ASIAN DEVELOPMENT BANK

PCR: NEP 22335

PROJECT COMPLETION REPORT

ON THE

THIRD ROAD IMPROVEMENT PROJECT
(Loan 1377-NEP[SF])

IN

NEPAL

August 2003

CURRENCY EQUIVALENTS

(as of 20 June 2003)

Currency Unit – Nepalese rupee/s (Nre/NRs)

		At Appraisal (June 1995)	At Project Completion (June 2003)
NRe1.00	=	$0.02	$0.0135
$1.00	=	NRs50.67	NRs74

ABBREVIATIONS

ADB	–	Asian Development Bank
DBST	–	double bituminous surface treatment
DDC		district development committee
DOR	–	Department of Roads
EA	–	executing agency
EIRR	–	economic internal rate of return
EMU	–	Equipment Management Unit
FIDIC	–	Federation Internationale des Ingenieurs-Conseil
GDP	–	gross domestic product
HDM	–	Highway Design and Maintenance Standards Model
ICB	–	international competitive bidding
IDC	–	interest during construction
IRI	–	International roughness index
LCB	–	local competitive bidding
MRCU	–	Maintenance and Rehabilitation and Coordination Unit
OWA	–	overall weighted average
PENMEC	–	penetration macadam
PCR	–	project completion review
RNDP	–	Road Network Development Project
SBST	–	single bituminous surface treatment
SCF		standard conversion factor
SDR	–	special drawing rights
VDC	–	village development committee
VOC	–	vehicle operating cost

NOTES

(i) The fiscal year (FY) of the Government ends on 15 July. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2003 ends on 15 July 2003

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

CONTENTS

BASIC DATA

A. Loan Identification

1.	Country	Nepal
2.	Loan Number	1377-NEP(SF)
3.	Project Title	Third Road Improvement
4.	Borrower	The Kingdom of Nepal
5.	Executing Agency	Department of Roads
6.	Amount of Loan	SDR25.649 million
7.	Project Completion Report No.	PCR: NEP 750

B. Loan Data

1.	Appraisal	
	– Date Started	23 May 1995
	– Date Completed	06 Jun 1995
2.	Loan Negotiations	
	– Date Started	07 Aug 1995
	– Date Completed	10 Aug 1995
3.	Date of Board Approval	21 Sep 1995
4.	Date of Loan Agreement	08 Dec 1995
5.	Date of Loan Effectiveness	
	– In Loan Agreement	07 Mar 1996
	– Actual	12 Jan 1996
	– Number of Extensions	-
6.	Closing Date	
	– In Loan Agreement	30 Jun 2001
	– Actual[a]	11 Jun 2002
	– Number of Extensions	
7.	Terms of Loan	
	– Interest Rate	1%
	– Maturity (number of years)	40
	– Grace Period (number of years)	10

8. Disbursements

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
28 Mar 1996	11 Jun 2002	6 years 2 months
Effective Date	**Original Closing Date**	**Time Interval**
12 Jan 1996	30 Jun 2001	5 years 5 months

[a] The loan account was kept open for 1 year after the original closing date to allow for maximum disbursement after the revision of the Asian Development Bank's civil works financing percentage. See also para. 15.

b. Amount ($)

Category	Original Allocation	Last Revised Allocation	Amount Canceled	Net Amount Available	Amount Disbursed	Undisbursed Balance
01 Civil Works	24,202,113	26,260,340	-	26,260,340	26,260,340	-
02 Equipment	1,999,298	1,011,629	-	1,011,629	1,011,629	-
03 Consulting Services	4,790,830	6,888,530	-	6,888,530	6,888,530	-
04 Service Charge	899,841	771,549	-	771,549	771,549	-
05 Unallocated	8,107,918	17,239		17.239	0	17,239
Total	**40,000,000**	**34,949,287[b]**	**-**	**34,949,287**	**34,932,048**	**17,239[c]**

9. Local Costs (Financed)

- Amount ($ million) 6.3
- Percent of Local Costs 31.8
- Percent of Total Cost 13.0

C. Project Data

1. Project Cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign Exchange Cost	31.50	28.60
Local Currency Cost	18.50	19.94
Total	**50.00**	**48.54**

2. Financing Plan ($ million)

Cost	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Implementation Costs						
Borrower-Financed	0.00	10.00	10.00	-	13.609	13.609
ADB-Financed	31.50	8.50	40.00	27.828	6.333	34.161
Other External Financing	0.00	0.00	0.00	-		
Total	**31.50**	**18.50**	**50.00**	**27.828**	**19.942**	**47.770**
IDC Costs						
Borrower-Financed	0.00	0.00	0.00	0.000	0.000	0.000
ADB-Financed	0.90	0.00	0.90	0.771	0.000	0.771
Other External Financing	0.00	0.00	0.00	0.000	0.000	0.000
Total	**0.90**	**0.00**	**0.90**	**0.771**	**0.000**	**0.771**

ADB = Asian Development Bank, IDC = interest during construction.

[b] The difference between the original allocation and the last revised allocation was due to the depreciation of SDRs from $1.56/SDR at the time of loan negotiation to $1.36/SDR at loan closing date.
[c] Canceled on 11 June 2002.

3. Cost Breakdown by Project Component ($ million)

Component	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Civil Works	24.05	17.15	41.20	22.248	16.960	39.208
Equipment	2.00	0.00	2.00	1.019	0.00	1.019
Consulting Services	4.55	1.15	5.70	4.561	2.321	6.882
Incremental Administration	0.00	0.20	0.20	0.00	0.661	0.661
Service Charge	0.90	0.00	0.90	0.771	0.000	0.771
Total	**31.50**	**18.50**	**50.00**	**28.599**	**19.942**	**48.541**

4. Project Schedule

Item	Appraisal Estimate	Actual
Date of Contract with Consultants	Feb 1996	04 Feb 1996
Completion of Engineering Designs	Jun 1997	31 Aug 1997
Civil Works Contract		
Date of Award	Mar 1996	19 Apr 1996
Completion of Work	Jun 2000	18 Jun 2000
Equipment and Supplies	Feb-Dec 1996	Apr-Sep 1996
Dates		
First Procurement	Oct 1996	11 Jun 1997
Last Procurement	Feb 1998	02 Nov 1999
Start of Operations		
Completion of Tests and Commissioning		
Beginning of Start-Up		
Completion of Stage I Civil Works	Oct 1998	Nov 1998
Completion of Stage II Civil Works	Oct 2000	Jun 2000

5. Project Performance Report Ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
From 25 Sep 1995 to 28 Feb 1999	S	S
From 01 Mar 1999 to 31 Mar 1999	S	PS[d]
From 01 Apr 1999 to 31 Dec 2000	S	S
From 01 Jan 2001 to 31 Jan 2001	S	HS
From 01 Feb 2001 to 28 Feb 2001	S	U[e]
From 01 Mar 2001 to 31 May 2001	S	HS
From 01 Jun 2001 to 11 Jun 2002	S	S

HS = highly satisfactory, S = satisfactory, PS = partly satisfactory, U = unsatisfactory.

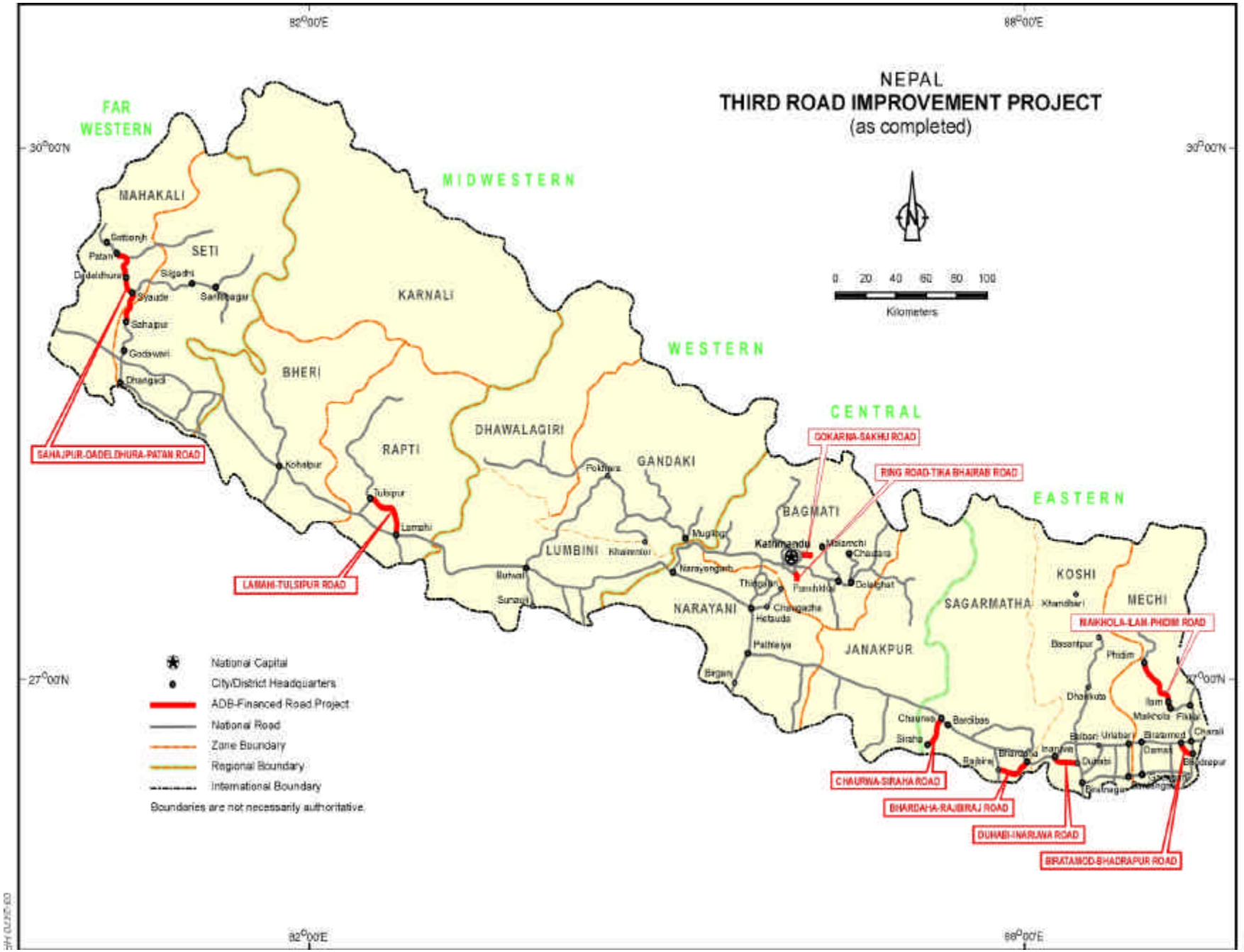
[d] This is due to the minor reduction in project implementation and implementation covenants.
[e] This is due to delays in the audited project accounts and corporate financial statement.

