



Performance Evaluation Report

PPE: KAZ 28403

Road Rehabilitation Project

(Loan 1455-KAZ)

in Kazakhstan

December 2005

Operations Evaluation Department
Asian Development Bank

CURRENCY EQUIVALENTS

	Currency Unit	–	tenge (T)	
	At Appraisal (May 1996)		At Project Completion (August 2001)	At Operations Evaluation (December 2005)
T1.00 =	\$0.0154		\$0.0066	\$0.0074
\$1.00 =	T65.00		T151.99	T134.45

ABBREVIATIONS

AADT	–	annual average daily traffic
AASHTO	–	American Association of State Highway and Transportation Officials
ADB	–	Asian Development Bank
ADTA	–	advisory technical assistance
BME	–	benefit monitoring and evaluation
DOR	–	Department of Roads
EIRR	–	economic internal rate of return
FIDIC	–	Fédération Internationale des Ingénieurs Conseils (International Federation of Consulting Engineers)
FSU	–	former Soviet Union
GDP	–	gross domestic product
GOST	–	Gosudarstvennye Standarty (Soviet Standards)
HDM4	–	Highway Design and Maintenance Model Version 4
ICB	–	international competitive bidding
IFI	–	international financial institution
IRI	–	international roughness index
Kazdornii	–	Kazakhstan Road Science Research Institute
MOTC	–	Ministry of Transport and Communications
OED	–	Operations Evaluation Department
OEM	–	Operations Evaluation Mission
PCR	–	project completion report
PIU	–	project implementation unit
PPTA	–	project preparatory technical assistance
RRP	–	report and recommendation of the President
RSPS	–	road sector policy statement
SRA	–	State Road Authority
TA	–	technical assistance
VOC	–	vehicle operating cost

NOTE

In this report, “\$” refers to US dollars.

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Operations Evaluation Department, PE-673

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The guidelines formally adopted by the Operations Evaluation Department (OED) on avoiding conflict of interest in its independent evaluations were observed in the preparation of this report. The fieldwork was undertaken by Phil Salt and Andrey Yershov (staff consultants) under the guidance of the mission leader. To the knowledge of the management of OED, there were no conflicts of interest of the persons preparing, reviewing, or approving this report.

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BASIC DATA

Project Preparation/Institution Building

TA No.	TA Name	Type	Person-Months	Amount (\$000)	Approval Date
TA 2285	Preparation of Road Rehabilitation Program	PPTA	87	600	11 Jan 1995
TA 2631	Institutional Strengthening of the Road Sector ^a	ADTA	53	750	27 Aug 1996
TA 2632	Feasibility Study of Selected Priority Road Sections ^b	PPTA	20	250	27 Aug 1996

Key Project Data (\$ million)	As per ADB	
	Loan Documents	Actual
Total Project Cost	77.0	78.0
Foreign Exchange Cost	40.0	46.3
Local Currency Cost	37.0	31.7
ADB Loan Amount/Utilization	50.0	43.8
ADB Loan Amount/Cancellation		6.2

Key Dates	Expected		Actual	
	Fact-Finding		21 Feb-6 Mar	1996
Appraisal		7-17 May	1996	
Loan Negotiations		24-26 July	1996	
Board Approval		27 August	1996	
Loan Agreement		18 October	1996	
Loan Effectiveness	16 January	1997	31 March	1997
First Disbursement			5 June	1997
Project Completion		May 2000	August	2002
Loan Closing	30 November	2000	11 December	2002
Months (effectiveness to completion)		41		64

Economic Internal Rates of Return (%)	Appraisal	PCR	PPER
Economic Internal Rate of Return	21.5	14.7	19.8

Borrower Republic of Kazakhstan

Executing Agency Ministry of Transport and Communications

Mission Data

Type of Mission	No. of Missions	No. of Person-Days
Fact-Finding	1	37
Appraisal	1	32
Project Administration		
Inception	1	5
Review	5	25
Midterm Review	1	15
Special Loan Administration	1	3
Project Completion	1	16
Operations Evaluation	1	17

ADB = Asian Development Bank, ADTA = advisory technical assistance, PCR = project completion report, PPER = project performance evaluation report, PPTA = project preparatory technical assistance, TA = technical assistance.

^a Attached technical assistance to Loan 1455-KAZ. ADB. 1996. *Technical Assistance to Kazakhstan for the Institutional Strengthening of the Road Sector*. Manila.

^b Attached technical assistance to Loan 1455-KAZ. ADB. 1996. *Technical Assistance to Kazakhstan for the Feasibility Study of Selected Priority Road Sections*. Manila.

EXECUTIVE SUMMARY

This report details the findings of an evaluation of the Road Rehabilitation Project in Kazakhstan. The Project was Asian Development Bank's (ADB) first support for the transport sector in Kazakhstan. It was also the first road investment in the country supported by an international financial institution.

Kazakhstan is a large, landlocked country. Under the centrally planned economy of the former Soviet Union, it was a major supplier of raw materials and intermediate products, and provided strategic transport links between Russia and the Central Asian Republics. The breakup of the Soviet Union led to major transition challenges for Kazakhstan's road sector. Lack of maintenance caused road conditions to deteriorate. Since efficient transport is a prerequisite for building a market-based economy, the Government prioritized rehabilitation and maintenance of the road network. There was also a need to strengthen road sector institutions and policies. In the early 1990s the Government began to transfer some roles, such as civil works construction and transport services, to the private sector. The remaining institutions needed to be reoriented toward strategic management and regulatory roles. This would require strengthening of the institutions and their capacity, and improving the policy and legislative framework.

The rationale for the Project was that the deterioration of the road network had to be reversed if Kazakhstan were to realize its economic development potential. The Project would provide for more efficient movement of freight and passengers, strengthen institutional capacity in the road sector, and improve the road sector policy environment.

The largest component of the Project involved rehabilitation of a 192-kilometer (km) section of the country's north-south road corridor. Another component supported maintenance of other sections of the corridor. A further component was to support institutional development and implementation of an agreed agenda for road sector reform and legislative changes.

