ADB

Completion Report

Project Number: 38255-033
Loan Number: 2458
March 2020

India: Uttarakhand State-Road Investment Program (Project 2)

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Asian Development Bank

CURRENCY EQUIVALENTS

Currency unit – Indian rupee/s (₹)

		At Appraisal (15 July 2008)	At Project Completion (31 March 2015)
₹1.00	=	$0.024	$0.016
$1.00	=	₹41.76	₹62.50

ABBREVIATIONS

ADB	–	Asian Development Bank
CSC	–	construction supervision consultant
DMF	–	design and monitoring framework
EIRR	–	economic internal rate of return
EMMP	–	environmental management and monitoring plan
IMC	–	infrastructure management consultant
km	–	kilometer
MFF	–	multitranche financing facility
PCR	–	project completion review
PIU	–	project implementation unit
PMU	–	project management unit
PWD	–	Public Works Department
Q	–	quarter
SRP	–	short resettlement plan
VOC	–	vehicle operation cost

NOTES

(i) The fiscal year (FY) of the Government of India ends on 31 March. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2019 ends on 31 March 2019.

(ii) In this report, “$” refers to United States dollars.

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CONTENTS

BASIC DATA

A. Loan Identification

1.	Country	India
2.	Loan number and financing source	2458 from ADB's ordinary capital resources
3.	Project title	Uttarakhand State Road Investment Program (Project 2)
4.	Borrower	Government of India
5.	Executing agency	Public Works Department, Government of Uttarakhand
6.	Amount of loan	$140.0 million
7.	Financing modality	MFF

B. Loan Data

1.	Appraisal	
	– Date started	16 May 2008
	– Date completed	24 July 2008
2.	Loan negotiations	
	– Date started	11 September 2008
	– Date completed	11 September 2008
3.	Date of Board approval	22 October 2008
4.	Date of loan agreement	10 February 2009
5.	Date of loan effectiveness	
	– In loan agreement	90 days from the loan agreement (11 May 2009)
	– Actual	22 April 2009
	– Number of extensions	None
6.	Project completion date	
	– Appraisal	30 September 2012
	– Actual	31 March 2015
7.	Loan closing date	
	– In loan agreement	31 March 2013
	– Actual	31 March 2015
	– Number of extensions	3
8.	Financial closing date	
	– Actual	19 August 2015
9.	Terms of loan	
	– Interest rate	London interbank offered rate (LIBOR) based
	– Maturity (number of years)	25
	– Grace period (number of years)	5
10.	Terms of relending (if any)	None

11. Disbursements

a. Dates

Initial Disbursement 9 July 2009	Final Disbursement 19 August 2015	Time Interval 73.38 months
Effective Date 22 April 2009	**Actual Closing Date** 31 March 2015	**Time Interval** 71.31 months

b. Amount ($)

Category	Original Allocation (1)	Increased during Implementation (2)	Canceled during Implementation (3)	Last Revised Allocation (4=1+2-3)	Amount Disbursed (5)	Undisbursed Balance (6=4-5)
1 Civil works	126,800,000		(26,514,831)	100,285,169	99,501,369	783,800
2 Consulting services	13,200,000		(5,485,169)	7,714,831	7,428,637	286,194
Total	**140,000,000**		**(32,000,000)**	**108,000,000**	**106,930,006**	**1,069,994**

() = negative.
Notes:
1. The first partial loan cancellation of $20 million was made on 3 April 2013, the second partial loan cancellation of $5 million on 25 August 2014, and the third partial loan cancellation of $7 million on 11 December 2014.
2. The undisbursed amount was canceled at financial account closure on 19 August 2015

C. Project Data

1. Project cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign exchange cost	6.20	3.11
Local currency cost	193.80	135.85
Total	**200.00**	**138.96**

2. Financing plan ($ million)

Cost	Appraisal Estimate	Actual
Implementation cost		
Borrower financed	54.00	29.27
ADB financed	140.00	106.93
Other external financing		
Total Implementation cost	**194.00**	**136.20**
Interest during construction costs		
Borrower financed	6.00	2.76
ADB financed		
Other external financing		
Total interest during construction cost	**6.00**	**2.76**

ADB = Asian Development Bank.

3. Cost breakdown by project component ($ million)

Component	Appraisal Estimate	Actual
Infrastructure improvement component	164.50	134.82
Infrastructure management component	3.30	1.38
Contingencies	26.20	
Financial charges	6.00	2.76
Total	**200.00**	**138.96**

4. Project schedule

Item	Appraisal Estimate	Actual
A. Civil works		
Procurement	Q1 2008–Q3 2008	Q2 2008–Q4 2010[a] Q2 2012–Q2 2013[b]
Construction	Q3 2008–Q1 2010	Q1 2009–Q1 2015
Post-construction maintenance	Q1 2010–Q1 2013	Q3 2010–Q1 2018
B. Consultancy services		
1. Construction supervision		
Consultant recruitment	Q1 2008–Q3 2008	Q2 2008–Q3 2009
Implementation	Q3 2008–Q1 2010	Q3 2009–Q2 2015
2. Infrastructure management		
Consultant recruitment	Q2 2008–Q4 2008	Q3 2009–Q4 2010
Implementation	Q4 2008–Q4 2009	Q4 2010–Q4 2011
3. Program support		
Consultant recruitment	Q2 2008–Q4 2008	Q2 2009–Q4 2010
Implementation	Q4 2008–Q2 2013	Q4 2010–Q1 2015

Q = quarter.
[a] Out of 20 contracts, 19 contracts were progressively procured during Q2 2008–Q1 2010 and one remaining contract in Q4 2010.
[b] Three contracts (packages 1, 4, and 7) were terminated because of poor performance of contractor and re-awarded for completion of remaining of works during Q2 2012–Q2 2013.

5. Project performance report ratings

	Ratings[a]	
Implementation Period	Development Objectives	Implementation Progress
From 1 January to 31 December 2009	Satisfactory	Satisfactory
From 1 January to 31 December 2010	Satisfactory	Satisfactory
From 1 January to 31 December 2011	On Track[b]	
From 1 January to 31 December 2012	On Track[b]	
From 1 January to 31 December 2013	On Track[b]	
From 1 January to 31 December 2014	On Track[b]	
From 1 January to 31 March 2015	On Track[b]	

[a] Project performance report ratings are based on a different method than that used for the project completion report.
[b] Based on new project performance ratings from 2011 using e-operations.

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Inception	13-20 January 2009	7	49	a, b, d, j, e, e, e
Review 1	8-11 September 2009	6	24	a, b, e, e, e, e
Review 2	8–12 November 2010	5	25	a, b, c, d, j
Special project administration	1718 February 2011	1	2	b
Special project administration	14–16 December 2011	1	3	b
Mid-term review	16–20 April 2012	4	20	b, c, d, j
Review 3	21–23 January 2013	3	9	b, e, j
Special project administration	6–7 February 2014	2	4	b, j
Review 4	9–10 Jul 2014	2	4	a, b
DEA-ADB joint review	11 July 2014	9	9	a, b, b, b, f, g, h, h, j
Project completion review	5-6 September 2019	6	12	b, e, e, e, g, j

DEA = Department of Economic Affairs, Ministry of Finance (the borrower), ADB = Asian Development Bank, a = project specialist, b = project implementation officer, c = environmental specialist, d = resettlement and social development specialist, e = consultants, f = country director, g = associate project officer, h = portfolio management specialist, j = associate project analyst.

I. PROJECT DESCRIPTION

1. Uttarakhand is in the northern part of India, bordering the People's Republic of China to the north, Nepal to the east, and the Indian states of Uttar Pradesh to the south and Himachal Pradesh to the west and northwest. Over 90% of Uttarakhand's terrain is hilly and minimally connected through rail and air links. Its roads therefore are a lifeline for the state.

2. India and Uttarakhand envisioned reducing poverty and increasing personal incomes by improving personal mobility and access to markets and public services through increased investment in road infrastructure. To guide its investment in roads, the Government of Uttarakhand prepared a road development plan that aimed to improve the state's 16,800-kilometer (km) road network to national standards and maintain them in a good condition and with specific capacity development initiatives.[1]

3. Upon request from the Government of India, the Asian Development Bank (ADB) approved a multitranche financing facility (MFF) of $550 million in 2006 to finance significant parts of the road development plan through seven discrete projects over 10 years.[2] The collective outcomes of the MFF investment program were: (i) improvement of 10,800 km of state roads, covering almost two-thirds of the Public Works Department (PWD) network, and their maintenance for 3 years under performance-based contracts; and (ii) enhancement of the PWD's accountability and transparency.

4. Based on the first periodic financing request, ADB approved the first tranche of the MFF program (project 1) on 2 January 2007 for an amount of $50 million. The project closed on 1 May 2013.

5. ADB received a second periodic financing request from the Government of India on 10 July 2008 for an amount of $140 million.[3] The second tranche of MFF program (project 2) was approved on 22 October 2008 and made effective on 22 April 2009. During implementation, the original loan closing date of 31 March 2013 was extended to 31 March 2015 (paras. 22 and 23). Project 2 comprised (i) an infrastructure improvement component to improve 966 km of state roads and (ii) an infrastructure management component to adopt improved policies and operational procedures and increase staff skills.

II. DESIGN AND IMPLEMENTATION

6. Under the MFF, each tranche of the investment program funded a stand-alone project. Thus, this report will focus on project 2 rather than the MFF program as a whole.

A. Project Design and Formulation

7. The PWD, the executing agency of project 2, is responsible for developing and maintaining state roads. About 65% of state roads under the PWD's jurisdiction needed repair or rehabilitation, primarily because of inadequate funding and inefficient road asset management capability (planning, budgeting, and supervision). To support Uttarakhand's road development plan, it was critical to improve road networks and enhance the road sector management capability. The MFF

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[1] ADB. 2008. *Project Administration Memorandum: Uttarakhand State-Road Investment Program (Project 1)*. Manila.

[2] ADB. 2006. *Report and Recommendation of the President to the Board of Directors on Proposed Multitranche Financing Facility to India for the Uttaranchal State-Road Investment Program*. Manila.

[3] ADB. 2008. *Periodic Financing Request Report: Uttarakhand State-Road Investment Program (Project 2)*. Manila.

modality was appropriate because it enabled the state government to implement a structured road map programmatically, consistent with its capacity to undertake such a project. While the overall project design was adequate, some of the expected performance targets and indicators in the design and monitoring framework (DMF) were not project-specific and instead aligned with the overall MFF program. The project design included roads that offered opportunities to improve intra-state road network connectivity and connect less traveled roads with the national highway network. Project management unit (PMU) selected project roads using a multicriteria ranking system based on (i) Uttarakhand's overall vision for its development and (ii) financial, environmental, social, and technical constraints and secretary, PWD approved them in accordance with schedule 4 of the framework financing agreement (selection criteria and approval process for projects).

8. To prepare project 2, consultants engaged by the PMU created engineering designs. PMU carried out environmental and social assessments in compliance with ADB guidelines. [4] PMU consulted extensively with key stakeholders during project inception and throughout implementation. PMU also assessed the project's economic viability. Overall, the project design and modality were adequate. Because of the road sector's importance to economic development and poverty reduction, project 2 was relevant to the Government of India's development policies and ADB's country partnership strategy and programming update for India, 2006–2008, both at appraisal and at completion.[5] The project scope underwent no major changes during implementation.

B. Project Outputs

9. Project 2 outputs were (i) paved, repaired, or rehabilitated state roads and (ii) staff with improved skills and revised operating procedures (para. 5). The DMF indicators at appraisal and status at completion for project 2 are in Appendix 1.

10. **Paved, repaired, or rehabilitated state roads.** At appraisal, project 2 comprised 58 roads totaling about 966 km (footnote 3). Civil works included strengthening and widening roads, resurfacing roads, installing road safety features, and strengthening culverts and bridges. Out of 58 roads identified at appraisal, the state government dropped three roads totaling 19.4 km before the bidding stage.[6] Thus civil works contracts, through 20 contract packages, were awarded for 55 roads. A detailed assessment at the bidding stage found the actual length of these roads to be 911 km rather than the 946.6 km considered at appraisal. PMU terminated three of the 20 civil works contracts (packages 1, 4, and 7) during implementation because of the contractors' poor performance, then re-awarded the completion of balance works.

11. During project 2 implementation, many project roads were damaged by recurrent natural disasters such as cloudbursts, floods, and prolonged rains in 2011, 2012, and 2013, which caused landslides and caving of roads. Contractors restored some portions of damaged project roads through variations to existing contracts. Furthermore, a few sections of project roads experienced premature pavement distress. Contractors broadly took up restoring the premature pavement distress and also executed additional works for providing breast and/or retaining walls and drains through variations to existing contracts.

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[4] ADB's *Environment Policy* (2002) and *Environment Impact Assessment Guidelines* (2003)

[5] ADB. 2006. *Country Partnership Strategy and Programming Update. India 2006–2008*, Manila; Government of India, Planning Commission. 2008. *Eleventh Five Year Plan, 2007–2012*. Delhi; and Government of India, Planning Commission. 2012. *Twelfth Five Year Plan, 2012–2017*. Delhi.

[6] The three roads, Chamkhala–Dabhra road (5.4 km), the Narsinghdanda–Guroli road (8 km), and the Pangot–Bagartalla road (6 km), were taken up under other government programs.

12. Contractors completed 11 of the 20 contracts by the original loan closing date of 31 March 2013. The remaining contracts were delayed—because of re-awarding of three terminated contracts, additional restoration works, and slow progress of some contractors—and were completed by the revised loan closing date of 31 March 2015. Upon completion of all contracts, the project improved 881 km of 55 roads, against the assessed 911 km (para. 10), including associated works on culverts, bridges, road safety features, and a few new bus-bays with shelters. One contract dropped 6 km because geological factors caused continuous settlement of the road. As decided by the Uttarakhand state government, 24km under 2 contracts were dropped from the project to be improved under other programs financed by the state government.

13. The civil works contracts included post-construction maintenance over 3 years, using a performance-based approach. Compared with project 1, project 2's overall performance in post-construction maintenance improved, mainly because of training and capacity building of project implementation unit (PIU) staff and contractors, PIU staff's effective supervision of maintenance works, and better rates quoted by the contractors. Further, based on project 1 experience, PMU modified the contractual provisions on releasing performance guarantee and retention money in the re-awarded contracts to strengthen post-construction maintenance (para. 31).

14. **Staff with improved skills and revised operating procedures.** This output aimed to help the PWD restructure its organizational arrangements, adopt improved business practices, and enhance its staff skills. To keep the continuity of advisory services to the PWD, the infrastructure management consultant (IMC) engaged under project 2 continued most of the activities initiated by the IMC under project 1.

15. Project 2's IMC assisted the PWD, focusing on a planning, management information, and project management system; road maintenance; and the reorganization of PWD human resources development and training. The IMC and PWD achieved good progress in the following areas:

(i) The IMC, in consultation with the PWD and the PMU, prepared reports on (a) the proposed planning unit structure and establishment level; (b) the role and functions of the planning unit; (c) corporate planning; (d) road planning; and (e) programming and budgeting. The PWD established a planning unit under the chief engineer, with three dedicated staff comprising one executive engineer and two assistant engineers.

(ii) The IMC advised the PWD on requirements for establishing a management information and project management system as a centralized electronic road database—including road inventory and condition data, traffic data, rehabilitation and maintenance history, and data on expenditures incurred—which could provide optimum interventions and also form a basis for auditing routine maintenance performance under the performance-based maintenance contracts.

(iii) The IMC completed several tasks to help the PWD strengthen their capacity to manage and supervise performance-based contracts for monitoring routine and periodic maintenance activities, a baseline survey on pavement serviceability for completed roads of the MFF carried out. The IMC also worked with the PWD on a strategic plan to rehabilitate and maintain PWD roads, including area-based maintenance contracts. Based on lessons learned under projects 1 and 2, the IMC helped the PWD strengthen the bid documents for project 3 with adequate securities and safeguards to ensure that contractors fulfill their maintenance obligations.

(iv) Based on IMC recommendations from project 1 and further review and prioritization by the PWD and the IMC in project 2, the Government of Uttarakhand started reorganizing the PWD structure and increasing the focus on planning, road sector management, and project implementation. The reorganization's key highlights include creating new positions: (a) an engineer-in-chief, (b) a chief engineer responsible for planning and budgeting; (c) two chief engineers responsible for national highways and external aided projects and information technology; and (d) five superintending engineers, with two positions fully dedicated to implementing ADB-funded projects and rural roads projects. The IMC identified the staffing needs for the chief engineer's office, planning unit, and the PMU, based on the organizational structure. IMC prepared a comprehensive plan on human resource development strategy.

16. Under project 2, the IMC trained 705 PWD staff, compared to the required 200 staff, through a series of trainings in design review, performance monitoring, quality assurance, financial management, and the management information and project management system. IMC also conducted workshops on bidding for performance-based contracts, quality control for construction and equipment, labor management, and compliance with environmental and social safeguards. IMC conducted a tour to Himachal Pradesh (with similar terrain) to study their road management systems and practices. PWD established a planning unit and carried out the PWD reorganization with an improved focus on planning, road sector management, and project implementation. IMC carried out training for developing course outlines, selected trainees, and organized trainings with external institutions. The IMC also helped the PWD to outsource design, construction, and maintenance works. The infrastructure management component continued further implementation under project 3.

