ASIAN DEVELOPMENT BANK

PCR:PAK 26225

PROJECT COMPLETION REPORT

ON THE

SUKKUR BRIDGE PROJECT
(Loan 1323 – PAK)

IN

PAKISTAN

September 2001

CURRENCY EQUIVALENTS

Currency Unit — Pakistan Rupee/s (PRs)

		At Appraisal (June 1994)	At Completion (May 2001)
PRs1.00	=	$0.0327	$0.0166
$1.00	=	PRs30.59	PRs60.375

ABBREVIATIONS

ADB	–	Asian Development Bank
EIRR	–	economic internal rate of return
FIDIC	–	Federation Internationale des Ingenieurs-Conseil
ha	–	hectare
ICB	–	international competitive bidding
IRI	–	international roughness index
km	–	kilometer
m	–	meter
NHA	–	National Highway Authority
TA	–	technical assistance
VOC	–	vehicle operating cost

NOTES

(i) The fiscal year (FY) of the Government of Pakistan ends on 30 June. For example, FY2000 began on 1 July 1999 and ends on 30 June 2000.

(ii) In this report, "$" refers to US dollars.

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BASIC DATA

A. Loan Identification

1.	Country		Pakistan
2.	Loan Number		1323-PAK
3.	Project Title		Sukkur Bridge Project
4.	Borrower		Islamic Republic of Pakistan
5.	Executing Agency		National Highway Authority
6.	Amount of Loan	(Original)	$45.0 million
		(Final)	$45.0 million
7.	PCR Number		PCR:PAK 624

B. Loan Data

1.	Appraisal	
	– Date Started	27 June 1994
	– Date Completed	14 July 1994
2.	Loan Negotiations	
	– Date Started	3 September 1994
	– Date Completed	4 September 1994
3.	Date of Board Approval	29 September 1994
4.	Date of Loan Agreement	24 October 1994
5.	Date of Loan Effectiveness	
	– in Loan Agreement	24 January 1995
	– Actual	24 April 1995
	– Number of Extensions	One
6.	Closing Date	
	– in Loan Agreement	31 December 1999
	– Actual	30 September 2000
	– Number of Extensions	One
7.	Terms of Loan	
	– Interest Rate	According to the Asian Development Bank's pool-based variable lending rate system for US dollar loans
	– Maturity (number of years)	25
	– Grace Period (number of years)	5

. 8. Disbursements

a. Dates

Initial Disbursement	Final Disbursements	Time Interval
2 October 1995	6 July 2001	5 years, 9 months
Effective Date	**Original Closing Date**	**Time Interval**
24 April 1995	31 December 1999	4 years, 8 months

b. Amount ($ million)

Category/Component	Original Allocation	Last Revised Allocation	Net Amount Disbursed	Amount Cancelled
Civil Works	29.71	29.71	25.53	4.18
Consulting Services	3.11	3.11	2.66	0.45
Interest during construction	6.28	6.28	5.38	0.90
Unallocated	5.90	5.90	0	5.90
Total	**45.00**	**45.00**	**33.57**	**11.43**

9. Local Costs (ADB-Financed) – $2.46 million

C. Project Data

Project Cost ($ million)

Currency	Appraisal Estimate	Actual
Foreign Exchange	35.10	31.11
Local Currency Cost	29.60	21.06
Total Cost	**64.70**	**52.17**

2. Financing Plan ($ million)

Source	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
ADB	35.10	9.90	45.00	31.11	2.46	33.57
Federal Government	0	19.70	19.70	0	18.60	18.60
Total	**35.10**	**29.60**	**64.70**	**31.11**	**21.06**	**52.17**

3. Cost Breakdown by Project Component ($ million)

Item	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Local
1. Civil Works	21.00	21.00	42.00	24.01	17.28	41.29
2. Right–of–Way	0	1.50	1.50	0	1.83	1.83
3. Consulting Services	1.92	1.03	2.95	1.72	0.95	2.67
4. Project Management	0	1.00	1.00	0	1.00	0
5. Physical Contingencies	1.15	1.18	2.33	0	0	0
6. Price Contingencies	4.75	3.89	8.64	0	0	0
Subtotal	28.82	29.60	58.42	25.73	21.06	46.79
7.Interest During Construction	6.28	0	6.28	5.38	0	5.38
Total	**35.10**	**29.60**	**64.70**	**31.11**	**21.06**	**52.17**

4. Project Schedule

Item	Appraisal Estimate	Actual
Date of Contract with Consultants	1 January 1995	1 March 1995
Civil Works Contract		
Date of Award	30 January 1995	10 December 1995
Completion of Works	30 October 1998	30 June 2000

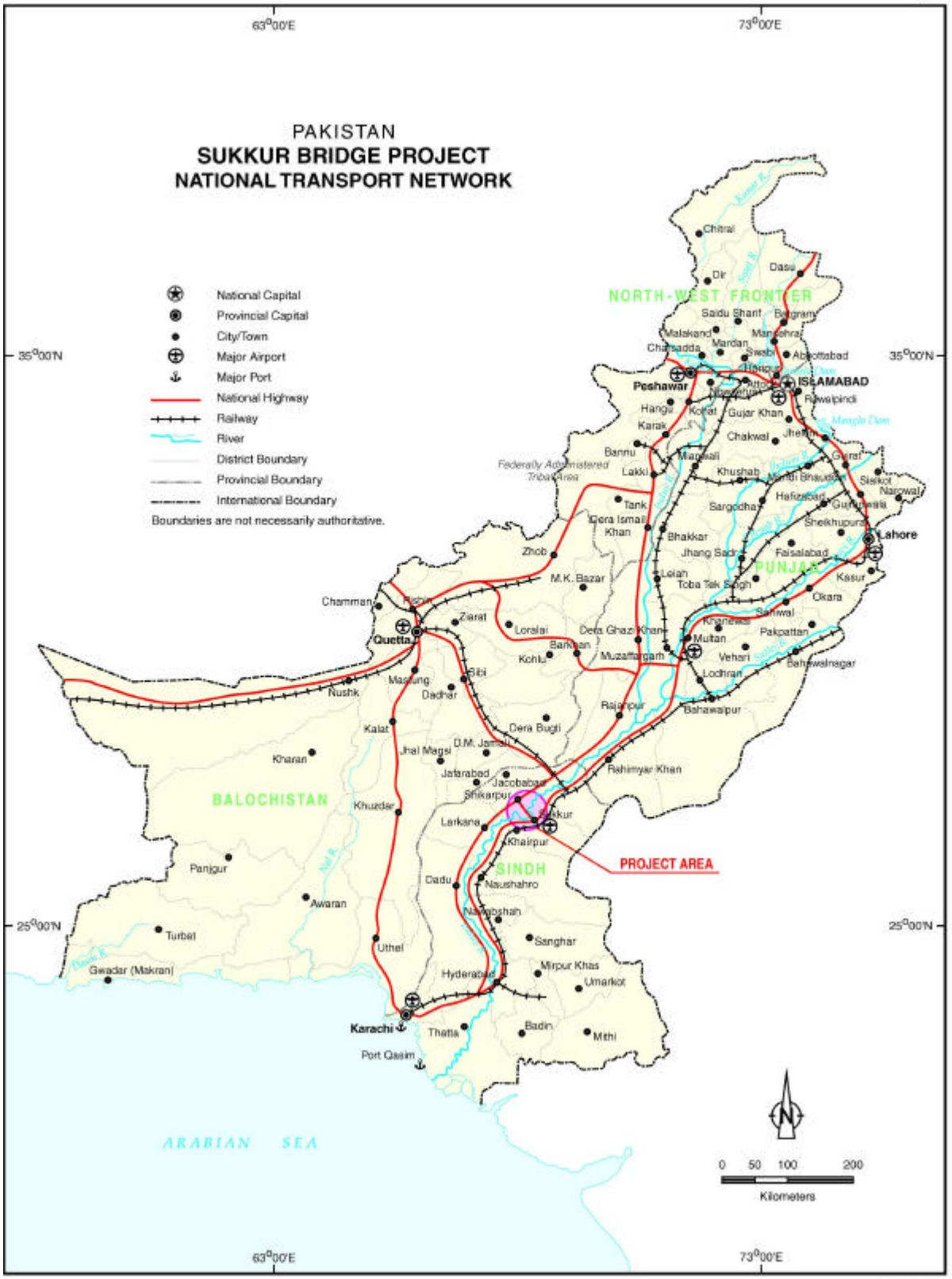
D. Data of Asian Development Bank Missions

Name of Missions	Date	No. of Persons	No. of Person–Days	Specialization of Members [a]
Fact-Finding	15-30 Apr 1994	4	60	a, d, f, g
Appraisal	27 Jun–14 Jul 1994	1	17	d
Review 1	3–14 Sep 1994	2	22	a, h
Review 2	6–12 Sep 1995	2	12	a, h
Review 3	2–12 Sep 1996	2	20	a, h
Review 4	3–20 Nov 1997	3	51	a, h
Review 5	12–21 Sep 1998	2	18	a, h
Review 6	6–18 Feb 1999	3	36	a, h
Review 7	3–10 Oct 1999	1	7	a
Review 8	12–20 Jul 2000	1	8	a
Project Completion Review [b]	26 Mar–6 Apr 2001	3	30	a, e, h

[a] a – engineer, b – financial analyst, c – counsel, d – economist, e – consultant specialist, f – programs officer, g – social development specialist, h – assistant project analyst.

