



Completion Report

Project Number: 32223
Loan Number: 1920(SF)
March 2013

Bangladesh: Road Network Improvement and Maintenance Project

Asian Development Bank

CURRENCY EQUIVALENTS

Currency Unit – taka (Tk)

		At Appraisal (10 June 2002)	At Project Completion (19 December 2011)
Tk1.00	=	\$0.02	\$0.012
\$1.00	=	Tk50.00	Tk80.73

ABBREVIATIONS

ADB	–	Asian Development Bank
ARMP	–	annual road maintenance program
BRTA	–	Bangladesh Road Transport Authority
DPP	–	Development Project Proposal
EIA	–	environmental impact assessment
EIRR	–	economic internal rate of return
FY	–	fiscal year
HDM	–	Highway Design and Maintenance Standards Model
IRI	–	international roughness index
NPV	–	net present value
OFID	–	OPEC Fund for International Development
PCR	–	project completion review
PRMC	–	periodic road maintenance component
RHD	–	Roads and Highways Department
RIC	–	road improvement component
RNIMP	–	Road Network Improvement and Maintenance Project
RRMC	–	routine road maintenance component
RSC	–	road safety component
SDR	–	special drawing rights
TEC	–	Tender Evaluation Committee
TTC	–	travel time cost
VOC	–	vehicle operating cost

NOTES

- (i) The fiscal year (FY) of the Government of Bangladesh ends on 30 June. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2012 ends on 30 June 2012.
- (ii) In this report, "\$" refers to US dollars.

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BASIC DATA

A. Loan Identification

1. Country	Bangladesh
2. Loan Number	1920-BAN(SF)
3. Project Title	Road Network Improvement and Maintenance Project
4. Borrower	People's Republic of Bangladesh
5. Executing Agency	Roads and Highways Department, Ministry of Communications
6. Amount of Loan	SDR48,964,000 (\$65 million equivalent)
7. Project Completion Report Number	PCR: BAN-1834

B. Loan Data

1. Appraisal	
– Date Started	3 June 2002
– Date Completed	10 June 2002
2. Loan Negotiations	
– Date Started	9 September 2002
– Date Completed	11 September 2002
3. Date of Board Approval	10 October 2002
4. Date of Loan Agreement	3 February 2003
5. Date of Loan Effectiveness	
– In Loan Agreement	4 May 2003
– Actual	27 October 2003
– Number of Extensions	3
6. Closing Date	
<u>ADB</u>	
– In Loan Agreement	31 December 2007
– Actual	19 December 2011
– Number of Extensions	2
<u>OFID</u> ¹	
– In Loan Agreement	31 December 2007
– Actual	Active
– Number of Extensions	2
7. Terms of Loan	
<u>ADB</u>	
– Interest Rates	1.00% per annum (during grace period) 1.50% per annum (after grace period)
– Maturity (number of years)	32
– Grace Period (number of years)	8
<u>OFID</u>	
– Interest Rates	1.00% per annum
– Maturity (number of years)	20
– Grace Period (number of years)	5

¹ OFID = OPEC Fund for International Development

8. Disbursements

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
29 November 2005	19 December 2011	73 months
Effective Date	Original Closing Date	Time Interval
27 October 2003	31 December 2007	50 months

b. Amount (SDR '000)

Category Number (1)	Category (2)	Original Allocation (3)	Partial Cancellations/Additions (4 = 3 - 5)	Last Revised Allocation (5)	Amount Disbursed (6)	Undisbursed Balance ^a (7 = 5 - 6)
1A	Civil Works: RI	34,633,000	18,280,015	16,352,985	15,730,974	622,011
1B	Civil Works: PRM	3,736,000	1,518,933	2,217,067	2,392,252	(175,185)
1C	Civil Works: RRM	542,000	0	542,000	525,490	16,510
2A	Road Safety: BSI	301,000	0	301,000	154,438	146,562
2B	Road Safety: EPC	189,000	0	189,000	0	189,000
3A	Consulting-Supervision	3,919,000	257,308	3,661,692	2,505,043	1,156,649
3B	Consulting-Design	746,000	(200,000)	946,000	798,882	147,118
4	Interest Charge	637,000	0	637,000	406,368	230,632
5	Unallocated	4,261,000	2,942,692	1,318,308	0	1,318,308
	Total (SDR)	48,964,000	22,798,948	26,165,052	22,513,448	3,651,604
	Total US\$ Equivalent	65,000,000	24,463,457	40,536,543	34,925,561	5,610,982

(-) = negative number, BSI = black spot improvement, EPC = education and public campaign, PRM = periodic road maintenance, RI = road improvement, RRM = routine road maintenance.

^a An undisbursed loan of SDR3,651,604.20 (\$5,610,982 equivalent) was cancelled on the loan closing date of 19 December 2011. Previous cancellations of SDR22,798,948.01 (\$35,550,330.66 equivalent) were made three times during 30 July 2007–7 July 2008. In total, SDR26,450,552.21 (\$41,161,312.65 equivalent) was cancelled from the loan.

9. Local Costs (Financed)

	Appraisal	Actual
- Amount (\$ million)	21.30	10.27
- Percent of Local Costs	28.97	29.39
- Percent of Total Cost	17.33	21.68

C. Project Data

1. Project Cost (\$ million)

Cost	Appraisal Estimate (Total)	Actual
Foreign Exchange Cost	49.40	28.70
Local Currency Cost	73.50	47.35
Total	122.90	76.05

2. Financing Plan (\$ million)

Cost	Appraisal Estimate (Total)			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Implementation Costs						
ADB Financed	43.70	21.30	65.00	24.65	10.27	34.93
Government Financed	0.00	47.90	47.90	0.00	37.08	37.08
OFID	5.70	4.30	10.00	4.05	0.00	4.05
Total	49.40	73.50	122.90	28.70	47.35	76.05

ADB = Asian Development Bank, OFID = OPEC Fund for International Development

3. Cost Breakdown by Project Component (\$ million)

Component	Project Cost			Actual		
	Foreign	Local	Total	Foreign	Local	Total
A. Base Cost^a						
1. Land Acquisition/Resettlement	0.00	3.60	3.60	0.00	5.83	5.83
2. Road Improvement	33.80	45.80	79.50	18.94	31.99	50.93
3. Road Maintenance						
a. Periodic Road Maintenance	5.00	11.00	16.00	3.71	8.26	11.97
b. Routine Road Maintenance	0.30	0.60	0.90	0.31	0.70	1.01
4. Road Safety						
a. Black Spot Improvement	0.20	0.30	0.50	0.05	0.30	0.35
b. Education and Public Campaign	0.10	0.20	0.30	0.00	0.00	0.00
5. Consulting Services						
a. Supervision	3.20	2.00	5.20	3.88	0.00	3.88
b. Project Preparation ^b	0.40	0.60	1.00	1.18	0.00	1.18
6. Project Administration	0.00	1.00	1.00	0.00	0.00	0.00
7. Implementation of Land Acquisition and Resettlement	0.00	0.50	0.50	0.00	0.27	0.27
Subtotal (A)	42.90	65.60	108.50	28.07	47.35	75.42
B. Contingencies						
1. Physical ^c	4.00	5.40	9.30	0.00	0.00	0.00
2. Price ^d	1.70	2.50	4.20	0.00	0.00	0.00
Subtotal (B)	5.70	7.90	13.60	0.00	0.00	0.00
C. Interest Charges During Construction	0.80	0.00	0.80	0.63	0.00	0.63
Total^e	49.40	73.50	122.90	28.70	47.35	76.05

^a In 2002 prices^b Detailed design for the proposed Road Network Improvement and Maintenance Project II^c At 10% of base cost, excluding the road maintenance component^d At 2.4% annually for foreign exchange and local currency costs, excluding the periodic road maintenance component^e Including customs duties and taxes, estimated at about \$18.6 million equivalent

4. Project Schedule

Item	Appraisal Estimate	Actual
Land Acquisition and Resettlement		
- Commencement	July 2003	June 2006
- Completion	June 2005	December 2009
Detailed Design		
- Commencement	April 2003	September 2005
- Completion	December 2003	February 2007
Road Improvement (prequalification, bidding, approval, award, and construction)		
- Commencement	July 2003	October 2004
- Completion	June 2007	June 2011
Periodic Maintenance (selection, design, procurement, and implementation)		
- Commencement	April 2005	April 2007
- Completion	March 2007	July 2010
Routine Maintenance (design, procurement, implementation, and supervision)		
- Commencement	January 2004	February 2008
- Completion	June 2007	June 2011
Road Safety and Axle Load Control (black spot improvement, education, and public campaign)		
- Commencement	October 2003	November 2009
- Completion	September 2005	May 2011
Consulting Services for Supervision (selection and supervision)		
- Commencement	January 2003	September 2005
- Completion	June 2007	June 2011

Other Milestones:

- 31 March–4 April 2002: Loan Fact Finding conducted
- 31 May 2002: Management Review Meeting held
- 3–10 June 2002: Loan Appraisal conducted.
- 19 July 2002: Staff Review Committee Meeting held
- 9–11 September 2002: Loan Negotiation
- 22 January 2004: ADB approved minor change in scope
- 1 February 2004: Administration of the project delegated to Bangladesh Resident Mission
- 14 May 2006: Project Implementation Coordination Meeting held
- 14 January 2007: Consultants submitted draft final report on feasibility study for privatizing the Roads and Highways Department road equipment and workshops
- 8 March 2007: ADB approved resettlement action plan
- 13 March 2007: Notification of award of road improvement component contracts 1, 2, 3, 4, and 5 issued to successful bidders
- 20 May 2007: ADB approved updated resettlement plan
- 8 August 2007: ADB approved minor change in project scope for performance-based routine maintenance contracts
- 26 August 2007: Loan closing date extended by 24 months from 31 December 2007 to 31 December 2009
- 18 November 2007: Approval of bid evaluation reports for periodic road maintenance contracts 1, 2, 3, and 4
- 9 November 2009: Borrower's request received for extension of loan closing date from 31 December 2009 to 30 June 2011
- 21 December 2009: Loan closing date extended by 18 months from 31 December 2009 to 30 June 2011
- 19 December 2011: Loan account closed