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members[a]
Fact-finding	12–29 Mar 1995	3	51	d, g, f
Appraisal	23 May–6 Jun 1995	4	48	c, d, e, g
Inception mission	30 Jan–10 Feb 1996	2	24	a, d
Review mission 1	1–14 Sep 1996	2	28	a, d
Review mission 2	2–5 Apr 1997	1	4	
Review mission 3	26 Aug–12 Sep 1997	4	10	a(2), h, f
Mid-term review mission	19 Feb–5 Mar 1998	4	56	a(2), d, h
Review mission 4	25 Aug–3 Sep 1998	2	10	a(2)
Review mission 5	3–11 Dec 1998	4	24	a(2), h, i
Review mission 6	9–18 Apr 1999	1	10	
Review mission 7	1–7 Jun 1999	3	10	a, d, i
Review mission 8	1–11 Dec 1999	5	35	a, e, h(2), i
Review mission 9	2–10 May 2000	3	14	a, h, i
Review mission 10	10–21 Nov 2000	3	18	a, b, i
Review mission 11	26 Aug–1 Sep 2001	1	7	a
Project Completion Review[b]	9–20 Jun 2003	3	29	d, h, j

[a] a = engineer, b = financial analyst, c = counsel, d = economist, e = procurement consultant or specialist, f = staff consultant, g = programs officer, h = project analyst, i = national officer (resident mission); j = others (secondee)

[b] The project completion report prepared by N. Zhang, Mission Leader; H. Azeta, Secondee; and J. Ibe, Operations Officer was based on the initial PCR prepared by S. Widowati, Project Specialist; P. Dutt, Transport Specialist; and J. Ibe, Operations Officer.


NEPAL
THIRD ROAD IMPROVEMENT PROJECT
(as completed)
FAR WESTERN
MIDWESTERN
WESTERN
CENTRAL
EASTERN
MAHAKALI
SETI
KARNALI
BHERI
RAPTI
DHAWALAGIRI
GANDAKI
LUMBINI
BAGMATI
NARAYANI
SAGARMATHA
JANAKPUR
KOSHI
MECHI
Kilometers
SAHAJPUR-DADELDHURA-PATAN ROAD
LAMAHI-TULSIPUR ROAD
GOKARNA-SAKHU ROAD
RING ROAD-TIKA BHAIRAB ROAD
CHAURMA-SIRAHA ROAD
BHARDAHA-RAJBIRAJ ROAD
DUHABI-INARUWA ROAD
BIRATAMOD-BHADRAPUR ROAD
NAKHOLA-ILAM-PHIDIM ROAD
National Capital
City/District Headquarters
ADB-Financed Road Project
National Road
Zone Boundary
Regional Boundary
International Boundary
Boundaries are not necessarily authoritative.
82°00'E
88°00'E
30°00'N
27°00'N

I. PROJECT DESCRIPTION

1. Insufficient funding for and attention to rehabilitation and maintenance had led to a poor road network condition in Nepal. At project appraisal, 50% of the road network was poor and 25% was fair. The Government's primary objectives of increased economic growth and reduced poverty required significant improvements in the transport infrastructure to strengthen regional integration and provide agricultural areas with a reliable access to the growing potential markets. The Government identified road sector development priorities in its 8th five-year plan (1992-1997), during which the Third Road Improvement[1] was appraised. It also recognized the need to reduce total transport costs on the strategic network and to develop a geographically balanced network to satisfy regional integration needs.

2. The Project was formulated to contribute to the Government's goal of reducing total transport costs on the strategic network to help stimulate economic development and reduce poverty in the project influence areas. The main objective was to actively support the Government's strategy for improving and rehabilitating its strategic road network to bring the Project roads to an economically maintainable standard so that they would provide reliable all-weather passage. The project would contribute to a reduction in total transport costs, which ultimately would help promote economic growth and poverty reduction. The Project would also assist in building the capacity of the local road construction industry (Appraisal Report, pares. 4 and 52). The project framework prepared by the project completion review (PCR) Mission is in Appendix 1. No framework was prepared at appraisal.

3. At appraisal, the Project comprised three components:

(i) **Road improvement.** Civil works and related consulting services to improve approximately 250 kilometers (km) of roads comprising of Sahajpur-Dadeldhura-Patan (120 km), Lamahi-Tulsipur (46 km), Maikola-Ilam (15 km), and Ilam-Phidim (67 km).

(ii) **Road rehabilitation.** Civil works and related consulting services for rehabilitation and periodic maintenance of high-priority feeder roads totaling about 100 km in Eastern and Central regions.

(iii) **Capacity building.** This component was provided through consulting services and equipment support. Consulting services, in addition to preconstruction and construction supervision works, also included inputs to help the Department of Roads (DOR) improve road maintenance capabilities in the Far Western region and provided DOR and local contractors with construction and equipment management advice. Equipment support included procurement of certain specialized road construction equipment, generally high-cost items, to be leased to local contractors working on the Project.

4. Anticipated outputs at appraisal included an improved and upgraded strategic road network, reduced vehicle operating costs (VOCs), increased agricultural inputs and products, and a developed local contracting industry. Also covenant stipulated that the

[1] Loan 1377-NEP (SF): Third Road Improvement Project, for $40.0 million, approved on 21 September 1995.

Government would prepare a priority investment plan available to industry showing indicative medium-term road works, take all necessary measures to introduce a road maintenance fund bill[2] to its Parliament, and allocate an increasing amount of funds, by about 15% annually, for road maintenance.

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

5. The Project conformed to the operational strategy of the Asian Development Bank (ADB) for the road subsector in Nepal at the time of appraisal to support efforts to (i) bring the strategic road network to a maintainable standard by striking a better balance between financing for rehabilitation and maintenance and for new construction, (ii) reduce transportation constraints to key agricultural production areas, and (iii) develop the local private sector contracting industry. The roads included in the Project were strategic roads connecting major agricultural production areas and were to be implemented with substantial participation of local contractors and consultants.

6. Under the Eighth Five-Year Plan, the Government accorded high priority to completing the geographically balanced strategic road network, developing a planned maintenance program and financing, and reducing total transport costs on the strategic network. In line with this strategy, the Project covered the more underdeveloped Far Western, Midwestern, and Eastern regions. The Project was expected to bring the roads to a maintainable standard to reduce transport cost and improve transport services. A sustainable maintenance system was another important element of this strategy. ADB and other external agencies supported the establishment of a self-sustained Road Board Bill, covenanted under the Project. The Project was therefore highly relevant to the Government's sector strategy.

7. Measures to promote private participation were also in line with ongoing reforms in the sector. A viable local private industry would play an important role in establishing an efficient transport sector. At appraisal, the road construction industry was fragile mainly because of an erratic workload and lack of continuity of works. A medium-term investment plan supported under the Project would enable contractors to better assess the likely demand for their services. The Project included providing high-cost construction equipment available for leasing to local contractors and management advice to local contractors during implementation of the Project.

8. Most of the sector policies prevailing at appraisal are still in effect. Future maintenance is to be provided by the Road Maintenance Fund and the Road Board Bill; however, interim assistance may still be required until the Road Maintenance Fund and the Road Board Bill are fully operational. Domestic road construction contractors performed satisfactorily. The original project objectives were largely unchanged during project implementation. While overall original project designs were maintained during project implementation, there were certain changes to address issues such as improvement of previous designs, essentially in respect of slope stabilization, which was

[2] At present, it is designated as Road Board Bill.

common to the roads of Sahajpur-Dadeldhura-Patan and Maikhola-Ilam-Phidim[3] in the hilly and mountainous areas where retaining walls would have to be strengthened to prevent slides and earth movement. Other major design changes included upgrading the pavement for the Dadeldhura-Patan section so that the whole road of Sahajpur-Dadeldhura-Patan would be uniformly paved.

B. Project Outputs

9. Implementation followed the arrangements envisaged at appraisal, except for (i) deletion of a part of (38 km) the Dadeldhura-Patan section and a part of (24.5 km) the Ilam-Phidim section, (ii) modifications of construction specifications of Sahajpur-Dadeldhura and Ilam-Phidim roads, (iii) additional 15 km of road emergency repairs in the improvement component (Godawari-Budhitola); and (iv) reduction in the length of roads in the road rehabilitation component. Due to the higher than-expected cost primarily for slope stabilization, upgrading surfacing of all rehabilitation roads, additional works requested by local authorities, and reduced value of special drawing rights (SDR), the scope of works had to be reduced before awarding the contracts[4]. The modifications followed from changes in circumstance after the earlier design works.[5] For example, for the Sahajpur-Dadeldhura road it became necessary to provide additional retaining walls due to the difficult terrain that had not been appropriately noted during earlier design, and a curtailment to the length of upgrade of the Ilam-Phidim road. The modifications were also necessary because between the previous designs and construction in 1996, the existing road and structures had deteriorated further. This deterioration manifested itself in landslides, movements of slopes, and deterioration of drainage and existing structures, which in some instances failed during road construction works (such as during the compaction of pavement layers). In addition, all improved road sections received bituminous treatment for easier maintenance. Some sections were originally proposed to be at gravel surfacing standard. Additional works that were not envisaged at appraisal included Godawari-Budhitola emergency repairs, airport access upgrading in Tulsipur, and provision for bus parking area requested by local authorities. ADB approved all changes in scope and modifications to the appraised project design. Roads appraised and actually improved are presented in Table 1.

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[3] All feasibility designs were done at various times between late 1980s and early 1990s. ADB provided TA assistance for the engineering design in 1992 and 1994, respectively. The Project consultant were required to review the previous designs and necessary improvements were made, especially in respect of slope stabilization. Some design changes were due to further road deterioration during the time lapse between the various previous designs and project implementation in 1996. Therefore, those improvements were necessary to accommodate the changed road conditions (see para.9).

[4] While the 24.5 km Ilam-Phidim section has been picked up in the forthcoming Road Network Development Project (RNDP), the 38 km section of Dadeldhura-Patan remains unfunded because of low expected economic internal rate of returns (EIRRs).

[5] Engineering design for the road improvement component was carried out in earlier design works under TA 1704-NEP: *Third Road Improvement Project,* for $100,000, approved on 25 May 1992 funding increased to $118,000 on 10 October 1994, and was reviewed under loan project implementation.

Table 1: Civil Works as Appraised and Actual

Road Section	Appraised (km)	Actual (km)
Road Improvement	**248.00**	**201.80**
Lamahi–Tulsipur	46.00	46.60
Dohajpur– Dadeldhura	70.00	70.20
Dadeldhura–Patan	50.00	12.00
Maikhola–Ilam	15.00	15.50
Ilam–Phidim	67.00	42.50
Godawari–Budhitola[a]	0.00	15.00
Road Rehabilitation	**100.00**	**78.60**

[a] The 15 km emergency repairs were not envisaged during project preparation.

10. The scope of the roads rehabilitation component was reduced. Eventually, the total length of selected rehabilitated roads was about 80 km instead of 100 km at appraisal due to fund constraints[6]. The consulting services and capacity building components were as envisaged at appraisal. The consulting services were effective in reviewing and improving design during implementation and ensuring the quality of completed works. An Equipment Management Unit was established in DOR in April 1996 and the leasing of equipment began in November 1996. Although the equipment actually procured under the Project cost less than what was allocated at appraisal (from $2.0 million to about $1.0 million), it was very useful in ensuring that the local contractors working under the Project completed quality works on time.

11. Overall, the Project was implemented within the envisaged available funds and period except for the loan closing date (see para.15). However, civil works had to be reduced due to shortage of funds.

C. Project Costs

12. The total cost of the Project at appraisal was estimated at $50.0 million equivalent[7] comprising a foreign exchange component of $31.5 million and a local currency component of $18.5 million including taxes and duties. ADB's loan of $40.0 million equivalent from its Special Funds resources was to cover all foreign exchange costs and part of the local currency costs amounting to $8.5 million (46.0% of total local currency estimate). The balance of funding was to be provided by the Government. The actual total cost was $48.54 million, ADB's actual disbursement was $34.93 million, or about 87% of the $40.0 million estimated at appraisal.