C. Project Costs and Financing

17. Upon completion, the actual cost of civil works, a major component of the project cost, was ₹6,185 million, 5% higher than the appraisal estimates of ₹5,884 million.[7] However, the total project cost of $138.96 million at completion was much lower than the appraisal estimates of $200 million (para. 18). The lower cost primarily resulted from (i) the depreciation of the rupee against the dollar since appraisal, (ii) the non-utilization of contingencies, and (iii) the 30-km reduction in road length of three contract packages (para. 12).[8] At the borrower's request, ADB canceled loan savings three times and canceled the undisbursed amount at the financial account closure of the loan. The appraisal and actual project costs are in Appendix 2.

18. At appraisal, the project cost, including contingencies and financial charges, was estimated at $200 million, including $145.3 million for civil works. It was envisaged that the project would be financed through an ADB loan of $140 million (70% of the project cost) and government funds of $60 million (30%). At completion, ADB financed $106.93 million (77% of the project cost) and the state government financed $32.03 million (23% of the project cost). The project costs by financier are in Appendix 3.

D. Disbursements

19. The loan proceeds were disbursed in accordance with ADB's *Loan Disbursement Handbook* (January 2007, as amended from time to time) and *Disbursement Guidelines for Disbursement Operations, LIBOR-Based Loan Products* (July 2002, as amended from time to

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[7] At appraisal, the estimated road length was 966 km and at completion, the cost was for a road length of 881 km.
[8] The exchange rates used were ₹41.76 = $1.00 at appraisal and ₹62.50 = $1.00 at project completion.

time). The executing agency used the statement of expenditure procedure for individual payments not exceeding $100,000, which facilitated project implementation, and the experience of the executing agency and ADB was satisfactory.

20. After the first disbursement on 9 July 2009, disbursements gradually picked up and peaked with disbursements of $31.98 million (29.91% of the net loan amount) in 2010 and $32.08 million (30.01%) in 2011, but the pace of disbursement markedly declined after that. In 2012, only $12.45 million (11.64% of the net loan amount) was disbursed and in 2013, $9.85 million (9.21%). Disbursements slowed because (i) natural disasters in Uttarakhand in June 2013 disrupted works and (ii) three terminated contracts required repeated rebidding and delayed the award of contracts for the completion of balance works. However, in the initial 3 years of implementation, the actual disbursements were more than or nearly equal to executing agency's projections. On request of the state government, three partial loan cancellations were undertaken, totaling $32 million. The loan financial account stayed open through 19 August 2015 to complete the disbursement for expenditures incurred prior to loan closing. An undisbursed amount of $1.07 million was canceled at the financial account closure. Actual disbursements by year, together with cumulative disbursement, are in Appendix 4.

E. Project Schedule

21. ADB envisaged that project 2 would be implemented over 4.5 years, during September 2008–March 2013, including 18 months for physical improvements and 3 years of post-construction maintenance. Consultancy services for the IMC was 12 months and project support consultant was 54 months. To expedite procurement, ADB approved advance contracting and retroactive financing in June 2008.

22. The procurement for civil works contracts experienced delay, and the civil works contracts, with an 18-month completion period and 3 years of post-construction maintenance, were awarded between the first quarter (Q1) of 2009 and Q1 2010, except one contract awarded in Q4 2010. During implementation, the works progressed slowly and the construction period extended beyond the original completion date, because of the contractors' weak capability for planning, project management, and construction management, together with force majeure events caused by floods and disaster. In addition, the construction period of 18 months is considered inadequate for completing works in remote and scattered locations in mountainous terrain during a limited working season. During implementation, three contracts were terminated because of poor performance of the contractors and re-awarded to other contractors by Q2 2013. Despite these delays, 11 of the 20 contracts were completed before the original loan closing date of 31 March 2013. The remaining contracts were substantially delayed and necessitated extending the loan closing date to 31 March 2015.[9] Appendix 8 compares the appraisal and actual implementation schedule, and Appendix 6 shows the chronology of main events.

F. Implementation Arrangements

23. The implementation arrangements were as envisaged at appraisal. The PWD, as an executing agency for the project, established a PMU to serve as its representative. The PMU was responsible for the project's day-to-day implementation and comprised a project director, two project managers, and other requisite staff. A resettlement cell headed by a resettlement officer

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[9] The original closing date of 31 March 2013 was extended to 30 September 2014 on 29 April 2013; the second extension up to 31 December 2014 was approved 7 November 2014; and third and final extension up to 31 March 2015 was approved on 31 December 2014.

and assisted by a social development and resettlement specialist (a consultant) was set up in the PMU to prepare, implement, and monitor short resettlement plans (SRPs). A full-time environment specialist in the PMU implemented and monitored environmental safeguards. A program support consultant was engaged to help the PMU coordinate and facilitate expeditious processing and effective implementation of the investment component, and an international consulting firm was engaged to help the PMU implement the infrastructure management component. At appraisal, it was envisaged that four PIUs established for project 1 would continue and two additional PIUs would be established under the PMU to execute project 2 at the field level (footnote 3). However, based on field requirements, initially three additional PIUs were established and subsequently four more PIUs were established, totaling 11 PIUs. Each PIU had one executive engineer, one assistant engineer, two technical staff, one accounts officer, and two administrative staff. Technical staff in each PIU were given additional responsibility to manage safeguards activities. The PMU coordinated with the PIUs and construction supervision consultants (CSCs) to implement and monitor construction activities, SRPs, and environmental management and monitoring plans (EMMPs). The arrangements for project management through PMU, PIUs, and consultants were generally adequate, and no major issues arose during implementation. The organizational structure of project implementation is in Appendix 9.

24. In 2006, the state government established a steering committee chaired by a chief secretary to ensure the effective and timely implementation of the investment program and to address major policy and coordination issues. However, during project execution, the Chief Minister assumed the chairmanship of the committee. For issues that required interagency coordination, the PWD's direct contact with the relevant authority turned out to be more effective for resolving these issues, rather than bringing these issues to the steering committee to seek a higher-level decision.

G. Consultant Recruitment and Procurement

25. Consultants were recruited in accordance with ADB's Guidelines on the Use of Consultants (2007, as amended from time to time). To expedite procurement, ADB approved advance contracting and retroactive financing in June 2008. As envisaged at appraisal, three consulting firms were engaged to supervise civil works, one consulting firm to support the PMU in timely processing and implementation of the investment component, and one international consulting firm to implement the infrastructure management component. These consultants were selected with quality- and cost-based selection. Contracts for construction supervision services were signed during Q3 2009, for program support consulting services in Q3 2010, and for the IMC in Q3 2010. Because of delays in executing civil works, PMU extended CSC contracts.

26. The performance of CSCs engaged under project 2 was rated *less than satisfactory*. The CSCs were assigned the power of the engineer in accordance with the contract and undertook the tasks specified in the terms of reference, including design reviews, project management, construction supervision, measurement and payment assistance, environmental monitoring, and progress report preparation. However, delayed and partial mobilization of the staff, together with frequent turnover of key personnel, caused less-than-satisfactory performance of construction supervision services. In addition, premature pavement distress (para. 11) was partially attributable to inadequate supervision by CSCs. Further, in view of PMU dissatisfaction with CSC performance in project 1 and staffing constraints within the PWD, supervision arrangements by a composite team from the PWD and supervision consultants was approved by ADB in June 2010 on a pilot basis for six civil works contracts packages under project 2. During implementation, this supervision arrangement was not carried forward for project 3, because of the PWD's difficulty in

deploying experienced and dedicated staff, therefore project performance auditor and program management consultant were introduced under project 3.

27. The program support consultant and IMC under project 2 performed their tasks according to their terms of reference; their performance was *satisfactory.* The program support consultant provided timely inputs to help process and implement investment activities, and the IMC delivered useful reports, provided necessary trainings, and helped implement organizational changes, planning, and maintenance components (paras. 15–16).

28. The civil works procurement conformed to ADB Procurement Guidelines (2007, as amended from time to time). Procurement of all contract packages followed national competitive bidding procedures. Civil works contracts were awarded during Q1 2009–Q4 2010 (para. 22) with a construction period of 18 months and a 3-year post-construction maintenance period. ADB approved advance contracting and retroactive financing in June 2008, but the unsuccessful tender of 14 out of 20 packages procured in advance delayed the contract awards. The procurement process started in Q2 2008; six out of 20 contract packages were awarded in Q1 2009. Hill road packages received only one bid reach, with much higher prices than estimated, and 14 packages were re-bid with relaxed criteria for qualification. In the second call for bids in Q1 2009, the response was better, with prices lower than the initial bidding but still slightly higher than the estimated prices. During implementation, three contract packages were terminated because of poor contractor performance and re-awarded to other contractors in Q2 2013. Appendix 5 summarizes the project contract packages.

29. Project 1 construction began in Q3 2007 and experienced delay during implementation. Based on project 1 experience with contractor performance, project 2 contracts incorporated a provision of interim liquidated damages (based on progress milestones) to secure better performance. However, because of contractual and procedural implications, this provision did not bring about the expected result. PMU thus decided not to continue this practice for future projects of the MFF.

30. Project 2's procurement process started in Q2 2008, during project 1 implementation (Q3 2007–Q2 2012), with no scope for incorporating project 1 learnings and experiences on maintenance into project 2 bid documents. However, when re-bidding for three terminated contracts started in Q2 2012 (para. 28), the PWD tried another method based on experience gained, recognizing the need to get contractors to deliver post-construction maintenance as required. Retention money (a certain percent of money retained by the PWD for each interim payment) was restructured to be released 25% at construction completion, 25% at the end of the defects liability period, and the remaining 50% at the end of the maintenance period. Similarly, the performance guarantee was restructured to be released 50% at construction completion and the remaining 50% at the end of the maintenance period, instead of releasing full retention money at the end of construction and the performance guarantee at the end of the defects liability period.

31. The overall performance of the contractors was *less than satisfactory*. Some of the civil works contracts were slow in execution because of contractors' insufficient or slow mobilization of resources and inadequate planning and weak construction management capability. During implementation, three contracts were terminated because of poor performance (para. 22).

H. Safeguards

32. **Environment.** Project 2 was classified as category B for environment safeguards in accordance with ADB guidelines (footnote 4). At appraisal, the initial environmental examination

(IEE) reports and EMMP were prepared for all subprojects. Based on the IEE, a summary of the environmental impact assessment covering all roads was also prepared and posted on the ADB website. During implementation, 55 roads (para. 10) were taken up for improvement and 20 contracts incorporating EMMPs were awarded.

33. To ensure effective implementation of environmental requirements, the PMU continued to engage the environment specialist who had worked for project 1. Most of the environmental impacts were temporary, site specific, and could be readily addressed by incorporating mitigating measures in the design and by adopting good housekeeping practices. The main focus was on contractor compliance with the EMMP. CSCs specializing in environment regularly visited construction sites and provided necessary guidance to contractors. Supervision consultants regularly advised the PMU of the status of EMMP implementation through quarterly environment reports. The PMU, through the environment specialist, also closely monitored EMMP implementation through physical inspections of construction sites.

34. When project 2 started implementation, a few contractors did not fully comply with the EMMP, particularly in camp hygiene, dust treatment, occupational safety and petroleum and bitumen handling. The contractors' weak capacity (para. 31) and lack of awareness of the EMMP and statutory requirements lowered their compliance with environmental safeguards during the project's initial stages.[10] The ADB project team and experts provided regular training to PMU and PIU staff, consultants, and contractors on environmental safeguards, which improved their capacity and supervision of environmental safeguards.

35. Field visits in March 2011 observed that out of 21 hot mix plants established for operation under project 2, 16 plants obtained "consents to establish" from the Uttarakhand State Environmental Protection and Pollution Control Board; out of these 16 plants, only 10 plants obtained "consents to operate." Pending these consents, the contractors were advised to source material only from plants with valid consents from the board. The problem of getting consents was gradually resolved as PMU and PIU staff and contractors became more familiar with the regulations. The board's faster processing time for applications also helped gradually resolve the problem. The average application processing time for the consent to establish was 459 days during project 1 and fell to 59 days during project 2. By April 2013, all contractors obtained necessary consents from the board. The observed lack of statutory permits in tree felling and forest land was also resolved progressively. The executing agency regularly submitted environmental monitoring reports, which were disclosed on ADB's website. Overall compliance was satisfactory.

36. **Involuntary resettlement and land acquisition**. Project 2 was classified as category B for involuntary resettlement. At appraisal, 11 out of 58 roads had resettlement impacts. In two roads minor strips of land (54 square meters) and structures of 27 encroacher and squatter households (totaling 57 affected households) were partially damaged, including boundary walls and parts of buildings. During implementation, PMU found that 10 of the 55 project roads (para. 10) had involuntary resettlement impacts. PMU conducted a census survey along these roads. Then, PMU prepared SRPs, based on survey findings and consultations with stakeholders. Initially, 49 families were assessed as affected, but because PMU limited road improvement to the right of way, only 20 families were found to be vulnerable, comprising 115 affected persons. The impact on most of these project affected persons was on residential and commercial frontages and boundary walls. PMU provided compensation to the affected families in accordance

[10] Out of 14 contractors, 10 contractors were new for project 2 and 4 contractors were involved in project 1.

with the entitlement matrix in the SRPs and confirmed that the affected families were satisfied with assistance received.

37. Project 2 established a grievance redressal committee to address complaints, but it received no grievances from project affected families or persons. The ADB project team and experts provided regular training to PMU and PIU staff and consultants on social safeguards under various programs, which enhanced their capacity to deal with social safeguard issues. Compliance with involuntary resettlement safeguards requirements was *satisfactory*.

38. **Indigenous peoples**. At appraisal, project 2 was classified as category B, with no envisaged impact on indigenous peoples. During project 2 implementation, PMU found that no segment of the population was affected based on ethnic origin or scheduled tribe.[11] The road improvement has encouraged better transportation services, improving access for all people to social services, higher levels of schooling, and health facilities.

I. Monitoring and Reporting

39. The borrower and the state government complied with loan covenants for project 2, which enabled the PWD to carry out the project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, and environmental practices. In general, there was no delay in complying with any of project 2 covenants, except an initial delay in submitting quarterly progress reports and delays in submitting audit reports. No covenant was suspended or waived during the project implementation and all covenants were complied with. During this period, the state government provided adequate oversight, coordination, and necessary support for the project. The PMU and PIUs were adequately staffed with necessary resources allocated, except for slow mobilization of staff at the initial stage of project implementation. Procurement for civil works contracts and engagement of consultants followed ADB guidelines and procedures (paras. 25 and 28). The implementation of environmental and social safeguard requirements was *satisfactory*.

40. PMU prepared the project progress reports and submitted them to ADB in a timely manner as required, except for some delays at the initial stage of implementation. Audited project financial statements by independent private auditors were submitted to ADB for each of the fiscal years (FYs) from 2010 to 2016, with delays of 1–116 days. These audit reports referred to the project accounts as “unqualified” in their opinions, except for FY2010. The PMU sent monthly accounts in the prescribed form to the office of the Accountant General of Uttarakhand, who audited the project accounts at their own schedule, sometimes covering several years of project accounts in one audit. The Accountant General carried out audits three times during project 2 implementation.

41. During implementation, ADB conducted nine review missions, including special project administration missions and the mid-term review. These missions comprehensively reviewed all aspects of the project. The PMU closely monitored project performance. All the covenants were compiled with. Appendix 7 summarizes the status of compliance with project 2 loan covenants.

[11] The project did not trigger any direct or indirect impact affecting dignity, human rights, livelihood systems, culture or territories of the indigenous peoples.

III. EVALUATION OF PERFORMANCE

A. Relevance

42. Project 2 is considered *relevant* at appraisal and completion because it was an integral part of the national government's policy to boost economic growth and reduce poverty. More specifically, the project supported the government's implementation of its Eleventh Five Year Plan, 2007–2012 and Twelfth Five Year Plan, 2012–2017, both of which pursue inclusive and sustainable growth through infrastructure development (para. 8).

43. Project 2 also aligns with ADB's country partnership strategy and programming update for India, 2006–2008 (footnote 5) which set forth two priority agendas: (i) inclusive and environmentally sustainable growth and (ii) improved infrastructure and services.

44. The design and modality of project 2 was adequate and appropriate (paras. 7-8). As the second in the series of MFF projects, the structure of project 2 was similar to project 1 and incorporated two components, one for infrastructure improvement and one for infrastructure management. The first component was designed to finance only those subprojects that were ready for implementation. By structuring the project in this way, the commitment charges would be minimized. The second component was designed to strengthen the institutional capacity of the PWD in stages. Project 2's IMC carried forward the works initiated earlier by project 1's IMC to maintain continuity in capacity building efforts under the MFF program. With components structured in this manner, project 2 is regarded as properly designed and well structured. The scope underwent no major changes during project implementation.

45. However, the DMF was not formulated in a sharply focused manner specific to project 2. Most of the DMF performance indicators were not project-specific, and 9 of 13 performance indicators were the same as those of the MFF. This has made the assessment of project 2's specific achievements difficult. Further, during the appraisal and substantial implementation of project 2, there were no related projects financed by other development partners in Uttarakhand.

