types: 3.0m or 2.0m. The basic shape around junction is mount-up, and the pavement is DBST (Double Bituminous Surface Treatment).
Drainage Work	On the basis of road condition and water velocity analysis, 3 types of drainage works are selected as follows: L-shaped side ditch, LU-shaped side ditch, and Open channel (Three Side Stone Pitching Water Canal). In addition, some structures connected to the existing drainage systems are designed: Catch Basin, Cross Drainage Pipe, and Clearing Work.
Traffic Signal System	Junctions to be provided with signal system: 1. Clock Tower Junction 2. Shoprite Junction 3. Kampala-Entebbe Road Junction 4. Jinja Road Junction - Traffic Signal System for Cars (LED type) - Traffic Signal System for Pedestrians (LED type) - Back-up Power Supply System (Small UPS+Generator with Automatic Starter):to install power back-up devices, considering frequent blackout at the site
Road Safety System	- Public Bus Bay (Bay area for existing buses will be installed out of the junction center) - Pedestrian Barrier: Flower Bed will be installed at the center of junctions - Pedestrian Barrier: Planting zone will restrain reckless pedestrians from crossing junctions. - Traffic Signs - Traffic Marking (Section Line, Safety Lane, etc.) - Traffic Island (Mount-up) - Signals for Pedestrians (Signal Junctions)

The total Project cost was provisionally estimated at Japanese Yen 984 million (Japanese obligation: Yen 769 million, Ugandan obligation: Yen 215 million), subject to further examination and decision of the grant amount by the Government of Japan. The Ugandan main tasks include tax issue with regard to procurement and security of obstacles. The required construction period of the Project is 23.5 months including the tender period.

The public facilities in Kampala City that were constructed before the national independence in 1962 are still in use. Especially, the importance of road transport increases more and more. The priority is put on the improvement of traffic infrastructure in the national development plan; however, it is difficult to accomplish without any financial aid. The road maintenance is also limited due to the lack of budget. Against this background, it is urgently required to improve road structures which reach the use-limit. This will contribute to the development of Kampala City and stable lives of 1.208 million citizens. In addition, it is important and indispensable for the transportation sector to solve traffic congestion and improve trunk roads, so as to stabilize macro-economy.

In that the case the urban function, such as that of the junctions or trunk roads in Kampala City, collapses, the nation-wide loss would be enormous. Thus the Project has the important role of advancing all improvement projects for urban trunk roads.

The Project will generate great effects as shown above and will simultaneously contribute to the improvement of Basic Human Needs ("BHN"). As such, it is necessary to implement the Project urgently under Japan's Grant Aid for the following reasons:

- The urban life-lines such as junctions and trunk roads are physically saturated,
- The road function doesn't meet the demand of traffic growth,
- The traffic congestion disturbs commercial activities, and
- The lives are lost by traffic accidents.

The Project for Improvement of Traffic Flow in Kampala City
Basic Design Study Report

Contents

Chapter 1

BACKGROUND OF THE PROJECT

1. Background of the Project

The Government of Uganda (hereinafter called "GOU") requested the Government of Japan in April 1995 to provide a Grant Aid for the study on "Improvement of Trunk Roads at Kampala Urban Interface Sections" for alleviating traffic congestion in Kampala City. In response to the request, JICA conducted the Master Plan (M/P) Study and Feasibility Study (F/S) from December 1996 to November 1997 with the following purposes:

- M/P is aimed at improving the road network in Kampala City by the target year 2015; and
- F/S is aimed at basic designing short-term urgent projects, which should be implemented by the year 2005.

According to the Study results, traffic congestion in Kampala City is caused mainly by insufficient traffic capacity of junctions, frequent flooding of road sections, and damage of pavement. To deal with those problems, the following 5 packages were proposed as short-term urgent projects:

- Package1 (1998 - 1999): To improve Portbel, Kibue, Natete, Wandegeya, and Makerere Junctions
- Package2 (1999 - 2001): To improve Natete Road (L=3.8km) and Gaba Road (L=9.1km)
- Package3 (2001 - 2002): To improve Portbel Road (L=4.8km)
- Package4 (2002 - 2003): To improve Gayaza Road (L=4.6km)
- Package5 (2003 - 2005): To improve Hoima Road(L=8.5km) and Jinja Junction

GOU requested in December 1997 that Package 1 and Package 2 be taken up for implementation under Japan's Grant Aid, however, as a result of negotiation between the two governments, further study for Package 1 only was conducted by JICA from April 1998 to September 1998. The Exchange of Note (hereinafter called "E/N") for this package was concluded between the two governments in November 1998. The detailed design of the Project was carried out from December 1998 to April 1999, and the construction started in July 1999 and finished in March 2000.

Subsequently, study for Package 2 also was conducted by JICA from March 2002 to August 2002. The E/N for the Natete Road only was concluded in November 2002, and the construction started in April 2003 and finished in March 2004. The E/N for the Gaba Road was concluded in June 2003, and the construction finished in March 2005.

On the other hand, the Kampala City Council (hereinafter called "KCC"), recognizing the importance of alleviating traffic congestion in the city center through such above-mentioned projects, successfully implemented the "Kampala Urban Traffic Improvement Plan (KUTIP)" from 2001 to 2003 with a loan extended by the World Bank.

Against this background, GOU requested the Government of Japan for the study on "Improvement of Traffic Flow in Kampala City" under Grand Aid. The Project aims at alleviating the severest traffic congestion in the Kampala City center by harmonizing the improvement plans proposed in KUTIP and JICA's studies in and out of the city center.

Chapter 2

CONTENTS OF THE PROJECT

2. Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Overall Goal and Project Purpose

GOU, with the support of the World Bank and IMF since 1987, has implemented the structural adjustment policy positively aiming at macroeconomic stabilization by concrete ways such as reduction of the number of civil servants and liberalization of the agricultural market. To activate economic activities within this framework, GOU has determined the development targets in the Public Investment Plan (PIP), 1996/97-1998/99 and speeded up infrastructure maintenance for their accomplishment. Following are the envisaged development targets:

- Economic Growth and Poverty Extermination;
- Continuous Economic Growth; and
- Improvement of Governmental Organization and Public Service.

Expansion of the transportation sector is an essential way to achieve the above-mentioned goals. Therefore, GOU formulated in 1996 a "10-Year Road Sector Development Programme (RSDP1), 1996/97-2005/2006". In the year 2000, GOU formulated a "RSDP2, 5-years Rolling Plan, 2001/02-2010/11" on the basis of the reviewed RSDP1.

In the above context, the study on "Improvement of Trunk Road at Kampala Urban Interface Sections" under Japan's Grant Aid was implemented from 1996 to 1997 on the basis of RSDP1, for the purpose of alleviating traffic congestion in Kampala City. The study results indicated that the main causes of traffic congestion in Kampala City are the following:

- Small junctions don't have sufficient traffic capacity;
- Road sections are flooded when it rains, and
- Pavements have been deteriorated due to fatigue.

To solve the above issues, several studies were implemented under Japan's Grant Aid, namely the study on "Improvement of Trunk Roads in Kampala" Phase 1 and Phase 2 completed in March 2000 and February 2005 respectively. Following those studies, and in conjunction with the "Kampala Urban Traffic Improvement Plan" materialized by KCC in 2003 with the World Bank's financing, this Study on "Improvement of Traffic Flow in Kampala City" was taken up under Japan's Grant Aid. The project's objective is to alleviate the severest traffic congestion points in the Kampala City center in strict and smooth coordination between the project road junctions and other junctions already completed also under Japan's Grant Aid outside the city center.

2-1-2 Outline of the Project

The project facilities are outlined in Table 1-1, and the project direct and indirect effects are as follows:

As direct effects, the Project is planned to increase the traffic capacity of both roads and junctions, resulting in a substantial increase of the traffic volume. It is forecast that the traffic volume on the Entebbe and Jinja Roads will increase by 60% from 50,000cars/day to 80,000cars/day 10 years after the completion of the Project. Moreover, it is also expected that the stop time at junctions will be reduced to 1/3 of the present time due to the installation of traffic signals.

By improving drainage facilities, the useful life of roads will be increase and, accordingly, the road maintenance cost will be reduced. In addition, the rate of traffic accidents around the project site will be reduced due to the improvement of junctions, roads, and traffic safety facilities.

As for indirect effects, benefits are expected from the Project:

- Land use will be upgraded and the city's economy will be activated;,
- The commercial and business functions along the project roads will be enhanced, through the promotion of urban type land use and development of new businesses with more effective investment;
- The road safety and road users' consciousness of traffic safety will be improved as a result of the installation of traffic signals, sidewalks, pedestrian barriers between roadways and sidewalks, and traffic signs under the Project;
- The public transportation service will be improved; and
- The public transportation network service by small buses inside Kampala City and between the city center and suburbs will be improved by the control of traffic flow and installation of bus bays. This social impact is expected to be strong because small buses are used by many people.

Table 2-1 Projects for Assistance

Item	Contents / Scale
Improvement of 6 existing junctions and 2 roads	1. Clock Tower Roundabout 2. Shoprite Roundabout 3. Katwe-Mengo Hill Roundabout 4. Kampala-Entebbe Road Junction 5. Jinja Road Roundabout 6. Africana Roundabout 7. Nsambya Road 8. Entebbe Road
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Pavement Work	Surface course will be asphalt concrete (AC) same as at the present, and the required thickness is estimated from the future traffic volume (10 years after the completion of the Project).
Sidewalk	The basic road width is determined for two types: 3.0m or 2.0m. The basic shape around junction is mount-up, and the pavement is DBST (Double Bituminous Surface Treatment).
Drainage Work	On the basis of road condition and water velocity analysis, 3 types of drainage works are selected as follows: L-shaped side ditch, LU-shaped side ditch, and Open channel (Three Side Stone Pitching Water Canal). In addition, some structures connected to the existing drainage systems are designed: Catch Basin, Cross Drainage Pipe, and Clearing Work.
Traffic Signal System	Junctions for assistance 1. Clock Tower Junction (Synchronized Control) 2. Shoprite Junction (Synchronized Control) 3. Kampala-Entebbe Road Junction 4. Jinja Road Junction - Traffic Signal System for Cars (LED type) - Traffic Signal System for Pedestrians (LED type) - Back-up Power Supply System (Small UPS+Generator with Automatic Starter):to install power back-up devices, considering frequent blackout at the site
Road Safety System	- Public Bus Bay: Bay area for existing bus will be installed out of the junction center - Pedestrian Barrier: Flower Bed will be installed at the center of junctions - Pedestrian Barrier: Planting zone will restrain reckless pedestrians from crossing junctions. - Traffic Signs (Warning sign, Regulatory sign, and Instruction sign) - Road Marking (Regulatory marking, Instruction marking, and Section marking) - Traffic Island (Mount-up) - Signals for Pedestrians (Signal Junctions)

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

Various factors were taken into consideration such as natural, traffic, social-economic, and environmental conditions with regard to the primary design objective which is facility rehabilitation. The design and construction methods were also examined in consideration of the construction influences on schools, hospitals, factories, existing shopping streets, and related facilities. In overall designing, the roads were so designed as to improve the important trunk roads in Kampala City, with due consideration on reduction of construction period and minimization of construction and maintenance costs.

(1) Basic Policy

1) Road Design Standard

The design of the project roads and junctions was carried out in conformity with the Ugandan Road Design Manual (MOWHC, November 1994, hereinafter called "Road Design Manual"), in principle. For items which are not clearly stipulated in the Road Design Manual, the British Standard, AASHTO, and Japan Road Structure Ordinance were adopted. The following road design manuals were referred to in the Study:

Geometric Design Standard
: Road Design Manual - Road Safety Revision Draft (MOWHC, May 2004),
: Road Design Manual (MOWHC, November 1994),
: A Policy on Geometric Design of Highways and Streets (AASHTO, 2001),
: Explanation and Application of Cabinet Order for Road Structure (Japan Road Association, February 2004),

Pavement Design Standard
: Road Design Manual (MOWHC)
: Asphalt Overlays for Highway and Street Rehabilitation
: Design of Pavement Structures (AASHTO, 1993)
: Asphalt Pavement Manual (Revised Edition), (Japan Road Association)

Road Earthwork Design Standard
: Road Earthwork Manual (Japan Road Association)

Road Drainage Design Standard
: Road Design Manual (MOWHC, November 1994)
: Drainage Manual (Japan Road Association)

Intersection Design Standard
: Road Capacity Manual (AASHTO)
: Road Traffic Capacity (Japan Road Association)
: Planning and Design of Intersections (Japan Society of Traffic Engineers)

2) Road Classification

The Entebbe Road and Jinja Road are classified into Category "A" of national roads in the Road Design Manual. The standard details are shown in Table 2.2.

Table 2-2 Road Classification in Uganda

	Category A
Classification	Urban Arterials
Criteria for Road Classification	- Part of international trunk road - Linkage between district capital and development area
Number of Required Lanes	One lane one direction (2 lanes for both directions)
Carriageway Width	3.5 m x 2 = 7.0 m

In the Japan Road Structure Ordinance, road classification is Type 4 in urban area, and design traffic is Class 1 (if it is more than 10,000 cars/day). The traffic on Kampala roads is about 30,000 cars/day, and that on the Entebbe Road is about 40,000 cars/day.

3) Design Speed

According to the Road Design Manual, the design speed for the Category A roads is stipulated to be 80-110km/h; however, this speed level was decreased for urban areas in consideration of smoothness, comfort, safety, and economical benefit for car driving. Accordingly, the design speed

in road alignment design was determined to be 40km/hr at junctions and 60km/hr on single-lane roads.

4) Geometric Design Standard

Basically, the geometric design standard provided in the Road Design Manual was adopted. For items which are not clearly stipulated in the Road Design Manual, the standards shown in Table 2-3 were adopted with the reference to AASHTO and the Japan Road Structure Ordinance for the detailed standards of urban roads.

Table 2-3 Adopted Standards

Geometric Elements	Adopted Standard	Ugandan Standard	Japan Road Structure Ordinance	AASHTO
Road Classification	Urban Road	Category A	Type 4, Class 1	Urban Arterials
Design Speed	40-60km/ hr	80-110km/hr	60km/ hr	30-60 mph
Min. Curve Radius	150m	125m	150m	-
Max. Grade	5.0%	4.0-6.0%	5.0%	5.0-11.0%
Minimum Transition Curve	50.0m	-	50.0m	
Cross Fall	2.0%	2.5%	2.0%	1.5-3.0%
Road Width	3.5m	3.5m	3.25m	10-12 ft.

5) Opening year

The opening year was planned to be January 2007 for the Entebbe Road and August 2007 for the Jinja Road. The traffic growth rate was forecast to be about 6.0% (2004-2007) and 3.0% (after 2008) during 10 years after the opening. For this forecast, the values obtained at the following periods were referred to:

- The increase rate of traffic volume is about 6.2% by traffic survey (1997-2000), and
- The increase rate of car possession in Kampala City is about 6.0% (1999/2000-2002/2003).

6) Pavement Design

There are several pavement design methods such as AASHTO, BS, and Japan Pavement Association. AASHTO was adopted in principle in this Study as the most popular international method. The AASHTO design method for asphalt pavement was applied following the procedures described in Figure 2.1 below.

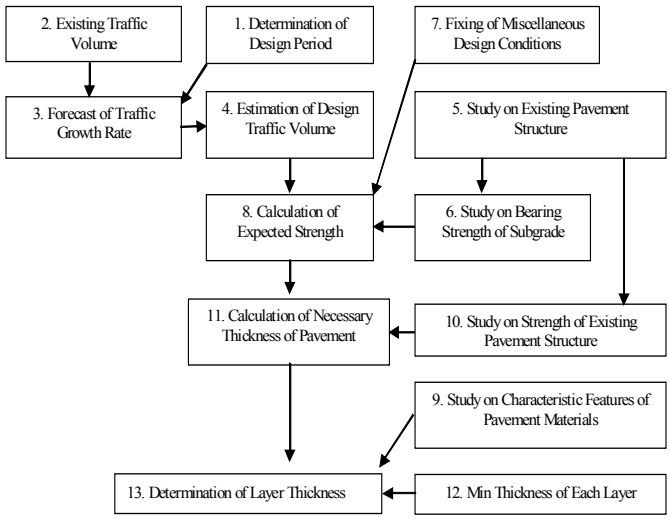


Figure 2-1 Pavement Design Flow

7) Drainage Design

The drainage plan was worked out in conformity as much as possible with the Kampala Drainage Master Plan (KDMP) prepared by KCC. In addition, the road drainage system was designed in conformity with the Road Design Manual in principle, considering to utilize the drainage facilities installed under the "Nakibuvo Channel Rehabilitation Project (NCRP)" Project. For items which

are not clearly stipulated in the Road Design Manual, such as the estimation of displacement and velocity, the Drainage Guidance by the Japan Road Association was adopted.

8) Junction Design

The details of junction standard in an urban area are not stipulated in the Road Design Manual. After junction locations were closely examined, the validity of the Project was confirmed on the basis of the Road Capacity Manual by AASHTO and the Intersection Traffic Analysis (Traffic Junction Standard Analysis Method) by the Japan Society of Civil Engineers.

Pedestrian crossings shall be designed in consideration of not only traffic volume growth, but also the safety for pedestrians and cars. Their design should include various analytical results such as features of location, traffic volume at each direction, combination rate of vehicle type, and number of pedestrian crossings. Especially, sidewalks shall follow the lead tracks of pedestrians as much as possible, so as to prevent dangerous crossing at the places which are not designated for crossing. In addition, creating a clear boundary between carriageways and sidewalks is expected to reduce traffic accidents.

9) Facility Design for Road Safety

With the objective of road safety, the following facilities were planned:

- Improvement of pedestrian barriers;
- Reinstallation of bus bays for public buses;
- Installation of traffic signs and road markings;
- Installation of pedestrian protection and road crossing control devices at junctions; and
- Installation of pedestrian crossings.

(2) Policy on Natural Environment

1) Policy on Climate and Rainfall

It rains much annually in the Republic of Uganda. The annual rainfall is about 1,300mm - 1,700mm as much as in Japan. The intensity of rainfall is also very high. The maximum daily rainfall is 100mm. In addition, rainwater flows very fast at the project site because it is the city center, and the road surface around the city center is paved due to urbanization. The drainage was planned to meet these conditions.

2) Policy on Temperature and Wind Velocity

Uganda is located on the equator in the East Africa; however, its temperature is mild because it is located at a high elevation (average altitude: 1,200m). The difference of temperature between day and night is 15 degrees Celsius, which is relatively high. The average wind velocity is 4 knots, which is also relatively high under the condition of terrain and location that Kampala City is near the Lake Victoria. Taking the above into consideration, technical specifications must be prepared taking sufficiently into account the quality control measures such as the cure of concrete during the construction period.

(3) Policy on Social Condition

1) Society-Economy-Form of Town

The population of Kampala City increases as high level urbanization spreads to not only the existing urban area, but also the surrounding area along the radial roads. In addition, most functions such as administration, commercial, and business concentrate in the Nakasero business district, the center of Kampala City.

These two factors result in the severe traffic congestion on the low standard roads at the peak hours (in the morning and evening) between the urban area and the suburbs.

2) Traffic Condition in Kampala

The traffic in Uganda is composed of railroad, road, water transport, and aviation. Among these, the road traffic has important role, accounting for 90% of all traffic. All transport, with local towns and adjoining countries such as the Republic of Congo or the Republic of Rwanda, must pass via relay points in Kampala City.

The pavement rate of Kampala City is 59%, which is relatively high compared to the national average 8%. However, the roads in Kampala City are paved mainly by the DBST method, which does not use granular materials for sub-base course, in conformity with the light- traffic standard stipulated before the national independence in 1962. Many pot hole and pavement crack directly impact the traffic condition in Kampala City; accordingly, the Project was planned taking the above into consideration. The total length of roads and paved roads are shown in Table 2-4.

Table 2-4 Total Length of Roads and Paved Roads in Kampala and Uganda (km)

Area	All Weather Road		Earth Road	Total	Ratio of Paved Road
	Asphalt Pavement	Gravel			
The Whole Country	2,276	10,635	12,721	25,632	8.8%
Kampala City	126	81	5	212	59.4%
The Whole Country（under the control of MOWHC）	2,107	5,862	0	7,969	26.4%

Source: MOWHC

(4) Policy on Construction Condition, Procurement Condition or Special Condition, and Custom

1) Labor Condition

The unemployment rate of Uganda is not announced. There is only uncertain data; national average is 30%. The unemployment rate of Kampala City may be higher than the national average due to the population concentration in the center of Kampala City.

2) Laws and Regulations

Employers shall follow the Labor Law (revised in May 2000) about employment. Working conditions stipulated mainly in the Labor Law are as follows:

- Weekly Work Hour: 48 hours
- Overtime Pay: It is calculated as follows if weekly work time is over 48 hours.
- Payment by the hour x 1.5 x Overtime
- Payment by the hour x 2.0 x Overtime (Sunday and Holidays)
- Weekly Rest Hour: Continuous 24 hours
- Break during Working Hours: 30 minutes per 6 hours
- Transportation Expense/Housing Allowance: Proper amount
- Maternity Leave: 4 weeks (Only for Women)
- Social Insurance (NSSF): Employers are responsible for 10% of salary while
- employees are responsible for 5 %

The above regulations are adopted in the Project. In addition, the law regulating the minimum wage to be 50,000UShs (27US$ equivalent) is proposed, but it has not been approved.

3) Expensive Construction Cost for Public Work

The construction cost for public works in Uganda is considered to be more expensive compared to that in surrounding countries. There are mainly three factors:

- National construction companies need more experience in construction;
- Free competition is not established due to monopoly by foreign construction companies, and
- There are not many companies that trade import materials although Uganda is an inland country.

In “White Paper on Government Policy”, GOU intended to improve this situation immediately. With this background, MOWHC added up US$1.25 million in RSDP-2 and formulated “The Development of the Local Construction Industry” for the purpose of encouraging national construction industry. In addition, “Seven-points in the 3-year Action Plan” was formulated as a concrete action plan. The Project was also planned not to use special construction methods or materials, but the regulars that local contractors can handle.

(5) Policy on Application of Local Contractor

1) Executive Condition of Contractor

A total of 177 contractors have registered in MOWHC (in 2004), and they are classified into 4 grades from A to D on the criteria of company scale, experience, and so on. There are 23 contractors in Grade A, 15 in Grade B, 40 in Grade C, and 99 in Grade D. Some companies in Grade A are international companies. Some local contractors are large enough to conduct not only civil works, but also architectural works. The head-offices of some companies are located in Kampala City.

2) Technical Standard of Contractors

Technical standard of contractors shall be judged at the prequalification for bidding by MOWHC. Grade A shall be given to a company with a score of more than 85 out of 100 while Grade B shall be given to those with a score of 70 to 85. The criteria include 6 factors:

- General information (10 points),
- Total amount of road construction for past 2 years (25 points), if it is more than 500 million UShs (¥30 million equivalent)
- License or experience of staff (15 points),
- Possession of construction machines (35 Points); this is the biggest factor
- Financial affairs (10 points), and
- Evaluation by MOWHC (5 points).

The total score of all the above 6 criteria is 100 points.

Based on this evaluation, local contractors categorized in grade A or B are available as subcontractors for the Project. Quality and progress control, however, cannot be judged at the prequalification; therefore, practical construction should be implemented under the supervision of Japanese contractors.

(6) Policy on Availability of Implementation Institute as to Management and Maintenance (Budget, Member, Technical Level, and so on)

The budget of GOU for maintenance is not sufficient according to the past record. The main reasons are as follows:

- Maintenance Organization
  Maintenance organization is divided into MOWHC and KCC; therefore, a unified long-term rehabilitation is not planned.
- Existing infrastructure in Kampala City
  Ugandan engineers related to the Project have sufficient maintenance abilities; however, it is difficult to ensure maintenance properly within the limited budget because most of the infrastructures in Kampala City are old (constructed in the 1950s), which means it is expensive to maintain such old infrastructures.

Efficient maintenance method and reasonable facility operation should be built through workshops and counterpart training at the project implementation stage.

(7) Policy on Grade of Facilities and Equipments

This policy is described as follows:

- To design appropriate lane formation and road width on the junctions without extra land expropriation on the basis of the present traffic volume,
- To increase the traffic capacity of bottle-neck junctions in order to improve the traffic flow,
- To include the Nsambya Road (length: 200m), which is additionally requested, into the Project and connect with the Kibuli Junction, which is already improved, in order to increase the project effect,
- To install mounded-up sidewalks, pedestrian barriers, bus bays, road signs and road marking on the roads to ensure safety,
- To install traffic signals which have emergency back-up systems, so as to ensure the stable power supply during blackouts in Kampala City,
- To install side ditches, pipe culverts, open drainages and etc. in order to improve the drainage condition in Kampala city, so as to ensure stability of road structure,
- To design the economical pavement structure in consideration of the existing road pavement conditions, such as to replace only surface course where sub-base course is recyclable.
- To reduce the construction cost by hiring local contractors, procuring local materials and equipments, and adopting appropriate construction method.