13. The estimate for civil works alone was $41.2 million, including contingencies. The actual civil works contract costs were $39.2 million[8] at the time the loan account was closed in June 2002. The lower costs were due to the unfavorable exchange rate of SDR against the dollar, which in turn, partly contributed to the reduction of the scope of works. Despite the favorable change in the dollar–Nepalese rupee exchange rate, from NRs50.67/$ at appraisal to NRs74.0/$ at loan closing, the unfavorable change in the

[6] This is mainly due to the combined effects of its (i) need for significant additional retaining walls on the Sahajpur-Dadeldhura section, and Maikhola-Ilam-Phidim due to shortcomings in previous designs; (ii) additional works for upgraded pavement and emergency repairs of 15 km of an existing road because of monsoon damage, and (iii) reduced SDR value against the dollar, which reduced the original ADB allocation of $40 million to $34.9 million and maintained the reduced scope of works even though the award contract prices were lower than those at appraisal.

[7] In December 1994 prices, at an exchange rate of $1.00 = NRs50.67.

[8] It was achieved by reducing the scope of works by 20% (across the board) as funding for the works would have been sufficient.

SDR-$ exchange rate, from $1.56/SDR at the time of loan negotiations to $1.36/SDR at loan closing, reduced the actual usable loan amount in dollars. There were major shifts from foreign to local costs, from 63% foreign exchange cost estimated at appraisal to 58% at loan closing date. If local currency financing is taken into account, the proportion of ADB financing is reduced from 80% at appraisal to 70% at loan closing. The reason was that most of the civil works contracts were awarded to local contractors so that the Government financed a higher-than-expected proportion of local costs.

14. The approved amount of the contract for consulting services was $5.9 million equivalent, compared with the appraisal estimate of $4.8 million, or $5.7 million including contingencies. Several variations to the contract raised the actual consulting services costs to a total of about $6.9 million, substantially higher than the appraisal estimate to cover additional works mainly due to design inadequacy, landslides, and road deterioration that was not expected at appraisal.

15. To reflect an anticipated cost overrun of ADB funds largely due to the cost of design changes to the civil works and the devaluation of the SDRs, after January 2000 ADB reduced civil works from 72% to 65% for international competitive bidding (ICB) contracts and 50% for local competitive bidding (LCB) contracts, and the Government provided finance of over $1 million additional counterpart fund. As a result of this and rigorous cost management, a surplus of ADB funds turned out and ADB restored financing of civil works LCB contracts from 50% to 72%, on the condition that disbursement would be up to the available loan amount. Loan closing date was kept open for 1 year after the original closing date to allow for maximum disbursement at the revised financing percentage of civil works. A loan amount of $17,238.67 eventually was not used before the loan account closing date and was subsequently canceled. Appraisal and actual costs are compared in Table 2, and details are in Appendix 3. The effect of reducing the scope on the regions is noted in para. 37.

Table 2: Appraisal and Actual Project Costs
($ million)

Item	Appraisal			Actual		
	FX	**LC**	**Total**	**FX**	**LC**	**Total**
A. Civil Works						
1. Road Improvement	18.1	11.9	30.0	19.796	15.148	34.944
2. Road Rehabilitation	2.5	1.5	4.0	2.452	1.811	4.263
B. Consulting Services	3.9	0.9	4.8	4.561	2.321	6.882
C. Equipment	2.0	0.0	2.0	1.019	0.000	1.019
D. Incremental	0.0	0.2	0.2	0.000	0.661	0.661
Administration	4.1	4.0	8.1			
E. Contingency	0.9	0.0	0.9	0.771	0.000	0.771
F. Service Charge						
Total	**31.5**	**18.5**	**50.0**	**28.599**	**19.941**	**48.540**

FX = foreign exchange, LC = local currency.
Note: Use of an average annual exchange rate for currency conversions may cause discrepancies in cost across tables.
Source: ADB staff estimates

D. Disbursements

16. ADB approved a $40.0 million loan from its Special Funds resources on 21 September 1995.[9] The first disbursement was made in March 1996. The disbursement rate picked up significantly in the last 2 years of implementation, reflecting faster implementation than expected. Details of the cumulative annual disbursements of the loan are in Appendix 4. The total disbursements of $34.932 million were about 87% of the estimated $40.0 million at appraisal.

17. The establishment of an imprest account for eligible payments for civil works and consulting services benefited the Project. Statement of expenditures procedures applied for the Project also facilitated the processing of disbursement.

E. Project Schedule

18. The main events during project implementation are in Appendix 5. The Project was scheduled to start in January 1996 and to be completed by June 2000. Because the designs needed to be reviewed, civil works actually started 4-6 months behind the original schedule. However, no major further delays were experienced. Of 22 contract packages, only 4 contracts were delayed by 4-8 months, 2 contracts were completed on time, and 16 contracts were completed earlier than the contract period. The Project was substantially completed in June 2000, 1 year before the original loan closing date. Due to the reasons indicated in para. 5, the project account was closed 1 year later, i.e., in June 2002 to allow for maximum loan disbursement. Appendix 6 shows actual implementation against the schedule envisaged at appraisal.

F. Implementation Arrangements

19. The implementation arrangements envisaged at appraisal were generally followed. The Borrower was the Kingdom of Nepal and DOR served as the Executing Agency (EA). Day-to-day management of the Project was the responsibility of DOR's Project Directorate (ADB). The Project Directorate was delegated more authority than in previous ADB-financed road projects, and to the full extent allowed under the Government's Financial Administration Rules. The Project Directorate was authorized to approve contract variation orders up to 20% of the accepted bid price. Project managers, based at three construction sites, also had a key role in acting as the employer's local representative. They were considered successful to expedite activities and decisions affecting Project implementation.

G. Conditions and Covenants

20. There were no particular conditions for effectiveness of the Loan Agreement. Compliance with the major loan covenants is reviewed in Appendix 7. No covenants were modified, suspended, or waived during implementation. Most of the covenants were fully complied with, particularly those relating to implementation arrangements, screening and selection of roads in the road rehabilitation component, benefit monitoring and evaluation, and land acquisition. Submissions of some audited accounts were, however, delayed by 1-2 months. With regard to road maintenance, the Government prepared the annual maintenance plan, but the allocated funds were not sufficient. The Government also prepared a road maintenance program to be implemented under a Road Maintenance Fund arrangement. The Road Board responsible for overseeing

[9] Forty years for repayment, including 10 years grace period with no interest.

implementation has not been in full operation although the Parliament approved the Road Board Act on 8 July 2003. The delays before approval were due mainly to the political situation that constrained the Government to consider fuel levies as one of the main sources of the Road Fund. Unless the Road Board Bill is made fully operational, interim support from external agencies will still be necessary to keep the existing roads in maintainable condition.

H. Consultant Recruitment and Procurement

1. Consultant

21. To prepare the Project and, in particular, to assist in appraisal, ADB used consultant inputs. ADB provided project preparatory technical assistance (TA)[10] to prepare a feasibility study of the Project. Under the loan, consulting services were provided for stage I design review and construction supervision; stage II design preparation, procurement, and construction supervision; capacity building; and equipment procurement and management advice for DOR's Equipment Management Unit. To avoid delays, ADB approved advance action for consultant selection, in accordance with ADB's *Guidelines on the Use of Consultants.* There were no deviations from the agreed-upon procedures. Out of 49 consulting firms that submitted expressions of interest in the Project, 7 firms were invited to submit proposals, but proposals were received from only 4. The contract with the selected consulting firm was signed on 4 February1996, about 1 month after the loan was declared effective. Advance action facilitated the smooth start-up of project implementation.

22. Goods and services from the loan funds were procured in accordance with ADB's *Guidelines on Procurement.* Civil works and equipment were basically procured as appraised. Invitations to tender for the procurement of plant and equipment were issued to eligible bidders. All civil works contracts, except one carried out under ICB procedures, were awarded through LCB. The 22 contract packages for civil works were procured in two stages. DOR had previous experience with ADB projects, and no major problems were encountered in packaging the contracts, preparing the bidding documents, or evaluating the bids. No major disputes or contractual difficulties arose with any contracts during procurement.

I. Performance of Consultants, Contractors, and Suppliers

23. The performance of consultants in assisting DOR and the local contractors was generally satisfactory. As the Project involved a large number of contract packages scattered all over the country, consultant support was essential, particularly in project-wide monitoring and coordination. The actual person-months were higher than estimated at appraisal. An additional 10% of international and 20% of domestic consulting inputs were required mainly to revise road design and to protect slopes, and to cover defect liability periods services – unexpected at appraisal – due to monsoon damage of completed roads.

24. The performance of the contractors and suppliers was generally satisfactory. However, contractors in a few civil works contracts needed extra time to complete their works due to delays in mobilizing the critical plant and equipment. Once the problems

[10] Engineering design for the road improvement component was carried out in earlier design works under TA 1704-NEP: *Third Road Improvement Project,* for $100,000, approved on 25 May 1992 funding increased to $118,000 on 10 October 1994, and was reviewed under loan project implementation.

were resolved, progress improved. The quality of the built physical infrastructure is generally good, reflecting the satisfactory performance of consultants, contractors, and suppliers. As to claims from the contractors to the employer, there are about five ongoing contract claims for the settlement of rates, fuel price and quantities, which will be settled by dispute resolution board that has been or will be established for the claims.

J. Performance of the Borrower and the Executing Agency

25. The performance of the Borrower and DOR was generally satisfactory. The Government dealt effectively with implementation difficulties, including landslides; the need to modify design, slope protection, and pavement structure; and the associated increase in the project cost. Government decisions resulted in a more appropriate quality of roads. However, the Government could not avoid reducing the scope of works due to cost increase, on one hand, and the devaluation of SDR, on the other. Local staff seconded by DOR to the consultants generally performed well, given that they had limited supervision and contract management experience. DOR benefited greatly from this experience and its capacity to manage construction and maintain paved roads is improved.

K. Performance of ADB

26. The overall performance of ADB was satisfactory. ADB monitoring through 13 missions and 298 staff days was adequate. The regular intervals of the ADB missions built up a good relationship with DOR and provided a forum to review potential problems and take appropriate actions. ADB worked closely with the Government to resolve implementation issues, including the need to modify the road design and reduce road length to avoid a cost overrun. The processing of approvals and disbursements were prompt. There were no significant disagreements between ADB and DOR on the terms of reference, bid documents, awards, or other matters that would have affected the implementation procedures, project costs, or schedule of implementation.

III. EVALUATION OF PERFORMANCE

A. Relevance

27. The Government identified improving road transport between district headquarters and the national highways as well as enhancing rural road conditions as important priorities in its Eighth Five-Year Development Plan. ADB's objectives for this sector are to support poverty-reduction efforts by improving the road links to rural areas to reduce transport constraints to key agricultural production areas and promote the growth of the agriculture sector. ADB also supports the Government's efforts to bring the road network to a maintainable standard.

28. This Project has improved 187 km of roads in Eastern, Midwestern and Far Western regions where road conditions were generally poor. The roads connect local agricultural communities to market centers and the East-West Highway, the key arterial route in the country. In addition, the Project included rehabilitation of 80 km of feeder roads in Eastern and Central regions to keep them in maintainable condition. These feeder roads connect farming communities to main roads and market centers. As the Project-influenced regions are poverty stricken – regions with over 60% of the population

living below the poverty line – the improved access helps reduce transport cost, provides reliable access to major market centers, and brings part of the country's strategic road network to an economically maintainable condition. Thus the project objectives are directly in line with ADB and the Government's objectives at both project formulation and project evaluation. Hence, the Project is highly relevant and gets a rating of 3 for relevance.

