

(4) Transportation

Dust and noise by transportation during mobilization and hauling materials from the quarry site is thought of as one of the normal construction hazards. Major issues will be coming from hauling the rock materials to through site. But vehicles for this purpose can pass the relatively open land, not densely populated areas. Therefore, such environmental impacts can be mitigated during the construction period.

(5) Navigation on the White Nile

During the construction period, temporary bridges will be constructed for about three years to give access to the job sites. The temporary bridges will have an open space on the Khartoum side to enable boats and ships to pass through. Therefore, any special problems in connection with navigation are not anticipated.

11.4.3 Environmental Effect After Completion

(1) Impact on Pedestrians

As the existing bridge between Khartoum and Omdurman cities has only 0.9 meter wide sidewalks on its deck and people have great difficult in passing by on foot, most of the passengers between the two cities are using vehicles instead of walking and the number of pedestrians is only a few at present.

If the new bridge which has 2.0 meter wide sidewalks is completed, many people can enjoy the benefits passing between the two cities on foot.

(2) Possible Rehabilitation of the Existing Bridge

The existing White Nile Bridge has been carrying a number of vehicles since its completion in 1920. At present, this bridge has many problems as follows, which are revealed by a study conducted from 1987 to 1988, "Assessment, Inspection and Rehabilitation of the White Nile Khartoum-Omdurman Bridge" by Coode Blizard Ltd:

- In the superstructure, there has been severe damage to a number of key load carrying members at deck level due to vehicle impact.
- The Sliding bearings of the fixed spans have frozen and should be replaced.
- The swing span wedges no longer support the bridge adequately and need to be replaced.

- Piers located in the river are severely corroded and need a new outer steel plate protection.

In order to rectify the abovementioned deteriorated parts, traffics passing over the existing bridge should be diverted to other routes. For this purpose, the completion of the New White Nile Bridge is very significant.

(3) Possible Changes in Landuse and Development

With the completion of the Project, the landuse pattern of Al Fittaihab Town near the approach road on the Omdurman side will change rapidly. The short term significant social effect will be the transfer of the land from Third Class Residential land to First Class Residential land. The land price of such directly effected area, about 10 ha, will increase, particularly the price of roadside land which, unless discouraged by special regulations, will be sought after for commercial and residential purposes.

The long term effect, unless regulatory measures are taken in time, will be uncontrolled urbanization, environmental pollution from the places of access to the road leading to traffic congestion and hazard. Such examples are observed in innumerable places of access to the existing Primary Distributors in Greater Khartoum at present.

Therefore, it is recommended that a town plan should be prepared for future urban development prior to the completion of the Project.

(4) Disruption of Water Management

A) Flood Plain Upstream of Bridge Site

As discussed in chapter VI, river flow discharge of the White Nile is well regulated by Gebel Aulia dam, and therefore its fluctuation is from 465 to 1,046 cu.m/sec throughout the year. During flood time, river water covers the riverside farm land about 2 to 3 meters in depth, however, the water current is almost still. The approach embankment will be constructed across this flood plain and it can be said that backwater caused by the approach road embankment will be nil and the disruption upstream will not be significant.

B) Inland Water Transportation

Economic losses due to the disruption of inland water transport are thought to be absolutely nil, because the new bridge will be constructed by maintaining much more navigational clearance than the existing bridge.

Further, the construction of the new bridge will enable the future rehabilitation works of the existing bridge, which has lost its mechanical function of a swing bridge and accordingly disturbs the navigation at present, by means of diverting its traffic to the new bridge during repair works.

In this regard, no inferior impact is anticipated.

(4) Future Utilization of Temporary Land

During the construction period, the construction yard will be reclaimed up to HWL elevation in the flood plain on the Omdurman side. This land might have a potentiality of future utilization as a public garden or soccer field or other public leisure purpose.

As for the borrow pit on the Khartoum side, which will be located at Sunt Wood and in which about 6 ha of pond will remain after obtaining the embankment materials, the pond will be utilized as a water reservoir in the dry season. By this, Sunt Wood can be utilized for farmland or expansion of the existing green nursery.

Accordingly it is recommended that a future utilization plan of the construction yard and the pond obtained from the borrow pit should be prepared prior to the completion of the Project.