(8) Policy on Construction Method, Procurement Method, and Construction Period

1) Policy on Construction Method

The pavement work under the Project accounts for 50 % of all work. Machines required for pavement work can be procured inside Uganda, so as to shorten the construction period and to ensure high quality of structures. In addition, precast products shall be installed in the site as much as possible to keep safety for labors and to prevent passing cars from crashing into the project structures.

2) Policy on Construction Period

The construction period was so determined as to reduce the environmental problem in consideration of special features of the project junctions and roundabouts and construction procedure. In addition, effective arrangement of construction machines and parties was also considered. It was planned to start traffic signals with the opening of the junctions: Clock Tower Junction, Shoprite Junction, and Jinja Road Junction.

2-2-2 Basic Plans (Construction Plan/Equipment Plan)

(1) Overall Plan

1) Sections of Requiring Japanese Assistance

Six junctions and two roads, located at the center of Kampala City, require Japanese assistance. These junctions are shown below:

1. Clock Tower Roundabout
2. Shoprite Roundabout
3. Katwe-Mengo Hill Roundabout
4. Kampala-Entebbe Road Junction
5. Jinja Road Roundabout
6. Africana Roundabout
7. Nsambya Road (200m)
8. Entebbe Road (340m)

2) Works to be Done by Japanese Assistance

The works to be done by Japanese assistance are the following:

1. Review of the geometric structure of the project junctions and execution of civil works to improve junctions;
2. Installation of energy saving traffic signal system (including back-up power system);
3. Improvement of road drainage; and
4. Installation of road safety facilities.

(2) Facility Plan

1) Pavement Design

a) Pavement Type

Generally, the pavement types include rigid pavement (concrete pavement), flexible pavement (asphalt pavement), or gravelling for light traffic. The flexible pavement is classified into Low Cost Pavement Structure (Penetration Method) and Asphalt Concrete Pavement Structure. The pavement type for the designed alignment under the Project was determined to be flexible pavement for the following reasons:

Material supply at local market
: It is difficult to procure a large amount of concrete in Uganda.

Construction records : Contractors in Uganda have insufficient experience in concrete pavement.

Ease of rehabilitation : Rehabilitation work for asphalt pavement is easier than that of concrete pavement.

Initial investment : Asphalt pavement cost is reasonable compared to concrete pavement cost.

Construction skill : There are not sufficient machines for concrete pavement.

b) Pavement Structure

Asphalt concrete pavement was adopted for the following reasons:

Importance as a trunk road : Mix rate of large vehicles is high.

Available period : The life of asphalt concrete is longer (10 years) than DBST (5 years)

Present state of urban roads
: Plenty of pot holes appear on DBST-paved roads constructed by other donors, and hinder road traffic.

Initial investment : The initial investment for AC pavement is larger than that of DBST; however, its maintenance cost is smaller in the long term.

Construction records : Contractors in Uganda have sufficient experience in AC pavement

c) Pavement Thickness Design

The pavement thickness was designed by CBR method on the basis of the geological survey results. AASHTO Standard was adopted for overlay on the existing pavement and new pavement after roundabouts are demolished. In addition, the Effective Thickness Procedures by US Asphalt Institute were adopted for the overlay pavement in consideration of remaining strength, so as to provide high economical design.

d) AASHTO Design Formula for Asphalt Pavement

Necessary strength of the pavement, termed Structural Number (SN), was calculated by the following formula:

$$\log_{10} W_{18} = Z_R * S_0 + 9.36 * \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\frac{\Delta PSI}{(4.2-1.5)}}{0.4 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 * \log_{10} M_R - 8.07$$

where,

- W18: passing number of equivalent single axle load of 18 kip (=8t) during the design period.
- ZR: coefficient of reliability = - 1.037
  (corresponding to Reliable Probability: R=85%. 80~99% is for urban roads)
- So: Overall Standard Deviation=0.45 (normally 0.45 is applied for flexible pavement)
- MR: Resilient Modulus
- ΔPSI: Loss of Performance Serviceability Index

(Ref.:initial value: Po=4.2, terminal value: Pt=2.5 Loss=Po-Pt=1.7)

One of the characteristic features of AASHTO is introduction of PSI (Present Serviceability Index), and the values shown in Table 2-5 are used in general.

Table 2-5 Value of PSI

	PSI	
Maximum	5.0	
Initial index Po	4.5 4.2	Rigid Pavement Flexible Pavement
Terminal index Pt	3.0 2.5 2.0	Bench mark index for Overlay. It will be selected from three indexes shown in the left column as the execution time for overlay work
Minimum	0	

Acceptable values of terminal service index Pt are interpreted as described in Table2.6.

Table 2-6 Terminal Present Serviceability Index(PSI)

Terminal Performance Service Index P_t	Percentage of users who recognize that road surface is unacceptable for drivers.
3.0	12%
2.5	55%
2.0	85%

Terminal Present Serviceability Index of Pt=2.5 was adopted for this study.

e) Design Period

In the Study, the design period was determined to be 10 years after the completion of the Project, supposing the following 2 items:

- The traffic is heavy, but there are not many heavy-vehicles on the project junctions and roads.
- The periodical maintenance is conducted by Uganda after the opening to the public.

f) Estimation of Number of Axle Loads

The number of axle loads was calculated on the basis of the traffic survey conducted in September 2004, the number of axles of each vehicle type, and EAL factors. The future growth rate of the traffic was assumed to be 6.0% from 2004 to 2007 and 3.0 % thereafter.

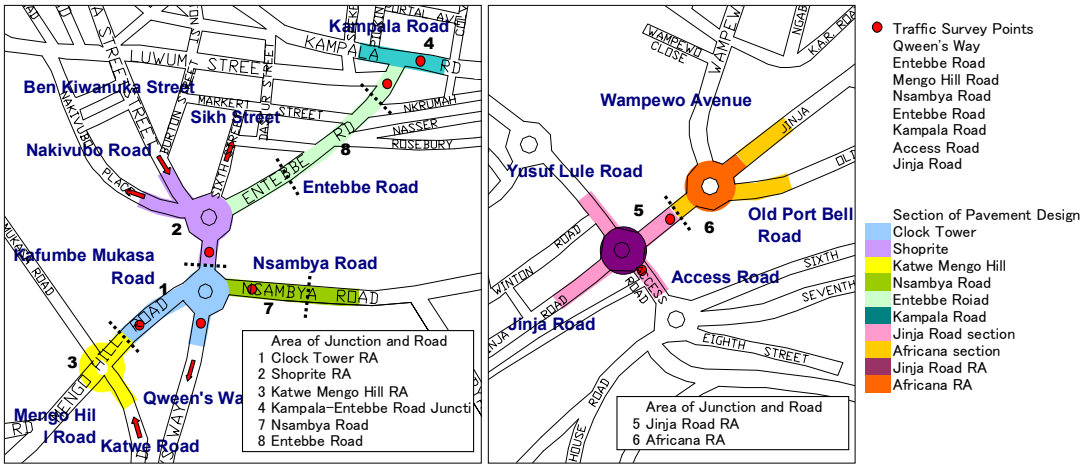


Figure 2-2 Points/Areas of Traffic Count Survey and Design of Pavement

Table 2-7 Traffic Volume at the Project Roads

Survey Points	Passenger Car	Mini Bus	Pickup Car	Bus	2-axle Truck	3-axle Truck	Trailer	Total
Queensway Road	4,811	5,230	1,281	61	781	121	112	12,397
Entebbe Road (North of CRT)	6,782	8,145	2,091	59	352	109	75	17,613
Mengo Hill Road	7,115	7,119	1,873	25	853	145	109	17,239
Nsambya Road	6,019	4,259	2,029	41	791	170	136	13,445
Entebbe Road	6,413	1,224	1,785	89	509	102	35	10,157
Kampala Road	4,973	5,810	1,450	84	336	21	12	12,686
Access Road	9,089	995	2,505	18	624	117	81	13,429
Jinja Road	7,243	5,448	2,019	81	589	76	76	15,532

Note) Points are shown in Figure 2-7

Table 2-8 Conversion Factors for 18 kip EAL

Survey Points	Passenger Car	Mini Bus	Pickup Car	Bus	2-axle Truck	3-axle Truck	Trailer
Gross weight (t)	1.5	3.0	3.0	15.0	12.0	20.0	20.0
Axle number	1+1	1+1	1+1	1+2	1+1	1+2	1+2
Front Axle Load (t)	0.5	1.0	1.0	3.0	4.0	4.0	4.0
Rear Axle Load (t)	1.0	2.0	2.0	6.0	8.0	8.0	8.0
EAL Factor Front	0.00002	0.0002	0.0002	0.0198	0.0625	0.0625	0.0625
EAL Factor Rear1	0.00024	0.0039	0.0039	0.3164	1.0000	1.0000	1.0000
EAL Factor Rear2				0.3164		1.0000	1.0000
EAL Factor Total	0.0003	0.0042	0.0042	0.6526	1.0625	2.0625	2.0625

(EAL Factor = (Axle Load/8t)^4

Table 2-9 Estimated Axle Load (2004)

Project Points	Passenger Car	Mini Bus	Pickup Car	Bus	2-axle Truck	3-axle Truck	Trailer	Total of 8t axle
Queensway Road	527	8,018	1,964	14,530	302,882	91,090	84,315	503,326
EntebbeRoad (North of CRT)	743	12,486	3,206	14,054	136,510	82,057	56,461	305,517
Mengo Hill Road	781	10,943	2,879	5,971	331,710	109,457	82,281	544,022
Nsambya Road	659	6,529	3,110	9,766	306,760	127,978	102,383	557,185
Entebbe Road	702	1,876	2,736	21,200	197,397	76,787	26,348	327,046
Kampala Road	545	8,907	2,223	20,009	130,305	15,809	9,034	186,832
Access Road	995	1,525	3,840	4,288	241,995	88,079	60,978	401,700
Jinja Road	793	8,352	3,095	19,294	228,422	57,214	57,214	374,384

The opening year was estimated to be January 2007 for the area from the Clock Tower Junction to the Kampala-Entebbe Road Junction and July 2007 for the Jinja Road and the Africana Junction respectively. The conversion factors for 18 kips EALs for 10 years after the opening were estimated as shown in Table2-10.

Table 2-10 Forecasted Yearly 18 kips Axle Numbers at Project Roads

Year	Queensway Road	Entebbe Road (CT-SR)	Mengo Hill Road	Nsambya Road	Entebbe Road	Kampala Road	Access Road	Jinja Road
2004	503,326	305,517	544,022	557,185	327,046	186,832	401,700	374,384
2004(Sep -)	167,775	101,839	181,341	185,728	109,015	62,277	133,900	124,795
2005	533,526	323,848	576,663	590,616	346,669	198,042	425,802	396,847
2006	565,537	343,279	611,263	626,053	367,469	209,924	451,350	420,658
2007(Start)	599,469	363,876	647,939	663,616	389,517	222,520	478,431	445,897
2008	617,453	374,792	667,377	683,525	401,203	229,195	492,784	459,274
2009	635,977	386,036	687,398	704,030	413,239	236,071	507,568	473,052
2010	655,056	397,617	708,020	725,151	425,636	243,154	522,795	487,244
2011	674,708	409,545	729,261	746,906	438,405	250,448	538,478	501,861
2012	694,949	421,832	751,139	769,313	451,557	257,962	554,633	516,917
2013	715,798	434,487	773,673	792,393	465,104	265,700	571,272	532,425
2014	737,272	447,521	796,883	816,164	479,057	273,671	588,410	548,397
2015	759,390	460,947	820,790	840,649	493,429	281,882	606,062	564,849
2016	782,171	474,775	845,413	865,869	508,231	290,338	624,244	581,795
2017(- Jan)	67,136	40,752	72,565	74,320	43,623	24,921		
2017(- July)							375,067	349,562
Total 10 years since the forecast date	8,206,218	4,981,144	8,869,725	9,084,334	5,332,152	3,046,106	6,870,795	6,403,575
EAL for Calculation	8.2E+06	5.0E+06	8.9E+06	9.1E+06	5.3E+06	3.0E+06	6.9E+06	6.4E+06

g) Existing Pavement Structure and Bearing Capacity of Subgrade (Design CBR)

On the basis of PSI survey and the existing pavement structure by the test pitting survey in September 2004, the pavement design sections were categorized as shown in Table 2-11. The design CBR of subgrade material was calculated from the immersion CBR test (immersed in water for 4 days).

Table 2-11 Existing Pavement Structure and its Damage Condition

Section for Pavement Structure	AC Pavement Thickness (mm)	Base Course Thickness (mm)	Subbase Thickness (mm)	Subgrade Design CBR (%)	PSI Average
Around Clock Tower Junction	50	200	200	7	61
Shoprite Junction	50	200	200	8	57
Katwe-Mengo Hill RA	50	150	200	10	57
Nsambya Road	50	200	200	10	49
Entebbe Road	50	150	150	8	56
Kampala Road	100	100	100	9	61
Roads around Jinja Road	100	200	200	10	44
Road around Africana RA	75	200	200	10	44
Jinja Road RA	100	200	200	10	24
Africana RA	100	200	200	7	25

h) Estimation of Required Structural Coefficient (SN)

The required SN at each section was estimated as shown in Table 2-12.

Table 2-12 Required SNs by Section

Section for Pavement Structure	Subgrade CBR (%)	Survey Points of Junction	EASL (10 Years)	Required SN (inch)	Required SN (mm)
Around Clock Tower Junction	7	Queensway Road	8,200,000	4.12	105
Shoprite Junction	8	Entebbe Road(CT-SR)	5,000,000	3.62	92
Katwe-Mengo Hill RA	10	Mengo Hill Road	8,900,000	3.66	93
Nsambya Road	10	Nsambya Road	9,100,000	3.67	93
Entebbe Road	8	Entebbe Road(SR-KE)	5,300,000	3.66	93
Kampala Road	9	Kampala Road	3,000,000	3.18	81
Roads around Jinja Road	10	Access Road	6,900,000	3.51	89
Road around Africana RA	10	Jinja Road	6,400,000	3.46	88
Jinja Road RA	10	Access Road	6,900,000	3.51	89
Africana RA	7	Jinja Road	6,400,000	3.96	101

i) Characteristics of Base Course Materials

Newly constructed subgrade, Resilient Coefficient (MR) of sub-base and surface course, and Layer Coefficient (a) were assumed as shown in Table2-13.

Table 2-13 Resilient Coefficient: (MR) Layer Coefficient: (A) by Layer of Pavement

	AC Surface	Base Course	Subbase Course	Subgrade
Material Specification	Hot Mixture	Modified CBR=80% or more PI=4.0% or less	Modified CBR=30% or more PI=6.0% or less	
Resilient Modules (M_R)*	300,000psi	28,000psi	15,000psi	CBR x 1,500psi
Layer Coefficient ai	0.44	0.14	0.11	

Note: Relation between CBR, Resilient Modules, and Layer coefficient
AASHTO Guideline for Pavement p16 and p17

SN of existing pavement was calculated on the assumption that the existing pavements are deteriorated due to natural condition and traffic condition. There are also two assumptions as follows:

- Surface course is deteriorated due to traffic load and climate; and
- Subgrade is deteriorated due to undrained condition and so on

Table 2-14 Layer Coefficient of Existing Pavement Material and Drainage Coefficient

Damage Level	Layer Coefficient of Surface		Layer Coefficient of Base Course			Coefficient of Drainage
	Surface Condition	AC Surface	Surface Condition	Base Course	Subbase Course	
1	Minor Crack	0.35~0.40 0.40	No Problem on Surface 0.10~0.14	0.14	0.11	Great 1.1
2	Hexagonal Crack 10% or less	0.25~0.35 0.30		80% 0.11	80% 0.09	Good 1.0
3	Hexagonal Crack 10% or more	0.20~0.30 0.25	Problem on Surface 0.00~0.10	70% 0.10	70% 0.08	Normal 0.9
4	Medium Level Hexagonal Crack 10% or more	0.14~0.20 0.17		60% 0.08	60% 0.07	Bad 0.8
5	Hexagonal Crack More than 10 %	0.08~0.15 0.12		50% 0.07	50% 0.06	Bad 0.7

Attention: Relation between CBR, Resilient Modules, and Layer coefficient
AASHTO Guideline for Pavement p16 and p17

The layer coefficient and drainage coefficient for each section were supposed as shown in Table 2-15 on the basis of Table 2-14.

Table 2-15 Layer Coefficients of Existing Pavement Material and Drainage for Each Section

Design Section for Pavement Structure	Surface Crack	Layer Coefficient Surface a_1	Surface Problem	Layer Coefficient Base Course a_2	Layer Coefficient Subbase Course a_3	Drainage Condition	Drainage Coefficient Base Course m_2
Around Clock Tower Junction	2	0.30	2	0.11	0.09	Normal	0.90
Shoprite Junction	2	0.30	2	0.11	0.09	Normal	0.90
Katwe-Mengo Hill RA	2	0.30	2	0.11	0.09	Good	1.00
Nsambya Road	3	0.25	3	0.10	0.08	Normal	0.90
Entebbe Road	1	0.40	1	0.14	0.11	Good	1.00
Kampala Road	1	0.40	1	0.14	0.11	Good	1.00
Roads around Jinja Road	3	0.25	4	0.10	0.08	Normal	0.90
Road around Africana RA	3	0.25	4	0.10	0.08	Normal	0.90
Jinja Road RA	4	0.17	5	0.08	0.07	Poor	0.80
Africana RA	4	0.17	5	0.08	0.07	Poor	0.80

Note: There are 5 level evaluations on the basis of PSI survey and site survey

j) Comparison between the Present Strength and Required Strength of Pavement

The overlay pavement thickness was calculated from the present pavement structure shown in Table 2-11, layer coefficient and drainage coefficient shown in Table 2-15. The required thickness of asphalt concrete is shown in Table 2-16.

Table 2-16 Remaining SN of Existing Pavement and Overlay Thickness

Section for Pavement Structure	Required SN (mm)	Remaining SN (mm)	Shortage of SN (mm)	Required Surface Thickness a1=0.44 (mm)
Around ClockTower Junction	105	48	57	130
Shoprite Junction	92	48	44	100
Katwe-Mengo Hill RA	93	47	46	105
Nsambya Road	93	42	51	116
Entebbe Road	93	54	39	89
Kampala Road	81	61	20	45
Roads around Jinja Road	89	55	34	77
Road around Africana RA	88	49	39	89
Jinja Road RA	89	39	50	114
Africana RA	101	39	62	141

k) Structure of Existing Pavement

Generally, asphalt concrete shall be overlaid with the surface thickness shown in Table 2-16. If the existing surface is more than 4 inches (10cm), the base course and surface shall be constructed after removal of the existing surface so as to ensure good adhesion of pavement. The procedure is shown in Table 2-17.

Table 2-17 Thickness of Overlay

Section for Pavement Structure	Required SN (mm)	Remaining SN Course (mm)	Insufficien N (mm)	Surface (AC) a1=0.44 (mm)	Binder (AC) a2=0.44 (mm)	Base Course a3=0.14 (mm)	Calcilated SN (mm)
Around ClockTower Junction	105	36	69	50	50	200	72
Katwe-Mengo Hill RA	93	35	59	50	50	150	65
Nsambya Road	93	32	61	50	50	150	65
Jinja Road RA	89	24	65	50	50	200	72
Africana RA	101	24	77	50	50	250	79

l) Structure of New Pavement

The new pavement structure in the road widening areas and inside the present roundabouts was calculated on the basis of values shown in Table 2-18.

Table 2-18 Pavement Structure in Widening Area

Section for Pavement Structure	Required SN	Surface a1=0.44 (mm)	Binder a1=0.44 (mm)	Base Course a2=0.14 (mm)	Subbase Course a3=0.11 (mm)	SN
Around ClockTower Junction	105	50	50	200	300	105
Shoprite Junction	92	50	50	150	300	98
Katwe-Mengo Hill RA	93	50	50	150	300	98
Nsambya Road	93	50	50	150	300	98
Entebbe Road	93	50	50	150	300	98
Kampala Road	81	50	0	200	300	83
Roads around Jinja Road	89	50	50	150	300	98
Road around Africana RA	88	50	50	150	300	98
Jinja Road RA	89	50	50	150	300	98
Africana RA	101	50	50	200	300	105

m) Pavement Thickness

The structures of overlay and new pavement are shown in Table 2-19.

Table 2-19 Pavement Structure in Widening Area

Section for Pavement Structure	Overlay and Improvement for Existing Pavement					Widening Area (New Pavement)				
	Sign	Milling/ Removal (mm)	Surface (mm)	Binder (mm)	Base Course (mm)	Sign	Surface (mm)	Binder (mm)	Base Course (mm)	Subbase Course (mm)
Around ClockTower Junction	Re-2	50	50	50	200	Nc-3	50	50	200	300
Shoprite Junction	Ov-2	10	50	50		Nc-2	50	50	150	300
Katwe-Mengo Hill	Re-1	50	50	50	150	Nc-2	50	50	150	300
Nsambya Road	Re-1	50	50	50	150	Nc-2	50	50	150	300
Entebbe Road	Ov-2	10	50	50		Nc-2	50	50	150	300
Kampala Road	Ov-1	10	50			Nc-1	50	0	200	300
Roads around Jinja Road	Ov-2	10	50	50		Nc-2	50	50	150	300
Road around Africana RA	Ov-2	10	50	50		Nc-2	50	50	150	300
Jinja Road RA	Re-2	100	50	50	200	Nc-2	50	50	150	300
Africana RA	Re-3	100	50	50	250	Nc-3	50	50	200	300

2) Lane Plan

The road width was designed to be 3.5m per lane for Category "A" roads in the Road Design Manual (existing road width is 3.5m). For reference, road width is specified to be 3.25m (Type 4, Class1 roads) in the Japan Road Structure Ordinance, and 10-12ft (3.66m) in AASHTO.

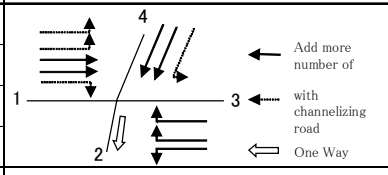
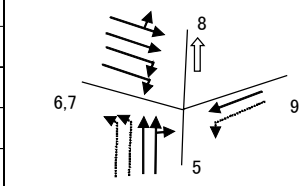
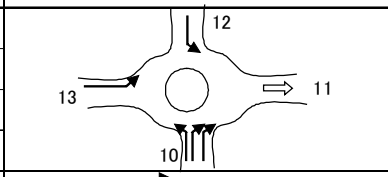
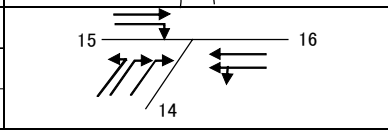
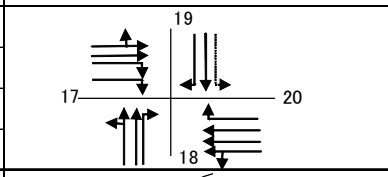
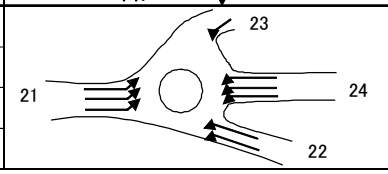
Table 2-20 Project Lane Number based on Present Traffic Volume

Junction	Road (Arm)	Daily Traffic Volume[1] PCU[2]/day	30th DHV[3] PCU K=8% PCU/hr	Allowable traffic volume PCU/hr	Number of Lane		
					Present	Improved Plan	Present/Allowable traffic volume ratio
Clock Tower	Mengo Hill Road (KM RA side)	42,568	3,405	2,707	One way 3 lane	No change	0.84
	Qween's Way	29,607	2,369	2,670	One way 2 lane	One way 3 lane	0.59
	Nsambya Road	35,025	2,802	2,591	Both way 1+1lane	Both way 2+2lane	0.54
	Entebbe Road (SR RA side)	73,201	5,856	2,618	Both way 2+2lane	Both way 3+2lane	0.89
Shoprite	Ben Kiwanuka Street	24,941	1,995	2,767	One way 2 lane	No change	0.72
	Nakivubo Road	33,933	2,715	2,750	One way 2 lane	No change	0.99
	Sikh Street	5,225	418	2,772	One way 1 lane	No change	0.30
	Entebbe Road (Center side)	33,979	2,718	2,604	Both way 2+2lane	No change	0.52
Katwe-Mengo Hill	Katwe Road	37,284	2,983	2,699	One way 3 lane	No change	0.74
	Mengo Hill Road	14,277	1,142	2,425	Both way 1+1lane	No change	0.47
	Kafumbe Road	10,347	828	2,720	Both way 1+1lane	No change	0.30
Kampala-Entebbe Road	Entebbe Road	36,474	2,918	2,699	Both way 2+2lane	No change	0.54
	Kampala Road (Center side)	36,655	2,932	2,683	Both way 2+2lane	No change	0.55
	Kampala Road (Jinja side)	46,696	3,736	2,721	Both way 2+2lane	No change	0.69
Jinja Road	Jinja Road (Center side)	47,583	3,807	2,650	Both way 2+2lane	No change	0.72
	Access Road	43,327	3,466	2,648	Both way 2+2lane	No change	0.65
	Yusuf Lule Road	34,323	2,746	2,647	Both way 2+2lane	No change	0.52
	Jinja Road (Africana side)	64,346	5,148	2,661	Both way 3+3lane	No change	0.64
Africana	Old Port Bell Road	19,924	1,594	2,644	Both way 1+1lane	No change	0.60
	Wampewo Road	8,489	679	2,685	Both way 1+1lane	No change	0.25
	Jinja Road (Jinja side)	43,352	3,468	2,693	Both way 2+2lane	No change	0.52

Note 1) Daily Traffic Volume is the average of traffic survey conducted for 2 days in Sept. 2004.
Note 2) The conversion coefficient to PCU (Passenger Car Unit) for each car type is 1.1 (passenger car and pick-up truck), 1.3 (small bus and bus), and 2.0 (large truck and so on) according to the JICA Master Plan "Improvement of Trunk Road at Kampala Urban Interface Sections"
Note 3) DHV and Allowable Traffic Volume are calculated in conformity with the Road Design Manual.