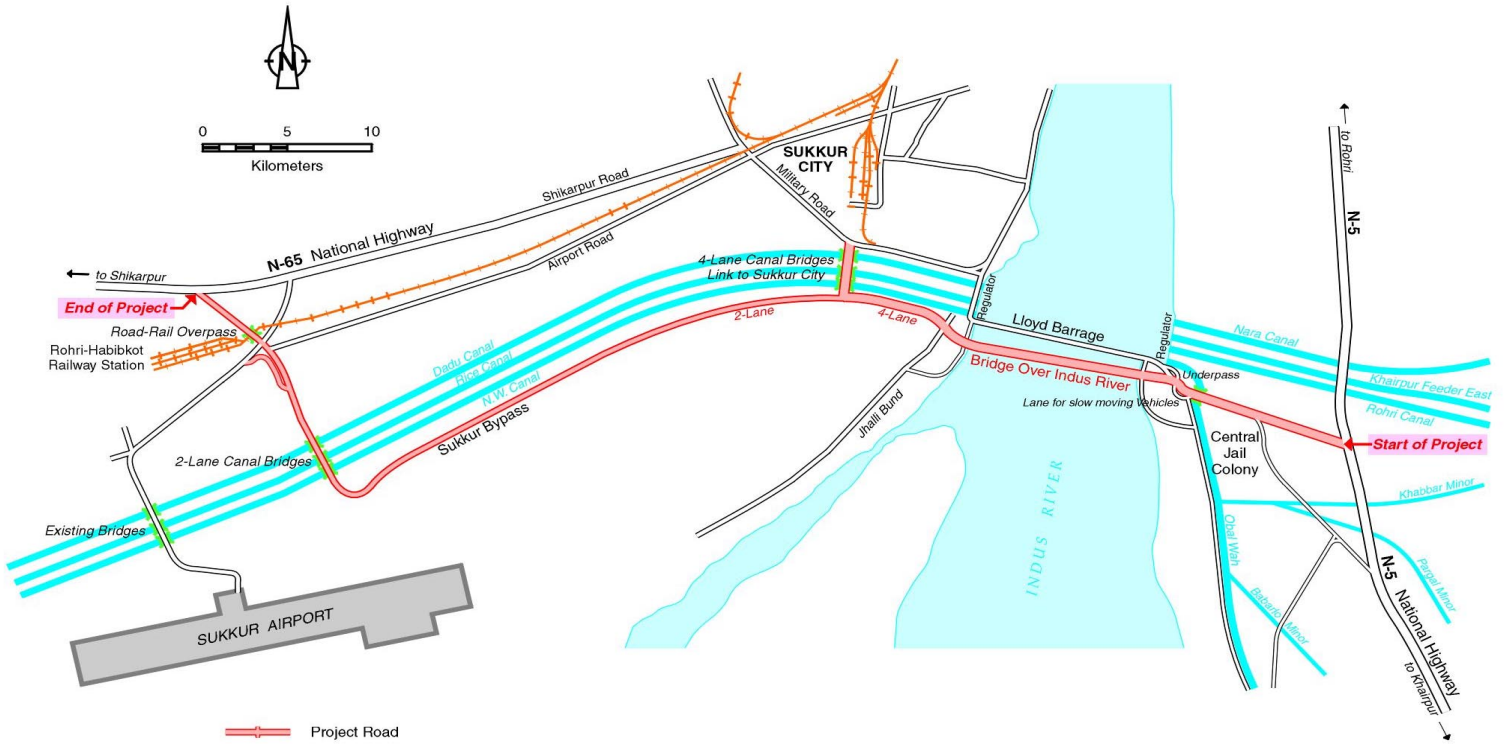
[b] The Mission consisted of H. Masood, Transport Specialist/Mission Leader; T. Mella, Assistant Project Analyst; and P. Arlidge, Transport Economist/Staff Consultant.

Map 1


PAKISTAN
SUKKUR BRIDGE PROJECT
NATIONAL TRANSPORT NETWORK
National Capital
Provincial Capital
City/Town
Major Airport
Major Port
National Highway
Railway
River
District Boundary
Provincial Boundary
International Boundary
Boundaries are not necessarily authoritative.
63°00'E
73°00'E
35°00'N
25°00'N
NORTH-WEST FRONTIER
BALOCHISTAN
SINDH
PUNJAB
PROJECT AREA
Federally Administered Tribal Area
ISLAMABAD
Peshawar
Quetta
Karachi
Lahore
Multan
Sukkur
Hyderabad
Chitral
Dir
Dasu
Saidu Sharif
Malakand
Mardan
Swabi
Abbottabad
Hangu
Kohat
Gujar Khan
Rawalpindi
Karak
Chakwal
Jhelum
Bannu
Mianwali
Lakki
Khushab
Gujrat
Sialkot
Narowal
Tank
Dera Ismail Khan
Sargodha
Hafizabad
Gujranwala
Sheikhupura
Bhakkar
Jhang Sadr
Faisalabad
Zhob
M.K. Bazar
Leiah
Toba Tek Singh
Kasur
Okara
Sahiwal
Chaman
Ziarat
Loralai
Dera Ghazi Khan
Khanewal
Pakpattan
Barkhan
Kohlu
Muzaffargarh
Vehari
Bahawalnagar
Lodhran
Sibi
Nushki
Mastung
Dadhar
Rajanpur
Bahawalpur
Kalat
Dera Bugti
Jhal Magsi
D.G. Jamali
Kharan
Jafarabad
Jacobabad
Rahimyar Khan
Shikarpur
Khuzdar
Larkana
Khairpur
Panjgur
Dadu
Naushahro
Awaran
Nawabshah
Turbat
Uthal
Sanghar
Gwadar (Makran)
Mirpur Khas
Umarkot
Thatta
Badin
Mithi
Port Qasim
ARABIAN SEA
0 50 100 200
Kilometers

PAKISTAN

SUKKUR BRIDGE PROJECT



01-1250 HR

I. PROJECT DESCRIPTION

1. Lack of adequate investment, particularly in the road subsector, had led infrastructure capacity in Pakistan to lag increasingly behind the growth of transport demands. This resulted in serious deterioration of the road infrastructure. The Seventh Five-Year Plan (FY1987-FY1993) initiated the task of providing adequate resources for the transport sector, focusing on the road subsector. The Eighth Five-Year Plan (FY1994-FY1998), during which the Project was appraised, took this process still further. Under a major study on the transport sector in Pakistan in 1988, the Project was identified as one of high priority.[1]

2. The main objective of the Project was to reduce the serious traffic congestion on the narrow carriageway of the Lloyd Barrage[2] and to maintain continuous and smooth access between Balochistan Province and the northern part of Sindh.[3] In addition, the Project aimed to help (i) strengthen the financial position of the National Highway Authority (NHA) through tolls for maintenance and highway development; (ii) reduce transport costs for the Indus River crossing,[4] thereby supporting agricultural and industrial development in the area; and (iii) enhance economic growth and employment generation in the area.

3. At appraisal, the Project comprised two components: (i) construction of a four-lane bridge with toll facilities across the Indus River at Sukkur[5] to replace the Lloyd Barrage's roadway crossing; and (ii) consulting services for preconstruction activities and for construction supervision. In addition to the 1.6 kilometer (km) main bridge, the civil works included a 10 km bypass road around Sukkur, connecting national highway N-65[6] to national highway N-5,[7] with several smaller bridges over irrigation canals.

4. The Project was consistent with the Government's strategy and development plans in the transport sector. The Project also conformed to the operational strategy of the Asian Development Bank (ADB) for the road subsector in Pakistan at the time of appraisal. The strategy focused on farm-to-market roads but also supported improvement of the national and provincial highway systems. In particular, bottlenecks in the system identified in the Road Master Plan were to be removed on a priority basis to facilitate efficient interprovincial traffic movements.

5. In view of the Government's strong interest in participation of the private sector in road infrastructure, the Project included a technical assistance (TA) grant for a study based on international experience for attracting private sector investments in highways in Pakistan.[8]

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[1] The study on the 'National Transport Plan of Pakistan' was prepared with assistance from the Japan International Cooperation Agency in March 1988.

[2] Also known as Sukkur Barrage, it was completed in 1932 and serves as the controlling point of the irrigation system in Sindh and partly in Balochistan. The road bridge at the barrage was not designed for the present high volume of traffic and has therefore been overstressed.

[3] The road included under the Project bypasses the congested traffic in Sukkur City and allows an unobstructed flow of traffic between Sindh and Balochistan provinces.

[4] The other crossings across Indus River are 120 kilometers upstream (north) at Guddu and 160 kilometers downstream (south) at Moro.

[5] Sukkur is the third largest city in the province of Sindh.

[6] National highway N-65 runs east-west connecting the upper Sindh Province with Balochistan Province.

[7] Running north-south through the entire length of the country, national highway N-5 is the main transport corridor connecting the port city of Karachi with the rest of the country.

[8] TA 2176-PAK: *Promotion of Private Sector Participation in Highway Financing, Construction and Operation*, for $475,000, approved on 29 September 1994.

II. EVALUATION OF IMPLEMENTATION

A. Project Components

6. The Project links the country's main national highway N-5 (Karachi - Lahore - Islamabad - Peshawar) with national highway N-65 (Sukkur - Quetta), bypassing the congested urban roads in the city of Sukkur. The Project consists pre-eminently of the construction of a major bridge of 1.6 km length crossing the Indus River 150 meters downstream of the Lloyd Barrage, with approach viaduct structures at either end for an overall length of about 1.9 km. The 5 km four-lane roadway takes off from the junction with N5 and goes over the bridge, terminating at the junction to Sukkur City, including the 0.5 km link to the city. The remaining road section that continues for a further 6 km is a single-lane completing the bypass of Sukkur City and linking with the N-65 at a point close to the city's airport (Map 1). A 10-lane toll facility has been provided near the junction of the project road with N-5 with four toll booths in each direction. The remaining two lanes are part of the infrastructure built for installing weighing equipment to control vehicle overloading.

7. The civil works were carried out essentially as envisaged at appraisal. The major item of work was the main Sukkur Bridge, which accounted for almost 50 percent of the construction cost. Other structures[9] together accounted for a further 25 percent, and road works accounted for the rest of the cost. There were no major changes in the Project's scope. Only a few minor changes in alignment and construction methodology were required during implementation, as follows:

(i) Shifting of the alignment, on the right bank of the Indus River, slightly to the edge of the Dadu Canal was undertaken to avoid cutting through the squatter village of Bachal Shah and to minimize resettlement.

(ii) Planned pile lengths were reduced during construction as a result of detailed investigations of the actual riverbed conditions that were found to be different from those assumed during design. This resulted in a reduction in cost of about $0.38 million.

8. The Project required installation of weighing devices to control axle overloading.[10] This complemented the efforts of the Executing Agency (NHA),[11] which recently initiated a country-wide program for axle load controls. The infrastructure for installation of the weighbridges on the bridge was completed as part of the civil works contract, but the equipment was not installed. During ADB's Project Completion Review Mission,[12] NHA assured the Mission that the weighbridges had been procured and would be installed by 30 May 2001. However, this action remains outstanding to date.

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[9] Bridges over canals, approach viaducts, underpasses and culverts.

[10] During appraisal, it was envisaged that the weighbridges that were to be procured under the ongoing ADB–financed Provincial Highways Project (Loan 1185-PAK(SF)) were to be used at the Sukkur bridge. However, as these were portable weighing devices that were not suitable for permanent installation, it was decided during implementation to install permanent static weigh stations.

[11] NHA is the main Government agency responsible for development and management of about 7,000 km of the national highway network in Pakistan.

[12] The Mission took place from 27 March to 6 April 2001.

9. The consulting services for design review and construction supervision were provided as envisaged at appraisal. The consulting services were effective in reviewing and improving design during implementation and ensuring the quality of completed works. While there was no change in scope, the period of services was extended due to delays in completion of construction. The chronology of the main events given in Appendix 1 provides details on project implementation.

10. The TA for a study on the promotion of private sector participation in highway financing, construction, and operation was also implemented as envisaged at appraisal. The study was included at the request of the Government of Pakistan, as NHA was keen in seeking private sector involvement on a number of projects in the road subsector and needed appropriate policies for attracting private sector investments. The consultant was mobilized in April 1995 and the study was completed in November 1995. The final report was well received by NHA, which adopted the recommendations in developing its policies and procedures for seeking private sector investments.

