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Report No: 20587-BD

IMPLEMENTATION COMPLETION REPORT
(IDA-25690)

ON A

CREDIT

IN THE AMOUNT OF SDR 143.6 MILLION (US$ 200.0 MILLION EQUIVALENT)

TO THE

PEOPLE'S REPUBLIC OF BANGLADESH

FOR THE JAMUNA BRIDGE PROJECT

June 19, 2000

Infrastructure Sector Unit
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective 03/30/2000)

Currency Unit = Bangladesh Taka
Bangladesh Taka 51.00 = US$ 1.00
US$ 0.0196 = Bangladesh Taka 1.00

FISCAL YEAR

July 01 June 30

ABBREVIATIONS AND ACRONYMS

AADT	-	Annualized Average Daily Traffic
ADP	-	Annual Development Program
ADB	-	Asian Development Bank
BCL	-	Bangladesh Consultants Limited
BRAC	-	Bangladesh Rural Advancement Committee
BUET	-	Bangladesh University of Engineering & Technology
CCL	-	Compensation stipulated Under law
DHI	-	Danish Hydraulic Institute
EFAP	-	Erosion and Flood Action Plan
EIRR	-	Economic Internal Rate of Return
EMAP	-	Environment Mitigation Action Plan
FY	-	Financial year
GOB	-	Government of Bangladesh
ICB	-	International Competitive Bidding
ICR	-	Implementation Completion Report
IDA	-	International Development Association
ILI	-	Intensive Learning Implementation Completion Report
IP	-	Inspection Panel
JBD	-	Jamuna Bridge Division
JBIC	-	Japanese Bank for International Cooperation (formerly OECF)
JBP	-	Jamuna Bridge Project
JMBA	-	Jamuna Multipurpose Bridge Authority
JV	-	Joint Venture
MDM	-	Milestone decision meetings

Vice President:	Mieko Nishimizu
Country Manager/Director:	Frederick T. Temple
Sector Manager/Director:	Jonathan Kamkwalala
Team Leader	Arun Banerjee
Task Team Leader	Fabio Galli

NGOs	-	Non-governmental organizations
NPV	-	Net Present Value
OD	-	Operational Directive
O&M	-	Operation and Maintenance
PAP	-	Project Affected People
PD	-	Project Director
PIA	-	Project Impact Area
POE	-	Panel of experts
PQ	-	Pre-qualification
QAG	-	Quality Assurance Group
R&R	-	Resettlement and Rehabilitation
RRAP	-	Revised Resettlement Action Plan
SAR	-	Staff Appraisal Report
TA	-	Technical assistance
UNDP	-	United Nations Development Programme
WB	-	World Bank

BANGLADESH
JAMUNA BRIDGE PROJECT

CONTENTS

Borrower's Evaluation
Map No. 25248

Project ID: P009509	*Project Name:* Jamuna Bridge
Team Leader: Fabio Galli	*TL Unit:* SASIN
ICR Type: Intensive Learning Model (ILM) of ICR	*Report Date: June 19, 2000*

1. Project Data

Name: Jamuna Bridge
L/C/TF Number: IDA-25690
Country/Department: BANGLADESH
Region: South Asia Regional Office
Sector/subsector: PD - Distribution & Transmission; TH - Highways

KEY DATES

			Original	*Revised/Actual*
PCD:	02/03/87	*Effective:*	05/26/94	08/12/94
Appraisal:	09/05/93	*MTR:*		03/03/97
Approval:	02/17/94	*Closing:*	06/30/99	12/31/99

Borrower/Implementing Agency: Government of Bangladesh (GOB)/Jamuna Multipurpose Bridge Authority (JMBA)
Other Partners: Asian Development Bank (ADB) and Japanese Bank for International Cooperation (JBIC) (formerly OECF)

STAFF	Current	At Appraisal
Vice President:	Mieko Nishimizu	D. Joseph Wood
Country Manager:	Frederick Thomas Temple	A. Hamilton
Sector Manager:	Jonathan Kamkwalala	Frederick Thomas Temple
Team Leader at ICR:	Fabio Galli	Ismail Mobarek
ICR Primary Author:	Fabio Galli	

2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: HS
Sustainability: L
Institutional Development Impact: M
Bank Performance: HS
Borrower Performance: HS

	QAG (if available)	ICR
Quality at Entry:		S
Project at Risk at Any Time:		

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

3.1.1 The objectives of the project were to connect the eastern and western parts of Bangladesh through the construction, operation, and maintenance of a multi-purpose bridge over the Jamuna River in order to stimulate economic growth by facilitating cross-river transport of passengers, freight, and transmission of electrical power.

3.1.2 The components designed to achieve the project objectives and funded under the project were as follows:

(a) construction of a 4.8 km long bridge to carry a 4-lane carriage way with shoulders and with foundations strong enough to carry a railway line, electric power interconnector, gas pipeline and telecommunication facilities;
(b) construction of two end viaducts of about 128 meters each to connect bridge to approach roads;
(c) construction of two guide bunds of about 2.2 km each and a flood protection bund on the east bank to regulate the river at the chosen site;
(d) construction of two approach roads on embankments at each end of the bridge;
(e) measures to mitigate the effects on the environment, Project Affected People (PAP), fisheries, and wildlife; and,
(f) technical assistance and training including project management, construction supervision, and institution building training of Jamuna Multipurpose Bridge Authority (JMBA).

3.1.3 The project objectives were consistent with both the Government of Bangladesh (GOB) and International Development Association's (IDA) transport sector strategy which recognized the strong linkages between poverty alleviation, private sector development, and the provision of essential supporting infrastructure.

3.1.4 The project objectives were very clear--construction of a multipurpose bridge across the Jamuna River--and ambitious since the Jamuna Bridge Project (JBP) was, and still is, the most expensive and one of the most technically challenging transport infrastructure investments ever attempted in Bangladesh. The project design fully supported the achievement of the project objectives through well developed and fully engineered physical components. The implementation of the physical components was fully supported by JMBA whose primary objective was the preparation and implementation of the project.

3.2 Revised Objective:

There was no revision/change in the objectives of the project.

3.3 Original Components:

Rating	Component	Sector	Cost(US$)
HS	BRIDGE	TY	263,000,000.00
HS	GUIDE BUNDS	TY	322,000,000.00
HS	EAST APPROACH ROAD	TY	35,000,000.00
HS	WEST APPROACH ROAD	TY	29,000,000.00
S	EMAP	VY	6,000,000.00
S	RRAP AND EFAP	VR	73,000,000.00
HS	TECH. ASST	BI	34,000,000.00

3.4 Revised Components:
N/A

3.5 Quality at Entry:
3.5.1 Quality at entry of the project can be considered ***satisfactory.*** Project planning and preparation were intensive and lengthy. This ensured that the project was at a very high state of implementation readiness once it became effective. For example, before IDA Board presentation, all civil works bids and consultant services proposals had been received and evaluated, giving accurate cost estimates for the project. By effectiveness, all of the construction and consultant contracts for the project had been signed. Furthermore, by effectiveness, GOB had already raised about US$100 million in counterpart funds to implement the project and had already established JMBA to manage project implementation. This high state of procurement and engineering readiness was achieved despite the fact that because of the changing morphology of the Jamuna River, the approximate location of the bridge could only be decided in late 1992 and the location of the bridge access roads could be fixed only in late 1994.

3.5.2 To mitigate the environmental and social impacts of the project comprehensive social and environmental studies were conducted which led to the preparation of the Environmental Management Action Plan (EMAP) and Revised Resettlement Action Plan (RRAP). It must be emphasized that this was the first time in Bangladesh that for such a large infrastructure project the social and environmental components were being prepared to IDA's Operational Directives (OD) 4.01 and 4.30 standards. GOB passed two pieces of legislation exclusively for this project to facilitate land acquisition and prevent speculators from making fraudulent claims for loss of houses/structures. Despite the very comprehensive preparation of both the EMAP and RRAP, a local Non Governmental Organization (NGO) lodged a complaint with IDA's Inspection Panel (IP) for alleged violations of ODs concerning erosion and flood impact on the people living in the chars (shoals and banks) upstream and downstream of the bridge. The IP launched a preliminary investigation which found that in respect to the char PAPs, OD's 4.01 and 4.30 had not been fully complied with. As a result of ongoing studies on the potential impact of the Jamuna Bridge on the char PAPs and the IP complaint, GOB took the decision to compensate all erosion affected people in the project impact area (PIA). This led to the finalization of a comprehensive char PAP specific Erosion and Flood Action Plan (EFAP) for implementation under the project to supplement both the existing RRAP and EMAP. In order to implement the environmental and social components of the project, JMBA entered into contracts with several local NGOs, who assisted JMBA to implement all three environmental and social mitigation plans. This mechanism functioned reasonably well, although there have been difficulties in coordination among the various agencies involved. At project closing, the resettlement program is still ongoing. The objectives have been partially accomplished, in that the majority of the PAPs have been resettled and compensated for losses. A full impact assessment has not yet been undertaken, although a rapid, qualitative assessment indicates that losses of agricultural land have led to difficulties for many in reestablishing livelihoods. There are reports that some of the poorer and more vulnerable have not yet been fully rehabilitated. IDA will continue to supervise the project until it is clear that JMBA has undertaken all actions required under the three mitigation plans, and that adequate assistance has been given to all affected people. This will be documented more fully during the remainder of the supervision period. Under the current program, this is expected to be completed in mid 2001. The implementation of the environmental and social mitigation plans is judged to be satisfactory based on the policies and organizational structures established (in particular the support to flood and erosion affected people); the sustained efforts to ensure that people are given their due compensation; and the reasonably satisfactory progress in implementing the program in terms of inputs and immediate outputs. Longer term outcomes cannot be adequately judged at this time. The implementation of the program has highlighted a number of challenges and unforeseen difficulties; these are described more fully in Annex 10. The report focuses primarily on these challenges

in order to engage the various stakeholders in a discussion about lessons learned and implications for future projects. However, this should not be taken as lack of recognition of the substantial efforts and achievements made.

3.5.3 Quality at entry for the project can be considered satisfactory, as mentioned above, but is actually quite high from a technical, engineering, procurement, and financial point of view thanks to a very long and thorough project preparation phase. However, the preparation of the social and environmental components of the project did not sufficiently address the effects that the construction of the Jamuna Bridge would have on char dwellers. This was in part due to the braiding nature of the river which made it difficult to forecast what chars were going to remain and which would be eroded naturally until the actual start of construction of the bridge. For instance, the actual construction of the West Guide Bund started only in September 1995, and its effect on the chars could not be quantified until the following high water season. Thus, before June 1996, the full impact of the bridge construction could not be accurately/fully determined.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

4.1.1 The project achieved all of its major physical and non-physical objectives and should also achieve substantial development results. Thanks in large part to the completion of the Jamuna Bridge for the first time the Northwest of Bangladesh, with over 30 million people, is fully connected to the country's transport/infrastructure network. This is already generating increased economic development opportunities through reduced transport costs and better access to key consumption centers/markets like Dhaka. Evidence of this can be seen in the higher levels of traffic (+41%) on the Jamuna Bridge when compared to Staff Appraisal Report (SAR) traffic estimates. This is despite GOB's decision to go for a 'higher toll' strategy vis-à-vis what was proposed in the SAR to maximize financial rather than economic benefits. Once complementary road and rail investments, to further integrate the Jamuna Bridge to the transport network of the country are completed, further reductions in transport costs should be realized, which should in turn further stimulate economic development in the area.

4.1.2 Thanks in part to the completion of the Jamuna Bridge, natural gas, electricity, and telecommunications, can now be transported more efficiently to the energy/telecommunication deficient parts of the country. If border and transshipment arrangements are streamlined between India and Bangladesh, the Jamuna Bridge will fulfill its role as a critical transport link on the trans-Asia highway and rail. This will facilitate the movement of trade from Nepal, Bhutan, and Northeastern India to/through Bangladesh. An unexpected outcome of the project was demonstrated during the 1998 floods when the Jamuna Bridge kept connected large parts of the country that were flooded.

4.2 Outputs by components:

4.2.1 ***Physical Components.*** The implementation of the physical components of the project can be considered ***highly satisfactory.*** All of the physical components were substantially completed by June 1998. Compared to the contractually stipulated completion dates, this was about six months behind schedule but one full year ahead of the project closing date. Considering that the Jamuna is a braided and turbulent river with very large seasonal fluctuations in water levels, it is remarkable how quick and incident free was the construction of the bridge. To keep the river under the bridge very large and complex river training works had to be designed and executed almost simultaneously with the construction of the bridge. The technical difficulty of executing the physical components of the project was further compounded by a very short working season (about 7 months) and by very tight contractual completion dates. What follows is a table which indicates the planned vs. actual completion of the individual civil works contracts:

Component contract	Start of Contract	Original contract completion date	Revised contract completion date	Actual Completion
Bridge & Approach viaducts	10/15/1994	12/13/1997	6/20/1998	6/20/1998
River Training Works	10/15/1994	4/2/1997	12/13/1997	10/16/1997
East Approach Road	10/15/1994	2/1/1997	3/31/1998	3/31/1998
West Approach Road	10/15/1994	2/1/1997	12/1/1997	12/1/1997

4.2.2 One of the key success factors in implementing the physical components of the project was that the design, engineering, most of the land acquisition, procurement of contractors, and selection of supervision and management consultants had been substantially completed by Credit effectiveness. Furthermore, International Competitive Bidding (ICB) together with the application of strict pre-qualification (PQ) criteria succeeded in attracting highly qualified international contractors to the bidding process. This enabled GOB to procure internationally experienced contractors to execute the civil works contracts.

4.2.3 There was only one late award of contract, namely for river training works, which, however, caused a chain reaction of delays in the completion of the other contracts. The resulting six-month delay in completing all of the civil works contracts is minimal considering the various other negative impacts like hartals, weather, and floods.

4.2.4 Although the construction schedule was tight, the overall construction quality of all the contracts is close to international standards and far superior to the usual standards achieved in South Asia. The riding quality of the approach roads is excellent while that of the bridge is somewhat lower because of the need to reduce the cost and weight of the bridge. There were a number of construction-related issues that arose during implementation such as: (a) highly publicized cracks in pre-cast concrete units of the bridge works; (b) underwater subsoil problems which led to slope failures in the river training works; (c) east guide bund redesign; (d) delayed handover of east bridge end area; (e) slow progress in embankment construction; (f) pile wall thickness; and (g) karimon rock issue. All of the construction related issues were successfully resolved.

4.2.5 ***Social & Environmental Components.*** The implementation of the social and environmental components of the project can be deemed ***satisfactory*** despite the IP complaint. To implement the project almost 3,000 hectares of land were acquired in very land scarce Bangladesh and about 100,000 people were affected to varying degrees by its implementation, the majority of them through land acquisition and displacement. For many of them, the loss of agricultural land signified loss of their main source of income, and the project has attempted to rehabilitate these people and provide alternative livelihood opportunities. This made the scale and complexity of preparing and implementing the social and environmental components of the project almost a project within the project. Furthermore, it must also be stressed that it was the first time that IDA, together with GOB and the other co-financiers, have implemented the social and environmental components of a large infrastructure project in Bangladesh to such a high standard. Therefore, the implementation of the RRAP, EFAP, and EMAP, under the JBP broke new ground and was a learning experience for all parties involved. It is probable that land acquisition was in excess of what was actually required for the project, and caused greater displacement than necessary, for example by acquiring a hundred meter wide corridor for access roads. While it is difficult to quantify exactly the unnecessary

land acquisition, JMBA is now in a position where they have excess land and have to find uses for it. Future projects of this nature would benefit from a tighter integration of environmental, social, technical and economic impact assessments before designs are finalized, in order to avoid or minimize displacement and other negative impacts wherever possible.

4.2.6 The primary objective of the RRAP was quite ambitious since it tried to ensure that all PAPs should be at least as well off after project implementation as they were before, if not better off. The entitlement/benefits program represented a fully fledged social development program in itself and considerably improved GOB policy in the area of Resettlement and Rehabilitation (R&R). During implementation GOB raised some concerns that the RRAP entitlement package was too generous and that it would establish a precedent for all large infrastructure projects in the country whether or not they were funded by external agencies. Despite this, GOB/JMBA took a proactive role in implementing the social component of the project. Supervision reports and evaluations indicate that this was largely successful, but that there have been significant implementation difficulties. Concerns have also been raised related to governance issues. Reports indicate that some people have benefited from fraudulent compensation payments, while some among the poorer PAPs may not have received sufficient compensation or assistance, and have been rendered landless and worse off than before. Case studies and sample data support these reports, but a more systematic assessment of impacts will be undertaken during the remainder of IDA's supervision period.

4.2.7 One specific group of PAPs that was not explicitly covered in the RRAP were the char dwellers who would eventually be affected by erosion and flood impact of the project. IDA pointed this out during supervision missions as early as 1994, but GOB was initially reluctant to establish entitlements for victims of floods or erosion, pointing out that this would set a difficult precedent in a country like Bangladesh with winding rivers where erosion occurs naturally due to shifts in channels and flooding occur naturally every year. However, following a complaint to the Bank's IP and a preliminary investigation by the Panel, GOB agreed to adopt a compensation policy that would be time-bound and limited within the bridge project's impact area. More specifically, this would compensate for properties lost due to erosion and flooding. Titles to the lands would remain with the owners, who would regain them if the lands resurfaced. While there have been implementation difficulties with the EFAP, it should be considered a major achievement, and may set the standard for future major infrastructure works affecting the natural river regime in the country.