The present traffic volume shall be calculated based on the analysis of potential traffic volume provided in the Road Design Manual. Referring to this volume, the lane number shall be determined within the ROW.

Table 2-21 Saturation Analysis and Improvement Plan of Junctions

Junction	Approach Road	Number of Lanes in improved Plan	Improvement Plan	Improvement Area Distanve from stop	Degree of Saturation 1) Top:AM Peak Bottom:PM Peak	Signal Cycle Time (sec) Top:AM Peak Bottom:PM Peak	Service Level 2)
Clock Tower	1 Mengo Hill Road (KM RA side)	One way 3 lane (in)				3)	
	2 Qween's Way	One way 3 lane (out)		–	0.85	108	3
	3 Nsambya Road	Both way 2+2lane		180	1.07	108	3
	4 Entebbe Road (SR RA side)	Both way 3(out)+2lane		(100)			
Shoprite	5 Entebbe Road (CT RA side)	Both way 3(in)+2lane		(100)		※3	
	6 Ben Kiwanuka Street	One way 2 lane		150	1.01	108	3
	7 Nakivubo Road	One way 2 lane			0.98	108	3
	8 Sikh Street	One way 1 lane (out)		–			
	9 Entebbe Road (Center side)	Both way 2+2lane					
Katwe-Mengo Hill	10 Katwe Road	One way +3 lane (in)		60	Traffic capacity of Roundabout shall be examined by inflow traffic volume of each approach road		
	11 Mengo Hill Road	Both way 1+1 lane		20			
	12 Kafumbe Road	Both way 1+1 lane		20			
	13 Mengo Hill Road (CT RA side)	One way +3 lane(out)					
Kampala-Entebbe Road	14 Entebbe Road	Both way 2+2 lane		100	0.76	70	1
	15 Kampala Road (Center side)	Both way 2+2 lane		100	0.73	70	1
	16 Kampala Road (Jinja side)	Both way 2+2 lane		60			
Jinja Road	17 Jinja Road (Center side)	Both way 2+2 lane		160			
	18 Access Road	Both way 2+2 lane		150	0.92	80	2
	19 Yusuf Lule Road	Both way 2+2 lane		130	1.28 4)	91	2
	20 Jinja Road (Africana side)	Both way 3+3 lane					
Africana	21 Jinja Road (JR RA side)	Both way 3+3 lane			Traffic capacity of Roundabout shall be examined by inflow traffic volume of each approach road		
	22 Old Port Bell Road	Both way 1+1 lane		120			
	23 Wampewo Road	Both way 1+1 lane		20			
	24 Jinja Road (Jinja side)	Both way 2+2 lane		150			

Note 1) This is the ratio against Signal Cycle Time which is the total of minimum required time of green signal. If it is beyond 1.0, it is difficult to meet the project traffic volume.

Note 2) This is the service level showing the congestion level at a grade crossing. The ease of passing a grade crossing for users (cars and pedestrians) in one cycle of signals is adopted as the criteria.

- Service Level 1: Signal Cycle Time is less than 70 seconds
- Service Level 2: Signal Cycle Time is more than 70 seconds and less than 100.
- Service Level 3: Signal Cycle Time is less than 100.

Normal range of signal cycle time is from 40 seconds to 180 seconds.

Source: Planning and Design of Intersections (Japan Society of Traffic Engineers)

Note 3) The same signal cycle time is adopted for systematic control at Clock Tower and Shoprite junctions. This is possible because the project traffic signals are close to each other.

Note 4) The grade of saturation is far beyond 1.0 in the afternoon peak hours. It is necessary to increase the road lane for drastic improvement, which is almost impossible due to the difficulty of new land acquisition. Therefore, only at this junction, a narrower road width is adopted to increase road lane.

3) Shoulder Width

The shoulder width of Category "A" and Class I roads is stipulated to be 2.0m in the Road Design Manual; however, the shoulder width of urban roads with sidewalks is not clearly mentioned. Under this condition, it was determined to be 0.5m for the left side, 0.25m for the center, and 0.5 m for the right side in conformity with the Japan Road Structure Ordinance.

4) Center Strip

The center strip (mount up type) shall be installed for the roads that have more than 4 lanes at the present, and its width shall be from 50cm to over 2m. It is generally 2m as specified in the Road Design Manual; however, it was designed to be within ROW. According to the Japan Road Structure Ordinance, a center strip shall be installed for the roads that have over 4 lanes (2 lanes on 1 side) for safety and smooth traffic. The width of a center strip for Type-4 roads is 1m.

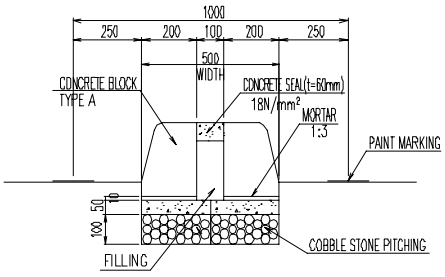


Figure 2-3 Median Strip (Narrow Section)

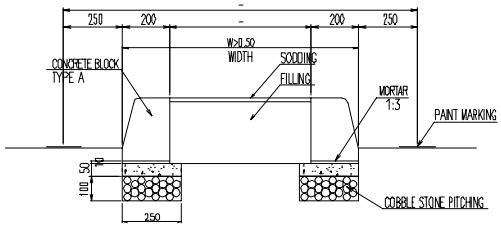


Figure 2-4 Median Strip (Wide Section)

5) Side Walk Width

In the sidewalk planning, pedestrian barriers, which are not stipulated in the Road Design Manual, were adopted from the viewpoint of road safety. The barrier was designed as an exclusive road for bicycles and pedestrians, so as to guide slow vehicles such as bicycle or wheelchair to sidewalk. Their width was determined to be 3.0m in accordance with the Japan Road Structure Ordinance.

On the other hand, the width of sidewalks out of junction centers was designed to be 2.0m as the number of pedestrians decreases at these sections.

6) Road Drainage Design

Drainage design was done in conformity with the "Kampala Drainage Master Plan (KDMP)". In addition, the drainage system completed under the NCRP Project (Preparation of a Kampala Drainage Master Plan, December 2001) shall be utilized so as to reduce the cost. For some items that are not stipulated in the Road Design Manual, the Japanese Design Standard was adopted.

a) Determination of Rainfall Probability for Drainage Design

In the Road Design Manual, the rainfall probability for drainage design is stipulated for bridges only. It shows 25 years for main bridges and 20 years for others.On the other hand, the probability used in each water system improvement plan is 10 years in NCRP.

The Japanese Standard determines the probability of 3 years for road surface and slope surface drainage facilities, and 5 to 10 years for the road drainage facilities which drain the water from large natural slopes. The probabilities for each drainage facility under the "Improvement of Trunk Roads in Kampala, Phase 1 and Phase 2" Project were determined as shown in Table 2-22.

Referring to the above record, the same rainfall probability as that adopted in the former project was retained.

Table 2-22 Comparison of Return Periods

	Japanese Standard	Japan's Grant Aid Project	Ugandan Standard	NCRP	Adopted Value
Road Drainage	3Years	3 years	-	-	**3Years**
Road Crossing Culvert	5-10Years	10 years	Bridge 20-25years	10Years (Outlet)	**10Years**

b) Catchment Area

The catchment area planned in NCRP was adopted for the Project.

c) Estimation of Design Flood

The design flood volume was estimated by the following Rational Formula:

Q = 1/3.6 x C x I x A or Q = 1/3.6 x C x I x a

Q: Flood Peak at Catchment Exits (m3/sec)
C: Runoff Coefficient (Ref.: Table 2-27)
I: Average Rainfall Intensity over the whole Catchment Area (mm/h)
A: Catchment Area (km2)

The specific values of coefficients were determined as follows:

Runoff Coefficients: C

The Runnoff Coefficient is 0.8 for the road surface and 0.3 for adjoining areas. Almost all adjoining areas of the project roads are hilly areas with scattered houses.

Table 2-23 Runoff Coefficients

Land use		Runoff coefficient	Adopted value
Road Surface	Paved	0.70-0.95	**0.80**
	Unpaved	0.30-0.70	
Shoulder, Slope	Fine grain soil	0.40-0.65	
	Coarse grain soil	0.10-0.30	
	Hard rock	0.70-0.85	
	Soft rock	0.50-0.75	
Sandy Lawns	Flat 0-2%	0.05-0.10	
	Steep2-7%	0.10-0.15	
	Steep more than7%	0.15-0.20	
Clayey Lawns	Flat 0-2%	0.13-0.17	
	Steep2-7%	0.18-0.22	
	Steep more than7%	0.25-0.35	
Roofs Dispersed area Grassland, Park Soft to moderate mountain Steep mountain			**0.30**
Lakes, swamps, etc		0.70-0.80	
Vegetation		0.10-0.30	

Rainfall Intensities: I

Rainfall intensities, usually defined in relation with the reaching time of waters from the farthest places in catchment areas, were estimated by the Kerby Formula. It is usually known empirically that the rainfall intensity is 15-30 minutes in mountainous areas, 3-5 minutes at cut slopes and 5 minutes in urban areas in general. The structure of the Kerby Formula is described below:

$$T_1 = 1.445 * \left[\frac{N * L}{\sqrt{S}} \right]^{0.467} = 30 mn$$

Where

T_1: Rainfall Intensity (Min.)
N: Kerby Coefficient of Roughness, which is 0.3
L: Length of Catchment Area (m)
H: Average Difference in Height within Catchment Area (m)
S: Gradient, H/L

The Kerby Formula is not applicable in the case the value T1 is larger than 120 minutes or less than 10 minutes because the degrees of errors go beyond the limit of allowance. As such, a T1 minimum period of 10 minutes was assumed for the analysis of road surfaces.

Short period Rainfall Intensities were estimated by the following formula:

$$R_t = \frac{R_d}{24} * \left(\frac{24}{T_c} \right)^{\frac{2}{3}}$$

Where

R_t: Rainfall Intensity (mm/hr)
Rd: Probable Daily Rainfall (mm/day)
Tc: Time of concentration:

Road surface drain=10 minutes=0.17hr, and Road side drain =30 minutes = 0.5hr.

Discharge Volume of Catchment Areas

The value planned in NCRP was adopted for the volume of water flowing into the project road:

Entebbe Road (C17.20 Q = 0.33m/sec)

d) Determination of Drainage Type

The appropriate types of drainage were determined as shown in Table 2-24 in consideration of the location of drainages.

Table 2-24 Determination of Drainage Types

Type of Drainage	Advantage	Disadvantage	Location to be installed
L shaped side ditch	Easy disposal of road surface drainage	Draining length shall be long due to small cross section.	Upstream area and junction
LU shaped side ditch	Drainage ditch suitable to displacement can be adopted	It takes time to clean.	Business Area Junction
Open drainage	Easy maintenance	It cannot be installed if there is no extra space.	Center Strip
Shallow open drain	Crossing by pedestrians and car is possible.	Cross section is small.	Access road to Main Line upstream

The drainage toward the Nakibuvo channel was designed on the assumption that improvement work shall be done by GOU.

e) Determination of Cross-sectional Area of Drainage

The flowing capacity of each drainage facility was determined by the following formula:

$Q=A * V$

Where

A: Channel Cross-sectional Area (m^2)
V: Flow Velocity (m/sec), which is defined by the Maning Formula:

$V=1/n * R^{2/3} * i^{1/2}$

Where

N: Maning's Roughness Coefficient ($sec/m^{1/3}$)
R: Hydraulic Radius (m) = A/P
P: Perimeter (m)
I: Channel Gradient

f) Results of Drainage Design

The results of drainage design are shown in Table 2-25

Table 2-25 Drainage Sections

Location	Slope	Velocity	Outflow	Drainage Design				Outflow	Sefety factor
	i (%)	V(m/s)	Q(m^3/s)	Drainage type	A(m^2)	R(m)	n	Q(m^3/s)	
Kampala Road									
C17-20	6.00% (1:16.56	4.00	0.334	LU Type 400x300	0.120000	0.120000	0.015	0.4767	1.4
C17-21	3.17% (1:31.50	3.30	0.422	LU Type 400x300	0.120000	0.120000	0.015	0.3465	0.8
C17-23	4.65% (1:21.50	3.85	0.500	LU Type 400x400	0.120000	0.120000	0.015	0.6003	1.2
C17-24	5.26% (1:19.00	4.25	0.543	D=600	0.282743	0.150000	0.013	1.4082	2.6
C17-25	4.00% (1:25.00	4.02	0.663	D=600	0.282743	0.150000	0.013	1.2280	1.9
C17-26	11.11% (1: 9.00	6.18	0.791	LU Type 400x400	0.120000	0.120000	0.015	0.9279	1.2
C17-27	2.53% (1:39.50	3.47	0.791	D=900	0.636173	0.225000	0.013	2.8795	3.6
C17-16	2.70% (1:37.00	3.61	0.780	D=900	0.636173	0.225000	0.013	2.9746	3.8
C17-40	0.80% (1:125.0	3.01	2.738	D=1,200	1.130973	0.300000	0.013	3.4871	1.3
C17-41	0.80% (1:125.0	3.01	2.738	D=1,200	1.130973	0.300000	0.013	3.4871	1.3
C17-42	0.80% (1:125.0	3.01	2.738	D=1,200	1.130973	0.300000	0.013	3.4871	1.3

7) Traffic Signal System

a) Power Supply System

The power supply system in Kampala City has not been improved since the completion of the Grant Aid study on "Improvement of Trunk Roads in Kampala" in March 2000. GOU plans to improve the power supply system by lowering the voltage directly from high to low (240V) with the use of special cables. This supply system will ensure voltage stabilization. In addition, AVRs (Automatic Voltage Adjusters) shall be installed as a countermeasure against low voltage.

At the present, planned blackout for 3 to 4 hours is implemented once a week; therefore, it is necessary to provide an alternative power source in order to cope with such planned blackout. For this reason, the traffic signal system shall be built giving due consideration to the following actions (Table 2-26):

- To compare Electric Bulb and Light-Emitting Diode (LED: power consumption is 1/3) to be used for traffic lights;
- To propose an alternative power source to deal with planned blackout and accidental blackout (maximum 12 hours);
- To plan for a low voltage power supply; and
- To propose the posibility of solar power as an alternative power source.

As a result, the combination of LED, UPS (uninterruptible power supply), and Automatically Operated Generator was applied. The power consumption of LED is very low, which results in small size system. UPS not only is reasonable in price, but also lasts sufficiently long against accidental blackout (maximum 12 hours) and planned blackout which are assumed to continue for a while.

The power system envisaged for traffic signals is shown in Figure 2-5.

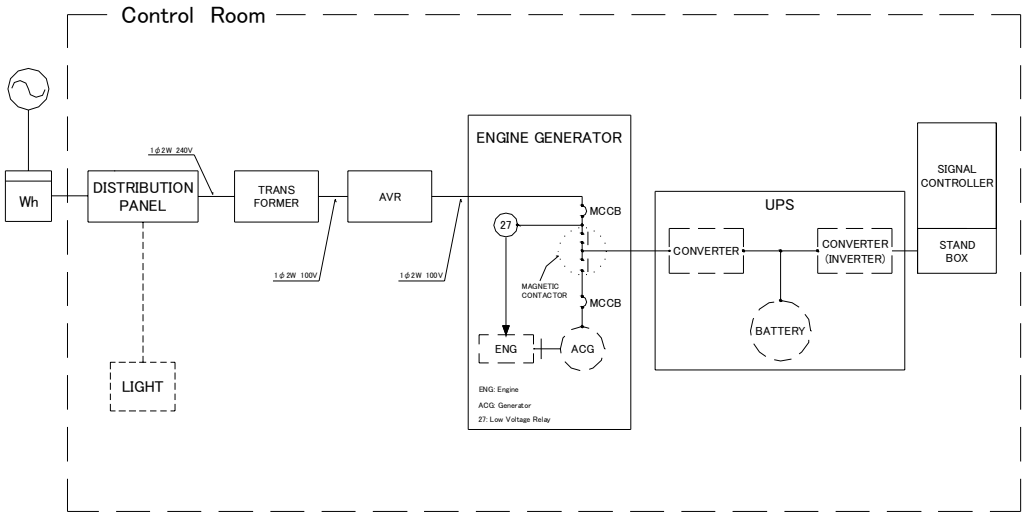


Figure 2-5 Power System

Table 2-26 Comparison of Traffic Signals and Power Back-up

		Plan 1	Plan 2	Plan 3	Plan 4	Plan 5
Instrument	Light Storage battery	-Bulb Type -UPS	-LED -Manually Operated Generator	-LED -UPS	-LED -Solar Power +UPS（accumulation）	-LED -Small UPS Automatically Operated Generator
Record of Kampala City		Japan's Grant Aid Study – Phase 1 Wandegeya、Natete, Portbell Junction	Japan's Grant Aid Study – Phase 2 Kiburi and Bakuli Junction	-None	-None	-None
System		UPS copes with blackout up to 4.2 hours continuously.	Manually Operated Generator copes with blackout.	Commercial electricity is accumulated in UPS.	- Solar power was adopted as a storage battery -Necessary electricity for back-up is accumulated in UPS with solar system.	- Combination of LED, UPS, and Automatically Operated Generator - LED reduces electricity consumption - UPS copes with short time blackout (less than 40 seconds). - Automatically Operated Generator copes with long term blackout (more than 40 seconds)
Light	Visibility	-Imitative Lighting -Normal Visibility ○	- No Imitative Lighting -High Visibility ◎	Same as Plan 2	Same as Plan 2	Same as Plan 2
	Safety	- Dangerous because of complete light-off - Periodical replacement △	- No complete light-off because one light consists of many LED - Traffic signal works at any time ◎			
	Durability	Input Voltage is ±10% of Normal Voltage ○	Input Voltage is ±10% of Normal Voltage ○			
	Stability in long term	- All bulbs should be replaced at the same time once a half year - Periodical lense cleaning is needed. △	- No periodical replacement - Periodical lense cleaning is needed. ◎			
	Stability	- Normal Voltage ±10% - Input of Normal Voltage is required to keep the system in long term. - Exclusive cable and AVR should be installed. ○	- Generator copes with blackout. The commercial voltage doesn't affect the utility. ◎	- Normal Voltage ±10% - Input of Normal Voltage is required to keep the system in long term. - Exclusive cable and AVR should be installed. ○	- The system is stable because solar power provides electricity stably to UPS ◎	- Normal Voltage ±10% - Input of Normal Voltage is required to keep the system in long term. - Exclusive cable and AVR should be installed. ○
	Safety	- Practical Back-Up time is 4 hours because power supply against long term blackout is in proportion to UPS amount and cost. ○	- Generator doesn't cope with blackout immediately because it is manually operated. - It cannot be used as a traffic safety countermeasure in reality. △	- Practical Back-Up time is 4 hours because power supply against long term blackout is in proportion to UPS amount and cost. - Countermeasure against long term blackout is impossible. ○	- Practical Back-Up time is 4 hours because power supply against long term blackout is in proportion to UPS amount and cost. - Countermeasure against long term blackout is impossible. ○	- It can cope with long term blackout (more than 12 hours) because back-up time depends on the battery amount. ◎
	Maintenance	No need of periodical maintenance ◎	- KCC needs to operate generator manually at every blackout. △	No need of periodical maintenance ◎	- Periodical cleaning of solar panels is needed. - Protection against throwing stone is needed. △	- Periodical diesel supply is needed according to blackout time ○
Finance	Including 10 years maintenance cost	8,460,000 Yen (122%) △	 –	7,500,000 Yen (102%) ○	8,550,000 Yen (123%) △	6,930,000 Yen (100%) ◎
Total Evaluation						This plan was adopted for the following 2 reasons: - It can cope with long term blackout (max 12 hours) and planned blackout assumed to continue for a while. - Its cost is reasonable.

8) Road Safety Facilities

a) Public Bus Bays

The existing bus bays for public small buses shall be transferred to the back of junctions as 3.0m wide stop lanes, so as to keep smooth traffic flow and road space.

b) Pedestrian Barrier: Flower Bed

Flower beds made of structural bricks shall be installed for the following purposes:

- To prevent cars from crashing into pedestrians,;
- To guide/force pedestrians not crossing the road;
- To guide a driver's eyes for safe drive;
- To work as a crash barrier, and
- To improve the city environment

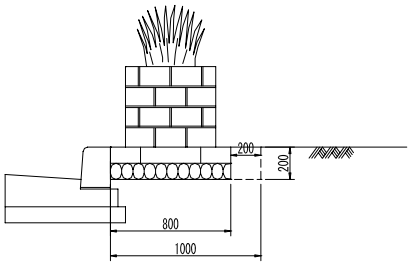


Figure 2-6 Flower Bed

c) Pedestrian Barrier: Planting Zone

Planting zones shall be installed to ensure safety for both cars and pedestrians. They shall be replaced by flower beds if necessary.

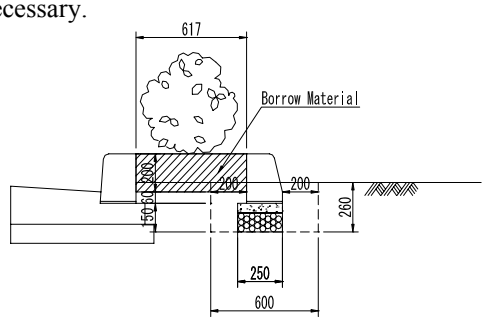


Figure 2-7 Planting Zone

9) Road Safety Facilities

a) Traffic Signs

Traffic signs shall be installed at critical sections of the roads to enhance road safety in conformity with Ugandan Standard. The installation points and method of each sign are shown in Table 2-27 and Table 2-28.

Table 2-27 Installation Points of Traffic Signs

Classification of Traffic Sign		Installation Point
Warning sign	Sharp turn ahead	− Radius of curvature is less than 100m. − Bending point with junction angle of more than 45 degrees
	Steep gradient ahead	Steep slope (grade is more than 6%)
	Narrow carriageway	Narrowing point of road lanes
	Pedestrian crossing ahead	Installation point of pedestrian crossing except signal junction
	School	Around Kindergarten or Elementary School
Regulatory sign	Stop	Exit of minor road at unarranged junction
	Do not enter	Exit of one way
	Do not pass	Continuous sections where grade is large
	Parking prohibition	Traffic inflow point and shopping streets
	Standing and parking prohibition	Traffic outflow point
	Direction designated lane	Points necessary to prohibit car intrusion in a particular direction
Instruction sign	Pedestrian crossing	Installation points of pedestrian crossing except signal junction
	Bus bay	Installation point of bus bay for public bus
	Roadside parking place	Installation point of roadside parking place

Table 2-28 Installation Method of Traffic Signs

Item	Specification	Remark
Strut type	Single strut type	-
Installation method	Roadside system	To be posted 50cm away from road edges in principle
Height	2.0m above the ground	-
Assignment	In row parallel to carriageway	All of 3 signs shall include temporary stop sign; therefore, the visibility is sufficiently good. For this reason, signs shall be installed in row parallel to carriageway in all cases where 1, 2, and even 3 different types of signs are installed.
Assignment order	In conformity with the traffic sign code	-

b) Road Markings

Road markings shall be installed with road signs to ensure traffic safety and smoothness as shown in Table 2-29.

Table 2-29 Location for Installation of Road Markings

Classification of road marking		Installation point
Road marking (Instruction marking)	Center line	All lines except points where “Do not pass” sign and median strip are installed.
	Lane line	where there are many lanes at the junction.
	Channelizing strip	where the lane number at the junction changes.
	Stop line	where exit of junction and stop signs are installed.
	Pedestrian crossing	where pedestrian crossing is installed.
Road marking (regulatory marking)	Passing division	where there are many lanes at the junction.
Section marking	Changing sidewalk width	where the road width changes
	Roadside parking place	where there are bus bay and road parking place.