B. Implementation Arrangements

11. The implementation arrangements envisaged at appraisal were not fully followed. The Borrower was the Islamic Republic of Pakistan and NHA served as Executing Agency. There were slight departures from the implementation arrangements due to NHA's operational practices.[13] At appraisal, it was assumed that NHA's general manager (Design) or his designated senior officer[14] would be responsible for project coordination and liaison with ADB, the general manager (Sindh) would assist in bidding, land acquisition, and resettlement, and that NHA would appoint a project director based at Sukkur for day-to-day implementation. In practice, after award of the civil works contract, NHA's Operations division got involved in contract administration and closely supervised the functions of the project director and general manager (Sindh). This initially caused some problems in conveying instructions to the consultant and contractor; however, an acceptable working arrangement was subsequently evolved. The organizational set-up of NHA is presented in Appendix 2.

12. Another issue affecting implementation involved lack of delegation of authority to the project director. The Federation Internationale Des Ingenieurs-Conseils (FIDIC) – based contract specified the NHA chairman as the employer without providing a role for the project director as the employer's representative. Moreover, NHA did not delegate any of the employer's functions to the project director. This resulted in significantly diminishing the role on site of the project director, who lacked any decision–making authority. In accordance with the contract, the supervision consultant had to deal directly with the chairman without any consultation with the project director. This affected implementation on the referral of all decisions to the NHA headquarters in Islamabad resulted in delays. The situation was partially mitigated by a more efficient communication system. In addition, the imbalance between the consultant's powers as the engineer and the project director's lack of authority hindered good working relations between NHA field staff and the consultant and affected contract administration.

[13] NHA's 'Design' division handles projects during design and procurement stages. After award, the 'Operations' division takes over responsibility for the projects.

[14] Since the start of the Project, NHA's Director for the Funded Project Management Cell under the General Manager (Design) was responsible for project coordination and liaison with ADB.

C. Project Costs and Financing Plan

1. Project Costs

13. The total cost of the Project at appraisal was estimated at $64.7 million. The foreign exchange component was $35.1 million (54 percent) and the local currency component was $29.6 million equivalent (46 percent). The latter included customs duties and other taxes estimated at $11.0 million (17 percent of the total). The estimate for the civil works alone was $42.0 million, excluding contingencies. The actual civil works contract costs were $41.29 million[15] at the time of closing of the loan account on 6 July 2001. The approved amount of the contract for construction supervision was $2.67 million equivalent, compared with the estimate at appraisal of $2.95 million. Several variations to the contract raised the actual cost to a total of $2.67 million. The loan savings of $11.44 million, which were subsequently cancelled, primarily reflected minimal use of contingencies. An analysis of the costs of the project components estimated at appraisal against the actual costs is shown in Table 1.

Table 1: Summary of Project Costs at Appraisal and Actual Expenditures
($ million)

	Appraisal Estimates			Actual Costs		
Project Component	**Foreign Exchange**	**Local Currency**	**Total**	**Foreign Exchange**	**Local Currency**	**Total**
Right-of-Way	0	1.50	1.50	0	1.83	1.83
Civil Works	21.00	21.00	42.00	24.01	17.28	41.29
Consulting Services for Construction Supervision	1.92	1.03	2.95	1.72	0.95	2.67
Project Management [a]	0	1.00	1.00	0	1.00	1.00
Physical Contingencies	1.15	1.18	2.33	0	0	0
Price Contingencies	4.75	3.89	8.64	0	0	0
Interest during Construction	6.28	0	6.28	5.38	0	5.38
Total	**35.10**	**29.60**	**64.70**	**31.11**	**21.06**	**52.17**

[a] The Executing Agency was not able to provide a breakdown of the actual costs.

[15] This figure excludes the final invoice of $1.764 million and the large claim of PRs1,200 million.

14. Against an estimated cost of $474,000, the TA study was completed at a cost of $461,850.

2. Financing Plan

15. ADB provided a loan of $45.0 million equivalent from its ordinary capital resources to cover the entire foreign exchange cost and part (33 percent) of the local currency cost, excluding customs duties and other taxes and land acquisition costs. The remaining local currency cost of $19.70 million equivalent was to be financed by the Borrower from its own resources. Due to nonutilization of contingencies and the reduction in value of the local currency against US dollars, the ADB financing dropped from 70 percent to 64 percent.

Table 2: Financing Plan
($ million)

	Appraisal Estimate				Actual			
Source	Foreign Exchange	Local Currency	Total	Percent	Foreign Exchange	Local Currency	Total	Percent
ADB	35.10	9.90	45.00	70.0	31.11	2.46	33.57	64.3
Borrower	0	19.70	19.70	30.0	0	18.60	18.60	35.7
Total	**35.10**	**29.60**	**64.70**	**100.0**	**31.11**	**21.06**	**52.17**	**100.0**

D. Project Schedule

16. At appraisal it was estimated that the Project would be implemented over a period of five and a half years including one year for the defects/liability period under the civil works contract. Though the commencement of implementation followed the appraisal schedule of mid–1994, about six months were lost due to delays in prequalification and preparation of bid documents.[16,17] The letter of acceptance to the selected contractor was issued on 10 December 1995 with a commencement date of 5 March 1996 and a completion date of 4 March 1999. Appendix 3 shows actual implementation schedule against the schedule envisaged at appraisal.

17. The initial progress on civil works was very slow. By August 1998, only 30 percent progress had been achieved. The contractor, in July 1998, requested an extension due to delays in handing over the full site and delays associated with (i) new methodology for construction of piles, and (ii) cutting of the guide bund[18] of the Lloyd Barrage. The engineer recommended an interim extension of 444 days (from 5 March 1999 to 22 May 2000) that was approved by NHA. The physical works were completed within the extended period and the certificate of substantial completion was finally issued on 19 May 2000.

[16] Scheduled to be delivered to ADB by early December 1994, the bid documents were sent for ADB approval in April 1995.

[17] Though the prequalification list was finalized by 28 March 1995, the letters of invitation were sent out to qualified/conditionally qualified firms on 1 June 1995 as NHA re-submitted names of three firms.

[18] Through design oversight, the soft fit of the main bridge girder conflicted with the guide bund. Of the two available options–slight cutting of the earthen guide bund or complete re-design of the span involving smaller girders and additional support–the former was considered more appropriate and cost effective.

18. In view of the extension in the contract period, the loan closing date was extended from 31 December 1999 to 30 September 2000 to allow for settling of final accounts and to enable payments to the contractor after completion of physical works. Due to delays experienced by NHA in the audit of the contractor's final invoice and decision on the contractor's claim, the loan account was kept open until 6 July 2001 at the request of the Borrower. However, to date the final invoice has not been approved and neither NHA nor the contractor has reached a settlement on the claim.[19]

19. The following are considered the main causes of the delays:

(i) NHA's failure to give timely access to the site owing to delay in the process of land acquisition and resettlement, in particular through the town of Bachal Shah. This was the dominant feature throughout the main period of delay, March 1996 to mid-June 1998.

(ii) Slow start and mobilization by the contractor shown most clearly in the late marshalling of equipment. This was such as to give cause for belief that the contractor would not have been able to act effectively even if full access to the site had been made available in proper time.

(iii) Nonprovision by the contractor of the second set of launching equipment (two had been proposed by the contractor in the bid documents), which would have allowed launching of main bridge girders simultaneously from both banks of the Indus River.

(iv) NHA's payment record, which was such as to put it clearly in breach of contract. In May 1998, the contractor invoked Clause 69.4 of the Conditions of Contract, which allows slowing down or suspending the works in the event of nonpayment. Though not exercised, this notice remained in effect till completion and did not prevent the contractor from expediting the main bridge construction to meet the revised completion date of 22 May 2000.

(v) Redesign of the main bridge piles.[20] Confirmatory boring results indicated different sub-strata conditions from those shown in the soil investigation report prepared by the design consultant. Additional borings were required for determining the length of piles at each pier.

(vi) Delay by the Indus River Commission in allowing construction of the main bridge superstructure where it intersected with the barrage's flood protection bund. Work on the launching of girders was halted for four months before the situation was resolved.

[19] The matter has been referred to arbitration.
[20] This was undertaken by the supervision consultant which resulted in reduction of the designed pile lengths (para. 7).

E. Engagement of Consultants and Procurement of Goods and Services

1. Consultants

20. To prepare for the Project, and in particular to assist in appraisal, ADB used a variety of consultant inputs. ADB provided a small-scale TA[21] to review and update the detailed engineering of the project financed earlier by the Borrower and carried out by a domestic consultant. The consultants working under the then ongoing TA[22] for the proposed Second Highways Project were tasked with the responsibility of prequalifying intending bidders for the civil works contract and preparing the bid documents.

21. As envisaged at appraisal, an international consulting firm was engaged according to the ADB's *Guidelines on the Use of Consultants* to assist in bid evaluation and supervise the civil works under the Project. With the selection of the same consultant who carried out the design review and update, a degree of continuity was secured, as the consultant was closely familiar with the Project. During the course of the Project, consulting services were extended in line with the civil works to meet implementation delays.

2. Civil Works

22. At appraisal it was intended to execute the civil works through two contracts, one for the main bridge and immediate approaches and the other for the remaining works. However, a final decision in this regard was left until completion of the prequalification process. During prequalification, all firms except one indicated interest in both contracts. Therefore, the civil works were procured as a single contract using international competitive bidding (ICB) procedures in accordance with ADB's *Guidelines for Procurement*. The prequalification process took longer than estimated. Out of 51 applicants, 15 were prequalified: 6 unconditionally (among them the eventually successful bidder) and 9 conditionally (among them the firm that put in the lowest bid).

23. The lowest bid, among the nine received from prequalified firms, was 27 percent lower than the engineer's estimate. NHA held bid clarification meetings with the three lowest bidders to confirm their responsiveness, and on the basis of additional information gained, determined that the lowest bid was nonresponsive. The main reasons were that the lowest bidder's (i) method statement and work programs were not practical, (ii) personnel lacked comprehensive understanding of the type and quantum of work and English language capabilities, and (iii) proposed equipment resourcing was inadequate. The contract was, therefore, awarded to the second lowest bidder with a bid value that was nearly 3 percent lower than the engineer's estimate.

24. It appears that the prequalification process did not work satisfactorily. In particular, the conditional qualification as used in this case did not turn out to be a useful concept. In December 1995, ADB issued a new version of its *Guide on Prequalification of Civil Works Contractors*. This involved a more rigorous process of prequalification, notably through the new two-step approach to assessing applicants, with its "preliminary" and "detailed assessment" stages. Using the revised guidelines, it seems likely that the lowest bidder would not have been

[21] TA 2074-PAK: *Sukkur Bridge Project*, for $100,000, approved on 30 March 1994.
[22] TA 1779-PAK: *Second Highways Project*, for $250,000, approved on 5 November 1992.

prequalified in the present case and the considerable difficulties raised by its bid would thus not have arisen.[23]

F. Performance of Consultants and Contractor

1. Consultants

25. The consulting firm engaged for design review and updates appears to have performed the intended work satisfactorily. However, the consulting firm entrusted with preparing the bid documents and prequalification of contractors did not perform. Aside from major delays in the production of bid documents, the exercise for prequalification of bidders was not fully satisfactory, resulting in firms with a poor performance record being prequalified

26. The performance of the consulting firm engaged to supervise the construction works was generally satisfactory. The quality of supervision is reflected by the excellent quality of the completed physical works. However, there were problems between NHA's project staff and the consultant's chief resident engineers throughout the contract period (para.12).[24] Due to the neutral role played by the consultant as the engineer under the FIDIC–based contract, NHA considered them as siding persistently with the contractor and working against the interests of the employer.[25] This affected the consultant's ability to maintain a proper balance between employer and contractor during the course of the Project. The consultant was also not able to prepare a draft project completion report for the Borrower, which is still outstanding (para. 31).