4.2.8 As a direct result of the deficiencies in the land tenure system in the country, there were some delays in establishing the legitimacy of some of the claims for compensation. This resulted in delays in paying compensation under the RRAP and EFAP. (Because of the difficulties in establishing legal rights to land, a small number of claims have still not been settled by GOB.) The compensation approach taken is based on the district authorities being responsible for payment of the official amount of compensation stipulated under law (CCL) and the NGOs only coming in after this was paid with additional support and compensation payments to top up the CCL in order to ensure that payments represent full replacement cost of land and assets lost. This two-step approach has also been a source of delays. Concerns have been raised about demands for unofficial payments of "speed money", as it is known in Bangladesh, before people have been given the compensation they are entitled to. Fraudulent claims and collusion with local, powerful people, have led in some cases to excessive compensation payments.

4.2.9 To mitigate the environmental impacts of the project, an EMAP was developed for implementation during the life of the project. Some of the social/environmental mitigation measures identified in the EMAP and implemented under the project were: (a) reduction of construction related impacts; (b) agricultural development; (c) fisheries mitigation; (d) wildlife protection; (e) boat navigation; (f) social afforestation;

(g) water resources management; and (h) health and sanitation. A major environmental issue that arose during the construction of the bridge was the closure of the upstream (in relation to the bridge) Dhaleswari River intake. The impact of the closure of the Dhaleswari River intake was soon mitigated when another channel opened just south of the bridge and offset the effects of the upstream Dhaleswari River intake closure. All the above mentioned components have been implemented and some are still being implemented mainly by NGOs. The implementation of some of the mitigation measures developed by the EMAP, such as social afforestation and fish farming, should be self sustaining and will continue long after the completion of the bridge works.

4.2.10 Finally, it should be noted that although the physical works were completed in mid-1998 and the IDA funded portion of the project was closed on December 31, 1999, GOB has agreed to continue the implementation of some of the sub-components of the social and environmental components for several more years.

4.2.11 ***Technical Assistance (TA) Component.*** The focus of the TA component was primarily to assist GOB and JMBA to implement the project as efficiently and effectively as possible. A supervision consultant with full powers as the 'engineer', was selected to supervise the four civil works contracts and an internationally experienced management consultant was also selected to provide project management support to JMBA in implementing all aspects of the project. Furthermore, a Panel of Experts (POE) consisting of domestic and international experts was formed, to advise JMBA in all technical matters associated with the implementation of the civil works components of the project. The supervision consultant played a critical role in providing the necessary coordination to the three contractors working on the four civil works contracts and in ensuring that the civil works were being executed to the appropriate specifications and within the stipulated contractual time frame. The management consultant provided day-to-day support to JMBA in managing all contractual related matters and in implementing the RRAP, EMAP, and EFAP. The POE provided the necessary technical guidance and expertise on very specific technical matters.

4.3 Net Present Value/Economic rate of return:

4.3.1 The economic re-evaluation of the project was undertaken following the same methodology used in the SAR. All assumptions and key parameters adopted at appraisal were applied to the economic re-evaluation. It should be noted that the actual project implementation period was almost the same as assumed at appraisal for the economic analysis.

4.3.2 At present, there are still some uncertainties regarding the final cost of the project because a large amount of standing claims from some of the civil works contractors have not been settled. The financial cost of these standing claims (apart from the claims already accepted by JMBA) has been estimated at up to US$124 million. To arrive at a reasonable final cost for the project, the economic re-evaluation assumed that 1/3 of these claims, totaling about US$40 million will eventually be accepted by GOB. With this assumption and taking into account the changes to project costs, traffic and energy sector benefits, it was determined that the project's economic viability has improved slightly when compared to the SAR estimates. The composite base Economic Internal Rate of Return (EIRR) for the project at completion was re-estimated at **16.8%, 2.3** percentage points higher than the SAR estimate of **14.5%.** The base case estimate for the project's Net Present Value (NPV) at completion was **US$275 million,** compared with the SAR estimate of **US$182 million.**

4.3.3 Taking into account the large amount of controversy and debate that the economic viability issue generated during project preparation, it must be emphasized that the higher than projected EIRR is an important achievement. Furthermore, if GOB had decided to adopt a low toll strategy for truck traffic to

maximize the economic benefits of the Jamuna Bridge, the recalculated EIRR and NPV would have been slightly higher. This is because the high toll strategy adopted and the complementary road infrastructure being not yet complete might have caused slightly lower than projected truck traffic levels using the bridge, the benefit derived from which accounted for a substantial portion of the quantifiable project benefits. However, once the complementary road infrastructure investments are completed, truck traffic levels will probably achieve or even surpass the projected levels.

4.4 Financial rate of return:

4.4.1 According to the SAR, JMBA's financial objectives were to: (a) levy tolls at minimum levels so as not to discourage traffic from using the bridge, and (b) to raise enough funds from road users and other uses (such as power interconnector) to meet all maintenance and operation costs (including toll collection charges) and to meet in full debt servicing obligations.

4.4.2 To ensure that the Jamuna Bridge generated the necessary resources to cover the operation and maintenance (O&M) and heavy debt servicing costs, GOB has decided to adopt toll levels (see borrowers contribution to Intensive Learning Implementation Completion Report (ILI) for actual toll levels) that are very similar to what was recommended in the **JMBP Toll Study Report, 1997** (Toll Study) but that are substantially higher than what was envisaged in the SAR. So far toll revenues from the bridge have actually slightly exceeded (+1-2%) what was projected in the Toll Study, although tariffs negotiated for the rail, electricity and telecom lines across the bridge are substantially lower than what was recommended in the Toll Study and no rate has yet been negotiated for the gas pipeline.

4.4.3 Looking at the figures from the Toll Study (see Annex 11, Table I) the Jamuna Bridge should be able to generate an adequate level of revenue to cover the O&M and debt servicing costs and leave a surplus to be able to create a reserve fund to cover emergency repairs for the bridge or possibly seed capital for the development of other bridges in the country. Using more conservative traffic growth figures (see Annex 11, Table II & III) and a 2% annual depreciation in the Taka vis-à-vis the US$, the Jamuna bridge would still be able to cover all of the costs associated with its operations over a 35 year period. However, for several years during the 2004-2018 period (depending on which scenario is used) the net revenue (total revenues minus total costs) generated by the bridge could be insufficient to cover all costs which could possibly require supplementary funding from GOB.

4.4.4 What will determine in the long run the financial viability of the bridge will be a combination of the following factors; (a) actual depreciation of the Taka vis-à-vis the US$; (b) long term O&M costs; (c) cost of emergency repairs to bridge and river training works; (d) growth in the real economy and in transport demand; (e) elasticity of demand to increases/decreases in toll rates; (f) increases in the tariffs charged to rail, electricity and telecom and gas lines using the bridge; (g) change in the traffic mix using the project; and (h) competing road transport infrastructure investments.

4.4.5 Considering that the bridge has a design life of 100 years and that within the next 35 years the debt servicing costs to build the bridge will have dropped to zero, the likelihood that the bridge will generate a significant financial surplus for GOB are quite high. Even during the first 35 years of operations the likelihood that it will be generating an aggregated financial surplus is quite high as described in the previous paragraph.

4.5 Institutional development impact:

4.5.1 The institutional development impact of the project was limited since it was not one of the stated project objectives. Although a large TA component was funded under the project, its primary focus was to assist GOB/JMBA in implementing the project. As part of this component supervision and management consultants were selected to assist JMBA in managing the implementation of the project.

4.5.2 The full involvement of JMBA in the preparation and implementation of the project has enhanced its capability to manage the execution of large bridge projects in Bangladesh. As a result of this, JMBA has been given the responsibility to manage the planning, execution, O&M, and toll collection, for all major bridges (more than 1.5 km) in Bangladesh. Although not a stated objective of the project, JMBA has evolved into an operationally autonomous body. However, JMBA has not yet developed the appropriate set of skills to independently manage the construction and operation of a large multi-purpose bridge in Bangladesh.

4.5.3 The project did have some impact in fostering the development of the local engineering and construction industry by exposing it to international best practice. Furthermore, the international contractors and consultants recruited large numbers of nationals. This enhanced their skills in civil construction, engineering, supervision and planning. Finally, the implementation of the social and environmental components of the project helped GOB and, more importantly, the local NGO sector to further develop its capabilities in the rehabilitation of PAPs. This could be enhanced further by clearer selection criteria for choosing NGO partners to work on the social and environmental components, and by focusing more on social mobilization and capacity building among the affected people rather than just delivery of compensation payments.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

5.1.1 Periods of political turmoil--such as the non-cooperation movement (Hartal) of 1996--did have some effect on the implementation of the civil works components of the project. The IP complaint could have had a major effect on project completion if it had not been successfully handled by GOB and JMBA.

5.2 Factors generally subject to government control:

5.2.1 The decision by GOB to create and empower JMBA to manage the process of designing, planning, constructing, maintaining, and operating the Jamuna Bridge was a key success factor in implementing the project. More specifically, GOB's decision to on-lend the proceeds of the three loans/credits from the co-financiers to JMBA directly and to give it the same status as a governmental department greatly facilitated project implementation. Its full acceptance of the role of the supervision consultant as the 'engineer' and of the management consultant to assist JMBA also greatly facilitated project implementation.

5.3 Factors generally subject to implementing agency control:

5.3.1 JMBA's clearly defined role as the empowered entity in charge of managing and coordinating all of the activities and parties involved (different GOB ministries/departments, three co-financiers, two major consultants, and several contractors & NGOs) in preparing and implementing the project was critical. JMBA's willingness to actually use its authority to make contractual payments greatly facilitated funds flow to the contractors and consultants. The decision to establish social and environmental units within JMBA with the necessary staff and support from the management consultant was instrumental in enabling the implementation of the RRAP, EMAP, and EFAP. Financial accounting, reporting and auditing

arrangements for the project were not well defined. At the time the project was prepared and appraised the Bank did not have financial management specialists who could provide technical input from the Bank on these aspects.

5.4 Costs and financing:

5.4.1 The total project cost as compared to the SAR cost estimate is currently estimated at **US$753.7 million**. This is about **US$57.7** (+ 8.3%) million more than the **US$696 million** estimated in the SAR and includes an estimated provision of about **US$25.0 million** to settle all outstanding contractual claims. Taking into consideration the size, complexity and risk of the project, the final US Dollar costs are very close to the SAR projected figure. Since about 90% of the project costs were incurred in foreign exchange, the Taka completion cost estimate for the project is very close to the SAR projected Taka figure. If all other non-SAR funded project costs (provision for claims, taxes, GOB losses on foreign exchange payments, emergency trust fund, interest during construction, establishment and other expenses) are included, the total financial cost of the project increases to about **US$985.6 million.** Finally, fund flow problems did not significantly affect project implementation.

6. Sustainability

6.1 Rationale for sustainability rating:

6.1.1 The long-term sustainability of the project is ***likely*** for the following reasons:

6.1.2 The civil works have been fully completed to a high constructions standard. The river training works and the bridge itself were severely tested by the exceptional 1998 floods, they have performed almost extremely well from a technical point of view. Considering the design life of the Bridge works (100 years) there is the possibility that the course of the Jamuna River will shift to such an extent that it will leave the Bridge cut off from the river. This issue has generated considerable research and debate during project preparation and implementation. However, the POE has determined that the likelihood of this scenario occurring is quite low.

6.1.3 As planned, GOB is charging tolls for all types of vehicles using the Jamuna Bridge. The toll levels that have been set are consistent with the recommendations of the Toll Study. So far, the revenues being generated from the Jamuna Bridge are slightly ahead of the projections made in the toll study. In addition, as projected in the SAR, toll revenues should be able to fully cover the long term O&M of the bridge and, depending on the future exchange rate of the Taka vis-à-vis the US Dollar, should cover in full the debt servicing requirements (see section 4.4). Although not funded under the project, all of the complementary infrastructure investments on the Jamuna Bridge have been completed. A dual gauge railway line, power interconnector, gas pipeline, and telecommunication lines have been laid across the Jamuna Bridge.

6.1.4 The construction of the Jamuna Bridge has triggered several complementary transport sector investments to fully utilize the benefits of the bridge and to better integrate it in the transport network of the country. For example, the improved Jamuna Bridge access road to Dhaka is currently under construction. On the west side of the Bridge, the Hatikumrul-Bonpara Road financed by IDA is also under construction and once completed will provide a much shorter link between the West and the East of the country through the Jamuna Bridge. In addition, the construction of a new dual gauge railway line from Joydevpur near Dhaka to the east end of the bridge is well under way. On the west side of the bridge, the dual gauge conversion of the existing rail line from Jamtoil Junction to Parbatipur is also under execution. All of these

transport sector investments are expected to be completed within the next two to three years, and should dramatically improve the connectivity of the Northwest region with the rest of the country thanks to the Jamuna Bridge.

6.1.5 To fully utilize the extra land in its possession in the Jamuna Bridge area, JMBA has drawn up a comprehensive master plan for its sustainable development. It has already given out on concession part of the land for a period of 30 years to an international/domestic joint venture (JV) company to develop tourist facilities. Furthermore, the construction of an industrial park in Sirajganj has been approved by GOB and an allocation has been made in its Annual Development Program (ADP). During supervision of the remainder of the RRAP implementation, the issue of how displaced people can benefit from opportunities created by this land will be discussed with JMBA, in order to seek an equitable sharing of the project benefits with the local population.

6.2 Transition arrangement to regular operations:

6.2.1 JMBA has decided to contract out toll collection and O&M for the Jamuna Bridge to an international/domestic JV for a period of 5 years. The primary responsibility of the selected O&M contractor will be to ensure the routine maintenance of the civil works and to collect tolls on behalf of JMBA for a management fee. In case extraordinary maintenance of the Bridge is required, JMBA can also use its services or contract out the work to other contractors. To enhance toll collection efficiency and accountability, the O&M contractor has proposed to JMBA to install a new computerized integrated automatic vehicle classification system. The new system is currently being considered for installation by JMBA.

7. Bank and Borrower Performance

Bank

7.1 Lending:

7.1.1 IDA's performance during project preparation can be considered ***satisfactory***. The project was comprehensively prepared by a highly experienced team. This enabled the up-front resolution of complex social, environmental, technical, engineering, and economic viability issues, and it meant that the project was at a very high state of readiness once implementation started. The 'active' project identification/preparation phase lasted from 1989 to 1993, during which time a total of nine missions were fielded. The total approximate cost of project preparation from project identification to board approval was over US$1 million and it involved almost 400 staff weeks. Comparing project preparation costs for the Jamuna Bridge Project to current project preparation coefficients (about US$200-300 thousand), the cost of preparation can be considered high. However, considering the size, risk, and complexity of the project, the cost is justified.

7.1.2 Serious concerns were raised especially within IDA about the economic viability and overall cost of the project. As a result of these concerns the project was subjected to very thorough economic analysis which prolonged project preparation. (According to GOB these delays in project preparation led to a 20% increase in total project costs). Furthermore, the emphasis on economic viability and the need to reduce the overall cost of the project led to the cancellation of several essential complementary infrastructure investments.

7.1.3 To respond to the Category "A" environmental rating for the project, a very detailed Environmental Impact Assessment was conducted which resulted in the preparation of a comprehensive EMAP to mitigate the environmental social impacts of constructing the bridge. This was the first time in Bangladesh that the social and environmental impacts of an infrastructure project were handled in such a comprehensive

manner. To manage and mitigate the social impacts of constructing the Jamuna Bridge on PAPs, a RRAP was prepared for implementation during the project. One group of PAPs living on the upstream/downstream chars from the bridge was not explicitly covered in the RRAP. However, since the resettlement policy had made provision for unforeseen impacts becoming evident later, it was possible to add benefits and support to the people affected by project-induced erosion and flooding.

7.1.4 With regard to financial management aspects, although financial analysis of the implementing agency was undertaken, no appraisal of the financial management capacity of the JMBA was undertaken, nor an analysis of its financial management needs. However, the project hired financial consultants who prepared all required financial reports, which were satisfactory to the Bank.

7.2 Supervision:

7.2.1 IDA's performance can be considered ***highly satisfactory*** during supervision. As requested by GOB, IDA acted as the co-financier project implementation coordinator. This enabled IDA to take a more proactive role in resolving the issues faced during implementation. To expedite project implementation, the IDA supervision team instituted Milestone Decision Meetings (MDM). The objective of the MDMs was to bring together JMBA/GOB and all the co-financiers, consultants, POE, contractors, and NGOs, at regular interval to discuss and resolve all implementation-related issues. A total of eight MDM meetings were held during project implementation and they played a critical role in facilitating project implementation. For the full duration of project implementation, IDA also provided a co-financier project coordinator based in Dhaka who held monthly cofinanciers committee meetings.

7.2.2 IDA's supervision team greatly assisted GOB/JMBA and the other co-financiers in implementing the project. It provided experienced staff and was instrumental in assisting JMBA to establish the POE that could be used to provide guidance in resolving many of the key technical issues. The supervision team in the earlier stages of the project did not include financial management specialists, as these have only recently been engaged by the Bank. The supervision team was also very responsive in responding to major problems/crisis that arose during implementation. For example, when the IP complaint was filed, the supervision team together with JMBA and the other co-financiers took decisive action to address the issues raised in the complaint. Because of this, the preliminary IP investigation concluded that a full investigation of the project was not warranted.

7.2.3 The total cost of supervising the project was about US$900 thousand (about US$150 thousand per Bank financial year (FY)). Considering the size and complexity of the project, together with the heavy cost of responding to the IP complaint, the cost of supervision can be considered low. A total of 14 supervision missions (including the MDM meetings) were fielded with a maximum of three per FY.

7.3 Overall Bank performance:

7.3.1 IDA's overall performance was ***highly satisfactory***. Although the project was well prepared, it was at a high cost when compared to current cost standards. This enabled the quick and complete implementation of all of the project components due to their high state of implementation readiness. IDA provided both staff with the right skill mix and continuity to implement the project. Furthermore, IDA took on the leading role to coordinate with JMBA/GOB and the co-financiers all aspects of project implementation.