2-2-3 Basic Design Drawings

On the basis of the above scheme and the design criteria, the following drawings were prepared as shown in the Appendix:

- Plans
- Typical Cross Section
- Structural Design

2-2-4 Implementation Plan

(1) Implementation Policy

1) Basic Concept

On the assumption that the Project will be implemented under the Japan's Grant Aid Scheme, the implementation policies are determined as follows:

- To use local labors, materials and equipment to the maximum extent possible, so as to increase employment opportunities, to facilitate technical transfer, and to provide a positive impact to the local economy;
- To establish good communication between GOU, the consultant, and the contractor for smooth implementation of the Project;
- To prepare a practical construction plan in consideration of the local rainfall pattern, the required period for procurement of equipment, and the appropriate construction methods;
- To adopt construction methods which do not hamper the present traffic flow; and
- To propose the technical transfer to Ugandan engineers such as lessons about soft-components through JICA training.

2) Local Contractors

Maintenance technique shall be transferred by using local contractors as much as possible. This is indispensable in particular after the completion of the Project.

3) Necessity of ExpatriateEngineers

Electrical work involving special technique such as control of timing of traffic light installation is also required for the implementation of the city junction improvement project. Therefore, expatriate electrical engineers must be used for technical transfer to local contractors .

4) Ugandan Organization

MOWHC will be mainly responsible for the overall project implementation. It will manage all works related to the Exchange of Notes (E/N), such as procurement of necessary fund and any legal procedures. The Transport Planning Section of MOWHC will practically operate the Project, and KCC will administer the project facilities after the completion of the Project.

(2) Implementation Conditions

The following special aspects should be taken into due consideration for the project implementation:

1) Labor Law

The contractor shall manage labors properly with an adequate safety control plan and shall prevent conflicts with local labors. In all circumstances he shall abide by the labor laws and regulations in force in Uganda.

2) Environmental Consideration

The Project shall be implemented in conformity with the Environmental Guidelines of Uganda for preventing and mitigating environmental impacts such as pollution by surplus soil and dust. The comments provided by the Environmental Department of MOWHC and the National Environmental Management Agency (NEMA) regarding IEE were taken into consideration in the implementation plan.

The environmental impact and mitigation plan was worked out as shown in Table 2-30.

Table 2-30 Environmental Impacts and Mitigation Plan

Environmental Impacts	Mitigation Plan
Before Construction (Basic Design)	
Impact by project roads on private land and historical structures	Horizontal alignment should be so planned as to avoid transfer or removal of existing structures and facilities.
Water pollution by drainage from roads	Appropriate drainage should be planned.
Temporary construction plants	The temporary yard for construction materials should be placed near the construction site to reduce the environmental impact of road construction as much as possible
During Construction	
Air, noise, and vibration pollution	- Machines with low noise and low vibration should be used. - Machines should be appropriately controlled. - Soil, crushed stone, and asphalt should be covered with tent sheets. - Machines should not be used at night time. - Water should be sprinkled periodically to prevent dust. - Soundproof fences should be installed where too much noise is produced.
Waste	- To determine the quality and amount of planned waste. - To study the recycling of waste. - To confirm an appropriate disposal plan.
Water pollution by leaked oil from construction machinery	Oil leakage from machines shall be prevented by the following 2 measures: - To train machine drivers. - To control and maintain machines appropriately.
Traffic congestion	- To install traffic control signs. - To inform the residents sufficiently. - To arrange adjusters appropriately. - To request police to adjust traffic appropriately. - To study diversion roads. - To place the temporary yard as near the construction site as possible to avoid traffic congestion.

3) Religious and Local Restrictions

Besides the national and public holidays, there are many religious and local traditional holidays in Uganda. These holidays have to be taken into account in the estimation of the workable days.

4) Customs Clearance

All construction machines would be imported via neighboring Kenya because Uganda is a landlocked country. Therefore, the construction plan should be worked out in consideration of the required periods of time for transport, unloading, and customs clearance.

5) Implementation Order

It is important to introduce an efficient implementation order for smooth construction. The key element in determining this order is to avoid inefficient arrangements for labor, machines, and construction materials.

a) Construction Plan

Taking into consideration the commencement timing, scale, and location of the Project, it was planned that the construction works will be carried out in two phases as follows:

Phase-I:

1. Improvement of Clocktower RA and Installation of Traffic Signals (including Nsambya Road)
2. Improvement of Shoprite RA and Installation of Traffic Signals
3. Improvement of Katwe - Mengo Hill RA
4. Improvement of Kampala - Entebbe Road Junction and Installation of Traffic Signals

Phase-II:

5. Improvement of Jinja Road RA and Installation of Traffic Signals
6. Improvement of Africana RA

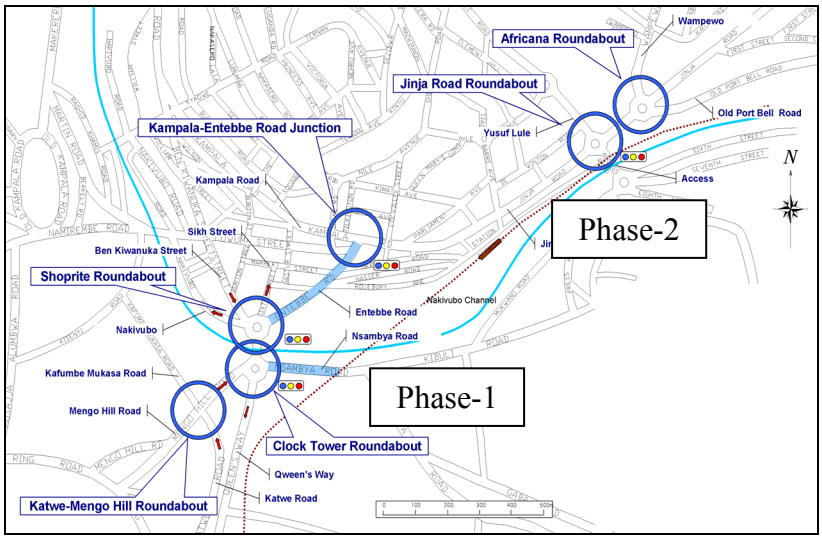


Figure 2-8 Project Location

b) Construction Procedure

The proposed construction procedure is shown in Figure 2-9.

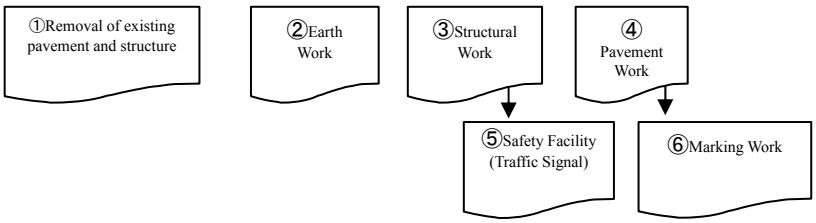


Figure 2-9 Construction Procedure

The construction sites are relatively close to each other in the project area. Simultaneous constructions at a few points may result in serious traffic congestion; therefore, simultaneous constructions of adjacent junctions shall be avoided. In addition, it was planned that there should be no time lag between the completion of traffic signal work and the completion of junction improvement work in order to reduce traffic confusion.

Phase-I:

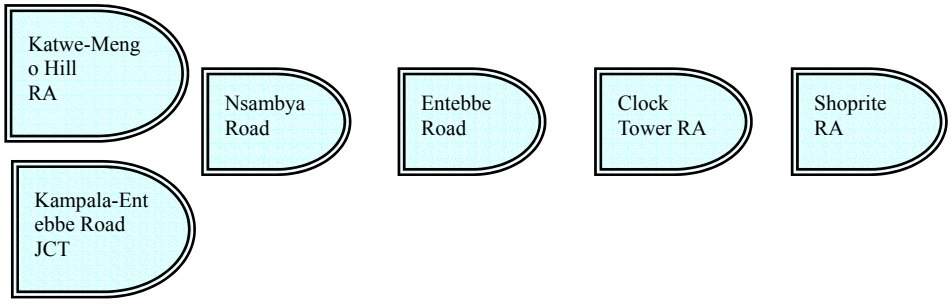


Figure 2-10 Phase-I Construction Procedure

Road secondary products such as kerb stone are mainly included in the structural works of the Project and the time required for such secondary products constitutes a critical factor in the overall construction process. Therefore, to ensure smooth construction, the works should start from Katwe - Mengo Hill RA where the quantity of secondary products is small compared to other RAs. It would take about a half year to produce secondary products for Phase-I works, and another half year to install the traffic signal system that will be procured from Japan, for the following reasons:

- The traffic signals and other ancillaries are produced only on demand; and
- The traffic signal system must be built and checked once in Japan before shipping.

As a result, the Clocktower RA and Shoprite RA are the last ones to be constructed in Phase-I due to the time-consuming traffic signal work.

6) Construction without Closing Roads

It is necessary to open roads to traffic during construction because the project roads are actually the existing active city roads. If there is not sufficient ROW, the one lane - one side open style shall be taken. Under this circumstance, special assistance by MOWHC and KCC is indispensable to secure safety for passing cars and pedestrians.

The traffic control plans for the Clock Tower RA that has the heaviest traffic volume are shown in Figures 3-11 to 3-13.

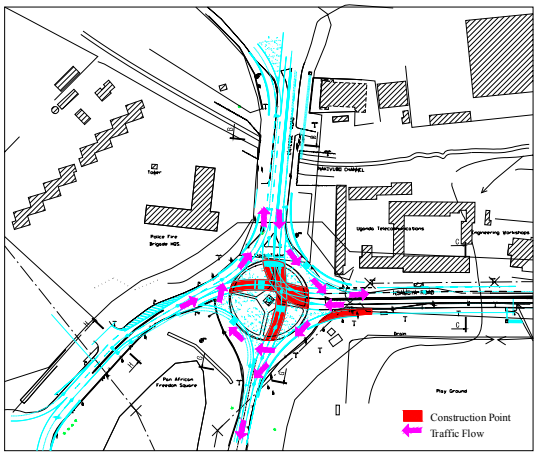


Figure 2-11 Present Traffic Flow (Construction is implemented inside island).

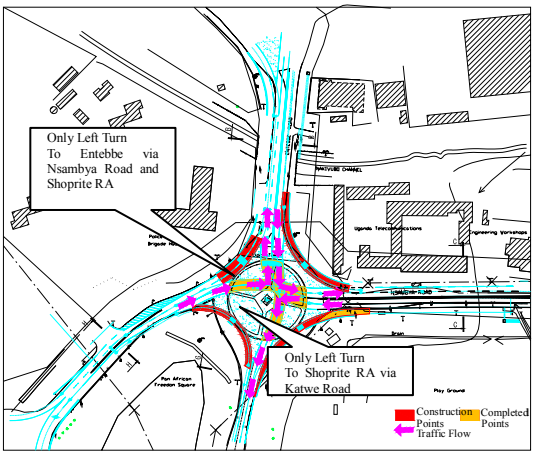


Figure 2-12 Completed sections partially open to traffic

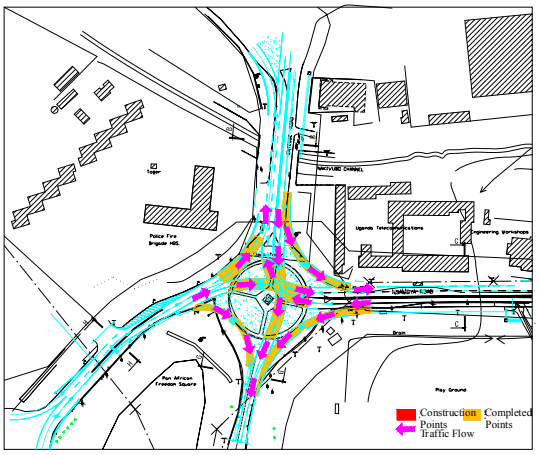


Figure 2-13 Traffic upon Completion

(3) Scope of Works

Obligations of Japan side and Uganda side are shown in Table2-31.

Table 2-31 Obligations of Japan Side and Uganda Side

Obligation of Japan	Obligation of Uganda
- To improve 6 junctions and 2 related roads mentioned in item "2-2 Basic Plan" - To maintain safety during the construction period and to inform the public of the construction work - To procure road construction materials from Uganda or Japan - To procure road construction machines - To prevent environmental pollution during the construction period - To prepare Tender Documents and assist in tendering as specified in item "2-4-4 Construction Schedule" - To manage the construction schedule and quality control	- To remove utility facilities such as electric line, telephone, water supply and sanitation, and houses inside ROW and to reinstall them upon work completion - To exempt customs duty, tax, and surcharge - To conduct EIA of the Project (It is under execution and will be finished by April 2005.) - To facilitate the non-Ugandan staff for their entry and stay in Uganda - To provide camp-yards and necessities such as water supply and sanitation, electricity, and telephone - To install an exclusive cable line and provide electricity for traffic signals

(4) Consultant's Supervision

1) Schedule of Consulting Services

The Project will be commenced upon the signing of an E/N between the two Governments regarding the Japan's Grant Aid for the Project. Then a contract for consulting services will be concluded between MOWHC and the Japanese consultant who will provide the following engineering services within the limits of the Japan's Grant Aid:

2) Tender Documents Preparation Phase

The Tender document will be prepared on the basis of Basic Design Report and should be approved by MOWHC.

- Preparation of Tender Documents

3) Tender Phase

MOWHC will select a Japanese contractor for execution of the Project through an open tender. The consultant will assist MOWHC in performing the following tasks at this phase:

- Bid announcement;
- Prequalification of contractors;
- Pre-bid conference and site inspection;
- Tender and tender evaluation; and
- Contract negotiation.

4) Construction Supervision Phase

The engineering services for construction supervision will begin with the issuance of a Notice to Proceed (N/P) to the Contractor by MOWHC.

The consultant shall perform his duties in accordance with the criteria and standards applicable to the construction works and shall exercise the powers vested in him as the Engineer under the contract to supervise the field works by the contractor.

The consultant within his capacity as the Engineer shall directly report to MOWHC about the field activities and shall issue field memos or letters to the contractor regarding various matters, including progress, quality, safety and payment for the works under the Project.

5) Implementation Organization

a) Organization for Preparation of Tender Documents and Support in Tendering

The tendering support work should be implemented as follows considering that the Project is implemented under Japan's Grant Aid.

- The tender and contract documents shall be in conformity with international standards.
- The technical specifications shall be prepared appropriately to ensure adequate quality of the construction works.
- The construction method shall match the real site conditions.
- The Ugandan construction specifications shall be fully referred to, whenever possible.

- The engineers to be in charge mainly of preparation of tender documents and support in tendering shall be selected among those who have been engaged in the Basic Design and possess sufficient knowledge of the nature and contents of the Project.

In particular, the following key staff and tasks will be required at this phase:

- Team Leader : Coordination of the overall project work to ensure smooth progress, liaison with parties concerned, preparation of the agreement for consulting services and tender documents, and assistance to MOWHC in tendering procedures.
- Tender Specialist : Preparation of technical specifications, tender drawings and the contract agreement with the contractor, as well as assistance in tendering.

b) Organization for Construction Supervision

A senior engineer with sufficient experience in Japan's Grant Aid studies shall be assigned as Resident Engineer for construction supervision. The Team Leader shall visit the construction site at each step of construction and shall be responsible for management work.

The engineers required at each step and their respective roles are shown below:

- Management Engineer : Coordination and liaison for all the project activities to ensure smooth work progress and management of all technical aspects.
- Resident Engineer : Solving any differences between the actual construction and design of horizontal alignment, cross structure, drainage, ancillaries, and so on; also responsible for daily quality inspection and control of construction schedule.
- Traffic Signal System Engineer : Transfer of knowledge on maintenance work, including manual and guidance to local maintenance administrators; also responsible for supervising electrical works.

(5) Quality Control Plan

Pavement material and concrete will be procured locally, but the quality control of local suppliers shall be confirmed. For other materials, certification by local suppliers shall also be required before procurement.

Moreover, in the case the accuracy and quality control test data on any work or material are insufficient, the contractor or supplier concerned in or outside Uganda shall be requested to issue additional certification with sufficient evidence to justify the quality of such work or material.

Table 2-32 below shows the quality control items required for the Project:

Table 2-32 Quality Control Items

Item	Test	Objective	Remark
Soil	- CBR Test	-Measure the bearing capacity of base course and subgrade	-3 molds/time x 4 days = 12 (4 days immersion).
	- Compaction Test	-Measure maximum compaction density	-Compaction for CBR
	- Specific gravity test for fine aggregate	-Measure specific gravity for mix design	
	- PI	-Physical Test	-Measure LL, PL
Aggregate	- Sieve Analysis	-Determine the gradation	-Automatic Sieve
	- Abrasion Loss	-Measure solidity of aggregate	-LosAngels Test Machine
	- Specific gravity test for coarse aggregate	-Measure specific gravity for mix design	
	- Water Absorption Rate	-For concrete mix design	
Concrete	- Salt Content Test	-Adequate test for adopted water	-Simple test with reagent
	- Slump Test	-Nature test for shipping material	
	- Air Content Test	-Same as above	
	- Compression Test	-Same as above	-Amuslar 100t -6 molds x 4 weeks = 24
Asphalt	- Penetration Test	-Nature test for arrival AS	-Automatic Type
	- Softening Point Test	-Same as above	-Automatic Type
	- Compaction Test	-Measure maximum compaction density	
	- Marshall Test	-Measure the nature of asphalt	-3 molds/time x 4 days = 12 pieces (for mix design)
	- AS Extraction Test	-Examine the amount of AS	-Soxlet Type
	- Field Compaction Test	-Confirm compaction density and thickness	-Core Cutter D100 -Replacement Bit x 5 pieces

The main quality control tests shall be executed in accordance with the frequency and method specified in the Specifications, and shall be approved by the Client.

(6) Procurement Plan

1) Construction Machines

There are no machine rental companies in Kampala City, however, necessary road construction machines can be rented from local construction companies who own such equipment. The major machines required for the construction works and their procurement source are shown in Table 2-33.

Table 2-33 Procurement of Construction Equipment

Item	Capacity	Uganda	Japan	Third Country
Bulldozer	15t	○		
Shovel	1.4m3	○		
Dump Truck	8.0t	○		
Backhoe	0.6m3	○		
Vibration Roller	3.0-4.0t	○		
Load Roller	10.0t	○		
Grader	3.1m	○		
Emulsion Sprayer	2,000lit	○		

Concrete Mixer	3.0m3	○		
Trailer	40.0t	○		
Lane Marker	2.0lit/min	○		
Asphalt Finisher	2.5-5.0m	○		

2) Construction Material

Most construction materials to be used for the Project are available in Uganda except for the traffic signal devices. Concrete admixture and ready mixed concrete will be procured near Kampala City where the project site is located. The major construction materials required for the construction works and their procurement source are shown in Table 2-34.

Table 2-34 Procurement of Major Construction Materials

Item	Uganda	Japan	Third Country	Remark
Asphalt	○			
Aggregate	○			
Asphalt Mixture	○			
Ready Mixed Concrete	○			
Cement	○		○	Cement made in Kenya is in circulation generally
Admixture for Cement	○		○	
Reinforcement Bar	○			
Form	○			
Marking Paint	○			
Delineator	○	○		
Diesel	○			
Gasoline	○			
Pole for Traffic Signal	○		○	
Traffic Signals and Ancillaries		○	○	

3) Traffic Signal System

In the study area, only 5 traffic signals provided by Japan's Grant Aid were being in use among the 15 traffic signals studied.

In 2000, 6 traffic signals were installed. Three of them were provided by Japan's Grant Aid, 2 by India, and 1 by Germany. The Indian traffic light installed at the Kampala - Entebbe Road Junction completely stopped in 2003 because the company that supplied the signal materials disappeared in September 1999. The German traffic signal installed at the Jinja-Nakawa Junction in 1997 was removed because it caused severe traffic congestion. Under such condition, GOU highly values Japan for the reliability of Japanese traffic signals, sufficient care service, etc. JICA's technical transfer on maintenance was also highly appreciated.

Thus the traffic signal system is proposed to be procured from Japan for the following two reasons:

- It has a good reputation as said above; and
- It is compatible with the existing signals.

Table 2-35 Comparison of Countries for Procurement

Item		Traffic Signal System procured from Japan	Traffic Signal System procured from other countries or fabricated in Uganda
Product		- Made in Japan	- Made in UK, Germany, and India
Record in Kampala City		- Japan's Grant Aid Study – Phase 1 Wandegeya and 2 other junctions - Japan's Grant Aid Study - Phase 2 Kiburi, Bakuli Junction	- More than 10 signals, but none is in use now.
Visibility 1	Form	- Side suspending type is compatible with other junctions where traffic signals are installed - Installation point can be changed ◎	- Vertical suspending type - Only height can be controlled. ○
Visibility 2	Light	- Either LED Type or Bulb Type ○	- Either LED Type or Bulb Type ○
Function	Specification	- Spot Control - Interlocking type is feasible. ◎	- Spot Control - No record of interlocking type △
Reliability	Record and Evaluation	- Reliability is high as judged by GOU, considering the working condition of the existing traffic signals installed at 5 junctions. - Reliability is ensured because the signals are built, fabricated, and inspected in Japanese factories before shipment to the site. ◎	- Reliability is low for the following 2 reasons: 1. 10 junctions don't work. 2. Components of traffic signal are carried to and erected at the site. - Support by manufacturers at local site is not available. △
Durability	Record	- It has the record of withstanding Ugandan voltage situation (decline, fluctuation, and blackout) ○	- No record of back-up against blackout △
Compatibility	Compatibility Control	- It is easy to control the traffic signal system between the Clocktower Junction and Kiburi Junction for the following 2 reasons: 1. These 2 junctions are close to each other (only 400m apart); therefore, one system can affect the other. 2. The Kiburi Junction is equipped with a Japanese traffic signal system; therefore, the same type of signal should be installed at the Clock Tower Junction to ensure compatibility between the 2 systems. ◎	- For the reason mentioned in the left column, it is difficult to control traffic harmoniously if the signal systems installed at the 2 junctions are of different types. △
Maintenance	Local Engineers	- Electrical engineers of MOWHC and KCC are already familiar with Japanese system through their training in Japan.	- There are no appropriate engineers who are familiar with these traffic signals.
	Manufacturer	- Japanese manufacturer is stable due to high demand of traffic signals. - It also provides technical support stably. ◎	- There are some problems on the manufacturer side as follows: 1. Manufacturer may collapse. 2. The components are not produced anymore. 3. Manufacturer doesn't provide sufficient support. △
Finance 1	Facility Investment (Initial Investment) Normal Junction: Jinja	- It is expensive compared to other country's systems. - Main Machine Cost Total 9,480,000 Yen Ratio 128% △	- It is less expensive compared to Japanese systems. - Main Machine Cost. Total 7,380,000 Yen Ratio 100% ◎
Finance 2	Maintenance Cost (Spare Parts)	- Components are procured in foreign country. - KCC has sufficient knowledge - Spare parts are easily procured because the existing traffic signals have been procured also from Japan. ◎	- Components are procured in foreign country. - Spare parts are not easily procured because the existing 5 signals are procured from Japan. - Technical support is not available. △
Total Evaluation		- Japanese traffic signal system is adopted for the following reasons: 1. It is compatible with other signals installed at junctions under Japan's Grant Aid Studies in Phase 1 and Phase- 2. 2. Spare parts can be easily procured because the existing signals have been also procured from Japan. 3. KCC possesses sufficient knowledge about Japanese traffic signal systems. 4. It is compatible with the existing adjoining traffic signals and thus can be controlled easily. ◎	

4) Condition of Constructoin Plants in Kampala City

a) Crushed Stone Plant

Five crushed stone plants listed in Table 2-36 who have been approved by the Central Laboratory of MOWHC are operating in Kampala City.

Table 2-36 Crushed Stone Plants

Crushed Stone Plant	Distance from Kampala City	Capacity
Muyenga	6 km	80ton/hr
Matuga	20km	50ton/hr
Mbalala	30km	30ton/hr
Kyaanja	12km	80ton/hr
Lutembe	20km	30ton/hr

In addition to the above, contractors such as Cementers Ltd., Federici-Stirling Co., Ltd., and Zzimwe Ltd. possess their own plants.

Crushed Stone Plant（Muyenga）

Crushed Stone Plant(Cementers)

One of the above cited 8 plants will be selected for the construction works under the Project. The selection shall be based on the following criteria:

- The plant shall have a sufficient capacity to supply the material in accordance with the construction schedule; and
- The supplied crushed stone shall be of adequate quality.

All of the existing 8 crushed stone plants meet the above criteria.

b) Concrete Plant

Concrete batching plants in Kampala City are owned by 5 companies: Ayouboco Ltd., Spencon Ltd., Cementers Ltd., Zzimwe Ltd., and Epic Ltd. Among those, the Cementers Ltd. and Epic Ltd. plants are approved by the Central Laboratory of MOWHC. The production capacity, monthly sales volume and relevant information of each plant are shown in Table 2-37.

Table 2-37 Concrete Batching Plants

Company Name	Production Capacity	Monthly Sales Volume	Location
Ayouboco Ltd.	30m3/hr	2,000-3,000 m^3	10km East of Kampala City
Cementers Ltd.	60m3/hr	1,000 m^3	7km North of Kampala City
Spencon service Ltd.	30m3/hr	-	25km West of Kampala City
Zzimwe Ltd.	-	Planned to operate within this year	30km East of Kampala City
Epic Ltd.	15m3/hr	800 m^3	5 km East of Kampala City

Concrete Plant (Cementers Ltd.)