B. Efficacy in Achievement of Purpose

29. The Project has improved 75% of the original target and rehabilitated 80% of the original target. Most of the physical components have thus been achieved.

30. The capacity building component as designed included equipment support and consulting services to help DOR improve road maintenance capabilities in Far Western region and to provide DOR as well as local contractors with construction and equipment management advice. This component as implemented allowed for the formation and successful operation of the Equipment Management Unit (EMU). The availability of a plant from the EMU was one of the factors that allowed the LCB contractors to meet their construction time frame obligations. However, the final value of the equipment allocated was reduced by 50% from $2 million to $1 million to reflect the cost constraint of the ADB fund and the need for such equipment.

31. One of the objectives during appraisal was to develop the local contracting industry. The Project employed 21[11] LCB contractors on the various contracts. Most of them had little previous experience of working to Federation Internationale des Ingenieurs-Conseil (FIDIC) conditions of contract. However, in the course of contract implementation they were trained to upgrade their capabilities. The LCB contractors learned very useful technical and contract management lessons from involvement in this Project. On the performance side, 20 contractors were rated as "good" by the supervision consultants for quality. For progress, three contractors delayed completion by 4-8 months, two achieved their objectives on time, and the rest advanced their completion of respective constructions from 1 week to 6.5 months. In this respect, the project achieved its objective of improving the capabilities of the local contractor industry.

32. Bearing in mind that over 75% of the physical output envisaged during appraisal was achieved, the EMU was successfully implemented and the capabilities of the LCB contractors were improved, the Project is judged efficacious and is given a rating of 2.

33. Benefit and monitoring surveys were undertaken in 2001. Traffic counts were made, road conditions inspected and VDCs/Municipalities[12] investigated/reviewed along the project routes on the matter of population, education, occupation, crop area and production, livestock, total income of an average household, shops, restaurant and lodges, industries, fare and freights, traffic growth, road roughness, vehicle damage factor, routine maintenance cost and local labor employed under the Project. Data from

[11] The 21 contractors represent about 12% of 180 Class A contractors in the country, who are eligible for contracts of this nature and volume, showing a wide range of capacity building among the local construction industry.

[12] The administration system in Nepal consists of the central government, 75 district development committees (DDCs) and about 3,800 village development committees VDCs/Municipalities in the country. For this Project, 12 DDCs for 16 VDCs were involved along the routes of five improvement roads.

the surveys were compared with the 1993 baseline data[13]. The International Roughness Index with and without the Project is in Appendix 8.

34. With the Project, the unit vehicle operating cost (VOC) was reduced for all types of vehicles, from 18.6% for utility vehicles to 4.3% for light buses. Overall VOC in 2001 was reduced by more than 50% with the Project than without the Project. Journey time on the 11 roads in 2001 was reduced by an average 50%. Speeds for all types of vehicles increased, e.g., car speed increased from 23.5 km/hour in the without-project case to 46.8 km/hour in the same year with the Project case.

35. After adjusting for inflation passenger fares for six roads decreased in various degrees from 9% to 11%, and slightly increased by 2% for five roads.[14] Freight rates decreased for all 11 roads from 4% to 15%. Shop owners reported having strong competition after the road Project, as more cheaper goods come.

36. Major social and economic indicators showed improvement as reflected in increased literacy rate;[15] more students;[16] enhanced crop and livestock production where production of major crops such as rice, maize, millet, wheat, potato, pulses, oilseeds, vegetables, ginger, cardamom, and amleso – increased;[17] higher income of an average household expressed by higher income from their major production;[18] more shops, restaurants and lodges and more factories.[19]

37. Other nonquantified benefits also increased: improved access to better markets, seeds, fertilizers, water, and hospital; better national integration; more bus stations, more use of roads and a more comfortable ride; more job opportunities in urban as well neighboring countries, etc. Due to reduction of the scope of works, the section Pokhara-Patan remains unimproved and nonpassable during the rainy season. Local people at the south and north ends of that sections have to travel through neighboring countries, for several days to cover 38 km. A similar observation was made for the dropped section from Pawan to Phidim, which is going to be picked up in the forthcoming Road Network Development Project. The overall poverty impact ratio is 85%, which based on available data, much more than the poor's 15.1% income share in the GDP in the country and represents a positive project impact on the poor.

38. In the absence of comparable surveys in adjacent areas where no similar project was being undertaken, the above improvements cannot be entirely attributed to the Project. Neither can one quantify the extent to which the above benefits are from the Project. But given the sharp contrast between the end of the improvement road in

[13] This base year was accepted during the feasibility study period (see recommendations).
[14] This is somehow in line with the present transportation structure in the country where there is a strong transport industry association in passenger transportation and a less strong association in the freight industry. The Government set a price ceiling for passenger fares, below which the association decides on the fares.
[15] For example, the literacy rate in Amargadhi municipality in Far Western region increased from 60% in 1993 to 65% in 2000.
[16] In five VDCs in Far Western region, the number of students increased from 5,475 to 8,260. One reason can be that due to better accessibility, students do not have to stay in school lodges but go home every day. Thus, schooling expenses are reduced.
[17] For example, in Shantidanda VDC, maize production increased by 110%, millet by 33%, wheat by 50%, potato by 50%, ginger by 100%, cardamom by 230%, and amleso by 149 times.
[18] The income of the average household increased by various degrees from 10% to 12% in year 1993 prices, but during the same period, the average household size increased by various degrees from 3% to 10%.
[19] For example, in Bijauri VDC, consumer shops increased from 15 to 25, restaurants from 2 to 6, medicine shops from 1 to 2, and tailoring shops from 2 to 4.

Pokhara and its unimproved extension to Patan, where the PCR Mission traveled a small section and found no comparable social or economic indicators, it is obvious that, to a large extent, the observed social and economic benefits from the improved sections are from the road project. Because there was no poverty baseline survey during project preparation and no district-level poverty line survey is available at present[20], the number of people who rose above the poverty line after the Project could not be confirmed. However, during constructions for the Project, a total of 2,675.5 person-years of local labor was employed, among whom about 80% were unskilled. The Project provided job opportunities for the otherwise self-employed local labor and, hence, good incomes to the local population. Likewise, the benefits from increased use of roads were not sufficiently quantified.

C. Efficiency in Achievement of Outputs and Purpose

39. Economic reevaluation was carried out (Appendix 8), adopting the same methodology used during appraisal. The results of the reevaluation as well as a comparison with the original evaluation results are in Table 3. The reasons for the differences are shown in the same table.

Table 3: Comparison of Economic Evaluation Results

Road Section	IRR %		Comments	
	At Appraisal	At PCR	Traffic Forecasts	Cost Estimates
Sahajpur-Dadeldhura	13.7	8.0	Actual traffic lower than expected on Syaule – Dadeldhura section	Actual cost 44% higher than predicted at appraisal.
Dadeldhura-Patan	12.4	0.4	Traffic as predicted at appraisal	Actual cost to KM12 178% higher than predicted at appraisal
Maikhola-Ilam	14.9	17.4	Actual traffic higher than predicted at appraisal	Actual cost 10% higher than predicted at appraisal
Ilam-Phidim	13.2	13.0	Actual traffic higher than predicted at appraisal on Ilam–Nepaltar and lower on the Nepaltar–44 km section	Actual cost to 44 km 64% higher than predicted at appraisal
Lamahi-Tulsipur	14.6	41.7	Actual traffic higher than predicted at appraisal	Actual cost 40% lower than predicted at appraisal
Duhabi-Ineruwa	35.5	20.0	Actual traffic lower than predicted at appraisal	Actual cost 70% lower than predicted at appraisal
Gokarna-Sankhu	15.0	5.7	Actual traffic lower than predicted at appraisal	Actual cost 56% higher than predicted at appraisal
Ring road-Tikabhairab	29.1	31.1	Actual traffic higher than predicted at appraisal	Costs as predicted at appraisal
Birtamod-Bhadrapur	27.5	36.6	Actual traffic higher than predicted at appraisal	Costs as predicted at appraisal
Chuharwa-Siraha	20.7	12.6	Actual traffic higher than predicted at appraisal	Actual cost 143% higher than predicted at appraisal
Bhardaha-Rajbiraj	16.0	15.9	Actual traffic lower than predicted at appraisal	Actual cost slightly lower than predicted at appraisal

Source: Consultant's report and ADB staff estimates.

[20] The present poverty line in monetary terms is NRs4,404. Approximately 50% of the population lives below the poverty line in the country (see Transport Sector Development for Nepal). But there is no district level poverty statistics in the country and the Central Bureau of Statistics is revising the data at present.

40. The overall reevaluated economic internal rate of return (EIRR) for the road improvement component is 15.7%, compared with the estimated 12.5% at appraisal.[21] Out of the Five sections, two, i.e., Shajhapur-Dadeldhura and Dadeldhura-Patan have lower individual EIRRs at reevaluation mainly because of the substantial construction cost increases in the two sections. Furthermore, the traffic volume was also lower than estimated at appraisal for Sahajpur-Dadeldhura because of its reduced length, so that it does not connect main towns, but ends nowhere. For Lamahi-Tulsipur and the Maikhola-Ilam roads, the reevaluated individual EIRRs are higher. For the Lamahi-Tulsipur, the cost was lower and traffic was higher than estimated at appraisal. For Maikhola-Ilam, the increase in actual traffic more than offset the 10% increase in construction cost.

41. In the case of the rehabilitated roads component, the EIRR is 18.7%. The EIRR for this component was estimated, not during appraisal, but during subproject selection. Of the six sections, only two rehabilitated sections had an EIRR lower than 12%. Even though the rehabilitation costs of some sections were higher than estimated, the traffic volumes were also higher, thus offsetting the increase in capital costs.

42. The weighted EIRR of the Project as a whole is 16.1%. It therefore satisfies the ADB threshold EIRR value of 12%. Hence the Project can be rated as efficient. It is believed that the improving of the security situations in the country, will raise the EIRR.

D. Preliminary Assessment of Sustainability

43. A major problem in Nepal is inadequate road maintenance. A root cause of road maintenance problems is unavailability of adequate funds to undertake even a minimum level of road maintenance. There is scope for improved road maintenance capacity at DOR. One of the several steps to strengthen its maintenance capability is introducing appropriate structures within the organization such as the Maintenance and Rehabilitation Coordination Unit (MRCU) to plan and program maintenance requirements and the strengthened Maintenance Division responsible for the upkeep of the strategic road network in each district.

44. The Parliament has approved a self-sustaining Road Board that will earmark road toll revenues and other possible sources of funds and allocate a fiscal budget to support the Road Maintenance Fund. The total funding size is not clear at the moment. It is unlikely that proposed increases in the Road Maintenance Fund will keep pace with the actual maintenance requirements on the strategic road network. At least, for the coming year, i.e. FY2003/2004, there will be a minimum gap of NRs180 million in maintenance funding for the strategic road network. Accordingly, this Project is rated as less likely to be sustainable.