CHAPTER - XII

IMPLEMENTATION PROGRAM

CHAPTER XII IMPLEMENTATION PROGRAM

12.1 GENERAL

The implementation schedule was studied using the condition that the construction of the New White Nile Bridge along with its approach roads and intersections would have been completed by March 1995. Prior to the commencement of the construction, it is necessary to complete such construction works as subsoil investigation, detailed engineering design, land acquisition, financial arrangement, and so on.

12.2 PROJECT OUTLINE

The construction project of the New White Nile Bridge is comprised of:

(1) Bridges

a) Bridge Location : Upstream of the existing White Nile Bridge, 1,100 meters on the east bank (Khartoum Side) and 1,400 meters on the west bank (Omdurman side)

b) Bridge Width : 22.75 meters

Roadway = 8.75 meters in both directions
Sidewalk = 2.00 meters on both sides
Median Strip = 1.25 meters

c) Total Bridge Length : 757.2 meters

Main Span Bridge = 172.0 meters
Side Span Bridge (Khartoum side) = 326.2 meters
Side Span Bridge (Omdurman Side) = 108.6 meters
Omdurman Side Viaduct = 150.4 meters

d) Main Span Bridge

Type : Cast-in-place Prestressed Concrete
Continuous Box Girder with V-shape Pier

Span Arrangement : 46.0 m + 80.0 m + 46.0 m

e) Side Span Bridge on the Khartoum side

Type : Prestressed Concrete Composite I-girder

Span Arrangement : 9 @36.2 m
(Reinforced concrete slab in which each three (3) spans will be constructed as a continuous structure.)

f) Side Span Bridge on the Omdurman Side

Type : Prestressed Concrete Composite I-girder

Span Arrangement : 3@36.2 m
(Reinforced concrete slab in which every three (3) spans will be constructed as a continuous structure.)

g) Omdurman Side Viaduct

Type : Reinforced Concrete Continuous Hollow Slab

Span Arrangement : 3@15.0 m + 3@15.0 m
+ (3@15.0 m + 15.4 m)

(2) Approach Roads

a) Road Width : 30.0 meters

Roadway = 9.5 meters in both directions
Sidewalk = 4.5 meters on both sides
Median Strip = 2.0 meters

b) Total Length of Approach Road : 3,642 meters

Omdurman Side = 2,285 meters
Khartoum Side = 1,357 meters

c) Roadway Elevation : RL + 382.10 meters
(Minimum)

(3) Intersections

a) Location : 2 places; start point on the Omdurman side
and end point on the Khartoum side

b) Intersection Type : At-grade intersections

Omdurman Side : T shape with separate turning lanes

Khartoum Side : Branch with separate turning lanes

12.3 PROJECT COST

Based on the studies of the preliminary engineering, construction cost, construction schedule, etc. the capital cost of the project is summarized as follows:

Table 12.1 Summary of Capital Costs

(Unit : Sudanese Pounds in Million,
August 1989 prices)

Main Items	Financial Cost		
	Foreign Currency Portion	Local Currency Portion	Total
Construction Cost	179.7(62.3%)	108.9(37.7%)	288.6(100%)
Engineering Cost	16.6(55.3%)	13.4(44.7%)	30.0(100%)
Land Acquisition & Compensation Cost	-	104.6(100%)	104.6(100%)
NCK's Administration Cost	-	2.3(100%)	2.3(100%)
Tax and Quay Due	-	42.6(100%)	42.6(100%)
Contingency	9.0(62.5%)	5.4(37.5%)	14.4(100%)
TOTAL	205.4(42.5%)	277.3(57.5%)	482.7(100%)

12.4 IMPLEMENTATION SCHEDULE

The opening year of the New White Nile Bridge is planned for March 1995. The implementation schedule and fund requirements are shown in Figure 12.1.

NCK is an executing organization for the Project and his major activities and responsibilities are discussed in Appendix 12.2.