Concrete Plant (Epic Ltd.)

The following criteria shall be applied in selecting the concrete plant for the Project:

- To have a large supply capability, enough to cover the project demand;
- To be located near the construction site (within 1.5 hours by agitator truck); and
- To have enough technological capability to control quality by itself.

It is considered that three of the above companies: Ayouboco Ltd., Cementers Ltd., and Epic Ltd. satisfy the above-mentioned criteria. At the construction stage, one of these 3 companies shall be selected for cement supply for the construction works under the Project.

c) Asphalt Plants

Asphalt plants in Kampala City are owned by 5 companies: Federici-Stirling Co., Ltd., Spencon Co., Ltd., Cementers Ltd., Dott Ltd., and Zzimwe Ltd. Among those, the plants of Federici-Stirling Co., Ltd. and Cementers Ltd. are approved by the Central Laboratory of MOWHC. The production capacity, monthly sales volume and relevant information of each company are shown in Table 2-38.

Table 2-38 Asphalt Plants

Company Name	Production Capacity	Location
Federici-Stirling Co., Ltd.	100ton/hr	30km East of Kampala City
Spencon Co., Ltd.	50ton/hr	25km West of Kampala City
Cementers Ltd.	25ton/hr	7km North of Kampala City
Dott Services Ltd.	10ton/hr	25km East of Kampala City
Zzimwe Ltd.	150ton/hr	25km East of Kampala City

In addition to the above, Dott Services Ltd. will introduce a new plant with a production capacity of 50ton/hr in 2005. Besides, some construction companies would establish new plants to cover the demand for each project. As such, it is possible to acquire from the existing plants the full amount of asphalt required for the project works, that is estimated to be about 10,000 tons.

Asphalt Plant (Cementers Ltd.)

Asphalt Plant (Zzimwe Ltd.)

(7) Implementation Schedule

The Project is scheduled to be implemented in two phases. The total construction period is 19.0 months with 12.5 months for Phase-I and 7.5 months for Phase-II, including a 1-month overlapping period for preparatory works between the two phases.

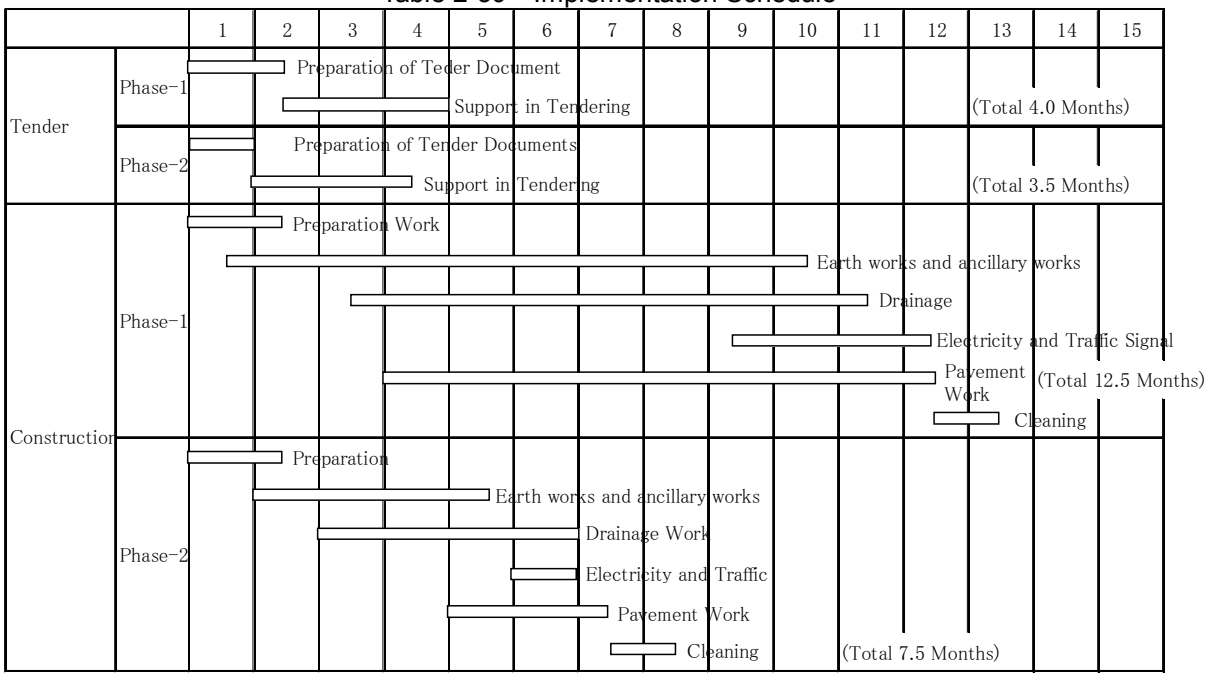
The Phase-I will begin upon the signing the Exchange of Notes (E/N) between the Government of Japan and Uganda for the road improvement works and the Agreement for Consulting Services between MOWHC and the Consultant, who will be selected as the Engineer acting on behalf of the GOU in the execution of the Project. The Consultant's services will consist of:

- Pre-construction activities for prequalification of tenderers, and tendering
- Construction supervision

The period required for pre-construction activities is 4 months.

A Japanese contractor will be selected through competitive bidding process in accordance with the Japan's Grant Aid procedures. The contractor so selected will carry out the construction works in accordance with the work program and schedule defined in the contract documents, including maintenance of the completed works until their final acceptance.

Table 2-39 Implementation Schedule



2-3 Obligations of Recipient Country

For smooth implementation of the Project, the Government of the recipient country shall fulfill the obligations and commitments described in Table 2-40.

Table 2-40 Recipient Country's Obligations and Commitments

Obligations		Confirmation
1	To acquire lands for road	As the project site is located in the center of Kampala City, the road alignment will be limited within ROW to avoid the necessity for new land acquisition The land within ROW is fully available because it is public land.
2	To replace public facilities such as electric line, telephone, tap water, advertisement, and so on	Study team received approval of advance support by UEDCL, UTL, NWSC, and KCC; as the result, each public service organization submitted cost estimate of removal and replacement to MOWHC.
3	To acquire construction yard and supply water and electricity	MOWHC is kindly requested by Study team to acquire construction yards (each is more than 10,000 m2) around Clock Tower RA and Jinja Road RA; therefore, MOWHC recommended the lands possessed by KCC. Study team surveyed the validity of proposed lands in terms of environment and construction convenience. As the result, these lands are adopted as construction yards. In addition, Uganda side shall be responsible for supplying construction yards with electricity and water.
4	To supply electricity to facilities such as traffic signals planned in the Project	It is confirmed that electricity shall be supplied up to electric pole near planned facilities in the Project
5	Responsible for Procedure and Cost of EIA	GOU has the experience of these items in the Study with Japan's Grant Aid such as the project" Improvement of Trunk Roads in Kampala, Phase 1 or 2". In the past, any delay never happened in these items.
6	Responsible for opening of bank account and expense of A/P	
7	Exemption of import and reimport of construction machines and materials	
8	Entry and Work permission for Japanese and Japanese companies related to the Project	
9	Exemption of customs and other tax for construction materials	
10	Responsible for the costs except Japanese obligation about construction, shipping, and installation	

others	To allocate sufficient budget for execution of the works belonging to its responsibility under the Project	At the survey stage, MOWHC didn't establish an independent budget for the Project; however, MOWHC keeps an annual budget for the "Kampala Urban Interface of Trunk" project as a special case.

2-4 Project Operation Plan

The operation and maintenance works shall be carried out in accordance with the work schedule shown in Table 2-41.

Table 2-41 Operation and Maintenance Schedule

Item	Frequency	Content of Works
Surface Pavement	1 time/year	Repairing of ruts, cracks and pot holes
Surface Cleaning	12 times/year	Cleaning 1time/month
Road Marking	1 time/2years	Repainting
Drainage	2 times/year	Removal of sedimentation
Traffic Signal	2 times/year	Lump cleaning and inspection of electric system
Electricity and Diesel Charge	Every year	Electricity charge for traffic signal Diesel charge for back-up system
Safety Facilities	3 times/year	Repair work of safety facilities such as flower bed and planting zone
Overlay	After 10 years	Asphalt overlay

2-5 Other Relevant Issues

2-5-1 Project Cost to be borne by Japan's Grant Aid

The total cost of the Project by the Japan's Grant Aid is estimated Japanese Yen 769 million consisting of 471 million for Phase-I and 298 million for Phase-II as summarized in Table 2-42 and 2-43.

This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

Total Project Cost Japanese Yen 769 million

Table 2-42 Project Cost for Phase-I to be borne by Japan's Grand Aid

for 4 junctions of Clock Tower, Shoprite, Katwe-Mengo Hill and Kampala-Entebbe Road and 2 roads of Nsambya and Entebbe with total length of approx. 2,236m

Items			Amount (Million Japanese Yen)	
Facilities	Junction and Road	Earth and Pavement Work	249	409
		Drainage Work	63	
		Roads Safety Facilities	44	
		Traffic Signal System	53	
Tendering and Construction supervision				62

Project Cost for Phase-I Japanese Yen 471 million

Table 2-43 Project Cost for Phase-II to be borne by Japan's Grand Aid

for 2 junctions of Jinja Road and Africana with total length of approx. 1,258m

Items			Amount (Million Japanese Yen)	
Facilities	Junction and Road	Earth and Pavement Work	186	256
		Drainage Work	23	
		Roads Safety Facilities	27	
		Traffic Signal System	19	
Tendering and Construction supervision				42

Project Cost for Phase-II Japanese Yen 298 million

Condition of Cost Estimate

1 Estimate Time: November 30, 2004

2 Exchange Rate: US$ 1 = 107.93 Yen
UShs 1 = 0.062 Yen (US$ 1 = 1,740.65 UShs)
The above-mentioned Exchange Rate is to be reviewed by the Government of Japan.

3 Construction Period: The construction consists of 2 phases. Tendering and construction period for each phase are shown in the construction schedule (Phase-I and Phase-II).

4 Others: The Project is implemented in conformity with the Japan's Grant Aid Scheme.

2-5-2 Project Cost to be borne by Ugandan side

The Project cost to be borne by the Ugandan side is estimated shown in Table 2-44.

Table 2-44 Project Cost to be borne by Ugandan Side

Unit : million Ushs.

No.	Item	Phase-I	Phase-II	Total
1	Obstacle Removal			
	(a) Compensation Cost	410	205	615
	Removal and reinstallation of public service facilities			
	(b) Electricity	250	200	450
	(c) Telephone	70	50	120
	(d) Water Supply & Sanitation	300	300	600
	Subtotal (1) (a+b+c+d)	**1,030**	**755**	**1,785**
2	Customs, taxes			
	(a) Fuel	44	26	70
	(b) Others (VAT, etc.)	727	469	1,196
	Subtotal (2) (a+b)	**771**	**495**	**1,266**
3	Facilities			
	(a) Building	15	30	45
	(b) Others	20	35	55
	Subtotal(3) (a+b)	**35**	**65**	**100**
4	Bank Commission (0.1%)	**8**	**5**	**13**
5	General Management cost (1+2+3+4)*10%	**184**	**132**	**316**
	Total (Subtotal 1+2+3)＋4+5	**2,028**	**1,452**	**3,480**

2-5-3 Maintenance Cost

The annual maintenance cost is US$101,400 (176.5 million UShs) as shown in Table 2-41, and it is mainly used for the daily maintenance such as improvement of traffic safety facilities and road surface cleaning. Considering the contents of works, KCC will be responsible for those daily maintenances. The project 6 junctions and 2 roads are also included in the maintenance area.

The KCC head office is in charge of surface pavement, road marking, traffic signal maintenance, electricity charge, and diesel charge. The five divisions are in charge of surface cleaning, drainage maintenance, and safety facilities maintenance. The obligation of the KCC head office is equivalent to 2.8% of the budget of the road and electrical sectors from 2004 to 2005 which is US$2,268,000 (3,947.3 million UShs). This is the available amount, referring to the recent growth of KCC budget.

On the other hand, MOWHC will be responsible for the overlay work (planned to be 10 years after the opening), which is US$540,400 (940.6 million UShs). This is also the available amount.

Table 2-45 Maintenance Cost Estimation

Item	Frequency	Unit (US$/)	Maintenance	
Obligation of KCC				
Surface Pavement	1 time/year	22,000	US$ 22,000	(38.3 million UShs)
Surface Cleaning	12 times/year	1,250	US$ 15,000	(26.1 million UShs)
Road Marking	1 time/2years	13,200	US$ 26,400	(46.0 million UShs)
Drainage	2 times/year	7,500	US$ 15,000	(26.1 million UShs)
Traffic Signal	2 times/year	7,500	US$ 15,000	(26.1 million UShs)
Electricity Charge Diesel Charge	year	2,000	US$ 2,000	(3.5 million UShs)
Safety Facilities	3 times/year	2,000	US$ 6,000	(10.4 million UShs)
Total (Annual Maintenance Cost)			US$ 101,400	(176.5 million UShs)
Obligation of MOWHC				
Overlay	After 10years		US$ 540,400	(940.6 million UShs)

2-6 Important Notices

(1) Care for Environment

Due to the fact that the Project will not involve substantial new construction works but consist mainly of improvement works on the existing roads and junctions, there would be no major problem of resettlement. In any case, however, GOU shall implement EIA to ascertain the environmental impact of the Project.

The following matters shall be given particular attention during the construction:

- Necessary measures shall be taken to ensure safety for pedestrians and cars;
- All information such as traffic stop and traffic divergence shall informed appropriately and timely to the public;
- Noise and dust eventually caused by driving cars shall be reduced to the minimum; and
- Water pollution caused by earthworks shall be alleviated as much as possible.

(2) Maintenance

As described before, the maintenance organization is divided into MOWHC and KCC in Uganda. GOU should consider integrating the maintenance organization for creating a long term development plan, so as maintenance work can be carried out more efficiently.

(3) Traffic Safety

The soft components have taken an important role in the projects since the Japan's Grant Aid studies in the year 2000. Various positive actions were implemented as follows:

- Transfer of technique to local counterparts through JICA training courses; and
- Organization of various workshops by trainees to explain how to manage road safety facilities such as arrow signals.

Therefore, a campaign aimed at enhancing traffic safety should be implemented under the Project as well. The following soft components have been implemented by the Ugandan side so far:

- Broadcasting of information on road congestion by FM radio; and
- Arrangement of traffic control for school children by bus associations.

Chapter 3

PROJECT EVALUATION AND RECOMMENDATIONS

3. Project Evaluation and Recommendations

3-1 Project Effects

According to the results of the socio-economic and field surveys, the following impacts and effects are expected to be generated by the Project implementation:

(1) Direct Impacts and Effects

Present Status and Issues	Countermeasures taken by the Project	Direct Impact and Effects
Traffic accidents often occur around the project junctions.	-Traffic signal shall be installed at junction -Pedestrian barriers shall be installed to separate carriageways and sidewalks completely. -Road crossings shall be installed in the consolidated area -Traffic signs and road markings shall be installed.	The traffic accidents around the junctions decrease.
Recent rapid growth of traffic volume and concentration of population in Kampala cause serious traffic congestion.	-Traffic signal system shall be installed in roundabout which cannot manage overflooded traffic. -The geometric structure of junctions shall be improved.	It shortens the time to drive from Entebbe Road to Jinja Road. The total distance is 4.7km, and it takes 38 minutes without the Project.

(2) Indirect Impacts and Effects

Indirect Impacts and Effects	Content
High-level land use and activation of city economy	The Project enhances the commercial and business functions along the envisaged roads, which will promote the urban type land use and development of new business with more effective investment.
Improvement of the public's consciousness on traffic safety	The installed facilities, such as traffic signals, sidewalks, pedestrian barriers between roads and sidewalks, and traffic signs will contribute not only to the prevention of traffic accidents, but also the upgrading of citizens' consciousness of road safety.
Improvement of public transportation service	Public transportation means such as small bus covers the area inside Kampala city and links the suburbs with the city center. It will be improved by controlling the traffic flow and installing bus bays. Its social impact is expected to be strong because small buses are mainly used by the majority of people.

(3) Scale of Benefit

1) Area benefiting from the Project

- All over Kampala City

2) Population benefiting from the Project

- 1.208 Million

3-2 Recommendations

In Uganda, the agricultural population and income decreases while the commercial activity increases recently; therefore, social infrastructure tends to have a more important role. Reform of tax system and improvement of social infrastructure, which contribute to tax income increase, are required to set the finances in order without any support by foreign aids such as the World Bank. The improvement of city roads, however, is not sufficient to solve the traffic congestion in the city. The tax system is expected to be reformed so as to restrain the car growth, to control traffic flow, and to improve public transportation.

GOU is expected to act in consideration of self-help and durability that are the basis of Japan's Grant Aid Policy. The concrete plans are as follows:

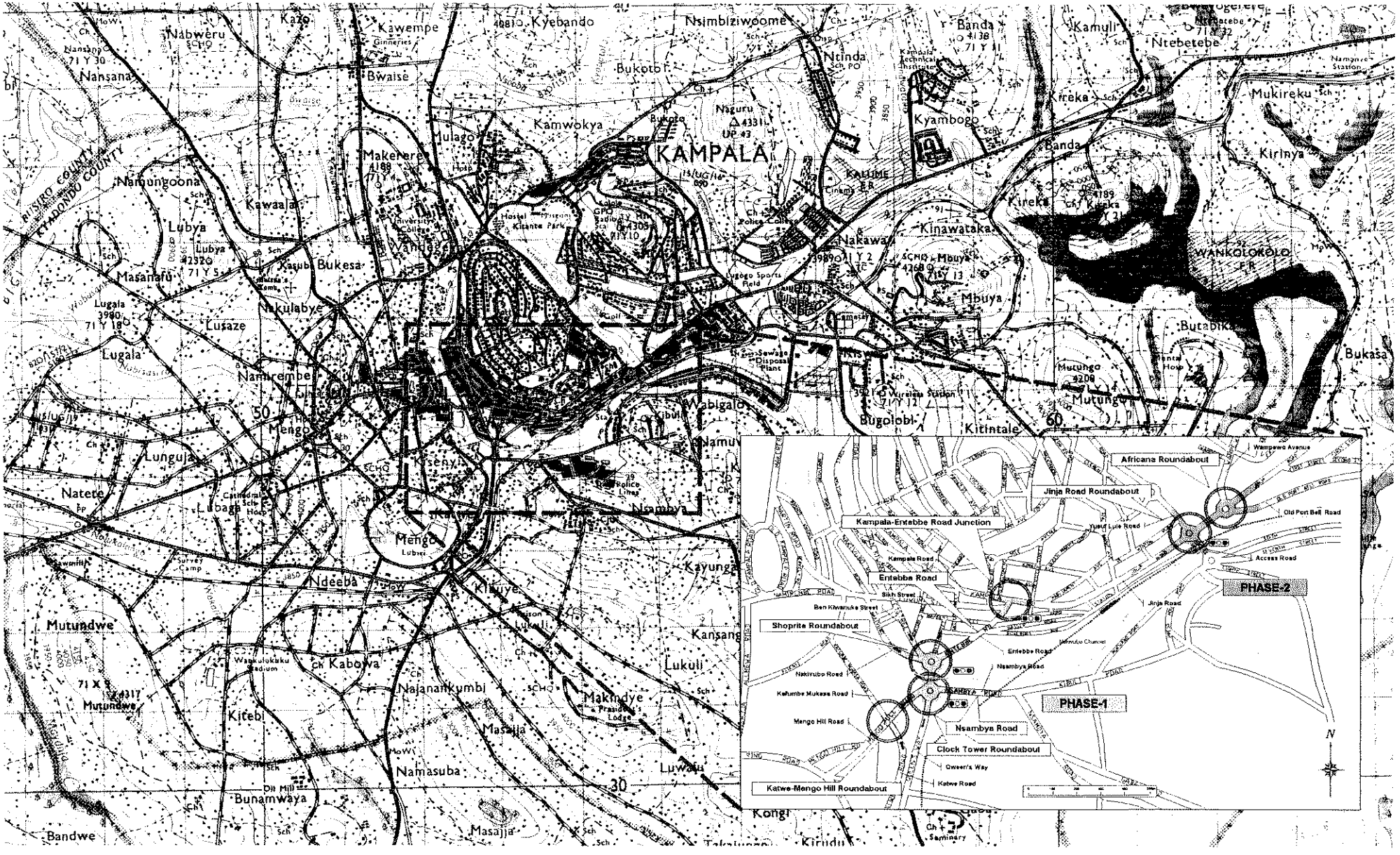
- To adjust road inventory,
- To recognize the importance of quality control and maintaining high quality, and
- To control the maintenance budget systematically.

In addition, the following reinforcement plans for maintenance ability should also be implemented:

- To create a maintenance center, a motor pool, and a research laboratory,
- To provide on the job training through each project,
- To prepare research organizations including universities,
- To activate associations for each product and industry type, and
- To introduce a license system for engineers.

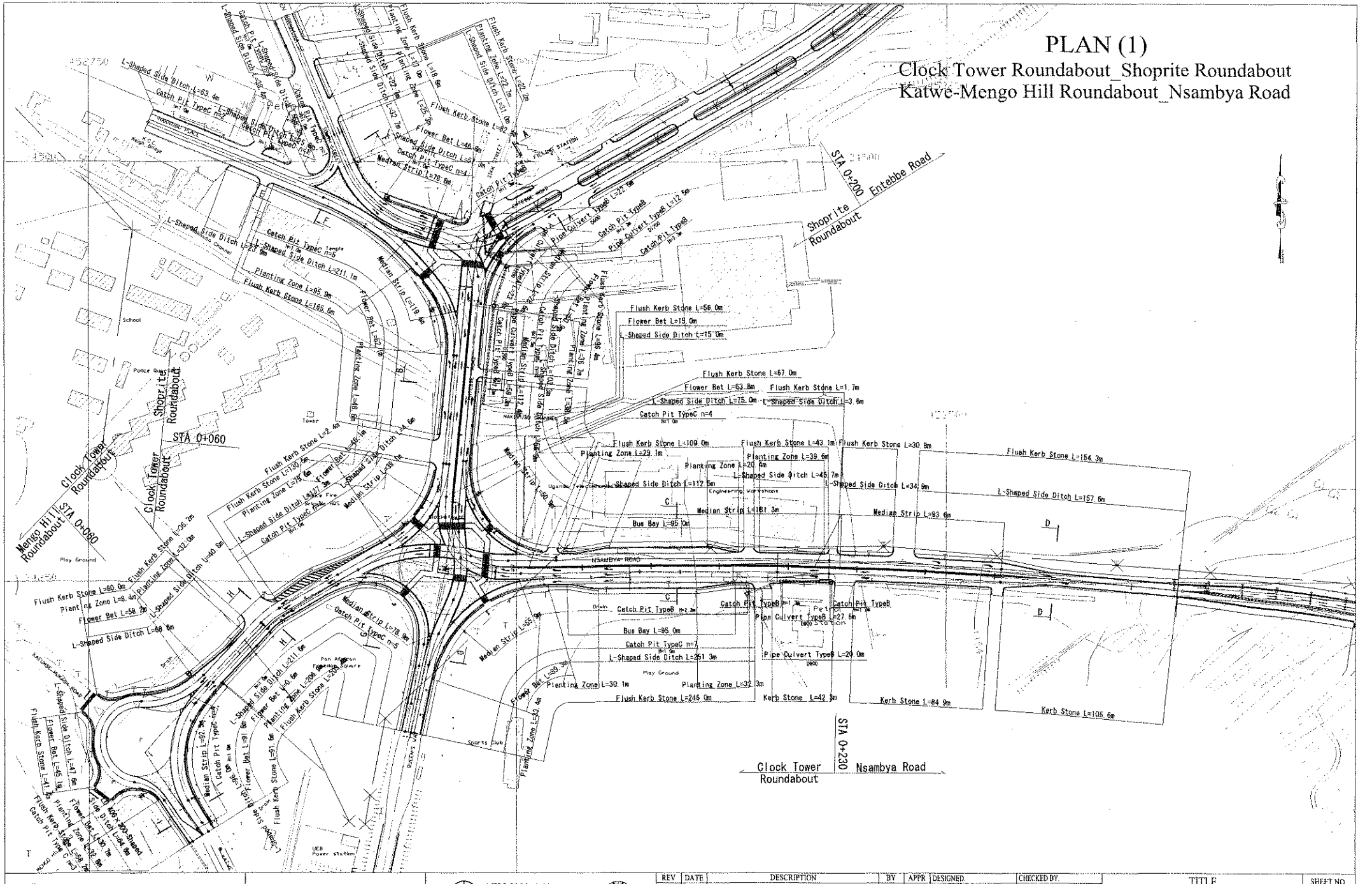
BASIC DESIGN DRAWINGS

LOCATION MAP



PLAN (1)

Clock Tower Roundabout_Shoprite Roundabout
Katwe-Mengo Hill Roundabout_Nsambya Road