5. Project Performance Report Ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
From 27 Oct 2003 to 31 Dec 2003	Satisfactory	Satisfactory
From 1 Jan 2004 to 31 Dec 2004	Satisfactory	Satisfactory
From 1 Jan 2005 to 31 Dec 2005	Satisfactory	Satisfactory
From 1 Jan 2006 to 31 Dec 2006	Satisfactory	Satisfactory
From 1 Jan 2007 to 31 Dec 2007	Satisfactory	Satisfactory
From 1 Jan 2008 to 31 Dec 2008	Satisfactory	Satisfactory
From 1 Jan 2009 to 31 Dec 2009	Satisfactory	Satisfactory
From 1 Jan 2010 to 31 Oct 2010	Satisfactory	Satisfactory
From 1 Jan 2011 to 19 Dec 2011	Satisfactory	Satisfactory

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Fact Finding	21 Mar–4 Apr 2002	3	45	a, b, c
Loan Appraisal	03–10 Jun 2002	3	24	a, c, d
Loan Inception	25 Nov–2 Dec 2004	2	16	b, e
Project Review 1	15–22 June 2005	1	9	b
Project Review 2	28 Nov–08 Dec 2005	1	11	b
Project Review 3	25 Jun–5 Jul 2006	1	11	b
Project Review 4	20–27 Dec 2006	1	8	b
Project Review 5	1–9 Jul 2007	1	9	b
Project Review 6	22 Nov–3 Dec 2007	4	48	b, d, f
Mid-Term Review Mission	5–21 May 2008	4	64	b, c, e, g
Project Review 8	18 Dec–6 Jan 2008	2	17	b, g
Project Review 9	1–29 Jul 2009	2	58	e, g
Project Review 10	9–18 Mar 2010	2	18	b, e
Project Review 11	10–27 Oct 2010	3	24	b, c, h
Project Completion Mission	26–28 Mar 2012	2	9	b, c

a = senior financial analyst, b = project implementation officer, c = staff consultant, d = social development specialist/project economist, e = project analyst, f = gender specialist/project specialist, g = transport specialist, h = head, portfolio management unit.

I. PROJECT DESCRIPTION

1. The Asian Development Bank (ADB) formulated the Road Network Improvement and Maintenance Project in response to the Government of Bangladesh's strategy for development of an integrated road network to link the rural poor to economic opportunities. Improvement of the road network under the project was expected to stimulate significant economic growth in the central-north and north-west regions of Bangladesh and contribute to poverty reduction. The project also envisaged introduction of policy and institutional reforms in the road subsector and addressing of social and environmental concerns.

2. The objective of the project was to help the government in achieving poverty reduction through economic growth by improving transport efficiency and strengthening integrated road networks, effectively linking national, regional, and district roads. The project outcomes would (i) improve regional and district roads to provide rural farmers with better access to markets, social services, and employment opportunities; (ii) secure government resources for periodic road maintenance; (iii) promote private sector participation in road maintenance; and (iv) improve road safety. At appraisal, the project included four components, each with a mix of investment and policy elements. The road improvement component (RIC) included the reconstruction and improvement of sections of a regional road in Mymensingh district, and of five "type A" feeder roads in Mymensingh, Jamalpur, Rangpur, Thakurgaon, and Dinajpur districts. It also included addressing the associated environmental and resettlement issues. The periodic road maintenance component (PRMC) was to finance priority road maintenance activities under the annual road maintenance program (ARMP). Implementation of the PRMC was expected to encourage the government to commit increased budgetary allocations to periodic maintenance of roads, and significantly contribute to securing government resources to address the critical backlog of periodic maintenance. The routine road maintenance component (RRMC) included contracting out of about 50 km of regional and type A feeder roads to domestic contractors for routine and recurrent maintenance through performance-based contracts, thereby promoting private sector involvement in road maintenance. The road safety component (RSC) was to improve accident-prone areas or black spots and undertake an education and public awareness campaign on road safety. The project framework, comparing the project at appraisal with its achievements, is in Appendix 1.¹

3. The executing agency for the project was the Roads and Highways Department (RHD) of the Ministry of Communications. ADB agreed to provide a loan not exceeding SDR48,964,000 (equivalent to \$65 million at loan appraisal) from ADB's Special Funds Resources, which financed part of the cost (52.9%) of the project.² The OPEC Fund for International Development (OFID) (formerly Organization of Petroleum Exporting Countries Fund) provided cofinancing of \$10.0 million equivalent (8.1%), which was used to finance portions of civil construction works. The remaining investment cost of \$47.90 million (39%) was financed by the Government of Bangladesh. Project administration was delegated to the ADB Bangladesh Resident Mission (BRM) on 1 February 2004.

¹ The project framework at appraisal has since been modified to conform to ADB's revised design and monitoring framework.

² ADB. 2002. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of Bangladesh for the Road Network Improvement and Maintenance Project*. Manila (Loan No. 1920-BAN[SF] \$65 million equivalent)

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

4. The project's focus on improvement of the country's primary road network, generating economic opportunities for the poor, proved to be satisfactory and highly relevant. The project was designed under ADB's Country Assistance Plan (CAP), 2000–2002, which had the overall strategic objective of achieving poverty reduction through creating better development opportunities for the poor.³ In the road subsector, ADB's country operational strategy was, among others, to focus on the development of the primary road network and complete linkages to the subregional transport network.⁴ The poverty reduction objective was a priority in the government's interim national poverty reduction strategy (i-PRSP), which emphasized the role of improved infrastructure as an instrument for poverty reduction.⁵ This poverty objective was reiterated in the partnership agreement on poverty reduction between ADB and the government.⁶ The project was also consistent with the Road Master Plan prepared by ADB and approved by the government.⁷ The project design followed the government's Fifth Five-Year Plan, which prioritized development and maintenance of an effective road network.⁸ The project was designed based on experience from 12 ADB-assisted road improvement projects (footnote 2). Project preparation was carried out by an ADB technical assistance project.⁹ Some minor changes were made to the project design during implementation, though they did not affect the relevance of the project.

B. Project Outputs

1. Road Improvement Component

a. Investment

5. It was envisaged at appraisal that the project would improve a 47 km-regional road in Mymensingh-Nandail and five type A feeder roads (about 127 km in total) in (i) Muktagacha-Chechua (10 km), (ii) Jamalpur-Dewanganj (41 km), (iii) Mithapukur-Madhyapara (24 km), (iv) Thakurgaon-Ranisankail (37 km), and (v) Saidpur-Parbatipur (15 km). The total length of the road sections improved under this component at project completion was 152.5 km (including 47 km of regional roads and 105.30 km of type A feeder roads). This is about 21.5 km less than the total road length envisaged for improvement at appraisal. The shortfall was mainly attributed to delayed land acquisition for Contract 4 (Saidpur-Parbatipur district road) and underperformance by the civil works contractor responsible for Contract 1 (Mymensingh-Nandail, Section 1, and Muktagacha-Chechua), and Contract 3 (Jamalpur-Dewanganj).¹⁰ The contractor suffered cash flow problems and lacked overall commitment. The incomplete road section (21.5 km) was later removed from the scope of the respective civil works contracts and

³ ADB. 1999. *Country Assistance Plan: Bangladesh, 2000–2002*. Manila.

⁴ ADB. 1999. *Bangladesh Country Operational Strategy: Responding to the Challenge of Poverty*. Manila.

⁵ Government of Bangladesh. 2002. *A National Strategy for Economic Growth, Poverty Reduction, and Social Development (i-PRSP)*. Dhaka.

⁶ ADB and the Government of Bangladesh. 2000. *Partnership Agreement on Poverty Reduction*. Manila.

⁷ ADB. 1994. *Technical Assistance to the People's Republic of Bangladesh for Preparation of a Road Master Plan (TA 1053-BAN for \$470,000)*. Manila.

⁸ Government of Bangladesh. Planning Commission, Ministry of Planning. *The Fifth Five-Year Plan, 1997–2002*. Dhaka.

⁹ ADB. 2000. *Technical Assistance to Bangladesh for the Road Network Improvement and Maintenance Project (TA 3508, approved in September 2000 for \$0.8 million)*. Manila.

¹⁰ One contractor was awarded both Contract 1 and Contract 3.

the project. Project benefits were not significantly affected due to linkages with the core road network provided by the project. The project has generated an increase in traffic on the completed project roads, assessed at 3,269 (annual average daily traffic) and the final estimate for the movement of people and goods on the improved roads is 485,940 (average vehicle-km). About 10.35 million people, including 5.05 million women, have indirectly benefited from the project, which is much higher than the 2.75 million anticipated at appraisal.¹¹ This observation is substantiated by the economic reevaluation (para. 32 and Appendix 6).

b. Policy

6. **Road Transport and Traffic Act.** Some progress has been made in the development of policy and legislation. The 1925 Highway Act was updated in 2001 as a condition of Loan 1789/1790-BAN: Road Maintenance and Improvement Project.¹² The government also drafted the Public Road Act in 2005, with the assistance of consultants funded by the United Kingdom Department for International Development (DFID), defining the jurisdictions, responsibilities, and compliance parameters of the road owner (the government) and road users. The draft act is still under review by the Ministry of Communication and other interministerial stakeholders, and is scheduled for final approval and enactment by 2013. The government, in 2004, amended the Motor Vehicles Ordinance 1984, and prepared the Motor Vehicles Act. These legal instruments support regulation of the movement of traffic throughout the country and thereby help mitigate traffic congestion on major road networks.

7. **Privatization of the Roads and Highways Department's road maintenance equipment and workshop.** In accordance with the loan agreement, RHD submitted a draft feasibility study in November 2006 on the privatization of their road maintenance equipment and workshop. However, the report lacked definitive recommendations and a time-bound action plan, and ADB advised RHD to revise the report focusing on these elements. RHD's work on this report is still incomplete, due mainly to the reluctance of RHD workshop staff to allow privatization. Although this covenant was not complied with, the efficiency of road maintenance has improved over time, as performance-based maintenance contracts have been introduced, and all maintenance works are now outsourced to the private sector. This covenant is no longer very relevant, given the emergence of several private sector owned and operated equipment rental companies in the country. Nevertheless, continuous efforts by the RHD will be required to improve the efficiency of the existing maintenance equipment and workshop.