Borrower

7.4 Preparation:

7.4.1 The Borrowers performance during project preparation was ***highly satisfactory.*** JMBA was established in 1985 by GOB with the mandate to manage the preparation of a bridge project over the

Jamuna River. Furthermore, in 1986 to fund project preparation and eventual implementation, GOB established a "Jamuna Bridge Surcharge and Levy Ordinance". In 1986 with financing from United Nations Development Programme (UNDP) it conducted the first project feasibility study which recommended the Bhuapur-Sirajganj crossing site on the Jamuna River. In 1989 further techno-economic feasibility studies were conducted to recommend the appropriate technical and engineering configurations of the bridge as well as detailed designs for river training works. The study concluded that a multipurpose bridge which would allow the crossing of road, rail, and power was both economically and technically feasible.

7.4.2 Once it was determined that a multi-purpose Bridge across the Jamuna River was technically and economically feasible, GOB vigorously approached several co-financiers, including IDA, to fund the Jamuna Bridge Project. To reduce project implementation risk, GOB agreed and fully embraced a strategy of full implementation readiness. Before the start of implementation, it also funded with its own resources the construction of the embankment and access roads required to construct the bridge. To improve the quality of project preparation, an internationally experienced consultant was recruited to assist JMBA in the preparation of detailed engineering, Bill of Quantities and bidding documents. To systematically address the social and environmental impacts of the project, GOB also agreed to prepare social and environmental components consistent with the IDA's OD's 4.01 and 4.30. The preparation of these two components broke new ground in Bangladesh and set a precedent for all other externally-aided infrastructure projects.

7.5 Government implementation performance:

7.5.1 GOB's performance during implementation can be considered ***highly satisfactory.*** Although there were several changes of government during project implementation, their commitment to the project did not change. As a clear indication of its commitment to implementing the project, GOB not only established JMBA to prepare the project but also gave it the necessary financial, managerial, and decisional autonomy to implement the project.

7.5.2 To provide JMBA with the necessary funds to implement the project GOB agreed to on-lend the proceeds of the loans/credits from the co-financiers to JMBA. The on-lending agreement between GOB and JMBA functioned quite well during project implementation and despite the very heavy expenditure flows during the construction phase, there were minimal cash flow problems and payment delays to contractors and consultants. In addition, the over US$100 million raised by the GOB to fund the implementation of the JBP was not diverted to other purposes despite severe budgetary pressures faced by GOB. (For the full duration of the project GOB even provided a US$10 million trust fund to handle emergency expenditures during project implementation.)

7.6 Implementing Agency:

7.6.1 The implementing agency performance was ***satisfactory*** during implementation. JMBA played a key role in both project preparation and implementation by providing the necessary continuity and focus within GOB to prepare and implement the project. This ensured that the institutional memory gained during the very long project preparation phase was not lost. Furthermore, it gave the necessary confidence to the co-financiers since they had a single and fully committed interlocutor to deal with. Turnover of key staff was not excessively high when compared to the implementation of other projects in Bangladesh.

7.6.2 Because of the complexity of the project and the multitude of demands generated by the co-financiers, GOB agreed to hire an experienced management consultant to assist JMBA in implementing the project. This is particularly true for the implementation of the RRAP, EFAP, and EMAP and in the handling of contractual issues/disputes with contractors and the supervision consultant.

7.6.3 Although the IDA-funded portion of the project closed in December 1999, and the civil works contracts completed in June 1998, JMBA has not been able to resolve, in a timely manner, most of the pending contractual claims.

7.7 Overall Borrower performance:

7.7.1 The overall performance of the borrower can be considered ***highly satisfactory.*** This is a clear example of a project where project ownership was high and consistent despite changes in government and the large number of parties involved.

8. Lessons Learned

8.1 What follows are some of the key lessons that were learned from implementing the JBP.

8.2 ***Funding of large infrastructure projects.*** The successful implementation of the JBP demonstrates that IDA and other co-financiers still have a 'comparative advantage' in funding and facilitating the implementation of complex large infrastructure project in countries with poorly developed capital markets like Bangladesh.

8.3 ***Quality at entry.*** Quality at entry does not come cheap in terms of time and staff required to prepare a project. It is critical that adequate resources are 'invested' by both the borrower and IDA to properly prepare a project. The JBP is a clear example of a well designed and very thoroughly prepared project which was ready for implementation thanks to adequate resources being provided.

8.4 ***Ownership and commitment.*** GOB's very strong commitment to the project demonstrates the importance of ownership in executing complex projects like the JBP. Without such a high level of ownership and resulting commitment to the project by the borrower, it would not have been possible to successfully implement the project.

8.5 ***IDA supervision resources.*** One of the key success factors in implementing the project was that IDA was willing to provide the necessary resources to properly supervise the project. This is often not the case despite the findings of the Wapenhans Report of the early 90's.

8.6 ***Continuity of IDA staff.*** An important lesson is that the same core team that was responsible for project preparation should be made responsible for its implementation. In the case of the JBP, the same experienced team that prepared the project was also responsible for its full implementation. This provided the necessary continuity, skills, and more importantly accountability during the critical project implementation phase.

8.7 ***MDM.*** The MDM proved to be an extremely effective and systematic mechanism to focus and resolve specific implementation related issues and to foster a sense of ownership. The majority of MDM meetings were held at the construction site to focus attention on implementation issues. MDM should become an integral part of project supervision even if it means increasing supervision spending coefficients.

8.8 ***Empowered implementing agency.*** Without a fully empowered implementing agency like JMBA it would have been extremely difficult to coordinate and manage all the activities and parties involved in the preparation and implementation of the project.

8.9 ***Social & environmental components.*** The preparation and more importantly implementation of the social and environmental components of large civil works projects must be given the same attention as the preparation of the physical components. In the case of the JBP the real needs, in terms of resources, to implement the social and environmental components of the project was not appreciated until well into project implementation. It could be argued that because of its size and complexity, the JBP could have been split into two projects; one focusing on the physical works while the other one focusing on the social and environmental components. This approach could have generated the additional resources to better prepare and more importantly more closely supervise the implementation of the social and environmental components. However, such an approach would have further added to the complexity of the project, and would have made coordination among the various components more difficult.

8.10 ***Site readiness.*** The necessary land acquisition together with the shifting of utilities, structures and trees should be substantially completed before the start of physical implementation of a project. Comprehensive site readiness is probably the single most important element in reducing implementation delays and risks. Therefore, for projects that involve large civil works contracts with large amounts of land acquisition, the practice of requiring substantial site readiness before civil works contracts are cleared should become the norm. (For this to happen much greater early coordination/cooperation between the preparation of the physical and social components of the project will be required, allowing compensation and resettlement support to affected people to be carried out before displacement takes place.)

8.11 ***Supervision consultant as the 'engineer'.*** In the case of the JBP the role of the supervision consultant as the empowered engineer worked well. The engineer was given the necessary powers and independence to operate as the engineer and this reduced payment delays and potential problems with the contractors. Thus for a large complex project like the JBP the role of the supervision consultant as the engineer can be effective if properly managed.

8.12 ***Partnership with other co-financiers.*** As the JBP demonstrated, co-financing can be an extremely effective mechanism to fund large, complex and risky projects. However, for co-financing to be fully effective, a clear understanding of the roles and responsibilities of each co-financier must be ascertained early in the process. Furthermore, one of the co-financiers must take the lead to ensure that the agreed modus operandi for project preparation and implementation is followed. The very high cost of the JBP made co-financing the only viable option for funding, since none of the major development agencies were willing to fund or take the risk of implementing the project on their own. Thus, partnership with other co-financiers to fund large infrastructure projects can be useful to reduce financial risk and increase leverage.

8.13 ***Development objectives.*** The JBP had very clear and focused objectives. The lesson learned is that the development objectives of a project must be clear and focused and should be fully supported by well prepared project components. Too often development objectives are vague and not fully supported by well developed project components.

8.14 ***ICB.*** Because of ICB, GOB was able to procure, in a cost effective manner, internationally experienced contractors to execute technically challenging civil works contracts. However, ICB alone, without a strict PQ process, would not have resulted in the procurement of the most suitably qualified contractor at the lowest possible price to execute the works. Thus the lesson learned from implementing the JBP is that a combination of ICB together with a very strict PQ process produces the best results.

8.15 ***Arbitration and dispute resolution mechanisms.*** Both the arbitration and dispute resolution mechanisms did not function as intended since the concept of binding arbitration is not really accepted by GOB. This means that unless contractual disputes are resolved amicably they can only be resolved through the court system which can be very time consuming. Thus, the effectiveness of arbitration and dispute resolution mechanisms in resolving contractual disputes needs to be revisited to ensure their effectiveness.

8.16 ***Resolution of claims.*** The procedure to resolve claims generated by the project has been slow and cumbersome with some of the claims not having been resolved two years after the completion of the civil works. This means that a more streamlined claim resolution mechanism needs to be developed for future large infrastructure projects in Bangladesh. Without it, it could lead to higher bid prices for civil works since contractors will adjust their bid prices to reflect the probable delays in the settlement of claims.

8.17 ***Role of NGOs and local authorities.*** NGOs played a significant role in facilitating the implementation of the RRAP, EMAP and EFAP funded under the project. They were also instrumental in triggering the IP preliminary investigation. Considering the wide variety of performance and capabilities of NGOs in Bangladesh, it is absolutely essential that a more systematic selection process be adopted to ensure that only qualified NGOs are selected. To ensure that both cost and quality are taken into consideration for the evaluation of NGO proposals, a cost based selection process should be considered and only NGOs that meet certain minimum criteria in terms of track record in designing and implementing socioeconomic development programs; in house capability in terms of staff and skills; financial resilience; and in particular the ability to work with PAPs long after the projects are officially closed, should be short-listed. Furthermore, a system of blacklisting poorly performing NGOs needs to be established to ensure some form of accountability for their performance. In the longer run, a balanced approach must be found between the compensation and mitigation efforts necessary to address project-induced impacts, and more sustainable development efforts benefitting the local population in general. While compensating for negative impacts is the responsibility of the implementing agency, in this case JMBA, more sustainable area development efforts are the responsibilities of the local authorities, often working in collaboration with development NGOs. Efforts should be made to clearly delineate roles and responsibilities, and fit the mitigation efforts for the displaced population into the broader area development program.

8.18 ***Continuity of consultant roles.*** The set of consultants that were involved in preparing the feasibility studies and detailed engineering for the bridge, approach roads and river training civil works were retained to supervise the actual construction of the bridge. This arrangement ensured a consistent engineering approach and minimized the amount of potential conflicts/disputes that could have arisen if there were a different set of consultants involved in the preparation and project supervision phases. Thus, in the case of the JBP the arrangement of having the same set of consultant involved in all phases of the project was a key success factor.

8.19 ***Management consultant.*** An internationally experienced management consultant was selected to assist JMBA in project implementation. The emphasis on project implementation meant that some of the consultant knowledge was not adequately transferred to JMBA. Terms of reference with less of a focus on implementation and more on knowledge transfer might have resulted in a better balance between the contradicting set of objectives of the services.

8.20 ***IP.*** The JBP was one of the first IDA projects that was subjected to the IP complaint process. The IP complaint was filed by a local NGO alleging violations to IDA's social safeguard policies. Although the IP preliminary investigation process worked reasonably well, it should be streamlined and made more cost effective. While complaints from aggrieved parties can never be ruled out, IDA can address these

complaints best by ensuring that attention to social and environmental safeguards are fully incorporated and well documented in project planning and implementation, and in particular by developing clearer criteria for ensuring that there is adequate local commitment and capacity to undertake the project.

8.21 ***Counterpart funding.*** As a clear demonstration of its commitment to the project, GOB raised and earmarked a good part of the funding required for implementation before proceeding with the construction of the Jamuna Bridge started. This meant that despite very large funding requirements during the peak implementation period, the project never suffered from major fund flow delays. Since funds flow delays are often cited as one of the most common problems affecting project implementation, serious consideration should be given by borrowers to put part of the funds required to implement the project in an 'escrow' account before the implementation of the project actually starts.

8.22 ***O&M of completed physical works.*** To ensure the sustainability of the physical investments, JMBA/GOB have contracted out the O&M and toll collection to an internationally experienced company. However, taking into consideration that the design life of the bridge is about 100 years, JMBA needs to review all of the options at its disposal to ensure the long term O&M of the Jamuna Bridge.

8.23 Several lessons were learned from implementing this very important project for Bangladesh. The most important lesson is that project ownership supported by concrete actions is critical to ensure the successful implementation of a complex and large project like the JBP. Through the early establishment of JMBA and the earmarking of funds to meet part of the counterpart funding requirements of the project, GOB demonstrated a very strong sense of project ownership and commitment. Another important lesson is that institutions like IDA can play a critical role in mobilizing the necessary funding and expertise to implement a complex infrastructure project like the JBP. Other important lessons that can be drawn from implementing the JBP is that the completion of engineering, full site readiness, selection of consultants and procurement of contractors should be sine qua non conditions for loan/credit effectiveness or even Board approval. Furthermore, much more attention and, consequently, resources need to be devoted in both designing and coming up with the appropriate mechanisms to implement the social and environmental components of large infrastructure projects like the JBP. Finally, the long term O&M arrangements for a physical investment like the Jamuna Bridge which has a 100-year design life need to be examined carefully to ensure its operational and financial sustainability.

9. Partner Comments

(a) Borrower/implementing agency:

Please see Annex 12 for Borrower/implementing agency comments.

(b) Cofinanciers:

Please see Annex 12 for Cofinanciers' comments.

(c) Other partners (NGOs/private sector):

N/A

10. Additional Information

N/A

Annex 1. Key Performance Indicators/Log Frame Matrix

Output Indicators:		
Indicator/Matrix	**Projected in last PSR[1]**	**Actual/Latest Estimate**
Contract No.2		The Works of Contract 2 were substantially completed on October 16, 1997, and the completion certificate to this effect issued in November 1997.
General		
Mobilization/Preparation	November 1994	
Stone Supply	February 1995	
East Guide Bund		
Dredging Access Channel	June 1994	
Dredging East Bank	April 1995	
Fascine Mattress	April 1995	
Rip Rap Falling Apron	April 1995	
Open Stone Asphalt	April 1995	
West Guide Bund		
Dredging West Bank incl. Closure	May 1996	
Fascine Mattress	April 1996	
Rip Rap Falling Apron	April 1996	
Open Stone Asphalt	April 1996	
Closures		
Bed Protection	November 1995	
Partial Closure	March 1996	
Final Closure	November 1996	
Temporary Works		
Stretch A1-A2	March 1996	
Stretch A2-A3	October 1995	
Stretch A3-A4	October 1995	
Demobilization/clearance	June 1996	
Contract No. 1		The Contract 1 Works were substantially completed on June 20, 1998, and the Bridge opened on June 23, 1998. Gas pipeline completed November 1999.
Mobilization		
Mobilization etc.	June 1995	
Design work		
Geotechnical Work	March 95	
Main Bridge	February 1995	
(a) Piles	September 1995	
(b) Substructure	August 1996	
(c) Superstructure		
Constructure Work		
Main Bridge Work	July 1996	
(a) Pile Work	July 1996	
(b) Substructure Work	November 1997	
(c) Superstructure Work	November 1997	
Approach Viaducts Work		
Contract No. 3		The Works of C3 were substantially completed on March 31, 1998, and the Completion Certificate to this effect issued early April.
Mobilization, etc.	May 1995	
Drainage Provisions	February 1995	
Embankment	October 1995	
Granular Sub-base	January 1995	
Agg. Road Base	February 1996	
Asphalt Surfacing	March 1996	
Box Culverts	February 1996	
Slab Bridges	February 1996	
Misc.	March 1996	

Contract No. 4 Mobilization Drainage Embankment Granular Sub-base Agg. Road Base Asphalt Surfacing Box Culverts Slab Bridges Misc. November 1995	 May 1995 February 1996 October 1995 January 1996 February 1996 March 1996 February 1996 February 1996 March 1996	Works of C4 were substantially completed on December 1, 1997, and the Completion Certificate to that effect issued.
EMAP		Ongoing - Based on Environment Management Action Plan
EFAP Compensation for flood and erosion affected people	Milestones will be determined based on impact assessment and updated implementation reports, expected by September 2000.	Ongoing - Based on Erosion and Flood Action Plan
RRAP Resettlement opportunities Compensation for lost land and assets Livelihood rehabilitation	Milestones will be determined based on impact assessment and updated implementation reports, expected by September 2000.	Ongoing - Based on Revised Resettlement Action Plan

Original targets are taken from the SAR. There were very few changes made during the project implementation

Annex 2. Project Costs and Financing

Project Cost by Component (in US$ million equivalent)

Project Cost By Component	Appraisal Estimate US$ million	Actual/Latest Estimate US$ million	Percentage of Appraisal
Main Bridge	220.40	222.73	101
River Training	244.05	269.57	110
Approach Roads	52.90	62.75	118
{Contingency for contract claim (Pending)}		25.00	
Technical Assistance:			
Implementation	21.00	23.26	110
Institution	6.00	6.46	107
Others - Resettlement	52.50	35.49	67
Total Baseline Cost	596.85	645.26	
Physical Contingencies	56.20	74.96	133
Price Contingencies	42.95	33.51	78
Total Project Costs	696.00	753.73	
Total Financing Required	696.00	753.73	

Project Costs by Procurement Arrangements (Appraisal Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	620.35 (191.93)	0.00 (0.00)	0.00 (0.00)	46.50 (0.00)	666.85 (191.93)
2. Goods	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
3. Services	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
4. Technical Assistance Implementation	0.00 (0.00)	0.00 (0.00)	22.50 (7.00)	0.00 (0.00)	22.50 (7.00)
5. Institution	0.00 (0.00)	0.00 (0.00)	6.65 (1.07)	() 	6.65 (1.07)
6. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Total	620.35 (191.93)	0.00 (0.00)	29.15 (8.07)	46.50 (0.00)	696.00 (200.00)

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	0.00 (189.10)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (189.10)
2. Goods	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
3. Services	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
4. Technical Assistance Implementation	0.00 (0.00)	0.00 (0.00)	0.00 (10.01)	0.00 (0.00)	0.00 (10.01)
5. Institution	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
6. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Total	0.00 (189.10)	0.00 (0.00)	0.00 (10.01)	0.00 (0.00)	0.00 (199.11)

1/ Figures in parenthesis are the amounts to be financed by the IDA Credit. All costs include contingencies.