2. Contractor

27. The contractor made a very slow start with less than adequate mobilization during the early stages of the contract. Initially a lot of time was lost as the contractor tried to seek approval of an alternate design (submitted as part of the bid) that was unacceptable to NHA as well as to the consultant. Subsequently, the delays by NHA in acquiring the required right–of–way and completing the resettlement process provided the contractor with a legitimate cause for not performing at a speed that would have enabled project completion within the contract period. The contractor showed little initiative in trying to overcome the multitude of site problems during the early stages. With the change of contractor's project manager and NHA's approval of a time extension in mid-1998, the contractor showed real commitment to the Project and generated significantly higher rates of progress and eventually completed the works before the extended contract completion date. This was despite serious delays in payments by NHA, causing the contractor to invoke Clause 69.4 of the contract (para. 37). Generally, the works constructed by the contractor were of excellent quality.

G. Conditions and Covenants

28. Not all of the covenants of the loan and project agreements were fully complied with, as shown in Appendix 4**.** Though most of the resettlement process has been completed (albeit with

[23] The Government of Pakistan apparently had difficulty in accepting the second lowest bid. The Finance Division considered that Pakistan had lost PRs370 million by not accepting the lowest bid and instructed NHA either to force the second lowest bidder down or to award the contract to the lowest bidder. In its letters to NHA, ADB was firm in refusing to countenance this action.

[24] Three Chief Resident Engineers were appointed during the course of project implementation.

[25] The third Chief Resident Engineer was somewhat overzealous in defending the position of the employer to offset NHA's opinion of the previous Chief Resident Engineers.

significant delays), compensation to some of the Project–affected persons for lands still continues. The unusual delays were caused by the long and complicated process of establishing the value of the land by the District Administration, funded for this purpose by NHA. While NHA was monitoring the resettlement process, it did not take effective measures to expedite the process and did not inform ADB of the progress. This had an adverse effect on project implementation, causing significant delays in construction due to the contractor's lack of access to the full site.

29. The loan covenant for allocating PRs430 million for maintenance of the national highways has been partly complied with, as NHA has initiated a six-year program for highway rehabilitation, improvement, and maintenance that includes an annual allocation of PRs1 billion for routine and preventive maintenance of highways.

30. The loan covenant regarding traffic on the Lloyd Barrage requires denying access to all motorized traffic except for barrage inspection. However, the barrage remains open to motorcycles, auto rickshaws, and light four-wheeled motorized vehicles in addition to nonmotorized traffic. The exceptions are trucks and buses. This is an acceptable and economically sound arrangement for the local cross-river traffic that would have otherwise been subjected to substantial increases in journey distance. This in effect mirrors the old (1889) Lansdowne Bridge on the other side of Sukkur City, which carries only light vehicles mainly between Sukkur and the town of Rohri on the opposite bank of the Indus.[26]

31. The loan covenant regarding the Borrower's project completion report remains outstanding, despite several promises by NHA to submit the report. The major impediment has been lack of support by the supervision consultant. Though this activity was included in their terms of reference, the firm is asking for additional compensation to complete the report.

32. The loan covenant regarding axle load controls require installation of weigh-in-motion equipment, procured under the Provincial Highways Project.[27] However, the equipment was either unavailable or unsuitable for installation at the time. Under a country-wide axle load control program, NHA plans to install weighbridges at the toll facilities, which will be effectively used for controlling vehicle overloading.

H. Disbursements

33. Disbursement of the loan proceeds was slower than expected, because of the delays in project implementation. Details of the annual disbursements of the loan are shown in Appendix 5. Due to cost savings, the total disbursements of $33.57 million were about 25 percent less than the $45 million estimated at appraisal.

[26] The Lansdowne Bridge is reported, by its toll collectors, to have a current daily traffic of about 3,000 vehicles a day (all types, excluding bicycles). Of these it seems 1,000-1,500 are four-wheeled vehicles. The tolls are PRs10 per trip for pickups and wagons (small passenger vehicles); PRs2 for cars and camel and horse carts; PRs1 for motorcycles, auto rickshaws; and donkey carts; bicycles are free.

[27] During appraisal, it was envisaged that the weighbridges that were to be procured under the ongoing ADB–financed Provincial Highways Project (Loan 1185-PAK(SF)), were to be used at the Sukkur bridge. However, as these were portable weighing devices that were not suitable for permanent installation, it was decided during implementation to install permanent static weighstations.

I. Environmental and Social Impacts

34. The initial environmental examination report that was prepared during the processing stages of the Project showed that the environmental impact of the Project would be largely positive. The traffic congestion on the Lloyd Barrage and in the city of Sukkur has been replaced by the free flow conditions of the bypass at minimal initial disruption to the environment. During the course of construction, all relevant aspects such as drainage and erosion prevention received due care and attention. The net effect of the Project, particularly in terms of air pollution, has been positive.

35. At the time of appraisal it was estimated from a detailed survey that the relocation of people and activities would be limited to 98 small private houses, 18 minor commercial shops, and 24 public buildings. In the case of private households and shops, this would have involved land-for-land exchange in a neighboring plot of 1.9 hectares (ha). During implementation, the actual area required was 3.2 ha, indicating an increase of 70 percent. The total cost of all resettlement including land compensation, that was estimated at PRs37 million at appraisal, turned out to be PRs75 million. As the road alignment was changed since the early surveys, comparison with the appraised resettlement plan became difficult. However, the increase seems partly due to an influx of people in the intervening period, causing a substantial increase in the number of people affected by the Project. The whole process of land acquisition and resettlement took considerably longer than had been anticipated and was more difficult to implement. Particular problems were also posed by a mosque that impinged on the road line in Bachal Shah. This issue was eventually resolved without encroaching on the mosque structure.

36. The Project had a positive effect in terms of additional employment opportunities during the project construction period. A major socioeconomic benefit has been in the relief of traffic congestion on the Lloyd Barrage and in the city of Sukkur. This was immediately evident at the opening of the Sukkur Bridge. Within the city, congestion was substantially reduced by shifting of the bus terminal to the end of the bypass. The old site had become inadequate to cater to the transportation needs of the city. From the poverty reduction aspect, the Project allows unimpeded and safer passage to nonmechanized transport on the Lloyd Barrage.

J. Performance of the Borrower and the Executing Agency

37. The performance of NHA as the Executing Agency was mixed. It was very effective during the bid evaluation stage and worked closely with ADB in ensuring the selection of a capable contractor. It withstood pressure from other Government agencies for awarding the contract to the lowest bidder, whose past performance and bid proposal did not justify the award of a project of this size. However, NHA remained a weak executing agency. Its major weakness lay in its inability to ensure timely payments. Apparently, the accounting and audit sections within NHA function quite independently, and the project director, and other operations staff do not have much control. This led to serious delays in payments, and the contractor was eventually sufficiently provoked to invoke Clause 69.4 of his contract, which allowed him to slow down construction without being penalized. Though during the later part of the contract there was a significant improvement in payments, they were never enough to justify withdrawal of notice of this clause. The final payment (of almost $1.764 million) is still outstanding, as NHA's audit department has raised a number of issues that have not been resolved. The issue of a major claim by the contractor also remains outstanding. Another area in which NHA was not able to meet its obligation in a timely manner was land acquisition and resettlement. Here again after NHA was able to acquire the necessary funds, the responsibility of land acquisition and resettlement compensation rested with the District Administration, and NHA was not very

effective in ensuring timely payments to the Project–affected people. The delays in resolution of the issue of slight cutting of the barrage's guide bund with the Sindh Irrigation Department and the Indus River Commission also demonstrates NHA's inability to anticipate problems and play a proactive role in finding an early solution. Similarly, relocation of utilities was delayed due to lack of timely response by NHA.

38. A major part of the problem seems to lie in the fragmented organizational structure of NHA and on its ad hoc practices that do not clearly define the lines of authority or the operational procedures and prevent effective contract administration. All divisions/departments worked independently and were unable to focus on specific problems affecting the Project. Lack of delegation to the project director and other relevant staff prevented effective administration in the field and delayed implementation, as decisions were all made at the headquarters.

K. Performance of the Asian Development Bank

39. Although ADB's performance was generally satisfactory, the Project would likely have benefited from more frequent ADB review missions, particularly during the troubled early years of the Project. Prior to appraisal, ADB staff showed innovation in effectively utilizing the available TA resources in project processing. Following appraisal, ADB fielded review missions at approximately yearly intervals over the first four years. [28] The pace then quickened with the increase in the rate of implementation progress. The missions did well in sorting out the often numerous problems and in attempting to help in their resolution. ADB's Resident Mission in Pakistan played a minor but useful role in the later years of project implementation. It could probably have been more involved in the critical early years, though it then lacked experienced staff in the road sector.

III. EVALUATION OF INITIAL PERFORMANCE AND BENEFITS

A. Financial Performance

40. The Report and Recommendation of the President included a financial evaluation that related net income from tolls to the cost of the Sukkur Bridge rather than the Project as a whole. This gave a financial rate of return of 12.1 percent. The toll rates are still much as were used at appraisal.[29] With the traffic on the bridge substantially less than assumed at appraisal, the rate of return falls overall to near zero. However, the tolls charged at the bridge toll facility are not intended to recover the costs of the Project. They are part of the toll facilities being set up over the national highways to raise sufficient revenue to allow for the gradual improvement of the highway system and its long-term maintenance.[30] The revenues from the Sukkur Bridge toll plaza were running at PRs40 million a year.[31]

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[28] These were combined with other review mission for ongoing loans in the country.

[29] They are: cars and jeeps PRs10 a crossing, pickups and minibuses PRs20, (rigid) trucks and buses PRs25, and articulated trucks and truck-trailers PRs50.

[30] By March 2001, 36 toll facilities were in operation and 10 more were planned. NHA reported that the revenues were over PRs2 billion a year. NHA planned to raise revenue to PRs4 billion annually over the next five years. This would be adequate to meet the sustainable long-term maintenance cost of the system, estimated at PRs3 billion a year.

[31] Results are based on the first nine months of full operation.

