No.

MINISTRY OF WORKS AND TRANSPORT (MOWT)
GOVERNMENT OF THE REPUBLIC OF UGANDA

THE FEASIBILITY STUDY
ON
THE CONSTRUCTION
OF
A NEW BRIDGE ACROSS RIVER NILE AT JINJA
IN
THE REPUBLIC OF UGANDA

FINAL REPORT

VOLUME 1: SUMMARY REPORT

OCTOBER 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS CO., LTD.

EIGHT - JAPAN ENGINEERING CONSULTANTS INC.

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The exchange rates applied in this Study are:

US$ 1.00＝Ushs* 2039.6＝Japanese Yen 98.27 (March, 2009)

* Ushs: Uganda Shillings

PREFACE

In response to the request from the Government of Republic of Uganda, the Government of Japan decided to conduct the Feasibility Study on the Construction of a New Bridge across River Nile at Jinja and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA sent to Uganda the Study Team which consists of Oriental Consultants Co., Ltd. and Eight – Japan Engineering Consultants Inc. from October 2008 to October 2009. The Study Team is headed by Mr. Isamu Gunji of Oriental Consultants Co., Ltd..

The Study Team held discussions with the officials concerned of Uganda, and conducted field surveys at the study area. Upon returning to Japan, the Study Team conducted further studies and prepared this final report.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Republic of Uganda for their close cooperation to the Study Team.

October 2009

Toshiyuki Kuroyanagi
Director General
Economic Infrastructure Department
Japan International Cooperation Agency

October 2009

Toshiyuki Kuroyanagi
Director General
Economic Infrastructure Department
Japan International Cooperation Agency (JICA)

Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of "the Feasibility Study on the Construction of a New Bridge across River Nile at Jinja".

The Study was undertaken in the Republic of Uganda from October 2008 to October 2009 by the Study Team organized by Oriental Consultants Co., Ltd. and Eight – Japan Engineering Consultants Inc. under the contract with JICA.

This report consists of four volumes: Summary, Main Report, Appendix and Drawings. It explores the feasibility of the New Nile Bridge from socio-economic, engineering and environmental viewpoints, fully applying the JICA Guidelines for Environmental and Social Considerations.

We would like to express our sincere gratitude and appreciation to all the officials of your agency, the Ministry of Foreign Affaires, the Embassy of Japan in Uganda, the Ministry of Works & Transport and Uganda National Roads Authority as the counterpart agency, and to counterpart personnel.

We hope that the report will be able to significantly contribute to the development of the Republic of Uganda.

Very truly yours,

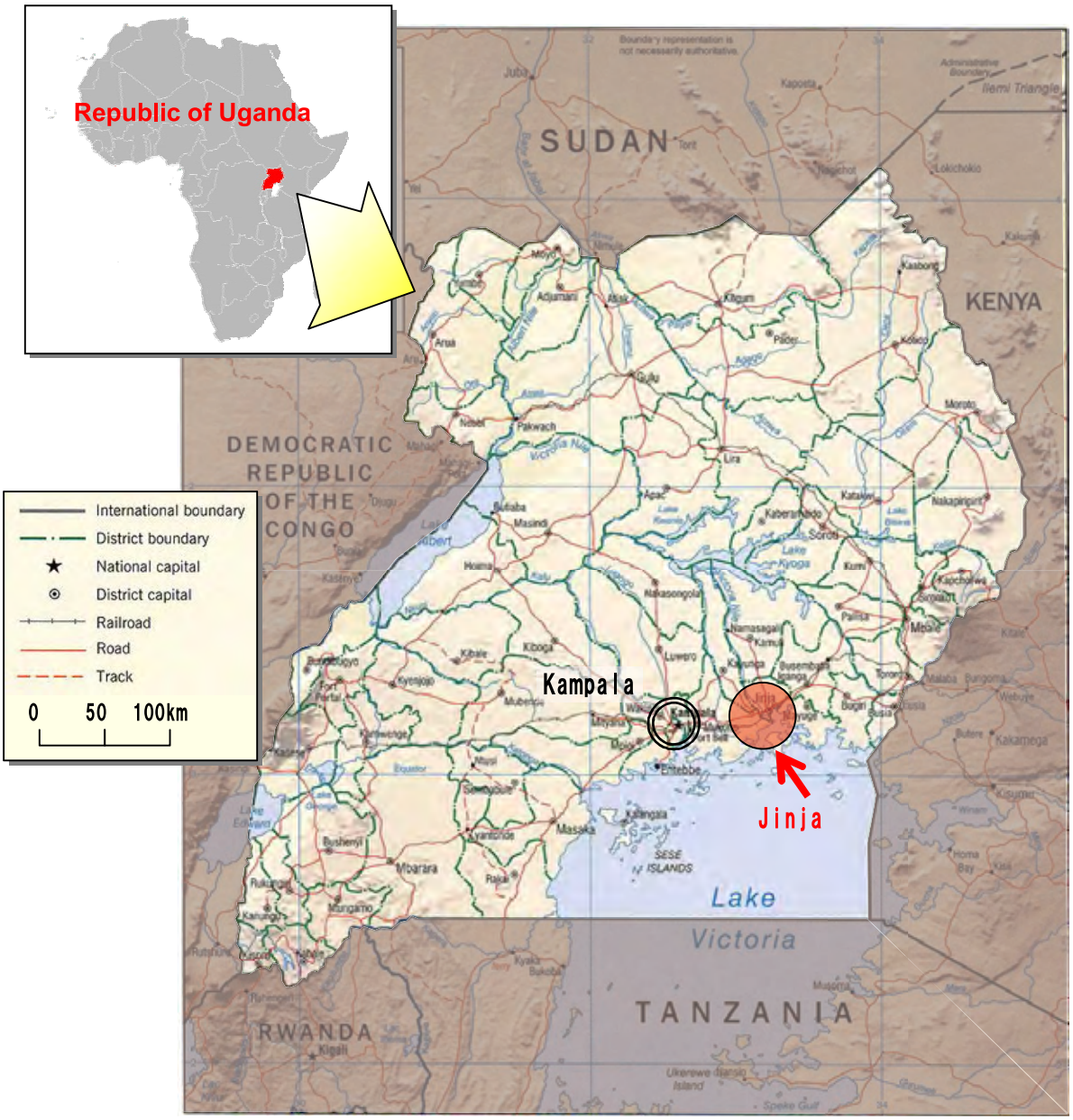
Isamu Gunji
Team Leader

The Feasibility Study on the Construction of a New Bridge across River Nile at Jinja

The Consortium of Oriental Consultants Co., Ltd. and Eight – Japan Engineering Consultants Inc.

Republic of Uganda

Project Location Map



■Area	241 thousand km^2 (About 0.6 times of Japan)	■GNI per capita	US$ 300 (2006, WB)
■Population	29.9 million (2006) Population Growth Rate :3.3% (2006/2005)	■Economic Growth	5.4% (2006, WB)
		■Price Rise	6.7% (2006, WB)
■Capital	Kampala (with a population of 1.2 million in 2002)	■Trade (2005,World Bank)	Export: US$864mil (Fish, Coffee, Tea, Cotton) Import: US$1784mil (Electronics, Cereal, Chemical Products, Oil & Oil Products)
■Ethnic	Buganda, Langi, Acholi etc.	■Currency	Uganda Shilling (UGX)
■Language	English, Swahili, Rganda	■Exchange Rate	US$1.00＝1,831 UGX (Jan, 2008)
■Religion	Christian (60%), Ancient Religious (30%), Muslim (10%)	■ODA Performance of GOJ (Cumulative Value till 2006)	(1) Government Loans 7.26 bil Yen (2) Grant Aid 36.2 bil Yen (3) Technical Assistance 11.8bil Yen
■Major Industry	[Agriculture] Fish, Coffee, Tea, Cotton [Mining] Copper, Mineral Phosphate, Tungsten [Industry] Fabric, Tobacco, Cement		(1), (2): EN Base, (3): JICA Base

Source: Ministry of Foreign Affairs

CG IMAGE OF THE NEW NILE BRIDGE

Outline of the Project

1. Country: Republic of Uganda

2. Project Name: The Feasibility Study on the Construction of A New Bridge across River Nile at Jinja

3. Executing Agency: Uganda National Roads Authority (UNRA)

4. Study Objectives:

- To conduct the feasibility study on the construction of a new bridge across the River Nile at Jinja including its approach roads (hereafter referred to as the Project).
- To Transfer relevant skills and technologies to personnel concerned with the Study

5. Study Contents:

Stage 1: Collection of Data/Information and Analysis of Present Conditions

(1) Collection and review of relevant data & information
(2) Investigation of social and economic conditions
(3) Natural condition study

Stage 2: Examination of Optimum Methods to Cross the River Nile

(1) Social economic framework
(2) Future traffic demand forecast
(3) Design standard study
(4) Study for adequate bridge alignment
(5) Technical support for IEE
(6) Assistance on public consultation

Stage 3: Feasibility Study on a New Nile Bridge

(1) Review of bridge positions and alignments
(2) Study on bridge types
(3) Assistance on Environmental Impact Assessment (EIA)
(4) Preliminary design
(5) Operation & maintenance management plan
(6) Project cost estimation
(7) Economic and financial analysis
(8) Study for the implementation schedule of the project

Stage 4: Technical Transfer

(1) Planning of the technical transfer
(2) Execution of technical transfer

6. Conclusion and Recommendation:

1) Conclusion

The study concluded that:

- The project is technically and economically feasible and environmentally sound.
- Hence, it is justified to implement the project for national and people's benefits.
- An optimum location of the project should lie on the Alignment A which begins at Nile Brewery junction and passes by Nytil Textile Factory before crossing the River Nile and which further extends to Nalufenya roundabout after the River.
- A bridge type should be a PC Cable-stayed bridge with inverted Y-shape Pylon and Single Plane Stayed-Cable.
- Introduction of Toll System to the Project should be carefully examined again during the Detailed Design stage involving stakeholders not only the service providers but also users.