2/ Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Project Financing by Component (in US$ million equivalent)

	Appraisal Estimate			Actual/Latest Estimate			Percentage of Appraisal		
	Bank	Govt.	CoF.	Bank	Govt.	CoF.	Bank	Govt.	CoF.
Civil Works	190.30	44.50	380.60	193.83	153.62	387.00	101.9	345.2	101.7
TA - Consultant services and Training	9.70	0.00	19.40	10.28			106.0	0.0	0.0
							0.0	0.0	0.0

Annex 3: Economic Costs and Benefits

Jamuna Bridge Project
Economic Re-Evaluation At Project Completion

The ICR Mission re-evaluated the project economic analysis based on the latest project data at project completion. The re-evaluation was undertaken following the same methodology as adopted during appraisal. All economic cost and benefit streams used in the re-evaluation were expressed in 1993 prices, as was done during appraisal. Except as noted in this annex, all assumptions and key parameters adopted at appraisal were applied in the economic re-evaluation. It should be noted that actual project implementation period was almost the same as assumed at appraisal for the economic analysis. At appraisal, the economic analysis was undertaken with the assumption that the construction would start in April 1994 and the bridge would be opened to traffic in July 1998. In reality, the construction started in October 1994, and the bridge was opened to traffic in June 1998. The revisions made in the economic re-evaluation and the resulting economic performance indicators are described below.

I. Change in Costs

At present, there are still some uncertainties regarding the capital costs of the project because a large amount of standing claims from the four major civil works contractors have not yet been settled. The financial costs of these standing claims (apart from the claims already accepted by JMBA) amount to $124 million. To arrive at a reasonable final cost for the project, the re-evaluation assumed that one-third of these claims totaling $40 million would be accepted by the JMBA. With this assumption and taking into account costs of approved variation orders, the final financial cost of the project as identified in the Staff Appraisal Report (SAR) reached $717 million. This represents a 3% increase over the appraisal estimate of $696 million. It should be noted that the project also incurred expenditures for reimbursement of taxes and custom duties, exchange losses, etc., which were not included in the SAR. If these costs were included, the total project costs would reach $908 million.

To arrive at economic costs in the re-evaluation, all contract price adjustment payments for inflation as well as all taxes and custom duties were excluded from the final contract costs for civil works and consultancies. The local currency costs were converted to economic cost by applying a standard conversion factor of 0.89, as at appraisal. While the foreign exchange financial costs were converted to economic costs by using the border prices. After adjusting the financial costs into economic costs, the resulting final economic cost of the project was estimated at $660 million, a 5.3% rise from $627 million estimated at appraisal. Reflecting the increase in capital costs, the operation and maintenance (O&M) costs of the bridge and river training works were adjusted proportionally to the increase in capital costs, as well as to reflect the expected increase in O&M requirements from the O&M contract. The resulting O&M financial costs have been increased from an annual average of $2.7 million at appraisal to $3.8 million (in 1993 prices) during the economic life of the project.

The annual distribution of the project's capital costs was revised based on the actual disbursement occurred up to June 1999. The revised distribution of the capital costs were spread over the period of 1994 to 1998, with most of the costs (74%) incurring during 1995 to 1997. In contrast, the appraisal estimate of total investment during the period of 1994 and 1995 was larger than the actual investment during the first two years of the project. The change in the phasing of investment was mainly due to delay in the start of construction, and consequently the revision of cash flow projection

of the contractors as compared to appraisal schedule. However, as the appraisal evaluation conservatively assumed the Bridge's opening year at mid 1998, the beginning year of the Bridge benefit streams remained unchanged as at appraisal.

Taking into account the cost increase and change in disbursement profile, the project's economic rates of return was re-estimated. The result indicated that the impact of the cost increase on the project's EIRR is minimal. The negative impact of the project's cost increase on EIRR was mostly offset by the positive impact of the change of disbursement profile.

II. Changes in Benefits

a. Traffic Benefits

The ICR Team obtained actual bridge crossing traffic data from the JMBA, as well as the traffic data over the Aricha-Nagabari Ferry crossing from the Bangladesh Inland Water Transport Corporation for the period of June 1998 (Bridge opening) to December 1999. From the actual bridge-crossing traffic data, the ICR mission calculated the actual annualized average daily traffic (AADT) volumes based on the same vehicle classification used at appraisal. In addition, actual bridge-crossing traffic growth rates for the period of 1993-1997 was inferred, and compared with the projection for the same period made at appraisal. The AADT of 1998-1999 derived from the actual traffic volumes was also compared with the projected AADT of 1998 made at appraisal. The motor cycle traffic was excluded in the analysis, as was done at appraisal. The summary of the comparison is shown in the table below.

	Trucks	Buses	Light Vehicles	Average/Total
Appraisal Projection:				
(i) AADT in opening year (1998)	1093	340	196	1,630
(ii) Growth rate (1993-1997)	6.6%	6.6%	8.2%	7.5%
Actual at Completion:				
(iii) AADT in opening year (1998-99)	920	799	575	2,294
(iv) Growth rate (1993-1998)	3.6%	24.1%	32.7%	18.1%
_ in AADT: (iii)/(i)	-16%	135%	193%	41%

There are two main findings from the comparison. First, the actual total traffic volume at completion was substantially higher than the appraisal estimates, but truck traffic was lower than the appraisal projection. The actual AADT in the opening year of the bridge (1998-99) was 2,294 vehicles, compared with the appraisal projection of 1,630 vehicles, a 41% increase. Secondly, the actual growth rate of truck traffic during 1993-1998 was lower than the appraisal estimate, while the actual growth rates of light vehicle and bus traffic were significantly higher than the appraisal estimates.

The actual higher-than-expected traffic volumes for light vehicles and buses in the first year of bridge opening may be explained by three main factors:

(i) the recreational visit to the Bridge as a sightseeing trip by the Bangladeshi in the first year after the bridge opening. Indeed, the bridge has been perceived as a major attraction for the Bangladeshi. For the recreational visitors of the bridge, light vehicles and buses were the means of travel. This kind of traffic was considered abnormal and was not projected to continue after the first year. The estimation of first year AADT excluded traffic data during the period of June 1998- August 1998;

(ii) the conservative assumption adopted at appraisal regarding the build-up of induced traffic. It was assumed at appraisal that induced traffic will take 8 years to materialize, starting at 20% in 1998. Based on the ICR analysis, it appeared that the assumption remain valid for the freight traffic, the building-up of which depends on the business demand response and general economic development, and it does take time. However, for passenger traffic, the build up time appeared to be short. People seemed to have little trouble realizing the benefits of the bridge, and bridge-induced trip demand increased rapidly following the opening of the bridge. Less than 5% of the light vehicle and bus traffic over the Jamuna corridor remains with the Aricha-Nagabari ferry crossing; and

(iii) the relatively low level of bridge toll on bus, in comparison with the ferry tariff. At appraisal, it was assumed that the bridge toll would be set at equivalent to the levels of ferry tariffs on different kinds of vehicles without the bridge.

The lower-than-expected truck traffic over the bridge could be explained by the following factors: (i) the relatively high toll level on truck (Tk 1,000 per truck per one-way bridge crossing as comparing to about Tk 700 per ferry crossing) appeared to have depressed traffic diversion; (ii) the various incentives provided to truck drivers in Aricha-Nagabari Ferry seemed to have attracted some truck traffic to remain with the ferry; (iii) the waiting time for truck traffic crossing the river has been minimized as 70% of the truck traffic in the Jamuna corridor has diverted to the Bridge; and (iv) the main road corridor link from Dhaka area to the Bridge site has been under undergoing widening and upgrading since 1998 under the Jamuna Bridge Access Road Project (a separate project funded by ADB). The construction activities have depressed truck traffic diversion somewhat, since truck traffic have more flexibility in choosing route compared with bus traffic. However, the completion of the road project by mid 2002 should stimulate truck traffic diversion to use the Bridge.

The actual growth rates between 1993 and 1998 have been adopted as the growth rates before the bridge opening in mid-1998 in the revised economic analysis. However, in keeping with the conservative assumptions made during appraisal, the traffic forecast for the period of 1998-2025 has remained the same as at appraisal at 5%. After 2025, traffic benefits were assumed to be constant, as was done at appraisal. Reflecting on the actual traffic growth pattern, the build-up period for bus and light vehicle traffic has been revised to two years, while build-up period for truck traffic was assumed to be eight years, same as at appraisal. Similarly, vehicle waiting time and ferry crossing time have been assumed to be the same as adopted at appraisal.

As a result of the revised traffic volume compared with appraisal projection, the project's EIRR was affected. While the higher bus and light vehicle traffic increased the passenger traffic benefit substantially, the increase of passenger traffic benefits were offset by the reduction in freight benefits as a result of the lower-than-expected truck traffic volume, and the significance of freight traffic benefit in the project's benefit streams. Therefore, despite the significant rise in total traffic volume, the project's overall traffic benefits at project completion did not increase accordingly.

b. Energy sector benefits

In the absence of the Jamuna Bridge, the scenario at appraisal was that the Bangladesh Power Development Board would need to construct a stand-alone power interconnector across Jamuna to carry power from east to west, at a financial cost of about $114 million during 1998-2000, whereas the bridge would carry this power transmission at a cost of about $6 million. The required electricity pylons have been constructed on the Bridge for transmitting electric power from both sides of the river. Benefit was taken at appraisal for the net difference in economic costs for power transmission across the river in the with and without bridge scenario. This aspect of energy benefit remained unchanged at project completion.

Taking natural gas across the river from east to west to produce power in the west was not considered a viable alternative in the absence of the Bridge as an underwater gas pipeline was estimated to cost about $250 million, and was considered difficult in practice. However, now that the bridge has been completed, the Power Development Board has decided to take gas across the river using the Jamuna Bridge for producing power on the western side (in Sirajganj) of the river until such time when gas is discovered and developed on the west side of the river. The gas pipeline on the Bridge was completed and commissioned in late November 1999. As such, the gas sector aspect of the energy benefits can now be quantified and included in the project's benefit streams. In the without gas pipeline on the bridge scenario, fuels would be used for power generation and other applications in the west side in the period until gas is discovered and developed. The benefit to the project would be the savings of consuming gas in power plants and other applications instead of using more costly imported gas oils as the alternative. In addition, the cost of power transmission lines on land and related installations will also be saved. The distance of transmission lines from power plant in the east to the Bridge and from the Bridge to the Sirajganj power plant in the west is about 160 km, costing about $100 million. In contrast, the required length of the gas pipeline is about 40 km since gas had already been brought close to the west side of the Bridge for other industrial uses before the bridge construction finished, and its construction cost was estimated at about $20 million. The net economic cost saving to the project was estimated to be about $130 million in 1993 prices. The revised economic analysis included this additional savings, which was assumed to be spread over 1998-2000. However, because the economic evaluation in the SAR did not quantify the gas pipeline benefit (there was great deal of uncertainty in quantifying this aspect of the benefits at that time), the re-evaluation also estimated the project EIRR with the gas pipeline benefit excluded from the project benefits.

In addition, the gas pipeline will make it easier and much cheaper to transmit gas from the west to the east and for potential export, when the gas is discovered and developed in the west. The government has entered into exploration contracts with international gas companies to explore and develop gas field in the west side of the river. It was expected that first gas field production will start in 2005-2006. However, the potential benefit of gas discovery and development in the west was not included in the original economic analysis nor in the economic re-evaluation.

III. The economic re-evaluation results and sensitivity analysis

Following the similar methodology adopted at appraisal, and taking into account the changes in project costs, traffic benefits and energy sector benefits as discussed above, it was estimated that the project's economic viability has slightly improved. The composite base EIRR of the project at completion was estimated at 16.8%, 2.3 percentage points higher than the appraisal estimate of 14.5%. The base estimate of the project's net present value at completion was $275 million, compared with appraisal estimate of $182 million.

The base economic viability indicators were subject to the following sensitivity analyses. (i) Pending on the final settlement of the outstanding claims between the contractors and JMBA, the final costs of the project may be revised from what is currently assumed for the re-evaluation. As part of the re-evaluation, without commenting on the validity of the claims, it was assumed that only 33% of the outstanding claims were to be assessed as valid to arrive at the base EIRR at completion. If 50% of those claims were to be accepted by JMBA, the project's EIRR would be reduced to 16.2% from 16.8%, as the final economic costs would have increased to $681 million. (ii) If gas pipeline savings were excluded from the project's benefit streams, the project's EIRR would be reduced to 15.3% from 16.8%. (iii) If the traffic benefits were to decrease by 20%, the project's EIRR would be reduced to 15.0%. (iv) In the worst case scenario, were the project costs increased by 20% and the traffic benefits reduced by 20%, the project's EIRR would fall to 13.0%, but the project would still remain viable. The summary of economic re-evaluation and sensitivity analyses are shown below:

Base EIRR at Completion	50% of claims accepted	Excluding gas pipeline benefits	20% reduction in traffic benefits	Cost (+20%) and benefits (-20%)	Base EIRR at Appraisal
16.8%	16.4%	15.3%	15.0%	13.0%	14.5%

IV. Other Potential Benefits Not Quantified

As discussed in the SAR, the EIRR estimated above excludes many substantial potential benefits to the country which are not easy to quantify. In the without bridge scenario, the high cost of freight traffic crossing the river has effectively created a "non-tariff barrier" to trade crossing the river, incurring heavy economic losses to the economy on both sides of the river. The elimination of the " trade barrier" by the Bridge will lead to more efficient flow of goods and services within the country, and stimulate economic development in the northwest of the country, which is relatively underdeveloped but has abundant natural resources. In addition, the multi-purpose nature of the Bridge facilities implies that the Bridge can also help improve railway link, telecommunications, power, and gas transmission, in addition to road link. All of these facilities would help bring about a structural change of the economy. However, the benefits from these structural changes will take time to materialize, and can not be quantified confidently at this time. Also, these potential benefits will require the support of a comprehensive development program to complement the construction of the Bridge.

To this end, it should be pointed out various initiatives have been undertaken by the government with donor assistance to promote the economic development in the northwest part of the country. An agricultural development master plan has been developed for the northwest, and an agricultural development loan is under processing by the ADB to support the agricultural growth in the areas. IDA assistance has also been underway for improvement of priority road network in the northwest to facilitate the area's development. Under ADB assistance, a railway line has been laid on the Bridge, and railway tracks on both sides of the Bridge linking existing railway network have been under construction and are expected to be completed by 2002. Also, the road corridor between Dhaka and the Bridge has been undergoing widening and upgrading.

Furthermore, the economic analysis at appraisal did not include benefits due to potential emergence of Indian transit traffic (from north-central India to northeastern states like Tripuri and Assam) through the Bridge. The advantage of such transit traffic is clear since the distance through this route will be reduced by at least 200 km per trip. However, the materialization of such a benefit will depend critically on the ongoing discussions between India and Bangladesh in this regard, and the political climate of the two countries. It is estimated that about 6 million tons of goods move annually from north-central India via the Indian states of West Bengal, to Assam and other northeast states of India. It is likely that at least two million tons of this traffic could move through the Bridge. The total annual transport cost savings from this transit route is estimated to be at least $24.0 million equivalent, of which Bangladesh should claim at least half of the benefit through toll charges. However, because it is currently not certain what mode of transport this transit traffic will likely take and when the traffic will materialize, this additional project benefit was not included in the revised economic evaluation of the mid-term review mission (the inclusion of this benefit will increase the project's EIRR by one percentage point).

In terms of impacts on the local community and economy, studies indicate that the benefits have been substantial on the eastern side of the bridge, while the western side has experienced more problems such as greater difficulties in handling the resettlement process, and reduction in earnings among many of the affected people. A preliminary impact assessment estimates that the percentage of people earning more than 5,000 taka per month has gone from 40% to 50% in Tangail, while it has declined from 23% to 17% in Sirajganj. A limited beneficiary survey indicates far higher levels of satisfaction on the Tangail side.

While the overall benefits of the bridge are indisputable, these concerns demonstrate the challenges in addressing localized, negative impacts and ensuring that local communities are given the necessary support.