B. Effectiveness

46. Project 2 is rated *effective* in achieving its outcomes and outputs. The efficiencies of interstate and intrastate transport services increased as demonstrated by (i) increased issuance of goods vehicle permits from 660 to 851 per month by 2015, (ii) increased bus utilization rate of State Road Transport Corporation from 200 km to 310 km per bus per day by 2019; and (iii) increased issuance of new stage carrying permits from 15 to 21 per month by 2015.

47. The sustainability of project roads has been enhanced as per reduction in routine maintenance costs and extended service life of pavement. The average annual routine maintenance cost during the post construction maintenance period decreased to $850 per km. The average service life of periodic maintenance work was extended from 3 years to 5 years or longer. To increase operational transparency and governance of the PWD, the Road Board was established in January 2009.[12] Independent, private audit firms conducted financial audits every year during 2009–2016 (para. 40). The project synergized with national road development

[12] The Road Board was established in January 2009. Other pre-existing mechanisms at state, district, and block level were in use and provided opportunities to various stakeholders including the PWD, transport operators, and road users to discuss user concerns. The stakeholders have interacted regularly through these mechanisms, which are more effective, have wider participation, and hence used to discuss and address user concerns.

programs, with 36 project roads (65%) connected to the networks of the National Highways Development Project or Pradhan Mantri Grameen Sadak Yojna roads at 78 locations.

48. Project 2 improved 881 km (paras. 10 and 13) of state roads with an international roughness index of less than 4.5 at completion.[13] The project improved the skills of staff and enhanced the institutional capacity of the PWD by providing training to 705 PWD staff in planning, design, quality control, safety, contract administration, safeguards compliance, formulation of performance targets, and monitoring of performance-based maintenance contracts. Design, construction, and maintenance works of the PWD have been outsourced.

49. **Environmental impact**. Since environmental impacts of project 2 occurred during the construction stage, the main focus of monitoring was on EMMP implementation. In the early stage of implementation, a number of contractors did not comply with EMMP requirements, but this problem was eventually resolved (para. 34). Similarly, some contractors did not comply with statutory regulations. When construction started, a few contractors did not have statutory permits for hot mix plants, tree felling, and use of forest area. PMU eventually resolved this noncompliance issue. With the above problems resolved, project 2 was regarded as effectively implemented with regard to environment requirements (para. 35).

50. **Social impact**. The project did not require land acquisition (para. 36). Thus, most of the expected social impact would affect encroachers and informal settlers who built their structures within the right of way. To minimize the impacts, the PWD improved roads in the right of way, which reduced the number of affected families to 20 (para. 36). Compensations were provided to those affected families in accordance with the entitlement matrix in the SRPs (para. 36). It was found that the project did not affect any segment of the population based on ethnic origin or scheduled tribe (para. 38).

C. Efficiency

51. The project is *efficient* in achieving its outcome and outputs. To assess project efficiency, the project's economic internal rate of return (EIRR) was re-evaluated using a methodology similar to that at appraisal and updated data. The economic benefits were calculated by comparing the "with project" and "without project" cases, including savings in vehicle operating cost (VOC) and passenger travel time cost. The EIRR was calculated at 14.5% with an economic net present value of ₹802.26 million for whole project, which is higher than the 13.0% EIRR estimated at appraisal. The EIRR exceeds the ADB-recommended discount rate of 12% considered at appraisal. The higher EIRR mainly stems from higher growth rates of traffic in early years of operation compared to growth rates assumed at appraisal. The project is therefore considered to be economically viable. The EIRR was subjected to sensitivity analysis to test different scenarios for maintenance cost and benefits. The sensitivity analysis results indicated that the project continued to be economically viable for all tested scenarios. Even with a 20% maintenance cost increase combined with a 20% benefit reduction, the EIRR would still be 12.4% for the whole project. The EIRR exceeds the ADB recommended discount rate of 12%. The sensitivity analysis confirmed that the project has robust economically viability. The sensitivity analysis also showed that the EIRR was more sensitive to changes in economic benefits. For this reason, the state government needs to pay attention to the socioeconomic development of the project area and foster local transport services. The details of the economic re-evaluation are in Appendix 10.

[13] As per the Indian Roads Congress, the average roughness for semi-dense bituminous road is 2500–3500 millimeters per km, corresponding to an international roughness index of 3.5–4.5

52. In terms of process efficiency during implementation, the project experienced initial delays. Despite these delays (paras. 22 and 28), with joint efforts and close monitoring by the PWD, ADB, and the supervision consultants, the contractors improved their performance by drawing contract-by-contract action plans and mobilizing additional resources. Although project completion was delayed, lower project completion costs contributed to project efficiency (para. 18). The effect of time overruns in completion was captured in the economic analysis.

D. Sustainability

53. The project is rated *likely sustainable*.[14] This has been demonstrated by (i) the good condition of the project roads; (ii) the state government's strong commitment to ensure adequate maintenance and funding not only for the project roads but the entire road network; and (iii) the PWD's enhanced institutional capability.

54. The project roads did not generate revenue; the PWD maintained the roads adequately for the initial post-construction period of 3 years using a performance-based approach through an in-built provision under the construction contracts (para. 13). After the initial 3-year maintenance period, the PWD provided the requisite funds and maintained the project roads, which are in good condition even after 4–7 years, without the need for periodic maintenance. Because none of the project roads are toll roads, PMU did not require or conduct financial analysis to assess the sustainability of project roads, either at appraisal or completion. Apart from assessing the sustainability of the project roads, PMU also evaluated the institutional aspects related to road maintenance and road asset management for the road network.

55. Through long-term, continuous, and close interaction with the IMCs and their inputs, the state government is now more aware of the importance of road maintenance and has taken steps to move from a traditional maintenance system to a more systematic maintenance model. The IMCs for projects 1, 2, and program management consultant for project 3 developed a series of recommendations on how to manage road assets more efficiently and cost-effectively, including: (i) shifting from the current input-based contracting to performance-based maintenance contracting, (ii) establishing a dedicated road fund for maintenance, and (iii) introducing standard operational procedures for systematic maintenance. The IMCs' close interaction and recommendations played a catalytic role and the state government has formulated, for the first time in its history, a road policy [15] solely dedicated to maintenance, approved by the government on 20 March 2015 with immediate effect. The policy assessed Uttarakhand's entire road network on 31 March 2014 and rated the condition of about 80% of the road network as good to fair. Allocated funds for road maintenance increased from ₹1,550 million in 2010–2011 to ₹2,393 million 2018–2019. The salient features of the policy include (i) establishing a planning, budgeting and monitoring cell; (ii) preparing a road inventory and pavement condition index survey for preparation of the annual maintenance plan; (iii) special priority on routine maintenance in the annual maintenance plan; (iv) providing dedicated funds for maintenance; (v) providing training for PWD staff to enhance skills in planning, contract management, and supervision of maintenance works; and (vi) conducting a road user satisfaction survey. While full operationalization of the policy will take time, the official adoption of these policy measures strongly indicates that the state government will introduce a more systematic and cost-effective maintenance system.

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[14] The criteria for the assessment of *likely sustainable* in ADB's Guidelines for the Evaluation of Public Sector Operations is that the positive effects should meet expectations, the probability of any material risks occurring is moderate, and risks are largely mitigated. ADB. 2016. *Guidelines for the Evaluation of Public Sector Operations.* Manila.

[15] The Uttarakhand Road Maintenance Policy, 2015

56. **Vulnerability to natural calamities.** Uttarakhand's roads are vulnerable to natural disasters. State roads are prone to landslides and other road damage caused by the mountainous terrain. The state equips and supports the PWD well for this kind of problem, and the national government also provides additional financial support to the state from the India National Disaster Relief Fund. Since the natural disasters are unpredictable and thus beyond the PWD's control, this issue should be addressed separately from the usual discussion on sustainability.

E. Development Impact

57. The project's development impact is rated *satisfactory*. Project 2 improved 881 km of roads, 8% of the road network to be covered by the MFF program. The headcount poverty ratio in the investment program catchment area declined from 32.7% in 2004–2005 to 11.26% in 2011–2012. As a result of the project, (i) VOC savings per vehicle-km are estimated at ₹1.44 for cars or jeeps, ₹4.64 for buses, ₹2.12 for light trucks, and ₹4.28 for heavy trucks (Appendix 10); (ii) the share of passenger time-cost benefits is estimated to increase to 7% by 2033; (iii) 1.40 million average daily vehicle-km were generated in the first full year of operation; (iv) accessibility to markets, schools, hospitals and other public services improved; and (v) many local skilled and unskilled laborers were employed in the construction of the project roads. The improved roads provide opportunities for further economic, industrial, and commercial development, potentially leading to increased employment.[16]

F. Performance of the Borrower and the Executing Agency

58. The overall performance of the borrower, state, and its executing agency (the PWD) is rated *satisfactory*.[17] The Department of Economic Affairs in the Ministry of Finance and the Government of Uttarakhand actively participated in project coordination and monitoring. The state government provided requisite counterpart funds and established a well-staffed PMU and PIUs. The PMU coordinated various activities, including shifting utilities, resettlement activities, tree-cutting, obtaining environmental clearances, procuring civil works, and engaging consultants. The PMU and PIUs strengthened their capacity in ADB's procedures and policies on procurement, financial management, and environmental and social safeguards through the experience gained on project 1. The state complied with the requirements of the loan and project agreements.

G. Performance of the Asian Development Bank

59. ADB's overall performance was *satisfactory*. ADB headquarters administered the project until January 2010, then delegated administration to ADB's India Resident Mission. ADB was closely involved in identifying and resolving issues during implementation through (i) tripartite project review meetings between the Department of Economic Affairs, the executing agency, and ADB, and (ii) regular review missions to project sites. ADB also looked into implementation issues affecting project performance, provided necessary advice, and prepared action plans to expedite project implementation. The ADB project team and experts provided regular training and handholding support to PMU and PIU staff, consultants, and contractors on project management and environmental and social safeguards during the review missions and under various training programs. Document approvals during implementation (e.g., engagement of consultants and procurement of civil works) were provided promptly, and all claims for payment were processed

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[16] The project also contributed to ADB Strategy 2030, Operational Priority 1 (addressing remaining poverty and reducing inequalities), with decline in headcount poverty ratio from 32.7% in 2004-2005 to 11.26% in 2011-2012 and with 881 km of roads improved.

[17] However, ADB has widely recognized the weakness across the portfolio in the financial management performance of the borrower, executing agency, and ADB, and wide-ranging corrective actions are already being undertaken.

smoothly. At the borrower's request, ADB extended the loan closing date thrice to facilitate project completion and kept the loan account open to facilitate the final stage disbursements of expenditures incurred prior to loan closing (para. 22). The state government has recognized ADB's assistance in providing timely advice and actions on all aspects of the project.

H. Overall Assessment

60. Overall, project 2 is rated *successful*. The project is *relevant* to both the Government of India's development objectives and ADB's country partnership strategy and program update, 2006–2008 for India (footnote 5). The design and modality were appropriate, and the project was implemented without major changes in scope. The project is rated *effective* in achieving its outcomes. The project's outputs and outcomes demonstrated that it was an effective intervention for enhancing the PWD's capacity, increasing efficiency of transport services, improving the condition of project roads, and increasing the PWD's operational transparency and governance. The project is rated *efficient* with a recalculated EIRR of 14.5%. The project is regarded *likely sustainable* because of the PWD's commitment to maintaining project roads in good condition and the state government's institutional and policy actions.

Overall Ratings

Criteria	Rating
Relevance	Relevant
Effectiveness	Effective
Efficiency	Efficient
Sustainability	Likely sustainable
Overall Assessment	Successful
Development impact	Satisfactory
Borrower and executing agency	Satisfactory
Performance of ADB	Satisfactory

ADB = Asian Development Bank.
Source: Asian Development Bank.

IV. ISSUES, LESSONS, AND RECOMMENDATIONS

A. Issues and Lessons

61. **Improving the design and monitoring framework.** Some of DMF's expected performance targets and indicators were aligned more with the overall investment program: 9 of 13 performance indicators were the same as those of the MFF. A project-specific DMF should be distinct, specific, and directly attributable to the respective tranche, so that the project's achievement against project-specific indicators and targets can be suitably evaluated.

62. **Strengthening post-construction maintenance.** Based on project 1 and 2 experience, modifications in bidding documents withheld parts of the retention money and performance bank guarantee until the end of the maintenance period in the three packages re-warded after the termination of three original contracts (para. 30). Since these provisions worked well, this practice should be continued for future projects. Further, some of the contractors tended to quote unrealistically low maintenance prices in an attempt to offer the lowest bid. Therefore, future ADB projects should explore the option of paying for maintenance costs as a predetermined percentage of the contract price or a fixed amount to eliminate the contractors' tendency to quote unrealistic maintenance prices.

63. **Enhancing existing mechanisms to address transport issues.** While the project welcomes new mechanisms, in some cases such mechanisms, like the Road Board, duplicate existing systems. The Road Board was established and met twice, but the state government was not particularly enthusiastic about pursuing it because other mechanisms already served similar purposes. The PWD, other government authorities, and community representatives have held consultations every three months at village, block, and district levels in a long-standing practice. In addition, a state-level meeting (the Transport Authority Committee) discusses transport issues between highway authorities and transport operators. These mechanisms have been effective in absorbing views of road users and transport operators. With these long-standing, frequently used mechanisms in place, there was little need to introduce another mechanism to absorb the views of road users and transport operators.

B. Recommendations

64. **Further action or follow-up.** A major achievement of project 2 is the PWD's decision to adopt the Uttarakhand state road maintenance policy, 2015, which incorporates key IMC recommendations. ADB should continue to engage in policy dialogue with the state government to help full operationalize the policy. ADB should also follow up on the related matter of area-wide and performance-based road maintenance contracting, which the state government has seriously considered introducing for the entire state road sector. ADB should continually work together with the PWD and consider providing further assistance for this area.

65. **Future monitoring**. Once the management information and project management system is fully implemented, the system will enable the PWD and ADB to monitor project impact, outcome, and outputs in a more effective and evidence-based manner. This system will also facilitate the effective monitoring of future projects to be developed for Uttarakhand.

66. **Timing of the project performance evaluation report**. The project performance evaluation may be conducted in 2022, by which time the benefits of the MFF program would be fully materialized.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators and Targets	Project Achievements
Impact Increased economic growth and reduced poverty in Uttarakhand	Households below the poverty line in Investment Program catchment areas decrease from 36% in 2006 to 20% by 2017	**Achieved.** The head count poverty ratio declined from 32.7% in 2004–2005 to 11.26% in 2011–2012.[a]
Outcomes 1. Increased efficiency of inter- and intrastate transport services	1.1 Increase in the number of goods vehicles permits issued from 660 to 750 per month by 2012	**Achieved.** In FY2013, average goods vehicle permits issued per month were 786. [b] In FY2015, average goods vehicle permits issued per month were 851. [b]
	1.2 Increase in SRTC bus utilization rate from 200 to 250 km per bus per day by 2012	**Achieved.** In FY2013, average SRTC bus utilization rate was 299 km per bus per day. [c] In FY2019, average SRTC bus utilization rate was 310 km per bus per day. [c]
	1.3 Increase in stage carriage permits issued from 15 to 20 per month by 2012	**Achieved.** In FY2012, about 197 new stage carriages were registered (average of about 18 per month).[b] In FY2015, about 247 stage carriage permits were issued (average of about 21 per month).[b]
2. Enhanced sustainability of road network in good condition	2.1 Routine maintenance cost reduced from $1,400 to $1,000 per km through area-wide PBCs by 2012	**Achieved.** The average routine maintenance cost on project roads during the performance-based maintenance period of 3 years was $850 per km per annum, which is less than $1000. [1,d]
	2.2 Average service life of periodic maintenance works increased from 3 to 5 years by 2012	**Achieved.** All project roads were progressively completed by 2015 (8 contracts by 2012, 5 contracts in 2013, 5 contracts in 2014 and 2 contracts in 2015). Even after a lapse of 4-7 years completion, there has not been a need

[1] As against the schedule of September' 2012 for completion of civil works at appraisal, works on project roads were completed progressively during 2010-2015 and the 3-year performance-based maintenance period, which was a part of construction contract, ended progressively, during 2013-18. Due to completion of the 3-year post-construction maintenance period during 2015-18, area-wide PBCs could not be considered and taken up. Moreover, as the project roads are scattered in different districts, area-wide PBCs is not feasible. The proposal for piloting area wise performance-based maintenance contract for different set of roads is under consideration of the state government.