2) Recommendations

Natural Environmental Considerations

Throughout this EIA study on the natural environment, it was found that potential impacts regarding the water quality, regional drainage, and waste treatment would be critical for the implementation of the construction of the proposed bridge. In particular, there are several water intake points (detailed descriptions about this water intake are summarized in the social environmental study section) around the project site and the biodiversity around the current riverine condition is good. So, special care shall be taken for the prevention of the water quality degradation.

Also, it was found that several important fish species with IUCN "Endangered" status occur around the project site of the River Nile, so the conservation of those species is one of important and challenging points, though the proposed project will not cause direct, significant negative impacts on those species.

Key directions and/or principles for the development of a comprehensive EMP, which are discussed within this study, and engineering results of D/D to be held after this feasibility study should help to prepare an action plan for the implementation of EMP before the construction starts. NaFIRRI, one of key inland freshwater fishery resources institutes, has a great knowledge about the aquatic eco-system of the upper Victoria Nile. Therefore, the participation of this institute in executing the EMP can be useful for the successful implementation of EMP for the natural environment.

Social Environmental Considerations

Land acquisition and involuntary resettlement are considered as major negative impacts on social environment caused by the Project. The ESIA study conducted by UNRA's consultant reveals that approximately 72,000m2 of land is to be taken as the ROW for the approach road and the actual number of built-up properties that require resettlement action along the adopted road alignment are 26 units consisting of 16 dwelling houses (comprising of either partially or completely built units), 2 commercial and 8 industrial buildings. These negative impacts could be minimized with adequate, fair, and prompt compensation and resettlement of communities based on the on-going RAP process.

It is therefore recommended in the next project phase (detailed design) to cope with the following issues:

- Monitoring of the compensation procedures
- Loss of access route to properties
- Potential business loss
- Establishment of grievance procedure and redress system

The Feasibility Study on the Construction of A New Bridge across River Nile at Jinja

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 Background and Objectives of the Study

The Republic of Uganda is a landlocked country surrounded by Kenya, Tanzania, Sudan, the Democratic Republic of Congo and Rwanda. Kampala, the capital city of Uganda, is the cargo traffic generating source and the centre of distribution of goods. Kampala is therefore considered as the hub of the national road network.

The Northern Corridor route runs through Kampala in parallel with the northern coast of Lake Victoria. This route constitutes a major strategic link from Uganda and other inland neighbouring countries (Rwanda, Burundi and the eastern part of the Democratic Republic of Congo) to Mombasa Port in Kenya.

The Northern Corridor route crosses the River Nile through the existing Nalubaale Dam Bridge at Jinja, located about 80 km to the east of Kampala. Currently, the bridge is the bottleneck for the transport of goods and passengers, due to the narrow width, plate deck deterioration and exfoliation of the concrete surface of the bridge piers. Also, the increasing traffic volume coupled with overloaded heavy vehicles is increasingly causing the structural deteriorations of the bridge.

In order to handle the situation, the Government of Uganda requested the Government of Japan to carry out a Feasibility Study on the Construction of A New Bridge across River Nile at Jinja. In response to the official request, the Government of Japan through the Japan International Cooperation Agency deployed a Study Team in November 2008.

The objectives of the Study are summarized hereunder.

- To conduct a feasibility study on the construction of a new bridge across River Nile at Jinja including the construction of approach roads on both sides of the bridge (hereafter referred to as the Project).
- To Transfer relevant expertise, skills and technologies to Ugandan personnel concerned relative to the development of the Project.

The Study commenced with the presentation of an Inception Report in November 2008 followed by the submission of a Draft Final Report in August 2009, for presentation to the Steering Committee in early September 2009.

One month for the review and comments of the Report by the Steering Committee was allocated, prior to finalizing and submitting the Report to JICA in October 2009.

Table1.1 shows the major tasks schedule showing the milestones for report submissions and Steering Committee meetings as well as Public Consultation meetings.

Table 1.1 Schedule of the Major Tasks

Year	2008		2009											
Month	11	12	1	2	3	4	5	6	7	8	9	10	11	12
♦ **Project Activities**														
Selection of Representative Alignment of Each Route	▬	▬	▬											
Selection of Optimum Solution (Optimum Alignment & Bridge Type)			▬	▬	▬	▬								
Preliminary Design & Cost Estimation						▬	▬	▬	▬					
Economic & Financial Analysis									▬	▬				
Implementation Plan / EIA									▬	▬				
♦ **Report**	△ ICR			△ PR1	△ SPR		△ ITR		△ PR2		△ DFR	△ FR		
♦ **EIA Activity by COWI**										△ DFR			△ APPR	
♦ **Public Consultation**		△ 1st			△ FGD	△ 2nd					△ 3rd			

Note: ICR: Inception Report, PR1: Progress Report 1, SPR: Special Report, ITR: Interim Report, PR2: Progress Report 2, DFR: Draft Final Report, FR: Final Report

1.2 Study Area

The Study covers the areas directly affected by the proposed development. Figure 1.1 shows the location of proposed New Nile Bridge (Location A) and its surrounding area.

Figure 1.1 Study Area

2. SELECTION OF OPTIMUM SOLUTION TO CROSS RIVER NILE AT JINJA

2.1 Base Alignment Alternatives of the Project

The three alignment alternatives, which are the basis in formulating the comparative analysis for selecting the optimum solution in the study, are shown in Table 2.1 and Figure 2.1 hereunder.

Table 2.1 Outline of Base Alignment and Bridge Location Alternatives

Name of Alignment	Description of Bridge Location
Alignment A	500 m upstream of Nalubaale Dam with river width of 300 m;
Alignment B	1,200 m upstream of Nalubaale Dam, very close to Nile Bridge, with river width of 170 m;
Alignment C	1800 m downstream of Nalubaale Dam with river width of 250 m.