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation				
11/89	*3*	EG, FA, OA		
04/90	*4*	EG, FA, EC, TS		
07/90	*3*	EG, EC, FA		
05/92	*4*	RE, TS		
10/92	*1*	PR		
01/93	*2*	RE		
03/93	*1*	EG		
05/93	*2*	RE, TS		
08/93	*2*	EG, EC		
Appraisal/Negotiation				
09/93	*8*	AN, EG, EC, TS, FA, EO, LC		
Supervision				
04/94	*5*	RE, EG, DB, EV, LC	HS	HS
07/94	*2*	EG, EC		
09/94	*4*	EV, EG, RE, TS	HS	HS
03/95	*3*	EG, TS, EC	S	S
10/95	*7*	EO, EG, EC, TS, RE	S	S
03/96	*5*	EC, EG, EV, TS, RE	S	S
07/96	*5*	EG, RE, TS, EC, EV	S	S
12/96	*6*	EC, EG, TS, EV, RE, SS	S	S
03/97	*2*	TS, EV	S	S
10/97	*6*	EG, TS, FA, EV, RE, SS	S	S
03/98	*4*	EG, TS, EV, SS	S	S
10/98	*5*	TS, EV, RE, EG, FA	S	S
05/99	*4*	EG, TS, TA, RE		
ICR				
01/2000	*7*	FA, TS, EC, EG, AN, RE, DB	S	S

EG - Engineer, FA - Financial Analyst, OA - Operations Analyst, RE - Resettlement, TS - Transport Specialist, PR - Procurement, EC - Economist, AN - Anthropology, EO - Ecologist, LC - Legal Counsel, DB - Disbursement, EV - Environment, SS - Social Scientist, TA - Team Assistant

It should be noted that in addition to supervision missions, project team members based in Dhaka have had ongoing dialogue and interaction with JMBA and the other development partners including NGOs.

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US$ (,000)
Identification/Preparation	330.2	900.3
Appraisal/Negotiation	61.6	203.9
Supervision	349.6	895.1
ICR	26.2	50.9
Total	767.6	2050.2

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	Rating				
☒ *Macro policies*	○ *H*	○ *SU*	● *M*	○ *N*	○ *NA*
☒ *Sector Policies*	○ *H*	○ *SU*	● *M*	○ *N*	○ *NA*
☒ *Physical*	● *H*	○ *SU*	○ *M*	○ *N*	○ *NA*
☒ *Financial*	○ *H*	● *SU*	○ *M*	○ *N*	○ *NA*
☒ *Institutional Development*	○ *H*	○ *SU*	● *M*	○ *N*	○ *NA*
☒ *Environmental*	○ *H*	● *SU*	○ *M*	○ *N*	○ *NA*
Social					
☒ *Poverty Reduction*	○ *H*	● *SU*	○ *M*	○ *N*	○ *NA*
☒ *Gender*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Other (Please specify)*					
☒ *Private sector development*	○ *H*	○ *SU*	● *M*	○ *N*	○ *NA*
☒ *Public sector management*	○ *H*	○ *SU*	○ *M*	○ *N*	○ *NA*
☒ *Other (Please specify)*	○ *H*	○ *SU*	● *M*	○ *N*	○ *NA*
Social impacts related to resettlement and displacement (RRAP and EMAP)					

*Objectives = relates to the objectives specified in the SAR
Outputs = relates to the outputs specified in the PAD

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6.1 Bank performance	*Rating*
☐ *Lending*	○ *HS* ● *S* ○ *U* ○ *HU*
☐ *Supervision*	● *HS* ○ *S* ○ *U* ○ *HU*
☐ *Overall*	● *HS* ○ *S* ○ *U* ○ *HU*

6.2 Borrower performance	*Rating*
☐ *Preparation*	● *HS* ○ *S* ○ *U* ○ *HU*
☐ *Government implementation performance*	● *HS* ○ *S* ○ *U* ○ *HU*
☐ *Implementation agency performance*	○ *HS* ● *S* ○ *U* ○ *HU*
☐ *Overall*	● *HS* ○ *S* ○ *U* ○ *HU*

Annex 7. List of Supporting Documents

1. Full supervision reports, including Form 590/PSR of the project: 1994-2000
2. Status Report as of March 31, 1998 - Presentation to Board
3. Jamuna Bridge Project Staff Appraisal Report dated January 24, 1994
4. Jamuna Bridge Project Legal Document - February 1994
5. 1997 - Toll Study
6. Rapid Assessment

Annex 8. Beneficiary Survey Results

A limited, mainly qualitative impact assessment has been carried out for the RRAP and EFAP programs. The conclusions and arguments in this report are partly based on the draft report from this study, in addition to earlier supervision missions and other reports. The final report from the study will be available in July 2000, and will be discussed with JMBA and the co-financiers. Based on these discussions, a decision will be taken regarding follow up requirements in terms of additional data requirements, future supervision, and possible further support efforts to the affected population.

Annex 9. Stakeholder Workshop Results

Minutes of Stakeholder Workshop on Intensive Learning Report of Jamuna Multipurpose Bridge Project held on January 23, 2000

A one-day stakeholder workshop was held on January 23, 2000 at NEC Bhaban-2, Sher-e-Bangla Nagar, Dhaka-1207. The meeting was chaired by Mr. A.K. Abdul Mobin, Secretary, Jamuna Bridge Division. The meeting was moderated by Mr. Abdul Muyeed Chowdhury, Secretary, Internal Resources Division and Chairman, NBR. The meeting was attended by senior officers from different Ministries, Government and non-government organizations, Professors of Bangladesh University of Engineering and Technology (BUET), development partners like World Bank (WB), Japan Bank for International Cooperation (JBIC), distinguished guests and PAPs participated in the workshop. At the start of the plenary session, Mr. Abdul Muyeed Chowdhury, immediate predecessor of Dr. Mobin, discussed his experience with the project.

Mr. Chowdhury described the project and its implementation. He provided an overview on the performance of the contractors and consultants. Mr. Muyeed Chowdhury said, "Nothing succeeds like success, we are all happy that the project has successfully been completed". He reiterated that it would be naïve and foolish to say that there was no problem in such a big project. Three consecutive governments were associated with the project. "Problems sometimes were created by people with ulterior motive, sometimes unknowingly," he added.

Mr. Chowdhury discussed the 'crack problem' of the project. He said, that it might happen in civil engineering projects but newspapers tried to make a mountain out of this mole. "Finally we could catch the bull by horn and bury the 'crack'." He said there were problems in land acquisition, particularly in the system of record keeping and record creation. People also doubted whether or not the project would be conceived, if conceived whether the fund would be available, if fund was available, whether the construction work of the project would start, and if the work starts whether the work would be completed.

Having said all of these, Mr. Muyeed Chowdhury observed that..."by global standards the Jamuna Bridge Project was implemented in time and without price escalation. It is now making money. I am of the opinion, if need is established, go for this work and don't listen to the economists".

Thereafter, Dr. A.K. Abdul Mobin requested Mr. Omar Hadi, Secretary, Ministry of Civil Aviation and former Addl. Secretary, Jamuna Bridge Division (JBD), to deliver his view from his experience. Mr. Omar Hadi said that the idea of a bridge over the Jamuna was conceived in 1964 (in the Provincial Assembly of the erstwhile East Pakistan). In 1985 an authority was created by an Ordinance. As administrative action by an authority was not adequate in this regard, a Division was formed under the name Jamuna Bridge Division. At the same time the Government promulgated a law to raise surcharge and levies for the internal expenditure of the project he added. Besides, the Government made some laws for land acquisition so that affected people might benefit.

Mr. Omar Hadi pointed out that unfortunately the transfer of technology did not exist in this project, because only three things were in the project document "look, listen, and learn". The result is the present sufferings. He reiterated that there was much lacking on the part of administration regarding

transfer of technology. Mr. Abdul Muyeed Chowdhury said "we cannot blame the contractors or co-financiers in this regard. Proper organizational arrangement of JMBA was faulty so that new manpower was not recruited. If we really needed transfer of technology, he said proper organization set-up had certainly been there. We all come on deputation and go back with memories."

Mr. Benu Gopal Dey, Project Director (PD) Resettlement, presented his paper and showed RRAP activities using slides. He explained the performance of resettlement activities in detail. Mr. Shahid Alam, former PD of the project, also shared his experience on the resettlement of PAPs.

The Danish Hydraulic Institute (DHI) representative discussed the actual course of the Jamuna, showing erosions of the river with slides. Mr. Shafiqur Rahman, Professor BUET wanted to know about some 'unforeseen' issues. He said, during feasibility study conditions of the river were not properly looked into and because of this many cases have cropped up. Quazi Mahbudul Haq, consultant, Bangladesh Consultants Limited (BCL) took part in the discussion saying "JMBP is not that important on the count of engineering as it is on human consideration. JMBA has got an excellent prospect to move from the 20th century to the next, but the contractors have not. He also said "project is for the welfare of the people but got secondary attention. Resettlement was a fantastic job he said. Jamuna Bridge is a means towards an end, not the end in itself. This is the lesson we have learnt from the project."

Dr. Jafarullah Chowdhury representative of Ganosastho expressed satisfaction on the performance of resettlement. He said "resettlement is a new concept in our country. JMBA has done an excellent job for rehabilitation of the project affected persons (PAPs)."

In the second session, the BRAC representatives presented their paper on EFAP. They said three types of compensation were given to affected persons. PAPs from Resettlement and Environment Unit also participated in the workshop. They threw light on some issues they confront at length. They demanded some agro-based industry like hatcheries. An Officer of Rural Development Movement also took part in the workshop and narrated resettlement activities conducted by BRAC.

In this regard, the Secretary, JBD, said that was not needed for the opening of the spill channel.

Mr. Aziz, Director, BCL, taking part in discussion said that there was no consultant for Dhaleswari I and II. He said, the contracts for Jamuna Bridge Project were prepared on the basis of Fédération International des Ingénieurs Conseils for which most of the points of the contracts were unknown to the Bangladesh Engineers. But there is no doubt that our engineers have learnt many things and gained knowledge. Thus we can say that the transfer of technology has been made, he added.

Mr. Fabio Galli, representative of the World Bank said "JMBP is clearly a successful project, no doubt. Unwavering and total commitment of the Government has been fulfilled. This was not in words, in deeds also." However, he said "everything was under one umbrella, implementation could have not been more effective if those were separately implemented".

Mr. M.M. Mannan, Coordinator for JMBP and transport specialist of the World Bank congratulated the participants. He said "This is borrower's project. This is GOB's project." Uninterrupted payment was made to the contractors. However, he indicated that land records were now totally outdated.

Mr. Ismail Mobarek, Port Specialist, World Bank, said "it is a proof to everybody that the projects in Bangladesh could be done timely and successfully. I have been associated with another project in Bangladesh for 10 years but the project has not yet been completed."

Closing remarks: Many of the participants indicated that they found the workshop informative. They said that ..."the bridge has been completed successfully, now successful maintenance is required."

Annex 10. Issues Related to Resettlement and Rehabilitation

A. Introduction

This annex summarizes some of the key issues, challenges, and lessons learned related to resettlement and rehabilitation (R&R) in the Jamuna Bridge project. It argues that the project constitutes a landmark in addressing social impacts caused by development projects in Bangladesh, and has established several important principles and implementation mechanisms. Implementation of these principles has proven harder than originally envisaged, and there are still outstanding issues and concerns related to resettlement in the project. Not all compensation has been paid, and some among the PAPs are reported to have been unable to reestablish their previous levels of income. Overall, however, the project has been largely successful given the weak organizational capacity at the start of the project period.

B. Policies and action Plans

Land Acquisition Issues. Nearly 3,000 hectares of land were acquired by the Government of Bangladesh to build the bridge, approach roads, guide bunds, and other infrastructure work needed for the Jamuna Bridge. This affected almost 100,000 people, who were displaced or otherwise affected through loss of land and assets. Normally, the land acquisition for infrastructure works would have been undertaken in accordance with the Bangladeshi legal framework. The country's Land Acquisition Act dates back to colonial times, although it has been modified and amended since then.

Resettlement Policy. Since the project was financed with assistance from IDA, the World Bank's OD 4.30 on Involuntary Resettlement applied. This supplements national laws and practices in three main areas:

- it requires that land acquisition and displacement be avoided or minimized where possible;
- it requires people losing land or other assets be compensated at full replacement cost (whereas the normal practice in Bangladesh has been to compensate the recorded value of the land plus a certain percentage as additional compensation for the involuntary nature of the land acquisition); and
- it requires that people losing livelihood opportunities as a result of the project be assisted in reestablishing their income levels to at least pre-project levels

The basic principle of the World Bank's resettlement policy is that people affected by a project should share in its benefits, and at the very least not be worse off as a result of the project. Additionally, the World Bank emphasizes consultations and a high level of participation by the affected population. To the extent possible, people should be assisted in R&R through a process of informed choice.

In Bangladesh, the level of poverty is high; the population density is high; and the availability of replacement land is low. During the project preparations it was therefore agreed that providing replacement land to all displaced persons would not be a viable option. Instead, the project would ensure that people were given sufficient cash compensation to enable them to replace their lost land through private purchases, or make other investments. The project was to facilitate this process. Additionally, support was to be given to those suffering a reduction in incomes, to ensure that they were adequately rehabilitated and assisted in finding new or alternative livelihood opportunities. It was recognized that this constituted a risk, in that poor people are frequently unable to make productive use of a large cash grant, and that the money might be spent on consumption rather than on replacement land, homestead, or investment in income opportunities. The project therefore has the responsibility to assist people in making the best use of the compensation money provided.

These and other principles were agreed on in the overall resettlement policy of the project. This was judged by IDA's technical experts and Legal Department to be in compliance with OD 4.30. It should be noted that this was the first time in Bangladesh that such a broad, comprehensive development approach was taken to address social impacts of infrastructure projects. There was initial reluctance on GOB's side to adopt this approach, since it was felt that this would add unnecessary cost and complexity to the project, and raise expectations for similar support mechanisms in other projects, whether they were funded by IDA or not. Experience has shown, however, that implementation of the resettlement program has been carried out reasonably satisfactorily, and has provided a valuable learning experience and a precedent for improved handling of social impacts in such projects in Bangladesh. It is now expected that the Jamuna Bridge policy framework will form an important input to the new, national policy framework on involuntary resettlement, which is currently under preparation.

RRAP. The project preparation entailed surveys and studies of the impact area, and a census of the likely affected population. A detailed plan of action was developed, describing support mechanisms, actions to be taken, organizational responsibilities, budgets, and a framework for monitoring and evaluation. This was approved in 1993 as the Revised Resettlement Action Plan. Overall, the project acquired nearly 3,000 hectares of land, leading to physical displacement and other impacts on nearly 100,000 people. Depending on the categories of losses suffered, a detailed entitlement database was developed for all the persons entitled to support under the policy. In many cases, an individual or a household was entitled to various types of compensation or support, since they were affected by more than one type of impact (loss of land, buildings, crops, etc.)

In implementing the resettlement program and the EFAP (see next section), several innovative solutions have been adopted. For instance, the seasonal changes brought about through the river's flooding and movement have been captured through satellite imagery. These images have been used as supporting documentation in determining support and compensation to flood and erosion affected people.

EFAP and IP Investigation. In the original resettlement policy, it was recognized that the project might impact on other areas or populations not initially recognized during the planning phase. Provision was therefore made for the policy framework to be updated or amended in accordance with the general principles. This proved to be an important provision, since concerns were raised early on that the bridge works would change the natural flow of the Jamuna river. This might lead to increased flooding or erosion, potentially displacing more people.

IDA supervision missions engaged in a dialogue with GOB on this issue on various occasions, requesting that support mechanisms be developed to assist victims of increased flooding or erosion. As with the earlier policy discussions on the resettlement framework, the Government was reluctant to establish this principle. Erosion and flooding are ongoing, common phenomena in Bangladesh, and it is rare to find any community with a stable population that goes back several generations. Having to move because of flooding or erosion is not unusual. The Government also pointed out the difficulty in distinguishing between flooding or erosion occurring naturally, and that which is induced by a project such as the Jamuna Bridge.

This issue was still being debated when, in 1996, a local NGO filed a complaint with the World Bank's independent IP, charging that the Bank had not complied with its own mandatory safeguard policies. Specifically, they argued that project-induced flooding and erosion would displace poor people living on the chars, the sandbanks and islands in the river. After a preliminary investigation, the Panel concluded that the Bank was largely in compliance, but it criticized the project for insufficient involvement and participation by the affected population.

The IP investigation and renewed efforts from the Bank contributed to the adoption of the EFAP (Erosion and Flood Action Plan) from 1996/97 onwards. It was agreed that people living within a delimited area upstream and downstream from the bridge works would be given assistance if they suffered displacement or losses from erosion or flooding, within a limited number of years. Beyond this time, it was agreed that erosion and flooding should be considered natural and no longer project induced. It was also agreed that all affected people within this area would be given assistance. This is a generous but practical approach, since it is not possible to determine exactly the amount or boundary limits for natural and induced flooding or induced erosion within the impact area.

It should be noted that the EFAP approach is significantly harder to implement than the RRAP. In the case of the RRAP, land acquisition and displacement is planned, and compensation and assistance can and should be organized in advance of actual displacement taking place. In the case of the EFAP, the opposite is the case: People do not become entitled to support until they have actually been displaced by flooding or erosion, and the amount and location of this is wholly unpredictable.

The adoption of this principle is a highly significant milestone. For the first time in Bangladesh, and possibly anywhere in the world, the Government has accepted responsibility for compensating and assisting people suffering from flooding or erosion caused by a development project. It remains to be seen whether the principles will be adopted in other, similar projects.

C. Challenges

The section above described some of the early challenges related to establishing frameworks and policies to address issues of displacement and resettlement. The implementation of the RRAP and EFAP has made a number of other issues and challenges apparent. They include:

- **Coordination of Social and Environmental Impacts in Infrastructure Projects.** Addressing social and environmental issues adequately requires that these concerns be taken into account throughout the entire project cycle. They should be part of feasibility studies, design choices, implementation mechanisms, outcome monitoring, etc. This has only been partly successful in the case of the Jamuna Bridge project. While an integrated coordination mechanism was established within the JMBA, this was only to address impacts after design choices had been made. There was little or no attempt to address social impacts in planning designs and civil works. The most serious mistake made in this context was the excessive land acquisition undertaken for the project. Far more land was acquired than actually required, and large numbers of people have been displaced unnecessarily. During implementation, implementation of the various components should be synchronized and coordinated, for example to ensure that displacement does not take place before people have been properly compensated, and have an alternative location to move to. This has not always been the case.