The road rehabilitation component proved difficult to implement. The implementation arrangements followed international forms of bidding, contracts, and technical standards and specifications, but the Executing Agency had no prior experience with these. This made for a difficult working relationship between the supervision consultant and the contractor, and contributed to delays.

The pavement has extensive transverse cracking. This is aesthetically displeasing, but the road is performing adequately in terms of traffic handling. Cracking is common in countries with extreme temperature variations, and it need not impair performance or reduce asset life as long as adequate routine maintenance is carried out.

The immediate causes of the cracking are not well understood. Among the possibilities are inappropriate specifications for bitumen and aggregate, lapses in material quality control, poor standard of laying aggregate, weaknesses in the original road structure, and opening the base course to traffic before laying the wearing course. The underlying causes are clearer. The unfamiliar implementation arrangements led to the detailed design being less thorough than intended. This made it difficult for the Executing Agency, the consultant, and the contractor to use normal contractual mechanisms to address problems that arose during implementation.

The evaluation found no evidence to suggest that cracking would necessitate major remedial investment. Such investment is unlikely to be required as long as the Government continues to provide adequate routine maintenance.

Average annual daily traffic on the rehabilitated road increased from 1,295 vehicles at appraisal to an estimated 1,617 vehicles in 2005. Traffic growth was slightly slower than estimated at appraisal, reflecting the economic adjustment difficulties the country was experiencing in the early years of project implementation. As a result of sustained high economic growth since 2000, traffic growth is expected to be higher in the future.

The benefits to road users anticipated during appraisal have largely materialized. Road rehabilitation has roughly halved trip times and caused vehicle operating costs to fall by an average of about 20%. A significant adverse effect has been the rapid increase in road accidents on the rehabilitated road.

The economic reappraisal indicates that road rehabilitation has had relatively high economic returns, with an economic internal rate of return of 19.8%. Even in a scenario of sudden pavement deterioration, the original investment would still be justified by the relatively high economic returns already achieved.

The road maintenance component was simpler and achieved its intended results. There were no major problems implementing the road maintenance contracts following domestic bidding procedures. The road maintenance equipment procured under the Project has generally performed satisfactorily and continues to be used to maintain the north–south road corridor.

The institutional and policy support did not achieve its intended outcome. This was due to lack of Government ownership. The agreed agenda was overly ambitious, and ADB and the Government engaged in too little dialogue during project formulation. The advisory technical assistance was insufficient to bring about change, and its approach focused too much on preparing reports and too little on supporting national change processes.

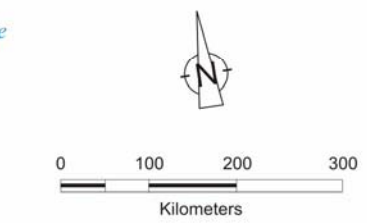
The Project is rated successful, at the bottom end of the range of successful rating. It was assessed as relevant, less effective, efficient, and likely to be sustainable, with limited institutional and other impacts. The performance of ADB was less satisfactory. It did not adequately adapt project formulation to fit the country and sector circumstances and ensure Government ownership of reform proposals. It also provided too little support during implementation. The performance of the Government was satisfactory given Kazakhstan's ongoing transition from a centrally planned to a market economy, and its status as a newly independent country.

Since pavement deterioration cannot be completely ruled out, the Government will have to continue to carefully monitor pavement condition in order to identify any rapid deterioration that may occur and determine the most economical remedy.

The main lesson from the Project is that it may require an extended timeframe to bring about broad changes in policies, processes, and standards. International systems for road design, construction, and maintenance—as well as policies and institutional features—could not be quickly transferred to Kazakhstan to replace those of the former Soviet Union. In such circumstances, project design needs to incorporate a more realistic path of change, which may initially require less emphasis on international standards and implementation models, and more emphasis on gradually building familiarity and confidence in international methods.

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KAZAKHSTAN ROAD REHABILITATION PROJECT (as implemented)



- National Capital
 - Provincial Capital
 - City/Town
 - Project Road
 - Main Road
 - Railway
 - River
 - Provincial Boundary
 - International Boundary
- Boundaries are not necessarily authoritative.

I. INTRODUCTION

A. Evaluation Purpose and Process

1. The Road Rehabilitation Project, Kazakhstan was selected as part of the annual random sample of completed projects post-evaluated by the Operations Evaluation Department (OED) of Asian Development Bank (ADB). The Operations Evaluation Mission (OEM) visited Kazakhstan from 7 to 23 June 2005. By that time there had been nearly 4 years of full operations since completion of civil works, which provided a sufficient basis for evaluating project performance. The evaluation report prepared by the Mission was used to field test OED's draft *Guidelines for Preparation of Project Performance Evaluation Reports for Public Sector Operations*. As such it incorporates revisions to the structure and rating system that were not incorporated in previous OED post-evaluation reports.

2. The evaluation draws upon a review of project documents and other relevant studies, and discussions between ADB staff and officials of Government agencies concerned with the Project, international financial institutions resident in Kazakhstan, contractors, and consultants. It incorporates the results of the OEM's field inspections of the rehabilitated road, traffic studies, a rapid beneficiary assessment, and updated road accident data. A copy of the draft evaluation report was shared with the concerned ADB departments and offices and those of the Borrower and the Executing Agency—the Ministry of Transport and Communications (MOTC)—and their views have been incorporated and acknowledged where relevant.

3. In 2004 the project completion report (PCR)¹ rated the Project partly successful.² Although it found the Project highly relevant to addressing the needs of the transport sector, it rated performance less effective, less efficient, and less sustainable. The main reason was that there were cracks in the rehabilitated pavement, which were reportedly due to poor quality bitumen. The PCR expected initial maintenance costs to be high because of the need to repair cracks because major remedial works would be required in 2008 at an estimated cost of \$20 million (almost half the original cost of rehabilitation). The additional costs would reduce the economic internal rate of return (EIRR) from acceptable (14.7%) to borderline level (10.5%). The pavement defects had been the subject of a prolonged and unresolved dispute involving the Executing Agency, the contractor,³ and the supervision consultant⁴. In the case of the Project's road maintenance component, the PCR rating reflected the findings that some of the equipment procured was unsuitable for Kazakhstan's extreme weather conditions. Regarding the project component to support road sector institutions and policy, the PCR found that there was a lack of ownership by the Government, and that none of the targeted outputs and outcomes had been achieved.