B. Economic Performance

41. The economic reevaluation of the Project uses the actual costs and implementation schedule as the basis for deriving the economic costs and their annual distribution. Essentially the same methodology was adopted as at appraisal, comparing the "without project" and "with project" cases. The "without project" case was continuation of the use of the narrow and weak road bridge of the Lloyd Barrage with its restrictions on the use of large trucks and with its increasingly severe congestion. The Project has entirely replaced the barrage for heavy traffic and has allowed unrestricted operation to all vehicles crossing the Indus River, whether on the new bridge or on the old barrage. The benefits from the "with project" case were identified by calculating vehicle operating cost savings. These savings were through reduced congestion, through operation on the higher quality surface of the new road, and (in movements of multi-axle trucks) through savings in route length from diverting to the new bridge and through a switch from the use of 2-axle trucks. The benefits have been calculated over 20 years, with substantial residual value for the structures and a small residual value for the road works.[32]

42. Traffic counts at the time of appraisal were obtained from the records used in that work. Estimates of present (2000-2001) traffic volumes were based on counts obtained from several sources, such as from the supervision consultants' Benefit Monitoring and Evaluation report, from the agency collecting tolls on the bridge for NHA, [33] from a February 2001 NHA survey, and from special counts done by NHA staff at Sukkur for the Project Completion Review Mission. There were errors and inconsistencies in these counts; however, at the low range of reported traffic volumes there was a good measure of agreement. The traffic volumes used in the reevaluation have been set conservatively and are the lowest of the available counts. These figures indicate generally very little change over the six years since appraisal. This is partly due to lower economic growth over these years than had been expected. In reevaluation, a more optimistic view is taken of the future with overall growth of traffic set at 5 percent a year as compared with the 6 percent a year assumed at appraisal. Appendix 6 provides the economic reevaluation for the Project.

43. The economic internal rate of return (EIRR) of the Project was recalculated at 20.0 percent compared with the estimate of 15.7 percent at appraisal. The main reason lies in additional benefits from an increase in multi-axle trucks in the "with project" case that was much more than the appraisal's projections. Conservative assumptions have been made concerning the extent of distance saved by diverting from other routes and the savings from using larger trucks against smaller.

44. Sensitivity tests assessed the impact of potential change in project components. The robust nature of the project returns is indicated by the benefits that would have to reduce by 49 percent for the EIRR to fall below 12 percent. [34]

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[32] 70 percent for structures and 30 percent for the rest of the works with an overall residual value of 65 percent.

[33] At present the Frontier Works Organization, an army–owned outfit that is responsible for collecting tolls on all NHA highways, is collecting tolls on the Project.

[34] Sensitivity analysis has shown that the Project still remains viable with an economic internal rate of return of 17.9 percent at 2 percent growth rate and of 16.4 percent at 0 percent growth.

C. Attainment of Benefits

45. Two of the main objectives of the Project–relief of acute traffic congestion on the Lloyd Barrage and removal of all heavy traffic–were achieved immediately on the opening of the new bridge across the Indus River in June 2000. Any danger to the structure of the barrage's road bridge has been averted and there are immediate savings in vehicle operating costs and in journey times.

46. The Project has effectively established a new link in the national highway system. It has attracted considerable traffic, thereby reducing congestion on other routes. The main benefit relates to traffic between northern Balochistan and central Sindh on the eastern side of the Indus, but other movements are also attracted including part of the flow between Karachi and Peshawar. Perhaps even more important is the apparent substantial shift from small trucks to large trucks, with consequent large unit savings on the long hauls that characterize Pakistan's road freight industry.

47. With respect to the economic development objectives of the Project, it is not yet possible to estimate the extent to which savings in commercial vehicle operating costs have been or will be passed on to consumers. In the case of bus and minibus operation, isolating the effects of the bridge and bypass has been made particularly difficult by the transfer of the bus station at Sukkur from a near-central point on Military Road to the western end of the bypass. Not foreseen at appraisal, this action adds to the benefits of the Project.

48. The Project has generated other benefits not quantified in the present reevaluation. These benefits include much easier and safer passage for nonmechanized transport and for motorcyclists and passengers in auto rickshaws. Access to Sukkur City has improved, particularly during peak hours, compared with traffic congestion and delays at the barrage earlier.

49. Due to the high quality of construction of the new bridge and roads, the maintenance costs should be very small in the early years of its operation.[35]

50. Revenues have been raised from tolls since the opening of the bridge. The weighbridges are scheduled to be installed soon to check vehicle overloading as part of a national program. Enforcement will be introduced gradually.

IV. TECHNICAL ASSISTANCE

51. The Project also included a TA grant for promotion of private sector participation in highway financing, construction, and operation (footnote 8). There were no issues in the procurement of consulting services or in undertaking the TA, which commenced in October 1994 and was completed in 1995 as intended. The main objective of the TA was to assist NHA in developing measures to promote private sector investments in construction and operation of major highways and bridges in Pakistan and to frame appropriate policies and procedures involving legal, financial, and technical aspects. The study was undertaken in the following five phases to achieve the TA objectives: (i) review of international experience, (ii) the current

[35] Change in maintenance costs in the "with" and "without" project cases is of little significance in this instance as the Project was essentially concerned with the removal of a short but critical bottleneck in the highway system. In the reevaluation, a simplified approach has been taken using estimated annual maintenance costs.

situation in Pakistan, (iii) attracting private sector highway investment to Pakistan, (iv) the path to implementation, and (v) identification of suitable projects.

52. The performance of the consultant was satisfactory and the TA is rated successful. Though there appears to be no references to the study in the various ADB mission reports and memoranda produced during the course of the Project, the study has been considered very useful by the executing agency and other aid agencies involved in encouraging private sector participation. [36]

V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

53. The Project was completed as conceived at appraisal. Though there were some delays in completion, the quality of the completed physical works was excellent and there were no cost overruns. In accordance with the Loan Agreement, the executing agency is collecting tolls; the revenues collected are far in excess of the Project's maintenance needs and contributes to NHA's ability to finance highway maintenance and development. The Project is part of NHA's vehicle overload control program and efforts are under way to install a weighstation on the Project.

54. The main objectives of the Project have been met. The congestion on the road bridge at the Lloyd Barrage has been removed and there is now a true national highway link providing continuous access between Balochistan and the northern part of Sindh. The structural integrity of the road-bridge on the Lloyd Barrage has been secured with traffic restrictions that allow only local nonmotorized and light vehicles.

55. The transport costs have been reduced as a result of savings in travel distance and in vehicle operating costs. There is a significant increase in the numbers of multi-axle trucks crossing the river at Sukkur compared to the appraisal projections contributing to the Project benefits. It is still not possible to quantify the effects on consumers and on economic development generally, but in the competitive conditions of the road transport industry in Pakistan they are almost sure to be positive. Environmental effects are small but positive. No poverty reduction objectives were considered at appraisal; however, the most visible impact is the improved access and safety for nonmechanized vehicles crossing the Indus River at the barrage. Overall the Project was successful (Appendix 7 contains an analysis of the Project's rating).

B. Lessons Learned

56. The main cause of delay in the completion of the Project was associated with land acquisition and resettlement. Though a detailed resettlement plan was prepared during project processing, it was not updated and became ineffective after a realignment was undertaken during implementation. This added to the difficulty of monitoring the resettlement process. The loan covenants required NHA to closely monitor resettlement and keep ADB advised of the progress, but this was not done. NHA finally managed to acquire the financial resources needed for compensation and resettlement, but was constrained by the progress of the District

[36] This judgment is based on Project Completion Review Mission's discussions with the World Bank's Islamabad office.

Administration, which was responsible for assessing the value of compensation and making payments to the affected persons.

57. The project implementation arrangements should have been carefully structured to reflect the operating practices of the executing agency and in conformity with the provisions of the civil works contract. This is important in projects involving large infrastructure construction. Any inconsistencies between an executing agency's operating practices, contract provisions, and project implementation arrangements will affect smooth implementation. In projects with ICB contracts, it is critical that the developing member countries executing agencies should be trained in FIDIC provisions to help them in understanding the independent role of the engineer and to be aware of the consequences of not complying with the contract provisions.

58. Prequalification is a critical activity in any contract, but is particularly important in large ICB contracts. The project schedule was affected due to an inadequate prequalification exercise. ADB's *Guidelines for Prequalification* provide a good base for evaluation of the proposals, but, it is important that the information in proposals be verified through reference checks and other means. Conditional qualification may only be allowed in accordance with the ADB guidelines, but with an unreasonably low bid a conditionally prequalified bidder may adversely affect the bid evaluation process. Hence, with proper planning conditional qualification may be avoided.

C. Recommendations

1. Project–Related

59. ADB needs to continue monitoring of: (i) the installation of the weighing equipment at the Project's toll facility and its proper operation in the context of the NHA's national axle load control program, and (ii) the progress of the NHA's toll collection system in the context of funding of maintenance of the national highway network.

60. The following actions with respect to the outstanding loan covenants are recommended:

i. the Borrower's project completion report should be completed and submitted to ADB as early as possible,

ii. all outstanding payments under the resettlement plan should be completed as early as possible, and

iii. NHA should privatize by open competitive bidding the management of toll collection.

61. A Project Preparatory Audit Report (PPAR) should be scheduled toward the second half of 2003. This should give sufficient time for the patterns of long-distance freight movements to have settled following the forthcoming completion of the full dualization of national highway N-5.

2. General

62. For future projects in the road sector it is recommended that (i) a detailed resettlement plan should be prepared[37] and agreed as part of project processing, and updated during implementation, when design changes are made; (ii) resettlement costs should be indicated as part of counterpart funding, and (iii) either resettlement should be completed prior to award of civil works contract or the civil works schedule should have adequate provision for undertaking the resettlement activity.

63. The implementation arrangements under future projects should reflect the functioning of the executing agencies and should not conflict with the civil works contract provisions.

64. Conditional prequalification, particularly under ICB contracts for civil works, should follow the ADB guidelines. Reference checks and other indirect means should be used to verify the eligibility of the applicants.

65. ADB should give more attention to an adequate review of loans, particularly in the initial stages. With close monitoring of projects and properly spaced loan reviews, ADB would be able to respond more effectively to the implementation issues and take necessary action to mitigate problems.

[37] The resettlement plan implementation should be monitored by an independent institution such as a nongovernment organization to ensure that the Project–affected persons' interests are fully safeguarded and reimbursements are made promptly.