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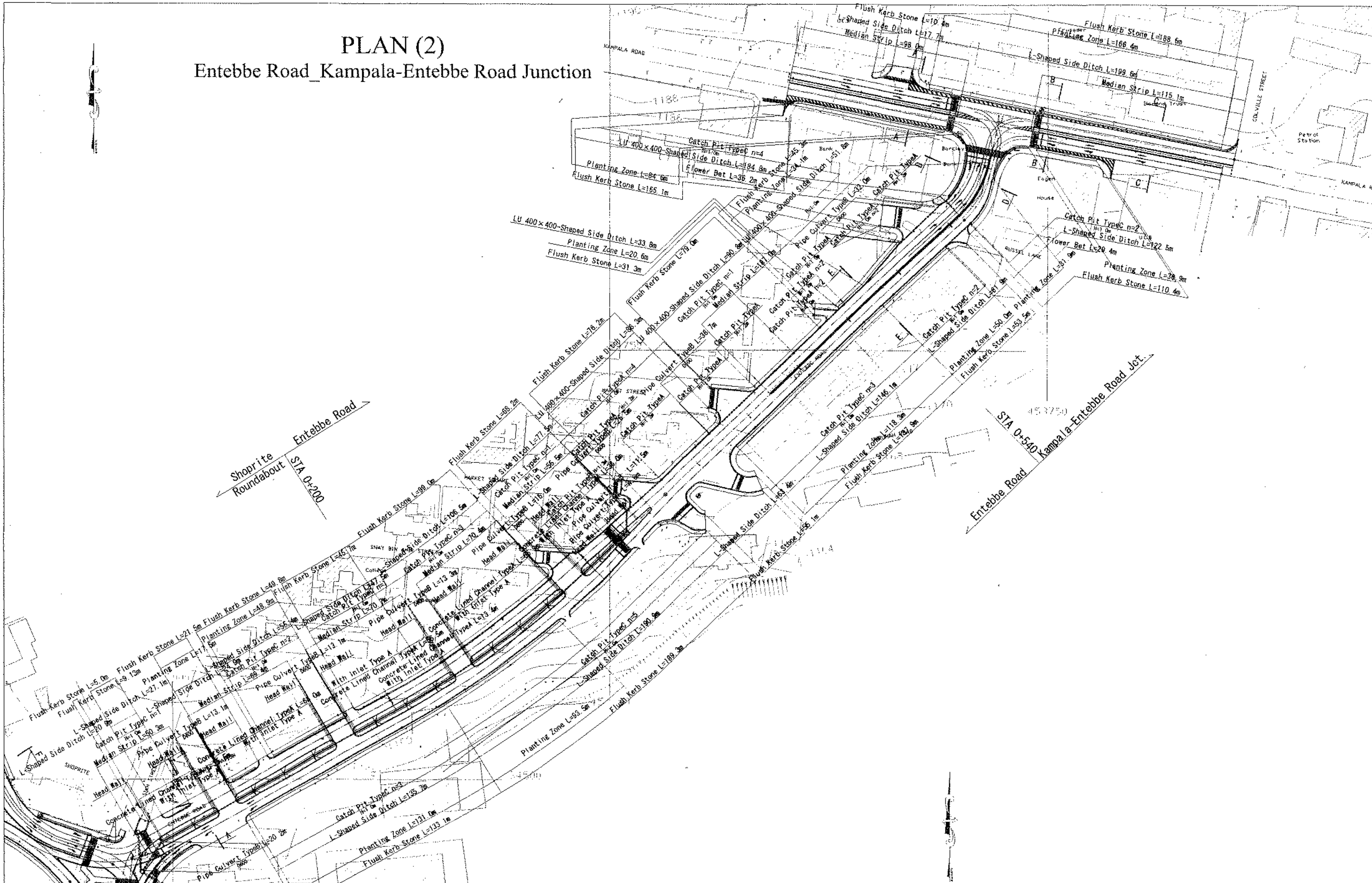
								DATE: ** . Feb . 05	DATE: ** . Feb . 05	PLAN (1) Clock Tower Roundabout_Shoprite Roundabout Katwe-Mengo Hill Roundabout_Nsambya Road	B - 1
								DRAWN:	APPROVAL BY:		
								DATE ** . Feb . 05	DATE		
								SCALE: 1 : 1,000			

PLAN (2)

Entebbe Road_Kampala-Entebbe Road Junction



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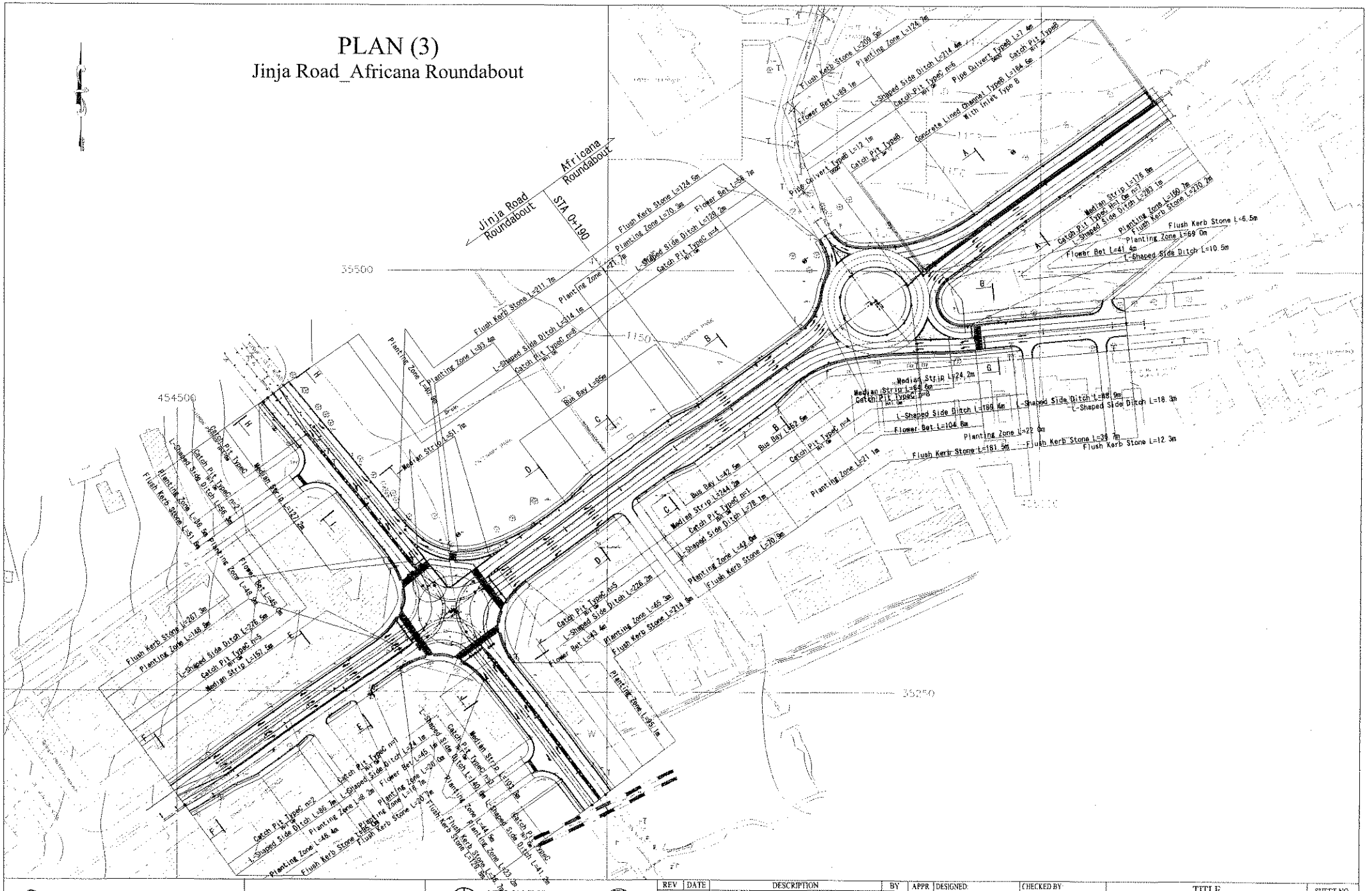
SHEET NO. B - 2

PLAN (3)
Jinja Road_Africana Roundabout



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TYPICAL CROSS SECTION (1)

Clock Tower Roundabout_Shoprite Roundabout_Katwe-Mengo Hill Roundabout_Nsambya Road

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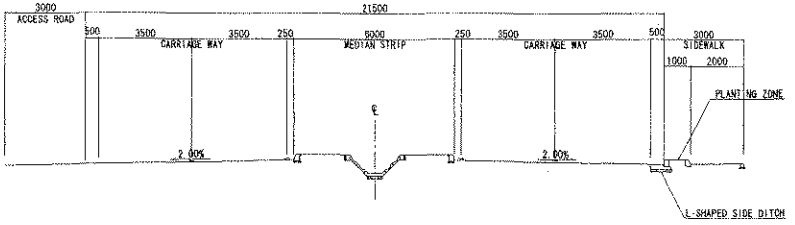

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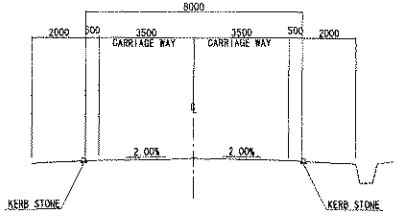

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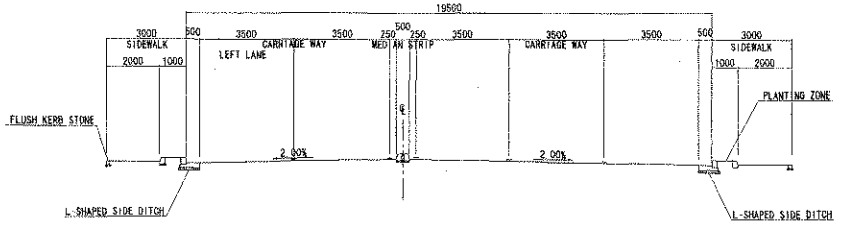

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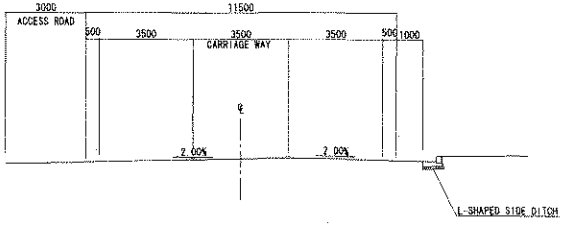

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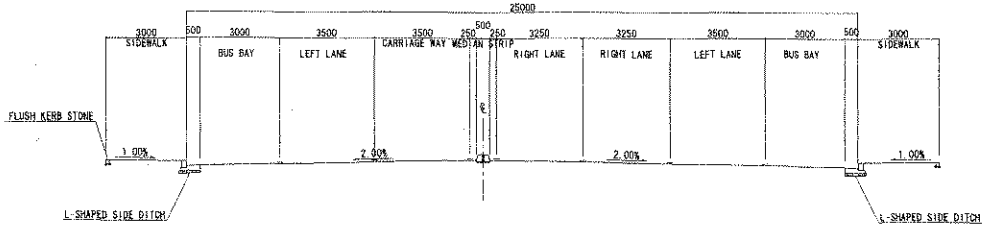

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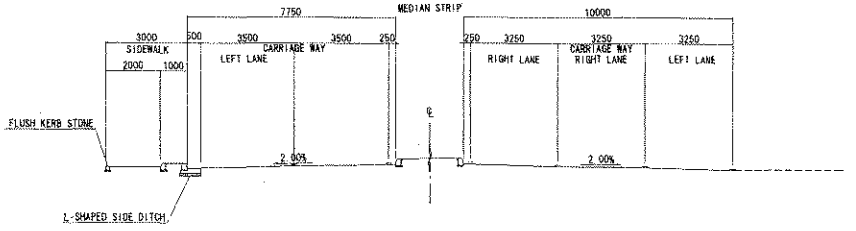

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				DRAWN DATE: ** Feb. 05	APPROVAL BY DATE:		
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TYPICAL CROSS SECTION (2)

Clock Tower Roundabout_Shoprite Roundabout_Katwe-Mengo Hill Roundabout_Nsambya Road

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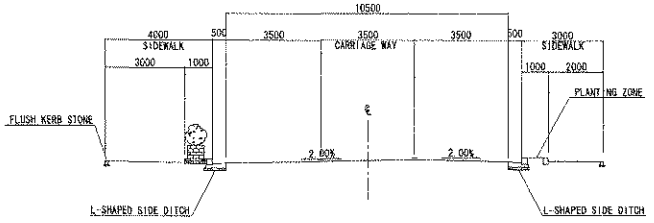

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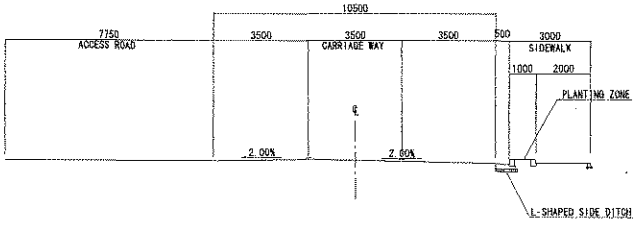

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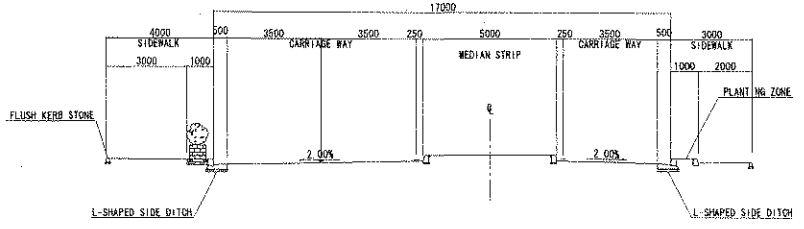

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TYPICAL CROSS SECTION (3)

Entebbe Road_Kampala-Entebbe Road Junction

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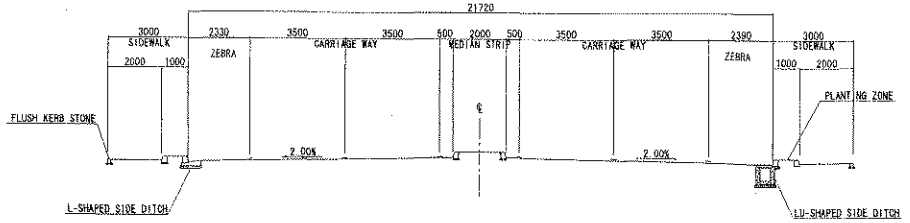

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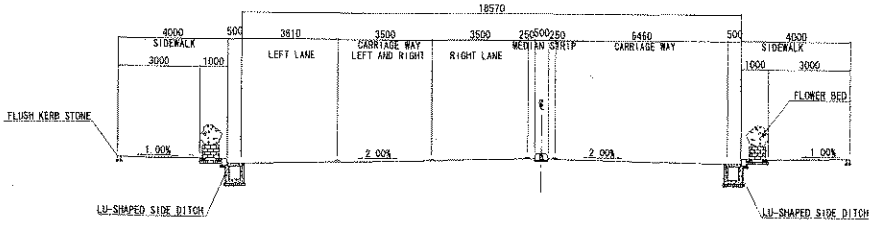

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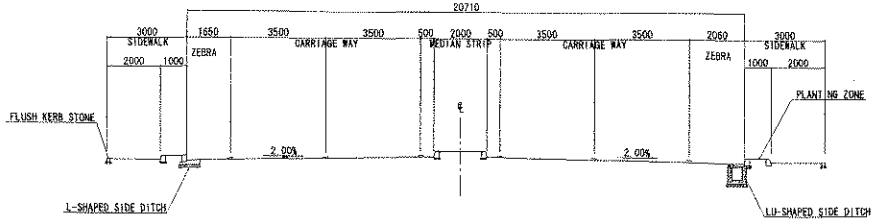

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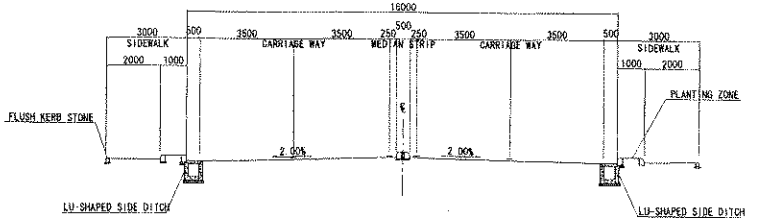

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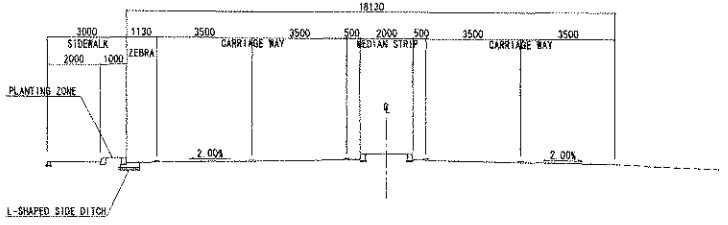

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				DRAWN DATE: ** . Feb . 05	APPROVAL BY: DATE:		
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TYPICAL CROSS SECTION (4)

Jinja Road_Africana Roundabout

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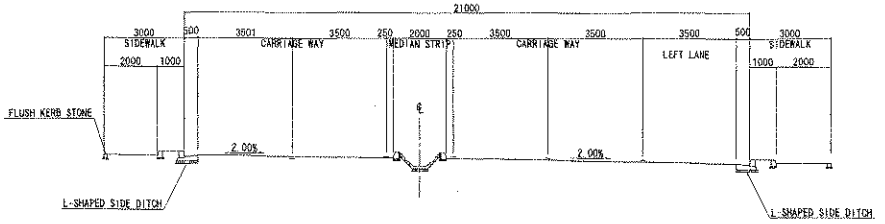

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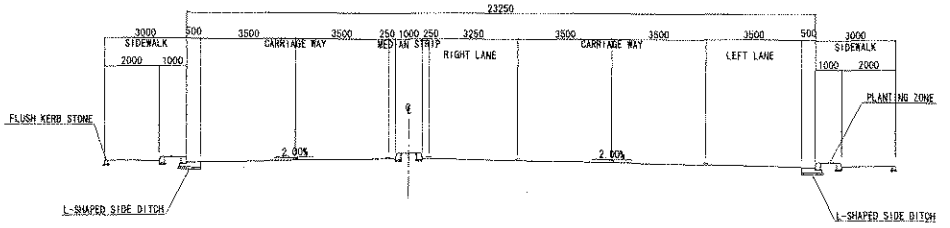

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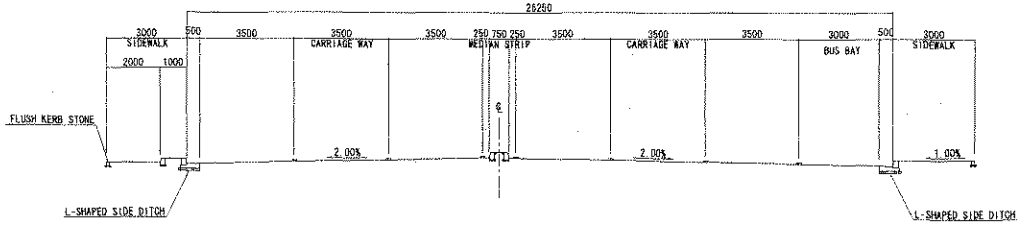

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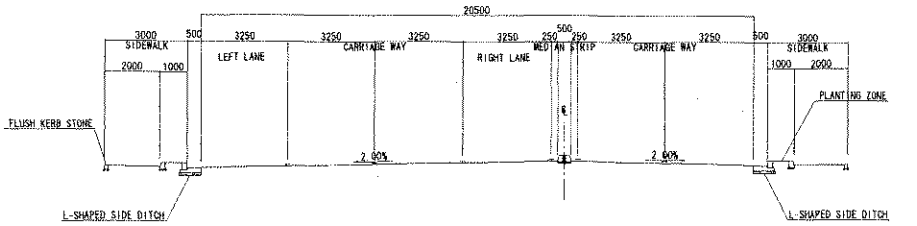

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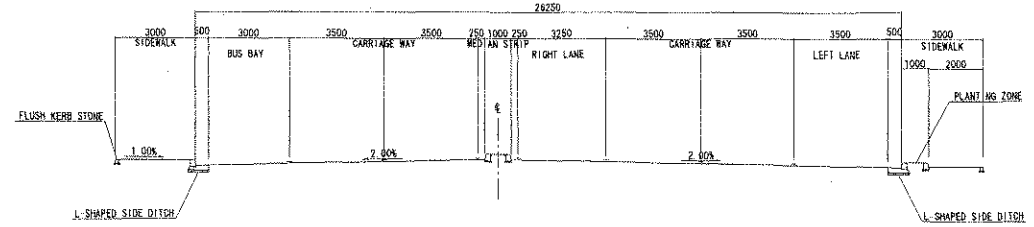

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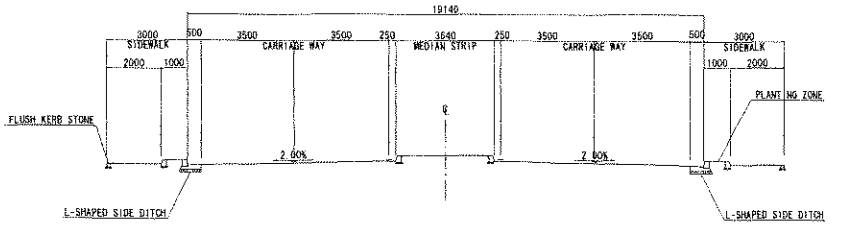

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	THE PROJECT FOR IMPROVEMENT OF TRAFFIC FLOW IN KAMPALA CITY	NIPPON KOEI CO.,LTD. AND JAPAN ENGINEERING CONSULTANTS CO.,LTD.	REV / DATE / DESCRIPTION / BY / APPR	DESIGNED: ** Feb. 05	CHECKED BY: ** Feb. 05	TITLE: TYPICAL CROSS SECTION (4) Jinja Road_Africana Roundabout	SHEET NO: C - 4
				DRAWN: ** Feb. 05	APPROVAL BY:		
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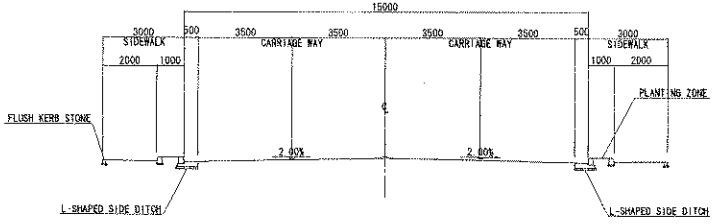
TYPICAL CROSS SECTION (5)

Jinja Road_Africana Roundabout

G-G

0 Sta. 0+013



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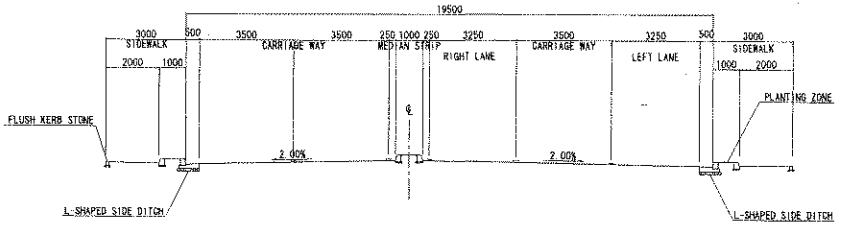

H-H

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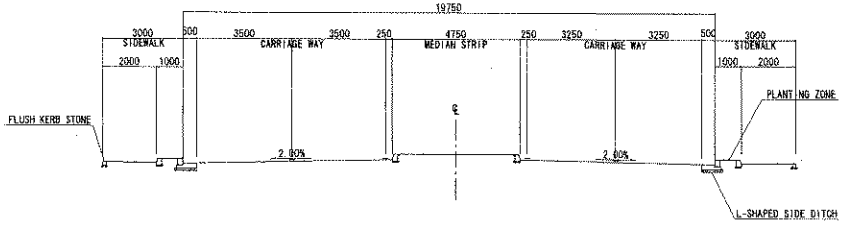

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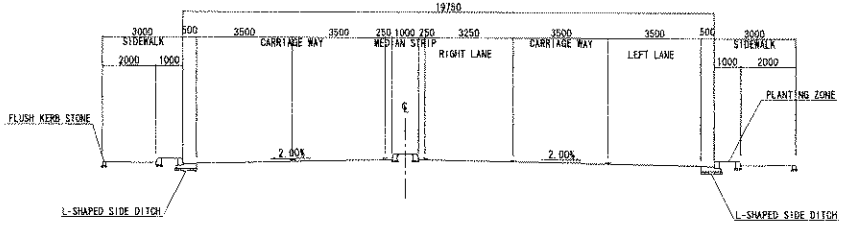


JICA JAPAN INTERNATIONAL COOPERATION AGENCY	THE PROJECT FOR IMPROVEMENT OF TRAFFIC FLOW IN KAMPALA CITY	NIPPON KOEI CO.,LTD. AND JAPAN ENGINEERING CONSULTANTS CO.,LTD.	REV	DATE	DESCRIPTION	BY	APPR	DESIGNED: DATE ** Feb. 05 DRAWN: DATE ** Feb. 05 SCALE 1 : 100	CHECKED BY DATE ** Feb. 05 APPROVAL BY DATE	TITLE: TYPICAL CROSS SECTION (5) Jinja Road_Africana Roundabout	SHEET NO. C - 5

APPENDICES

1. Member List of the Study Team

Appendix-1 Member List of the Study Team

1-1 Field Survey （from September 4 to October 8, 2004）

Mr. Yukihiko EJIRI	Leader	Senior Assistant to the Director General, Grant Aid Management Department, JICA
Mr. Katsuji MIYATA	Project Coordinator	Technical Coordination and Examination Team, Office of Technical Coordination and Examination, Grant Aid Management Department, JICA
Mr. Hiroshi FUJISAWA	Chief Consultant/Road and Traffic Planner/Social and Environmental Analyst	Nippon Koei Co., Ltd.
Mr. Isao INUZUKA	Road Designer/Natural Condition Surveyor	Nippon Koei Co., Ltd.
Mr. Masari HOSAKA	Traffic Signal System Planner	Japan Engineering Consultants Co., Ltd.
Mr. Tetsuro IZAWA	Construction and Procurement Planner/Cost Estimator	Japan Engineering Consultants Co., Ltd.