- **Resettlement sites and self-relocation.** The project has established resettlement sites both on the east and west banks. While this is a requirement where large displacement takes place, reports indicate that the option to move to a resettlement site should be combined with assistance towards self-relocation. In many cases, those who managed to choose their own new home among friends or family have fared better than those who have moved into the resettlement site.

  Reports also indicate that the eastern resettlement site in Tangail has been much more successful than the site on the west bank. This has been credited to the fact that most of a village moved as a group in Tangail, thereby maintaining the networks and support mechanisms they already had established. This was expressed by one of the PAPs, who said:

"Men can sustain hardship for a long time but do not want to break social bondage of long duration".

(Reported in resettlement evaluation, June 2000)

It has been reported that in contrast, many of the occupants in the resettlement site on the west bank are landless poor from Sirajganj, who have been moved far from their original homes. In some cases, they have not been displaced by the Jamuna Bridge project, but have become homeless or landless either by natural erosion or river embankments constructed in Sirajganj.

- **Capacity and institutional sustainability**. It is not a surprise that attention to social impacts has proven difficult to integrate and coordinate into the overall project management. The project objectives have been defined in technical terms, and decisions have been made by technical experts who do not have the training or background to incorporate social or environmental considerations. Given this limitation, much has been accomplished, both in terms of gradually developing internal coordination capacity through the JMBA's Resettlement Unit, and through outsourcing of work and partnership with other institutions such as local NGOs who have more experience in community organizing, income generation activities, etc.

  At the end of the project period it is uncertain whether sufficient capacity has been developed for JMBA to coordinate these issues in the future. In particular, it has become clear that much greater emphasis has to be placed on implementation mechanisms, institutional capacity, and incentives, rather than just on the policy, preparation, and prescriptions of resettlement planning. For JMBA to be able to address these issues in the future will require sustained efforts, adequate resources, and continued collaboration with other agencies.

- **Ensuring adequate compensation**. It was agreed that the balance between the legally recognized compensation and the full, market-based replacement cost for lost land and assets would be covered through a payment which the NGOs working on the project would be responsible for. Establishing this additional payment, known as MARV, has proven difficult. It has also led to frequent delays, since the MARV payment could not be made until the formal land acquisition payment which the revenue authorities in the district were responsible for. Numerous complaints have been made about delays and other problems in getting these payments expedited.

  To some extent, these problems have been caused by inadequate land records and the difficulties in verifying claims. The result, however, has been that many PAPs have not received their full compensation in time, and have been unable to purchase new land. Some have also produced fictitious documentation of land transactions, often among friends or relatives, to be given the various grants and compensation amounts they are entitled to. In some cases, this has been done to expedite the process, but in other cases this constitutes attempts to defraud the project, for example by claiming compensation for fictitious structures, or by claiming higher values than what the assets are worth. Frequently, this has been done in collusion with local authorities. This is described in more detail in the next section.

- **Gender issues**. The project has enhanced women's status and access to resources in relation to land ownership, since title to new land is being registered in both husband's and wife's name. The limited impact evaluation indicates that some women have benefited from income generating activities, which have been more targeted and suitable for women than for men. On the negative side, there are reports that demands for dowry have increased substantially with more money available among the PAPs.

- **Governance issues**. Concerns have been raised about demands for unofficial payments of "speed money", as it is known in Bangladesh, before people have been given the compensation they are entitled to. Fraudulent claims and collusion among local, powerful people have led to excessive compensation payments, while in some cases the poorest among the PAPs have been unable to get the full support they are entitled to. Reports indicate that a standard "transaction fee" of ten percent of the compensation amount has been common in cases where the PAPs could document ownership and had all the papers in order. If they did not have all the papers in order, the fee was higher.

  A serious problem arose early on with fraudulent claims being made for structures, particularly in the area of the western approach road. Several thousand structures were erected after the agreed-upon cut-off date for entitlements, in the hope of getting additional compensation. It seems clear that in many cases, this was instigated by local elites, who hoped to gain from this. Legislation was passed to make this practice illegal, and the structures were for the most part dismantled. Nevertheless, many people were compensated excessively, while it has also been reported that some legitimate PAPs lost their structures without compensation in the move to prevent these fraudulent claims.

  The evaluation undertaken in the spring of 2000 indicates that these issues and impacts have been considerably more serious on the western side of the Jamuna, in Sirajganj district. On the east bank, in Tangail, there has been less conflict, and local leaders have been more supportive of the villagers. Overall, social cohesion, support, and community development seems to have been more successful on the east bank than on the western side, although it is unclear exactly what has caused this. The changes and disruptions brought about by the Jamuna Bridge project may have contributed to the problems on the west side, but if so, that does not explain why people on the eastern side seem to have been able to cope better.

- **The Role of NGOs**. Several local NGOs have worked on different aspects of the resettlement program, both in the initial planning stage (BRAC undertook the first socio-economic surveys on behalf of the project authorities), and through implementation. The role of the NGOs has not been an easy one. They have been regarded as contractors by the project authorities, and have had as their main mandate to provide delivery of certain services such as compensation payments and training. They have also participated in the monitoring and reporting of the process, although the focus has been on inputs and immediate outputs rather than outcomes and results.

  The first draft of the limited impact assessment suggests that the NGOs could have played a much more productive role if they also were asked to play a greater role in community organizing, information campaigns, and more responsibility in addressing grievances.

  Concerns have also been raised about the capacity of NGOs to undertake this type of work, and in some cases accusations have been made about collusion between NGOs, local elites, and politicians in diverting funds from the project. Clearer guidelines need to be developed to set standards for selection of NGOs, their roles and responsibilities, and how to ensure transparency and good governance in the work they undertake.

- **Time frame and sustainability.** Reports indicate that for many PAPs, the shock of displacement and loss of land has been serious. The project is responsible for resettlement, compensation and rehabilitation, but there has been a lack of clarity regarding time frame and sustainability. With the entitlements and compensation for losses suffered, it is easy for PAPs to develop a "victim mentality" and make excessive claims, or to expect continued charity and welfare. This is not the intention of a

resettlement program. JMBA has expressed concern that there is a lack of clear standards about how much and for how long they should be expected to be responsible for people's development. More explicit attention needs to be given in the future to how the mitigation of negative impacts can be combined with sustainable development, participatory planning and implementation on the part of the beneficiaries, and how support to displaced people can be combined with local area development efforts.

D. Conclusions

The Jamuna Bridge project has achieved a great deal related to resettlement, particularly in establishing basic principles and approaches. Overall, the resettlement and compensation payments have largely been completed, while efforts at rehabilitating those who have suffered loss of livelihood have proven less successful. Since this affects the very poorest and most vulnerable, it is clear that more attention needs to be given in the future to risk assessment, vulnerability, and livelihood opportunities for the poorest.

It now seems clear that both IDA and the Government initially underestimated some of the challenges in implementing the RRAP and EFAP, particularly in regard to institutional capacity, commitment, and issues related to governance. As a result, the outcomes are uneven. There are clear winners – including some among the PAPs as well as among local elites who have gained more than they were entitled to. On the other hand there are also losers, particularly among the poorest, who have been unable to access the various support mechanisms established. There have also been more indirect impacts on local communities, such as reported sharp increases in traffic-related deaths and accidents.

The preliminary impact assessment for the resettlement program states,

"75% of PAPs are now staying as squatters in the khas land or in the land of relations as they could not buy new lands with the CCL received against loss of agricultural lands and homestead lands. Main occupations of the people of this area were handloom operation, agriculture and day labor. As their lands have been acquired, 40% of these PAPs have been forced to become jobless."

As of project closing, the resettlement program has not been completed. Additional research is required to document the impacts, and decisions need to be reached regarding how the poorer and more vulnerable can be given additional support. IDA will continue to supervise the project until there is agreement that the provisions in the RRAP and EFAP have been fulfilled.

Annex 11. Financial Analysis

Table I

Assumption from 1997 Toll Study

Cash-Flow : Net Revenue

Taka, million

Year	Total Costs	Total Revenue	Net Income	Return	Cost Cover
1998	536	987	452	45.8%	1.84
1999	385	1095	710	64.8%	2.84
2000	386	1217	831	68.3%	3.15
2001	467	1358	890	65.6%	2.90
2002	589	1516	927	61.2%	2.58
2003	689	1611	923	57.3%	2.34
2004	1006	1715	709	41.3%	1.70
2005	1194	1828	635	34.7%	1.53
2006	1207	1930	723	37.5%	1.60
2007	1282	2040	758	37.2%	1.59
2008	1145	2158	1013	46.9%	1.88
2009	1082	2285	1203	52.7%	2.11
2010	1077	2421	1344	55.5%	2.25
2011	1159	2541	1381	54.4%	2.19
2012	1284	2667	1383	51.8%	2.08
2013	1233	2801	1568	56.0%	2.27
2014	1308	2944	1636	55.6%	2.25
2015	1443	3095	1653	53.4%	2.15
2016	1500	3255	1755	53.9%	2.17
2017	1580	3424	1844	53.9%	2.17
2018	1475	3604	2129	59.1%	2.44
2019	1363	3795	2432	64.1%	2.78
2020	1358	3998	2640	66.0%	2.94
2021	1446	4213	2768	65.7%	2.91
2022	1580	4442	2862	64.4%	2.81
2023	1482	4684	3202	68.4%	3.16
2024	1240	4942	3702	74.9%	3.98
2025	1059	5216	4156	79.7%	4.92
2026	1079	5506	4427	80.4%	5.10
2027	1170	5815	4644	79.9%	4.97
2028	1061	6143	5082	82.7%	5.79
2029	944	6491	5547	85.5%	6.88
2030	942	6861	5918	86.3%	7.28
2031	1043	7254	6211	85.6%	6.96
2032	1194	7605	6412	84.3%	6.37
2033	992	7603	6611	86.9%	7.66

Total Costs:	O&M + debt service (principal plus interest)
Total Revenue:	Road Tolls + rail charge + power charges
Net Income:	Total Revenue minus Total Costs
Return:	Net Income Over Total Revenue
Cost Cover:	Total Revenue over Total Costs
Assumptions:	Foreign exchange rate risk borne by GOB

Base Case Scenario

Table II

Cash-Flow : Net Revenue

Taka, million

Year	Total Costs	Total Revenue	Net Income	Return	Cost Cover
1998	535.5	539	3.7	0.7%	1.01
1999	389.8	632	242.0	38.3%	1.62
2000	395.3	768	372.7	48.5%	1.94
2001	481.7	836	354.4	42.4%	1.74
2002	607.9	906	297.9	32.9%	1.49
2003	731.6	1069	337.8	31.6%	1.46
2004	1103.1	1153	50.3	4.4%	1.05
2005	1333.8	1244	-90.3	-7.3%	0.93
2006	1368.0	1314	-54.2	-4.1%	0.96
2007	1463.9	1390	-73.5	-5.3%	0.95
2008	1348.4	1611	262.4	16.3%	1.19
2009	1306.1	1707	400.6	23.5%	1.31
2010	1323.3	1807	484.0	26.8%	1.37
2011	1427.2	1914	487.1	25.4%	1.34
2012	1574.0	2029	454.9	22.4%	1.29
2013	1558.5	2356	797.7	33.9%	1.51
2014	1701.8	2498	796.0	31.9%	1.47
2015	1913.7	2647	733.3	27.7%	1.38
2016	2020.2	2807	786.9	28.0%	1.39
2017	2131.8	2977	845.1	28.4%	1.40
2018	2058.8	3464	1404.7	40.6%	1.68
2019	1979.3	3674	1694.2	46.1%	1.86
2020	2006.5	3897	1890.1	48.5%	1.94
2021	2127.4	4133	2006.0	48.5%	1.94
2022	2294.9	4384	2089.2	47.7%	1.91
2023	2231.2	5109	2877.4	56.3%	2.29
2024	1893.9	5420	3526.6	65.1%	2.86
2025	1606.9	5749	4142.4	72.1%	3.58
2026	1650.9	6046	4395.3	72.7%	3.66
2027	1767.0	6356	4589.1	72.2%	3.60
2028	1682.7	7346	5662.9	77.1%	4.37
2029	1591.3	7720	6128.6	79.4%	4.85
2030	1615.8	8118	6502.0	80.1%	5.02
2031	1742.3	8476	6733.8	79.4%	4.86
2032	1920.0	8974	7053.7	78.6%	4.67
2033	1645.7	9436	7789.8	82.6%	5.73

Total Costs:	O&M + debt service (principal plus interest)
Total Revenue:	Road Tolls +Other revenue streams
Net Income:	Total Revenue minus Total Costs
Return:	Net Income Over Total Revenue
Cost Cover:	Total Revenue over Total Costs
Assumptions:	Taka depreciates by about 2% a year against US$;
	Toll Revenues are increased by about 10% every 5 years; and
	Non-toll rates are as per negotiated rates.

Low Case Scenario

Table III

Cash-Flow : Net Revenue

Taka, million

Year	Total Costs	Total Revenue	Net Income	Return	Cost Cover
1998	535.5	539	3.7	0.7%	1.01
1999	389.8	617	226.7	36.8%	1.58
2000	395.3	741	345.4	46.6%	1.87
2001	481.7	795	313.7	39.4%	1.65
2002	607.9	851	242.7	28.5%	1.40
2003	731.6	908	176.7	19.5%	1.24
2004	1103.1	967	-136.0	-14.1%	0.88
2005	1333.8	1030	-303.8	-29.5%	0.77
2006	1368.0	1078	-290.3	-26.9%	0.79
2007	1463.9	1130	-334.2	-29.6%	0.77
2008	1348.4	1184	-164.1	-13.9%	0.88
2009	1306.1	1242	-63.8	-5.1%	0.95
2010	1323.3	1303	-20.6	-1.6%	0.98
2011	1427.2	1366	-61.2	-4.5%	0.96
2012	1574.0	1433	-140.5	-9.8%	0.91
2013	1558.5	1504	-55.0	-3.7%	0.96
2014	1701.8	1578	-123.9	-7.9%	0.93
2015	1913.7	1656	-258.0	-15.6%	0.87
2016	2020.2	1738	-282.2	-16.2%	0.86
2017	2131.8	1824	-307.4	-16.9%	0.86
2018	2058.8	1915	-143.9	-7.5%	0.93
2019	1979.3	2010	31.0	1.5%	1.02
2020	2006.5	2111	104.3	4.9%	1.05
2021	2127.4	2216	89.1	4.0%	1.04
2022	2294.9	2328	32.6	1.4%	1.01
2023	2231.2	2445	213.3	8.7%	1.10
2024	1893.9	2567	673.5	26.2%	1.36
2025	1606.9	2696	1089.0	40.4%	1.68
2026	1650.9	2702	1051.0	38.9%	1.64
2027	1767.0	2707	939.7	34.7%	1.53
2028	1682.7	2712	1029.3	38.0%	1.61
2029	1591.3	2717	1125.2	41.4%	1.71
2030	1615.8	2722	1105.9	40.6%	1.68
2031	1742.3	2726	984.0	36.1%	1.56
2032	1920.0	2731	811.3	29.7%	1.42
2033	1645.7	2736	1090.5	39.9%	1.66

Total Costs:	O&M + debt service (principal plus interest)
Total Revenue:	Road Tolls +Other revenue streams
Net Income:	Total Revenue minus Total Costs
Return:	Net Income Over Total Revenue
Cost Cover:	Total Revenue over Total Costs
Assumptions:	Taka depreciates by about 2% per year against US$
	Traffic growth figures are as per SAR figures; and
	Non-toll revenues are as per negoitated rates.

Annex 12. Partner Comments

(a) Borrower Implementing Agency:

Borrower Comments on Implementation Completion Report

1) In the top of the Abbreviation page correction should be as BDTk. 1 = US$ 0.0196
2) In the first page, the title of the project should be "Jamuna Multipurpose Bridge Project'.
3) In page No. 1 Para. 3. 1. 1, the last line should be written as 'facilitating stimulate economic growth by transport of road and rail passengers, freight and transmission of gas & electrical Power".
4) In the page No.2 Para-3.1.2(c), "and a hard point' should be added at the end of last line.
5) In the page No.4, Para -4.2.3, the second line should be written as below - was caused by the late award of the river training works contract due to delay in finalization of loan agreement which prevented the selected.....
6) In the page No.5 Para -4.2.4 In addition to the causes mentioned, the following causes should be added: (f) Pile wall thickness (g) Karimon rock issue.
7) In page 6, para 4.3.2 this clause should be revised to take account of the successful conclusion of claims negotiation with three of the four contractors.
8) In the page No.7 Para 4.3.3, it is mentioned "This is because the high toll strategy has resulted in slightly lower than projected truck traffic levels using the bridge", this statement is not true. The reason behind the lower than projected truck traffic levels is due to presently under construction of the access road, not because of high toll.
9) In the page No.7, para-4.5.2 the last two lines should be changed as follows: JMBA has not yet developed appropriate skills to independently manage the Construction and operation of a large bridge in Bangladesh.
10) In the page No. 8, Para-5.3, the fifth line should start in the following way, 'The decision to establish social and environmental units within ...
11) in the page No. 8, Para-5.4. 1, the total cost needs to be revised after finalization of settlement of all claims of the contracts.
12) In the page No.10, para-6.2.2 "Several options are currently being bridge management contact, may be omitted.
13) In page No. 10 para 7.1.1. in the fifth line it is mentioned 'The active Project identification/preparation phase lasted from 1989 to 1993. The causes of delay in project preparation phase while the consultants submitted the final feasibility report in 1989 should be mentioned in this para. Because for the delay in taking decision by IDA, the original approved cost of the project proforma (PP) increased from US$700.00 Million to US$ 860.00 Million at the time of commencing the project. The cost of delay in holding decision by the donors, particularly IDA was extremely high.
14) In the page No. 11 para-7.1.3, the last line should be written as below "An action plan-EFAP-to mitigate the impacts of the Jamuna bridge on the project affected people had to be developed and retrofitted during project implementation.
15) In page 12, para 7.6.1, the first line mentions "JMBA played a key role in both project preparation and implementation by ... and implement the project," According to the above statement the implementing agency's performance should be highly satisfactory. JMBA is a small organization, and it played very important and significant role in project preparation. JMBA put all out efforts to convince GOB and the donors for implementing the project.
16) In the page No. 13, para-7.6.3, we do not agree with the statement that "... JMBA has not shown the necessary initiative and imagination to resolve [the claims] in a mutually satisfactory manner." We consider that the World Bank is misinformed about the manner in which the Government of Bangladesh and the Authority have undertaken the task of claims resolution. Happily, the settlement with the Contractor for Contract-1 has shown clearly that the bank is incorrect. It is well known to all those involved in the process that the position vis-a-vis. Contract 2 - the only contract the claims of which remain unresolved-is the result of the Contractor's intransigence and seeming inability to undertake negotiation with the necessary flexible attitude.