APPENDIXES

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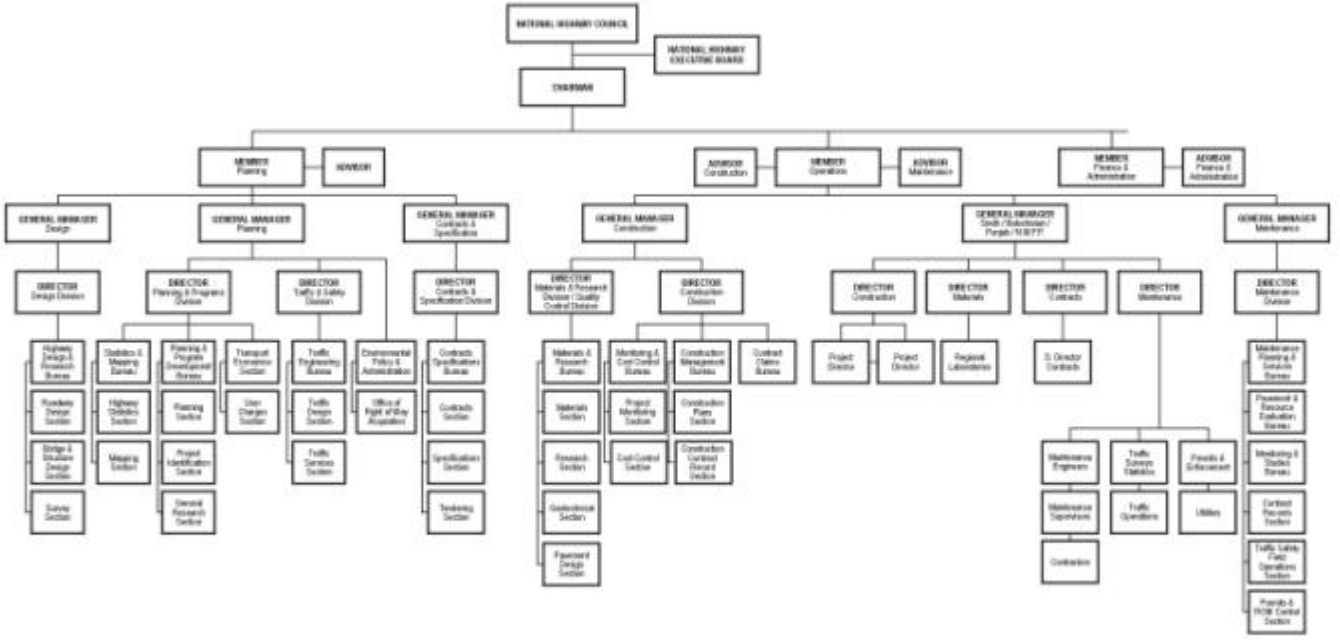
CHRONOLOGY OF MAIN EVENTS

Date	Event
A. 1994	
12 January	Approval for advance action for civil works procurement.
15-30 April	Fact-Finding Mission.
19 May	National Highway Authority (NHA) submits its recommendations for the shortlist of supervision consultants.
3 June	Management Review Meeting (MRM).
27 June-14 July	Appraisal Mission.
13 June	Asian Development Bank (ADB) concurs with the prequalification documents.
4 July	NHA's fax giving its final recommended shortlist of supervision consultants is received.
14 July	ADB approves shortlist of supervision consultants and draft invitiation letter.
24 July	ADB approves the prequalification questionnaire.
1 August	Advertisement of the Project in a local newspaper.
10 August	Staff Review Committee (SRC) Meeting.
3-4 September	Loan negotiations.
6 September	Report and Recommendation of the President submitted to the Board.
29 September	Loan approved.
24 October	Loan documents signed.
6 December	Consultant's Selection Committee Meeting.
8 December	ADB approves the selection and ranking of consultants.
B. 1995	
25 January	ADB approves the prequalification evaluation for civil works.
16 February	ADB approves draft contract for construction supervision.

Date	Event
4 April	Consultant's contract received.
24 April	Loan was declared effective.
30 April	ADB approves issue of bidding documents.
1 June	Letters of invitation issued to prequalified bidders.
6-12 Sept	Review Mission in the field (Sr Project Engineer & Asst Project Analyst).
24 November	Procurement Committee Meeting held for award of civil works.
24 November	ADB sends fax approving award of civil works contract.
10 December	NHA issues letter of acceptance to civil works contractor.
C. 1996	
6 March	Construction commences.
2-12 September	Review Mission in the field (Sr Project Engineer & Asst Project Analyst)
D. 1997	
9 April	Chief resident engineer was replaced at the request of NHA.
3-20 November	Review Mission in the field (Sr Project Engineer, Project Engineer & Asst Project Analyst).
E. 1998	
6 May	Contractor issues notice to suspend works due to nonpayment.
12-21 Sept	Review Mission in the field. (Sr Project Engineer & Asst Project Analyst).
29 November	NHA's request for extension of loan closing date.
F. 1999	
3 February	Consultant receives letter from NHA requiring replacement of the chief resident engineer.
6-18 February	Review Mission in the field (Sr Project Engineer, Project Implementation Officer, and Asst Project Analyst).

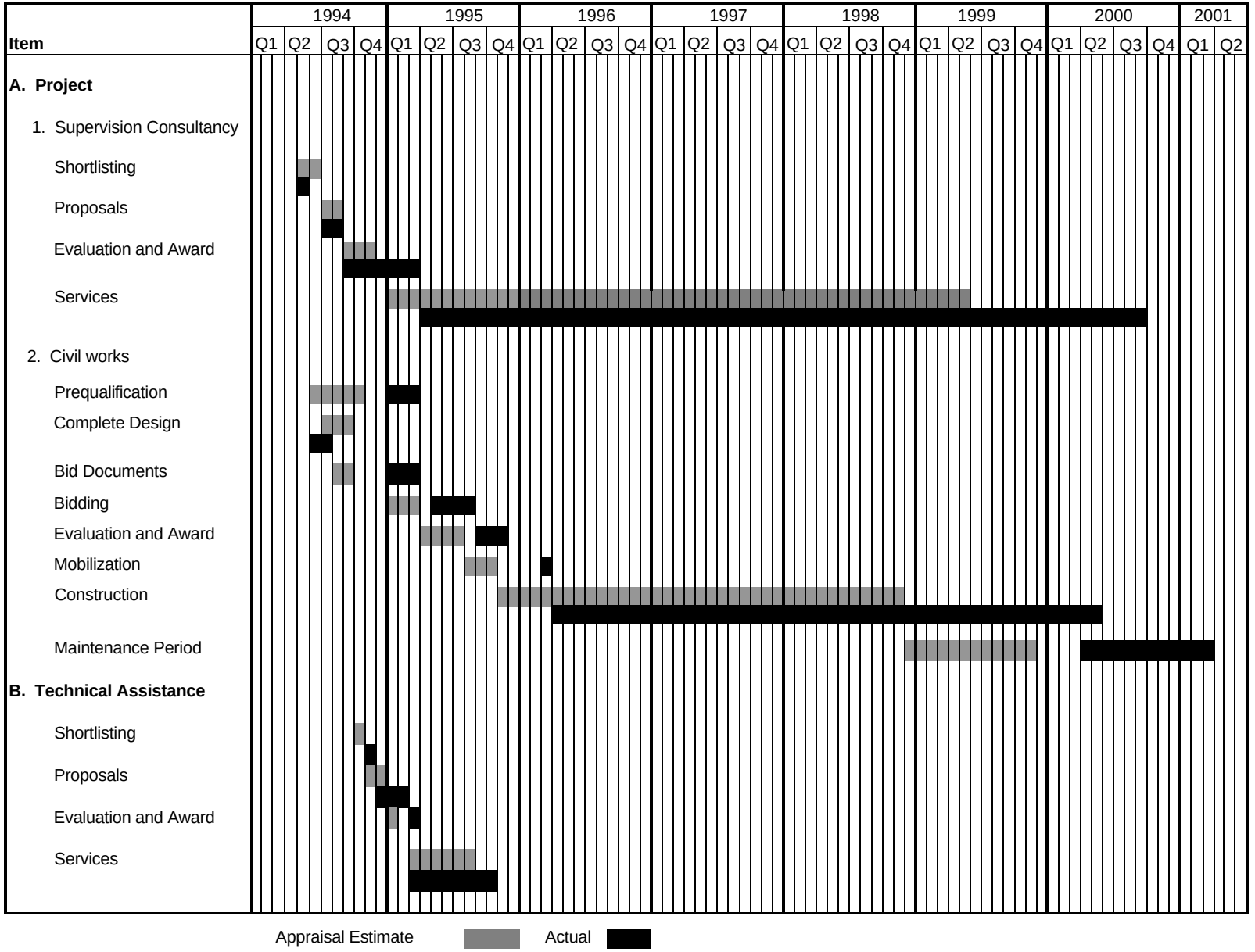
Date	Event
3 April	NHA approves new chief resident engineer.
14 April	ADB sends fax advising NHA on payment of escalation in United States dollars and Pakistan rupees.
17 May	NHA approves payment of escalation in the dollar/rupee proportions identified in the contract.
3-10 October	Review Mission in the field (Project Engineer & Project Implementation Officer).
1 December	ADB approves extension of loan closing for nine months from 31 December 1999 to 30 September 2000.
G. 2000	
20 May	One-year defects liability period commenced.
9 June	Taking-over certificate was issued.
9 June	Sukkur Bridge was opened to traffic.
15 June	ADB approves rates of toll charges on the bridge as proposed by NHA.
12-20 July	Review Mission in the field.
30 September	Loan was closed.
26 May - 6 April	Project Completion Review (PCR) Mission fielded.
6 July	Loan account closed.

ORGANIZATION CHART OF THE NATIONAL HIGHWAY AUTHORITY



Appendix 2

IMPLEMENTATION SCHEDULE



COMPLIANCE WITH COVENANTS

Number	Covenant	Status
A.	**Project Implementation**	
1	The General Manager (Design) shall be responsible for overall project coordination. The General Manager (Sindh) of National Highway Authority (NHA) shall assist with respect to the procurement and land acquisition and property compensation.	Complied with.
B.	**Resettlement and Compensation**	
2	The Borrower and NHA shall ensure that all persons displaced by the Project shall be adequately compensated for their loss of land, housing, crops, and other forms of livelihood.	Being complied with.
3	NHA shall monitor closely the resettlement and compensation process, and shall provide the Asian Development Bank (ADB) with information on the progress thereof.	Not fully complied.
C.	**Operation and Maintenance**	
4	The Borrower and NHA shall promptly privatize by open and competitive bidding the management of those operation and maintenance activities of the project facilities recommended by the consultants engaged under the Technical Assistance Agreement (TA No. 2074-PAK).	Not complied.
5	NHA shall be responsible for operating the toll facilities under the Project. NHA shall retain all fees and toll proceeds from the project and apply such proceeds (less toll collection and maintenance expenditures) toward maintenance of the Project facilities and maintenance and improvement of national highways.	Complied with.
6	The Borrower shall make a budgetary allocation of an amount not less than PRs430,000,000 each year for future maintenance of national highways, after giving due regard to price increases.	Partly complied. Though allocations have been low in the past, NHA is initiating a comprehensive six-year program for highway rehabilitation, improvement, and maintenance, which includes an annual allocation of PRs1 billion for routine and preventive maintenance of national highways.