E. Environmental, Sociocultural, and Other Impacts

45. The extent of ground movements, slopes, and road failures that took place along the project roads was higher than originally envisaged. Trees were planted to help ensure slope stability. Tree planning was more effective in Eastern region than in the Far Western. On the whole, the project had no significant adverse environmental impact. It also had no significant sociocultural impact. With widespread use of bioengineering, grass and trees were planted along the slopes that need stabilization in Eastern and Far Western regions. This not only saved cost compared with concrete or other structures to

[21] It is obvious that if not for the insurgency in the country, overall EIRRs would be higher.

protect the slopes that were prone to slides or unstable factors, but also improved vegetation and produced a positive impact on the environment – retaining grass and trees soil erosion reduced, and the threat of landslides was minimized. During the Mission, it was noted that basically the vegetation cover worked well except in a small section where goats grazed. If the problem is not addressed promptly, that section could be quickly damaged. In addition, by strictly following agreement as indicated in the RRP, roads were essentially built on the existing right-of-way so that land acquisitions were minimized.

46. Far Western region is the poorest region of the country. The improvement of Sahajpur-Dadeldhura-Patan provides enhanced access to the other regions for people in and outside the region. This impact is positive in promoting national integration and balanced economic development across the country.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

47. Although the length of the improvement and the rehabilitation components was reduced by 25% and 20% respectively, the components were largely implemented as largely conceived. The Mission visually inspected the conditions of the Project road and found the generally in good condition, except for a few potholes, settlements, and bulging breast walls. In certain sections on the route of Sahajpur-Dadeldhura-Patan, bioengineering was threatened by goat grazing, which could reduce the grass or plant areas and cause bioengineering to fail if the problem is not properly addressed. For the former EMU's equipment, a list and report provided by the Government showed most items in good condition while some would need major or minor repair. The Mission visually inspected 15 of 48 pieces around the country and found that they appeared generally to have had substandard maintenance. They would need good and immediate maintenance; otherwise, they would quickly become useless. Overall, the Project improved roads that connect local agricultural communities to market centers and to the East-West Highway, in addition to helping keep such roads in maintainable condition. All-weather access of agricultural inputs to the project areas and of agricultural outputs to market centers is expected to help improve the income level of farmers living in the areas. Other benefits include improved access to other regions, hospitals, schools, cheaper water, more job opportunities, more commercial activities, etc. Such access is important, as over 60% of the population in the Project-influenced area live below the poverty line. The project is rated as highly relevant, efficacious, efficient but less sustainable over the long run with no significant environmental, sociocultural, and other impacts. Overall the Project is rated successful (Table 4).

Table 4: Project Rating

Criterion (a)	% Weight (b)	Assessment (c)	Rating Value (d)	Weighted Rating[a] (b x d)
Relevance	20	Highly relevant	3	0.6
Efficacy	25	Efficacious	2	0.5
Efficiency	20	Efficient	2	0.4
Sustainability	20	Less sustainable	1	0.2
Environmental, Sociocultural and others	15	Negligible	3	0.45
Overall Rating	**100**			**2.15**

[a] Highly successful if overall weighted average (OWA) >2.5, and no criterion with less than 2; successful if OWA = 1.6-2.5, and no criterion with less than 1; less than successful if OWA = 0.6-1.6, and not less than 2 criteria with less than 1; Unsuccessful if OWA < 0.6
Source: ADB Staff estimates.

B. Lessons Learned

1. Importance of Proper Financial Estimates When Designing Projects

48. The actual cost incurred for four of the five improvement projects was significantly higher, i.e., ranging from 10% to 178% higher than estimated at appraisal. For the fifth, the actual cost was 40% lower than the appraisal estimate. The higher-than-expected costs were due mainly to underestimated geotechnical considerations, especially in slope stabilization and the decision to lay bituminous surfacing throughout Road 4. The roads became economically nonviable since their EIRRs dropped to less than 12%. If the costs were estimated more realistically, candidate roads would have been selected better by taking into account economic viability together with other selection criteria – connectivity, poverty impact, and other social-economical considerations – and allocation of scarce resources in the country could have been optimized.

2. Importance of Government Commitment to the Maintenance Fund

49. The major problem facing road maintenance today is lack of financing. The Road Board Bill was expected to have been in place by 1996. Yet it was approved after 6 years and is not yet fully effective. It is important to continue to dialogue with the Government to make adequate maintenance funds available for the road project. There would have been an agreement with the Government on adequate funding levels for road maintenance and the funding levels could have been a loan covenant. If properly enforced, this covenant could have assured sufficient financing levels, at least for the project roads**.** Sustainability should be given full consideration when the Government sets up an institution so that a resulting setup does not become inactive due to inadequate operational funds shortly after project completion. These lessons should be incorporated in the next ADB assistance to the country.

3. Need to Avoid Creating Agencies Dependent on Foreign Assistance

50. The EMU was an organization that used to be part of DOR and yet was funded from foreign assistance. Its purpose was to ensure that local contractors had access to a suitable plant to carry out road projects. The EMU had been successful in serving that purpose. In fact, had not been for the EMU, the local contractors could not have completed their contracts. However, the fact is that although the EMU was successful in helping local contractors carry out their work, it was not economically sustainable

because of (i) unexpected market weakness due to political instability, (ii) the need for DOR to carry out certain emergency repairs of damaged roads, and (iii) DOR's inability to pay the associated rent. At the same time, the financial capabilities of local contractors increased over time so that the need for EMU equipment declined. DOR disbanded the EMU to reflect reality. In the future, economic viability and sustainability should be considered when setting up a unit. The market forecast and sources of maintenance fund should especially be evaluated. What should be avoided is setting up an agency playing a commercial function but with no secure market visibility so that its existence would depend on continued foreign assistance.

C. Recommendations

1. Project-Related

51. **Future Monitoring.** ADB needs to have a continuing dialogue with the EA and the Borrower on providing adequate financing for maintaining project facilities. It would be desirable to formulate performance standards with allowable International Roughness Index values on the project roads as a measure of success so that the Government's efforts to provide sufficient funds for project road maintenance can thus be objectively assessed.

52. **Procurement of Consultants.** For a developing country like Nepal, cost is a major factor to consider in recruiting consultants. ADB's quality- and cost-based selection method should be used in future ADB projects to minimize costs while maintaining quality. The existing capacities of the EA and cost implications of person-months of consulting services should be considered when assessing the need for and duration of consulting services.

53. **Covenants.** The loan covenants under the Project were generally in line with the need and reality of the country. In future ADB assistance, one covenant should be on the availability of maintenance funds, especially since the Road Board Bill has been approved by the parliament and it is the Government's plan to mobilize adequate maintenance funds in 3 years.[22]

54. **Additional Assistance.** Given the huge demand for road development and maintenance in the near future, high poverty incidence, developmental impact on poverty reduction and economic development, and shortage in funding necessary investments in the country, ADB should stay in the road subsector. DOR's capacity to use appropriate technical methods, including HDM4 in programming and prioritizing road development and maintenance activities in a most cost-effective manner should be strengthened. Strengthened capacity to control overloading and improved road safety is also needed.

55. **Drawing Sustainable Plans When Settingup Relevant Agencies.** DOR has several units that were set up using foreign assistance. However, there does not seem to be a transition plan to ensure that such units are eventually self-sustaining and do not need to be funded externally. It is important that a clear time-bound plan be drawn to either devolve the organization to the private sector or otherwise ensure a sufficient operating budget from the public sector budget.

[22] According to the Ministry of Finance, the Government plans to phase out borrowing from the World Bank for road maintenance within 3 years.

56. The Government should make greater efforts to provide most needed maintenance funds to prevent former EMU equipment from deteriorating and avoid wasting precious public assets, especially equipment that either is still in running condition or can be repaired. The Government should explore all possibilities to use these assets in the forthcoming ADB RNDP and other projects.

57. Road improvement may have a greater impact on economic growth and poverty reduction in the country if complemented by suitable development investment plans, e.g., in agriculture, water, school, tourism, etc. Greater efforts are needed to take into account the country's regional social and economic development plan when drawing a road investment plan and to fit road investment into the overall picture of the country's economic and social development objectives, e.g., link roads to tourism attractions or other economic centers.

58. **Timing of PPAR Preparation.** Some project roads, i.e., in Far Western and Mid-western areas, are in parts of the country that are affected by insurgency problems. Their location would inevitably have an impact on traffic volume and thus the economic viability of the project. It would, therefore, not be advisable to carry out a PPAR Mission until the security situation is stable and a more realistic picture of the country can be drawn and documented.

2. General

59. For project appraisal, efforts should be made to ensure that the logical framework is complete and comprehensive. The EA's capacity should be more realistically assessed. When formulating a financing plan, cost estimation should not be too far from reality so that a drastic change in scope of works can be avoided. Reasonable contingencies should be included and foreign exchange fluctuations anticipated.

60. The benefit monitoring system for road projects should cover monitoring transport services and operating structures as well assess whether and how the savings in VOC of commercial vehicles are actually passed on to the commuters and users. The date will facilitate assessment of whether the assumptions made in the economic evaluation are true in reality. For projects with major expected poverty impact, detailed and comprehensive poverty baseline should be prepared at appraisal so that meaningful comparisons can be made to measure impact on the poor people after project completion. In addition, the baseline year should be immediately before the project so that impact from the project can be more clearly ascertained. If possible, areas within the project influence and adjacent areas where there is no similar project should be compared to determine the extent of the impact that can be attributed to the project.

PROJECT FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks	Achievement
Goal				
Promote economic growth by improving transport infrastructure in the project areas	Increase in per capita income of regions and districts	Annual socioeconomic reports at region and district levels through national and local statistics	Political stability Complementary development in the project areas	
Purpose				
1. Reduce transport costs, reduce travel, increase speed and improve transport services	Improved 350 km of roads Reduced vehicle operating costs by about 50%, increased speeds by 100%, and travel time reduced by 50% Availability and affordability of transport services	Completion of the civil works and capacity building - activities Traffic-related statistics Socioeconomic survey Project supervision missions and post-evaluation	Adequate counterpart funds and capacity to execute the Project	257.2 km of roads were improved. Vehicle operating cost reduced by 44%, speed was increased by 98%, and travel time was reduced 47%. Number of vehicles increased by 45%; freight fare decreased by about 10%; but bus fare was unchanged.
2. Provide agricultural production areas with all-weather access to markets	Increased volume of marketed agricultural products	Market survey and monitoring of agriculture production process	Complementary agricultural development in the Project areas	Agricultural outputs increased by about 25%.
3. Assist development of local private road construction industry	Works carried out by local contractors completed with quality and in timely manner	Benefit monitoring and evaluation report Progress reports Bidding evaluation	Work progress on schedule and within the estimated costs	Works were completed with satisfactory quality, but with some delay.
Outputs				
1. Improvement of 250 km roads in Eastern, Mid Western, and Far Western regions	Civil works procurement complete by March 1996 for Stage I and March 1998 for Stage II	Bid evaluation reports Progress reports Project completion reports Review missions	Work progress on schedule and within the estimated costs	
2. Rehabilitation of 100 km feeder roads	All civil works completed in accordance with technical specifications by June 2000	Audited financial statements Loan ledgers	Satisfactory performance of consultants and contractors	

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks	Achievement
3. Procurement of equipment for leasing to local contractors	Year-round passage after completion Equipment procured by September 1996			
Activities/Inputs				
1. Consultants: 260 person-months of international and 900 person-months of domestic consulting services 2. Project funding of $50 million: ADB $40 million and the Government $10 million.	Consulting services to commence in February 1996 Bidding documents for Stage II complete by June 1997 Loan to be approved by September 1995 and effective after 3 months Government budget allocated for the Project	Effective coordination/ communication with the executing agency Progress reports Signed loan agreement in schedule Annual financial statement	Approved ADB loan of $40 millions equivalent by September 1995 Timely and adequate placement of counterpart funds	