17) In the page No. 14, para-8.9, the report omits mention of the site facilities for the Construction Supervision Consultant, the Management Consultancy and Authority. The housing and offices were completed many months late by the Contractor for Contract 2. This presented very significant difficulties in supervision of the project, which should not be allowed to recur. Possible solutions include:
   * inclusion in the Contract Documents of liquidated damages for late completion of these facilities; and
   * Provision of these facilities by means of a preliminary contract, timed to ensure that the facilities would be complete at the start of the principal site work.
18. In the page No. 15 para-8.15, in the third line it is mentioned "the probable reason is that ... the civil works have been completed". This is not true. This line should be omitted. Because some responsibilities lies on contractors who did not submit claims in time.
19. In the first para of the page 25, causes of low truck volume crossing the bridge have been mentioned. The cause No. ii states "The various incentives provided to truck drivers in Aricha-Nagarbari Ferry seemed to have attracted some truck traffic to remain with the ferry." It is not mentioned what types of incentives are provided to the truck drivers to remain with the ferry. The cause of low traffic volume mentioned in (iv) of the same para is the main reason and the para should be restated accordingly.

(b) Cofinanciers:

Japanese Bank for International Cooperation's Comments (formerly Overseas Economic Cooperation Fund of Japan):

Comments on ILI

- The list of abbreviations be made more exhaustive incorporating abbreviations like QAG at para 2.
- The full import of some of the abbreviations like BRAC, JBIC and UNDP be corrected. [BRAC stands for Bangladesh Rural Advancement Committee, JBIC stands for Japan Bank for International Cooperation, UNDP stands for United Nations Development Programme].
- Various dates mentioned in the draft (for example, the end of contract of river Training Works, contract & 4 figures at pages 18 and 19 of annex -1) may be re-checked to see that they reflect the correct dates.
- In the Project Data (first page), please mention "JBIC" or "JBIC (formerly OECF)" against the entry "Other Partners.
- At para 3.3, the abbreviations put under 'sector' be specified and the cost mentioned in the next column be denominated.
- WB may consider deleting the last sentence of page 3.
- Para. 4.2.5: As it came out at a later stage, the acquisition of 3,000 hectares of land appeared to be more than necessary. A more prudent acquisition plan could have been adopted. This could also minimize the social and environmental impacts.
- Para. 5.4.1: It is not mentioned if the total cost including the WB non-SAR funded cost includes cost for RRAP/EFAP and EMAP, gas pipeline, or railway track. If so, these items may also be included in the parenthesis.
- An important thing that could be learnt is that the executing agency should have good knowledge of the operation procedures of the development partners.
- The ownership of the project was manifested due mainly to the spontaneous participation of the public in the raising of the counterpart fund. The involvement of the stakeholders therefore is critical to the successful implementation of the project. The other reason for the successful implementation of the project was the preparedness of the Government/executing agency before the effectiveness of loans, the preparedness took inordinately long time though. This prolonged preparedness could possibly be shortened for future projects if the lessons learnt from this project can be effectively integrated

Asian Development Bank's Comments

Comments on the Draft Intensive Learning Implementation Completion Report prepared for the Jamuna Bridge Project

Para. 3.5	Quality at entry may be qualified more.
Para. 4.1.1	The statement with respect to high toll strategy may be qualified.
Para. 4.2.2	The Jamuna Bridge with its dual gauge rail configuration will also fulfill its role as a critical rail link on the Trans Asian Railway.
Para. 4.5.	Degree of capacity building and training provided under the Project (on the-job training and/or other training)? Did the consultants not have any institutional impact at all? I thought some impact would have been made albeit low.
Para. 6.1.3	Some further elaboration and the actual toll levels adopted would be helpful.
Para. 6.1.4	The rail, power interconnector and gas pipeline were not to become operational until later (2002, 2010 and 2005). This needs more elaboration.
Para. 6.1.5.	The new dual gauge railway line from Joydevpur to the east end of the bridge is expected to be completed during 2001 and opened for revenue service in 2002.
Para. 7.1.3	Was the project preparation costs high compared with similar types of projects in similar environments?
Para. 7.6.2	With respect to engagement of management consultants, which perhaps was the only sensible option for this type of project(?), this para. could be phrased somewhat more positively.
Para. 8.14	Could a different approach and process have been adopted to resolve the claims? What options were available or could have been considered?
Para. 8.18	What areas of capacity building was lacking or could have been strengthened to maximize impact?

Other: Some more background to the Project would be useful.

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

JAMUNA MULTIPURPOSE BRIDGE AUTHORITY

JAMUNA BRIDGE PROJECT

BORROWER'S EVALUATION OF THE PROJECT

Table of Contents

Intensive Learning Implementation Report
Borrower's Contribution

1. Introduction

This paper provides an evaluation by the Jamuna Multipurpose Bridge Authority of the extent to which the objectives of the Jamuna Multipurpose Bridge Project have been achieved. The principal issues that have arisen during implementation of the project and the lessons that have been learned from. The evaluation forms part of the intensive learning implementation process that is being undertaken as a requirement of the World Bank. Although at this time the construction works have been completed there are a number of outstanding issues relating to contract claims settlement and the Resettlement and Environment programs will continue until June 2001.

2. Project Objectives

The overall objective of the Jamuna Multipurpose Bridge Project is to stimulate economic growth by providing land transport of passenger and freight traffic, and transmission of electricity, natural gas and telecommunications facilities between the North-West quadrant and Eastern half of the country in a cost effective manner.

While the final success of the project will be demonstrated by the socio-economic development if facilitates, for the practical purposes of this evaluation JMBA has focussed on the practical objectives relating to the project implementation. Such objectives were defined by JMBA as part of a Strategic Planning process at the commencement of the project implementation and can be identified as relating to the following areas:

- Successful completion of the Jamuna Multipurpose Bridge Project
- Establishing safe and efficient arrangements for operation and maintenance of the Project
- Developing the institutional capability of the JMBA and establishing it as a permanent organization with an expanded role

Each of these areas is considered in more detail in the following paragraphs.

3. Successful Implementation of the Project.

This has been evaluated on the basis of:

1. Completion of the project to specification
2. Completion of the project on time
3. Completion of the project to budget
4. Effectiveness of implementation arrangements
5. Adequacy of protection of the environment
6. Treatment of Persons directly and indirectly affected by the project

3.1. Completion to Specification

This is best approached by examination of the principal exceptions arising during implementation, which are noted as follows:

3. 1. 1. Main Bridge Contract - Main piling design

The Contract specification required the main piles to be "compact" (resistant to failure under earthquake loading). The Contractor's tendered design failed to meet this requirement of the specification. The necessary compactness was achieved by replacing the originally specified sand filling to the piles with concrete. The Contractor has, however, raised a claim for the additional cost of concrete filling to the piles.

JMBA rejected the claim in principle and it is now under discussion as part of the ongoing process to achieve a negotiated settlement with the Contractor.

3.1.2 Main Bridge -Cracks in Concrete

The Contract specification limited the allowable maximum crack width in structural concrete to O.25mm. In the event, a few cracks in excess of this limit developed in certain elements of the bridge. Exhaustive investigations revealed a combination of causes (design detailing, thermal effects and construction techniques). None of the cracks threatened the integrity of the bridge and all were rectified by means of injection grouting and local reinforcement to safeguard the durability of the bridge.

There was, however a considerable amount of publicity and potential public concern surrounding this issue. This was dealt with effectively by concerted action by JMBA, the consultants and members of the Panel of Experts. An open meeting was held in Dhaka to inform the public of the nature of the reported cracks and the action taken and to give reassurance that the integrity of the structure was completely safeguarded.

3.1.3 Main Bridge - Gas Pipeline Collapse

Installation of the gas pipeline was undertaken as a variation order on the contract, fully funded by Petrobangla. During hydro-testing of the pipeline in early June 1998 a failure of the pipe fittings occurred which caused the entire pipeline to collapse. Investigations indicated design failure as the cause. The pipeline has been replaced with re-designed fittings at the Contractor's expenses but has generated a number of problems in terms of claims for additional expense and damages.

JMBA has claimed damages for the additional supervision and design checking costs involved in the reinstallation and for the cost of the CONAT reimbursement made to the contractor for the second importation of materials. The Contractor has registered a counterclaim for additional expenses associated with the reinstallation, which are claimed to be improvements to the original design.

These matters are now under consideration as part of the claims negotiation process for Contract 1.

3.1.4 River Training Works Falling Apron Rock

The Contract Specification required rock, which was to be placed in the falling apron to the guide bunds, to meet a number of criteria. One of the sources of rock, "Karimun rock from Indonesia marginally failed one of these criteria, the AIV (Aggregate Impact Value) test. This was not considered to be serious, but nevertheless the size of the rock was increased as a precaution. There were no financial implications arising from this issue.

3.1.5 River Training Works - Guide Bund Failures

The Contract Specification required the East and West Guide Bunds to be constructed to defined slopes. In the event it proved impossible to build the guide bunds to these slopes under the conditions prevailing and significant parts of the West Guide Bund failed during the course of construction. This, the most serious problem encountered on the entire project, was overcome by re-designing the guide bunds to flatten the slopes.

These events have resulted in significant claims being made by the Contractor, which have been rejected by JMBA. The issue of application, extent and adequacy of insurance cover on the contract has been the subject of protracted discussion and correspondence as part of the claims negotiation process for Contract 2.

3.1.6. Approach Roads - Drainage Channels

Part of the drainage channels around the East Bridge End Facilities have collapsed. The reasons for this are currently under investigation and the solution will depend on the outcome of this investigation.

3.1.7. Settlement of Underpass

An additional road over rail bridge, in lieu of a level crossing, and associated adjacent underpass was constructed as part of the West Approach Road. It was not possible to carry out local site investigations prior to design and still meet the construction program so the design was based on the assumption that local ground conditions were similar to elsewhere on the contract. The box culvert underpass settled and cracked after construction. Post- failure investigations revealed a local pocket of soft material. The box culvert was satisfactorily repaired by injection grouting and retrofitting a formed joint.

3.2 Completion to Time

The task of implementing the project on time was made particularly demanding by the complex nature of the project comprising not only construction of the bridge itself but also the river training works, approach roads and flood embankments and by the extensive Resettlement and Environment programs involved. Works had to be programmed to take account of the monsoon season.

With the exception of the gas pipeline the project was substantially completed on 20 June 1998 only 6 months later than the original planned completion date. The gas pipeline, which was the subject of a Variation Order on Contract 1 (Main Bridge and Approach Viaducts), collapsed in June 1998. This has been replaced by a new pipeline with re-designed fittings and was certified complete.

Start and finish dates for the contracts compared with the original and revised dates for completion are shown in Table 1.

Component	Contract Start	Original Contract End	Revised Contract End	Actual End
Bridge and Approach Viaducts	15 Oct 1994	13 Dec 1997	20 Jun 1998	20 Jun 1998 (ex gas pipe)
River Training Works	15 Oct 1994	2 Apr 1997	13 Dec 1997	16 Oct 1997
East Approach Road	15 Oct 1994	1 Feb 1997	31 Mar 1998	31 Mar 1998
West Approach Road	15 Oct 1994	1 Feb 1997	1 Dec 1997	1 Dec 1997

3.2.1 Reasons for Program Delay

The award of the contract for River Training Works was delayed by negotiations between JMBA and the Contractor on the contract price. As a result this delay the contractor was unable to mobilize prior to the 1994 flood season, the sequence of construction of the guide bunds had to be revised and the associated completion date for the river training works extended by 255 days to 13 December1997.

The re-sequencing of the River Training Works had a knock on effect in delaying the Main Bridge and Approach Road contracts. These contracts were also delayed by the period of political non-cooperation in March 1996. The Main Bridge was further affected by requirements for installation of the gas pipeline and broad gauge rail by the planned opening date.

3.3 Completion to Budget

The budgeted cost of the project is contained in the government's Project Proforma. This was revised in April 1994 and it is this revised proforma that has been used as the benchmark for financial performance of the project during the construction period.

An accurate measurement of the final cost of the project can only be made when the final costs of the construction contracts are known. At the time of preparation of this report (June 1999) final measurement of works, settlement of contractual claims and other differences in valuation have yet to be made. These are currently the subjects of negotiation with the contractors. Independent joint-facilitators have been appointed to assist in the resolution of claims on the Bridge and River Training Works contracts and an Inter-Ministerial Claims Committee has been formed to represent the government's interests in this process. The facilitation process is going ahead on both contracts. Substantial progress has been made with the Bridge contract, the River Training Works negotiations are awaiting resolution of an issue relating to claims against the Contractor's all risk insurance.

In addition to the forecast costs of contracts including the Construction Supervision Consultant's estimate of the final cost of claims etc., JMBA has requested government to provide a contingency of Tk 1,600 million (approx. USS 40 million) to cover the risk of final claim settlements exceeding the Construction Supervision Consultant's estimate.

Estimated outturn against the project budget has been assessed both including and excluding utilization of this contingency. Consideration has also been given to the effect of including and excluding the Resettlement budget/outrun from the calculation. The Resettlement Program in fact is contained in a separate Project Proforma that has recently been revised to show a significant saving against the original budget.

The result of this comparison is a range of cost increase, depending on assumptions, of between approximately 1 % and 8% over the budget. This is considered to be a satisfactory outcome having regard to the size and nature of the project. Details of the forecast cost against budget are contained in Annex B and the results of the comparison summarized in the following table.

	Including Resettlement		Excluding Resettlement	
	CSC Forecast Tk M	Contingency Expended TK M	CSC Forecast Tk M	Contingency Expended Tk M
Budget	36,036.94	36,034.94	34,404.94	34,404.94
Outturn	36,337.21	37,937.21	35,587.21	37,187.21
Increase	302.27	1,902.27	1,182.27	2,782.27
Increase %	0.84%	5.28%	3.44%	8.09%

Loans approximating to USS 200 million each were provided by the three Co-Financiers (IDA, ADB and OECP) with the balance of funding provided through the government's Annual Development Program (ADP). At the time of reporting, approximately 97% of the loans have been utilized. Use of the balance of approximately US$ 20 million equivalent is dependent on the timing of settlement of outstanding contract claims, and any extension of loan or loan grace period granted by the Co-Financiers. The Economic Relations Division of the Ministry of Finance has made an application for such an extension.

During the course of the construction period, the percentages disbursed by the Co-Financiers against certified sums due on the construction contracts were reviewed on two occasions:

1. During the Project Mid-Term Review in March 1997, the Co-Financiers instigated a reduction in the disbursement percentage, having regard to the forecast final cost of the contracts and the desirability of retaining a loan disbursement element through to the end of the project. It may be noted that the sum used for final cost in the Co-Financiers' calculations included the estimated cost of contract claims thereby implying a commitment to funding through to settlement of these claims.

2. In February 1998, having regard to the revised final estimated costs of the contracts and progress with loan disbursements, the government requested an upward revision of the loan disbursement percentages such that loan disbursements would be 100% of certified contract payments. This was agreed by the Co-Financiers.

The percentage contributions applying during the course of the project are shown in the following table:

	Construction Contracts			Technical Assistance		
	IDA	ADB	OECF	IDA	ADB	OECF
To March 97	30.70%	30.10%	30.70%	33.33%	33.33%	33.33%
April 97 to Feb 98	26.21%	26.21%	22.00%	33.33%	33.33%	33.33%
From March 98	35.75%	36.50%	27.75%	33.33%	33.33%	33.33%

If the reduction in disbursement percentage had not been applied in April 1997, it is likely that the full balance of the co-financier loans would have been utilized by 30 June, 1999.

3.4 Effectiveness of Implementation Arrangements

3.4. 1 Implementing Agency

The Jamuna Multipurpose Bridge Authority was formed by government Ordinance in 1985 as the implementing agency for the project. Since it had no other responsibilities JMBA formed an important focus for the complex implementation arrangements which included coordination of contractors and consultants and management of programs for Resettlement and Environment and dealing with the Co-Financier and Government funding departments. Designation of a separate Jamuna Bridge Division within the Ministry of Communication, with the Secretary having a dual role as Executive Director of JMBA contributed significantly to decisions being taken quickly on project matters.

A drawback with using such an agency funded from the government development budget was that many senior staff were appointed on deputation from other ministries and departments. As a consequence there was a relatively high turnover of staff and the lack of permanence impacted on the ability to secure transfer of technology from the consultants.