2. Road Maintenance Component

a. Investment

8. **Periodic road maintenance component.** At appraisal, the investment element of the PRMC was intended to finance 2 years of priority road maintenance activities under the ARMP. This was to cover periodic maintenance of an estimated 200 km of road per year, to be carried out through civil works contracts, totaling \$8.0 million equivalent. The roads were to be selected annually using the Highway Design and Maintenance Standards Model (HDM) ranking as part of the ARMP. This component was included in the project to encourage the government to commit more of its annual budget to periodic road maintenance. With a view to recovering part of the initial implementation delays, the ADB project review mission (25 June–5 July 2006)

¹¹ The number of indirect beneficiaries was taken from a 15 km-wide band (7.5 km on either side of the road).

¹² ADB. 2000. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of Bangladesh for the Road Maintenance and Improvement Project*. Manila.

agreed to undertake implementation of this component in 1 year (FY2008). A total of 391 km, under four PRMC contracts, were given periodic maintenance in the project area.¹³ Physical works under all contracts were substantially completed in August 2010. About 2.35 million people, including 0.96 million women, benefited from the completed road maintenance works. The construction period for all four contracts was initially 18 months, which was later extended to 26 months. The delay was partly due to late payment for the contractors' claim for 30–40% price escalation of all PRMC contract packages, which was critical to the contractors' cash flow. These payments could not be made within June 2010 due to the protracted approval process of the revised Development Project Proposal (DPP) by the Planning Commission, which was a prerequisite for disbursement.

9. **Routine road maintenance component.** At appraisal, an investment of \$0.9 million—including ADB financing of \$0.7 million equivalent and government counterpart funding of \$0.2 million equivalent—was envisaged for routine and recurrent maintenance of about 50 km of regional or type A feeder roads. Routine road maintenance (RRM) works were to be conducted by domestic contractors through performance-based contracts for the contract period of 3–5 years. RRM was carried out on 50.5 km of road in the project area, under one contract, at a cost of \$0.95 million.¹⁴ The physical works were completed in June 2011, before the scheduled date of December 2011. The project completion review (PCR) mission noted that the quality of works carried out by the contractors on all three major maintenance components—preventive work, catch-up routine work, and routine and recurrent work—was satisfactory. This is demonstrated by the improved riding quality of the completed roads.

b. Policy

10. **Maintenance financing.** In compliance with the loan agreement, the government annually selected roads for improvement, using the HDM. The government has also addressed the critical issue of regular and adequate road maintenance financing by substantially increasing the road maintenance budget in recent years. An ADB project preparatory mission¹⁵ calculated that the routine maintenance budget has covered 100% of costs since FY2009 (Tk2,700 million). This has increased from Tk741 million stated in the Road Master Plan (FY2007). The budget provision for periodic maintenance of roads and bridges increased from Tk1.7 billion in FY2007 to Tk4.0 billion in FY2012, though a backlog of about 760 km remains from 2011. This demonstrates the government's increasing emphasis on road maintenance.

11. **Mechanism for sustainable maintenance financing.** The government has committed itself to establishing a road maintenance fund using road-user charges, as required by the loan agreement of a previous ADB-assisted road project (footnote 12). A draft Roads Fund Board Act was prepared and is being processed by the government. It is expected that the cabinet will approve the act in 2013.¹⁶ It is important that the government ensure efficient and transparent use of the maintenance budget, which has been substantially increased since the approval of the project, because the road maintenance fund may not be sufficient to meet current needs, particularly reduction of the maintenance backlog. A 10-year maintenance financing strategy was agreed in 2012 between the government and ADB, as part of ADB's processing of a new

¹³ (i) Contract 1: Sherpur–Mymensingh (65 km), Jamalpur–Bangaon (30 km), Bangaon–Nalitabari (11 km); (ii) Contract 2: Madhupur–Mymensingh (47 km), Jamalpur–Madhupur (41 km); (iii) Contract 3: Beldanga–Panchagarh (76 km), Dinajpur–Beldanga (16 km); (iv) Contract 4: Barabari–Burimari (105 km).

¹⁴ 35 km on Rangpur–Saidpur national highway, 7.45 km on Rangpur bypass, and 8.05 km on Saidpur bypass.

¹⁵ ADB. March 2012. *Aide Memoir on the Consultation Mission for the Road Sector*. Dhaka.

¹⁶ The government in 2012 reiterated its plan to establish the Road Maintenance Fund. An interministerial meeting was held at the Ministry of Communication on 3 May 2012 to examine the draft bill in detail.

loan to the RHD—for the South Asia Subregional Economic Cooperation (SASEC) Road Connectivity Project. It is essential that the government applies this strategy in the coming years.

3. Road Safety Component

a. Investment

12. It was envisioned at appraisal that the project would undertake civil works at selected black spots along the project roads and other selected roads at a cost of \$0.8 million—comprising \$0.6 million ADB financing and \$0.2 million government counterpart funding. This also included an education and public awareness campaign for road users and pedestrians. A safety audit was to be conducted for project roads, along with detailed design of the project roads to comply with safety requirements. Safety was also to be assessed for about 200 km of existing roads with the highest accident rates. Road safety was to be improved in accordance with ADB's Road Safety Guidelines for the Asian and Pacific Region (June 2013). At completion, 204 km of road¹⁷ had been assessed under one RSC contract, implemented at a cost of \$0.37 million. The civil works and education and public awareness campaign were implemented in October 2010–April 2011, as scheduled. The PCR mission judged the quality of civil works and awareness campaign under the RSC to be satisfactory.

b. Policy

13. The project was also to assist the Bangladesh Road Transport Authority (BRTA) Road Safety Cell in implementing its strategic action plan. This was particularly to develop a more comprehensive highway code that would set out rules for road users and provide guidelines for safe driving, and to prepare illustrated guides for road safety education. As envisaged at appraisal, BRTA's capacity on road safety was strengthened by absorbing the staff resources of BRTA's Road Safety Cell (financed under the World Bank-assisted Road Rehabilitation and Maintenance Project-III). The PCR mission noted that the government had provided sufficient budget from FY2007 for the Road Safety Cell to carry out its task as secretariat to the National Road Safety Council. The Road Safety Cell also developed a comprehensive highway code in 2009 that set out rules for road users. ADB is continuing to support to the government's initiative to improve road safety (para. 35).

C. Project Costs

14. The total project cost at appraisal was \$122.90 million equivalent, out of which \$49.40 million (about 40%) was in foreign currency (including \$0.8 million in service charges and interest during construction) and \$73.50 million (about 60%) was in local currency, including taxes and duties. ADB's loan of \$65.0 million was to finance 52.90% of the total project cost. At appraisal, cofinancing by OFID of \$10 million equivalent was envisaged.

15. The actual project completion cost estimated by the project completion review mission was \$76.05 million equivalent. ADB financed \$34.93 million equivalent (45.93%), and OFID \$4.05 million equivalent (5.3%). The government financed the remaining \$37.08 million equivalent (48.75%) in local costs. The decrease in actual project cost is mainly attributed to the substantially lower than estimated bid prices for the civil works on all RIC contracts, which generated a saving of \$21.24 million equivalent. Also, about 19 km of road works were

¹⁷ The road sections improved under the Road Safety Component were: (i) Birampur–Fulbari–Dinajpur road (51 km); (ii) Saidpur–Beldanga road (22 km); (iii) Rangpur–Barobari–Kurigram road (31 km); (iv) Birganj–Pirganj–Ranisankail road (42 km); (v) Thakugaon–Pirganj road (24 km); and (vi) Tangail–Madhupur road (34.80 km).

cancelled under RIC contracts 1 and 3 due to underperformance of the civil works contractor; and 2.5 km of road works were cancelled under RIC Contract 4, because the necessary land was not transferred by the Ministry of Defense to the Ministry of Communication. The exchange rate fluctuations between special drawing rights (SDRs) and the US dollar, and the taka and the dollar—in favor of the taka—also contributed to a lower project cost at completion. This led to cancellation of \$41.16 million of loan funds, including cancellation of \$35.55 million during implementation and a \$5.61 million undisbursed loan balance at loan closing.¹⁸

16. The actual cost of almost all components was substantially lower than that envisaged at appraisal. However, the cost of land acquisition and resettlement increased from \$3.60 million equivalent at appraisal to \$5.83 million at completion, due to inclusion of an additional alignment under RIC Contract 3 (Jamalpur bypass),¹⁹ and increased land prices. Details of project costs at appraisal and at completion are in Appendix 2. For ease of comparing costs, the local currency costs incurred by the RHD were converted into US dollars using the prevailing exchange rate during each transaction.

D. Disbursements

17. The actual disbursement of loan funds on a yearly basis is given in Appendix 3. At loan closing, an amount of \$34.93 million equivalent had been disbursed, including \$0.63 million equivalent for interest during construction. The disbursement of ADB funds was slower than envisaged at appraisal due mainly to problems relating to procurement, land acquisition, and contractor underperformance (para. 5). Four partial cancellations of surplus loan funds were made following borrower requests on 30 July 2007, 29 November 2007, 7 July 2008, and 19 December 2011. The cancellations amounted to SDR22.51 million (equivalent to \$41.16 million) reducing the amount of ADB financing to \$34.93 million. The rise in the flow of disbursement in 2008 (\$4.77 million), 2009 (\$7.29 million), 2010 (\$9.22 million), and 2011 (\$8.85 million) reflected payment to the contractors under the RIC and good progress on the civil works, while the low disbursement in 2005 (\$26,161), 2006 (\$1.09 million) and 2007 (\$3.67 million) represented the initial start up delay and limited work during the initial period of civil works under the RIC. For consulting services and procurement of civil works contracts, loan funds were disbursed using direct payment and reimbursement procedures in accordance with ADB's *Loan Disbursement Handbook* (2007, as amended from time to time).

E. Project Schedule

18. ADB approved the loan on 10 October 2002. The loan agreement was signed on 3 February 2003 and became effective on 27 October 2003. The original closing date of the loan was 31 December 2007; however, the project suffered from initial start-up delays of 23 months due to protracted recruitment of design and supervision consultants. This resulted in parallel delays in (i) preparing detailed engineering design (38 months), (ii) procurement of the civil work contractors (16 months), and (iii) land acquisition and resettlement (54 months). Accordingly, civil works started in June 2007 instead of June 2004, as envisaged at appraisal. During 2008–2010, the project continued to experience further implementation delays caused by protracted land acquisition and resettlement. This was due to the government's inability to release funds on

¹⁸ The total amount financed (\$76.09 million equivalent) including cancellations, was more than the loan amount at appraisal (\$65 million) due mainly to appreciation of SDRs against the dollar, and depreciation of the taka against the dollar during project implementation.