Source: JICA Study Team

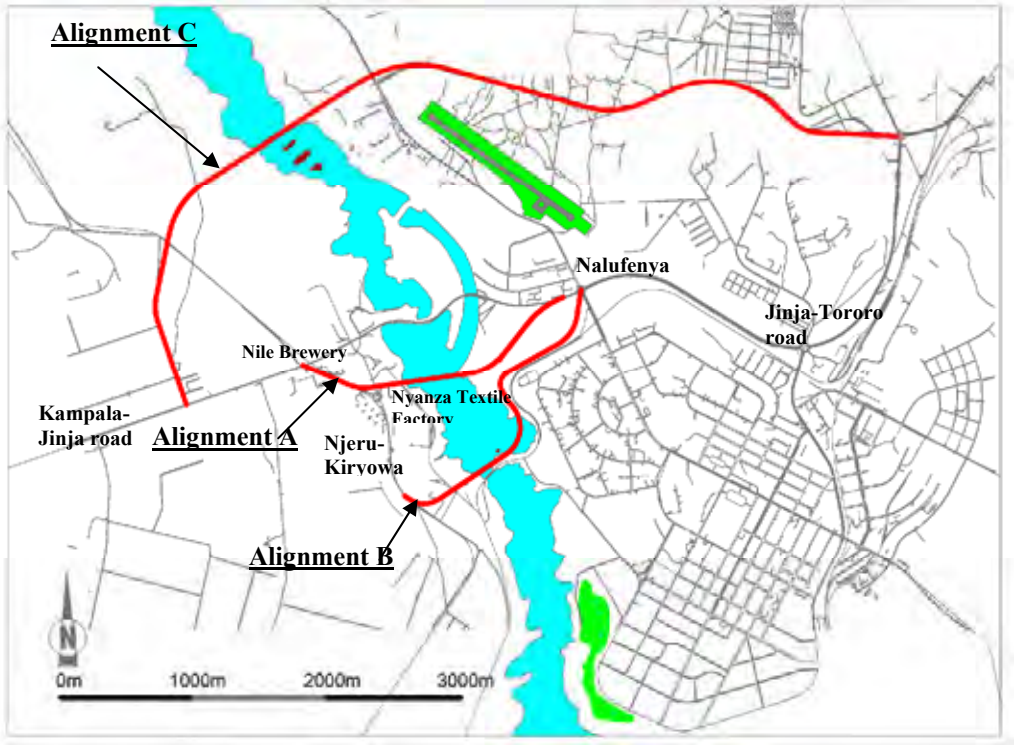
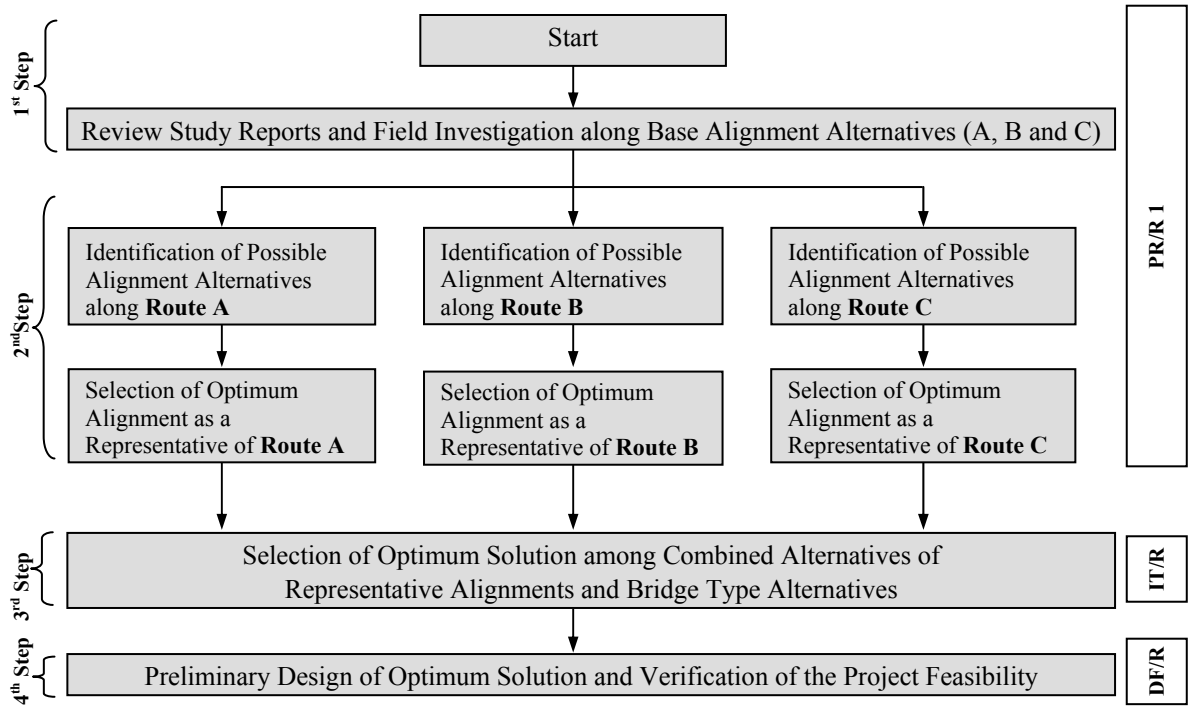


Figure 2.1 Base Alignment Alternatives

2.2 Methodology Flow for Selecting the Optimum Solution

Figure 2.2 shows the four (4) major steps taken to achieve the selection of the optimum solution for the Project.



Note: PR/R 1 (Progress Report 1), IT/R (Interim Report), DF/R (Draft Final Report)

Figure 2.2 Methodology Flow for Selecting Optimum Solution

First Step: Three (3) base alignments were reviewed, identified/confirmed at site and assessed by field investigation.

Second Step: Additional possible route alignments (combination of bridge locations and approach road alignments) are identified, based on field survey and engineering studies. Consequently, Route A comprised three (3) alignment alternatives, Route B has one and Route C has two alignment alternatives. Alignment alternatives for the respective routes were compared and ultimately three representative alignments were considered.

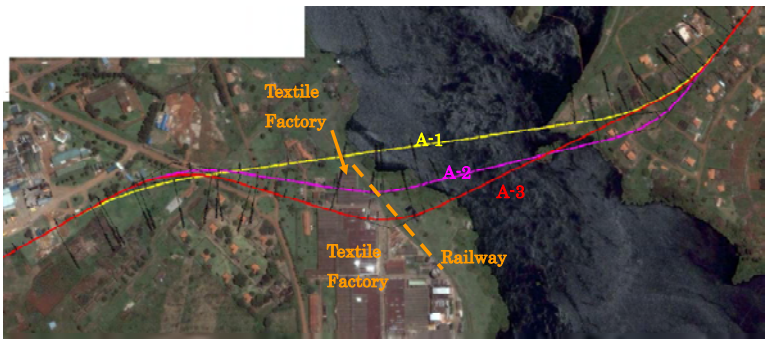


Figure 2.3 Alignment and Bridge Location Alternatives A-1, A-2 and A-3

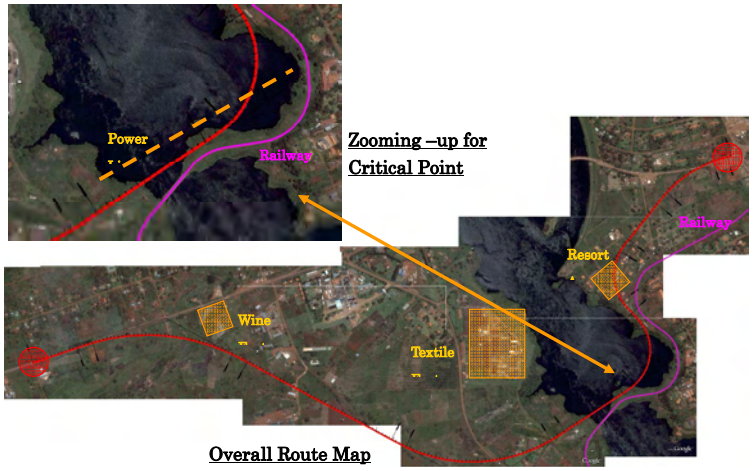


Figure 2.4 Alignment and Bridge Location for Route B

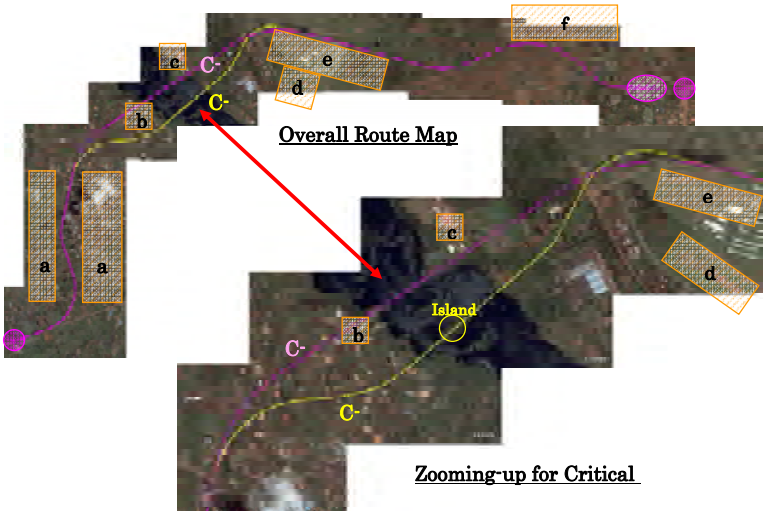
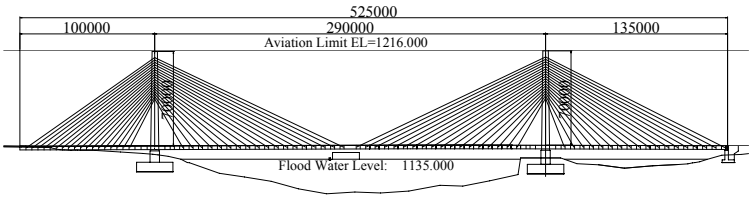
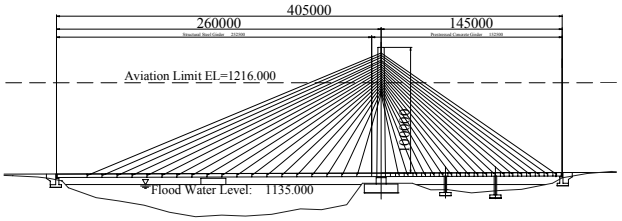
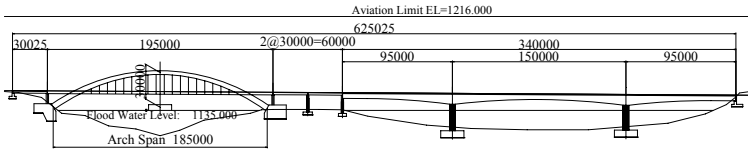
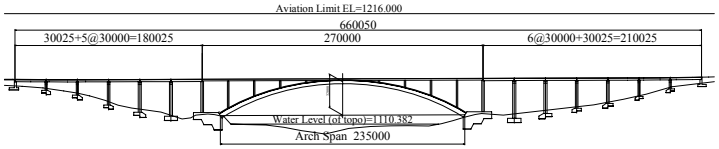
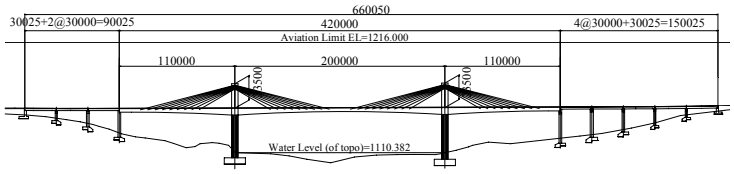
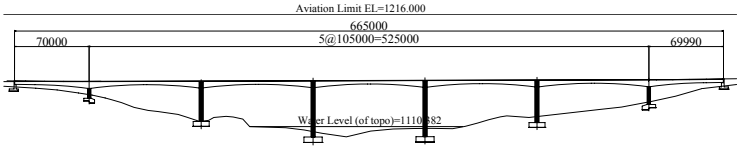