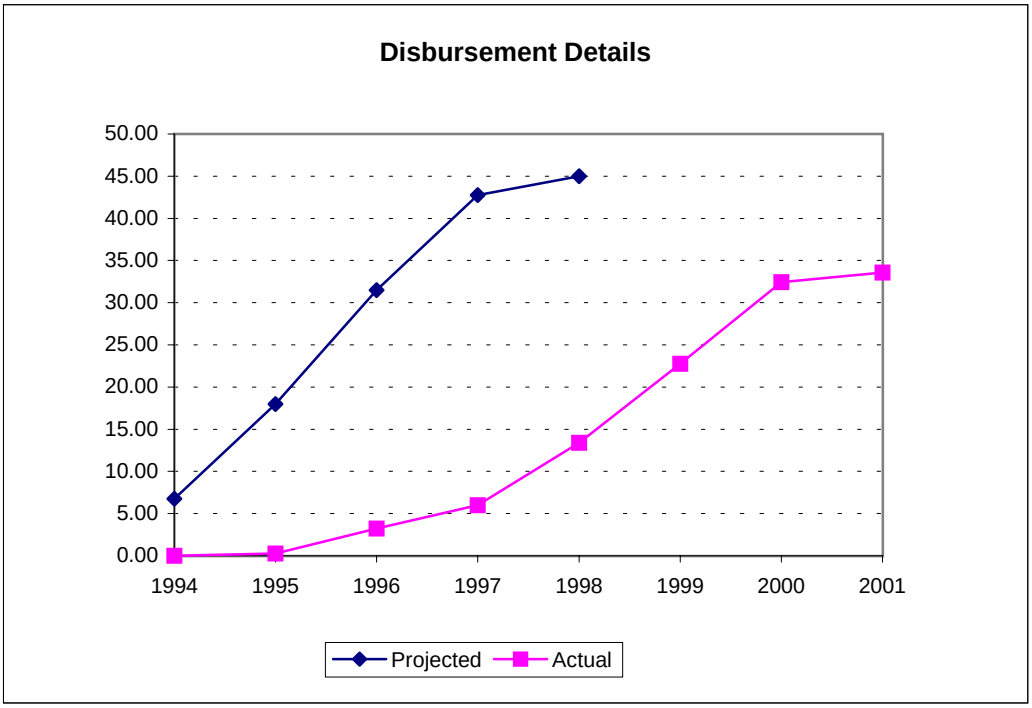
Number	Covenant	Status
D.	**Other Matters**	
7	The Borrower shall ensure that the Province of Sindh will install appropriate overhead and side barriers on the Lloyd Barrage to deny access to all motorized vehicles after the opening of the bridge to traffic.	Partly complied. Though overhead barriers have been installed to prevent heavy vehicles, small vehicles are allowed in the barrage.
8	Weigh-in-motion equipment procured under the Provincial Highways Project (Loan No. 1185-PAK(SF)) shall be used to assist in the enforcement of permissible axle loads of vehicles using the public road system.	Complied with. Under an overall axle load control program, NHA is installing weigh bridges at the toll facilities of the project.
9	NHA shall carry out the Project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental, and bridge and highway design and construction practices.	Complied with.
10	NHA shall make available, promptly, as needed, the funds, facilities, services, land, and other resources that are required, in addition to the proceeds of the loan, for the carrying out of the Project and the operation and maintenance of the project facilities.	Complied with.
11	In carrying out the Project, NHA shall employ competent and qualified consultants and contractors, acceptable to ADB.	Complied with.
12	NHA shall carry out the Project in accordance with plans, design standards, specifications, work schedules, and construction methods acceptable to ADB. NHA shall furnish to ADB, such plans, design standards, specifications, and work schedules.	Complied with.
13	NHA shall furnish to ADB all reports and information concerning the loan and the expenditures of proceeds; the goods and services and other items of expenditure; the Project; the management, operations, and financial condition of NHA.	Complied with.
14	NHA shall furnish to ADB monthly reports on the execution of the Project and on the operation, and management of the project facilities.	Complied with.

Number	Covenant	Status
15	Promptly after physical completion of the Project, but in any event not later than three (3) months thereafter or such later date as ADB may agree for this purposes, NHA shall prepare and furnish to ADB a report on the execution and initial operation of the Project, including its cost, and the performance of NHA.	Being complied with. NHA has agreed to submit the report by 15 May 2001.
16	NHA shall submit to ADB, audited financial statements not later than twelve (12) months after the close of the fiscal year to which they relate, including the report of the auditors.	Complied with.
17	NHA shall carry out benefit monitoring and evaluations under the Project by compiling and analyzing traffic data on the project bridge and roads. For this purpose, surveys will be conducted immediately following the opening of the bridge and roads to traffic. NHA shall incorporate its findings and supporting data in the Project Completion Report to be submitted to ADB.	Partly complied. The report prepared by the consultants requires additional information. The revised report was to be submitted to ADB by 30 April 2001.
18	NHA shall ensure that the construction, operation, and maintenance of the project facilities are in accordance with the ADB's Environmental Guidelines, and that drainage, landslides, erosion, and other issues relating to the prevention of damage to the natural environment receive due attention.	Complied with.
19	NHA shall install weighing and automatic vehicle classification-counting equipment at the approaches to the toll facilities, and shall not permit vehicles exceeding a single axle load of 10 metric tons to use the bridge constructed.	Complied with.
20	NHA shall consult with ADB on the initial amount of tolls to be charged at the Project's main bridge, and on adjustments to such tolls periodically for five years after completion of the Project.	Complied with.

DISBURSEMENTS

($ million)

Year	Projected	Actual
1994	6.75	
1995	18.00	0.26
1996	31.50	3.24
1997	42.75	5.98
1998	45.00	13.39
1999		22.77
2000		32.45
2001		33.56



ECONOMIC REEVALUATION

A. Introduction

1. The methodology used in the economic reevaluation was similar to that used at appraisal. As at appraisal, the analysis used the standard consumer surplus technique for road and bridge evaluation normally applied for Asian Development Bank (ADB) project appraisal. The road user savings following the lessening of traffic congestion that the new bridge and bypass provide were calculated, and the benefits of running vehicles on the new, high-class highway was assessed against operation on the old roads. The restrictions imposed on use of the Lloyd Barrage limited the size of trucks moving across the Indus River at Sukkur. There has been a very substantial increase in movement of multi-axle trucks across the river, some diverted from other routes, some replacing the more costly movement of small trucks. This now seems to be a significant element in the benefits that are making the Project the economic success that it appears to be.

B. Costs

1. Construction Costs

2. The economic construction costs were derived primarily from the financial costs of the civil works and consultancy services. Land acquisition and resettlement costs were also included, together with the Borrower's costs of project management. The technical assistance costs of project preparation and initial implementation were also included in the project costs.

2. Maintenance Costs

3. Estimates have been made of future maintenance costs with and without the Project. In this case the maintenance element is relatively small. The Project involves only 11 kilometers (km) of new road construction, with 70 percent of the overall cost in the Sukkur Bridge and other structures. The standard of the work that has been done is good and it will be several years before significant expenditure on maintenance will be needed, notably of the structures. The Project involves the reassignment of all heavy vehicles from the former crossing of the Indus to the new road and thus a reduction in future maintenance costs of the pavement of the road bridge of the Lloyd Barrage and of short stretches of internal town roads in Sukkur. Annual average figures are used in the calculations, which biases the results against the new facility. However, the differences between gain from loss of heavy traffic on the barrage and other city roads on the one hand and loss through addition of the new 11 km to the network that has to be maintained is so small as to be negligible.

3. Vehicle Operating Costs

4. The economic vehicle operating costs (VOCs) have been updated to late-2000 values, and recalculated by the Project Completion Review Mission.[1] The general methodology used at

[1] The cost relationships used at appraisal were those derived for Indian conditions by Dr. L.R. Kadiyali and Associates ("Updating Road User Cost Data", for the Ministry of Surface Transport [Government of India] and the Asian Development Bank, November 1991) . In recalculating the VOCs, the Project Completion Review Mission used a spreadsheet program developed by Pakistan's leading authority in this area, Mr. Abdul Majeed; this program uses the Kadiyali formulae. The Mission made some alterations to the vehicle operation assumptions and to the parts consumption formulas; all alterations reduced costs per kilometer. The results were checked against the set of detailed VOCs by vehicle type that Pakistan's National Transport Research Centre will be publishing shortly.

appraisal was followed, except that multi-axle trucks were divided into 3-axle rigid trucks and articulated trucks, and separate VOC estimates (with and without the Project) were used for each category. Motorcycles were excluded, except from the traffic congestion calculations (the volume:capacity ratio estimates) in the "without project" case. This was because light motorized vehicles are still being allowed to use the Lloyd Barrage — a change in the assumptions made at appraisal, and one of which the Mission approves. Person-time values were included in the recalculated VOCs.[2]

5. It was assumed that the well-built new road would be maintainable, and maintained, at an average surface roughness of International Roughness Index (IRI) 2.5 meters (m) per km. In the case of the Sukkur Barrage and other Sukkur roads in the "without project" case it was assumed that maintenance would be sufficient to keep roughness at the present level of around IRI 5 m/km.[3] The relevant VOCs used in the evaluation are given in Table A6.1. The table also gives the formulas used in the calculation of the costs arising from traffic congestion. A maximum volume:capacity ratio of 2.0 was applied; design capacity was taken to be 1,250 passenger car units an hour, as appropriate to a narrow two-lane road. Traffic growth is taken at 5 percent a year, slightly below the 6 percent a year used in the appraisal. In the later years of the 20-year assessment period most traffic would have been involved in extreme traffic congestion, at above a volume:capacity ratio of 2. In the "with project" case it will not be for a very long time that there is any significant traffic congestion.

Table A6.1: Vehicle Operating Costs By Type of Vehicle, 2000
(PRs per vehicle-kilometer)

IRI (m/km)	Car, Van, Jeep	Minibus, etc.	Bus	Truck 2-axle	Truck 3-axle	Truck Multiaxle
2.5 (w/ project)	5.15	6.53	14.27	11.73	14.50	17.68
5.0 (without project	6.15	8.30	17.57	14.62	18.69	22.68

Congestion cost linear formulas:

	Car, Jeep	Minibus	Bus	2-axle	3-axle	Articulated	Average
Linear Regression:							
Constant	4.23	5.55	11.73	10.04	12.28	14.88	6.94
Variable (* VCR)	4.83	5.17	12.93	9.76	11.25	13.27	6.94
Minimum (for VCR from 0.0 to 0.2)	5.15	6.53	14.27	11.73	14.50	17.68	8.21

VCR = volume:capacity ratio.

C. Benefits

6. The main quantifiable benefits of the Project are (i) savings in VOCs from the removal of traffic congestion on the road bridge of the Lloyd Barrage and on local roads into Sukkur; (ii) savings in VOCs from operation on the higher quality, smoother road provided in the Project as

[2] Moderate levels of person-time values were assumed: PRs30 per hour for car passengers and PRs5 per hour for public transport passengers.

[3] It appears that there has been some improvement in the condition of the relevant city roads since the time of appraisal.

compared with the Lloyd Barrage and the local roads; (iii) savings in VOCs of multi-axle trucks resulting from the provision of a shorter route across the Indus River (i.e., diversion from other routes); and (iv) savings in VOCs resulting from the replacement of 2-axle trucks by multi-axle vehicles in the crossing of the Indus at Sukkur. Traffic remaining on the Lloyd Barrage, it should be noted, benefits from congestion cost savings.

7. Savings in VOCs have been estimated based on the VOC data given in Table A6.1. It was conservatively assumed for multi-axle truck diversion that the average gain was 40 km. For 2-axle truck replacement it was assumed that a 2-axle truck carried 12 tons, a 3-axle truck 20 tons, and an articulated truck 25 tons; the average haul was taken to be 300 km, which is a very cautious estimate in the Pakistani context. All traffic was treated as normal traffic, as there seems to have been very little generated traffic as yet. There will be some generated traffic, both local and long-distance, but there has been no evident reduction in fares or freight rates (though local movements have clearly been reduced in terms of time taken) and it is not possible to quantify the extent of such traffic. There is no evidence to suggest that the substantial increase in multi-axle truck movement across the Indus at Sukkur is other than diverted traffic from other routes or smaller trucks.