¹⁹ The Jamalpur bypass was included in the project's scope at detailed design stage to avoid congestion and complex land acquisition on the first 3 km section of the Jamalpur–Dewanganj road.

time, resulting from a delay by the Planning Commission in approving the revised DPP;²⁰ continued underperformance by the civil works contractor for RIC contracts 1 and 3; and inordinate delays by the RHD in relocating utilities and cutting trees from the right of way. At appraisal, the project was planned for completion within 4 years, inclusive of preconstruction activities (December 2003–December 2007). Implementation of all components actually took about 7 years (October 2004–June 2011). To accommodate these delays, the closing date of the loan was extended twice by a total of 3.5 years, from 31 December 2007 to 30 June 2011.

F. Implementation Arrangements

19. The executing agency of the project was the RHD, operating under the Roads and Railway Division (presently, Roads Division) of the Ministry of Communication. The implementation arrangements were as envisaged at appraisal. For the RIC, RHD assigned a full-time additional chief engineer as project director, reporting to the chief engineer, and supported by two executive engineers acting as project managers, one each for project areas in central-east and north-west Bangladesh. The project director also had overall responsibility for the PRMC, including overseeing subproject selection, procurement, and monitoring and reporting. The project director also acted as project coordinator for the performance-based maintenance contract. As planned at appraisal, administration of the day-to-day implementation of the PRMC and RRMC was delegated to the RHD's zonal offices, through the project director. The PCR mission noted that the two executive engineers (project managers) and two subdivisional engineers (deputy project managers) were based in Dhaka during the initial stage and defect-liability period, instead of in the project areas. This might have contributed adversely to the efficiency of the RHD's project management, though the succeeding project (Road Network Improvement and Maintenance Project [RNIMP] II) has seen improvement on this, with responsible RHD personnel posted in the project areas. In addition, only one subdivisional engineer was assigned to assist the project director, which proved to be inadequate and delayed the RHD's actions on important project issues on several occasions. The BRTA was the implementing agency for the RSC, headed by a project director with the rank and status of director in charge of technical wing, reporting to the chairman of the BRTA. The project director was supported by the road safety cell manager, as project manager responsible for day-to-day affairs. This arrangement was adequate considering the smaller scope of activities under the road safety component.

G. Conditions and Covenants

20. The status of compliance with loan covenants is in Appendix 5. A review by the PCR mission confirmed the satisfactory compliance of the government, the RHD, and the BRTA with the major loan covenants. However, compliance with several covenants was only partly satisfactory. This included sector covenant 2 relating to conduct of a feasibility study for privatization of the RHD's road maintenance activities, and disinvestment of the RHD's road equipment and workshop, since the RHD did not prepare and adopt a time-bound action plan following the feasibility study prepared by consultants. However, the emergence of several private sector owned and operated equipment rental companies in the country after the approval of the project has rendered this covenant as less relevant.. These issues are being further pursued under RNIMP II, which also includes the same covenant.²¹ The government and

²⁰ The cost of land acquisition and resettlement increased drastically after inclusion of the Jamalpur Bypass (see footnote 21). The DPP needed revision to allocate the additional cost of resettlement.

²¹ ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of Bangladesh for the Road Network Improvement and Maintenance Project II (RNIMP II)*. Manila (Loan No. 2021-BAN[SF])

the executing agencies also substantially met reporting requirements. The RHD maintained separate records and accounts on transactions for goods and services financed under the loan. The accounts were audited annually by the government,²² and the audited accounts were generally submitted to ADB on time, which substantially met the requirements of the relevant covenant. All audit observations were settled with the auditors satisfactorily.

H. Consultant Recruitment and Procurement

1. Consultant Recruitment

21. Recruitment of consultants was as planned at appraisal and complied with ADB's Guidelines on the Use of Consultants (2010, as amended from time to time). The consultants were fielded in September 2005—a delay of 23 months. It was envisaged at appraisal that about 163 person months of international and 745 person months of domestic consultant services would be required for construction supervision, at an estimated cost of \$5.2 million equivalent. Consulting services for design of the project were originally earmarked under the Road Maintenance and Improvement Project (footnote 12). However, this activity was later brought under the Road Network Improvement and Maintenance Project by a minor change of scope approved by ADB. The actual input of consulting services at completion was 131.40 person months of international consultants and 1,078 person months of national consultants, without any additional cost. The reduction of international consultants' inputs and increase in national consultants' inputs was a cost-effective means to ensure consultants' presence. This accelerated progress on construction works under RIC contracts 1 and 3, which were making poor progress (para. 18). The consultancy period was extended from 14 October 2009 to 29 June 2011 at no extra cost.

22. The 23-month delay in recruiting the design and construction supervision consultant triggered commensurate delays in all project start up activities, and resulted in an overall project implementation delay. The delay was mainly due to the RHD's lack of adequate capacity for evaluation of consultants' proposals and prolonged clearance by the Ministry of Communication and the Cabinet Division. Subsequently, ADB reevaluated the consultants' technical proposals at the request of the government. The project also financed recruitment of a detailed design consultant for RNIMP II (footnote 21). The consultants were recruited and fielded in February 2006, a delay of 14 months. The consultants submitted the final designs for RNIMP II in April 2007.

2. Procurement

23. Overall, the government followed the procurement process as envisaged at appraisal. Contracts were procured under the RIC through international competitive bidding procedures, in accordance with ADB's Procurement Guidelines (2010, as amended from time to time). The bidding followed ADB's standard single-stage, two-envelope procedure. One lesson learned from the project is that in the absence of careful verification of the bidders' capacity to deploy resources, the RHD suffered from unsatisfactory contractor performance. The bids were evaluated by the RHD's seven-member Tender Evaluation Committee (TEC), which included two members from other government infrastructure agencies. The TEC initially recommended award of all five RIC contracts to a single bidder, which provided the lowest value bid for each package. However, following ADB's expression of concern regarding the capacity of the bidder to perform all five contracts, the TEC reassessed the contractor's equipment and finance

²² The Foreign Aided Projects Audit Department (FAPAD) audited the RHD's accounts on behalf of the government.

capacity, resulting in award of only two contracts to this bidder. Unfortunately, the TEC did not have sufficient capacity or an effective tool to verify the bidder's capacity. In the course of implementation, this contractor suffered severe financial cash flow problems causing delays in construction and cancellation of some road sections under contracts 1 and 3. The RHD received the bids on 31 July 2006 and awarded the five RIC civil works contracts in April 2007, with a delay of 16 months. Civil works for the PRMC and RRMC contracts were procured in accordance with local competitive bidding procedures acceptable to ADB. The bidding followed single-stage, two-envelope procedures without prequalification because of the smaller sizes of the PRMC and RRMC contract packages.

I. Performance of Consultants, Contractors, and Suppliers

1. Consultants

24. The performance of the consultants was generally *satisfactory*, in that they performed the tasks in accordance with their terms of reference. The consultants managed the project well and provided adequate guidance to the civil works contractors. This resulted in accelerated progress of civil works in RIC contracts 2, 4, and 5, and all PRMC and RRMC contracts. This helped compensate for the construction delays in other RIC contracts, notably contracts 1 and 3. Quality assurance by the consultants was also *satisfactory*, which was demonstrated by the improved riding qualities of the completed roads, including the sections completed under contracts 1 and 3. They regularly provided the RHD with adequate assistance and produced comprehensive monthly and quarterly reports, including a final completion report.

2. Contractors

25. The performance of the civil works contractors, particularly under the RIC, was not uniform. While works under contracts 2, 4, and 5 were completed satisfactorily, albeit with unavoidable delays, performance of the contractor for contracts 1 and 3 was *unsatisfactory*. The contractor was constrained by poor cash flow resulting from, among others, the possible mismanagement of the mobilization money. Consequently, the contractor was reluctant to perform the construction works assigned to them. The overall performance of the project could have been far better had this contractor acted with greater diligence. The performance of the contractors under the PRMC, RRMC, and RSC was *satisfactory*.

J. Performance of the Borrower and the Executing Agency

26. Given the project's large scope, the performance of the borrower was *satisfactory*. However, the government failed on several occasions, to make counterpart funds available in a timely manner, which disrupted payment to the contractors and consultants. The performance of the RHD was erratic, involving delays in key decision making, including procurement of consulting services and civil works contracts, revision of the DPP, and amendment of consultants' contracts. However, lengthy procedures at the Ministry of Communication and other government agencies also attributed to delays. Management of land acquisition and resettlement by the RHD and the local authorities was protracted, which delayed the implementation of civil works under the RIC. Overall, RHD's performance was *partly satisfactory*, albeit constrained by the implementation delays resulting from lack of capacity and poor performance by the RIC contractor. The endemic weakness in the RHD's overall contract administration system and failure in adopting punitive actions against the nonperforming contractor made the situation worse. Notwithstanding these impediments, the RHD substantially

completed most of the RIC (contracts 2, 4, and 5) and all of the PRMC, RPMC, and RSC contracts by the loan closing date of 30 June 2011.

K. Performance of the Asian Development Bank

27. ADB's performance is considered *satisfactory* in that its response to the government's request for assistance was timely and it processed the loan in a reasonably short time.²³ The project design incorporated lessons learned from previous ADB-assisted transport sector development projects. Project formulation and implementation arrangements were generally satisfactory. The project was initially administered from ADB headquarters and was delegated to the Bangladesh Resident Mission effective 1 February 2004. ADB responded quickly to the issues that emerged during project implementation. The resident mission carried out close and effective coordination through regular meetings with the RHD, and project review missions. ADB fielded one inception mission, 11 project review missions, and a mid-term review mission (5–28 May 2008), which were quite effective in identifying and resolving implementation issues upfront.