CIVIL WORKS CONTRACT PACKAGES
APPRAISED AND ACTUAL

As Appraised						Actual				
	Component	Procurement Mode	Length (km)	Estimated Contract Value			Procurement Mode	Length (km)	Actual Contract Value a/	
				NRs mn	$ mn				NRs mn	$ mm
A.	**Road Improvement**					**Road Improvement**				
	Lamahi-Tulsipur					**Lamahi - Tulsipur**				
L1	Km 0 to Km 46 + 600	ICB	**46.0**	**321.75**	**6.43**		ICB	**46.6**	**319.062**	**5.670**
	Sahajpur-Dadeldhura		**71.7**	**416.62**	**8.32**	**Sahajpur - Dadeldhura**		**70.2**	**903.316**	**14.072**
L5	Km 41 +250 to Km 51 +000	LCB	11.2		0.83		LCB	9.8	100.480	1.554
L6	Km 51 +000 to Km 63 +000	LCB	12.0		1.37		LCB	12.0	121.174	1.897
L7	Km 63 +000 to Km 75 +000	LCB	12.0		1.29		LCB	12.0	166.858	2.523
L8	Km 75 +000 to Km 88 +250	LCB	13.3		1.46		LCB	13.3	201.038	3.121
L9	Km 88 +250 to Km 101 +500	LCB	13.3		1.83		LCB	13.3	176.439	2.768
L10	Km 101 +500 to Km 111 +450	LCB	10.0		1.54		LCB	10.0	137.327	2.209
	Dadeldhura-Patan		**49.1**	**286.15**	**5.72**	**Dadeldhura - Patan**		**12.0**	**252.209**	**3.458**
L11	Km 111 +450 to Km 124 +000	LCB	12.6				LCB	6.0	120.219	1.695
L12	Km 124 +000 to Km 135 +500	LCB	11.5				LCB	6.0	131.99	1.763
L13	Km 136 +500 to Km 149 +000	LCB	12.5							
L14	Km 149 +000 to Km 161 +500	LCB	12.5							
	Maikhola-Ilam		**15.2**	**105.62**	**2.11**	**Maikhola - Ilam**		**15.5**	**206.786**	**3.204**
L7A	Km 65 +500 to Km 72 +000	LCB	6.5		0.94		LCB	6.5	108.882	1.723
L7B	Km 72 +000 to Km 80 +700	LCB	8.7		1.17		LCB	9.0	97.904	1.481
	Ilam-Phidim	LCB	**67.0**	**368.94**	**7.38**	**Ilam - Phidim**		**34.3**	**621.578**	**8.538**
							LCB	5.5	55.315	0.761
							LCB	7.3	137.896	1.766
							LCB	10.0	128.917	1.826
							LCB	7.0	122.812	1.727
							LCB	4.5	176.638	2.458
	Total		**248.9**	**1,499.08**	**40.39**	**Total**		**178.6**	**2,302.951**	**34.942**
B.	**Road Rehabilitation**	LCB	**100.0**	**200.00**	**4.00**	**Road Rehabilitation**				
	Selected Roads					Duhabi-Inaruwa Road	LCB	14.0	23.385	0.337
						Gokarna - Sankhu Road	LCB	8.1	54.600	0.774
						Ring Road - Tikabhairab Road	LCB	7.5	51.628	0.732
						Birtamod - Bhadrapur Road	LCB	13.0	22.765	0.319
						Chuharwa - Siraha Road	LCB	18.1	78.272	1.140
						Bharda - Rajbiraj Road	LCB	17.9	67.612	0.962
	Total		**100.0**	**200.00**	**4.00**	**Total**		**78.6**	**298.262**	**4.264**

[a] Inclusive of taxes totalling NRs123.883 million ($1.891 million equivalent).

ICB= International Competitive Bidding, LCB= Local Competitive Bidding

PROJECT COST AT APPRAISAL AND ACTUAL

($ million)

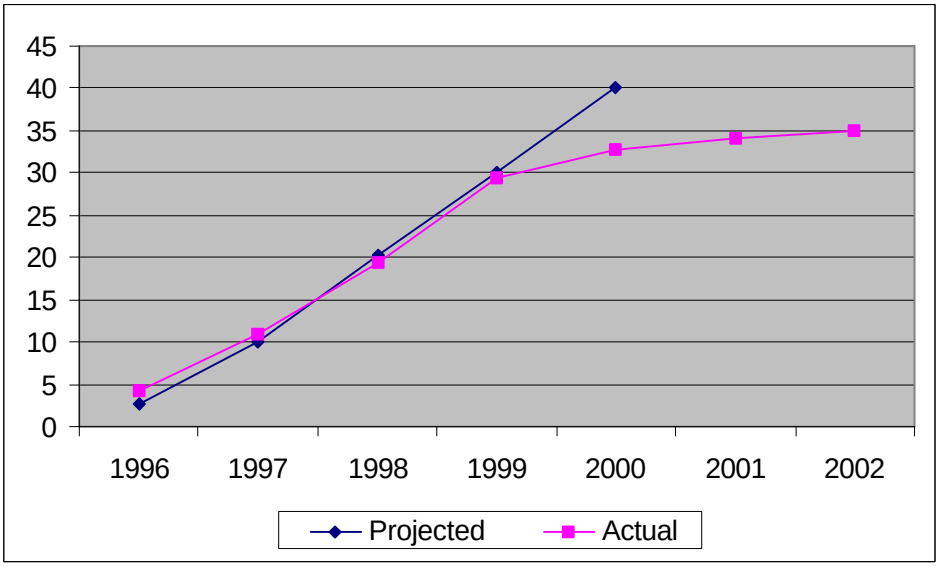
	Appraisal					Actual					
	FX		LC			FX		LC		Total	Total
Item	ADB	Gov.	ADB	Gov.	Total	ADB	Gov.	ADB	Gov.		Change
Civil Works	20.600	0.000	3.880	9.520	34.000	22.248	0.000	4.012	12.948	39.208	5.208
Consulting Services	3.900	0.000	0.900	0.000	4.800	4.561	0.000	2.321	0.000	6.882	2.082
Equipment	2.000	0.000	0.000	0.000	2.000	1.019	0.000	0.000	0.000	1.019	-0.981
Incremental Administration	0.000	0.000	0.000	0.200	0.200	0.000	0.000	0.000	0.661	0.661	0.461
Contingencies	4.100	0.000	3.720	0.280	8.100	0.000	0.000	0.000	0.000	0.000	-8.100
Service Charge	0.900	0.000	0.000	0.000	0.900	0.771	0.000	0.000	0.000	0.771	-0.129
Total	**31.500**	**0.000**	**8.500**	**10.000**	**50.000**	**28.599**	**0.000**	**6.333**	**13.609**	**48.541**	**-1.459**

ADB = Asian Development Bank Gov. = Government OF Nepal FX = foreign exchange LC = local costs.

CUMMULATIVE ANNUAL DISBURSEMENT
Projected and Actual Disbursements
($ million)

Year	Projected	Actual
1996	2.700	4.159
1997	10.010	10.862
1998	20.310	19.383
1999	30.090	29.441
2000	40.000	32.740
2001		34.035
2002		34.932

Disbursement Details
($ million)



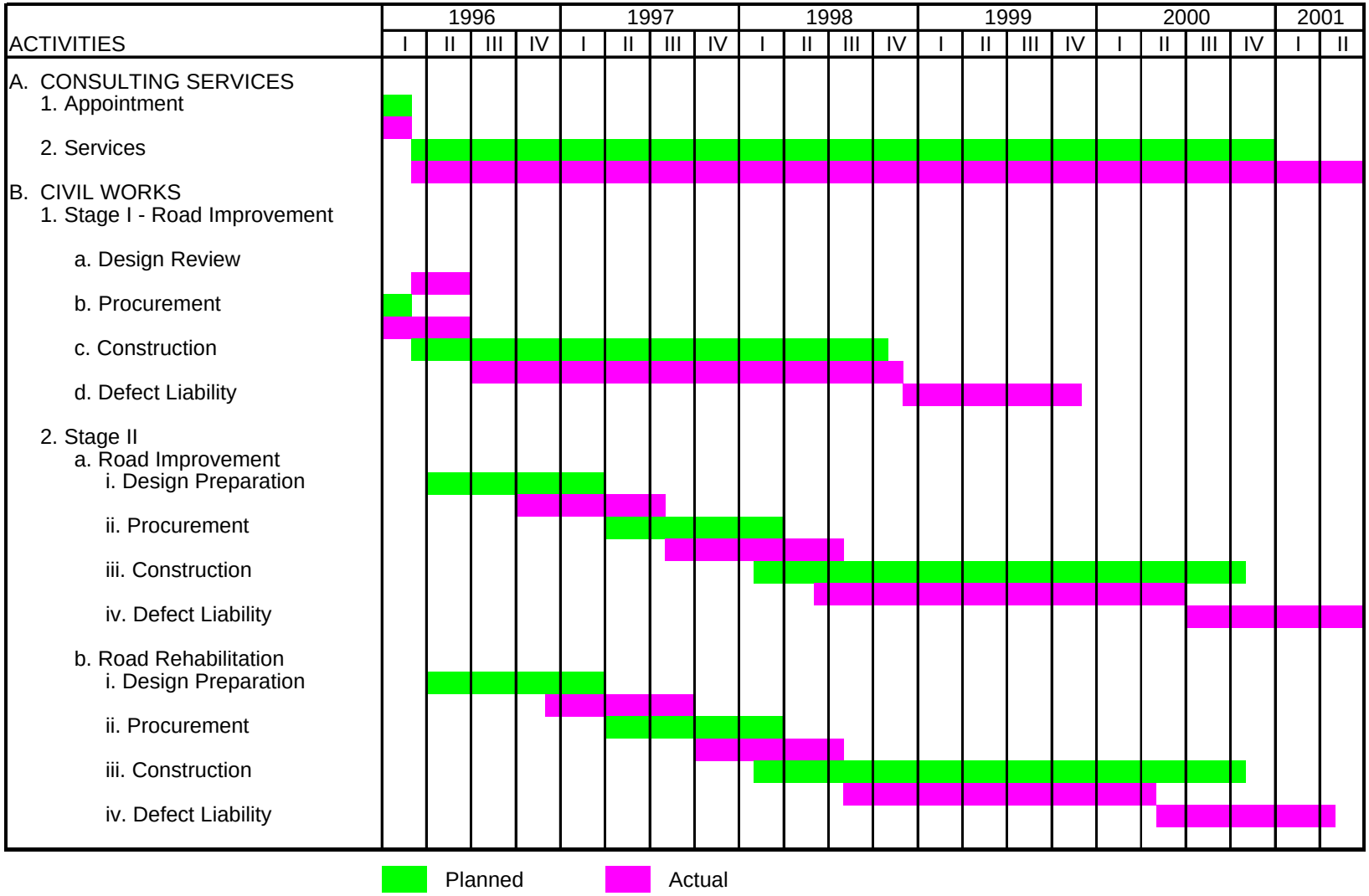
MAIN EVENTS

1994	May	Approval of advance procurement action
	Jun- Jul	Specific notice of the advance procurement action published in *UN Development Business*, and ADB
	Aug	Project-Specific Contact Mission
1995	Mar	Fact-Finding Mission Review of the draft pre-qualification documents
	Apr	Asian Development Bank's (ADB's) comments on the draft prequalification documents were sent to Department of Roads (DOR) ADB approved the Terms of Reference (TOR) and the proposed shortlist of consulting firms
	May	ADB's comments on the draft invitation documents for consulting services were sent to DOR Review of draft documents for contracts for International competitive bidding (ICB) ADB approved with minor revisions the invitation documents for consultant proposal
	May- Jun	Management Review Meeting
	Jul	Appraisal Mission
	Aug	ADB's comments on draft contract document and draft bid documents were sent to DOR
	Sep	Staff Review Committee Meeting
	Nov	Loan negotiations Evaluation Report for the consultants proposals and was sent to the ADB Loan Approval
	Dec	Approval of pre-qualification of ICB contract CSC approved and recommended negotiations with the first-ranked firm. ADB approved draft consultancy contract Signing of Loan Agreement
1996	Jan	Submission of legal opinion Government approved (i) the financial proposal of the first-ranked consulting firm and submitted the negotiated contract; and (ii) the list of prequalified civil works contractors.
	Feb	Loan was declared effective. Inception mission
	Mar	ADB received the signed consultant's contract with Scott Wilson Kirkpatrick. Approval of ICB contract award