8. In the case of road maintenance costs it is assumed that average annual expenditure is the equivalent of $10,000 a kilometer a year, with a 70 percent saving on the barrage and on the related town roads through the removal of heavy traffic to the new bridge and bypass.

D. Traffic Surveys and Forecasts

9. The traffic surveys of the original feasibility study had been updated just prior to appraisal in 1994. As in that study, the new traffic counts were only done for short periods. Similar counts were done in September 2000 for the Benefit Monitoring and Evaluation Report undertaken by the domestic consultants working with and subcontracted to the Project's supervision consultants. Single day and other counts were done for and during the Project Completion Review Mission. The Mission also sought and obtained other relevant traffic counts. Regrettably, there are too many inconsistencies in the data for one to be entirely sure in the matter. The general evidence is, however, strong that the current traffic on the Sukkur Bridge is in the order of 5,000-6,000 a day (four-wheeled and above). For the purposes of the present reevaluation the estimates of the current toll collectors—the army's Frontier Works Organization—have been taken as the basis; these give a total of a little over 5,500 a day. These estimates could well be a little below the true figures.

10. At appraisal it was assumed that all motorized traffic would be on the new bridge, but this has not happened. The traffic that remains on the barrage is, of course, relevant to congestion in the "without project" case. Here, only a single one-day count, undertaken by National Highway Authority (NHA) for the Project Completion Review Mission, is available; internal evidence suggests it may be too high, but it is given in Table A6.2, below, for lack of sufficient other evidence. Table A6.2 gives the actual count data used at appraisal (of March/April 1994), for comparison.

Table A6.2: Assumed Traffic Volumes, FY1994 and FY2001
(motorized vehicles a day)

Vehicle	1993/94 [a]	2000/01 [a]		
		Bridge	Barrage	Total
Cars, jeeps, vans	3,204	1,223	1,952	3,175
Minibuses	1,906	1,386	436	1,822
Buses	916	578	0	578
Two-axle trucks [b]	2,443	1,409	270 [c]	1,679
Three-axle trucks	64	670	0	670
Articulated trucks	8	300	0	300
Total "four-wheelers"	8,541	5,566	2,658	8,224
Two- and three-wheelers	3,544	1,050	3,015	4,065

Note: The figures used in Table A6.2 are from late March 2001. From the monthly toll revenue statistics, which run from June 2000, these seem representative of average daily traffic.
[a] 1993/94 counts were taken in March/April 1994 (1 24-hours, 2 16-hours); 2000/01 from March 2001.
[b] Including tractor-trolleys.
[c] Only tractor-trolleys.

11. At the last moment in the writing of this report, the results were obtained of a 24-hour count on the Sukkur Bridge done by an NHA team from Islamabad in February 2001. In overall terms the results were very close to those of Table A6.2, at a total of 5,687. There were, however, two important differences: the number of articulated trucks was significantly higher (at 499) and the number of buses was greater, at a level that fits better with the data of 1994 (at 823). It should be noted that the overall benefits of the Project would be measurably increased were this figure for articulated vehicles to be used in place of the assumed 300.

12. In the case of 2-axle trucks there has not been much, if any, decline in traffic in reality; it is assumed in this report that of the order of 700 2-axle trucks have been replaced by (fewer) multi-axle trucks. Still, the general picture is one of general stagnation, not of the 25-30 percent growth that had been expected at appraisal. This seems to result from a combination of factors: the choice of conservative figures for the 2000 estimates (as noted in para.11); the uncertainty associated with short period traffic counts; lower overall economic growth than expected in the 1990s; and the present economic and social conditions in Sindh, which is in the grip of a severe drought. It is, though, particularly unclear how the number of (large) buses could be so reduced.

E. Economic Internal Rate of Return Estimates

13. The economic internal rate of return (EIRR) for the Project was fully recalculated. The cash flows with respect to each of the identified types of benefit are given in Table A6.3 and the overall EIRR calculation is given in Table A6.4. The EIRR is 20.0 percent, which compares with 15.7 percent at appraisal. The difference is due to the benefits from the greater use of multi-axle trucks than had been expected in the "with project" case at appraisal.

14. Residual value is included as a negative cost at the end of the 20-year benefit assessment period. The economic life of bridge works, which account for 70 percent of the contract costs, is taken to be 100 years, giving a residual value of 70 percent. The residual value of the road works is taken to be 30 percent, giving an overall residual value of 65 percent.

F. Sensitivity Analysis

15. Sensitivity analysis was undertaken for three cases: (i) decrease in benefits by 15 percent, (ii) a capital cost increase of 15 percent, and (iii) both combined. Although the Project has been completed, there is a substantial claim by the contractor outstanding, and it is therefore possible that the costs of the Project may yet rise. The results, which show satisfactory returns even in the worst of the three circumstances (EIRR of 16.1 percent), are given in Table A6.5. To reduce the EIRR to the cut-off rate of 12 percent (the discounting rate) would require a reduction in benefits of 49 percent.

16. Annual average daily four-wheeled traffic on the Project's bridge across the Indus is almost certainly less than 6,000 at present. There is little other traffic, for the barrage takes almost all of that. One would not normally build a four-lane divided carriageway for such numbers, though one might well provide bridge substructures and culverts at such width, initially building two-lane superstructures and roadways on them. At appraisal it was thought that traffic on the bridge would be substantially higher, at a level that scarcely justified the evaluation of a stage-construction alternative. However, the assumption that the barrage should and would be closed to all motorized traffic could have been examined further, which in turn would probably have triggered the investigation of project alternatives.

Table A6.3: Project Benefits by Type by Year
(PRs '000, constant 2000)

Year	Congestion Relief	Improved Surface	Diverted Traffic	Use of Larger Trucks	Road Maint. Cost Savings	Total
2001	64,547	25,645	128,479	306,772	4,318	529,761
2002	68,709	26,927	134,902	322,110	4,318	556,968
2003	73,089	28,274	141,648	338,216	4,318	585,545
2004	77,689	29,687	148,730	355,127	4,318	615,551
2005	82,071	31,172	156,166	372,883	4,318	646,611
2006	86,166	32,730	163,975	391,527	4,318	678,716
2007	90,465	34,367	172,173	411,103	4,318	712,427
2008	94,980	36,085	180,782	431,659	4,318	747,824
2009	99,720	37,890	189,821	453,242	4,318	784,990
2010	104,697	39,784	199,312	475,904	4,318	824,015
2011	109,698	41,773	209,278	499,699	4,318	864,766
2012	114,468	43,862	219,742	524,684	4,318	907,073
2013	119,476	46,055	230,729	550,918	4,318	951,496
2014	124,734	48,358	242,265	578,464	4,318	998,140
2015	130,256	50,776	254,379	607,387	4,318	1,047,115
2016	134,369	53,314	267,098	637,756	4,318	1,096,856
2017	138,112	55,980	280,452	669,644	4,318	1,148,507
2018	142,043	58,779	294,475	703,126	4,318	1,202,741
2019	146,169	61,718	309,199	738,283	4,318	1,259,687
2020	150,503	64,804	324,659	775,197	4,318	1,319,480
NPV at 12% discount rate	683,674	265,589	1,330,562	3,177,021	32,254	5,489,100

Table A6.4: Economic Costs and Benefits of the Total Project
(PRs '000, constant 2000)

Year	Project Costs	Benefits	Net Benefits
1994	5,512	0	-5,512
1995	32,470	0	-32,470
1996	240,131	0	-240,131
1997	238,317	0	-238,317
1998	535,277	0	-535,277
1999	656,491	0	-656,491
2000	672,388	0	-672,388
2001	76,553	529,761	453,208
2002	5,272	556,968	551,695
2003	5,272	585,545	580,272
2004	5,272	615,551	610,278
2005	5,272	646,611	641,338
2006	5,272	678,716	673,444
2007	5,272	712,427	707,155
2008	5,272	747,824	742,551
2009	5,272	784,990	779,718
2010	5,272	824,015	818,742
2011	5,272	864,766	859,494
2012	5,272	907,073	901,801
2013	5,272	951,496	946,223
2014	5,272	998,140	992,867
2015	5,272	1,047,115	1,041,843
2016	5,272	1,096,856	1,091,583
2017	5,272	1,148,507	1,143,235
2018	5,272	1,202,741	1,197,469
2019	5,272	1,259,687	1,254,415
2020	(1,591,868)	1,319,480	2,911,348
Economic Internal Rate of Return			20.0%
Net Present Value (at 12% discount rate)			1,217,617

Table A6.5: Sensitivity Analysis

Assumption	EIRR (%)	SI [a]
Base case	20.0	0.73
Benefits down 15%	17.8	0.63
Cost up 15%	18.8	
Benefits down 15% and costs up 15%	16.1	

EIRR = Economic Internal Rate of Return, SI = sensitivity indicator.
[a] Sensitivity Indicator = % change in EIRR/% change in variable tested.

PROJECT FRAMEWORK [a]

Design Summary	Targets		Issues (Recommendations)
Goals	(Targets were not specified in the RRP)		
• Relieve traffic congestion on the Lloyd Barrage and in Sukkur City	Achieved		
• Safeguard the barrage by removing heavy traffic from it	Achieved		
• Enhance economic development of the area	Likely to be achieved satisfactorily		
Purpose	**Appraisal**	**Actual**	
• Provide new Indus bridge and bypass road	• 1.5 km bridge + 9.5 km road	Achieved	
• Allow all vehicles uninterrupted crossing	• Motorized traffic only via bridge	Light vehicles also on barrage	• Maintain light vehicles also on barrage
• Reduce transport costs	• EIRR: [b] 15.7%	20.1%	
• Increase NHA revenue through tolls	• Tolls on bridge	Achieved	• Monitor NHA toll revenue system
• Help control vehicle overloading	• Weighbridges at toll plaza	Still to be installed	• Install weighbridges and monitor national axle load control enforcement
Output	**Appraisal**	**Actual**	**Main causes of delay in civil works**
• Civil works – Indus bridge and bypass road	Completion: Oct 1998 Cost: $42 million (excluding contingencies)	Jun 2000 $41.3 million	• Full access to site not available until late due to land acquisition and resettlement problems • Slow start by contractor • Contractor's failure to undertake construction from both bunds of the river as indicated in the bids • NHA's payment delays, with invocation by contractor of Clause 69.4 (right to slow and suspend works) • Indus River Commission objection to bridge girder in intersection with one bund
Input			
• Supervisory services	• Jan 1995-Oct 1998 $2.95 million (excluding contingencies)	Mar 1995-Oct 2000 $2.67 million	
• Pre-project technical assistance planning services	• Not costed in RRP	$0.16 million	

EIRR = economic internal rate of return, km = kilometer, NHA = National Housing Authority, RRP = Report and Recommendation of the President.

[a] A project framework was not prepared at appraisal. The framework was prepared for the Project Completion Review and follow-up purposes.

[b] Based on vehicle operating cost savings and maintenance cost savings.