III. EVALUATION OF PERFORMANCE

A. Relevance

28. The project is rated *highly relevant*. The project's design and formulation were relevant to ADB's country strategy and the government's development objectives for the road subsector at appraisal (para. 4), and remained so at completion, as defined in the government's Sixth Five-Year Plan (2011–2015). The rationale for the project was satisfactorily justified by referring to the growing importance of the road sector as the principal mode of transport in the country. The need to give more focus to road maintenance and safety was also emphasized, as was improving operational efficiency, through private sector participation. The project outputs and outcomes were effectively designed to address these sector issues and opportunities, except for privatization of RHD's maintenance equipment and workshops, which is deemed less relevant given the recent emergence of private companies in the sector. The project was also conceived in the light of studies and research conducted by other development partners, including DFID and the World Bank.

B. Effectiveness in Achieving Outcome

29. The project is rated *effective*. The outcome envisaged at appraisal was substantially achieved, albeit with a minor shortfall in output. With reference to Outcome 2.1, "provide rural farmers with better access to markets, social services, and employment opportunities", the project has provided better access for rural farmers by improvement of about 150 km of regional and type A feeder roads, thereby contributing to reduced travel time to the nearest markets, health services, and schools. With regard to performance against the targets listed in the Project Framework (Appendix 1), an increase in gross domestic product and an expansion of employment have been achieved, though this can also be attributed to other government financed initiatives. Traffic growth on all feeder roads was as high as 7–8% in the past five years. Although this did not exceed traffic growth on national and regional roads as anticipated at appraisal, the PCR mission rated this achievement *satisfactory*. As for Outcome 2.2, "secure government resources for road maintenance and promote private sector participation in road maintenance", the government has demonstrated an increasing focus on securing the road

²³ The loan was approved within 4 months of the date of appraisal.

maintenance budget. The allocation for routine road maintenance increased from Tk741 million in FY2007 to Tk2,700 million in FY2012, and for periodic maintenance from Tk1.7 billion in FY2007 to Tk4.0 billion in FY2012. A performance-based maintenance contract has also been piloted under the RNIMP II, roll out of which is also under consideration.

30. It is too early to review the accident rate in the project roads over 5 years after completion (a key monitoring indicator to assess Outcome 2.3, “enhance road safety and axle load control”); however, it can be assumed that the improvement of black spots along 200 km of road, and the public road safety campaign will lead to reduced traffic accidents. Other recent achievements, including establishment of the Road Design and Safety Circle in the RHD, enactment of overloading control policy, and installment of weighbridges at strategic points, can also be partly attributed to the underlying policy dialogues related to the project.

31. Lastly, the project is highly likely to have contributed to regional integration among SASEC countries, although it was not specifically envisaged at appraisal. The roads improved under RIC Contract 5, and PRMC contracts 3 and 4 in the north-west of the country effectively linked National Highway 5 (Banglabandh–Panchagarh–Thakurgaon–Dinajpur–Rangpur–Bogra–Dhaka), and National Highway 509 (Rangpur–Lalmonirhat–Burimari) and strengthened connectivity with the subregional road network linking Nepal and Bhutan. The project thus strengthened the potential for economic development through increased subregional trade and commerce.

C. Efficiency in Achieving Outcome and Outputs

32. The recalculation of the economic internal rate of return (EIRR) for the RIC was 20.1%, based on the streams of costs and benefits over the construction period, plus 20 years after project completion. Although the EIRR is lower than that at appraisal (24.5%), it is still robust at 20.1%, which is well above the opportunity cost of capital at 12%, confirming the economic viability of the investment. The net present value was Tk2,098 million and the benefit-cost ratio was 1.81, resulting in satisfactory performance of the project although values are lower than appraisal. Based on the recalculated EIRR, as well as the supporting assumptions given in Appendix 6, the project has been rated *efficient*.

D. Preliminary Assessment of Sustainability

33. Maintenance of the project facilities is essential to sustain their economic life. At present the flow of funds is insufficient to cover the periodic maintenance costs of the road network. The RHD is responsible for maintaining the project roads, with annual budget allocations from the government (para. 10). The PCR mission noted that the project roads were in good condition. However, the unrestricted movement of overloaded heavy vehicles may contribute to damage of the project roads. The government has been increasingly aware of this need and has established axle load stations on three major national highways.²⁴

34. The government remains committed to the establishment of a road maintenance fund (para.11). Following a series of deliberations by the interministerial committee to discuss this issue, it was decided that the scope of the road maintenance fund would exclude the rural and urban road networks developed and maintained by the Local Government Engineering Department and other local government entities. Accordingly, in September 2012, the Ministry of Communication submitted the draft Roads Fund Board Act for consideration by the Cabinet

²⁴ The axle load stations were established at Manikganj on N5, Feni on N1, and at Hatikamrul on N5.

Division.²⁵ The government is committed to establishing the Roads Fund Board, which was strongly supported by the Transport Sector Coordination Wing established in the Planning Commission, and assisted by ADB.²⁶ It is expected that the Roads Fund Board will be established in 2013, which will contribute to enhanced sustainability through mitigating the constraints of maintenance funding. The 10-year maintenance financing strategy agreed between the government and ADB should also lead to a reduction in the maintenance backlog.

35. In support of the government road safety initiative, in 2011 ADB provided a technical assistance grant to enhance capacity in the RHD and BRTA to prepare the most urgent and cost-effective road safety improvement programs.²⁷ The technical assistance will contribute to the implementation of ADB's Sustainable Transport Initiative: Operational Plan²⁸ and the Operational Plan for Improving Health Access and Outcomes under Strategy 2020.²⁹ Overall, the project outputs are rated *likely to be sustainable*.

E. Impact

1. Environmental Impact

36. According to the initial environmental impact study prepared by the government, the project was not expected to cause significant environmental problems, and the potential adverse impacts were manageable. Thus, a full environmental impact assessment (EIA) was not required. However, one of the project roads (Mymensingh-Nandail road) was included in the red category in the country's Environmental Preservation Rules 1997, which required a full EIA. The RHD prepared the full EIA as part of the detailed engineering design, and civil works for the project road began after the EIA was approved by the Department of Environment.

37. The consultants prepared guidelines for an environmental management and monitoring plan (EMP), and also an environmental compliance report based on the summary EIA (SEIA). The EMP was agreed in March 2004, and was updated in 2005. The PCR mission noted that the project had complied with the mitigation measures and monitoring requirements stipulated by the SEIA. The status of compliance with the SEIA was monitored by subsequent ADB missions, the supervision consultants, and RHD's social and environmental experts. No environmental problems were observed during the PCR mission.

2. Socioeconomic Impact

38. The project's direct and indirect socioeconomic impacts were significant. The improved access to markets and other economic opportunities stimulated increased income for the rural poor through employment generation, increased trade and commercial activities, community integration, and changes in land use patterns from purely agrarian to semi-urban. The project also developed the market areas for local people by widening the roads with the provision of footpaths, drainage, and safety barriers, which benefited road users and improved road safety. It is expected that the project will also reduce the costs of transportation through increasing competition among the bus and truck operators.

²⁵ The bill sets out the purpose of the fund, the source of its revenues, the composition and general duties of the Road Fund Board, and the preparation and review of the annual road maintenance program of the road agencies.

²⁶ ADB. 2010. *Technical Assistance to the People's Republic of Bangladesh for Capacity Building and Support to the Transport Sector Coordination Wing of the Planning Commission*. Manila (TA 7388-BAN for \$500,000).

²⁷ ADB. 2011. *Technical Assistance for Road Safety Improvement Programs*. Manila (TA7840-BAN for \$600,000).

²⁸ ADB. 2010. *Sustainable Transport Initiative: Operational Plan*. Manila.

²⁹ ADB. 2008. *Operational Plan for Improving Health Access and Outcomes under Strategy 2020*. Manila.

39. At appraisal, the project set targets for employment of women in road construction and forestation activities, as well as requiring contractors not to differentiate wages based on gender. The target was that 50% of those employed during construction would be women, involved in slope protection works. The consultants monitored and reported on this in their monthly progress reports. It was noted that only a few women were engaged in turfing the embankments, as most women in the area are conservative and do not usually seek employment.

3. Resettlement Impact

40. At appraisal, the RHD prepared a summary land acquisition and resettlement plan. It was estimated that under the RIC component, about 165.58 acres of land would be required and a total of 4,230 people would be affected. At completion, a total of 199.54 acres of land had been acquired and 5,750 affected people had been paid compensation. The increase in acquired land and affected people was mainly due to inclusion of an additional road under RIC Contract 3. The sections of land that remained unused due to cancellation of road sections in RIC contracts 1, 3, and 4 will be used for future road development by the RHD or other government agencies.

41. In accordance with ADB guidelines, a land acquisition and resettlement plan was prepared and approved by ADB on 6 March 2007. A complete socioeconomic survey and a joint verification survey for the land acquisition and resettlement plan were undertaken. The revised land acquisition and resettlement plan was approved by ADB on 20 May 2007. In addition to compensation for losses incurred by affected people, the land acquisition and resettlement plan also included rehabilitation measures that would benefit the community. No indigenous peoples and/or ethnic minority issues emerged during project implementation.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

42. The project is rated *successful* based on a review of its relevance, effectiveness, efficiency, and sustainability.

B. Lessons

43. The project experienced substantial implementation delays of about 54 months (para. 18). Protracted recruitment of detailed design and construction supervision consultants, delayed procurement of the major civil works contracts, delayed land acquisition and resettlement, and most importantly, underperformance by a major civil works contractor compounded the delays. Delays in procurement of the civil works contracts were mostly due to government delays in procedures and decision making related to procurement, land acquisition, and resettlement. The RHD's capacity to plan and monitor resettlement activities must be enhanced, with ADB's assistance. In the absence of any advance action prescribed by the project, recruitment of the detailed engineering and construction supervision consultants was inordinately delayed (by 23 months). This adversely affected the preparation of detailed engineering design and final selection of the road alignment, delaying land acquisition and awarding of civil works contracts. ADB highlighted this issue, through its country programming review missions, and has since included, in most ADB-assisted projects, provisions for advance action for selection of consultants, and preparatory works for land acquisition and resettlement.