Figure 2.5 Alignment and Bridge Location Alternatives C-1 and C-2

Third Step: The representative alignment alternatives for the respective routes are then combined with possible bridge type options. Each representative alignment had more than two structural type options. Eventually, six alternatives shown in Table 2.2 were compared to select the optimum solution to cross the River Nile at Jinja.

Fourth Step: After the optimum solution was selected, preliminary design was pursued and supplemented by estimated total project cost and to determine the feasibility of the project.

Table 2.2 Definitive Bridge Type Alternatives

Bridge Type AA4 ：3-Span PC Cable-stayed	
	A plan to avoid the risk of setting the foundations on the river bed of hard rock in deep water and to satisfy aviation limit Most recommendable.
Bridge Type AA5 ：4-Span Hybrid Cable-stayed	
	A plan to avoid the risk of setting the foundations on the river bed of hard rock in deep water In case aviation limit is relaxed, this option is also recommendable.
Bridge Type BB1 ：RC Arch Bridge with 3-SpanBalanced Cantilever PC Box Girder + PC I-Girders	
	Recommendable. Only BB1 was selected as BB2 has higher risk for construction of foundations bearing on hard rock in deep water.
Bridge Type CC1 ：RC Arch Bridge with PC I-Girders	
	While the cost is high there is no risk for construction of foundations, CC1 is selected for further comparison.
Bridge Type CC2 ：3-Span Extra-dosed PC Girder with PC I-Girders	
	Since the cost difference is not much when compared with CC1, CC2 this option is selected for further comparison.
Bridge Type CC3 ：7-Span Balanced Cantilever PC Box Girder	
	Since there is low risk for the construction of the foundations and considering that the cost is the lowest, CC3 is also recommendable.

2.3 Comprehensive Evaluation

2.3.1 Evaluation Result

Evaluation of individual sub-items is scored accordingly, described hereafter as follows: 1 (inferior to other alternatives), 3 (moderate) to 5 (superior to other alternatives). The scoring were then weighted by factors derived from stakeholders' remarks as shown in Table 2.3.

Table 2.3 Definitive Scoring on the Alternatives

No.	Sub-item	A		B	C			Weight	
		AA4	AA5	BB1	CC1	CC2	CC3		
Alignment Length (km)		2.4		5.1	8.1			Weight of Sub-items by Stakeholders	Weight of Categories by Stakeholders in ratio
Construction Cost (US$ M)		67.7	66.0	90.0	83.0	85.2	76.9		
	Bridge	57.1	56.0	78.3	56.1	58.3	50.0		
	Road	10.6		11.7	26.9				
	Maintenance Cost (Present value US$1,000)	5.6	289.0	19.0	23.0	22.0	7.0		
	Construction Period (Year)	3.5	3.3	3.5	3.4	3.0	3.0		
1	1.1 Contribution to local development	5	5	4	3	3	3	4.17	0.21
2	2.1 Social environmental impact	4	3	4	2	2	2	3.39	0.17
3	3.1 Natural environmental impact	4	4	3	2	2	2	3.82	0.20
4	Engineering Aspects								
	4.1 Impact by airfield expansion plan	5	5	5	2	2	2	4.37	
	4.2 Construction cost	5	5	1	2	2	3	4.37	
	4.3 Risk of construction works	3	2	1	5	5	4	4.37	
	4.4 Maintenance	3	1	4	4	4	5	4.37	
	4.5 Bridge aesthetics	4	4	2	5	5	4	3.40	
	Composite score	4.00	3.37	2.63	3.53	3.53	3.58	4.18	0.21
5	Economic Benefits								
	5.1 Transit traffic & Through traffic	5	5	4	4	4	4	3.80	
	5.2 Accessibility to Kampala Road to/from Jinja	5	5	4	1	1	1	4.06	
	Composite Score	5.00	5.00	4.00	2.45	2.45	2.45	3.93	0.20
Overall Evaluation		**4.25**	4.11	3.51	2.64	2.64	2.64	19.49	1.00

2.3.2 Consensus

Based on the comparative evaluation of the six alternatives, Alignment A with Bridge Type AA4 (3-Span PC Cable-Stayed Bridge) scored the highest point among the alternatives and this was also confirmed by sensitivity analysis.

Since it was officially acknowledged that the aviation limit of Jinja Airfield was not relaxed, Bridge Type AA5 was not considered as an optimum solution.

Based on the above evaluation, the 3rd Steering Committee held on 1 April, 2009 accepted the recommendation of the Study Team, and also that of the stakeholders, during the 2nd Public Consultation held in Kampala on 3 April 2009, agreed with the Team's recommendation, for the adoption of, Alignment A with Bridge Type AA4 as the optimum solution to cross River Nile at Jinja.

3. TRAFFIC DEMAND FORECAST

3.1 Traffic Survey

The Study Team carried out traffic surveys (Traffic Count Survey, Roadside OD Interview Survey, Cargo Truck Survey and Stated Preference (SP) Survey) in December 2008 to gather primary traffic data for the analysis of the current traffic characteristics to provide a basis for the forecast of traffic demand of the project. ADT for the existing bridge is estimated at 9,412 (excluding motorcycle) vehicles per day or 11,124 vehicles (including motorcycle) per day in December 2008.

Regression analysis was made using traffic and socio-economic data (Uganda Population and GDP) to forecast future traffic demand. Additionally, the demand forecast considered international traffics through Uganda (trips between foreign countries) and the Influence of Oil Transport by an Oil Pipeline (Low Traffic Case). It seems that Influence of the Railway and Ferry would be very small and limited. Therefore, it was assumed that there would be no diversion from road traffic to the railway or the ferry in the future. The future traffic volumes on the project bridge were estimated as shown in Table 3.1 hereunder.

Table 3.1 Future Average Daily Traffic for Middle Growth Scinario

<Vehicle Base>

	Motorcycle	Sedan, SW	Mini Bus	Large Bus	Truck	Trailer	Total
2008*	1,712	3,868	2,886	146	1,510	986	11,108
2015	3,686	5,858	3,826	236	2,596	1,754	17,956
2025	6,356	8,578	4,934	358	4,870	2,848	27,944

Source: JICA Study Team
Note: * based on JICA Study Team's survey data in 2008
Unit: Vehicle/Day

<PCU Base>

	Motorcycle	Sedan, SW	Mini Bus	Large Bus	Truck	Trailer	Total
2008*	856	3,868	3,175	292	3,020	2,859	14,070
2015	1,842	5,858	4,209	472	5,192	5,087	22,660
2025	3,178	8,577	5,427	717	9,740	8,259	35,898

Source: JICA Study Team
Note: *) based on JICA Study Team's survey data in 2008
Unit: PCU/Day