4. The PCR found that weaknesses in project implementation arrangements had contributed to performance problems. MOTC was proficient in the technical standards and implementation methods of the former Soviet Union (FSU), but had no experience with the International Federation of Consulting Engineers (FIDIC) contracting arrangements that were introduced by the Project. MOTC was also unfamiliar with ADB procurement procedures. During implementation these problems were exacerbated by frequent changes of staff of the project implementation unit (PIU). ADB review missions were considered too short and infrequent to help MOTC resolve the implementation issues.

¹ ADB. 2004. *Project Completion Report on the Road Rehabilitation Project (Loan 1455-KAZ) in Kazakhstan*. Manila.

² The PCR mission was fielded on 9–16 July 2003.

³ Balfour Beatty and Merrell in association with Afdar and Zhezkazgar Zholdary.

⁴ Japan Overseas Consultant Co. Ltd. in association with Wilbur Smith Associates.

5. Since much of the PCR rating depended on its finding regarding the pavement defects, the evaluation examined the present condition of the pavement and interviewed a wide cross-section of persons involved in the construction. This helped clarify the nature, extent, and causes of the pavement defects, and helped establish their likely consequences and cost implications.

B. Project Objectives

6. The Project was classified as an economic growth project. According to the Report and Recommendation of the President (RRP),⁵ its expected impact was to arrest the decline in potential for Kazakhstan's future sustainable development. Its three expected outcomes were (i) more efficient movement of freight and passengers, (ii) improved institutional capacity, and (iii) an improved policy support environment.⁶

7. The project framework of the RRP identified three categories of expected outputs. The first category, accounting for nearly all of the estimated project cost, was the rehabilitation of the 192 km Gulshad–Akshatau section of the Almaty–Astana⁷ road corridor, maintenance of about 600 km of the corridor, and detailed design of about 200 km of other priority road sections to be identified by the attached project preparatory technical assistance (PPTA).⁸ Two further categories of expected outputs were (i) institutional strengthening of the Department of Roads by establishing a state road authority and 19 *oblast* road authorities; providing support for associated capacity building in terms of network planning, budgeting and financing management, and pre-construction and bidding procedures; enhancing road maintenance capacity, including establishing of road maintenance standards; and establishing a human resources development plan for the road sector; and (ii) road sector policy and regulatory improvements based on implementation of a road sector policy statement (RSPS), drawn up during project formulation, which called for a Road Fund Decree, updated road legislation, and adoption of road user cost recovery practices. The latter two categories were supported by an attached ADTA for institutional strengthening.⁹

8. The grouping of project outcomes and outputs in the project framework (para. 7) was inconsistent with their grouping in the main text of the RRP. In the main text they were described as (i) road rehabilitation, (ii) road maintenance and institutional strengthening, and (iii) consulting services for benefit monitoring and evaluation and design of other road sections. The main text reflected the contribution of these outcomes and outputs to project cost, whereas the project framework gave added emphasis to the institutional and policy initiatives agreed in the policy dialogue.

9. In the project framework there was also some confusion over the choice of verifiable indicators at impact and outcome. For example, arresting road deterioration and improving the capability of the Department of Roads were both considered impact indicators, whereas it may have been more accurate to consider the former an output indicator and the latter an outcome indicator. The outcome indicators for road rehabilitation included the EIRR, but might also have included outcomes for users such as reductions in journey time and transport user costs.

⁵ ADB. 1996. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grants to the Republic of Kazakhstan for the Road Rehabilitation Project*. Manila.

⁶ The project goal stated in the RRP is equated with project impact, and the project purpose is equated with outcome.

⁷ The RRP referred to the Almaty–Akmola corridor. Akmola was renamed Astana in 1998.

⁸ ADB. 1996. *Technical Assistance to Kazakhstan for the Feasibility Study of Selected Priority Road Sections*. Manila. (TA 2632-KAZ, for \$250,000).

⁹ ADB. 1996. *Technical Assistance to Kazakhstan for the Institutional Strengthening of the Road Sector*. Manila. (TA 2631-KAZ, for \$750,000).

10. For rating purposes, the evaluation has grouped outputs and outcomes to reflect the OEM's understanding of the major distinct categories of support under the Project, taking into account both the main cost elements and the emphasis of the RRP on institutional and policy initiatives. The evaluation considers three groups of project components: (i) road rehabilitation, including design of future road improvements, (ii) road maintenance, and (iii) support for road sector institutions and policy. This grouping is reflected in the summary design and monitoring framework in Appendix 1.

II. DESIGN AND IMPLEMENTATION

A. Formulation

11. The Project was the first support for the road sector in Kazakhstan by an international financial institution. In 1995 ADB provided project preparatory technical assistance (PPTA) to prepare an investment in rehabilitation of priority roads.¹⁰ After developing a priority list of 3,800 km of roads requiring rehabilitation and conducting technical and socioeconomic screening of 1,200 km of these roads, the PPTA identified the Almaty–Astana corridor as the top priority for rehabilitation and prepared a feasibility study of the Gulshad–Karaganda section. Based on the PPTA, the Government and ADB selected a 192 km section from Gulshad to Akshatau to be financed by the Project. Technical surveys showed that this section was heavily damaged. As a result, traffic speeds were low and vehicle operating costs (VOC) were high.

12. The PPTA was well prepared. In addition to identifying a suitable investment for ADB financing, it drew attention to the implementation challenges to be addressed. There was an established capacity of qualified engineers in Kazakhstan, but their training was based on the Soviet Standards (GOST) of the FSU and they had little familiarity with the international design standards used for international competitive bidding (ICB). The GOST standards were complex and difficult to correlate with international standards. Also, Government road agencies directly controlled the execution of works rather than employing an independent engineer to supervise the contractor, as FIDIC contracts require. The PPTA recommended that any local enterprise appointed for detailed design or construction supervision should work in association with an experienced international consultant to ensure quality control. It also identified a need to train engineers in ICB, FIDIC, project management, supervision, testing, and quality control. The PPTA also raised concerns about problems with the quality of available bitumen¹¹ and crushed aggregate¹² supplies. In the latter case it identified suitable quarries near the Gulshad–Akshatau road section.