44. A contractor's ability and commitment to deploy resources for civil works in good time is key to overall performance. While ADB's standard prequalification and bidding documents are devised to ascertain the bidders' technical and financial capabilities, further clarification is sometimes required to support the information provided by the bidders. The bidding process therefore needs further streamlining, particularly through ensuring that sufficient clarification is obtained by the executing agency, to verify the bidders' capacity to comply with qualifying criteria on financial resources, equipment, and personnel.

C. Recommendations

1. Project Related

45. **Future monitoring.** The government should regularly monitor the accrual of benefits from the facilities built by the project. To ensure a continued stream of benefits to the community, the government should provide adequate funds for routine, periodic, and staggered maintenance of the completed roads through allocations in the government's annual development program. The government should monitor the impacts of the maintenance works at least annually through the RHD.

46. **Covenants.** In order to further strengthen the government's capacity in management of land acquisition and resettlement and its smooth implementation (schedule 6, para. 13 of loan agreement), ADB should provide comprehensive safeguard support through project preparatory technical assistance during loan processing or regular review during loan execution. ADB should also encourage the government to take advance action, thereby ensuring that land acquisition and resettlement proceeds well in advance of civil works.

47. **Further action or follow-up.** It is expected that the government will establish a roads fund in 2013, to reduce the recurrent maintenance backlog. The government will also undertake the agreed maintenance financing strategy, which will ensure adequate and timely funding for infrastructure maintenance. This needs to be regularly followed up by the RHD, the line ministry concerned, and the Cabinet Division, with support from key development partners, including ADB. The unrestricted movement of overloaded heavy vehicles may damage the road network. To prevent this, the government should, in the short term, adopt and enforce an axle load control policy, including but not limited to the establishment and operation of axle load control stations on the major national and regional highways.

48. **Additional assistance.** The government should adopt and put in place a long-term program for continued enhancement of the capacity of the RHD and BRTA in managing the road network, including road safety. This will ensure sustainability, particularly of RHD's capacity to effectively manage and maintain the country's primary road network, and thereby contribute to the country's economic development.

49. **Timing of the project performance evaluation report.** A validation report on the project should be prepared by 2014 to assess its medium-term sustainability and long-term impacts. To produce the necessary data, ADB should require the government to continue monitoring the completed project, and reporting the project benefits, until the fielding of ADB's project validation mission.

2. General

50. It is recommended that project readiness be enhanced by completing adequate advance preparatory activities. Advance preparatory activities may include advance action for selection of detailed engineering design and construction supervision consultants, preparation of the detailed design, finalization of the procurement plan, retroactive financing, and substantial completion of land acquisition and resettlement.

51. The government should use the tools provided by the civil works contract agreement and adopt punitive measures against nonperforming contractors, including, but not limited to, barring them from participation in the bidding for future projects, if found justified.

PROJECT FRAMEWORK

Design Summary	Appraisal Performance Indicators/Targets	Project Achievements	Key Issues and Recommendations
1. Impact Economic development and poverty reduction through improved transport efficiency and strengthened integrated road networks linking national, regional, and feeder roads	Increase in gross domestic product (GDP) and expansion of employment and earnings Traffic increase in feeder roads higher than that in national and regional roads for the next 5 years	GDP grew by about 6% on average per year during 2002–2007 Traffic growth in the feeder roads was slightly lower (by 1%) than national and regional roads Increased employment generated increased income and stimulated economic development National poverty reduction index fell from 52% in 1999 to 43% in 2007	
2. Outcome 2.1 Provide rural farmers with better access to markets, social services, and employment opportunities 2.2 Secure government resources for road maintenance and promote private sector participation in road maintenance 2.3 Enhance road safety and axle load control	Reduced travel time to nearest markets, health services, and schools. Growth of rural enterprises. Employment generated in the off-farm sector. Increased labor mobility Allocation of road maintenance budget per kilometer for Roads and Highways Department (RHD) increased on a year-on-year basis for 5 years since loan effectiveness. Pilot performance-based road maintenance contracts can be replicated Accident rates on the project roads decreased by 30% over 5 years after completion of improvement. Development of enforceable measures to discourage overloading	Improved riding qualities of project roads demonstrated by International Roughness Index (IRI) of less than 5. Reduced vehicle operating costs (VOC) by 20%. Improved connectivity with the national highways leading to increased economic activities in rural areas, and consequent enhancement of employment opportunities Government allocations for routine road maintenance increased from Tk741 million in FY2007 to Tk2,700 million in FY2011, and for periodic road maintenance from Tk7.0 billion in FY2007 to Tk4.0 billion in FY2011. Government established three axle load control stations during 2010–2011, contributing to enhanced road safety	Para. 29 Paras.11, 29 Para. 33

Design Summary	Appraisal Performance Indicators/Targets	Project Achievements	Key Issues and Recommendations
<p>3. Project Outputs</p> <p>3.1 Improvement of regional road and type A feeder roads</p> <p>3.2 Periodic road maintenance (mainly sealing and overlay) of about 400 km of roads on a 2-year time slice of priority road maintenance activities under the annual road maintenance program. (For each of the 2 years, the component was to cover periodic maintenance of an estimated 200 km, to be carried out through civil works contracts. The roads to be maintained were to be selected annually using the Highway Design and Maintenance Standards Model [HDM] ranking as part of the annual road maintenance plan)</p> <p>3.3 Enhancement of road safety by conducting safety audits, improvement of accident black spots, and public awareness campaigns</p> <p>Activities/Inputs:</p>	<p>Regional roads: 47 km Type A feeder roads: 127 km</p> <p>Periodic maintenance of 400 km of roads over a 2-year time slice of 200 km each year.</p> <p>Safety audit conducted during detailed design. Assessment of safety on 200 km of existing roads with incidence of highest accident rates—findings to be considered by the project. Education and public awareness campaign</p>	<p>Rehabilitation completed by 30 June 2011. The increased vehicular traffic on the completed project roads has been assessed at 3,269 (annual average daily traffic). About 10.35 million people including 5.05 million women have benefitted from the project</p> <p>About 2.35 million people, including 0.96 million women, have benefited from the completed road maintenance works</p> <p>Design consultants conducted safety audit during 2005–2006. 204 km of roads improved under one civil works contract. Education and public awareness campaigns implemented in 2010–2011.</p>	<p>Para. 5</p> <p>Para. 8</p> <p>Para. 12</p>

Design Summary	Appraisal Performance Indicators/Targets	Project Achievements	Key Issues and Recommendations
Land acquisition/resettlement	\$3.60 million	\$5.83 million	
Road improvement component	\$79.50 million	\$50.93 million	
Road maintenance component			
Periodic road maintenance	\$16.00 million	\$11.97 million	
Routine road maintenance	\$0.90 million	\$1.01 million	
Road safety component	\$0.80 million	\$0.35 million	
Consulting services			
Supervision	\$5.20 million	\$3.88 million	
Project preparation	\$1.00 million	\$1.18 million	

PROJECT COST AT APPRAISAL AND AT COMPLETION

Component	Project Cost at Appraisal (\$ million)			Actual Project Cost (\$ million)		
	Foreign	Local	Total	Foreign	Local	Total
A. Base Cost^a						
1. Land acquisition/resettlement		0.00	3.60	0.00	5.83	5.83
2. Road improvement	33.80	45.80	79.50	18.94	31.99	50.93
3. Road maintenance						
a. Periodic road maintenance	5.00	11.00	16.00	3.71	8.26	11.97
b. Routine road maintenance	0.30	0.60	0.90	0.31	0.70	1.01
4. Road safety						
a. Black spot improvement	0.20	0.30	0.50	0.50	0.30	0.35
b. Education and public campaign	0.10	0.20	0.30	0.00	0.00	0.00
5. Consulting services						
a. Supervision	3.20	2.00	5.20	3.88	0.00	3.88
b. Project preparation ^b	0.40	0.60	1.00	1.18	0.00	1.18
6. Project administration	0.00	1.00	1.00	0.00	0.00	0.00
7. Implementation of land acquisition & resettlement	0.00	0.50	0.50	0.00	0.27	0.27
Subtotal (A)	42.90	65.60	108.50	28.07	47.35	75.42
B. Contingencies						
1. Physical ^c	4.00	5.40	9.30	0.00	0.00	0.00
2. Price ^d	1.70	2.50	4.20	0.00	0.00	0.00
Subtotal (B)	5.70	7.90	13.60	0.00	0.00	0.00
C. Interest Charges During Construction	0.80	0.00	0.80	0.63	0.00	0.63
Total^e	49.40	73.50	122.90	28.70	47.35	76.05

^a In 2002 prices

^b Detailed design for the proposed Road Network Improvement and Maintenance Project II

^c At 10% of base cost, excluding the road maintenance component

^d At 2.4% annually for foreign exchange and local currency costs, excluding the periodic road maintenance component