Design Summary	Performance Indicators and Targets	Project Achievements
		of periodic maintenance, indicating that the service life of periodic maintenance is more than 5 years on project roads.
3. Increased Operational transparency and governance of the PWD	3.1 Road Board functional by 1 January 2009 and holds formal meetings to discuss user concerns	**Achieved.** The Road Board was established in January 2009 and has met twice. [2]
	3.2 External audits of financial accounts, including procurement, indicate full compliance with agreed procedures	**Achieved.** An independent private audit firm regularly conducted external audits of the financial accounts, indicating compliance with the agreed procedures.
4. National road Development Programs synergized	4.1 Share of roads in good condition connected to NHDP and PMGSY roads increased from 10% to 30% by 2010	**Achieved.** Out 55 improved project roads, 36 project roads (65%) are connected to National Highways at 19 locations and PMGSY roads at 59 locations.
Outputs 1. Paved, repaired, or rehabilitated state roads	1.1 At least 966 km of state roads are in good condition (IRI<4.5) by 2010	**Achieved.** The project roads were progressively completed by 2015.[e] 881 km of state roads were improved under the project. [f] IRI of project roads was found to be less than 4.5 at completion. The project roads are in good condition even after 4-7 years from completion.
2. Staff with improved skills and revised Operating procedures	2.1 At least 200 PWD staff trained in one or more areas of (i) establishing realistic performance targets (ii) development of routine maintenance performance-based contracts for non-ADB roads	**Achieved**. 705 PWD staff were trained in area of planning, design, quality control, safety, contract administration, safeguards compliance including establishing performance targets and performance-based maintenance contracts during 2010-2015.
	2.2 Implementation of HRD strategy and training programme in developing course outlines, organization of training with external institutions and selection of trainees	**Achieved.** Under the HRD strategy, a planning unit was established and reorganization of PWD structure has been carried with the increased focus on planning, road sector management and implementation of projects. Training was carried out on

[2] Other pre-existing mechanisms at state/district/block level have been in use and have been providing opportunities to various stakeholders including highway departments, transport operators and road users to discuss user concerns. The stakeholders have been interacting regularly through mechanisms, which are more effective and have wider participation and hence utilized to discuss and address user concerns.

Design Summary	Performance Indicators and Targets	Project Achievements
		developing course outlines, selection of trainees and organization of trainings with external institutions. [3]
	2.3 Outsourcing of all design, construction and maintenance by 2012	**Achieved.** PWD has been outsourcing all design, construction and maintenance.

FY: Financial year, SRTC: State Road Transport Corporation, PBC: Performance based maintenance contracts, NHDP: National Highways Development Project, PMGSY: Pradhan Mantri Grameen Sadak Yojna, IRI: International Roughness Index, PWD: Public Works Department, ADB: Asian Development Bank, HRD: Human Resources Development
Source:
[a] Handbook of Statistics on Indian Economy, 2019, RBI, India (No further updates available).
[b] State transport department, Uttarakhand.
[c] Uttarakhand transport corporation, Uttarakhand (http://utc.uk.gov.in/, accessed on 16 October 2019)
[d] based on average expenditure incurred during the 3-year post-construction maintenance period.
[e] 3 contracts (packages 1, 4, & 7) were terminated due to poor performance of contractor and re-awarded for completion of balance of works during Q2 2012–Q2 2013, and works completed in Q1 2015
[f] Out of 58 roads of a length of 966 km identified at appraisal, 3 roads with a length of 19.4 km were dropped from the project by government of Uttarakhand before bidding. The actual length of these 55 roads was found to be 911 km upon detailed assessment at the bidding stage as against the length of 946.6 km considered at appraisal. During implementation, 24 km under 2 contracts were dropped from the project and improved under other state government programs. Another 6 km under one contract was dropped due to continuous settlement of the road due to geological factors.

[3] Training of PWD staff has been carried out under premium institutions like central road research institute (CRRI), Indian Academy of Highway Engineers (IAHE) and Indian Institute of Technology (IIT) Roorkee.

PROJECT COST AT APPRAISAL AND ACTUAL

($ million)

Component	Appraisal Estimate Foreign Exchange	Appraisal Estimate Local Currency	Appraisal Estimate Total Cost	Actual Foreign Exchange	Actual Local Currency	Actual Total Cost
A. Investment Costs						
1. Resettlement		0.10	0.10		0.10	0.10
2. Civil Works		145.30[a]	145.30		122.33[b]	122.33
3. Consulting Services - Design		1.00	1.00		0.99	0.99
4. Consulting services - Construction supervision		11.50	11.50		6.80	6.80
5. Environmental Mitigation and Monitoring		0.05	0.05		-	-
6. Taxes and Duties		6.70	6.70		4.61	4.61
Subtotal A		**164.65**	**164.65**		**134.82**	**134.82**
B. Project Management and Administration						
1. Project Management Unit		0.40	0.40		0.32	0.32
2. Project Implementation Unit		1.00	1.00		0.43	0.43
3. Program Support Consultant		1.10	1.10		0.14	0.14
Subtotal B		**2.50**	**2.50**		**0.89**	**0.89**
C. Other Program Components						
1. Infrastructure Management Component	0.20	0.40	0.60	0.35	0.14	0.49
Subtotal C	**0.20**	**0.40**	**0.60**	**0.35**	**0.14**	**0.49**
D. Contingencies						
1. Physical Contingency		16.70	16.70			
2. Financial Contingency		9.50	9.50			
Subtotal D		**26.20**	**26.20**			
E. IDC and Commitment Charges	**6.00**		**6.00**	2.76		2.76
Total Investment program Cost (A+B+C+D+E)	**6.00**	**194.00**	**200.00**	**3.11**	**135.85**	**138.96**

[a] Includes the cost of performance-based maintenance for 3 years

[b] Includes the cost of (i) performance-based maintenance for 3 years, and (ii) environmental mitigation and monitoring

PROJECT COST BY FINANCIER

($ million)

Source	At Appraisal				Actual			
	Foreign Exchange	Local Currency	Total Cost	% of Total	Foreign Exchange	Local Currency	Total Cost	% of Total
ADB	0.20	139.80	140.00	70	0.35	106.58	106.93	77%
Government	6.00	54.00	60.00	30	2.76	29.27	32.03	23%
Total	**6.20**	**193.80**	**200.00**	**100**	**3.11**	**135.85**	**138.96**	**100**

PROJECT COST AT COMPLETION BY FINANCIER AND COMPONENT
($ million)

Component	ADB		Government		Total Cost
	Amount	% of cost category	Amount	% of cost category	
A. Investment Costs					
1. Resettlement			0.10	100%	0.10
2. Civil Works[a]	99.50	81%	22.83	19%	122.33
3. Consulting Services - Design			0.99	100%	0.99
4. Consulting services - Construction supervision	6.80	100%			6.80
5. Environmental Mitigation and Monitoring			-		-
6. Taxes and Duties			4.61	100%	4.61
Subtotal A	**106.30**	79%	**28.52**	21%	**134.82**
B. Project Management and Administration					
1. Project Management Unit			0.32	100%	0.32
2. Project Implementation Unit			0.43	100%	0.43
3. Program Support Consultant	0.14	100%			0.14
Subtotal B	**0.14**	16%	**0.75**	84%	**0.89**
C. Other Program Components					
1. Infrastructure Management Component	0.49	100%			0.49
Subtotal C	**0.49**	100%			**0.49**
D. Contingencies					
1. Physical Contingency			-		
2. Financial Contingency			-		
Subtotal D					
E. IDC and Commitment Charges			2.76	100%	**2.76**
Total Investment program Cost (A+B+C+D+E)	**106.93**	**77%**	**32.03**	**23%**	**138.96**

[a] Includes the cost of performance-based maintenance for 3 years

[b] Includes the cost of (i) performance-based maintenance for 3 years, and (ii) environmental mitigation and monitoring

DISBURSEMENT OF ADB LOAN PROCEEDS ($ million)

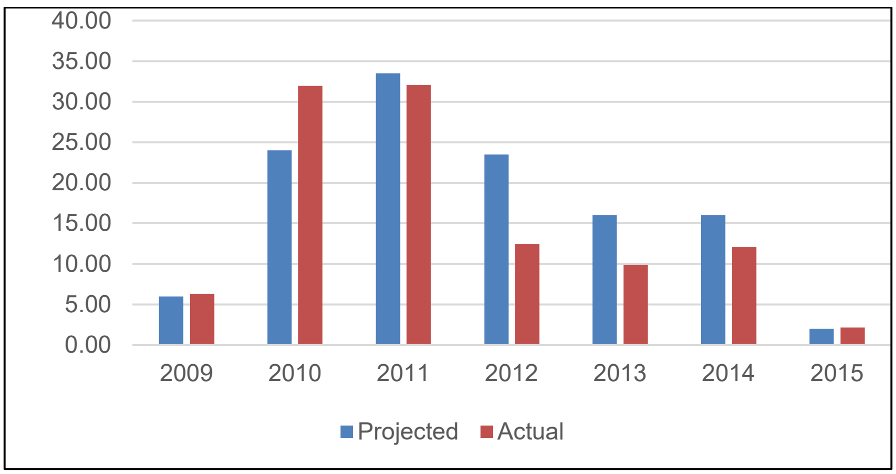
	Annual Disbursement Amount			Cumulative Disbursement	
Year	**Projected [a]**	**Actual**	**% of Actual total**	**Amount**	**% of Total**
2009	6.00	6.31	5.90%	6.31	5.90%
2010	24.00	31.98	29.91%	38.29	35.81%
2011	33.50	32.08	30.00%	70.37	65.81%
2012	23.50	12.45	11.64%	82.82	77.45%
2013	16.00	9.85	9.21%	92.67	86.66%
2014	16.00	12.08	11.30%	104.75	97.96%
2015	2.00	2.18	2.04%	106.93	100.00%
Total		**106.93**			

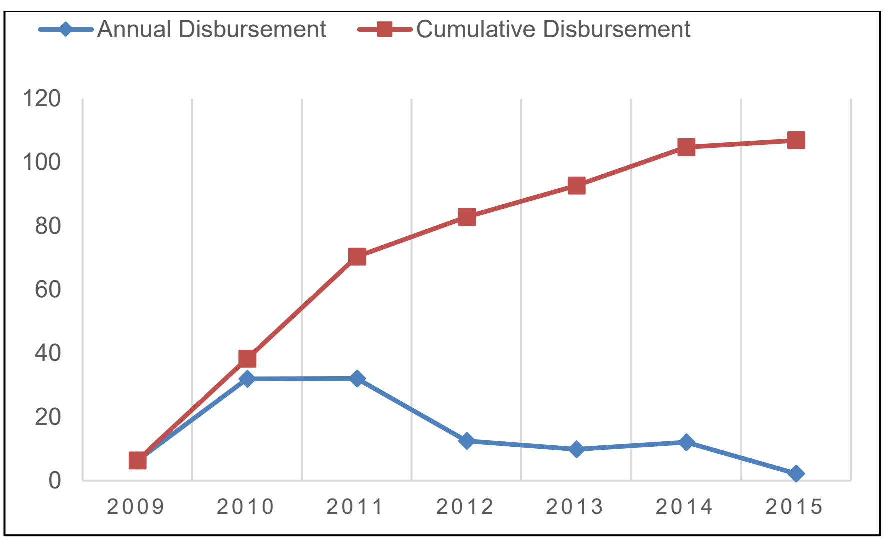
[a] EA year wise disbursement projections

ADB= Asian Development Bank

Source: Asian Development Bank

Figure 4.1: Annual and Cumulative Disbursement of ADB Loan Proceeds





ADB = Asian Development Bank
Source: The Asian Development Bank Loan Financial Information System

CONTRACT AWARDS OF ADB LOAN PROCEEDS

Contract No.	Contractor	Road Name	Length (km)	Procurement method	Contract date	Original Contract [e] Amount (₹)	Actual Cost [e] Amount (₹)	ADB Financing ($)
Civil works								
1	M/s Nyimi / M/s R.G. Buildwell	Harda-Bhikiyasain	7.560	NCB	02/05/2010 /10/05/2013	366,981,056 /378,768,597	84,480,722 /309,922,048	1,533,115 /4,103,581
		Ganiadeoli-Abhiyari	10.650					
		Ganiadeoli-Vishalkot	7.690					
		Chokhutiya-Bachhuvaban	10.940					
		Dhaula-Sinar	6.960					
2	M/s Singla	Jalikhan-Nobara	11.330	NCB	22/01/2010	420,020,984	468,087,349	7,908,441
		Kalnaband-Pantquarili	6.810					
		Baijnath-Gwaldam	3.190					
		Udiyariband-Sheraghat	43.090					
3	M/s Gangotri	Thal - Ogla	33.180	NCB	03/02/2009	413,126,978	355,327,349	6,094,106
		Pithoragarh-Jhulaghat	25.950					
4	M/s Nyimi / M/s Hillways	P.C.S.-Mandalak	11.550	NCB	29/03/2010 /08/02/2013	359,824,505 /348,531,762	81,590,361 /309,673,494	1,494,018 /4,161,748
		Lohaghat-Valikh	45.710					
5	M/s MBL	Malla-Talla-Ramgarh Nathuwakhan	13.160	NCB	23/10/2009	349,092,216	321,852,771	5,378,755
		Nainital-Pangot	12.860					
		Mangoli-Chamari	4.900					
		Kitcha-Dareu	8.680					
6	M/s Bharat	Chamoli-Guptakashi	25.774	NCB	15/10/2010	203,884,735	207,396,024	3,419,593
		Pokhri-Karanprayag	19.437					
		Chamoli-Sartoli	8.740					
7	M/s Harish M/s Mathiyan	Kirti Nagar-New Tehri	48.886	NCB	25/04/2009 /15/05/2013	412,482,348 /164874458	174,903,614 /155640723	3,098,312 /2,035,252

Contract No.	Contractor	Road Name	Length (km)	Procurement method	Contract date	Original Contract [e] Amount (₹)	Actual Cost [e] Amount (₹)	ADB Financing ($)
8	M/s Telecommunication	New Tehri - Ghanshali-Tilwara	46.020	NCB	30/03/2010	254,895,609	254,325,904	3,946,102
9	M/s Hillways	New Tehri-Ghansali-Tilwara	37.790	NCB	31/03/2010	181,218,996	172,041,928	2,929,899
10	M/s R.G. Buildwell	Chamba-Mussoorie	25.013	NCB	04/04/2009	205,353,725	212,358,916	3,535,744
11	M/s Woodhill	Kirti Nagar-Sorakhal Kirit Nagar - Dangdhari	45.210 17.100	NCB	14/10/2009	301,909,999	300,278,795	4,966,975
12	M/s Telecommunication	Chatiyara-Kepras Pratap Nagar - New Tehri	11.680 14.410	NCB	30/03/2010	157,444,645	156,566,747	2,326,586
13	M/s N.K.G	Biharigarh-Buggawala	9.158	NCB	28/02/2009	143,459,474	133,545,783	2,254,786
14	M/s N.K.G	Ruhalki-Sahdevpur Pirankaliyar-Mujahidpur-Sattiwala Raisi-Shahpur"	4.792 12.916 21.654	NCB	03/02/2009	366,990,081	366,649,157	6,257,554
15	M/s RRC link	Bhagwanpur-Baheri- Bhurj Road Bhagwanpur-Khedi Shikohpur Chudiyala-Bindukharak Aurangabad-Teliwala	5.159 12.872 9.590 4.650	NCB	28/04/2009	265,235,819	270,432,892	4,656,915
16	M/s R.G. Buildwell	Sungarkhal-Jwalpadevi Santudhar-Pavo	30.770 30.100	NCB	21/10/2009	365,681,135	378,803,012	6,329,732
17	M/s R.G. Buildwell	Kanmothalia-Jhandadevi Banekh-Thapla Satpuli-Dudhharkhal Samkhal-Suyalbend Dudharkhal-Tadkeshwar	15.310 9.730 24.530 6.400 6.400	NCB	18/01/2010	419,459,490	408,090,723	6,431,006
18	M/s Bharat	Chaubattakhal-Charurikhal	25.960	NCB	25/03/2010	330,240,354	310,078,795	4,931,910

Contract No.	Contractor	Road Name	Length (km)	Procurement method	Contract date	Original Contract [e] Amount (₹)	Actual Cost [e] Amount (₹)	ADB Financing ($)
19	M/s Bharat	Khirsu-Adibadri	21.070	NCB	19/12/2009	349,311,512	392,239,398	6,404,602
		Chalusain-Devikhet	8.500					
		Hanumanti-Fathehpur	5.950					
		Matiyali-Dwarikhal	17.220					
		Kandakhal-Chalusain-Devikhet	13.960					
20	M/s Telecommunication	Dhumakot-Nainidanda	13.080	NCB	19/12/2009	368,605,621	361,073,735	5,302,638
		Soparkhal-Lalitpur	8.650					
		Khaludanda-Apolosera	11.100					
		Rikhanikhal-Thailisan (Via Jaspurkhal)	5.020					
		Rikhanikhal-Thailisan (Via Bhagwaliya)	5.790					
		Rikhanikhal-Thailisain (Via Panas)"	6.460					
		Total	**911.061**			**5,868,238,226**	**5,325,643,253**	**93,864,674**

NCB=national competitive bidding, ₹ = Indian rupees
Note:
[a] 3 contracts (Packages 1, 4, & 7) were terminated due to poor performance of contractor and re-awarded for completion of remaining works
[b] Contract no.7- 12 km length was developed in other program, hence final length improved under the project reduced to 36.886 km
[c] Contract no.8- 12 km length was developed in other program, hence final length improved under the project reduced to 34.020 km
[d] Contract no.12- 6 km length was dropped due to continuous settlement of road on account of geological disturbance, hence final length improved under the project reduced to 20.090 km
[e] Includes 3 years performance-based maintenance cost
Source: The ADB loan financial information system and the project management unit

Contract No.	Consultant	Description	Procurement method	Contract date	Original Contract Amount (₹)	Actual Cost Amount (₹)	ADB Financing ($)
Consulting services							
CSC-1	M/s Scott wilson	CSC-1 for packages 1,2,3 & 5	QCBS	31/08/2009	128,654,000	140,592,510	2,777,585
CSC-2	M/s SMEC	CSC-2 for packages 6,7,8,9, 10,11&12	QCBS	17/08/2009	115,880,160	65,529,742	1,305,078
CSC-3	M/s Scott wilson	CSC-3 for packages 13,14,15,16,17,18,19&20	QCBS	24/07/2009	154,116,000	136,696,248	2,717,034
PSC-2	SNC-Lavalin	Program support consultant	QCBS	4/10/2010	17,624,500	7,205,314	140,781
IMC-2	M/s SMEC	Infrastructure Management consultant	QCBS	7/10/2010	5,071,187 485,535	7,219,717 346,356	141,802 346,356

CSC = construction supervision consultant, PSC = program support consultant, IMC = infrastructure management consultant, QCBS = quality and cost-based selection, ₹ = Indian rupees
Source: The ADB loan financial information system and the project management unit.