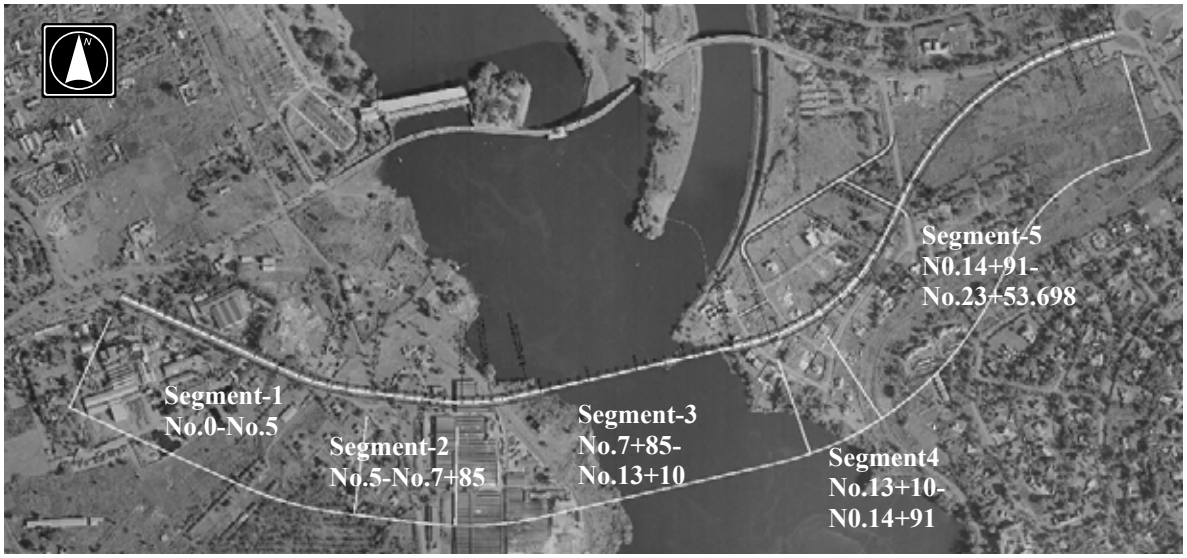
4. PRELIMINARY ENGINEERING DESIGN

4.1 Engineering Study

Meteorological condition (rainfall and wind velocity), river condition and geological & geotechnical condition data has been collected from statistics and field surveys and investigated. Those data are used as background information in preliminary engineering design.

4.2 Typical Cross Section of Road

The typical cross sections of the road are planed for each divided 5 segments as shown in Figure 4.1 and design of it are based on geometric design standard and land uses along route of the project. The typical cross sections for segments 1, 3 and 5 are formulated as shown in Figures 6.3 through 6.5.



Source: JICA Study Team

Figure 4.1 Segments for Cross Section

♦ **No.0- No.5 (Segment-1): Njeru Town**

The cross section for this segment was conceived to minimize areas from being affected by the development of the Project to curtail land acquisition cost.

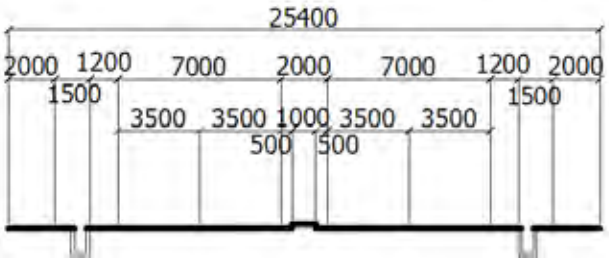


Figure 4.2 Cross Section for Segment-1

♦ **No14+91-No.23+ 53.698 (Segment -5): Jinja City**

The cross section of this segment satisfies the standard requirement for Class Ib Paved Road. It is also compatible with the Bugiri-Jinja road as a continuation of the project road.

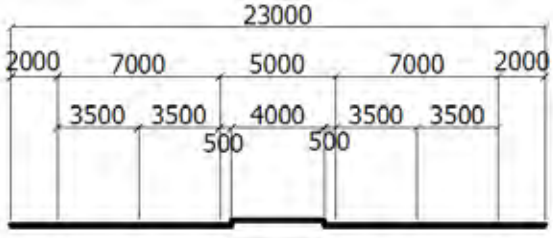


Figure 4.3 Cross Section for Segment-5

4.3 Bridge Design

The design conditions to be used for the bridge are listed as follows:

1. Prestressed concrete three-span cable-stayed bridge, with 290m main span, 100m left hand side span and 135m right hand side span, for a total bridge length of 525m.

2. The structure of 100m left side span will be the semi-underground beam type.
3. The structure will be provided with Inverted Y shape Pylons.
4. Spread type of footing will be used for the foundations on land (P1).
5. Cast in Place Concrete Pile with Steel Casing for foundations will be used on the island (P2).

The profile, plan, typical cross section and general view of the pylon of the New Nile Bridge are shown in Figure 4.4 through Figure 4.7.

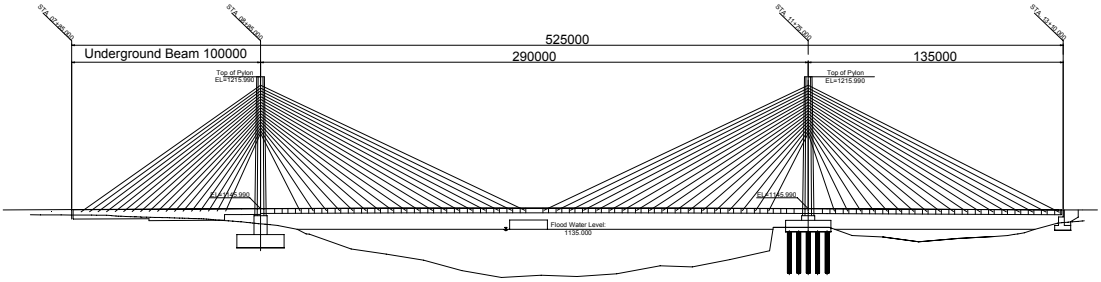
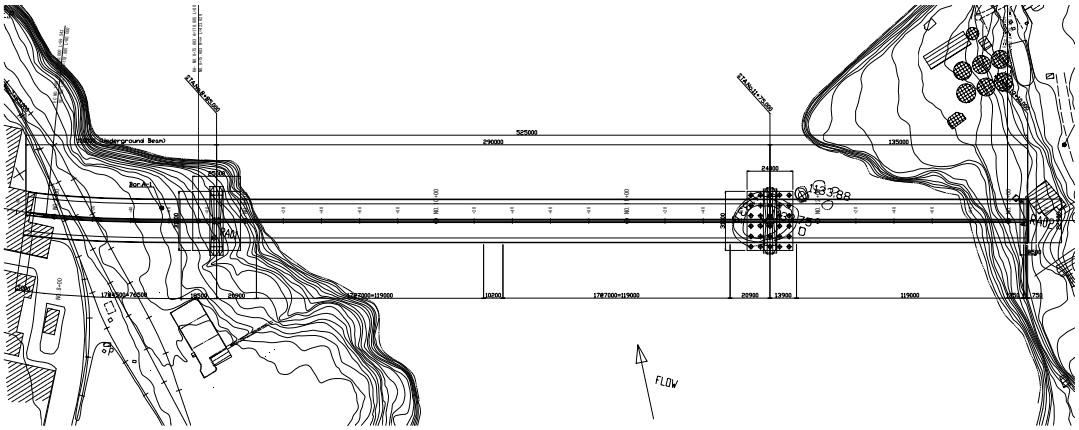
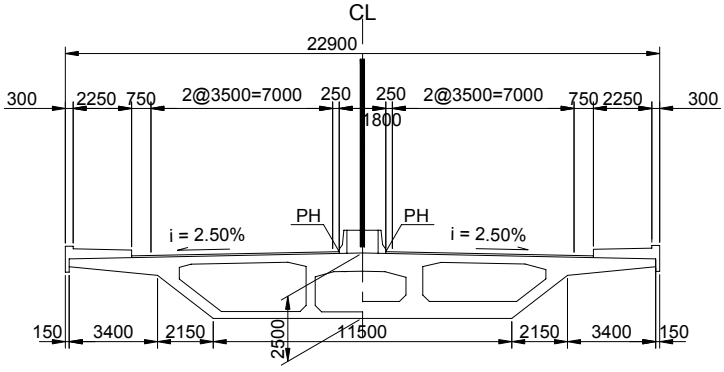