Year	Calendar	1990	1991	1992	1993	1994	1995
	Fiscal	1989	1990	1991	1992	1993	1994
<i>Detailed Design</i>			(6 months)				
<i>Land Acquisition & Compensation</i>			(14 months)				
<i>Tender Assistance & Construction Supervision</i>				(44 months)			
<i>Construction</i>				(42 months)			
FUND REQUIREMENT	Total Cost		(Unit: 1,000 Sudanese Pounds)				
Detailed Design Cost	FC	5,970	5,970				
	LC	1,220	1,220				
Land Acquisition & Compensation Cost	FC						
	LC	104,600	52,300	52,300			
NCK's Administration Cost	FC						
	LC	2,340	700	300	440	490	410
Tender Assistance & Construction Supervision Cost	FC	10,670		2,380	2,760	3,020	2,510
	LC	12,210		1,110	3,550	4,020	3,530
Construction Cost	FC	179,760		42,200	48,940	46,210	42,410
	LC	108,880		16,060	28,370	30,300	34,150
Tax and Quay Due	FC						
	LC	42,610		29,830	4,260	4,260	4,260
Contingency (5% of Construction Cost)	FC	8,980		2,110	2,450	2,310	2,110
	LC	5,450		800	1,420	1,520	1,710
TOTAL	FC	205,380	5,970	46,690	54,150	51,540	47,030
	LC	277,310	54,220	100,400	38,040	40,590	44,060
Grand Total (1,000 US Dollars)		482,690 (107,264)	60,190 (13,375)	147,090 (32,687)	92,190 (20,487)	92,130 (20,473)	91,090 (20,242)

Notes: (1) Cost estimate was made based on August 1989 prices and exchange rate US\$1.0=LS4.5=Y140.

(2) Land acquisition and compensation costs include value of land already owned by the Government of Sudan.

**THE FEASIBILITY STUDY ON THE
CONSTRUCTION OF THE NEW WHITE
NILE BRIDGE**

**Fig.
12.1**

**IMPLEMENTATION AND BUDGETARY
SCHEDULE**

JAPAN INTERNATIONAL COOPERATION AGENCY

CHAPTER - XIII

CONCLUSIONS

CHAPTER XIII CONCLUSIONS

From the wide ranging engineering and economic studies which the Study Team has undertaken, the following are concluded:

1. According to the results of the traffic survey in February 1989, the existing White Nile Bridge is carrying about 60,000 PCU in a day and serious traffic congestion occurs every morning and evening peak hour at present. Future traffic volume on this existing bridge is expected at 104,000 PCU in a day for the year 2015 and more serious traffic congestion will occur not only on the bridge but also its associated access roads.
2. In order to unplug these traffic bottlenecks, the construction of the new bridge as a by-pass route (Route B-1 on which a new bridge is to be located 1.1 km and 1.4 km south of the existing bridge on the east and west banks) connecting Al Fittaihab Town and Al Gaaba Road near Sunt Wood is thought the most favorable route.

As a result of the construction of the new bridge, the traffic capacity between Khartoum and Omdurman cities can be strengthened effectively. In this case, the future traffic volume on the existing bridge in the year 2015 is expected to be about 56,000 PCU, almost the same traffic volume as the present volume, and the new bridge will carry about 90,000 PCU in a day. Further, traffic congestion on the associated approach roads can be released.

3. As a result of engineering studies and preliminary design, a 4-lane bridge having a total length of 757.2 meters was recommended on the by-pass route which would begin at the turning point of Abu Syaid Road at Al Fittaihab Town on the Omdurman Side and end at the connection point with Al Gaaba Road near Sunt Wood on the Khartoum side.

The proposed new bridge consists of a 172 meter PC Box girder over the navigational course, a 326.2 meter PC I-girder and 150.4 meter RC Hollow Slab on the Omdurman side.

4. The construction of the New White Nile Bridge was judged very viable by the economic evaluation which showed an IRR of 17.7%.
5. If the construction of the New White Nile Bridge is completed, the following will be expected in addition to the improvement of traffic movements in future.

- In the short term, the completion of the new bridge would facilitate the development of AL Fittaihab Town in

Omdurman city.

- Distributing the traffic between the existing bridge and the new bridge would allow rehabilitation of the existing White Nile Bridge which is showing serious signs of deterioration, such as damage to a number of major members at deck level, wear on the swing span wedges to the extent that they no longer support the bridge adequately, and severe corrosion of piers located in the river.

Additionally it may be expected that significant social and other unquantified benefits will result from the implementation of the Project.

In conclusion the Study Team states that construction of a new bridge across the White Nile, 1.1 km and 1.4 km south (upstream) of the existing bridge on the east and west banks, connecting Khartoum and Omdurman cities is technically and economically feasible, and accordingly recommends that it be immediately implemented.

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