13. In formulating the Project,¹³ ADB followed standard approaches to implementation arrangements, consulting services, and procurement. This included use of ICB, FIDIC, international road construction standards, and design and supervision led by an experienced international consultant. No special provision (for example, providing a long-term adviser to MOTC) was made to guard against misunderstandings and conflicts that might arise as a result of unfamiliarity with international standards and contracting methods.

14. Policy dialogue during project formulation focused on development of the road sector policy statement (RSPS) to guide the road sector's transition from central planning to market orientation. This was intended to establish principles and priorities, delineate roles, and provide a

¹⁰ ADB. 1995. *Technical Assistance to Kazakhstan for Preparation of a Road Rehabilitation Program*. Manila.

¹¹ Oil distillate used for the surface layer of the road.

¹² Crushed stone or other material used for construction of pavement.

¹³ The loan Fact-Finding Mission was from 21 February to 6 March 1996, and the Appraisal Mission was from 7 to 17 May 1996. ADB's Board approved the Project on 27 August 1996.

basis for updating legislation. An initial draft RSPS was prepared during a mission to review the PPTA in November 1995. This was discussed at the fact-finding stage and confirmed before appraisal without MOTC raising any major issues. It set a comprehensive reform agenda centered around the transfer of roles from the state to the market, reorienting the remaining state institutions to concentrate on strategic management and regulation, and improving cost recovery. It is difficult to understand how or why the Government would have agreed to such an extensive reform agenda. The road sector institutions were proud of their achievements under the FSU and would have viewed international methods with skepticism. The most likely explanation is that the RSPS lacked Government ownership. It appears that the RSPS was largely prepared by the ADB mission. There is a similarity between this Project's RSPS and the road sector policy statement included in another ADB-financed project approved the previous year.¹⁴ Since the form of MOTC approval of the RSPS was quite vague, perhaps the Government did not consider this a binding commitment.

B. Rationale

15. There was a strong rationale for ADB to provide support for road rehabilitation. Kazakhstan is a vast, landlocked country. It is sparsely populated, with dispersed natural resources and centers of economic activity. Within the centrally planned economy of the FSU, it was a supplier of raw materials and intermediate products, and its road and railway networks provided strategic transport links between the Russian Federation and the Central Asian republics. Because of these unusual characteristics, the economy became the world's most freight intensive in terms of freight transport per capita.¹⁵ The decline and breakup of the Soviet Union brought serious challenges for the road sector. After 1991 there was initially a sharp decline in transport demand, with freight and passenger traffic falling by more than 50%. A lack of maintenance—linked to the severe economic contraction and tight fiscal situation during the period around the breakup of the Soviet Union—had caused the condition of the road network to deteriorate. A survey of pavement condition in 1992–93 found that 52% of national roads were in poor condition, 32% were in fair condition, and only 16% were in good condition. Surveys in 1994 pointed to further deterioration. Since efficient transport was considered essential for economic recovery and transformation into a market-based economy, by the mid-1990s the Government attached high priority to rehabilitation and maintenance of the national road network.

16. There was also a good case for institutional and policy support. The transition to a market economy had required major changes in the role of the transport sector. Under the FSU all road sector responsibilities were carried out by the state. In the early 1990s, the Government initiated reforms to establish a new policy, legal, and regulatory basis for the road sector, transfer civil works and transport service provision to the private sector, and restructure the remaining public role. The civil works function of the Motor Road Department was restructured into a joint stock company in 1993 and then privatized in 1996. Through the privatization program, most transport services were put in private hands. The remaining Government road functions were placed under a restructured Department of Roads. By the mid-1990s the first round of structural changes had been carried out, but it was not yet known whether they would be effective. A host of institutional development challenges remained, and capacity building was needed to support the performance of the new system. Aspects needing improvement included road sector policy, the regulatory environment, planning and budgeting, design and supervision, road maintenance programming and financing, road safety and environmental standards, and human resource capacity.

¹⁴ ADB. 1995. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to Mongolia for the Roads Development Project (Mongolia)*. Manila.

¹⁵ For example, while India's population is 50 times that of Kazakhstan, it generates only twice as much freight volume.

17. After Kazakhstan joined ADB in January 1994, the initial program of ADB assistance was guided by an interim operating strategy that sought to facilitate the country's transition to a market economy.¹⁶ Support for rehabilitation of infrastructure was integral to this strategy, since further deterioration in infrastructure would harm the long-term potential of the country. It was envisaged that ADB support would focus on projects that did not require intensive management and were within the implementation capacity of the Government. Support would also address issues related to the policy and regulatory environment, sector restructuring, cost recovery, efficient pricing, commercialization, enterprise reform, capacity building, and human resource development.

C. Cost, Financing, and Executing Arrangements

18. As reported in the PCR, the actual project cost of \$78.0 million was close to the appraisal estimate of \$77.0 million. The main changes in costs were for civil works and maintenance equipment. Civil works cost \$41.2 million, compared with \$36.2 million estimated at appraisal. The increase reflected variations in quantities of work required compared with the original contract estimates. Road maintenance equipment cost \$11.5 million, compared with \$5.8 million at appraisal, because bid prices were higher than expected. These cost increases were met from contingencies. The actual costs of routine maintenance (\$12.4 million) and consulting services for road rehabilitation (\$4.6 million) were close to the appraisal estimates.

19. The actual financing shares were \$43.8 million (56%) from ADB and \$34.2 million from the Government. This compared with appraisal estimates of \$50 million (65%) from ADB and \$27 million from the Government. The main reason for this change was that the Government decided to finance interest during construction (\$9.1 million). A comparison of actual and estimated project costs and financing is in Appendix 2.