CHRONOLOGY OF MAIN EVENTS

Date		Main Event
2008		
10	July	Periodic financing agreement received from the GOI
24	July	Approval of Periodic financing agreement
11	September	Loan negotiation completed
22	October	ADB board approval of the loan
2009		
28	February	Contract signing for civil works package 13
2	March	Contract signing for civil works package 3 and 14
4	April	Contract signing for civil works package 10
22	April	Loan effectiveness
25	April	Contract signing for civil works package 7
28	April	Contract signing for civil works package 15
24	July	Contract signing with the CSC - Package 3
17	August	Contract signing with the CSC - Package 2
31	August	Contract signing with the CSC - Package 1
8-11	September	ADB special loan administration mission
14	October	Contract signing for civil works package 11
21	October	Contract signing for civil works package 16
23	October	Contract signing for civil works package 5
19	December	Contract signing for civil works package 19
19	December	Contract signing for civil works package 20
2010		
18	January	Contract signing for civil works package 17
22	January	Contract signing for civil works package 2
31	January	Contract completion of contract package 15
5	February	Contract signing for civil works package 1
25	March	Contract signing for civil works package 18
29	March	Contract signing for civil works package 4
30	March	Contract signing for civil works package 8
30	March	Contract signing for civil works package 12
31	March	Contract signing for civil works package 9
20	September	Completion of civil works contract package 13
22	September	Completion of civil works contract package 14
8-11	September	ADB special loan administration mission
4	October	Contract signing with the PSC
7	October	Contract signing with the IMC
15	October	Contract signing for civil works package 6
7	November	Termination of contract package 7
2011		
15	January	Completion of civil works contract package 10

Date		Main Event
17−18	February	ADB special project administration mission
18	August	Termination of contract package 1
12	October	Termination of contract package 4
13	November	Completion of civil works contract package 9
14−16	December	ADB special project administration mission
31	December	Completion of civil works contract package 16
2012		
31	March	Completion of civil works contract package 11
16-20	April	ADB Midterm review mission
30	September	Original loan closing
25	December	Completion of civil works contract package 2
2013		
21−23	January	ADB project review mission
8	Feb	Contract signing for re-awarded civil works package 4
31	March	Completion of civil works contract package 3
31	March	Completion of civil works contract package 19
31	March	Completion of civil works contract package 5
10	May	Contract signing for re-awarded civil works package 1
15	May	Contract signing for re-awarded civil works package 7
30	September	Completion of civil works contract package 17
31	December	Completion of civil works contract package 8
2014		
6−7	February	ADB special loan administration mission
30	March	Completion of civil works contract package 20
31	March	Completion of civil works contract package 12 and 20
23	June	Completion of civil works contract package 18
9-10	July	ADB project review mission
30	September	First extension of loan closing
31	October	Contract completion of re-awarded package 4
31	October	Completion of civil works contract package 6
31	December	Second extension of loan closing date
2015		
25	March	Contract completion of re-awarded package 7
30	March	Contract completion of re-awarded package 1
31	March	Third extension of loan closing
19	August	Actual loan closing date

GOI = Government of India, CSC = construction supervision consultant, ADB = Asian Development Bank, PSC = Program Support Consultant, IMC = Infrastructure Management Consultant
Source: Asian Development Bank and Project Management Unit

STATUS OF COMPLIANCE WITH LOAN COVENANTS

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
Particular Covenants in Loan Agreement		
(a) The Borrower shall cause the State to carry out the Project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental, and state road development practices. (b) In the carrying out of the Project and operation of the Project facilities, the Borrower shall perform, or cause to be performed by the State, all obligations set forth in Schedule 5 to this Loan Agreement.	LA, Article IV Section 4.01	**Complied with.** (a) The project was carried out with due diligence and efficiency and conformity with sound financial, business, and development practices. **Complied with.** (b) All obligations set forth in Schedule 5 to this Loan Agreement were performed during project implementation and operation.
The Borrower shall make available to the State, promptly as needed and on terms and conditions acceptable to ADB, the funds, facilities, services, and other resources which as required, in addition to the proceeds of the Loan, for the carrying out of the Project.	LA, Article IV Section 4.02	**Complied with.** Adequate counterpart fund has been provided as needed.
The Borrower shall ensure that the activities of its departments and agencies with respect to the carrying out of the project and operation of the Project Facilities are conducted and coordinated in accordance with sound administrative policies and procedures.	LA, Article IV Section 4.03	**Complied with.** The project was carried out in accordance with sound administrative policies and procedures.
The Borrower shall take all action which shall be necessary on its part to enable the State to perform its obligations under the Project Agreement and shall not take or permit any action which would interfere with the performance of such obligations.	LA, Article IV Section 4.04	**Complied with.** The Project has been carried out with necessary support from borrower and actively participated in coordination and monitoring of the project.
(a) The Borrower shall exercise its rights under the funding arrangements referred to in Section 3.01 of this Loan Agreement, in such a manner as to protect the interests of the Borrower and ADB and to accomplish the purposes of the Loan. (b) The Borrower shall promptly notify ADB of any assignment, amendment, abrogation	LA, Article IV Section 4.05	**Complied with**. a) To accomplish the purpose of the Loan, Borrower exercised its right under the funding arrangement referred to in section 3.01. **Complied with.**

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
or waiver of rights or obligations under the funding arrangements referred to in section 3.01 of this Loan Agreement.		b) No rights or no obligations under the financing arrangements referred to section 3.01 of Loan agreement were assigned, amended, abrogated or waived.
Project Execution		
The Borrower designates the State as the Project Executing Agency. The Borrower shall cause the State, through PWD, to undertake all activities required for implementation of the Project in accordance with the provisions of this Loan Agreement and the Project Agreement.	LA, Schedule 5 Para. 1	**Complied with**. The State undertook through the public works department (PWD) of the State was designated as project executing agency undertook all activities for implementation of the Project in accordance with Loan Agreement and/or the Project Agreement
If and to the extent the provisions of this Loan Agreement and the Project Agreement assign duties and obligations to any other party than the Borrower (including, without limitation, the State), the Borrower shall ensure that such party observes those duties and performs those obligations in accordance with the relevant provisions of this Loan Agreement and/or the Project Agreement.	LA, Schedule 5 Para. 2	**Complied with.** No duties or obligations assigned to any party other than Borrower or the State.
PMU		
(a) The State shall ensure that the PMU remains adequately staffed and functional for the duration of the Project. The PMU shall comprise at least one Project Director at a Chief Engineer level; one procurement specialist; one finance manager; one environmental specialist to assist with the implementation of the EARF, the IEE and the EMPs; and one social and resettlement specialist to assist with the implementation of the RF and the RPs. The Project Director shall report to the Chief Engineer of the PWD. The Secretary of PWD shall be responsible for interdepartmental coordination and overall supervision of the Investment Program and the Project.	LA, Schedule 5 Para. 3	**Complied with.** (a) The PMU was established and headed by Project Director and consisted of Procurement specialist, Finance manager, Environmental specialist and Social and resettlement specialist.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
(b) The PMU shall be responsible for day to day operation of the Project and the Investment Program, and periodic functions such as preparation of PFRs for projects under the Facility, engagement of consultants and contractors, preparation of reports, approvals from relevant authorities and ADB, and overall supervision of consultants. (c) Within two months after the Effective Date, the State shall engage consultants for the program support activities referred to in Schedule 1 to this Loan Agreement.		**Complied with.** (b) The PMU took the responsibility of day to day operations of the project and periodic functions. **Complied with.** (c) The PWD has engaged Program support consultants and Infrastructure Management consultants in Oct'2010 for the program support activities referred to in Schedule 1 of Loan Agreement
PIUs		
(a) At least one month prior to the award of the first Works contract under the Project and no later than one month after the Effective Date, whichever is earlier, the State shall establish and maintain an adequate number of PIUs in close proximity to the relevant sites as and when required to effectively manage the Works contracts. (b) Each PIU shall be headed by an engineer of appropriate rank (but not lower than the rank of executive engineer), assisted by an engineer not below the rank of assistant engineer, at least two other technical staff including staff with expertise in social development and environmental management, an accounts officer and two support/administrative staff. The Head of each PIU shall coordinate and liaise with the Project Director of PMU, and shall be supported as needed, by the Investment program support consultants.	LA, Schedule 5 Para. 4	**Complied with.** (a) The State has established initially three additional PIUs in addition to existing four PIUs of project 1 and subsequently four more PIUs were established totaling eleven PIUs at close proximity to the project roads within respective region **Complied with.** (b) Each PIU was headed by Executive Engineer assisted by Assistant Engineer, two Technical staff one them is in-charge of social and environmental management, an accounts officer and support staff.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
Steering Committee		
(a) The State shall ensure that the Steering Committee established for the purposes of the Investment Program will remain fully functional for the duration of the Project. The Steering Committee is headed by the Chief Secretary of the State and comprises Secretaries of key State agencies. (b) The Steering Committee shall monitor and guide the Investment Program and the implementation of the Project to ensure its effectiveness and timeliness. (c) The State shall ensure that the composition of the Steering Committee, PMU and PIUs, agreed with ADB, remain fixed for the entire duration of the Project and the Facility.	LA, Schedule 5 Para. 5	**Complied with.** (a) The Steering Committee was headed by Chief Secretary and comprises of key secretaries, however during implementation Chief Minister had taken over as chairman. **Complied with.** (b) The Steering committee has been effective in addressing major policy and coordination issues, however for resolution of specific issues which require direct communication between PWD, and relevant authority found equally effective. **Complied with.** (c) The composition of the steering committee, PMU and PIUs, agreed with ADB, remained fixed for the entire duration of the project.
Counterpart funding		
The Borrower shall make available, and shall cause the State to make available, all counterpart funds required for timely and effective implementation of the Project, including any funds required to meet additional costs arising from design changes, price escalation and/or unforeseen circumstances, and shall ensure that the resources thus required are made available on an annual basis for each fiscal year.	LA, Schedule 5 Para. 6	**Complied with.** The counterpart fund has been made available for effective and timely implementation of the project in each fiscal year including the funds required for unforeseen circumstances.
Environment		
The State shall implement the Project in accordance with the EARF, the IEE, the	LA, Schedule 5 Para. 7	**Complied with**.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
EMPs, ADB's Environment Policy (2002), and applicable laws and regulations of the Borrower and the State. The State shall provide adequate training to the engineers that will be assigned with this task so at to ensure that the requirements of the EARF, IEE and EMPs are fully implemented in consultation with the relevant contractors and construction supervision consultants.		The Project was implemented in accordance with the EARF, the IEE and ADB's Environmental Policy (2002). While detailed, statutory environmental permissions were obtained for construction camp sites, forest areas and tree felling. The implementation of EMP provisions was observed with varying levels of compliance. The Engineers who were assigned for environmental safeguards were provided with training on environmental safeguards
Social and other matters		
The State shall: (a) implement the Project in accordance with the RF, the RPs, ADB's Involuntary Resettlement Policy (1995) and applicable laws and regulations of the Borrower and the State; (b) in case of any changes in the Project roads due to detailed design or change of alignment, ensure that that the RPs for the Project are updated on the basis of the final design and submitted to ADB for review and approval prior to award of the related Works contracts; and (c) monitor and submit to ADB quarterly progress and completion reports on land acquisition, environment management, resettlement and other issues.	LA, Schedule 5 Para. 8	**Complied with.** (a) The Project was implemented in accordance with the RF, the RPs, ADB's Involuntary Resettlement Policy (1995) and applicable laws and regulations of the Borrower and the State **Complied with.** (b) There were no changes in alignment of project roads and was no need to modify the RPs **Complied with.** (c) PWD submitted quarterly progress reports with updating the land acquisition, environment management, resettlement and other significant issues.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
Executions of Works Contracts		
Whenever possible, Works contracts under the Infrastructure Improvement Component shall include an obligation on the part of the contractor to conduct performance-based maintenance services on the improved road section(s) for three years from completion of the relevant Works in accordance with ADB's standard bidding documents, and other reference documents acceptable to ADB.	LA, Schedule 5 Para. 9	**Complied with.** All civil works contracts had incorporated the provision for post construction performance-based maintenance for a period of 3 years.
The State shall ensure that: (a) subject to compliance with the requirements of the RF, EARF and related RPs and IEE/EMPs, respectively, it shall (i) make available land and rights in land, free from encumbrances, and (ii) clear the utilities, trees, and any obstruction on such land, on a timely basis, i.e., strictly in accordance with the schedule as agreed under the related Works contract, as required for activities relating to each road or section of a road in the Works contract; and (b) subsequent to the award of a contract package to a contractor, ensure that roads or sections of roads (sites) in that package are not handed over to the contractor unless all provisions of the RF, EARF and related RPs and IEE/EMPs (as applicable) respectively, are satisfied	LA, Schedule 5 Para. 10	**Complied with.** (a) The executing agency (i) made available land and rights in land, free from encumbrances, and (ii) clear the utilities, trees and any obstruction on such land, on a timely basis. **Complied with.** (b) None of the roads in respective package have been handed over to the contractor unless all provisions of the RF, EARF and related RPs and IEE/EMPs are satisfied with.
The State shall provide adequate funding for independent monitoring of activities relating to land acquisition, resettlement, environment and other social issues under the Project.	LA, Schedule 5 Para. 11	**Complied with.** The State has engaged NGOs for independent monitoring of the land acquisition and resettlement plan. Sufficient funds were made available by the State for engaging these NGOs
For the purposes of this Project, the State shall ensure that the Works contractors incorporate provisions to the effect that the contractor shall (i) carry out HIV/AIDS awareness and prevention programs for labor,	LA, Schedule 5 Para. 12	**Complied with.** All civil contracts have incorporated such provision

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
(ii) not employ or use children as labor, (iii) disseminate information at work sites on risks of sexually transmitted diseases and HIV/AIDS as part of health and safety measures for those employed during construction, and (iv) follow and implement all statutory provisions on labor including equal pay for equal work), health, safety, welfare, sanitation, and working conditions. The Works contracts shall also provide for termination of the contract by the State in case of breach of any stated provisions by the contractors.		
Road Maintenance		
The State shall ensure adequate and timely funds for maintaining the network of roads developed under the Project in good condition during and after completion of the Project and Investment Program.	LA, Schedule 5 Para. 13	**Complied with.** All civil works contracts have the provision of 3-year performance-based maintenance post construction. For subsequent maintenance it was observed that the State Government allocation for maintenance of roads increased.
Road Safety		
The State shall ensure strict adherence by contractors to national and State road safety standards on signage, road markings, roadside structures, and maintenance, as well as to good practices in construction zone traffic management.	LA, Schedule 5 Para. 14	**Complied with.** Civil works contracts incorporated road safety standards which has been implemented sufficiently.
Performance Monitoring and Reporting		
Within three months of the Effective Date, the State shall develop a Project Performance Monitoring System (PPMS) for the Project. The PPMS shall monitor and evaluate the impacts, outcomes, outputs and activities in relation to the targets and milestones set for the Project.	LA, Schedule 5 Para. 15	**Complied with.** Under the supervision of the Project Director, project management unit (PMU) monitored the day to day activities of the project through the project implementation units (PIUs), PPMS developed under project 1 was adopted.
Notwithstanding the generality of Section 2.08 of the Project Agreement, the State shall provide ADB:	LA, Schedule 5 Para. 16	**Complied with.** (a) The PWD submitted the quarterly reports on