	Apr	Review bid evaluation report of Stage 1 contracts for Local competitive biddings (LCB)
	May	ADB approved award of 8 LCB contracts (Stage1).
	Sep	Equipment component of the project was reviewed.
	Oct	Review Mission 1 ADB approved the increase of the imprest fund ceiling from $200,000 to $1,500,000. Advertisement of the bid notice for supply of equipment and parts
1997	Jan	Advertisement of the bid notice for supply of vehicles
	Feb	Review Mission 2
	Apr	Evaluation report for the procurement of vehicles and spares was sent to ADB. ADB approved award of the contracts for supply of vehicles and spares.
	May	ADB approved award of the contracts (7 packages) for supply of equipment.
	Jun	Supply contracts for equipment and vehicles were received by ADB.
	Aug/Sep	Review Mission 3
	Dec	ADB approved the post qualified contractors for the Ilam-Phidim road (stage 2).
1998	Feb	Midterm Project Review Mission
	Apr	Approval of post qualified contractors for Sahajpur-Dadeldhuran roads and road rehabilitation (Stage 2)
	Jul	ADB approved the award of the contracts for Ilam-Phidim road. ADB approved award of the LCB contracts for road rehabilitation component.
	Aug/Sep	Review Mission 4
	Dec	Review Mission 5
1999	Mar	On Government's request, ADB approved the repair of the 15-km Godawari-Buditola section that was severely damaged by the 1998 monsoon. As a result, there was a minor change in project scope.
	Apr	Review Mission 6

	Jun	Review Mission 7
	Dec	Completion of stage 1 – ICB package Review Mission 8
2000	Jan	ADB reduced civil works financing from 72% to 65% for ICB contracts and 50% for LCB contracts due to anticipated cost overrun.
	May	Review Mission 9
	Nov	Review Mission 10
2001	Jul	ADB approved extension of consulting services to August 2001.
	Sep	Review Mission 11 ADB restored financing of civil works LCB contracts from 50 % to 72 % on the condition that disbursement will be up to the available loan amount.
2003	June	Project Completion Review Mission

IMPLEMENTATION PROGRESS



STATUS OF COMPLIANCE WITH LOAN COVENANTS

Covenant	Status
General	
1. The Borrower will cause the Project to be carried out with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental, and road construction and maintenance practices. (Loan Agreement [LA], Article IV, Section 4.01(a))	Complied with
2. The Borrower will make available, promptly as needed, the funds, facilities, services, qualified staff, land and other resources, which are required, in addition to the proceeds of the Loan, for carrying out the Project and for the Operations and Maintenance (O&M) of the project facilities. (LA, Article IV, Section 4.02)	Complied with
3. The Borrower will cause competent and qualified consultants and contractors, acceptable to the Borrower and the Asian Development Bank (ADB), to be employed. (LA, Article IV, Section 4.03(a))	Complied with
4. The Borrower will cause the Project to be carried out in accordance with plans, design standards, specifications, work schedules, and construction methods acceptable to the Borrower and ADB. (LA, Article IV, Section 4.03(b))	Complied with
5. The Borrower will maintain, or cause to be maintained, records and other items of expenditure financed out of the proceeds of the loan. (LA, Article IV, Section 4.06(a))	Complied with
6. The Borrower will (i) maintain, or cause to be maintained, separate accounts for the Project; (ii) have such accounts and related financial statements audited annually, in accordance with appropriate auditing standards, by independent auditors acceptable to ADB; and (iii) furnish ADB, not later than 9 months after the end of fiscal year, with certified copies of the audited accounts and financial statements. (LA, Article IV, Section 4.06(b))	Complied with
7. The Borrower will enable the Bank to discuss the Borrower's financial statements for the Project and financial affairs related to the Project from time to time with the Borrower's auditors. (LA, Article IV, Section 4.06(c))	Complied with
8. The Borrower will furnish, or cause to be furnished, to ADB brief monthly reports and detailed trimester reports on the carrying out of the project. (LA, Article IV, Section 4.07(b))	Complied with

Covenant	Status
9. Not later than 3 months after physical completion of the Project, the Borrower will prepare and furnish ADB with a project completion report, in form and detail as requested by ADB. (LA, Article IV, Section 4.07(c))	Complied with
Screening and Selection of Road Rehabilitation Component	
10. The Department of Roads (DOR) will, with assistance from the project consultants, carry out selection of roads for the rehabilitation component in accordance with criteria agreed upon by DOR and ADB, subject to the approval of ADB and to the availability of the proceeds of the Loan. (LA, Sch. 6, para. 5(a) and (b))	Complied with
Bioengineering Unit in Far Western Region	
11. The Borrower will fund from its own resources, separate from the Loan proceeds, all costs for counterpart staffing and for civil works undertaken by the bioengineering unit to be established under the Project in the Far Western Regional Maintenance Division. (LA, Sch. 6, para.6)	Complied with
Land Acquisition and Resettlement	
12. The Borrower will use its best efforts to avoid land acquisition and resettlement, by adjusting the design and alignment of the project roads. If resettlement is required, the Borrower will agree with ADB and carry out the resettlement plan. If land acquisition is unavoidable, the Borrower will ensure that all necessary land, properties, rights, including access to quarries and survey sites, required for the Project are promptly made available in timely manner. (LA, Sch. 6, para.7)	Complied with
Benefit Monitoring and Evaluation	
13. DOR, with the assistance of the Project consultant, will carry out project benefit monitoring and evaluation by compiling and analyzing appropriate traffic and other data for the project roads. (LA, Sch. 6, para. 8)	Complied with

Covenant	Status
Operation and Maintenance	
14. The Borrower will ensure that upon completion of the Project, the Project facilities are maintained in accordance with standards satisfactory to ADB. (LA, Sch. 6, para. 11)	Complied with.
15. The Borrower will prepare a priority plan satisfactory to the Bank for maintenance of roads, particularly on the strategic network of the Borrower. (LA, Sch. 6, para. 12)	Partly complied with. DOR prepared annual maintenance plans of the strategic road network; however, the allocations were not adequate.
16. The Borrower will cause Ministry of Works and Transport (MOWT) to take all necessary measures to introduce the Bill on a Public Road Maintenance Fund to its Parliament as soon as possible but not later than 30 September 1996. (LA, Sch. 6, para. 13(a))	Partly complied with. The bill was approved by the Parliament on 8 Jul 2002, was delayed by 69 months, and not yet fully operational.
17. The Borrower will allocate an increasing amount of funds for road maintenance from the road sector allocation to cover all required maintenance works, including periodic maintenance. (LA, Sch. 6, para. 13(b))	Partly complied with

ECONOMIC EVALUATION OF THE PROJECT

A. Methodology

1. The methodology adopted for the economic evaluation is the same as that adopted during appraisal. The costs and benefits are a function of road design, the without-project road conditions, traffic characteristics, and maintenance policies. The without-project case is defined as the situation where the quality of service is maintained at the present level. Any further deterioration is controlled by maintenance activities aimed at sustaining the present situation. Given this maintenance strategy for the without-project case, the road roughness levels prior to the improvement works are assumed to remain constant for the entire 20-year period. The costs associated with the without project case were first established as the base alternative for the Project.

2. The Highway Design and Maintenance Standards Model (HDM)-III software was then used to estimate the life cycle costs of the with-project case. The major benefit from this project was the reduced vehicle operating costs (VOCs) as a result of improved road roughness levels. This improvement is sustained through a maintenance strategy comprising annual routine maintenance, periodic resealing every 6 years and patching all potholes. The above strategy was subsequently applied to all project roads through the HDM model to produce pavement deterioration profiles for the entire 20-year period. Economic evaluation was then done by comparing the with-project case with the without project case. The project life assumed in this report is 20 years after opening. The first year of operation is taken to be 2001. It is further assumed that the residual value of the project infrastructure will be zero. This assumption has a negligible impact on the evaluation.

1. Project Capital Costs

3. All project costs are based on project disbursement records throughout the project construction period. The costs in these records are in current prices in the year of expenditure. They were converted to 2002 constant costs using price indices from the Rastra Bank (the Central Bank). Therefore there is no further adjustment for general inflation in the forecast values. Financial costs were converted to economic or border price equivalents using a standard conversion factor (SCF) developed by the Department of Roads (DOR). The SCF for capital costs is estimated to be 0.88.

2. Project Maintenance Costs

4. Maintenance costs were derived using DOR figures on the “average” maintenance costs for roads in Nepal based on a study carried out in 2001. This study concluded that routine maintenance of a paved road in Nepal is NRs30,000 per km in the hilly region and NRs10,000 in the terai region. Other maintenance activity unit costs were determined after discussions with DOR. The resulting maintenance costs are shown in Table A8.1. The SCF for maintenance costs is estimated to be 0.90.

Table A8.1: Maintenance Costs

Activity	Unit	Rate (NRs)
Routine maintenance (Terai)	per km	15,000
Routine maintenance (Hill)	per km	22,000
Resealing	per m^2	190
Patching	per m^2	400

Source: Study estimates

3. Traffic Forecasts Assumptions

5. Economic evaluation during appraisal assumed that the traffic growth rate would be 6% per annum over the study period. However a review of historical information and recent studies indicates that Nepal has experienced growth averaging between 7% and 8% per year over the past decade in the transport of both freight and passengers. This relatively high growth rate is attributed primarily to overall economic growth throughout the country as well as improvements to the road network in general, encouraging traffic movements. This growth is expected to continue with the growth of the economy and plans for continued investment in this subsector. Income elasticity (Gross Domestic Product (GDP)) of the demand for transportation in Nepal is considered to be between 1.5 and 2.0 for passengers and between 1.0 and 1.5 for freight. Considering an average 4.7 % average growth in GDP, traffic growth of 7-8% per annum is justified.

6. In recognition of the high historical growth rates and considering the probable future growth in population and economic activity, a set of “standard” growth rates is adopted for this study, starting at between 7% and 8% per year to 2011 for passenger traffic, declining to 6% from 2012 thereafter. For freight traffic, growth is estimated between 6% and 7% to 2012, declining to approximately 5% thereafter. A summary of traffic growth by vehicle type is shown in Table A8.2. The figures are derived by combining GDP growth forecasts with assumptions concerning incoming elasticities of demand for transport.