20. As envisaged at appraisal, MOTC was the Executing Agency and its roads department was the Implementing Agency. A PIU in the Implementing Agency was responsible for day-to-day project management. Changes of the minister and MOTC reorganizations led to frequent changes of staff in the Executing Agency, Implementing Agency, and PIU.¹⁷ New PIU teams took time to understand the Project and its implementation requirements. This impaired the PIU's ability to deal with implementation problems, particularly those concerning civil works for road rehabilitation. The staff turnover in the Executing Agency also meant that the original ideas behind the support for institutions and policy became obscured and eventually lost. At the beginning of 2002, as part of a wider policy decision to rationalize the use of PIUs, the Ministry of Finance abolished the PIU for the Project. By that time, most project activities had been completed.

D. Procurement, Scheduling, and Construction

21. **Procurement.** The road rehabilitation civil works were procured through a single contract using ICB among prequalified bidders. The contract was awarded to the lowest evaluated substantially responsive bidder. Procurement of road maintenance equipment was through a single supply contract awarded through ICB. These were carried out in accordance with ADB's *Guidelines for Procurement*. The routine maintenance support was procured through 13 Government-financed contracts using local competitive bidding procedures, as agreed at appraisal.

¹⁶ ADB. 1993. *The Bank's Interim Country Operational Strategies in Kazakhstan and the Kyrgyz Republic*. Informal Board Paper. Manila.

¹⁷ The roads department was renamed several times during project implementation. At appraisal, it was called the Department of Roads. By the time of the OEM, it was called the Committee for Road Infrastructure Development.

22. **Scheduling.** Project implementation took about 6 years, compared with 4 years estimated at appraisal. As indicated in the PCR, this was primarily due to delays in the road rehabilitation component, notably (i) an extended preconstruction period caused by the Executing Agency's lack of familiarity with ICB and FIDIC-type contracts (14.5 months compared with 6 months estimated at appraisal); (ii) a prolonged mobilization period caused by winter conditions and difficulties transporting the contractor's equipment (6 months compared with 2 months at appraisal); and (iii) an extended construction period caused by a slow initial rate of construction and problems with supply of materials, particularly bitumen (about 39 months compared with 31 months at appraisal).

23. There were also delays in the procurement of road maintenance equipment. It took 20 months to complete tendering up to contract award, compared with 6 months estimated at appraisal. MOTC proposed that all but one bid be declared unresponsive, and it took time for ADB, the design and supervision consultant, and MOTC to agree on the lowest evaluated substantially responsive bidder. This was linked to MOTC's unfamiliarity with ICB procedures. A comparison of the actual and appraisal schedules is in Appendix 3.

24. **Construction.** A series of problems were encountered during the road-rehabilitation civil works. These mainly concerned pavement defects. Since these problems have a significant bearing on the overall evaluation of the Project, the OEM examined them in some detail. The nature of the problems that occurred during construction is summarized below. Their implications for project outputs, effectiveness, and efficiency are discussed in later sections. A chronological narrative of the main events in implementation of civil works is in Appendix 4.

25. In 1998 only 12 km of the 192 km was completed, and only 8 km had a wearing surface. This was due to initial weaknesses in contractor management and shortages of construction equipment. These problems were subsequently corrected. It also reflected difficulty in obtaining bitumen supplies, which was a problem throughout construction. Over the remainder of construction (from 1999 to 2001) the rate of construction was generally acceptable, except that, because of the shortage of bitumen, much of the new base course was often without wearing course when construction was halted for the winter.

26. The two main defects concerned raveling¹⁸ and transverse (thermal) cracking. Both were evident after the first construction season. Over the course of the construction period raveling was often a contentious issue between MOTC, the consultant, and the contractor. On the other hand, while there was also extensive transverse cracking of the base course and wearing course, this was not considered a serious problem until the end of construction.

27. MOTC seems to have associated raveling with the use of mine waste as construction aggregate. At contract negotiations, MOTC was reluctant to use mine waste but the contractor had commissioned independent materials tests indicating that the mine waste satisfied the American Association of State Highway and Transportation Officials (AASHTO) standards referenced in the contract specifications. In 1999, after the emergence of raveling, MOTC commissioned a domestic institute to run further tests. These confirmed the earlier result, but also indicated that the material might not have met GOST standards, had GOST standards been used in the contract. In 2000 the contractor addressed the raveling problem by surface-dressing the affected areas, and by removing and replacing the surface material in severely affected areas. Although raveling did not recur on a significant scale, it continued to be a controversial subject over the remainder of the construction period. In 2000 MOTC presented a claim for damages

¹⁸ A process in which coarse material on the road surface loosens and separates from the roadbed because of a lack of binder or poor gradation of material.

against the supervision consultant. According to the PCR, this was on the grounds that the aggregate did not meet GOST standards—even though GOST standards were not part of the contract.¹⁹ Later, in 2000, MOTC commissioned another international consultant to run tests on the mine waste aggregates. These included tests—not specified in the contract documents—that suggested possible undesirable properties. However, in 2001 further testing by another international consultant found that the aggregates fully met contract specifications. In 2003 MOTC withdrew its claim against the supervision consultant.

28. Transverse cracking was evident throughout the construction period. At the end of each winter break, further transverse cracking of the base course and the wearing course was observed. In 2000, after laying test sections, the consultant and contractor concluded that a single thick layer would be more crack resistant than the two-layer approach specified in the contract. However, MOTC declined the proposed contract variation. At substantial completion in August 2001, and again at the end of the defects liability period in August 2002, the consultant considered that the works had been satisfactorily completed and endorsed the contractor's final claim. However, MOTC was unwilling to settle the final claim, and subsequently indicated that it might seek arbitration.²⁰ An independent technical audit conducted in late 2002 by another international consultant commissioned by MOTC said that there was extensive cracking, and attributed this mainly to deficiencies in the quality of bitumen. It estimated that additional routine maintenance of \$600,000 would be required for crack filling over the next 5 years, and that in 2008 the wearing course should be recycled and compacted and a new wearing course provided, at a cost of \$20 million. By the time the OEM took place in mid-2005, the contractor final claim remained unpaid and it was still not clear whether arbitration would proceed.²¹

29. To gain further insight into the causes of construction defects, the OEM consulted with a range of people who took part in different parts of the construction process, including representatives of MOTC, the consultant, the contractor, the road maintenance authority, and other technical experts and officials. These consultations suggested that the cracking could have a variety of causes other than problems with bitumen quality. Possible causes could include (i) inappropriate specifications for bitumen and/or aggregate; (ii) lapses in material quality control; (iii) for standard of laying asphaltic concrete; (iv) weaknesses in the underlying structure of the original road;²² and (v) opening of the base course for traffic before the wearing course had been laid (para. 25).²³ The OEM concluded that without extensive technical investigation, including excavations of the road, it would be impossible to determine the actual causes of the defects.