Figure 4.4 Profile of the New Nile Bridge



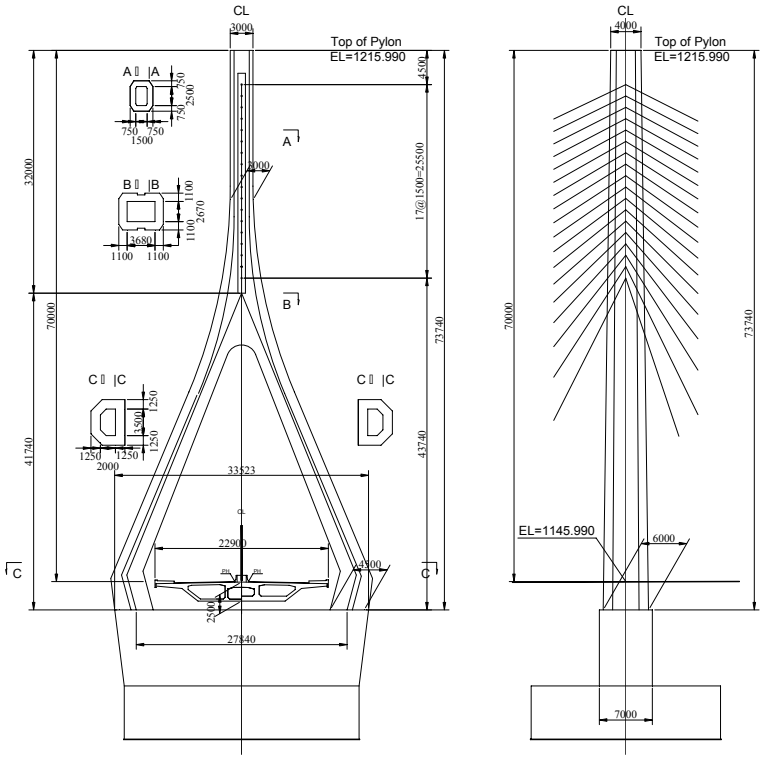
Source: JICA Study Team

Figure 4.5 Plan of the New Nile Bridge



Source: JICA Study Team

Figure 4.6 Typical Cross Section of the New Nile Bridge



Source: JICA Study Team

Figure 4.7 General View of the Pylon (P1)

5. CONSTRUCTION PLANNING AND COST ESTIMATES

5.1 Construction Schedule

The construction period will be 3.5 years (about 42 months) including mobilization and demobilization as shown in Table 5.1. The total project cost is estimated at US$ 115.7 million based on the price in June, 2009 as shown in Table 5.2.

Table 5.1 Construction Schedule of the Project

A4	1st Year												2nd Year												3rd Year												4th Year											
Description	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mobilization																																															
Material Order																																															
Oversea Transportation																																															
Custom & Inland Transportation																																															
Site Office																																															
Sub contract with local contractor																																															
Demobilization																																															
Temporary Works (Kampala side)																																															
Temporary Works (Jinja side)	Temporary Road, Jetty (between riverbank & island), Temporary Platform around island																																														
Temporary Works (for Plants)																																															
Temporary Yard for Plants																																															
Crusher Plant assemble																																															
Concrete Plant assemble and test																																															
Asphalt Plant																																															
Main Bridge Work																																															
Main Pier (P1)																																															
Excavation (Rock)																																															
Footing																																															
Column																																															
Tower (74.07m)																																															
Girder & Stay Cable																																															
PC Box Girder																																															
Main Pier (P2)																																															
Excavation (Rock)																																															
Piling Work													Steel Casing & Cast-in-place Concrete Pilings (φ = 1500mm)																																				
Footing																																															
Column																																															
Tower (74.07m)																																															
Girder & Stay Cable																									36 Blocks, Average Work Rate per Block including Stay Cable Installation is 14 days.																								
PC Box Girder																																															
Abutment (A1 & A2)																																														
Excavation																																															
Footing																																															
Wall																																															
Pavement & Accessory																																															
Road Work																																															
Earthwork & Structures																																															
Pavement & Traffic Facilities																																															

Table 5.2 Total Project Cost including Tax and Contingencies

No	Item	Cost	
		US$ thousand	Ushs Mil.
1	**Construction Cost**		
2	Bridge	70,387	143,561
3	Approach Road	11,747	23,959
4	Subtotal (2 + 3)	82,134	167,520
5	Tax(Import Tax)	1,936	3,949
6	Subtotal (4 + 5)	84,070	171,470
7	Contingency (10% x 6)	8,407	17,147
8	**Total** (6 + 7)	**92,477**	**188,616**
9	**Engineering Service**		
10	Detailed Design	3,405	6,946
11	Tender Assistance	712	1,451
12	Supervision	9,030	18,417
13	Total (10 + 11 + 12)	13,147	26,814
14	Total for Construction (8 + 13)	**105,624**	**215,430**
15	**Land Acquisition & Compensation**		
16	Total	10,111	20,622
17	**Grand Total** (14 + 16)	**115,735**	**236,052**

Source: JICA Study Team
US$ 1 = Ushs 2,093.60

6. IMPLEMENTATION PLAN

6.1 Outlook of the Toll Operation

There are several ambiguities, incomplete legislative background and inconsistency for concerning international treaty on tolling issues, and making it difficult to provide conclusive actions at the soonest time possible. Those problems and issues, if not acted accordingly, will become the primary contributory factors to the delay in commencing the implementation of the project.

Ultimately, the introduction of tolling system to the project needs more discussions and preparation of legislative actions and consensus of users on principles of the tolling system, including the necessity of alternative route when a toll system is introduced.

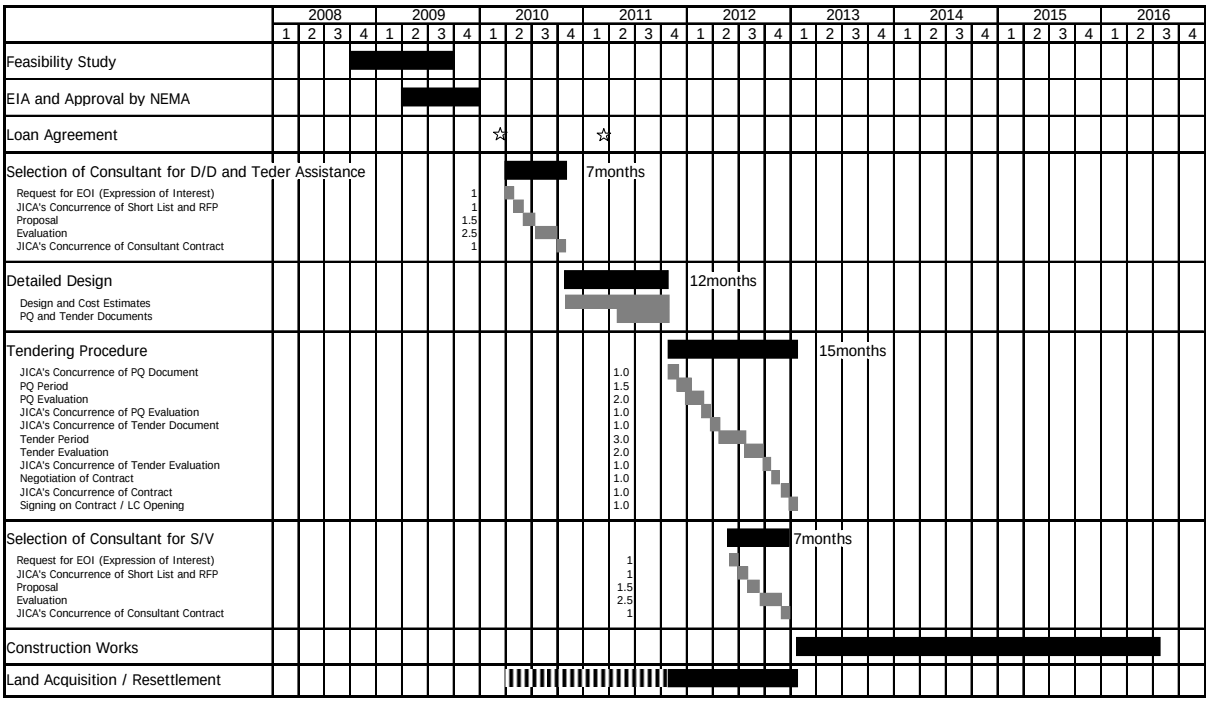
6.2 Implementation Plan

Because huge initial investment is required, the Proposed Nile Bridge Project will have to rely primarily on the financial assistance from either international or bilateral donor agencies.

As a recapitulation, the total implementation schedule will commence with the approval of the Loan Agreement for Detailed Design by March 2010 for which the construction will be completed by July 2016 as detailed in Table 6.1 hereunder.

Moreover, the detailed design of the Proposed Nile Bridge including the approach roads could be undertaken within the ROW determined by the Feasibility Study.

Table 6.1 Implementation Plan for Project



Source: JICA Study Team

7. ECONOMIC AND FINANCIAL EVALUATION

7.1 Economic Evaluation

Major quantifiable economic benefits derived from the proposed project are mainly composed of savings in vehicle operating cost and travel time cost. The project EIRR for the base case resulted in an EIRR of 17.1 %. The sensitivity analysis based on 20% reduced traffic demand and increased project cost by 20 %, resulted in an EIRR of 13.7 % thereby ensuring the economic viability of the project, the breakdown of which is shown in Table 7.1.