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
(a) within 45 days from the close of each quarter, with quarterly progress reports on all components of the Project and the Investment Program. Such reports shall include information on progress made during the period of review pursuant to the preceding paragraph of this Schedule, a summary financial account for the Project and Investment Program, changes, if any, in the implementation schedule, problems or difficulties encountered and remedial actions taken, anticipated problems and the proposed remedial measures, and work to be undertaken in the following period; and (b) a Project completion report within 3 months of completion of the Project, and a Facility completion report within 3 months of completion of the Investment Program. These reports shall cover a detailed evaluation of the Project and the Investment Program respectively, covering the design, costs, contractors' and consultants' performance, social and economic impact, economic rate of return, and other details as may be requested by ADB.		progress of all components including financial summary, changes in implementation schedule, issues in implementation and remedial actions taken and targets for succeeding quarters to ADB. **Complied with.** (b) A Project completion report has been submitted by the EA.
Review		
(a) ADB, the Borrower, and the State shall meet regularly as required, to discuss the progress of the Project and any changes to implementation arrangements or remedial measures required to be undertaken towards achieving its objectives and that of the Investment Program. (b) ADB, the Borrower and the State shall undertake a mid-term review of the Project between 18 and 24 months after the date that the first contract package for Works under the Project has been awarded. The review will focus on issues related to implementation arrangements, and agree on changes, if needed, to achieve the	LA, Schedule 5 Para. 17	**Complied with.** (a) Tripartite portfolio review meetings and State review meetings between Department of Economic Affairs (DEA), ADB and Borrower held as on when required. **Complied with.** (b) Midterm review has been carried out during 16-20 April 2012.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
objectives of the Project and of the Investment Program respectively.		
Audits		
The State shall ensure that all contracts financed by ADB in connection with the Project include provisions specifying the right of ADB to audit and examine the records and accounts of PWD and of all contractors, suppliers, consultants, and other service providers as they relate to the Project.	LA, Schedule 5 Para. 18	**Complied with.** The provision for right to audit and examine the records and accounts of PWD and of all contractors, suppliers, consultants and other service providers is included in their respective contracts
Notwithstanding the generality of Section 2.09 of the Project Agreement, the State shall ensure that an independent private audit firm is engaged (in consultation with ADB) and annual audits of consolidated accounts of the Project including for procurement are conducted, prior to the audit performed by the Comptroller and Auditor General of India.	LA, Schedule 5 Para. 19	**Complied with.** An independent private audit firm was engaged and carried out annual audits of consolidated accounts of the project.
Infrastructure Management		
The State shall ensure that the consultants for the Infrastructure Management Component under the previous tranche of the Investment Program complete their assignments in accordance with their terms of reference and recruit the consultants for the Infrastructure Management Component under this Project in a timely manner to ensure continuity in the implementation of this Component.	LA, Schedule 5 Para. 20	**Complied with.** IMC1 completed its services in March 2009. IMC2 was mobilized in November 2010 and continued the work done by IMC1.
(a) The State shall carry out the Project with due diligence and efficiency, and in conformity with sound administrative, financial, engineering, environmental and state road development practices. (b) In the carrying out of the Project and operation of the Project facilities, the State shall perform all obligations set forth in the Loan Agreement to the extent that they are applicable to the State.	PA, Article II, Section 2.01	**Complied with.** (a) The Project was carried out with due diligence and efficiency, and in conformity with sound practices. **Complied with.** (b) The State performed all obligations set forth in the Loan Agreement.
The State shall make available, promptly as needed, the funds, facilities, services, equipment, land and other resources which	PA, Article II, Section 2.02	**Complied with.** Adequate counterpart fund has been provided as needed.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
are required, in addition to the proceeds of the Loan, for the carrying out of the Project.		
(a) In the carrying out of the Project, the State shall employ competent and qualified consultants and contractors, acceptable to ADB, to an extent and upon terms and conditions satisfactory to ADB. (b) Except as ADB may otherwise agree, all Goods, Works and Consulting Services shall be procured in accordance with the provisions of Schedules 4 and 5 to the Loan Agreement. ADB may refuse to finance a contract where Goods, Works or Consulting Services have not been procured under procedures substantially in accordance with those agreed between the Borrower and ADB or where the terms and conditions of the contract are not satisfactory to ADB.	PA, Article II, Section 2.03	**Complied with.** Contractors and consultants were procured as per requirements of ADB procurement guidelines. **Complied with.** All Goods, Works and Consulting Services were procured in accordance with the provisions of Schedules 4 and 5 to the Loan Agreement.
The State shall carry out the Project in accordance with plans, design standards, specifications, work schedules and construction methods acceptable to ADB. The State shall furnish, or cause to be furnished, to ADB, promptly after their preparation, such plans, design standards, specifications and work schedules, and any material modifications subsequently made therein, in such detail as ADB shall reasonably request.	PA, Article II, Section 2.04	**Complied with.** The project was carried out in accordance with plans, design standards, specifications, work schedule and construction methods acceptable to ADB.
(a) The State shall take out and maintain with responsible insurers, or make other arrangements satisfactory to ADB, for insurance of Project facilities to such extent and against such risks and in such amounts as shall be consistent with sound practice. (b) Without limiting the generality of the foregoing, the State undertakes to insure, or cause to be insured, the Goods to be imported for the Project and to be financed out of the proceeds of the Loan against hazards incident to the acquisition, transportation and delivery thereof to the place of use or installation, and for such insurance any indemnity shall be payable	PA, Article II, Section 2.05	**Complied with.** (a) Provision for insurances covering risk, theft etc. has been incorporated in contract documents **Complied with**. (b) No goods were imported.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
in a currency freely usable to replace or repair such Goods.		
The State shall maintain, or cause to be maintained, records and accounts adequate to identify the Goods, Works and Consulting Services and other items of expenditure financed out of the proceeds of the Loan, to disclose the use thereof in the Project, to record the progress of the Project (including the cost thereof) and to reflect, in accordance with consistently maintained sound accounting principles, its operations and financial condition.	PA, Article II, Section 2.06	**Complied with.** Project records and accounts were in accordance with sound accounting principles reflecting the expenditure on Goods, Works and Consulting services.
(a) ADB and the State shall cooperate fully to ensure that the purposes of the Loan will be accomplished. (b) The State shall promptly inform ADB and the Borrower of any condition which interferes with, or threatens to interfere with, the progress of the Project, the performance of its obligations under this Project Agreement, or the accomplishment of the purposes of the Loan. (c) ADB and the State shall from time to time, at the request of either party, exchange views through their representatives with regard to any matters relating to the Project, the State and the Loan.	PA, Article II, Section 2.07	**Complied with.** During implementation, ADB, the State, and PWD cooperated fully to ensure purposes of the Loan to be accomplished. **Complied with.** No instance of interferes with, or threatens to interfere with, the progress of the Project. **Complied with.** ADB and the State regularly exchanged views with regard to any matters relating to the project
(a) The State shall furnish to ADB all such reports and information as ADB shall reasonably request concerning (i) the Loan and the expenditure of the proceeds thereof; (ii) the Goods, Works and Consulting Services and other items of expenditure financed out of such proceeds; (iii) the Project; (iv) the administration, operations and financial condition of the State; and (v) any other matters relating to the purposes of the Loan.	PA, Article II, Section 2.08	**Complied with.** (a) The State has furnished all such information to ADB during review missions and also as part of quarterly progress reports.

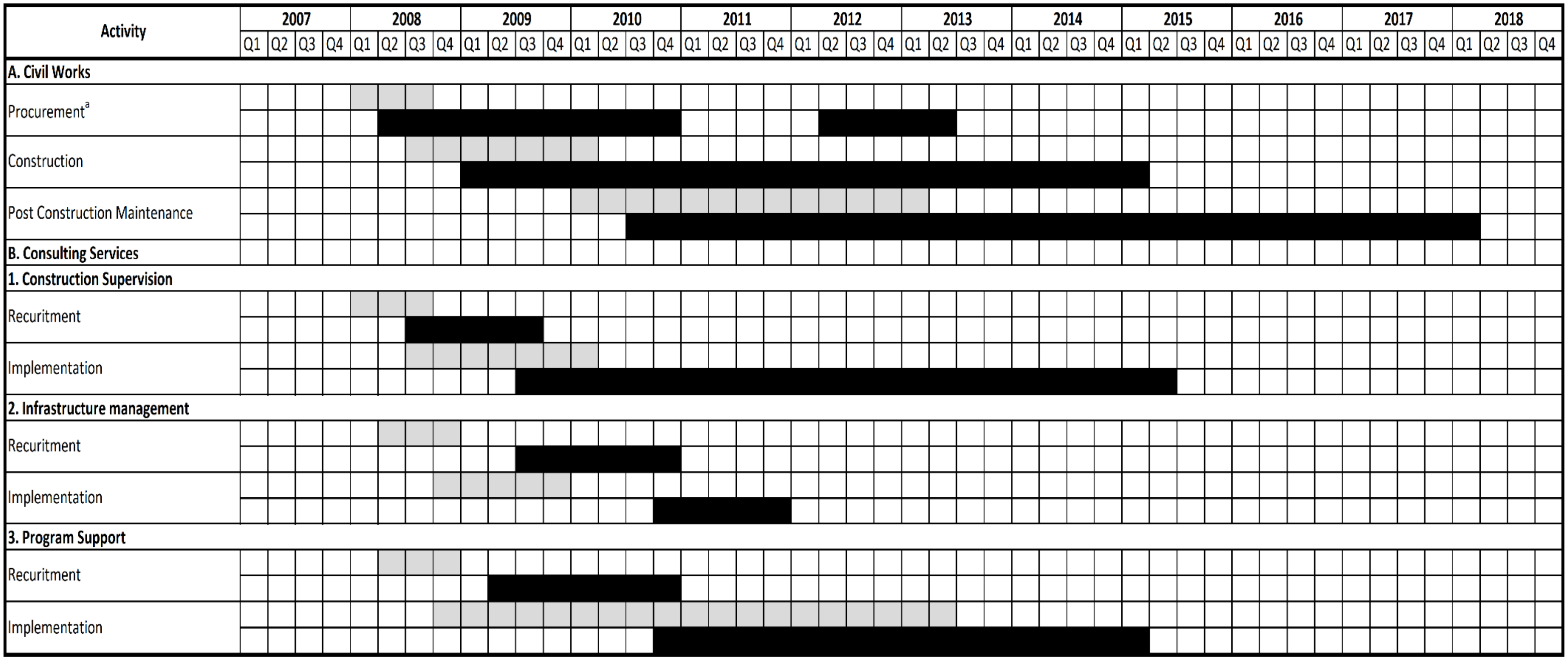
Covenant	Reference in Loan/ Project Agreement	Status of Compliance
(b) Without limiting the generality of the foregoing, the State shall furnish to ADB quarterly reports on the execution of the Project and on the operation and management of the Project facilities. Such reports shall be submitted in such form and in such detail and within such a period as ADB shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the quarter under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following quarter. (c) Promptly after physical completion of the Project, but in any event not later than three (3) months thereafter or such later date as ADB may agree for this purpose, the State shall prepare and furnish to ADB a report, in such form and in such detail as ADB shall reasonably request, on the execution and initial operation of the Project, including its cost, the performance by the State of its obligations under this Project Agreement and the accomplishment of the purposes of the Loan.		**Complied with.** (b) The State furnished the quarterly and other reports on the execution of the project. **Complied with.** (c) After completion, the state prepared and furnished to ADB its project completion report covering the execution and initial operation of the project, including its cost and other related matters.
(a) The State shall (i) maintain separate accounts for the Project; (ii) have such accounts and related financial statements (statement of expenditure and related statements) audited annually, in accordance with appropriate auditing standards consistently applied, by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB; and (iii) furnish to ADB, promptly after their preparation but in any event not later than six (6) months after the close of the fiscal year to which they relate, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto (including the auditors' opinion on the use of the Loan proceeds and compliance with the covenants of the Loan Agreement as	PA, Article II, Section 2.09	**Complied with.** The PWD maintained separate accounts for the project. The audited project accounts and related financial statement submitted to ADB as required in the loan agreement and considered acceptable.

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
well as on the use of the procedures for the statement of expenditures), all in the English language. The State shall furnish to ADB such further information concerning such accounts and financial statements and the audit thereof as ADB shall from time to time reasonably request. (b) The State shall enable ADB, upon ADB's request, to discuss its financial statements and its financial affairs from time to time with the auditors appointed by the State pursuant to Section 2.09(a) hereinabove, and shall authorize and require any representative of such auditors to participate in any such discussions requested by ADB, provided that any such discussion shall be conducted only in the presence of an authorized officer of the State unless the State shall otherwise agree.		**Complied with.** Audited project financial statements prepared by independent auditor were submitted to ADB for each fiscal year 2010-16.
The State shall enable ADB's representatives to inspect the Project, the Goods and Works financed out of the proceeds of the Loan, all other plants, sites, properties and equipment of the State, and any relevant records and documents.	PA, Article II, Section 2.10	**Complied with.** State supported ADB in the inspection relevant records and documents and also the Goods, and Works, sites, other plants, properties and equipment of the State financed out of the proceeds of the Loan.
(a) The State shall, promptly as required, take all action within its powers to carry on PWD's operations, and to acquire, maintain and renew all rights, properties, powers, privileges and franchises which are necessary in the carrying out of the Project or in the conduct of PWD's activities. (b) In relation to the Project, the State shall at all times conduct its activities in accordance with sound administrative,	PA, Article II, Section 2.11	**Complied with.** The State took prompt actions as required within its powers to carry on PWD's operations, and to acquire, maintain and renew all rights, properties, powers, privileges and franchises which were necessary in the carrying out of the Project or in the conduct of PWD's activities **Complied With.** The State conducted its activities in accordance with

Covenant	Reference in Loan/ Project Agreement	Status of Compliance
financial, environmental and state roads development practices. (c) In relation to the Project, the State shall at all times operate and maintain its plants, equipment and other property, and from time to time, promptly as needed, make all necessary repairs and renewals thereof, all in accordance with sound administrative, financial, engineering, environmental, state roads development, and maintenance and operational practices.		sound administrative, financial, environmental and state roads development practices. **Complied With.** The State operated and maintained its plants, equipment and other property, promptly as needed, made all necessary repairs and renewals thereof, all in accordance with sound administrative, financial, engineering, environmental, state roads development, and maintenance and operational practices.
Except as ADB may otherwise agree, in so far as it relates to the Project, the State shall not sell, lease or otherwise dispose of any of its assets whose disposal may prejudice its ability to perform efficiently or satisfactorily any of its obligations under this Project Agreement.	PA, Article II, Section 2.12	**Complied with.** The State and PWD didn’t lease or dispose of any of its assets that were required for satisfactory and efficient performance of any of its obligations under this Project Agreement.

Source: ADB project completion review mission.

APPRAISAL AND ACTUAL IMPLEMENTATION SCHEDULE

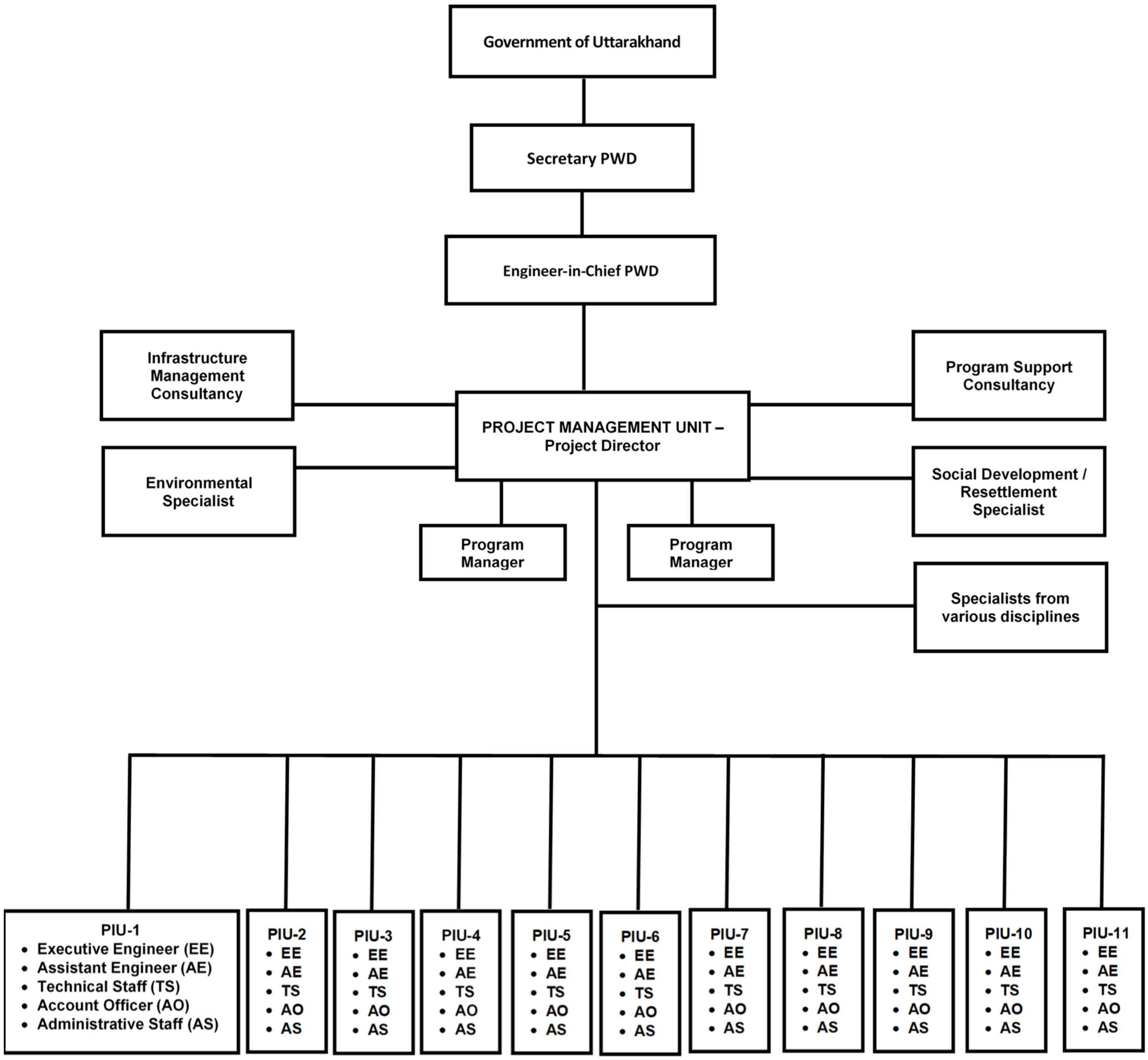


Notes: Q= Quarter | At Appraisal | Actual

Source: Endorsement of PFR2 Report and Authorisation of Loan Negotiations - July 2008

[a] Gap in procurement is due to retendering of 3 poor performance of contractors. Retendering started from Q1 2012 and awarded in Q2 2013

ORGANIZATIONAL CHART OF PROJECT IMPLEMENTATION



ADB = Asian Development Bank, PWD = Public Works Department, PIU = project implementation unit.
Source: UKPWD and project implementation units.