1-2 Explanation on Draft Report （from December 11 to December 30, 2004）

Mr. Jiro INAMURA	Leader	Deputy Resident Representative, JICA Kenya Office
Mr. Katsuji MIYATA	Project Coordinator	Technical Coordination and Examination Team, Office of Technical Coordination and Examination, Grant Aid Management Department, JICA
Mr. Hiroshi FUJISAWA	Chief Consultant/Road and Traffic Planner/Social and Environmental Analyst	Nippon Koei Co., Ltd.
Mr. Isao INUZUKA	Road Designer/Natural Condition Surveyor	Nippon Koei Co., Ltd.
Mr. Tetsuro IZAWA	Construction and Procurement Planner/Cost Estimator	Japan Engineering Consultants Co., Ltd.

1-3 Explanation on Draft Final Report （from February 19 to March 5, 2005）

Mr. Yoshiaki KANO	Leader	Resident Representative, JICA Kenya Office
Mr. Hiroshi FUJISAWA	Chief Consultant/Road and Traffic Planner/ Social and Environmental Analyst	Nippon Koei Co., Ltd.
Mr. Isao INUZUKA	Road Designer/Natural Condition Surveyor	Nippon Koei Co., Ltd.

2. Study Schedule

Appendix-2 Study Schedule

2-1 Field Survey （from September 4 to October 8, 2004）

No.	Day	Date	Study Team Schedule	Stay	Activities
1	9/4	Sat	Fujisawa, Inuzuka, Hosaka member from Japan, leave for Entebbe	In Air	
2	9/5	Sun	Fujisawa, Inuzuka, Hosaka arrived at Entebbe	Kampala	
3	9/6	Mon	Fujisawa, Inuzuka, Hosaka Inuzuka	Kampala	Distribution of Inception Report and explanation to MOWHC Request MOWHC for recommendation of local consultants for survey work
4	9/7	Tue	Ejiri, leader and Miyata leave for Entebbe Fujisawa, Inuzuka Hosaka	In Air Kampala	 Explanation of Inception report to MOWHC Collection of data
5	9/8	Wed	Ejiri, leader and Miyata arrived at Entebbe Izawa arrived at Entebbe Ejiri, leader, Miyata, Fujisawa, Inuzuka, Hosaka Ejiri, leader, Miyata, Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	 Courtesy call to JOCV, EOJ, MOWHC and MOFPED Explanation of Inception Report to MOWHC
6	9/9	Thu	Ejiri, leader, Miyata, Fujisawa, Inuzuka, Hosaka, Izawa Ejiri, leader, Miyata, Fujisawa, Inuzuka Hosaka, Izawa	Kampala	Site investigation for junctions and roads Discussion of Inception Report in MOWHC Collection of data
7	9/10	Fri	Ejiri, leader, Miyata, Fujisawa, Inuzuka, Hosaka, Izawa Ejiri, leader, Miyata, Fujisawa, Inuzuka Hosaka, Izawa	Kampala	Site visit of former projects sites of phase-1 and phase-2 Explanation of Environmental Guideline of JICA Collection of data
8	9/11	Sat	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Data arrangement and analysis, preparation of report
9	9/12	Sun	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Data arrangement
10	9/13	Mon	Ejiri, leader, Miyata, Fujisawa, Inuzuka Ejiri, leader, Miyata, Fujisawa, Inuzuka Hosaka, Izawa	Kampala	Donor meeting with WB, EU and DANIDA Courtesy call Minister, MOWHC Site investigation, collection of data
11	9/14	Tue	Ejiri, leader, Miyata, Fujisawa Inuzuka, Hosaka, Izawa	Kampala	Report to Embassy of Japan Site investigation, collection of data
12	9/15	Wed	Ejiri, leader and Miyata leave for Japan from Entebbe Fujisawa Inuzuka Hosaka, Izawa	Kampala	Report to JICA Kenya office Traffic volume survey and site investigation Arrangement of topography survey and geological survey Site investigation, collection of data
13	9/16	Thu	Fujisawa Inuzuka Hosaka, Izawa	Kampala	Traffic volume survey, site investigation Contract of Geological Survey with local consultant Site investigation, collection of data
14	9/17	Fri	Fujisawa, Inuzuka, Hosaka, Izawa Inuzuka	Kampala	Site investigation, collection of data, meeting with local company Contract for topographic survey
15	9/18	Sat	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Data arrangement, analysis and preparation of report
16	9/19	Sun	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Preparation of report
17	9/20	Mon	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Site investigation, collection and analysis of data and preparation of report
18	9/21	Tue	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Site investigation, collection and analysis of data and preparation of report
19	9/22	Wed	Fujisawa Inuzuka, Hosaka, Izawa	Kampala	Traffic volume survey Site investigation, collection and analysis of data and preparation of report
20	9/23	Thu	Fujisawa Inuzuka, Hosaka, Izawa	Kampala	Traffic volume survey Site investigation, collection and analysis of data and preparation of report
21	9/24	Fri	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Site investigation, collection and analysis of data and preparation of report
22	9/25	Sat	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Site investigation, collection and analysis of data and preparation of report
23	9/26	Sun	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	preparation of report
24	9/27	Mon	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Site investigation, collection and analysis of data and preparation of report
25	9/28	Tue	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Site investigation, collection and analysis of data and preparation of report
26	9/29	Wed	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Site investigation, collection and analysis of data and preparation of report
27	9/30	Thu	Fujisawa, Inuzuka, Hosaka, Izawa	Kampala	Running speed investigation, collection of data, preparation of report
28	10/1	Fri	Fujisawa, Inuzuka, Hosaka, Izawa Fujisawa, Inuzuka	Kampala	Running time/speed investigation, collection of data and preparation of report Meeting with other donors (WB)
29	10/2	Sat	Fujisawa, Inuzuka, Izawa Hosaka leave for Japan	Kampala In Air	Site investigation, data arrangement and analysis, preparation of report
30	10/3	Sun	Fujisawa, Inuzuka, Izawa Hosaka arrived at Japan	Kampala Japan	Site investigation, preparation of report
31	10/4	Mon	Fujisawa, Inuzuka, Izawa Fujisawa, Inuzuka	Kampala	Site investigation, preparation of report based on surveying results Meeting with other donors (DANIDA)
32	10/5	Tue	Fujisawa, Inuzuka, Izawa Fujisawa, Inuzuka	Kampala	Site investigation and preparation of report Meeting for technical matter with MOWHC
33	10/6	Wed	Fujisawa, Inuzuka, Izawa Fujisawa, Inuzuka, Izawa	Kampala	Preparation of report Report to Embassy of Japan and JOCV
34	10/7	Thu	Fujisawa, Inuzuka, Izawa left from Entebbe Izawa from Kenya, arrived at Tanzania Fujisawa, Inuzuka Fujisawa, Inuzuka left for Japan via Dubai	 Tanzania In Air	 Report at JICA Kenya office
35	10/8	Fri	Fujisawa and Inuzuka arrived at Japan	Japan	

2-2 Explanation on Draft Report （from December 11 to December 30, 2004）

No.	Day	Date	Study Team Schedule	Stay	Activities
1	12/11	Sat	Fujisawa, Inuzuka, Izawa leave from Japan, arrival at Dubai via Kansai International Airport	In Air	
2	12/12	Sun	Fujisawa, Inuzuka, Izawa leave from Dubai, arrival at Entebbe	Kampala	
3	12/13	Mon	Fujisawa, Inuzuka, Izawa	Kampala	Distribution of DBD to MOWHC Courtesy call to Embassy of Japan and JOCV
4	12/14	Tue	Fujisawa, Inuzuka, Izawa	Kampala	Explanation of DBD and discussion with DBD
5	12/15	Wed	Fujisawa, Inuzuka, Izawa Fujisawa, Inuzuka, Izawa	Kampala	Meeting for EIA with MOWHC Explanation of DBD and discussion with KCC
6	12/16	Thu	Fujisawa, Inuzuka, Izawa Fujisawa, Inuzuka, Izawa	Kampala	Meeting at Northern Bypass project with RAFU and EU design consultant Discussion for DBD with MOWHC and KCC
7	12/17	Fri	Inamura, leader leave from Nairobi, arrived at Entebbe Fujisawa, Inuzuka, Izawa Fujisawa, Inuzuka, Izawa	Kampala	 Field survey Discussion for DBD with MOWHC and KCC
8	12/18	Sat	Fujisawa, Inuzuka, Izawa	Kampala	Data arrangement and analysis
9	12/19	Sun	Miyata arrived at Entebbe Inamura, leader, Miyata, Fujisawa, Inuzuka, Izawa	Kampala	 Inner meeting
10	12/20	Mon	Inamura leader, Miyata, Fujisawa, Inuzuka, Izawa	Kampala	Discussion for M/D and DBD with MOWHC
11	12/21	Tue	Inamura, leader, Miyata, Fujisawa, Inuzuka, Izawa Inamura, leader, Miyata, Fujisawa	Kampala	Field survey Discussion for M/D and signing
12	12/22	Wed	Inamura, leader, Miyata, Fujisawa Inamura, leader, Miyata leave from Entebbe, arrival at Miyata leave for Japan Fujisawa, Inuzuka, Izawa	 Kenya In Air Kampala	Report to Embassy of Japan Site investigation
13	12/23	Thu	Fujisawa, Inuzuka, Izawa	Kampala	Joint site investigation with MOWHC
14	12/24	Fri	Fujisawa, Inuzuka, Izawa	Kampala	Investigation with MOWHC for utilities
15	12/25	Sat	Fujisawa, Inuzuka, Izawa	Kampala	Preparation of reports
16	12/26	Sun	Fujisawa, Inuzuka, Izawa	Kampala	Inner meeting
17	12/27	Mon	Fujisawa, Inuzuka, Izawa	Kampala	Investigation with MOWHC for existing drainage
18	12/28	Tue	Fujisawa, Inuzuka, Izawa	Kampala	Collection of data and analysis
19	12/29	Wed	Fujisawa, Inuzuka, Izawa leave from Entebbe Fujisawa, Inuzuka, Izawa left for Japan via Dubai	 In Air	
20	12/30	Thu	Fujisawa, Inuzuka, Izawa arrived at Dubai and leave for Kansai Airport Fujisawa, Inuzuka, Izawa arrival at Japan	 Japan	

2-3 Explanation on Draft Final Report （from February 19 to March 5, 2005）

No.	Day	Date	Study Team Schedule	Stay	Activities
1	2/19	Sat	Fujisawa, Inuzuka leave from Japan, arrival at Dubai	In Air	
2	2/20	Sun	Fujisawa, Inuzuka leave from Dubai, arrival at Entebbe	Kampala	
3	2/21	Mon	Fujisawa, Inuzuka Fujisawa, Inuzuka	Kampala	Distribution of DFR to MOWHC Courtesy call to Embassy of Japan and JOCV
4	2/22	Tue	Fujisawa, Inuzuka Fujisawa, Inuzuka	Kampala	Site inspection Explanation of FDR and M/D to MOWHC
5	2/23	Wed	Fujisawa, Inuzuka Fujisawa, Inuzuka	Kampala	Data arrangement Discussion of MOWHC and KCC for DFR and M/D
6	2/24	Thu	Fujisawa, Inuzuka Fujisawa, Inuzuka	Kampala	Data arrangement Discussion of MOWHC and KCC for DFR and M/D
7	2/25	Fri	Fujisawa, Inuzuka Fujisawa, Inuzuka	Kampala	Discussion of M/D with MOWHC Data arrangement
8	2/26	Sat	Fujisawa, Inuzuka Kano, leader leave from Nairobi, arrival at Entebbe	Kampala	Preparation of report
9	2/27	Sun	Kano, leader, Fujisawa, Inuzuka	Kampala	Inner meeting
10	2/28	Mon	Kano leader Fujisawa, Inuzuka	Kampala	Inspection Report generation
11	3/1	Tue	Kano, leader, Fujisawa, Inuzuka Kano, leader, Fujisawa, Inuzuka Kano, leader, Fujisawa, Inuzuka	Kampala	Final discussion and signing for M/D with MOWHC and KCC Site inspection Report to Embassy of Japan
12	3/2	Wed	Kano, leader, Fujisawa, Inuzuka Kano, leader leave from Entebbe, arrival at Nairobi Fujisawa, Inuzuka	 Kenya Kampala	Site inspection Preparation of report
13	3/3	Thu	Fujisawa, Inuzuka	Kampala	Meeting with KCC, preparation of report
14	3/4	Fri	Fujisawa, Inuzuka Fujisawa, Inuzuka leave from Entebbe to Dubai	 In Air	Meeting with MOWHC
15	3/5	Sat	Fujisawa, Inuzuka leave for Japan through Dubai and Kansai Airport Fujisawa, Inuzuka arrival at Japan	 Japan	

3. List of Parties Concerned in the Recipient Country

Appendix-3 List of Parties Concerned in the Recipient Country

Organization	Name	Position
Ministry of Works, Housing and Communications (MOWHC)	Hon. J. Nasasera	Minister
	Hon. A. Awuzu	State Minister for Transport
	Mr. C. Muganzi	Permanent Secretary
	Mr. Samson Bagonza	EIC/DE Commissioner Quality Assurance
	Mr. S. Ibanda	Commissioner Housing
	Mr. B. Kasimbazi	Under Secretary Finance and Administration
	Mr. W. E. Musunba	ACE (ED)
	Mr. A. O. Mugisa	ACE (ED)
	Mr. Balamu-Bisuti	AC/Road Maintenance
	Mr. K. Kagina	AC/DUR
	Mr. J. Bigabawa	AC (QM)
	Mr. G. Wandera	Chief Planner
	Mr. Alex Onen	PXE (ED)
	Mr. R. N. Kira	PXE (T)
	Mr. Opio Olanya	SEX/ED
	Mr. Nelson Omagor	Principal Environmental Officer
	Mr. Arne Poulsen	Road Sector Adviser, RAFU
	Mr. G. Magala	CE (ED)-(Secretary)
	Mr. J. Kakeeto	PSS
	Mr. J. Matovu	Public Relations Officer
	Mr. Ben Ssebugga - Kimeze	Assistant Commissioner Quality Assurance
	Mr. Joseph B. Mutabaei	Civil Technical Engineer
	Mr. O. Ssambwa	Project Engineer, RAFU
	Mr. S. Mulondo	Senior Material Engineer, Central Lab.
	Mr. B. Ssebbugga	Assistant Commissioner, Central Lab.
Kampala City Council (KCC)	Mr. Abraham. J. Byandala	City Engineer & Surveyor
	Mr. Stephen Kinyera	Deputy City Engineer & Surveyor
	Mr. Waiswa Naluwairo	Electrical Engineer
Ministry of Finance, Planning and Economic Development	Mr. C. M. Kassami	Permanent Secretary
	Mr. P. Ocailap	Commissioner Aid Coordinator
	Mr. E. Katwe	Japan's Grant Aid Coordinator
	Mr. P. Akidi	Senior Financial Officer
	Mr. J. Mwedde	Advisor
Ministry of Internal Affairs	Mr. G. Tibayuugwa	Regi Road traffic Officer, Traffic Police, Kampala
Ministry of Water, Lands and Environment	Mr. Rulusa Rukanyangyira	Senior Meteologist
European Union	Mr. Guy Rijcken	First Counselor
	Mr. Nigel Curtin	Team Leader, Kampala Northern Bypass Project (French Engineering Consultants)
World Bank	Mr. Richard Olowo	Procurement Specialist
	Mr. Labite Victoria Ocaya	Highway Engineer
Royal Danish Embassy	Mr. Jan Kildebogaard	Counselor
	Mr. Stephan Ajalu	Programme Officer

Organization	Name	Position
Embassy of Japan	Mr. Yoshitaka Kitazawa	Councilor
	Mr. Katsuki Morihara	Secretary
JICA JOCV Uganda Office	Mr. Hiroshi Furukawa	Coordinator
	Ms. Nobuko Nakamura	Project Formulation Adviser
JICA Kenya Office	Mr. Yoshiaki Kano	Resident Representative
	Mr. Jiro Inamura	Deputy Resident Representative
	Mr. Masaru Ishizuka	Assistant Resident Representative

4. Minutes of Discussions

Minutes of Discussions
on the Basic Design Study
on the Project for Improvement of Traffic Flow in Kampala City
in the Republic of Uganda

In response to the request from the Government of the Republic of Uganda (hereinafter referred to as "Uganda"), the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of Traffic Flow in Kampala City (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Uganda the Basic Design Study Team (hereinafter referred to as "the Team"), headed by Mr. Yukihiko Ejiri, Senior Assistant to the Director General, Grant Aid Management Department, JICA, and is scheduled to stay in the country from September 5 to October 7, 2004.

The Team held discussions with the concerned officials of the Government of Uganda.

In the course of the discussions, both sides have confirmed the main items described in the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Entebbe, September 14, 2004

Yukihiko Ejiri
Leader
Basic Design Study Team
Japan International Cooperation Agency

Charles Muganzi
Permanent Secretary
Ministry of Works, Housing and Communications
Republic of Uganda

Witness;

Abraham James Byandala
City Engineer and Surveyor
Kampala City Council
Republic of Uganda

ATTACHMENT

1. Objective of the Project

The objective of the Project is to secure a smooth traffic flow by the improvement of Six(6) Junctions in Kampala City.

2. Project Site

The sites of the Project are shown in Annex-1.

3. Responsible and Implementing Organizations

The responsible and implementing organization is the Ministry of Works, Housing and Communications (MOWHC).

The organization chart of MOWHC is shown in Annex-2.

4. Items Requested by the Government of Uganda

After discussions with the Team, the following items were finally requested by the Ugandan side. The Team will assess the appropriateness of each component and the final components of the Project will be decided by the Japanese side after further studies in Japan.

(1) Clock Tower Roundabout Improvement including a section joining Kibuli Junction and Clock Tower Roundabout
Earth Works, Drainage, Pavement, Road Furniture, Signal

(2) Shop-rite Roundabout Improvement
Earth Works, Drainage, Pavement, Road Furniture, Signal

(3) Jinja Road Roundabout Improvement
Earth Works, Drainage, Pavement, Road Furniture, Signal

(4) Katwe-Mengo Hill Roundabout Improvement
Earth Works, Drainage, Pavement, Road Furniture

(5) Africana Roundabout Improvement
Earth Works, Drainage, Pavement, Road Furniture

(6) Kampala Road - Entebbe Road Junction Improvement including Entebbe Road section approx. 500m
Earth Works, Drainage, Pavement, Road Furniture, Signal

5. Japan's Grant Aid Scheme

(1) The Ugandan side understands the Japan's Grant Aid scheme explained by the Team as described in Annex-3.

(2) The Ugandan side promised to take necessary measures, as described in Annex-4, for smooth implementation of the Project as a condition for the Japan's Grant Aid to be implemented.

6. Schedule of the study

(1) The consultants will proceed with further studies in Uganda until October 7, 2004.

(2) The Study consists of two phases; Phase I and II. In Phase I, JICA will prepare the draft report which includes a basic concept of the Project and its basic design. In Phase II, JICA will prepare the draft final report which includes the engineering design on the basis of the study results of Phase I. The final report will be completed by JICA through integration of the study results of both Phases I and II.

(3)JICA will prepare the draft report in English and dispatch a mission to Uganda to explain its contents around the middle of December 2004.

(4) Based on the results of discussions of the draft report, JICA will proceed with further examination of the study results in Japan by the middle of February 2005.

(5) JICA will prepare the draft final report in English and dispatch a mission to explain its contents around the middle of February 2005.

7. Other Relevant Issues

(1) The Ugandan side shall allocate the budget for its undertakings to be done in a timely manner by the Ugandan side, which are shown in Annex-4.

(2) The Ugandan side shall remove the existing structures and other facilities falling within the construction corridor before the works commence.

(3) The Ugandan side strongly requested installation of back-up power systems for signal and understood that the most appropriate power supply system in case of an emergency will be determined based on the results of further study.

(4) The Ugandan side strongly requested that all traffic signals to be installed should be sourced from Japan. The Team will consider this matter.

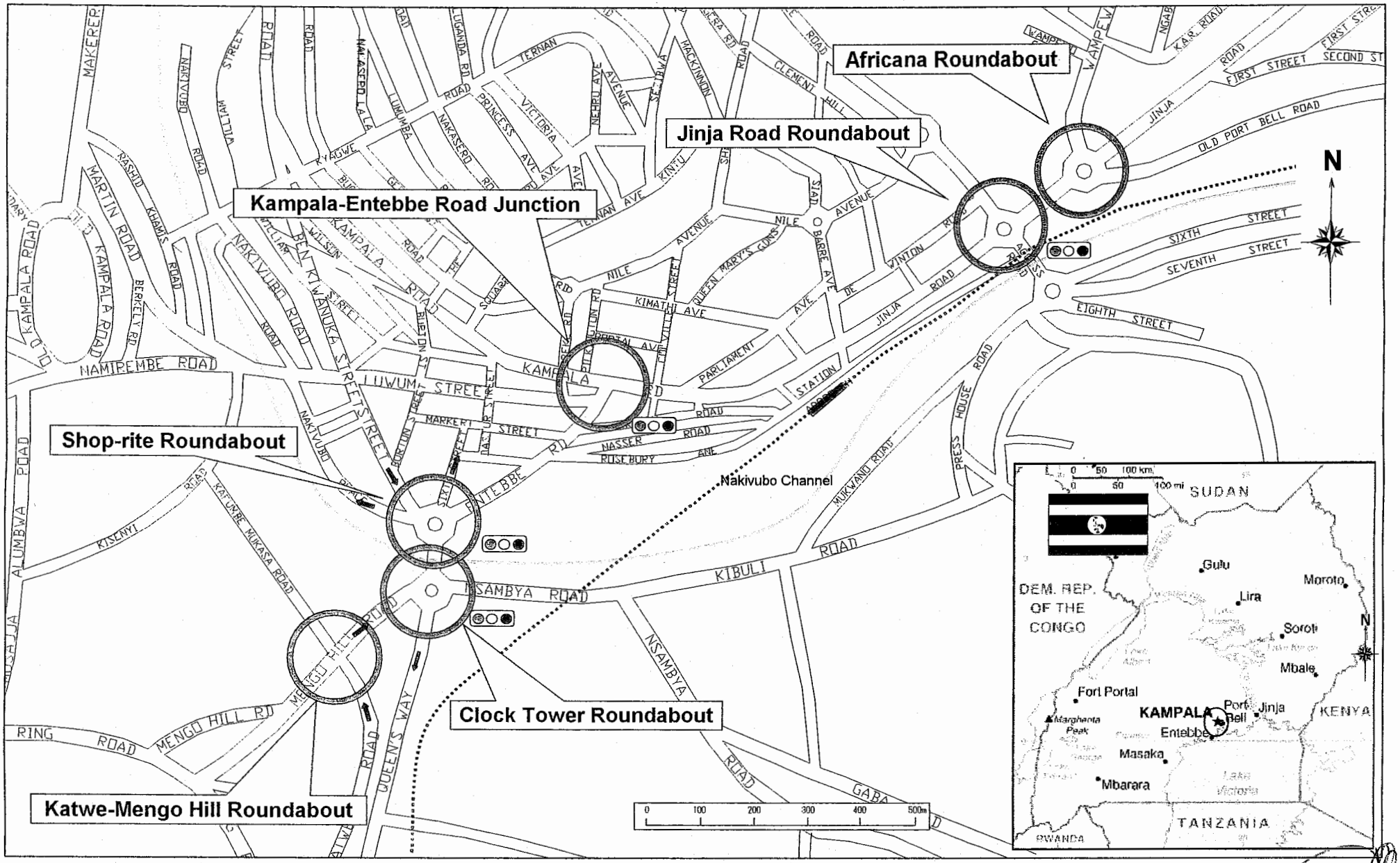
(5) The Ugandan side shall submit answers to the Questionnaire, which the Team handed to the Ugandan side, by September 30, 2004.