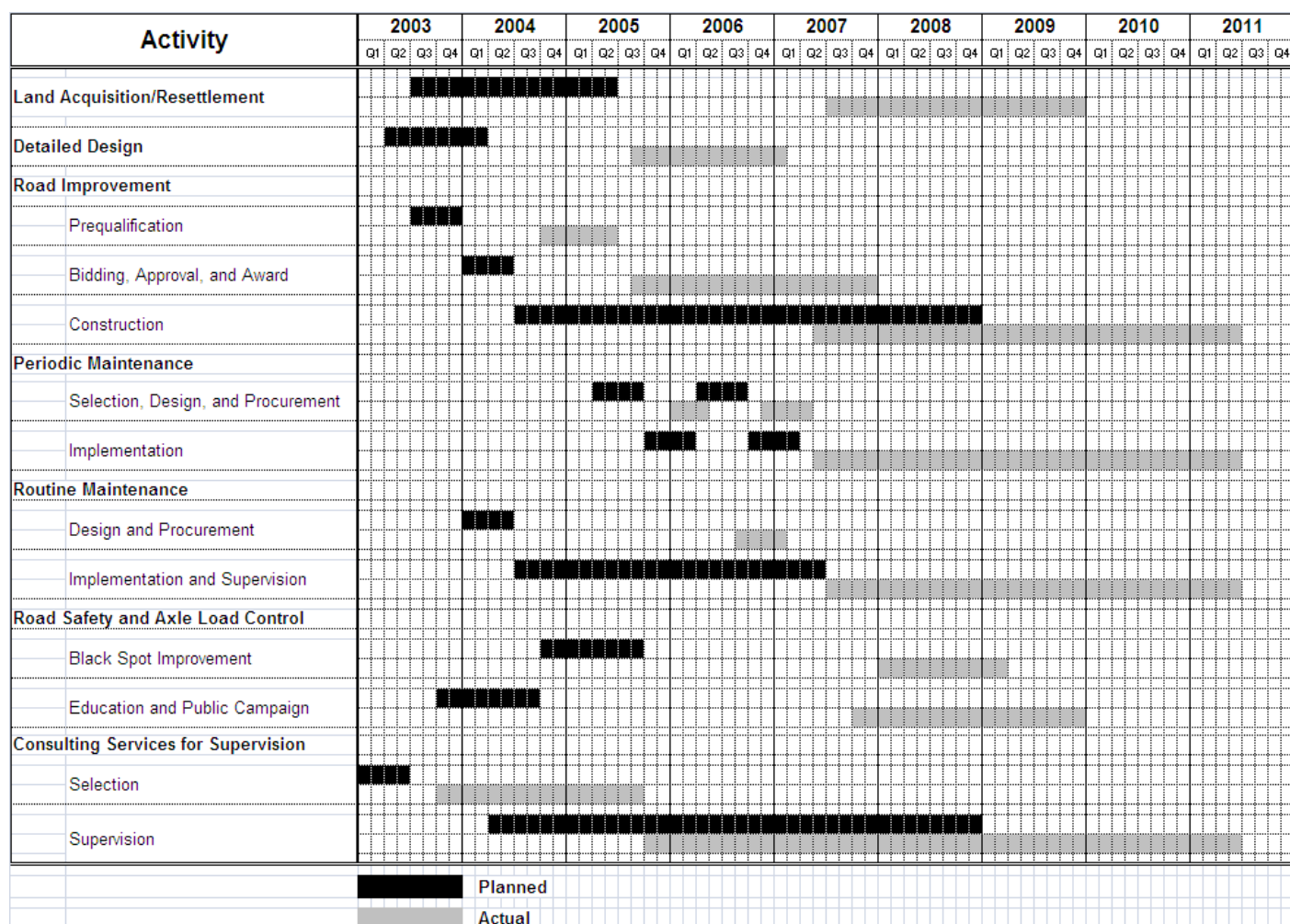
^e Including customs duties and taxes, estimated at about \$18.6 million equivalent

ANNUAL DISBURSEMENT BY CATEGORY**Loan 1920-BAN
(\$)**

CATEGORY	Year							Total
	2005	2006	2007	2008	2009	2010	2011	
1A Civil Works:								
RI	0	0	3,198,238	3,419,773	5,018,262	6,662,916	6,161,666	24,460,856
1B Civil Works:								
PRM	0	0	0	290,180	1,473,193	932,807	1,015,777	3,711,958
1C Civil Works:								
RRM	0	0	0	0	205,105	299,738	305,728	810,571
2A Road Safety:								
BSI	0	0	0	0	0.00	29,668	216,542	246,210
2B Road Safety:								
EPC	0	0	0	0	0.00	0	0	0
3A Consulting:	15,44					1,079,0		
Supervision	3	203,239	171,782	991,695	457,212	81	964,674	3,883,126
3B Consulting:	10,71							
Design	8	888,594	281,926	0	0	0	0	1,181,237
4 Interest Charge	0	4,905	26,704	69,058	132,331	211,220	187,386	631,603
5 Unallocated	0	0	0	0	0	0	0	0
Total	26,161	1,096,738	3,678,649	4,770,706	7,286,104	9,215,430	8,851,772	34,925,561

BSI = black spot improvement, EPC= education and public campaign, PRM = periodic road maintenance, RI = road improvement, RRM = routine road maintenance

PROJECT IMPLEMENTATION SCHEDULE



STATUS OF COMPLIANCE WITH LOAN COVENANTS

	Covenant	Reference	Status of Compliance
1.	Within one year of the effective date, the Borrower shall submit to the Parliament a draft Road Transport and Traffic Act that will replace the Motor Vehicles Ordinance.	Schedule 6, para 26	Complied with
2.	Privatization: The Borrower shall ensure that within 18 months of the effective Date, the supervision consultants shall have completed a feasibility study for privatizing RHD's road maintenance activities, including the disinvestment of RHD's road equipment and workshops, and that RHD develops a time-bound action plan acceptable to the Bank for implementing the Consultants recommendations.	Schedule 6, para 27	Partly complied with. Supervision consultant completed feasibility study. Although RHD did not prepare time-bound action plan, efficiency has been improved by introduction of performance-based contracts and outsourcing of maintenance works
3.	The Borrower shall absorb the current staff resources in the BRTA Road Safety Cell financed under the World Bank's Rehabilitation and Maintenance Project 3, and provide sufficient budget for the Road Safety cell to carry its tasks as a secretariat to the national Road Safety Council.	Schedule 6, para 24	Complied with
4.	Environment: The Borrower shall ensure that all environment mitigation measures identified in the Initial Environmental Examination conducted for this Project and to be identified in the Environmental Impact Assessment to be prepared for the Mymensingh Nandail road are incorporated into the Project design and followed during the Project Implementation in consultation with the Borrower's Department of Environmental requirements as set forth in Section 20 of the Bank's operation Manual, and the Bank's environmental assessment requirements as set forth in ADB, Environmental Assessment Requirements of the ADB.	Schedule 6, para 14	Complied with
5.	Social: The Borrower shall ensure that civil work contractors comply with all applicable labor laws, do not employ child labor for construction and maintenance activities, and provide appropriate facilities for employees children in construction campsites. The Borrower shall set employment targets for women for road construction activities as well as require contractors to pay the same wages of equal value, regardless of gender.	Schedule 6, para 15	Complied with

6.	The Borrower shall ensure that RHD appoints full-time domestic consultants/NGOs in accordance with criteria approved by the Bank to support Implementation and independent monitoring of the land acquisition and resettlement plan.	Schedule 6, para 12	Complied with
7.	The Borrower shall ensure that the land acquisition and resettlement activities under the Project are implemented in accordance with the Borrower's applicable laws and regulations, the Bank's Policy on Involuntary Resettlement, and the agreed Resettlement Plan.	Schedule 6, para 13	Complied with
8.	<p>Financial:</p> <p>(i) The borrower shall provide counterpart funding required for the Project in a timely manner through its approved Annual Development Plan allocations, and in accordance with the Project financing plan, including cost of (a) land acquisition; (b) resettlement compensation; (c) implementation and monitoring cost under the Resettlement plan; (d) utility relocation; and (e) general Project management expenses;</p> <p>(ii) The Borrower shall (a) engage external accounting experts to design the Project accounts to be used by RHD; (b) have the consolidated Project accounts and related financial statements audited annually by private sector auditors acceptable to the Bank. The Office of the Director of Accounts in RHD shall be responsible for coordinating all accounts activities and ensuring compliance with the Bank's audit and accounting requirements, which shall be followed up in a regular review by the Bank.</p>	<p>Schedule 6, Para 23</p> <p>Schedule 6, Para 17</p>	<p>Complied with, but sometimes with delay</p> <p>Complied with under Loan 2021-BAN</p>
9.	<p>Other Covenants:</p> <p>(i) Established, Staffed, and Operating PMU/PIU The Project Director shall have been appointed by RHD prior to the execution of this Loan Agreement. The Project Director shall report to the Chief Engineer of RHD and shall be supported by two Executive Engineers as Project Managers.</p> <p>(ii) Fielding of Consultants The Consultants shall be selected and engaged as a firm by RHD using the quality and cost based selection (QCBS) method in accordance with the following procedures and any other procedures agreed to by the Bank.</p> <p>(iii) A detailed midterm review of the Project shall be carried out on or about April/May 2005. The midterm review shall include high level discussions with the Government on the approach to contracting out routine maintenance through performance based maintenance contracts.</p>	Schedule 6, Para 2	<p>Complied with</p> <p>Complied with</p> <p>Complied with, though mid-term review was conducted in May 2008</p>

	<p>(iv) The Borrower shall ensure that the roads to be maintained in the Project area under the Road Improvement component are selected annually using the highway design and maintenance standards model under the Annual Road Maintenance Plan.</p> <p>(v) Prior to carrying out any civil works for road improvement component, RHD shall conduct a sample survey to establish a baseline for subsequent Project performance monitoring. The Borrower shall ensure that project monitoring is carried out annually on completed civil works throughout the project implementation period by RHD, and reviewed against the baseline.</p> <p>(vi) The Borrower shall submit all procurement activities to independent performance audits independent third parties to ensure transparency and objective and independent assessment of such activities. The performance audits shall be conducted twice during implementation in conjunction with the annual audit of the Project accounts related financial statements and shall be carried out by the private sector auditors referred to in the above para.</p>		Complied with
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ECONOMIC REEVALUATION

A. General

1. Economic reevaluation and analysis was conducted for each road under the Roads Improvement Component (RIC) of the Road Network Improvement and Maintenance Project (RNIMP), as planned at appraisal. The methodology employed in the reevaluation followed Asian Development Bank (ADB) Guidelines for the Financial Governance and Management of Investment Projects Financed by ADB (2002) and Guidelines for the Economic Analysis of Projects (1997). Reevaluation involves recalculating three major investment criteria: the economic internal rate of return (EIRR), the net present value (NPV), and the benefit-cost ratio (BCR). Road sector projects are generally appraised based on EIRR, if it is not tolled road or bridge or other infrastructure.

2. The RNIMP had four major components: (i) the Roads Improvement Component (RIC), (ii) the Periodic Road Maintenance Component (PRMC), (iii) the Routine Road Maintenance Component (RRMC), and (iv) the Road Safety Component (RSC). The RIC was the largest, involving more than 82% of the total investment. The methodology and assumptions adopted for economic reevaluation generally followed those used at appraisal. The benefits were quantified through a comparison of the subproject conditions with and without the project. The costs and benefits were measured in terms of border price equivalent values, using the world price numeraire, and expressed in 2010 prices.

3. In calculating vehicle operating costs (VOC) and travel time costs (TTC) the Roads and Highways Department (RHD) Road User Cost Manual, Annual Report, 2005 was used, considering representative vehicle categories at different levels of International Roughness Index (IRI) and costs. The costs and benefits for nontraded components were converted into economic price using the standard conversion factor of 0.85. The project life was considered 20 years after completion, with no salvage value at the end of the project life.