Table 7.1 Summary of the Economic Evaluation Results

			Project Cost		
			Base Case	10% Increase	20% Increase
Traffic Demand	**Base Case**	EIRR	**17.1%**	16.3%	15.5%
		NPV	**49,191**	43,444	37,698
		B/C	**1.86**	1.69	1.55
	10% Decrease	EIRR	16.2%	15.4%	14.7%
		NPV	38,879	33,132	27,385
		B/C	1.68	1.52	1.40
	20% Decrease	EIRR	15.3%	14.5%	**13.7%**
		NPV	28,567	22,820	**17,073**
		B/C	1.50	1.36	**1.25**

Source: JICA Study Team

Note: Unit of NPV is 000US$ discounted at 12%

7.2 Financial Evaluation

In summary, the results of the financial evaluation exercise for NPV, ROI (Return on Investment) and FIRR are shown in Table 7.2. Additionally, the FIRR could be only viable if based on toll rates of 12 times higher than the base rate. Table 7.2 shows the result of the financial analysis.

Table 7.2 Summary of Cash Flow Analysis

	Base Toll	Base Toll x 12
*NPV(US$1,000)	-60,091	450
*ROI	0.17	1.99
FIRR	Unsolved	12.7%

Source: JICA Study Team
*Note: *Discounted at 12%*

Base Toll

Class	Class 1	Class 2	Class 3	Class 4
Vehicle Type	Sedan, Wagon, Mini-bus	Bus and Light and Medium Truck	Heavy Truck	Semi and Trailer Truck
Toll Rate (Ushs)	300	600	600	1000

8. NATURAL AND SOCIAL ENVIRONMENTAL STUDIES

8.1 Natural Environmental Study

Firstly, the current baseline data on environmental conditions regarding the natural environment surrounding the study site were collected. The information collection focused mainly on technical site inspections, reviews of current reports and discussions with local researchers/or scientists around the study site.

Thereafter, based on the collected baseline environmental information and the engineering features for each alternative of this study, an IEE was carried out. Basically, the IEE took the following two steps. The first step, involved preliminary IEE for two scenarios, i.e., (i) Do-Nothing scenario, and (ii) Do-Project scenario of all the completed route alternatives (i.e., Routes A, B and C). By using more specific engineering information, a more detailed, route-specific IEE was carried out, to identify possible negative environmental impacts to be caused during and/after the construction of the Project for each of the alternative alignment options.

From this IEE study, it can be said that the order of the magnitude of potential negative impacts on the natural environment associated with Alignment A will be less significant, but not for Alignments B and C.

Technical support program was formulated by reviewing the ToR and tender documents on ESIA/RAP for the project implemented by UNRA and EIA law in Uganda.

Based on the interaction scheme and technical support system, several assistances such as the roadside air quality and noise studies were provided from JICA Study Team to UNRA. Also, technical transfer seminars on roadside air quality, noise and CO_2 emission studies were provided to UNRA for the capacity building of the environmental work, associated with the transport planning. The Draft Final Report for this ESIA/RAP studies were submitted to UNRA for review and comments in the mid September 2009. Thereafter, the official examination of submitted reports will be initiated by NEMA, and the environmental permit for the construction of the proposed project is expected to be approved in late November 2009.

8.2 Social Environmental Study

A social environmental study of the project area was carried out to determine the optimum alignment for crossing the River Nile. For the initial environmental examination (IEE) of the three alignment alternatives, firstly, the social environmental parameters were selected using scoping matrix pertinent to JICA Guidelines. Based on the results of the scoping, the assessment revealed the project's negative impacts on each environmental parameter by grading system: "grade A" to "D" for each alternative alignment.

The IEE results along the selected Alignment A show that Alignment A will bring about minor impacts on the social environment of the concerned area. Mitigation measures against these negative impacts are proposed as shown in Table 8.1.

Table 8.1 Summary of the Negative Impacts and Mitigation Measures

Negative Impact	Description	Mitigation Measure
Land acquisition	About 72,000m^2 of land is to be acquired for the ROW of the approach road.	● Conducting adequate RAP study for fair and appropriate compensation ● Engineering design will be pursued considering the need to reduce the area of ROW
Involuntary Resettlement	The actual number of buildings that require resettlement is 26 consisting of 16 houses (either partially or completely built), 2 commercial and 8 industrial buildings.	● Adequate, fair and prompt compensation under the RAP ● Consideration on issues of restoring peoples' livelihoods following disruptions from project activities ● Establishment of the mechanism for resettlement of some of PAPs relative to their demand
HIV/AIDS Concern	Influx of labours from the outside might cause the prevalence of Sexually Transmitted Diseases (STDs) and HIV/AIDS.	● Preparation of comprehensive HIV/AIDS mitigation programme for the staffs and laborers
Social conflict and Crime Issues	The increased influx of workers is likely to lead to conflict over housing, water resources and related social services.	● Encouraging the recruiting of local labour force from within the immediate communities
Occupational Safety and Health(OSH) for the Workers	There will be a number of health and safety concerns relating to the site preparation and construction.	● Preparation of OSH plan by contractor based on OSH Statute of 2006r
Public Health and Human Safety	The project might facilitate the incorporation of certain hazardous materials that could not have been envisaged in the ESIA study.	● Preparation of a comprehensive plan for the management of potential hazardous materials in conjunction with the Ministry of Health and the Uganda National Bureau of Standards(UNBS)
Risk due to Project related Traffic	There will be some disruption to local traffic movement during the construction of the proposed approach roads	● Preparation of traffic management control in close liaison with traffic police
Loss of access route to properties	The construction of the approach road will inhibit traffic flow for some of the roads in the eastern side.	● Provision of alternative alignment for the inhabitants

Source: JICA Study Team compiled from the Draft ESIA report

8.3 Resettlement Action Plan

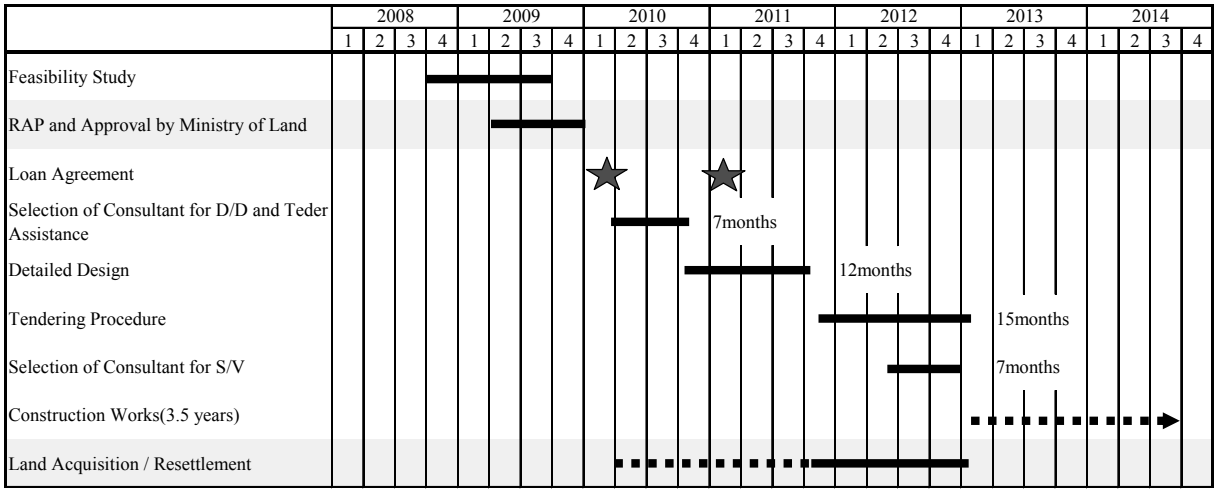
The resettlement action plan (RAP) should be prepared in accordance with the Resettlement/Land Acquisition Policy Framework (Nov. 2001) which provides institutional/legal framework and compensation system for resettlement/land acquisition. The overall objectives of the RAP is the provision of all findings and results of land acquisition preparatory exercises and based on the outcome RAP should propose the procedure to be taken for the land acquisition process for project implementation.

RAP for the Project has been prepared as part of the ESIA study. All the field works for the RAP preparation including measurement surveys has been completed on August 07, 2009 for which the draft RAP report is under preparation. RAP will be submitted to the Ministry of Land in the middle of September after the review of the Chief Government Valuer.

The measurement survey revealed that approximately 72,000 m^2 of land need to be acquired as the ROW of the approach road and the actual number of buildings that require resettlement is 26 consisting of 16 houses (either partially or completely built), 2 commercial and 8 industrial buildings.

The preliminary implementation schedule based on discussion with the Land acquisition specialist of UNRA is shown in Table 8.2.

Table 8.2 Preliminary Implementation Schedule for Land Acquisition/Compensation



Source: JICA Study Team

8.4 Assistance to Public Consultation and Technical Transfer

Public consultations were held three times and "Focus Group Discussion (FGD)" was held once during the study.

A series of the public consultation were conducted successfully with active commitment of UNRA.