(6) The Ugandan side shall provide necessary number(s) of counterpart personnel to the Team during the period of their studies in Uganda.

(7) The Ugandan side requested counterpart training in Japan.

(8) MOWHC shall review all tender documents and drawings prepared during the Study. Contracts shall be signed between the Government of Uganda represented by MOWHC and Japanese firms. MOWHC will be responsible for the implementation of the project and its outputs.

Annex-1



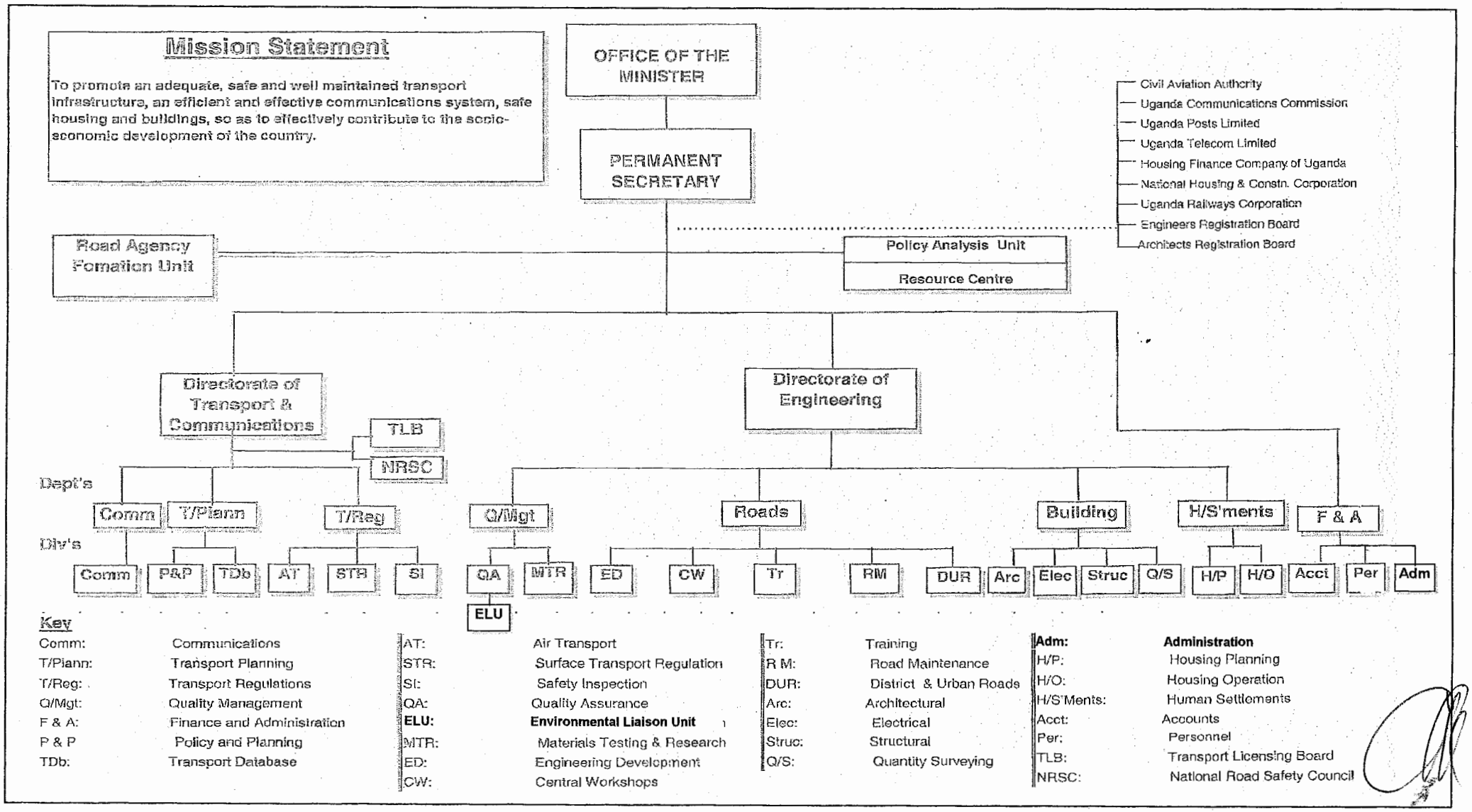
LOCATION MAP

THE PROJECT FOR IMPROVEMENT OF TRAFFIC FLOW IN KAMPALA CITY IN REPUBLIC OF UGANDA

Annex-2

ORGANIZATION CHART

THE MINISTRY OF WORKS, HOUSING AND COMMUNICATIONS (MOWHC)



JAPAN'S GRANT AID

The Grant Aid Scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

Japan's Grant Aid Scheme is executed through the following procedures.

Application	(Request made by the recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal &Approval	(Appraisal by the Government of Japan and Approval by the Cabinet)
Determination of Implementation	(The Note exchanged between the Governments of Japan and recipient country)

Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Scheme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

(1) Contents of the study

The aim of the Basic Design Study (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.
- Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is (are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3.Japan's Grant Aid Scheme

(1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

(2) "The period of the Grant Aid" means the one fiscal year, which the Cabinet approves, the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as national disaster, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

(3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, consulting, constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction,

b) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,

c) To secure buildings prior to the procurement in case the installation of the equipment,

d) To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,

e) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,

f) To accord Japanese nationals, whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(6) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(7) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(End)

Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct temporary roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the buildings	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1) Electricity		
	a. The distributing line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm, sewer and others to the site) to the site		●
	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
8	To bear the following commissions to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure unloading and customs clearance at port of disembarkation in recipient country		
	1) Marine (Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
10	To accord Japanese nationals whose service may be required in connection with the supply of the products and the services under the verified contact, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

Minutes of Discussions
on the Basic Design Study
on the Project for Improvement of Traffic Flow in Kampala City
in the Republic of Uganda

(Explanation on Draft Report)

In September 2004, the Japan International Cooperation Agency (hereinafter referred to as "JICA") despatched the Basic Design Study Team on the Project for Improvement of Traffic Flow in Kampala City (hereinafter referred to as "the Project") to the Republic of Uganda (hereinafter referred to as "Uganda") and through discussions, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult the Ugandan side on the components of the draft report, JICA sent to Uganda a Draft Report Explanation Team (hereinafter referred to as "the Team"), headed by Mr. Jiro Inamura, Deputy Resident Representative, JICA Kenya Office, from December 12 to December 29, 2004.

In the course of the discussions and field survey, both sides have confirmed the main items described in the attached sheets. The Team will proceed with further studies and prepare the Basic Design Study Report.

Entebbe, December 21, 2004

Signed by;

Jiro Inamura
Leader
Draft Report Explanation Team
Japan International Cooperation Agency

Signed by;

Charles Muganzi
Permanent Secretary
Ministry of Works, Housing and Communications
Republic of Uganda

Witnessed by;

Abraham James Byandala
City Engineer and Surveyor
Kampala City Council
Republic of Uganda

ATTACHMENT

1. Components of the Draft Report

The Ugandan side agreed and accepted in principle the components of the draft report presented by the Team. The main components are listed as follows and the contents of each component are shown in Annex-1.

(1) Improvement of the Clock Tower Roundabout, Shop-rite Roundabout, Jinja Road Roundabout, Katwe-Mengo Hill Roundabout, Africana Roundabout, and Kampala Road - Entebbe Road Junction

(2) Improvement of Nsambya Road (From the Clock Tower Roundabout to the Kibuli Junction, approx. 200m)

(3) Improvement of Entebbe Road (From the Shop-rite Roundabout to Kampala Road-Entebbe Road Junction, approx. 340m)

2. Japan's Grant Aid Scheme

The Ugandan side understands the Japan's Grant Aid scheme and the necessary measures to be taken by the Ugandan side as explained by the Team and described in Annex-3 and Annex-4 of the Minutes of Discussions signed by both sides on September 14, 2004.

3. Schedule of the study

(1) The consultants will proceed with further studies in Uganda until December 29, 2004.

(2) The consultants will proceed with further examination of the study results in Japan until the middle of February 2005.

(3) JICA will prepare the draft final report which will include the engineering design and despatch a mission to explain its contents around the end of February 2005.

(4) Based on the results of discussion of the draft final report, JICA will complete the final report and send it to the Government of Uganda by the end of April 2005.

4. Other Relevant Issues

(1) The Ugandan side agreed to secure and allocate enough budgets for compensation of properties and relocation of public utilities, which were described in Annex-4 of the Minutes of Discussions signed by both sides on September 14, 2004. The schedule and contents of the budget are shown in Annex-2.

(2) The Ugandan side shall undertake the work items listed in Annex-1 (attached herein) in addition to those listed in Annex-4 of the Minutes of Discussions signed by both sides on September 14, 2004.

(3) The Ugandan side requested the Team to arrange counterpart training in Japan on Urban Transport Management under a technical cooperation by JICA. The Ugandan side understands that an official request for the counterpart training is necessary to be submitted to the Japanese side through the Embassy of Japan.

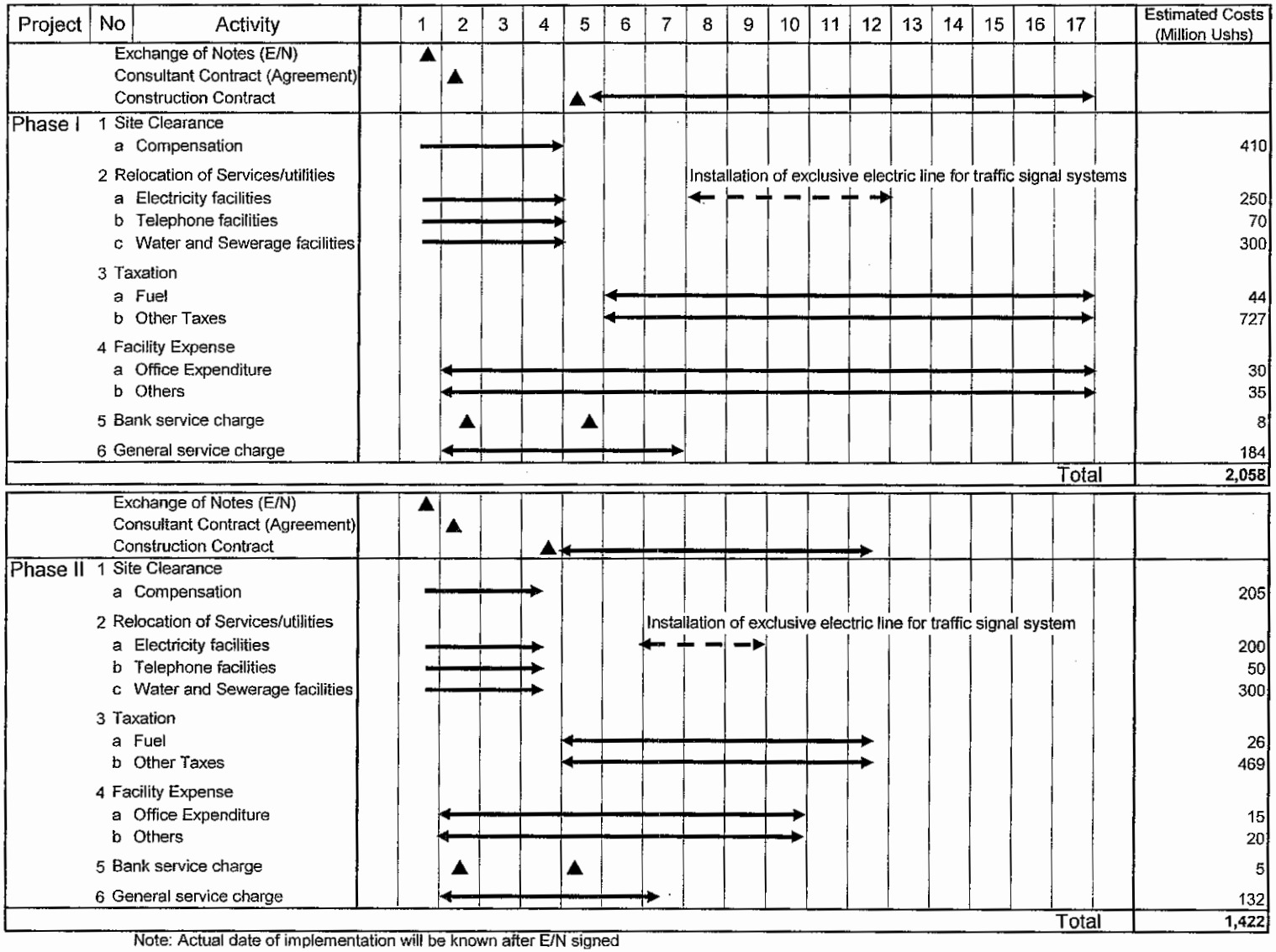
(4) The Ministry of Works, Housing and Communications (MOWHC) shall prepare and obtain the official approval of the Environmental Impact Assessment (EIA) from the National Environmental Management Authority (NEMA) by the end of April 2005.

Major Components of Junction Improvement Plan in the Basic Design

Category	Component	Contents	Content of works to be borne by the Government of Uganda	Remarks
Intersection Improvement	1. Clock Tower Roundabout	- to improve the geometric design structure of existing junctions. - to improve the road drainage facilities - to improve sidewalks - to install pedestrian crossings - to improve bus bays - to install traffic signs - to relocate existing street lights	- to obtain the official approval on the EIA by the end of April 2005. - to secure land necessary for the sites of the Project and remove any obstacles therein, prior to commencement of the construction. - to provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities in and around the sites. - to provide exclusive electric lines from nearest transformers to traffic signal systems. - to provide the necessary budget and assist in expediting the customs clearance for all products purchased under the Grant Aid. - KCC and MOWHC to ensure all the maintenance and repair work for the project facilities, such as pavement, road marking, drainage, traffic signal system, and pedestrian barrier.	- In principle, lane numbers and road width are planned same as the present; however, geometric design of junctions and road sections shall be reviewed based on the requirements of the traffic volume. - In principle, lane widths are 3.25m for right turn lane and 3.5m for others.
	2. Shop-rite Roundabout			
	3. Katwe-Mengo Hill Roundabout			
	4. Kampala-Entebbe Road Junction			
	5. Jinja Road Roundabout			
	6. Africana Roundabout			
Road Section Improvement	1. Nsambya Road			
	2. Entebbe Road			
Traffic Signal	1. Clock Tower Junction	- Traffic signals for vehicles and pedestrians (LED type) - Back-up power supply system (small UPS + generator with automatic starter)		- Install power backup devices in the view of unreliable power supply to the sites.
	2. Shop-rite Junction			
	3. Kampala-Entebbe Road Junction			
	4. Jinja Road Junction			

Annex-2

Implementation Plan of Preparation Works by the Government of Uganda



Note: Actual date of implementation will be known after E/N signed

Minutes of Discussions
on the Basic Design Study
on the Project for Improvement of Traffic Flow in Kampala City
in the Republic of Uganda
(Explanation on Draft Final Report)

In December 2004, the Japan International Cooperation Agency (hereinafter referred to as "JICA") despatched the Draft Report Explanation Team on the Project for Improvement of Traffic Flow in Kampala City (hereinafter referred to as "the Project") to the Republic of Uganda (hereinafter referred to as "Uganda") and through discussions, field survey, and technical examination of the results in Japan, JICA prepared a draft final report of the study.

In order to explain and to consult the Ugandan side on the components of the draft final report, JICA sent to Uganda a Draft Final Report Explanation Team (hereinafter referred to as "the Team"), headed by Mr. Yoshiaki Kano, Resident Representative, JICA Kenya Office, from February 20 to March 4, 2005.

As a result of discussions, both sides have confirmed the main items described in the attached sheets.

Kampala, March 1, 2005

Signed by;

Yoshiaki Kano
Leader
Draft Final Report Explanation Team
Japan International Cooperation Agency

Signed by;

Charles Muganzi
Permanent Secretary
Ministry of Works, Housing and Communications
Republic of Uganda

Witnessed by;

Stephen Kinyera
Deputy City Engineer and Surveyor
Kampala City Council
Republic of Uganda

ATTACHMENT

1. Components of the Draft Final Report

The Ugandan side agreed and accepted in principle the components of the draft final report presented by the Team.

2. Schedule of the study

JICA will complete the final report and send it to the Government of Uganda by the end of April 2005.

3. Other Relevant Issues

(1) The Team handed one copy of the draft engineering design of the facilities to the Ministry of Works, Housing and Communications (MOWHC). Both sides agreed that this draft design is confidential and should not be duplicated or released to any outside parties in order to secure the fairness of the Tender concerning the Project.

(2) MOWHC may finalize the tender documents through reviewing all documents and drawings prepared as a result of the study. MOWHC shall be responsible for project implementation and the output of the project executed through contracts with Japanese firms.

(3) The Ugandan side has already allocated 2.0 billion Uganda shillings (TR 52A(0279)) in the fiscal year 2005/2006 for compensation of properties and relocation of public utilities, which were described in Annex-2 of the Minutes of Discussions signed by both sides on December 21, 2004.

(4) Ugandan side agreed to secure and allocate the necessary budgets for operation and maintenance of the facilities/equipment constructed/procured under the Project, which are described in Annex-1.

(5) MOWHC shall prepare and obtain the official approval of the Environmental Impact Assessment (EIA) from the National Environmental Management Authority (NEMA) by the end of April 2005.

Operation and Maintenance Work

Implementation Organization	Maintenance Item	Annual Frequency	Contents of Work	Estimated Cost (Million Ushs)		
				Phase-I *1 5 Junctions	Phase-II *2 2 Jcs and roads	This Project *3 6 Jcs and roads
KCC	Pavement surface	1 time/year	Repairing of ruts cracks and pot holes	10.6	38.6	38.3
	Surface cleaning	12 times/year	Cleaning	7.4	10.0	26.1
	Road Marking	1 time/2years	Repainting	7.4	12.9	46.0
	Drainage	2 times/year	Removal of sedimentation	7.1	25.7	26.1
	Traffic signal	2 times/year	Lamp cleaning and inspection of electric system	7.1	25.7	26.1
	Electricity and cost of diesel for back-up system	Every year	Running cost for traffic signal	7.1	25.7	3.5
	Safety facilities	3 times/year	Repair work of safety facilities such as flower bed and planting zone	3.5	5.0	10.4
	Total (Annual maintenance work)			**50.2**	**143.6**	**176.5**
MOWHC	Overlay	10 years after each phase	Asphalt overlay	**474.6**	**200.0**	**940.6**

Notes of the projects;

*1 Phase-I The Project for Improvement of Trunk Roads in Kampala, construction year from 2000 to 2001
Improvement of 5 Junctions (Makerere, Natete, Kibuye, Portbell and Wandegeya)

*2 Phase-II The Project for Improvement of Trunk Roads in Kampala, Phase-II, construction year from 2003 to 2005
Improvement of 2 Junctions (Kiburi and Bakuli) and 2 Roads (Natete and Gaba)

*3 This Project The Project for Improvement of Traffic Flow in Kampala City
Improvement of 6 Junctions (Clock Tower, Shoprite, Katwe-Mengo Hill, Kampala-Entebbe Road, Jinja Road and Africana) and 2 Roads (Nsambya and Entebbe)

Maintenance costs are estimated on the basis of the Basic Design Study Reports of each project.

5. Other Relevant Data

SCREENING FORMAT

Name of a Proposed Project: **The Project for Improvement of Traffic Flow in Kampala City**

Project Executing Organization : **Ministry of Works, Housing and Communications**

Name, Post, Organization and Contact Point of a Responsible Officer

Name : **Mr. Nelson Omagor**

Post : **Principal Environmental Officer / ELU**

Tel : **077-458 903** Fax : E-Mail :

Date : **October 4, 2004**

Signature :

Mr. Nelson Omagor

CHECK ITEMS

Question 1 Address of a project site

- 5 Roundabout of Clock Tower RA, Shoprite RA, Katwe-Mengo Hill RA, Jinja Road RA and Africana RA in Kampala City
- 1 Junction of Kampala-Entebbe Road Junction in Kampala City

Question 2 Outline of the project

2-1 Does the project come under following sectors?

√ Yes O No

if yes, please mark the corresponding items.

O Mining development
O Industrial development
O Thermal power (including geothermal power)
O Hydropower, dams and reservoirs
O River. Erosion control
O Power transmission and distribution lines
√ Roads, railways and bridges
O Airports
O Posts and harbors
√ Waste supply, sewage and waste treatment **(Construction wastes is involved)**
O Agriculture involving large-scale land-cleaning or irrigation
O Forestry
O Fishery
O Tourism

2-2 Does the project include any of the following items?

O Yes √ No

if yes, please mark the corresponding items.

O Involuntary resettlement (scale: households persons)

O Groundwater pumping (scale: m3/year)

O Land reclamation, land development and land-clearing (scale: hectors)

O Logging (scale: hectors)

2-3 Description of the Project (Scale and/or Basic Information)

Proposed improvement works for 5 roundabouts and one road junction to involve: -

Improvement of traffic flow

- Increase of the junction capacity through improvement of intersection geometry and provision of additional lanes.
- Installation of traffic signals with power-saving type of power supply (at four (4) junctions of Clock Tower, Shop-rite, Jinja Road Roundabout and Kampala-Entebbe Road Junction).
- Installation of a signal power supply in case of an emergency (If necessary of back-up system for signal to be studied).
- Provision of pedestrian crossings and sidewalks and,
- Improvement of the road drainage.

2-4 Is the project consistent with the higher program/policy

√ Yes: Please describe the higher program/policy

(If meets most of the Government policies like : Poverty eradication trough better marketing by good roads)

O No

2-5 Did the proponent consider alternative before this request?

O Yes: Please describe outline of the alternative

√ No

2-6 Did the proponent have meeting with related stakeholders before this request?

√ Yes O No

if yes, please mark the corresponding stakeholders.

√ Administrative body (KCC, NEMA)

O Local residents

O NGO

√ Others (Road users, motorists, cyclists)

Question 3

Is the project a new or an on-going one? In case of an on-going one, have you received strong complaints, etc., from local residents?

√ New O On-going (there are complaints) O On-going (there are no complaints)

O Others: ( )

Question 4 Name(s) of laws or guidelines

Is Environmental Impact Assessment (EIA) including Initial Environmental Examination (IEE) required for the project according to the laws or guidelines in the host country?

√ Yes O No

if yes, please mark the corresponding items.

O Required only IEE (O Implemented, O on going, O Planning)

√ Required both IEE and EIA (O Implemented, √ on going, O Planning)

O Required only EIA (O Implemented, O on going, O Planning)

O Others: ( )

Question 5

In the case when EIA steps were taken, was the EIA approval by the relevant laws in the host country? If yes, please mark date of approval and the competent authority.

O Approved: without a supplementary condition	O Approved: with a supplementary condition	O Under appraisal

(Date of approval: Competent authority:)

√ Not yet started appraisal process

O Others: ( )

Question 6

Is the project requires a certificate pertaining to the environment and society other than the EIA, please indicate the title of that certificate.

O Already certified O Required a certificate but not yet done

Title of the certificate: ( )

O Not required

O Others: ( )

Question 7

Are any of the following areas located inside or around the project site?

O Yes √ No O Not identified

if yes, please mark the corresponding items.

O National park, protected area designated by the government (coast line, wetlands, reserved area for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or protected areas

O Virgin forests, tropical forests

O Ecological important habitat areas (coral reef, mangrove wetland, tidal flats)

O Habitat of valuable species protected by domestic laws or international treaties

O Likely salts cumulus or soil erosion areas on a massive scale

O Remarkable desertification trend areas

O Archaeological, historical or cultural valuable areas

O Living areas of ethnic, indigenous people or nomads who have a traditional lifestyle or special society valuable areas

Question 8

Does the project have adverse impacts on the environment and local communities?

O Yes √ No O Not identified

Reason: ( )

Question 9

Please mark related environmental and social impacts, and describe their outlines.

√ Air pollution (from dust)
O Water pollution
O Soil pollution
√ Waste (Construction waste and human waste)
√ Noise and vibration
O Ground subsidence
√ Offensive odors (Asphalt when burned)
O Geographical features
O Bottom sediment
O Biota and ecosystem
√ Water usage (for most of the activities)
√ Accidents (arising from occupational health and safety)
O Global warming
O Involuntary resettlement
√ Local economy such as employment and livelihood etc (People will gain employment locally)
√ Land use and utilization of local resources (Land will be taken up for alignments)
O Social institutions such as social infrastructure and local decision-making institutions
√ Existing social infrastructure and services (Areas, - Fire brigade parking - Railway line)
O The poor, indigenous of ethnic people
O Misdistribution of benefit and damage
O Local conflict and damage
O Gender
O Children's rights
√ Cultural heritage (Queen's Tower, Pan African Freedom Square, Indian Temple)
O Infections diseases such as HIV/AIDS etc.
O Others: ( )

Outline of related impacts: refer to ( )

Question 10

Information disclosure and meetings with stakeholders

10-1 If environmental and social considerations are required, dose the proponent agree on information disclosure and meeting with stakeholders in accordance with JICA Guidelines for Environmental and Social Considerations?

√ Yes O No

10-2 If no, please describe reasons below.