B. Economic Costs

4. The cost of construction of the RIC was estimated at appraisal as \$79.50 million (equivalent to Tk3,975 million at the 2002 exchange rate) excluding physical and price contingency. Project implementation was delayed and extensions were allowed twice for a total of 4 years. Allocated money could not be used due to lack of implementation efficiency, exchange rate fluctuation, lower than expected bid prices by contractors, and cancellation of some components (27 km of roads). As a result the actual costs of the RIC were reduced to \$50.93 million (65% of the original amount)—equivalent to Tk3785 million. The costs of construction of civil works include design, supervision, and monitoring consultancies but exclude interest and other charges during construction. All financial costs were converted to economic costs by deducting taxes and duties on tradable items and using the standard conversion factor of 0.85 for nontradable items. A comparison of original and revised costs (by road) is presented in Table A6.1.

Table A6.1: Summary cost comparison of RIC roads

Contract Number	Road Name	Length (km) (Planned/Actual)	Original Cost (Tk. million)	Revised Cost (Tk. million)	Traffic AADT (MT)
1A	Mymensingh-Nandail (1)	20/20	487	596	4,370
1B	Muktagacha-Chechua ^a	10/7	243		1,904
2	Mymensingh-Nandail (2)	28/28	810	1039	4,370
3	Jamalpur-Dewanganj ^b	41/25	770	568	1,711
4A	Mithapukur-Madhyapara	24/24	505	436	4,370
4B	Saidpur-Parbatipur ^c	15/12	316	342	2,728
5	Thakurgaon-Ranisankail	36/36	618	802	2,289
All Contracts	All roads	174/152 ^d	3,975	3,784	3,269 (average)

AADT = annual average daily traffic

MT = motorized traffic

^a Not done except patching^b 24 km completed^c 13km completed^d 152 km of roads completed, compared to 174 km planned

5. Incremental maintenance costs were calculated as the difference between the cost of routine and periodic maintenance in “with” and “without” project scenarios, in 2010 prices. The economic costs were derived from financial costs excluding taxes and duties for traded items and used the world numeraire for nontradable items. The annual operation and maintenance costs were derived on the basis of information collected from the RHD. For routine maintenance, Tk500,000 km/year was estimated for the without-project scenario, while Tk300,000 km/year was estimated with the project. For routine maintenance after each 5 year period, Tk2 million per km was estimated without the project, and Tk1.5 million per km with the project.

C. Economic Benefits

1. General

6. The estimated economic benefits were based on the comparison of lifecycle costs in with-project and without-project scenarios. In the without-project scenario, the roads would generally be either poorly maintained, with increased road roughness, or narrow with slightly fair condition accommodating only low vehicle speeds. This would result in high VOC and TTC. For the with-project scenario, roads would be in good condition, with a smooth surface, high vehicle speeds, and reduced VOC. Vehicle operating cost is generally calculated for normal, generated, and diverted traffic. TTC savings for passengers and freight can be added benefits for improved roads. The lifecycle costs of the transport system also include higher maintenance costs (routine and periodic) in the without-project scenario due to weak road structure.

2. Traffic Forecast

7. The project completion review (PCR) mission collected data from the RHD Highway Design and Maintenance Standards Model (HDM) Circle in aggregated form. Most of the field surveys were conducted in 2007 and updated in 2011, and were used in the HDM analysis for the annual road maintenance plan for 2011–2012. The PCR mission also reviewed the traffic data used in the feasibility study for the RNIMP. Despite delayed project implementation, motorized traffic has grown by about 7–8% in the main sections of regional corridors. The economic reevaluation consisted of an economic analysis of roads, based on the VOC and TTC savings benefits. Other nonquantifiable benefits were not considered. Traffic growth was assumed to be 8% during 2011–2017, 7% during 2018–2021, and 6% during 2022–2027.

3. Vehicle Operating Cost Savings

8. The economic vehicle operating costs used in the reevaluation were based on the RHD Road User Cost Manual, Annual Report, 2005, which was subsequently updated by the RHD Economic Circle in 2011. The manual included VOCs for all representative motorized vehicles, with an IRI of 0–15 m/km. The IRI survey used for the project feasibility study (carried out by the HDM Circle) identified most selected sections of road to be over 10 m/km. Some damaged sections had an IRI over 12 m/km. However, the average IRI was assumed to be 10.5 m/km for the project roads. The project planned to improve the selected roads to IRI 3 m/km. Typical HDM operating costs are presented in Table A6.2.

Table A6.2: Typical Vehicle Operating Costs with and without Road Improvement

Vehicle Type	With project (IRI = 3 m/km)	Without project (IRI = 10 m/km)	Without project (IRI = 15 m/km)
Car	5.71	9.12	13.01
Microbus	7.99	12.89	18.53
Minibus	6.68	7.43	8.57
Large bus	10.46	11.98	14.00
Small truck	8.98	10.25	12.32
Medium truck	9.79	14.29	18.05
Heavy truck	15.66	22.86	28.88

IRI = international roughness index in meters per kilometer

4. Travel Time Cost Savings

9. Travel time cost savings for passengers of all categories of vehicle were calculated at appraisal. The economic TTC documented in the RHD Road User Manual, 2005 (updated in 2011) was used for reevaluation. Economic analyses were conducted for individual project roads or sections of road grouped under construction contracts. An economic analysis was also conducted for the overall RIC implemented under the project. Table A6.3 shows Value of Passenger Time Cost:

Table A6.3: Value of Passenger Time Cost
(Tk per vehicle hour)

Vehicle Type	Passenger Time	Cargo time
Car	33.3	

Microbus	30.0	
Minibus	14.4	
Large bus	18.4	
Small truck		6.7
Medium truck		15.6

D. Results of Economic Analysis

10. The recalculated EIRR for the overall RIC was 20.1%, based on the streams of costs and benefits over the construction period, plus 20 years after project completion. The combined EIRR at appraisal was 24.5%, showed higher incremental economic benefits than reevaluation. Although the recalculated EIRR is lower than estimated at appraisal it is still robust, well above the opportunity cost of capital at 12%, making it economically viable. The NPV was Tk2,098 million and the BCR was 1.81, resulting in satisfactory performance of the project, even though assessed values were lower than at appraisal.

11. Table A6.4 compares the EIRR and NPV for each project road at appraisal and reassessment. At reassessment, the EIRRs for Mymensingh-Nandail regional highway were 23.1% and 18.9% respectively for two subsections, compared to 29.6% at appraisal. Improvement of the Muktagacha-Chechua road had to be abandoned due to the inefficiency of the contractor. Project implementation was comparatively better in Rangpur region, as all sections were satisfactorily improved, apart from a 2 km section of Saidpur-Parbatipur road, which passes through a cantonment area, and could not be improved to ADB standards.

Table A6.4: Economic Assessment—With Project (Base Case)

Project Road	With project		
	Appraisal	Reassessment	
	EIRR	EIRR	NPV (Tk million)
Mymensingh-Nandail (20 km) Contract 1A	29.6%	18.9%	282
Muktagacha-Chechua (10 km) Contract 1B (abandoned)	28.8%		
Mymensingh-Nandail (28 km) Contract 2	29.6%	23.1%	832
Jamalpur-Dewanganj (41 km) Contract 3	17.7%	14.3%	88
Mithapukur-Madhyapara (24 km) Contract 4A	23.1%	22.6%	333
Saidpur-Parbatipur (15 km) Contract 4B	30.8%	17.3%	115
Thakurgaon-Ranisankail (36.7 km) Contract 5	19.5%	16.3%	213
All roads combined (174 km), all 5 contracts	24.5%	20.1%	2,098

12. The Periodic Road Maintenance Component was the second largest component of the project. It was designed to rehabilitate and reconstruct heavily damaged sections of road, covering 200 km (made up of hundreds of small sections of road) per year, for two years. The HDM Circle selected those sections based on the HDM. The EIRR for periodic maintenance has a broad range of 80–400%.

E. Sensitivity Analysis

13. The sensitivity analysis was conducted based on (i) a 15% increase in investment costs, (ii) a 15% reduction in benefits, (iii) a combined 15% increase in investment costs and 15% reduction in benefits, and (iv) a combined 10% increase in investment costs and 10% reduction in benefits. While calculating EIRRs, it was found that project costs are a little bit more sensitive than traffic benefits. The results of the sensitivity analysis are presented in Table A6.5.

Table A6.5: Sensitivity Analysis

Component	EIRR at Appraisal (Base Case)	EIRR Recalculated at Completion	Sensitivity Analysis at Completion			
			Investment Cost +15%	Benefits Reduced by 15%	Investment +15% and Benefits –15%	Investment +10% and Benefits –10%
Mymensingh-Nandail (20 km) Contract 1A	29.6%	18.9%	17.0%	16.8%	15.1%	16.3%
Mymensingh-Nandail (28 km) Contract 2	29.6%	23.1%	21.4%	20.4%	19.0%	19.8%
Jamalpur-Dewanganj (41 km) Contract 3	17.7%	14.3%	12.9%	12.8%	11.3%	12.3%
Mithapukur-Madhyapara (24 km) Contract 4A	23.1%	22.6%	20.4%	20.1%	18.0%	19.5%
Saidpur-Parbatipur (15 km) Contract 4B	30.8%	17.3%	15.4%	15.2%	13.4%	14.7%
Thakurgaon-Ranisankail (36.7 km) Contract 5	19.5%	16.3%	14.5%	14.3%	12.6%	13.8%
All roads combined (174 km), all 5 contracts	24.5%	20.1%	18.3%	17.8%	15.8%	17.0%

F. Conclusion

14. Based on the post-implementation assessment of the project and recalculated EIRR, the project performance can be considered satisfactory, even with the shortfalls in targeted output. The risk analysis and sensitivity tests confirmed that the investment was effective and generated quantifiable benefits, increasing traffic on the target roads as projected.

15. The project is considered an effective investment in terms of its appropriate and robust economic benefits and traffic growth during and after project implementation. Qualitatively the project will generate substantial social and environmental benefits for the community, having long-term positive impacts on poverty reduction and gender equity.