ECONOMIC ANALYSIS AND SENSITIVITY ANALYSIS

A. General

1. The Asian Development Bank (ADB) project completion review (PCR) team conducted an economic re-evaluation of the project using a methodology similar to that used at appraisal and the updated data. The “without” project scenario assumed that the original state of the roads would be retained. The “with” project scenario considered the improvement of the roads carried out under the project enabling vehicles to drive faster with lower operating costs and reduced travel time. Economic benefits were calculated by comparing the “with” and “without” project scenarios. The project’s economic internal rate of return (EIRR) was calculated and subjected to a sensitivity test.

2. The economic analysis methodology followed the ADB’s *Guidelines for the Economic Analysis of Projects (1997)*. Calculation of EIRRs was based on the following general assumptions:

(i) the life of roads was taken as the improvement period followed by 20 years of operation;

(ii) all costs and benefits were expressed in Indian Rupees (₹) at 2018 constant prices;

(iii) the financial capital and maintenance costs were calculated into economic costs by using the conversion factor of 0.90.

3. The economic analysis was performed using the Highway Development and Management (HDM-4) to evaluate the viability of a network of 55 roads selected for improvement in Project 2. These 55 roads have been divided into 20 contract packages with respect to the location/ region of each road. The analysis was performed at both the disaggregated and aggregated network level. At the disaggregate level, economic analysis was performed for the cluster of roads in each contract package, which were awarded, for implementation, as one package, generally located in the same zone/region. The aggregate analysis was performed on the whole project, considering the cumulative net benefit of all packages. The analysis considered the vehicle operating cost (VOC) savings and travel time savings derived from the improvements, and the cost of improvements and the savings in future periodic and routine maintenance costs.

4. The project roads network consists of 10 secondary roads, termed as major district roads (MDR) and 45 tertiary roads termed as other district road (ODR) and village road (VR). All roads are single lane carriageway having carriageway varying between 3.4 m to 3.6m and proposed to be upgraded to 3.75m carriageway and 1 road to 5.5m carriageway. Except 5 roads, which are located in plain to rolling terrain, all roads traverse through hilly terrain. The project roads serve many villages and agriculture is the main economic activity along the project roads

B. Traffic Analysis and Forecast

5. Review of historical data: Earlier traffic surveys were carried out in the year 2007 at ‘project appraisal stage’. Further traffic data for the year 2017 was collected from PWD at PCR stage. In this phase, traffic counts for 9 vehicle types were collected, including passenger car/ van, bus, two & three wheelers, light commercial vehicle (LCV), three (3) categories of freight trucks including agricultural vehicles.6.Comparison of overall traffic growth : It is observed from the comparison of traffic count of motorized vehicles for sample roads in the year 2007 at appraisal and 2017 that the annual traffic growth rates vary from 8.6% to 13.9% per annum.

Table A10.1: Comparison of Traffic Count and Growth at appraisal in 2007 and at completion 2017 on Sample Roads listed in Appraisal (AADT in numbers)

Sr. No.	District	Road Name	Type of Road	2007 Traffic [(a)]	2017 Traffic [(b)]	Overall CAGR
1	Almora	Ganiadeoli-Abhiyari	ODR	192	615	12.3%
2		Chokhutiya-Bachhuvaban	ODR	310	1089	13.4%
3	Bageshwar	Baijnath-Gwaldam	MDR	914	2837	12.0%
4	Pithoragarh	Udiyariband-Sheraghat	SH	720	2410	12.8%
5	Pithoragarh	Thal - Ogla	MDR	601	1786	11.5%
6		Pithoragarh-Jhulaghat	ODR	530	1743	12.6%
7	Nainital	Malla-Talla-Ramgarh Nathuwakhan	ODR	820	2457	11.6%
8		Nainital-Pangot	MDR	952	3296	13.2%
9	US Nagar	Kitcha-Dareu	ODR	3341	10358	12.0%
10	New Tehri	New Tehri - Ghanshali-Tilwara	MDR	307	973	12.2%
11	Haridwar	Biharigarh-Buggawala	VR	1074	3529	12.6%
12	Haridwar	Ruhalki-Sahdevpur	VR	1050	3854	13.9%
13	Haridwar	Pirankaliyar-Mujahidpur-Sattiwala	VR	2455	8137	12.7%
14	Haridwar	Raisi-Shahpur	VR	439	1287	11.4%
15	Haridwar	Aurangabad-Teliwala	VR	389	1340	13.2%
16	Pauri	Santudhar-Pavo	ODR	162	409	9.7%
17	Pauri	Matiyali-Dwarikhal	ODR	317	1054	12.8%
18	Pauri	Kandakhal-Chalusain-Devikhet	ODR	114	368	12.4%
19	Pauri	Dhumakot-Nainidanda	SH	308	895	11.3%
20	Pauri	Khaludanda-Apolosera	VR	39	89	8.6%

*CAGR= Compound Annual Growth Rate; AADT= Annual average daily traffic
Source: [(a)] Project Appraisal -2007 and [(b)] Survey data of PWD-2017

6. The average traffic growth rate for motorized vehicles during 2007 to 2017 comes out to be 12.3%. From the study of the traffic composition of the data, it is observed that cars and two wheelers account for around 80% (car - 37% and two-wheeler – 43%) of the traffic on the sections. The comparison of traffic growth by vehicle category is discussed in the following paragraphs.

7. Comparison of Traffic Growth by Vehicle Category: The growth in traffic from 2007 to 2017 was compared for each vehicle type to understand category-wise growth and the findings are tabulated as follows:

Table A20.2: Comparison of Traffic Growth by Vehicle Category (2007 to 2017)

Road	Year	Two-wheeler	Three-wheeler	Car /Jeep	Bus	Mini Bus	LCV	2-Axle Truck	3-Axle Truck
Sample roads (20)	2007 [(a)]	8829	232	4248	279	123	587	657	75
	2017 [(b)]	30044	437	14984	478	196	1044	1205	137
	CAGR	13.0%	6.5%	13.4%	5.5%	4.8%	5.9%	6.3%	6.2%

(Traffic count – Aggregate traffic on sample roads)
Source: [(a)] Project Appraisal and [(b)] Survey Data of PWD-2017

8. The composition of tractor-trailers was shown, in the Detailed Project Report, for eight sample roads ranging from12% to 20% of total vehicles, while for other roads it was missing at appraisal. Considering that projects roads are dominantly village roads, the tractor vehicle has been considered 10% of base year traffic, for remaining 47roads in revaluation at PCR.

9. Past Trend of Vehicle Registration: The compound annual growth rates (CAGR) (%) in registered vehicles (by vehicle type) for Uttarakhand state is shown in the following table:

Table A10.3: Historical Vehicle Registration Data

Years (At end of)	Two wheelers	Three-Wheeler	Car/ Jeep	Taxi Cab	Bus	Heavy Vehicles	Tractor Trolley
2011-12	981,825	15,463	205,745	25,265	6,069	40,103	60,154
2012-13	1,105,315	16,315	242,026	28,722	6,218	41,802	64,916
2013-14	1,237,685	17,036	275,231	31,519	6,619	44,660	69,458
2014-15	1,387,457	18,293	311,908	34,449	6,962	48,387	72,478
2015-16	1,551,544	19,677	350,582	38,077	7,489	50,620	75,929
CAGR	**12.12%**	**6.21%**	**14.27%**	**10.80%**	**5.41%**	**6.01%**	**6.01%**

**Source: Statistical Abstract of Uttarakhand 2016-17*

10. It is observed that, for each vehicle category, the CAGR derived from the survey data as explained in para 8 above is in line with the growth rate per annum of the registered vehicles in the region.

11. Future Growth and Projections: Traffic forecast has been based on the transport demand elasticity approach, wherein a log-log relationship has been established between traffic and socio-economic indicators such as gross state domestic product (GSDP). From FY 2011-12 to FY 2016-17, the GSDP (at constant prices) of Uttarakhand has grown annually at 7.14%. This methodology is in line with the guidelines given in Indian Road Congress (IRC) 108-1996: *Guidelines for Traffic Prediction on Rural Highways*. The resultant elasticity values are presented in the table below.

Table A10.4: Elasticity values for each mode

Mode	Elasticity Value
Heavy Vehicles	0.91
Bus	0.76
Three Wheelers	0.84
Two Wheelers	1.19
Car/ Jeep	1.07
Tractor Trolley	0.94

12. Traffic Growth Rates: Considering that growth in population and gross domestic product as principal parameters for future passenger traffic demand, along with the above-mentioned elasticity values, the future average annual growth rates were estimated for all passenger and freight modes.

Table A10.5: Adopted Growth Rates up to 2035 for Economic evaluation

Years	Two wheelers	Auto Rickshaw	Car/ Jeep	Bus	Freight Vehicles	Tractor Trolley
2011-16 *	12.12%	6.22%	14.27%	5.41%	6.01%	6.01%

Years	Two wheelers	Auto Rickshaw	Car/ Jeep	Bus	Freight Vehicles	Tractor Trolley
2017-20	10.42%	5.81%	12.33%	5.25%	6.30%	6.55%
2021-25	10.16%	5.64%	10.10%	5.10%	6.12%	6.36%
2026-30	9.92%	5.47%	8.89%	4.95%	5.94%	6.17%
2031-35	9.30%	5.05%	8.33%	4.57%	5.48%	5.70%

** As per Statistical Abstract of Uttarakhand 2016-17*

13. Summary of comparison of derived growth rates at project completion with respect to the growth rates mentioned in Appraisal is given the table below:

Table A10.6: Comparison of growth rates at appraisal and at project completion (%)

Year	Adopted at Appraisal				Adopted at PCR			
	Bus	Car	Truck	LCV	Bus	Car	Truck	LCV
2007-09	8.40	9.00	7.80	7.80	5.41	14.27	6.01	6.01
2010-14	9.10	9.10	7.80	7.80	5.41	14.27	6.01	6.01
2015-17	8.78	9.45	8.10	8.10	5.41	14.27	6.01	6.01
2018-19					5.25	12.33	6.30	6.30
2020-25	7.80	8.45	7.15	7.15	5.10	10.10	6.12	6.12
2026-35					4.95	8.89	5.94	5.94

14. The growth rates up to 2016 considered in the PCR are based on actual growth rates observed in the survey data from 2007 to 2017 and the vehicle registration data recorded during the period.

15. It can be observed that from 2017 onwards, the PCR growth rates considered for car is on the slightly higher side with respect to appraisal. However, for bus, truck and LCV, the PCR growth rates are on lower side, taking into account past trend of growth in these vehicle categories. At appraisal, provision of generated traffic of 20% of traffic in 2012 (which was three years after completion of road improvement works) was made while carrying out economic analysis. However, at PCR, no generated traffic has been considered, presuming the traffic of 2017, based on traffic surveys, has already taken the enhancement of traffic due to generated traffic.

16. Traffic volume input: Five contract packages have one road in each package. For remaining 15 contracts packages, the number of roads under each package, varies from two roads to six roads. For the economic analysis at disaggregate level (contract package wise), the traffic data in 2007 (base year normal traffic and composition) has been taken from the weighted average with respect to the length of each road and respective traffic volume, for each package. A sample of one of the (package 14 – Zone: Haridwar), is given below:

Table A10.7: Weighted Average of traffic data: Normal Traffic (AADT) and composition

Contract Pkg No.	Road Name	Length (km)	Two-Wheeler	Car /Jeep	Bus	Mini Bus	LCV	2-Axle Truck	3-Axle Truck	Tractor	Total
Pkg 14 (#) (Haridwar)	Ruhalki-Sahdevpur	4.8km	926	55	31	0	31	7	0	196	1246
	Pirankaliyar-Sattiwala	12.9km	1958	449	2	0	22	20	3	186	2640
	Raisi-Shahpur"	21.7km	248	113	24	0	2	51	0	184	622
Weighted Average (Vehicle Numbers)			892	214	18	0	12	35	1	186	1360

Weighted Average (Composition)	66%	16%	1%	0%	1%	3%	0%	14%	100%

(#) Source: Traffic data of year 2007 at project appraisal stage

C. Engineering Design and Construction Costs

17. As per the detailed design report, all roads were r reconstructed/ Rehabilitated / upgraded to have adequate pavement composition for horizon period and standard single lane width. Construction cost has been taken from the actual expenditure incurred on each package. Compared with the cost estimation at appraisal, the upgrading unit cost in ₹ was about 18% higher.

18. As a result of upgrading, riding quality of roads has improved but the curvature and gradient remain broadly same due to site and topography constrains in the mountainous region. Since most of the project roads traverse through hilly / mountainous terrain, significant cost component has been incurred on safety / crash barriers, warning signs, and other safety measures as well preventive measures for slope disturbance. Due to such type of expenditure, cost of few of the roads has gone quite high. The unit cost of the project roads varies between ₹3.8 million per km to ₹13.8 million per km. The distribution (No of packages / roads and road length) with respect to the range of construction cost is given below in table A10.8

Table A10.8: Distribution of Construction cost for project 2

Range of Financial Cost (₹ in Million per km)	No. of Contract Packages	No of Roads	Length km	%
3.0–5.0	3	6	154.0	17.5
5.0–7.0	6	15	312.8	35.5
7.0–9.0	8	29	346.7	39.3
9.0–11.0	2	4	58.4	6.6
11.0–14.0	1	1	9.1	1.0
Total	**20**	**55**	**881**	**100**

19. The duration of construction has been taken as per the actual construction period for each package and it varies from 2 years to 5 years, between 2009 and 2014.

20. Economic analysis has been carried out using the world price numeraire, presented in the domestic currency. The financial construction and maintenance costs have been taken from the project completion cost and quoted unit cost respectively. In the economic reevaluation the "conversion factor" (CF) is the conversion factor to convert the financial costs into economic costs. The “Manual on Economic Evaluation of Highway Projects in India (IRC: SP30-2019)” by Indian Roads Congress recommends a factor of 0.80 - 0.90 for converting financial costs of road works to economic costs. The financial capital and maintenance costs have been calculated to economic costs by using the conversion factor of 0.90, as adopted at appraisal.

D. Maintenance Strategy and Maintenance Costs

21. Cost of routine maintenance has been taken as per amount quoted by the bidders for post construction maintenance period of three years and the maintenance costs. The cost of periodic maintenance has been derived from quoted rate of bidder. The routine and periodic maintenance, used in HDM-4 model, are summarized below in table A10.9.

Table A10.9: Maintenance Strategies and Cost

Item	Details/ Strategy	Financial Cost (₹)
Without Project Scenario		
Routine Maintenance	Scheduled; Annual maintenance	50,000/ km
Patch work	Condition responsive; when pot hole > 25nos/km	350/ sq. m.
Periodic Maintenance	Scheduled; Every 6th Year; 25mm Dense Graded Asphalt (₹350/ sqm for 3.5m width)	1.225 million /km
With Project Scenario		
Routine Maintenance	Scheduled; Annual maintenance	35,000/ km
Patch work	Condition responsive; when pot hole > 25nos/km	350/ sq. m.
Periodic Maintenance	Scheduled; Every 5th Year; 25mm Dense Graded Asphalt (₹350/ Sqm for 3.75m width)	1.3125 million /km

22. The without project scenario will have a higher cost for routine maintenance considering the deteriorated condition of the roadway and necessity of carrying out activities like slope stability of hill roads, cleaning of earth drains and longitudinal drains more frequently and rigorously. However, for periodic maintenance, slightly conservative maintenance strategy has been considered by proposing scheduled overlay every 6th year while for with project scenario, it is proposed every 5th year.