Table A8.2: Summary of Traffic Growth Rates (%)

Period	Car/Utility	Bus	Truck
2002-06	7.9	7.4	7.1
2007-11	7.9	7.4	6.1
2012-20	7.0	6.4	4.7

Source: Study estimates

4. Base Year Traffic

7. Traffic surveys were carried out in March-April 2001 and the AADT for each road is shown in Table A8.3 below. Traffic levels varied on some sections of the road and where relevant, road sections were disaggregated to reflect these differences.

5. Vehicle Operating Costs

8. The VOC developed for use in this evaluation is based on estimates developed by the MRCU in DOR, which is based on the equations and assumptions in the World Bank’s HDM-III, calibrated to reflect local conditions. Table A8.4 shows the VOC.

Table A8.3: Annual Average Daily Traffic (AADT) by Road Section, 2001

Road	Section	Car	Utility	Mini-bus	Light bus	LGV	HGV	Total
Sahajpur-Dadeldhura	Sahajpur-Syaule	2	29	0	30	2	56	118
	Syaule-Dadeldhura	3	52	0	44	3	69	171
Dadeldhura-Patan	Whole Road	0	33	0	10	0	28	71
Maikhola-Ilam	Whole Road	0	99	0	48	7	72	226
Ilam-Phidim	Ilam-Nepaltur	0	150	2	37	10	60	259
	Nepaltur-Phidim	0	15	0	23	1	31	70
Lamahi-Tulsipur	Lamahi-Ghorahi	5	176	26	83	11	116	416
	Ghorahi-Tulsipur	4	279	6	152	7	116	562
Duhabi-Ineruwa	Whole Road	13	94	1	4	12	66	189
Gokarna-Sankhu	Gokarna-Mulpani	254	191	74	206	107	23	855
	Mulpani-Sankhu	49	78	13	100	40	5	285
Ringroad-Tikabhairab	Ring Road-Chapagaun	803	513	225	70	293	304	2208
	Chapagaun-Tikabhairab	42	86	44	18	160	404	754
Birtamod-Bhadrapur	Whole Road	9	127	9	104	10	51	310
Chuharwa-Siraha	Whole Road	8	58	0	80	5	33	184
Bhardaha-Rajbiraj	Whole Road	6	65	4	31	4	57	167

Source: DOR Traffic Counts, Spring 2001.
HGV= Heavy Goods Vehicle, LGV= Light Goods Vehicle

Table A8.4: Economic Vehicle Operating Cost Breakdown (NRs/km)

Item	Car	Utility	MGV	LGV	Light Bus	Minibus
Fuel	1.96	2.47	4.33	2.36	4.05	2.57
Oil	0.23	0.23	0.41	0.41	0.41	0.41
Maintenance Parts	0.63	1.08	0.80	0.40	0.76	0.49
Maintenance Labor	0.37	0.51	0.41	0.30	0.37	0.33
Tires	0.08	0.29	1.79	0.83	1.66	0.78
Total Running Cost	**3.27**	**4.58**	**7.74**	**4.30**	**7.25**	**4.58**
Depreciation	2.81	3.46	0.84	0.71	0.86	1.18
Interest	2.02	1.66	0.61	0.43	0.52	0.71
Crew	0.00	1.44	1.36	0.83	1.69	1.43
Overhead and Insurance	0.01	0.77	0.11	0.07	0.10	0.15
Total Standing Cost	**4.84**	**7.33**	**2.92**	**2.04**	**3.17**	**3.47**
Total	**8.11**	**11.91**	**10.66**	**6.34**	**10.42**	**8.05**

Source: Study estimates and VOC Model.

Table A8.5: Road Condition and Pavement Specification

Road Section	Roughness Level[a] (m/km)		Pavement Specification
	At appraisal	At PCR	
Sahajpur-Dadeldhura	19.4	5.4	5.0 m wide PENMEC, No shoulder
Dadeldhura-Patan	20.7	5.3	3.5 m wide PENMEC, 1.0 m shoulder Gravel
Maikhola-Ilam	21.5	6.0	5.0 m wide PENMEC, No shoulder
Ilam-Phidim	19.3	6.2	5.0 m wide PENMEC, No shoulder
Lamahi-Tulsipur	18.5	4.3	3.5-4.5 m wide DBST, 1.0 m shoulder SBST
Duhabi-Ineruwa	9.5	4.7	5.0 m wide DBST, No shoulder
Gokarna-Sankhu	6.2	5.9	3.5 m wide DBST, 1.0 m shoulder SBST
Ringroad-Tikabhairab	11.0	5.0	5.0-6.0 m wide DBST,
Birtamod-Bhadrapur	12.5	7.4	3.5 m wide DBST, 1.0 m shoulder SBST
Chuharwa-Siraha	12.5	5.8	3.5 m wide DBST, 1.0 m shoulder SBST
Bhardaha-Rajbiraj	12.5	5.8	3.5 m wide DBST, 1.0 m shoulder SBST

[a] International Roughness Index (IRI)
PENMEC = penetration macadam, DBST = double bituminous surface treatment, PCR= Project Completion Report, SBST = single bituminous surface treatment
Source: Department of Road, 2002

B. Economic Evaluation Results

9. The evaluation results (Table A8.6) show that the overall reevaluated Economic Internal Rate of Return (EIRR) for the road improvement component is 16.1% compared with the estimated 12.5% at appraisal. Out of the five sections, two, i.e. Shajpur-Dadeldhura and Dadeldhura-Patan, have lower individual EIRR at reevaluation than at appraisal mainly because of their substantial construction cost increases. Furthermore, traffic volume was lower than estimated at appraisal. For the Lamahi-Tulsipur and the Maikhola-Ilam roads, the reevaluated individual EIRRs are higher. For Lamahi-Tulsipur, the cost was lower and traffic was higher than estimated at appraisal. For the latter Maikhola-Ilam roads, the increase in actual traffic more than offset the 10% increase in construction cost.

10. In the case of the rehabilitated roads component, the EIRR is 18.7%. The EIRR for this component was not estimated during appraisal. Of the six sections, only one rehabilitated section had an individual EIRR lower than 12%. Even though the rehabilitation cost of most of the sections were higher than estimated, the traffic volumes were also high and thus offset the increase in capital costs.

11. For the project as a whole, the weighted EIRR is 16.1%. It therefore satisfies the Asian Development Bank (ADB) threshold EIRR value of 12%. Hence the Project can be rated as efficient.

Table A8.6: Economic Evaluation Results

Road	IRR (%)
Sahajpur-Dadeldhura	8.0
Dadeldhura-Patan	0.4
Maikhola-Ilam	17.4
Ilam-Phidim	13.0
Lamahi-Tulsipur	41.7
Duhabi-Ineruwa	20.0
Gokarna-Sankhu	5.7
Ring road-Tikabhairab	31.1
Birtamod-Bhadrapur	36.6
Chuharwa-Siraha	12.6
Bhardaha-Rajbiraj	15.9
Overall Project	**16.1**

IRR=Internal Rate of Return

C. Distribution Analysis and Poverty Impact Ratio

12. Distribution analysis was carried out for the net economic benefits arising from the Project. The domestic price numeraire and the discount rate of 12% were used. The benefits were distributed among (i) passengers, (ii) freight users, (iii) vehicle owners, and (iv) the Government/economy (Table A8.7). It is assumed that minibus and freight vehicle owners will pass on 50% of VOC savings to users in the form of lower fare and freight, while bus owners will pass on only 5% of VOC savings to passages because of strong transport industry associations in deciding the bus fares.

Table AH.7: Distribution Analysis
(NRs million)

Year	Passenger Vehicles			Freight Vehicles			Total		
	Owner / Operator		Passengers	Owner / Operator		Freight Users	Owner / Operator		Users
	Private	Govt		Private	Government		Private	Govt	
1997	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2001	107.9	31.2	140.7	21.1	1.9	70.9	129.0	33.0	211.6
2002	115.3	33.4	147.1	22.3	2.0	72.2	137.6	35.4	219.3
2003	123.5	35.8	154.2	23.7	2.1	73.7	147.1	37.9	227.9
2004	131.8	38.3	163.9	25.0	2.3	77.5	156.9	40.5	241.4
2005	140.7	41.0	171.6	26.4	2.4	79.1	167.2	43.4	250.7
2006	149.5	43.6	179.3	27.8	2.5	80.6	177.3	46.1	259.9
2007	163.7	47.8	191.6	30.1	2.7	83.1	193.8	50.5	274.7
2008	174.8	51.1	203.8	31.5	2.8	87.2	206.3	53.9	290.9
2009	186.6	54.6	214.0	33.0	3.0	88.8	219.6	57.6	302.8
2010	199.0	58.4	224.9	34.6	3.1	90.5	233.6	61.5	315.3
2011	211.9	62.3	236.1	36.1	3.2	92.1	248.0	65.6	328.2
2012	222.8	65.7	245.6	37.0	3.3	93.1	259.9	69.0	338.7
2013	242.1	71.3	262.5	39.6	3.6	95.9	281.7	74.9	358.4
2014	255.3	75.4	274.0	40.8	3.7	97.2	296.1	79.0	371.2
2015	269.1	79.6	286.0	42.0	3.8	98.5	311.0	83.4	384.6
2016	282.6	83.8	297.7	43.0	3.9	99.7	325.6	87.6	397.4
2017	296.1	88.0	309.6	44.0	4.0	100.8	340.2	92.0	410.4
2018	310.7	92.5	322.3	45.1	4.1	102.0	355.9	96.6	424.3
2019	337.9	100.5	346.2	48.2	4.3	105.3	386.1	104.9	451.5
2020	355.0	105.8	360.8	49.4	4.5	106.7	404.4	110.3	467.5
NPV	**808.6**	**236.8**	**938.1**	**141.5**	**12.7**	**394.0**	**950.1**	**249.5**	**1,332.1**

Source: consultants' report and staff estimates.

13. To assess the poverty impact of the Project, the proportion of the poor in each category of beneficiary was assumed, taking into account similar study reports in the country and PCR mission's surveys in bus stations along the routes. About 80% of passengers and 20% of freight users are assumed to be poor. Unskilled labor employed under the Project was about 80% and skilled labor was 20%. The proportion of the poor in unskilled labor is assumed to be 100%, and 20% of skilled labor is assumed to be poor. This is based on the Mission's discussions with Ministry of Local Government and Central Bureau of Statistics in Nepal. Table A8.8 shows the distribution of benefits and the poverty impact ratio.

Table AH.8: Distribution of Benefits Analysis and Poverty Impact Ratio (NRs million)

Item	Financial Present Value	Economic Present Value	Economic - Financial	Passenger User	Freight User	Vehicle Owners	Labor	Govt / Economy	Total
Inflow									
Road User Benefits	0.0	2531.8	2531.8	938.1	394.0	950.1		249.5	
Outflow									
Investment	(1695.7)	(1526.1)	169.6					169.6	
O&M	(110.3)	(99.3)	11.0					11.0	
Labor	(210.5)	(189.4)	21.0				21.0		
Net Present Value	(2016.5)	716.9	2733.4	938.1	394.0	950.1	21.0	430.1	
Gains and Losses				938.1	394.0	950.1	21.0	(1586.4)	716.9
Proportion of the Poor (%)				80.0	20.0	0.0	95.0	15.0	
Net Benefits for the Poor				750.5	78.8	0.0	20.0	(238.0)	611.3
Poverty Impact Ratio									**0.85**

Note: The assumed shadow wage rate factor is 0.75.
Source: consultants' report and ADB staff estimates.