3.4.2 Consultants

A consortium of international and local consultants supervised the construction works. In addition, JMBA was directly assisted by the appointment of Management Consultants, providing technical and financial advice to the authority and by a Panel of Experts, senior local and international experts who were called upon to provide advice on technical issues as required.

In view of the size and complexity of the project, and relative inexperience of JMBA, being a new authority the advice and assistance of the Management Consultants and the Panel of Experts were of particular benefit in strengthening JMBA and enabling it to undertake the role of implementing agency more effectively.

3.4.3 Cofinanciers

The relationship and communication between JMBA and the Co-Financiers was generally very good. Training in procedures for key finance staff enabled the process of preparation of withdrawal and disbursement documentation for procurement to proceed smoothly. Differences in practices relating to control and monitoring of loans adopted by different co-financiers caused minor delay in some payments.

3.5 Protection of the Environment

Mitigation of the environmental impact of the project was provided for in the Environmental Management Action Plan (EMAP) prepared by the JM8A Environmental Unit and BUET in 1995. This comprised the following components much of the work on which was/is being undertaken through contracts with NGOs:

- Development of guidelines for construction related impacts
- Promotion of changes in cropping patterns
- Boat navigation survey
- Fish culture development
- Wildlife survey and monitoring
- Plantation and social afforestation
- Water level and quality monitoring
- Environmental planning of bridge ends and resettlement sites
- Environmental health education campaign

The opening of the' Dhaleswari spill channel reduced the required inputs on changes in cropping patterns and boat navigation to monitoring and evaluation only. Water levels and quality were monitored and found satisfactory, effectively completing this component. The Bureau of Health Education successfully completed the Environmental Health Education campaign. The programs relating to fisheries and plantation are on going. Progress on fish culture was delayed by the flood conditions and the work being undertaken by NGOs has been augmented by inputs directly from JMBA. Plantation and distribution of saplings among PAPs has been satisfactory and is continuing.

3.6 Fair and Just Treatment of Project Affected Persons

Resettlement and compensation of Project Affected Persons (PAPs) is being undertaken through the Revised Resettlement Action Plan (RRAP) in line with World Bank Operational Directive No OD4.3O and the Erosion and Flood Action Plan (EFAP) which is a sub-project of RRAP. The overall number of persons affected by the project is approximately 100,000.

RRAP includes the development of resettlement sites, the provision of a range of cash grants to compensate for loss of land and facilitate purchase of replacement land and occupational training and micro-credit programs. EFAP provides payments to compensate persons losing land or crops' as a result of erosion or flood deemed to be resulting from the project works.

A Resettlement Unit was set up within JMBA's structure to implement RRAP and has been assisted by a field-implementing agency. ROM. The Employment and Income Generation program, covering 3,000 project affected persons over 3 years is being implemented through two NGO's PKSF and DORP. Another implementing agency, BRAC, has been engaged to administer the EFAP program.

Good progress has been made with physical resettlement. Development of resettlement sites in Sirajganj and Shuapur has been completed and a further site in Bhuapur is in progress.

Disbursement of compensation has generally been slower than anticipated due to problems with verification of claimants and claim details.

The Resettlement program continues until the end of the year 2000 and efforts are being made to speed up the process of payment of entitlements.

4. Operation and Maintenance Arrangements

4.1 Institutional Arrangements for Operation and Maintenance

Having regard to the nature of the work required and the current level of experience within JMBA, it was decided to let an international contract for operation and maintenance of the works for the first five years. Following tenders and evaluation, a contractor was appointed and commenced responsibilities under a five-year contract with effect from 23 June 1998 when the bridge was opened to traffic. In addition to carrying out regular inspection and maintenance of works in accordance with the contract provisions, the contractor also collects all road tolls on behalf of JMBA and deposits them to JMBA's account on a monthly basis.

The first year of operation of this contract has resulted in a number of claims from the contractor for works considered to be outside the scope of the contract. JMBA is examining these claims. There has also been some delay to the procurement of essential equipment as a result of disagreement between JMBA and the contractor on the contractual provisions relating to the financing of these items.

4.2 Road Traffic Toll Levels

The parameters set for determination of the road tolls were that they should:

1. Be set at a level, which would recover the full cost of operation of the bridge including servicing debt
2. Be comparable with existing ferry service charges

The current schedule of tolls was agreed by government after recommendations made in a study carried out by JMBA's management consultants and documented in the Tolls Study Report September 1997. The approved tolls are shown below:

Vehicle Class	Toll (Taka)
Motorcycle	30
Car and Light Vehicle	400
Small Bus (29 seats or less)	550
Large Bus (more than 29 seats)	800
Light Goods Vehicle (less than 5 tonnes)	750
Medium Goods Vehicle (S to 8 tonnes)	1000
Heavy Goods Vehicle (more than 8 tonnes)	1250

On the basis of forecast road traffic, and proposed charges for rail and utility services using the bridge (see below), the Toll Study report demonstrated that the revenue from use of the bridge would be sufficient to cover full costs of operation and maintenance.

4.3 Tariffs for Rail and Public Utility Services

The Tolls Study Report included proposals for annual charges to be made in respect of provision for Rail, Gas and Electricity crossings via the bridge. The proposed annual charge for Rail was Tk 148 million and for Gas and electricity, Tk 150 million each. In negotiations with the appropriate authorities there has been considerable resistance to the proposed charges. Agreement has been reached with Bangladesh Rail for a payment of Tk 5 million per annum until the rail link from Dhaka to the Northwest is completed and thereafter an annual payment of Tk 75 million per annum will become effective. In the case of Electricity payment of Tk 0.5 million per annum will be made until the electricity connection is fully energized. A charge for telecommunications cabling on the bridge (not part of the Tolls Study Report proposals) of Tk 3 million has been agreed. No agreement has yet been reached for charges far the gas pipeline. The position can be summarized as follows:

Service	Toll Study Proposal	Current Position
Rail		
Gas	Tk 150 m per annum	No agreement
Electricity	Tk 150 m per annum	Tk 0.5 m per annum until fully energized then re- negotiate
Telecomm	Not considered	Tk 3 m per annum

Sums to be realized from tariffs are, therefore, significantly less than those envisaged in the Tolls Study Report. To mitigate against the reduced income from these sources compared with Tolls Study projections JMBA has applied to government for continued ADP funding of Operation and Maintenance expenditure

(with the exception of loan interest and reserve fund payments) for the first three years of O&M. Comparison of the forecast revenue and expenditure for the first 5 years of operation (assuming this additional funding is agreed) with the original Toll Study forecast is given in Annex 8.

The revenue surplus shown in this forecast will be used to create a reserve fund in lieu of insurance, for emergency repairs to the bridge. The provision of government AOP funds for the first 3 years effectively mitigates against the reduced tariff income during this period. After three years, toll revenue, together with the revenue from tariffs is forecast to be sufficient to cover operating costs.

4.4 Traffic Forecasts and Toll Revenues.

A detailed comparison of the first year's traffic and toll figures compared with the Tolls Study Forecasts is given in Annex C. Total traffic numbers and revenue are higher than forecast but the distribution of traffic by category is significantly different to that forecast by the Toll Study. When sufficient time has elapsed to allow traffic trends to settle down a further detailed traffic study will be necessary for planning and forecasting purposes.

4.5 Toll Collection Arrangements

The system of automated barriers and computerized toll recording installed as part of the contracts for the approach roads (which include all the bridge end facilities) proved to be unsuitable for practical use. As a result the Operation and Maintenance contractor introduced a manual receipting and control system which is currently in operation pending consideration of proposals for installation of an effective fully computerized tolling system. Under the current manual system tickets are issued to each vehicle (a separate ticket type for each toll class) and a manual control record maintained of the numbers of each type of ticket issued for each shift n each lane. The total numbers of tickets issued can be compared with the barrier count (an automatic indicator of the number of times the barrier has operated in each toll lane). Proposals have been made by the contractor for installation of a computerized system, which includes automatic vehicle recognition and tolling features to provide a safeguard that the correct toll is applied to each vehicle. Introduction of such a system, however, would entail a significant cost and may involve a change in the toll classifications currently in use.

5. Institutional Development and Expansion of Role of JMBA

In addition to successful completion of the Jamuna Multipurpose Bridge Project and establishing arrangements for its continued operation and maintenance JMBA identified development of itself as an organization as an important objective. This comprised establishing a continuing and enhanced role for the authority in the future and the gaining of necessary capability to fulfil this role.

5.1 Institutional Development

5.1.1 Legal and Administrative Framework

JMBA Ordinances were duly formulated to provide the necessary authority to undertake it's role

5.1.2 Staffing and Management Arrangements

During the course of the project implementation period, many of the staff of JMBA were on deputation from other government ministries and departments. Turnover of staff was high mitigating against retention of skills and experience within JMBA.

5.1.3 Training and Transfer of Skills from Consultants/Contractors

These two issues are considered together as they are closely linked. A major part of JMBA's training strategy was based on staff working alongside contractors and consultants to gain knowledge and

experience. This has only proved partially successful. A number of factors mitigated against effective transfer of technology including lack of defined contractual arrangements, staff deputation and transfer, lack of appropriate counterpart staff and pressure on the contractors and consultants to meet tight deadlines for completion of works.

5.2 Establishment as a Permanent Organization with Expanded Role

The JMBA Ordinance 1998 provides the statutory basis for the expanded and continuing role of JMBA. It establishes JMBA's responsibility for toll road developments and for all bridges in excess of 1500 meters long. In addition, it provides for JMBA to create corporate entities, to transfer assets to these and subsequently to sell shares in them.

6. Summary of Lessons Learned from Implementation of the project

Lessons Learned:

The Jamuna Multipurpose Bridge Authority a body corporate was created to undertake all necessary feasibility, design & build the Jamuna Bridge. The Authority has overall responsibilities in all matters in connection with the bridge.

For taking decisions on the important and complicated matters there is a board chaired by the Minister, in-charge of the Ministry of Communications. Moreover, the decisions required in the Government level are quickly resolved through The Jamuna Bridge Division. This Division had been established in June 1995 under the Ministry of Communications for providing speedy decisions to JMBA.

Moreover, during execution period of the project, Construction Supervision Consultant (CSC) consisting of bridge engineers, river experts, road expert's etc. was appointed. In addition, Management Consultant (MC) was appointed to assist JMBA in its duties during construction.

At the construction site the JMBA staff carried out functions as counterpart to the Construction Supervision Consultants (CSC). The Management Consultants (MC) assisted the JMBA staff.

The function of the counterpart staff was to provide a close day link between the Employer (JMBA) and the Engineers (Construction Supervision Consultants) in order to facilitate quick decisions by the Employer where and when required. It also enabled of JMBA staff to gain an intimate knowledge of the construction. This knowledge has become very helpful to JMBA in the subsequent operation and maintenance of the Project.

The JMBA counterpart staff had the authority to inspect the work at any time and bring to the notice of the Engineer (Construction Supervision Consultants) the observation of their inspection for improvement or rectification as the case may be. The JMBA, however, at site also had responsibilities regarding public relations and liaison between CSC and MC and between CSC, MC and Contractors on one side and local GOB bodies on the other.

SNIBP was very complicated project for which the development partners appointed a internationally reported consultant to supervise the construction work of JMBP.

For transfer of technology different construction contractors made arrangements to impart training to the Assistant Engineer's of JMBA at the construction site during construction of the project. The Engineers were given theoretical & practical training on different components of construction procedure, materials, technique, etc. So the Engineers of the Authority had gained knowledge in the different field of construction works (Main Bridge, River Training Works, Approach Roads etc.) of JMBP.

But it is also true that as Engineer CSC was mainly responsible for supervision of the construction work, they were directly associated with the implementation of the project. As a result, the IMBA technical

personnel had limited opportunities to be directly involved in the construction works. Moreover, the senior officials of the Authority including Project Director was Deputed from other government organizations Most of the Officers were deputed for a short period which created some difficulties in implementation of the project, and hampered transfer of technology to the local Engineers. For implementation of any large project, JMBA should appoint more senior officers instead of deputation.

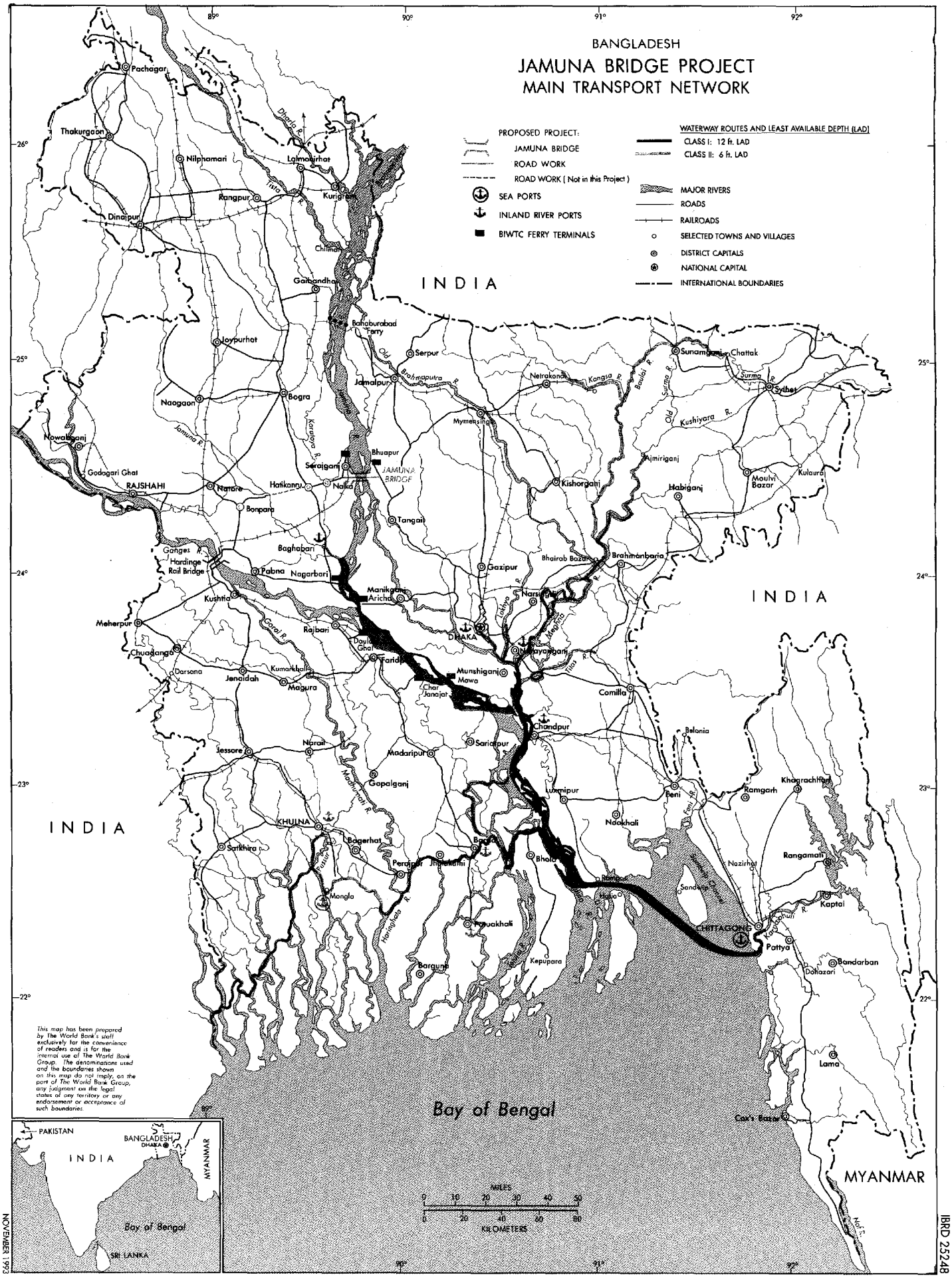
The objective of any big project is to achieve maximum economic benefits through the adoption of modern technology which is less costly, time saving and economically justifiable and technically feasible. In case of JMBP, a new technology (offshore) for sub structure of the bridge had been applied for the first time in Bangladesh. The engineers of SNIBA have gained experience from construction of the project.

For construction of East and West Guide Bund latest technique & instrument were used which is also new in Bangladesh. It is expected that JMBA has benefited substantially through the transfer of this technology.

The feasibility study was commenced in 1986 and the consultant submitted the final report in February 1989. On receipt of the study, there was disagreement of the World Bank with the economic analysis of the consultant. The Bank carried out economic analysis afresh with their experts. Being satisfied with the project's ERR (14.8%) the Bank agreed to finance the project in 1993. But due to lapse of long time from 1989 to 1993, the project cost increased by 37.60%, (original cost was Th. 2500.00 cr. and 1st revised cost was Tk.344O.OOct). Implementation of a project deserves examination of minimum effectiveness. The original date of commencement and completion of the project was 1990 and 1994 respectively. But the revised date of commencement and completion was October 1994 and June 1993 respectively. Pre-appraisal, appraisal, loan negotiation of this project took a long time. GOB had to make lot of efforts to convince the Development Partners by satisfying their queries. From the experience of JMBP, it can be said, the project cycle from the stage of study to the implementation should be closely monitored by time bound action plan. The period for pre-appraisal, appraisal, loan negotiation, should be shortened. In this regard the government and the development partners should reach timely.

From the various stages vis-à-vis, feasibility study, pre-appraisal, appraisal, evaluation, loan negotiation, selection of consultant and contractors, procurement, payment procedure etc., the JMBA staff have gained significant experience. As a result of which the GOB has decided to implement 1.5 Km and above type of Bridge, Toll Road, Fly-over, etc., under this Authority.

MAP SECTION



NOVEMBER 1993

IBRD 25248