E. Project Benefits

23. Due to improved road condition, vehicles now drive faster than before the project, leading to substantial economic benefits in the project areas. At appraisal, three types of economic benefits were captured for the project roads: (i) savings in vehicle operating cost (VOC) (ii) savings in the value of passenger time; and (iii) benefits arising due to reduction in agriculture spoilage, which was calculated outside HDM-4. However, the benefits arising due to reduction in agriculture spoilage has not been recalculated, in the revaluation of economic analysis, due to lack of information on its assumptions at appraisal and calculation which are considered more subjective. The benefits due to reduction in agriculture spoilage, at aggregate / network level, have been taken as of that appraisal. However, at disaggregated level for each contract package, the VOC per vehicle-kilometer was computed for each class of vehicle, using input values for the economic costs of new vehicle, tyres, fuel, lubricants and maintenance labour that were abstracted from. The VOC savings per vehicle-km were estimated at ₹1.44 for cars, jeeps; ₹4.64 for buses; ₹2.12 for light trucks; and ₹4.28 for heavy trucks. The summary of saving in VOC, is presented in table A10.10

Table A10.10: Unit Vehicle Operation Costs
(₹Per Vehicle -Kilometer)

Scenario	Car/ Jeep	Mini Bus	LCV	Truck	Truck-Trailer	Two-Wheeler
Alt-0: Without Project	7.60	18.94	9.30	31.72	37.11	1.95
Alt-1: With Project	6.16	14.30	7.18	27.44	29.95	1.58
VOC Savings	1.44	4.64	2.12	4.28	7.16	0.37

Source: HDM4 analysis at aggregate level.

24. Passenger travel time cost savings were recalculated for different types of passenger vehicles (Car/ Jeep/ Taxi, two-wheeler, and bus). Unit value of time for passengers & cargo and other factors used to estimate time cost savings included average vehicle loads, percentage of work-related trips, time costs by different road users, and travel speeds for different types of

passenger vehicles were taken from IRC : SP30-2019 : *Manual on Economic Evaluation of Highway Projects in India.* Most of the project roads are in the hilly regions of Uttarakhand state and they provide significant improvement in connectivity. The additional benefits provided by upgraded roads to these habitations include health, education, agriculture, poverty reduction, safer movement of traffic etc., which have not been considered in the analysis.

F. Economic Revaluation and Sensitivity Tests

25. Based on the assumptions and parameters above, the EIRRs were calculated for each Contract Package for a horizon period comprises construction period of respective package and 20 years of operation period. The revaluated EIRR for the project, with and without benefit of agriculture spoilage is as given below:

Table A10.11: Comparison of economic indicators at appraisal and PCR

1. Scenario	2. EIRR (%) at Base Case	
	At Appraisal	**At PCR Stage**
Excluding benefit arise due to reduction in Agricultural spoilage	13.0 %	14.5%
Including benefit arise due to reduction in Agricultural spoilage	18.6%	18.8%

26. At disaggregate level, economic analysis has been carried out for 20 contract packages without including any benefit due to reduction in agriculture spoilage. Nine contract packages have EIRR less than 12%. These roads have low traffic volume and high cost for upgrading due to significant cost towards the slope stability, additional culverts and drainage as 15 roads traverse through hilly terrain. However, they are mostly village roads that would significantly improve the accessibility of the villagers. The salient features of economic analysis of each package is summarized in table A 10.13.

27. The revaluated EIRR for the project, as a whole (aggregate as a network) is 14.5% as compared to 13.0% estimated at appraisal. The higher EIRR was mainly due to the higher traffic growth rates in early years of operation. The project is considered economically viable. The costs and benefit streams for the aggregate total of 20 Contract packages over the full evaluation period are in table A10.14 and table A10.15, excluding benefit arise due to reduction in agricultural spoilage and including benefit arise due to reduction in agricultural spoilage, respectively.

28. The EIRR was subjected to a sensitivity analysis to test different scenarios of maintenance costs and benefits. The sensitivity analysis results indicated that the project continued to be economically viable for all scenarios. If a 20% maintenance cost increase would be combined with a 20% benefit reduction, the EIRR would be still 12.4% for the whole project. The sensitivity analysis confirmed that the project has robust economic viability. The sensitivity analysis also showed that the EIRR was more sensitive to changes in economic benefits. The results of the sensitivity analysis are shown at following table A10.12.

Table A10.12 Sensitivity Analysis

Case	Tests: Main. Cost	Tests: Benefits	EIRR	NPV @12% (₹ million)
Base Case			14.5%	802.26
Changes (+/ -)		- 20%	12.0%	0.00
	20%		14.9%	919.51
	20%	- 20%	12.4%	114.78

EIRR = economical internal rate of return, NPV = net present value.

Table A10.13: Salient features of Economic analyses at Aggregate level

Contract Package No.	Zones/ Districts	No. of Roads	Length (km)	Construction Cost (financial ₹ million /km) #	AADT Vehicle Numbers	EIRR for Contract Package	NPV @ 12% (₹ Million)
Pkg - 1	Almora	5	43.80	8.87	185	0.2%	(126.745)
Pkg - 2	Bageshwar & Pithoragarh	4	64.42	7.19	616	16.3%	134.977
Pkg - 3	Pithorgarh	2	59.13	5.88	626	19.4%	176.865
Pkg - 4	Champawat	2	57.26	6.69	407	13.4%	26.345
Pkg - 5	Nainital & US Nagar	4	39.62	8.09	1453	25.5%	283.905
Pkg - 6	Chamoli	3	53.95	3.81	194	10.1%	(8.325)
Pkg - 7	Tehri Garhwal	1	36.89	8.84	1033	25.6%	316.125
Pkg - 8	Tehri Garhwal	1	34.00	7.37	338	7.2%	(66.435)
Pkg - 9	Tehri Garhwal	1	37.80	4.32	1041	38.0%	309.195
Pkg -10	Tehri Garhwal	1	19.01	10.74	1141	17.2%	85.835
Pkg -11	Tehri Garhwal	2	62.31	4.69	318	13.0%	17.455
Pkg -12	Tehri Garhwal	2	26.09	5.67	121	(0.35)%	(51.105)
Pkg -13	Haridwar	1	9.65	13.81	1218	14.6%	28.835
Pkg -14	Haridwar	3	39.40	8.98	1360	21.9%	277.385
Pkg -15	Haridwar	4	32.27	8.05	517	12.11%	5.885
Pkg -16	Pauri	2	60.87	6.05	153	1.6%	(144.115)
Pkg -17	Pauri	5	62.40	6.37	194	3.6%	(118.715)
Pkg -18	Pauri	2	47.03	6.52	198	4.3%	(84.675)
Pkg -19	Pauri	4	45.63	8.52	241	3.4%	(128.255)
Pkg -20	Pauri	6	50.10	7.08	132	(0.1)%	(132.185)
Total	**Phase 2**	**55**	**881.63**	**147.54**	**11486**	**14.5 %**	**802.26**

(Contract-wise; excluding benefit arise due to reduction in agricultural spoilage)
#: Aggregate cost of each contract package

Table A10.14: Cost and Benefit Streams for Phase 2: (₹ million)
(Excluding benefit arise due to reduction in Agricultural spoilage)

Year	Base Case- Do Nothing				Rehabilitation- Do something				Benefits				
	Capital Cost	**Routine Cost**	**Time Cost**	**VOC**	**Capital Cost**	**Routine Cost**	**Time Cost**	**VOC**	**Capital Cost**	**Routine Cost**	**Time Cost**	**VOC**	**Total**
2009	0.00	40.02	853.97	1,501.81	326.62	0.00	853.97	1,501.81	(326.62)	40.02	0.00	0.00	(286.60)
2010	0.00	41.19	946.65	1,699.48	1,633.10	0.00	945.60	1,690.00	(1,633.10)	41.19	1.05	9.48	(1,581.38)
2011	0.00	42.24	1,065.15	1,978.03	1,633.10	0.00	1,048.29	1,830.30	(1,633.10)	42.24	16.87	147.73	(1,426.26)
2012	973.66	42.24	1,218.88	2,317.13	653.24	27.77	1,167.68	1,995.02	320.42	14.47	51.20	322.11	708.21
2013	0.00	39.67	1,282.88	2,219.32	489.93	27.77	1,295.92	2,153.96	(489.93)	11.90	(13.04)	65.36	(425.71)
2014	0.00	39.67	1,433.96	2,524.96	707.68	27.77	1,438.82	2,297.75	(707.68)	11.90	-4.86	227.21	(473.43)
2015	0.00	39.67	1,611.86	2,890.15	118.40	28.01	1,590.41	2,515.94	(118.40)	11.66	21.45	374.21	288.93
2016	0.00	39.67	1,830.13	3,340.69	192.65	27.88	1,797.27	2,839.91	(192.65)	11.79	32.85	500.78	352.77
2017	0.00	39.67	2,119.12	3,937.60	160.57	27.86	2,054.02	3,237.03	(160.57)	11.80	65.10	700.56	616.90
2018	977.39	39.67	2,463.42	4,613.37	526.12	27.87	2,339.89	3,663.46	451.27	11.80	123.53	949.90	1,536.50
2019	0.00	39.67	2,724.20	4,604.54	63.89	27.82	2,695.82	4,180.88	(63.89)	11.84	28.38	423.66	399.99
2020	0.00	39.67	3,170.22	5,355.31	118.40	28.02	3,135.32	4,815.07	(118.40)	11.65	34.90	540.24	468.39
2021	0.00	39.67	3,580.75	6,088.16	192.65	27.90	3,535.79	5,381.53	(192.65)	11.77	44.96	706.63	570.71
2022	0.00	39.67	4,033.02	6,938.56	160.57	27.88	3,971.37	6,014.67	(160.57)	11.79	61.65	923.90	836.77
2023	0.00	39.67	4,576.06	7,968.12	526.12	27.92	4,465.77	6,722.24	(526.12)	11.75	110.29	1,245.88	841.80
2024	977.61	39.67	5,245.21	9,137.34	63.89	27.86	5,077.92	7,591.26	913.71	11.81	167.29	1,546.08	2,638.89
2025	0.00	39.67	5,816.94	9,264.03	118.40	28.06	5,773.22	8,581.21	(118.40)	11.60	43.71	682.82	619.75
2026	0.00	39.67	6,701.24	10,636.19	192.65	27.92	6,644.38	9,724.83	(192.65)	11.74	56.87	911.35	787.32
2027	0.00	39.67	7,683.21	12,199.33	160.57	27.93	7,608.52	11,014.33	(160.57)	11.74	74.70	1,185.00	1,110.87
2028	0.00	39.67	8,629.93	13,858.56	526.12	28.03	8,519.69	12,261.23	(526.12)	11.64	110.24	1,597.33	1,193.09
2029	0.00	39.67	9,725.26	15,708.32	63.89	27.88	9,558.64	13,696.28	(63.89	11.79	166.62	2,012.04	2,126.56
2030	978.72	39.67	10,838.08	17,445.44	118.40	28.06	10,641.50	15,169.68	860.33	11.60	196.59	2,275.76	3,344.28
2031	0.00	39.67	11,602.39	17,307.09	192.65	27.93	11,564.56	16,417.18	(192.65)	11.73	37.83	889.91	746.82
2032	0.00	39.67	12,281.99	18,620.08	160.57	27.99	12,228.07	17,418.48	(160.57)	11.68	53.92	1,201.60	1,106.63
2033	0.00	39.67	13,034.31	20,084.61	526.12	28.19	12,958.41	18,503.39	(526.12)	11.48	75.90	1,581.22	1,142.48
2034	0.00	39.67	13,658.42	21,473.13	(480.47)	27.88	13,555.56	19,406.99	480.47	11.79	102.86	2,066.14	2,661.27
												NPV	802.26
												EIRR	14.5%

() = negative, EIRR = economical internal rate of return, NPV = net present value, VOC = vehicle operating cost.
Source: Asian Development Bank project completion review mission.

Table A10.15: Cost and Benefit Streams for Phase 2: (₹ million)
(Including benefit arise due to reduction in Agricultural spoilage)

Year	Base Case- Do Nothing				Rehabilitation- Do something				Benefits					
	Capital Cost	Routine Cost	Time Cost	VOC	Capital Cost	Routine Cost	Time Cost	VOC	Capital Cost	Routine Cost	Time Cost	VOC	Agriculture Spoilage #	Net Benefits
2009	0.00	40.02	853.97	1,501.81	326.62	0.00	853.97	1,501.81	(326.62)	40.02	0.00	0.00		(286.60)
2010	0.00	41.19	946.65	1,699.48	1,633.10	0.00	945.60	1,690.00	(1,633.10)	41.19	1.05	9.48		(1,581.38)
2011	0.00	42.24	1,065.15	1,978.03	1,633.10	0.00	1,048.29	1,830.30	(1,633.10)	42.24	16.87	147.73		(1,426.26)
2012	973.66	42.24	1,218.88	2,317.13	653.24	27.77	1,167.68	1,995.02	320.42	14.47	51.20	322.11		708.21
2013	0.00	39.67	1,282.88	2,219.32	489.93	27.77	1,295.92	2,153.96	(489.93)	11.90	-13.04	65.36		(425.71)
2014	0.00	39.67	1,433.96	2,524.96	707.68	27.77	1,438.82	2,297.75	(707.68)	11.90	-4.86	227.21	322.99	(150.44)
2015	0.00	39.67	1,611.86	2,890.15	118.40	28.01	1,590.41	2,515.94	(118.40)	11.66	21.45	374.21	329.45	618.38
2016	0.00	39.67	1,830.13	3,340.69	192.65	27.88	1,797.27	2,839.91	(192.65)	11.79	32.85	500.78	336.04	688.81
2017	0.00	39.67	2,119.12	3,937.60	160.57	27.86	2,054.02	3,237.03	(160.57)	11.80	65.10	700.56	342.76	959.66
2018	977.39	39.67	2,463.42	4,613.37	526.12	27.87	2,339.89	3,663.46	451.27	11.80	123.53	949.90	349.61	1,886.11
2019	0.00	39.67	2,724.20	4,604.54	63.89	27.82	2,695.82	4,180.88	(63.89)	11.84	28.38	423.66	356.61	756.60
2020	0.00	39.67	3,170.22	5,355.31	118.40	28.02	3,135.32	4,815.07	(118.40)	11.65	34.90	540.24	363.74	832.13
2021	0.00	39.67	3,580.75	6,088.16	192.65	27.90	3,535.79	5,381.53	(192.65)	11.77	44.96	706.63	371.01	941.72
2022	0.00	39.67	4,033.02	6,938.56	160.57	27.88	3,971.37	6,014.67	(160.57)	11.79	61.65	923.90	378.43	1,215.20
2023	0.00	39.67	4,576.06	7,968.12	526.12	27.92	4,465.77	6,722.24	(526.12)	11.75	110.29	1,245.88	386.00	1,227.80
2024	977.61	39.67	5,245.21	9,137.34	63.89	27.86	5,077.92	7,591.26	913.71	11.81	167.29	1,546.08	393.72	3,032.61
2025	0.00	39.67	5,816.94	9,264.03	118.40	28.06	5,773.22	8,581.21	(118.40)	11.60	43.71	682.82	401.6	1,021.35
2026	0.00	39.67	6,701.24	10,636.19	192.65	27.92	6,644.38	9,724.83	(192.65)	11.74	56.87	911.35	409.63	1,196.95
2027	0.00	39.67	7,683.21	12,199.33	160.57	27.93	7,608.52	11,014.33	(160.57)	11.74	74.70	1,185.00	417.82	1,528.69
2028	0.00	39.67	8,629.93	13,858.56	526.12	28.03	8,519.69	12,261.23	(526.12)	11.64	110.24	1,597.33	426.18	1,619.27
2029	0.00	39.67	9,725.26	15,708.32	63.89	27.88	9,558.64	13,696.28	(63.89	11.79	166.62	2,012.04	434.70	2,561.26
2030	978.72	39.67	10,838.08	17,445.44	118.40	28.06	10,641.50	15,169.68	860.33	11.60	196.59	2,275.76	443.39	3,787.67
2031	0.00	39.67	11,602.39	17,307.09	192.65	27.93	11,564.56	16,417.18	(192.65)	11.73	37.83	889.91	452.26	1,199.08
2032	0.00	39.67	12,281.99	18,620.08	160.57	27.99	12,228.07	17,418.48	(160.57)	11.68	53.92	1,201.60	461.31	1,567.94
2033	0.00	39.67	13,034.31	20,084.61	526.12	28.19	12,958.41	18,503.39	(526.12)	11.48	75.90	1,581.22	470.53	1,613.01
2034	0.00	39.67	13,658.42	21,473.13	(480.47)	27.88	13,555.56	19,406.99	480.47	11.79	102.86	2,066.14	479.94	3,141.21
													NPV	2,377.88
													EIRR	18.80%

() = negative, EIRR = economical internal rate of return, NPV = net present value, VOC = vehicle operating cost; # agricultural spoilage taken from appraisal
Source: Asian Development Bank project completion review mission.

CONTRIBUTION TO THE ADB RESULTS FRAMEWORK

S. no.	Level 2 results Framework Indicators (Outputs and Outcomes)	Target	Aggregate output	Methods/Comments
1	Use of roads built or upgraded average daily vehicle-kilometers in the first full year of operation	-	1,403,983 million vehicle-kilometers per day in 2017	At completion that the traffic increased at an average 12.30% per year in 2007-2017.
2	Provincial, district, and rural roads built or upgraded (kilometers)	966 km provincial, district, and rural roads built	881 km district and rural roads	55 road sections comprising total 881 km were rehabilitated or upgraded per specific rehabilitation requirements utilizing the loan funds.