Table 8.3 Schedule and Main Topics of Public Consultations

Public Consultation(PC)	Date and Venue	Main Topics
1st PC	December 12, 2008 in Kampala	Introduction of the outline of the Project and presentation of the Study schedule
Focus Group Discussion	March 6, 2009 in Jinja	Presentation of the Project to Focus group directly affected by the Project
2nd PC	April 3, 2009. in Kampala	Establishment of basic agreement on the optimum alignment and bridge type of the Project.
3rd PC	September 8, 2009 in Seeta	Presentation of the results of the Feasibility Study and opinion exchange

Technical transfer programs related to seminars on bridge planning, roadside noise study and roadside air quality study were also conducted successfully.

9. CONCLUSION AND RECOMMENDATIONS

- The project is technically and economically feasible and environmentally sound. Hence, it is justified to implement the project for national and people's benefits.
- It is recommended to select Alignment A which is located close to Nytil Textile Factory.
- It is recommended to adopt PC Cable-stayed bridge with inverted Y-shape Pylon and Single Plane Stayed-Cable.
- Preparation and execution of RAP in adequate, fair and prompt manner is most anticipated to expedited the land acquisition process.
- Introduction of Toll System to the Project should be carefully examined again during the Detailed Design stage involving stakeholders not only the service providers but also users.

THE FEASIBILITY STUDY ON THE CONSTRUCTION OF A NEW BRIDGE ACROSS RIVER NILE AT JINJA IN THE REPUBLIC OF UGANDA

VOLUME 1: SUMMARY REPORTS

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- ABBREVIATIONS -

AASHTO	American Association of State Highway and Transportation Official
AC	Asphalt Concrete
ADT	Average Daily Traffic
AfDB	African Development Bank
B/C	Benefit per Cost ratio
BEL	Bujagali Energy Limited
BOT	Built Operation Transfer
CBD	Central Business District
CBR	California Bearing Ratio
CCA	Civil Aviation Authority
CPI	Consumers Price Index
DANIDA	Danish International Development Agency
DBST	Double Bituminous Surface Treatment
DCP	Dynamic Cone Penetration Test
DD	Detailed Design
DRC	Democratic Republic Congo
DSM	Dar es Salaam
EAC	East African Community
EIRR	Economic Internal Rate of Return
EM	Environmental Monitor
EMP	Environmental Management Plan
EPP	Emergency Preparedness Plan
ESA	Equivalent Standard Axle
ESIA	Environmental and Social Impact Assessment
EU	Europe Union
FAA	Federal Aviation Authority
FDI	Foreign Direct Investment
FGD	Focus Group Discussion
FIRR	Financial Internal Rate of Return
FIRRI	Fisheries Resources Research Institute
GDP	Gross Domestic Product
GOU	Government of Uganda
GRDP	Gross Regional Domestic Product
HDM4	Highway Development and Management
HEST	Haplochromis Ecology Survey Team
IDI	International Development Institute
IEE	Initial Environmental Examination
IRI	International Roughness Index
IUCN	International Union for Conservation of Nature
IUCN-CR	IUCN-“Critically Endangered” species
IUCN-EN	IUCN-“Endangered” species
IUCN-LC	IUCN-“Least concern” species
IUCN-NT	IUCN-“Near Threatened” species
IUCN-VL	IUCN-“Vulnerable” species
JICA	Japan International Cooperation Agency
JST	JICA Study Team
KPA	Kenya Port Authority
KRC	Kenya Railway Corporation
LC	Local Council
LHS	Left Hand Side

LVEMP	Lake Victoria Environmental Management Project
LVFO	The Lake Victoria Fisheries Organization
MBS	Mombasa
MDD	Maxim Dry Density
MOF	Ministry of Finance
MOHC	Ministry of Housing and Communication
MOW	Ministry of Works
MOWT	Ministry of Works and Transport
MW	Megawatt
NaFIRRI	The National Fisheries Resources Research Institute
NEMA	National Environment Management Authority
NFA	National Forest Authority
NPV	Net Present Value
NRA	National Revenue Authority
Nspt	N-value of SPT
NTSMP	National Transport Sector Master Plan
O&M	Operation and Maintenance
OD	Origin and Destination
OMC	Optimum Moisture Content
OSH	Occupational Safety and Health
PAF	Performance Assessment Framework
PAPCO	Paper and Pulp Company
PAPs	Project Affected Persons
PCU	Passenger Car Unit
PFI	Private Finance Initiative
PPP	Purchasing Power Party
PPP	Public Private Partnership
RAFU	Road Authority Formulation Unit
RAP	Resettlement Action Plan
REAP	Poverty Eradication Action Plan
REO	Resident Engineer's Organization
RHS	Right Hand Side
RMI	Road Maintenance Initiative
RMR	Rock Mass Rating
ROI	Return on Investment
ROW	Right of Way
RQD	Rock Quality Designation
RVR	Rift Valley Railway Ltd.
SADC	Southern Africa Development Community
SATCC	Southern Africa Transport and Communications Commission
SCF	Standard Conversion Factor
SEA	Social and Environmental Assessment
SPC	Special Purpose Company
SPT	Standard Penetration Test
SW	Station Wagon
TAH	Trans African Highway
TPA	Tanzania Port Authority
TRRL	Transport and Road Research Laboratory
TTC	Travel Time Cost
UEDCL	Uganda Electric Distribution Company Limited
UETCL	Uganda Electric Transmission Company Limited
UNECA	United Nations Economic Commission for Africa
UNRA	Uganda National Road Authority
URA	Uganda Railway Authority

URC	Uganda Railway Corporation
USD	Uganda Standard Datum
VAT	Value Added Tax
VOC	Vehicle Operation Cost
WB	World Bank
WWR	White Water Rafting

1. INTRODUCTION

1.1 Background of the Study

The Republic of Uganda is a landlocked country surrounded by Kenya, Tanzania, Sudan, the Democratic Republic of Congo and Rwanda. Kampala, the capital city of Uganda, is the cargo traffic generating source and the centre of distribution of goods. Kampala is therefore considered as the hub of the national road network.

The Northern Corridor route runs through Kampala in parallel with the northern coast of Lake Victoria. This route constitutes a major strategic link from Uganda and other inland neighbouring countries (Rwanda, Burundi and the eastern part of the Democratic Republic of Congo) to Mombasa Port in Kenya.

The Northern Corridor route crosses the River Nile through the existing Nalubaale Dam Bridge at Jinja, located about 80 km to the east of Kampala. Currently, the bridge is the bottleneck for the transport of goods and passengers, due to the narrow width, plate deck deterioration and exfoliation of the concrete surface of the bridge piers. Also, the increasing traffic volume coupled with overloaded heavy vehicles is increasingly causing the structural deteriorations of the bridge.

In order to handle the situation, the Government of Uganda requested the Government of Japan to carry out a Feasibility Study on the Construction of A New Bridge across River Nile at Jinja. In response to the official request, the Government of Japan through the Japan International Cooperation Agency deployed a Study Team in November 2008.

1.2 Objectives of the Study

The objectives of the Study are summarized hereunder.

- To conduct a feasibility study on the construction of A New Bridge across River Nile at Jinja including the construction of approach roads on both sides of the bridge (hereafter referred to as the Project).
- To Transfer relevant expertise, skills and technologies to Ugandan personnel concerned relative to the development of the Project.

1.3 Study Area

The Study covers the areas directly affected by the proposed development.

The Study also needs to consider the whole Uganda and the surrounding countries, including Kenya, Tanzania, Rwanda, Burundi, the eastern part of the Democratic Republic of Congo and the southern part of Sudan.

1.4 Milestone of the Study

The Study commenced with the presentation of an Inception Report in November 2008 followed by the submission of a Draft Final Report in August 2009, for presentation to the Steering Committee in early September 2009.

One month for the review and comments of the Report by the Steering Committee was allocated, prior to finalizing and submitting the Report to JICA in October 2009.

Table1.1 shows the major tasks schedule showing the milestones for report submissions and Steering Committee meetings as well as Public Consultation meetings.

Table 1.1 Schedule of the Major Tasks

Year	2008		2009											
Month	11	12	1	2	3	4	5	6	7	8	9	10	11	12
♦ **Project Activities**														
Selection of Representative Alignment of Each Route	■	■	■	■										
Selection of Optimum Solution (Optimum Alignment & Bridge Type)			■	■	■	■								
Preliminary Design & Cost Estimation						■	■	■	■					
Economic & Financial Analysis									■	■				
Implementation Plan / EIA									■	■				
♦ **Report**	△ ICR			△ PR1	△ SPR		△ ITR		△ PR2		△ DFR	△ FR		
♦ **EIA Activity by COWI**										△ DFR			△ APPR	
♦ **Public Consultation**		△ 1st			△ FGD	△ 2nd					△ 3rd			

Note: ICR: Inception Report, PR1: Progress Report 1, SPR: Special Report, ITR: Interim Report, PR2: Progress Report 2, DFR: Draft Final Report, FR: Final Report

All efforts were undertaken to complete the Study successfully to ensure the viability of the project for possible implementation through loan arrangements and preparation of the corresponding plans and Detailed Design works.

Figure 1.1 Study Area