E. Design Changes

30. There were no major changes in scope during implementation.

F. Outputs

31. **Road Rehabilitation.** The physical outputs of the road rehabilitation component were as envisaged at appraisal. The Gulshad–Akshatau road was rehabilitated to a 7 meter (m) surfaced

¹⁹ Claim for damages of \$951,570.

²⁰ Contractor's final claim for \$3,318,887.67.

²¹ The Ministry of Justice, which is handling this matter, declined to meet with the OEM.

²² By choosing to rehabilitate rather than rebuild the road, the Government was able to carry out the works at a much lower unit cost, which made good economic sense. However, this meant that weaknesses in the original construction of the underlying structures, including the embankment, roadbed, and drainage, were not fully addressed in the design. Such weaknesses can eventually be a source of structural problems with newly laid flexible pavements, leading to increased maintenance and reduced asset life.

²³ In some cases the exposed base course was subject to cracking. While the cracks were repaired and tested before laying the wearing course, it is not known whether the strength of the base course was affected.

width, generally with 8 cm of coarse graded asphaltic concrete base overlaid with 5 cm of dense asphaltic concrete wearing course, and 2.4 m shoulders. A summary of the physical accomplishments of the Project is in Appendix 5.

32. The OEM inspected the rehabilitated road and found that it was generally well built, except for two defects: (i) transverse cracking at intervals of about one to three car lengths (100–150 cracks per km) throughout the 192 km; and (ii) about 5–10 short sections of severely deteriorated road surface, each about 10–20 m in length. Photographs of the rehabilitated road are in Appendix 6.

33. In countries such as Kazakhstan that experience extreme temperature variations, some element of cracking of flexible pavements is unavoidable.²⁴ The extent of cracking can be limited by using certain specifications for aggregate and bitumen, but it is difficult to avoid cracking altogether. The cracking on the project road is aesthetically displeasing, but it does not significantly affect ride quality at present. However, it does make the roadway susceptible to consequent damage from water and frost–thaw cycles. This means that a rigorous approach to routine maintenance must be followed, since cracks can quickly expand in freeze–thaw conditions, leading eventually to rapid surface breakup. As long as adequate routine maintenance is carried out to fill cracks, they need not impair the performance of the road or shorten the asset life.

34. Routine maintenance of cracks on the project road is being carried out to a high standard. At the time of the OEM it appeared that virtually every transverse crack on the 192 km road section had been sealed. The staff of the *oblast* road authority responsible for routine maintenance demonstrated good technical knowledge of the maintenance techniques and materials required for sealing such cracks.

35. The short sections of severely deteriorated road surface are accident hazards, especially in icy winter conditions.²⁵ While the *oblast* road authority has made efforts to maintain these sections using patching techniques, this is not a permanent solution. At some point they will have to be reconstructed. An important deficiency is that at present there is no signage to warn drivers of these upcoming accident hazards.

36. Through the attached PPTA, a feasibility study of selected priority road sections was completed. Detailed designs for these sections were then prepared under the Project.

37. **Support for Maintenance.** The physical outputs of the road maintenance support component were as envisaged at appraisal. Routine maintenance was carried out over several sections of road, totaling about 600 km, along the Almaty–Astana corridor between 1999 and 2001. This contributed to improving the traffic-handling performance of these sections. Some 299 road maintenance equipment items were procured. Most of the road maintenance expenditure was on trucks, pickups, sand spreaders, snow ploughs, and spare parts. These were mainly for use by the Kazakhavtodor²⁶ road maintenance branches of the Astana, Almaty, Zhambyl, Karaganda, Pavlodar, and North-Kazakhstan *oblasts*. The equipment contributed to improved maintenance capacity at the *oblast* level.

²⁴ This problem is recognized in parts of Canada, such as Saskatchewan, that have temperature conditions similar to Kazakhstan's. Cracks also appeared in an ADB-financed road in the northeastern part of the People's Republic of China, an area that is also subject to extreme temperature variations.

²⁵ Additional deterioration may occur in future, especially in winter, and this could lead to further accident black spots.

²⁶ The state road contractor.

38. **Institutions and Policy Support.** The outputs of the institutional and policy support component were less than envisaged at appraisal. The supervision consultant developed routine road maintenance standards and a manual, but failed to gain MOTC's support for using these to replace existing standards and approaches to routine maintenance. All of the studies included under the attached ADTA were completed, including organizational development and capacity building studies, and studies analyzing the possible adoption of a systems development plan, a human resource development plan, a road user cost recovery program, and a road transport act. However, few of the recommendations of these studies were implemented, so their actual outputs in terms of improved road sector institutions were minor. Similarly, few of the policy reforms envisaged by the RSPS were implemented, notably (i) the road user cost recovery program was briefly adopted but then abandoned when the Road Fund was abolished in 1998; (ii) the proposed committee for transport sector legal reforms was not formed to review existing laws and regulations and prepare updated legislation on roads and road transport; and (iii) the proposed national transport advisory committee was not formed to guide further road sector reforms. While new Road Act legislation was approved in 2001²⁷ and various road sector policy and institutional reforms were carried out,²⁸ these were not attributable to the Project.

G. Consultants

39. An international consultant was recruited to design and supervise road rehabilitation, support procurement of road maintenance equipment, and carry out benefit monitoring and evaluation. Recruitment followed ADB's *Guidelines on the Use of Consultants*. The overall performance of the consultant was satisfactory, although its initial performance was less satisfactory.

40. The consultant began facing difficulties during contract negotiation. MOTC indicated that the draft detailed designs and tender documents for the road rehabilitation civil works had already been prepared by a domestic consultant, and asked that the consultant's initial task of supervising all stages of the detailed design and preparing the tender documents should be reduced to a one-month review of the work already completed by the domestic consultant. This was not in accordance with the terms of reference (TOR) and was at odds with the advice of the PPTA (para. 12). In requiring this change, MOTC risked compromising the quality of the detailed design and contract documents. Since neither MOTC nor the domestic consultant were familiar with international standards or FIDIC, they may not have fully appreciated this. ADB was represented at the contract negotiation and should have objected. Former staff of the consultant and contractor interviewed by the OEM said that the documents prepared by the domestic consultant were of poor quality. The review process, which took about 4 months, was fraught with difficulty. The designs and documents had to be redone. Successive rounds of changes, exacerbated by translation problems between Russian and English, led to repeated friction between the consultant, MOTC, and the domestic consultant, immediately harming the working relationship between the consultant and MOTC. While the final designs and contract documents were of an acceptable standard, the process by which they were prepared, including a lack of supervision of detailed technical surveys and tests prescribed in the outline TOR, was not a good way to start the country's first ICB road project.

²⁷ The Executing Agency confirmed that Parliament accepted the following laws and decrees: (i) Decree of the Government of the Republic of Kazakhstan "About the Improvement of the Legal Base of the Road Management", No. 845, 7 September 1998; (ii) Decree of the Government of the Republic of Kazakhstan "About the Concept for the Road Sector Development of the Republic of Kazakhstan for the Years 2001–2008", No. 726, 29 May 2001; and (iii) Law of the Republic of Kazakhstan "About the Roads", No. 245, 17 July 2001.

²⁸ The Executing Agency referred to (i) the Program for Road Sector Development of the Republic of Kazakhstan for the years 2001–2005, which is nearing completion; and (ii) the proposed Program for the Road Sector Development of the Republic of Kazakhstan for the years 2006–2012.

41. The supervision consultant repeatedly changed its international staff during its first 2 years of work. Another problem was that the consultant's senior staff were initially based in Almaty, some 600 km from the site. Since MOTC was unfamiliar with the role of the independent engineer under FIDIC and needed to be convinced of its worth, these initial weaknesses harmed the process of building a positive working relationship between MOTC and the consultant.

42. In 1999, an engineer with extensive international experience in construction supervision and FIDIC took over as team leader. He was based on site and—according to people interviewed by the OEM—appears to have followed best practices in terms of quality management, planning, documentation and testing of materials, and workmanship for compliance with specification. At site this expert maintained a technical documentation library and a laboratory for testing materials, including aggregate and bitumen, and provided on-the-job training for domestic staff. Following this change in personnel the consultant performed satisfactorily up to completion of services in 2002.

H. Loan Covenants

43. The Government complied with standard loan covenants, except that it abolished both the PIU (para. 20) and the project steering committee in 2002. By then the Project was substantially completed so this non-compliance did not materially affect the Project.

44. The Government did not comply with the three specific covenants intended to bring about implementation of the RSPS:²⁹ (i) although it briefly adopted improved cost recovery measures, they were abandoned when the Road Fund was abolished (para. 38); (ii) drawing upon the work of the ADTA consultant, a high-level committee for transport sector legal reforms was to prepare legal reforms and issue regulations, but this committee was not formed; and (iii) as required under the RSPS, a national transport advisory committee was to guide further transport sector reforms, but this committee also was not formed.

I. Policy Setting

45. In the nearly 10 years since project approval, Kazakhstan has continued its transition toward economic liberalization and market orientation. The problems of adjustment were eased by growth in oil and gas production and revenues. The economic contraction, unemployment, social concerns, and tight fiscal situation of the period immediately following the collapse of the Soviet Union gave way to a period of sustained high economic growth, rising incomes and employment, and greatly improved Government finances. With reduced reliance on external investment financing, the extent to which IFIs could influence policy agendas was reduced.

46. These overall patterns were also evident in the road sector. The transport services market is now liberalized, with service providers free to set prices.³⁰ The path toward change was slower for the principal Government institutions responsible for managing the road network. MOTC and Kazakhavtodor still operate along traditional bureaucratic lines and conduct their operations according to rules and norms rather than actual needs. There remains a lack of reliable data on traffic and road conditions and a lack of planning systems for road maintenance.³¹ With improved fiscal conditions, budgets for roads have increased. The Government could afford to raise maintenance budgets substantially and forestall the increases in road user charges advocated by

²⁹ Loan Agreement, Schedule 6, paras. 3 and 7–9.

³⁰ There are still some elements of monopolistic practices and problems with licensing and standards.

³¹ Center for System Research of the President's Administration of the Republic of Kazakhstan, 2005. *State Roads development Program for 2006–2015*. Astana.

IFIs. One comparatively recent development is that the Government now recognizes that Kazakhstan has a serious road safety problem, and is giving increased priority to improvement of road safety. Overall, road sector policies have evolved in a manner consistent with the direction advocated by ADB, albeit over a longer timeframe than estimated by ADB. However, the pace, sequencing, and details of the reforms were determined by the Government, and there is no evidence that ADB played a meaningful role in supporting the policy reform process. ADB was unable to find ways to engage substantially in the reform of the Kazakhstan road sector.

III. PERFORMANCE ASSESSMENT

A. Overall Assessment

47. The overall assessment of the Project was *successful*. It was, however, at the lower limit of the range of performances that could be considered successful. This was based on separate assessments for the three groups of project components (para. 10). Both the road rehabilitation and road maintenance components were rated successful, while the institutions and policy component was rated unsuccessful.

48. To arrive at the overall assessment, the individual component ratings were aggregated using weightings developed by the OEM: road rehabilitation (55%); road maintenance (25%); and institutions and policy (20%). These reflect the relative importance of the component groupings to expected overall project outcomes, taking into account their contribution to project cost at appraisal, and adjusted to recognize the emphasis that the RRP attached to supporting institutions and policy. The rating of each component group used four criteria: relevance (20% weight), effectiveness (30%), efficiency (30%), and sustainability (20%). Individual criterion ratings were in whole numbers from 0 to 3, in increasing order of project performance.³² The overall assessment is summarized in Table 1. Further details are in Appendix 7.

Table 1: Overall Performance Assessment

Criterion	Project Component			Overall
	Road Rehabilitation	Road Maintenance	Institutions and Policy	
1. Relevance	2	3	1	2.1
2. Effectiveness	1	2	0	1.1
3. Efficiency	3	2	0	2.2
4. Sustainability	2	2	0	1.6
Total Rating^a	2.0	2.2	0.2	1.6

^a Highly successful > 2.7; successful $2.7 \geq S \geq 1.6$; partly successful $1.6 > PS \geq 0.8$; unsuccessful < 0.8.
Source: Operations Evaluation Mission.

B. Relevance

49. The Project is rated *relevant* (Table 1). The road maintenance component was rated highly relevant, the road rehabilitation component was rated relevant, and the support for institutions and policy component were rated less relevant. The rating takes account of (i) relevance to the country's priorities and ADB's country and sector strategies, (ii) adequacy of

³² For example, irrelevant (0), less relevant (1), relevant (2), and highly relevant (3).

justification for the respective interventions, and (iii) extent that each intervention was appropriately designed to achieve the intended outcomes and impacts.

50. All three components were fully consistent with Government priorities at the time of appraisal and evaluation:

- (i) At appraisal, improvement of the Almaty–Astana road corridor was the Government’s top priority for road improvement. The corridor continues to be the country’s most important national highway, serving as the main north–south route for domestic traffic and a strategic link to Russia and Europe for international and transit traffic. It also facilitated the relocation of the national capital from Almaty to the new city of Astana. The offices of the central Government were transferred to Astana in 1997, and Astana’s population increased from about 250,000 in 1996 to about 550,000 in 2005.
- (ii) At appraisal, support for institutional strengthening and capacity building and for policy and regulatory improvements were relevant to the road sector’s transition from a centrally planned to a market-oriented model. Roles formerly carried out by the public sector—such as transport services and some construction—had been transferred to the private sector, and the role of the public sector needed to be revised accordingly.

51. The three components were consistent with ADB’s country strategy at the time of appraisal and evaluation. Support for rehabilitation and maintenance of infrastructure, and for road sector institutional and policy reform, were part of ADB’s interim country operating strategy for supporting Kazakhstan’s transition to a market economy (para. 17). These are also priorities in ADB’s current country strategy, which emphasizes investment in rehabilitation and maintenance of roads that are part of the regional transport network, improving managerial and strategic capacity, enhancing construction and maintenance standards, and promoting market reforms.³³

52. The need for rehabilitation and improved maintenance of the Almaty–Astana corridor was clearly demonstrated by the surveys and analysis conducted by the PPTA.

53. Project relevance was weakened by the design of the road rehabilitation and institutions and policy components. Although most aspects of the former component were well formulated, the implementation arrangements failed to allow for MOTC’s lack of familiarity with international standards, FIDIC contracts, and ADB procedures such as ICB. It was clear from the PPTA and from dialogue with the project processing missions that road sector professional and technical staff in Kazakhstan followed FSU standards and project management practices. They had a long tradition of doing so, and many were understandably skeptical about international approaches.

54. This weakness in design led to recurring conflicts (i) between international standards and FSU standards; (ii) between international and FSU methods of assigning responsibilities for civil works execution;³⁴ and (iii) between MOTC, on one hand, and consultant and contractor, on the other. As a result there were misunderstandings and project management arrangements did not always function as intended. This was an impediment to effective communication between MOTC, the consultant, and the contractor in resolving technical problems. There were several adverse consequences that detracted from project outcomes, including: (i) since MOTC reduced

³³ ADB. 2005. *Country Strategy and Program Update 2006-2008, Kazakhstan*. Manila.

³⁴ While the Project followed the roles for the client, consultant, and contractor defined under the FIDIC contract, under the FSU approach the client retained full authority over construction.

the role of the international consultant in the detailed design (para. 40), it is likely that the quality of design was lower than it would have been had it been prepared under the full supervision of the international consultant, as intended; and (ii) although the consultant brought defects to MOTC's attention and suggested technical ways to address them, MOTC had difficulty accepting the consultant's advice, which in some instances led to defects not being addressed.³⁵

55. Since this was the first IFI road project in Kazakhstan, it would have been appropriate to adapt ADB's standard implementation arrangements to better address these circumstances. Options might have included placing a long-term technical advisor in MOTC to provide intensive staff training, attaching a road engineer to ADB's Kazakhstan Resident Mission, making a commitment to provide frequent ADB review missions or staff consultant inputs, or adopting modified standards or forms of contract.³⁶

56. Given the lack of results achieved by the institutions and policy component, the OEM concludes that the design of this component was flawed. While the RSPS provided a potentially attractive reform agenda, and while there was a case for providing ADTA to support its implementation, there was little Government ownership (para. 14) and the few associated loan covenants were too vague to provide a spur for reform. The Government has since made progress, without ADB assistance, in implementing further reforms, and recognizes the continuing need for reforms to complete the transition and streamline road sector arrangements (para. 46).

C. Effectiveness

57. The weakest aspects of project performance was concerned effectiveness. The Project was rated *less effective*. The road maintenance program was rated effective, the road rehabilitation was less effective, and the institutions and policy support is ineffective (Table 1). In assessing effectiveness, this evaluation considers whether intended outcomes were achieved or are likely to be achieved. It also takes into account the effect of the implementation process on project outcomes, including the effect of delays in outcomes, and implementation side effects.

58. **Road Rehabilitation.** The OEM found that the rehabilitated Gulshad–Akshatau section was performing adequately in terms of roughness, ability to carry traffic, and general operational features, and was allowing vehicles to travel at significantly higher speeds and at lower VOC than before rehabilitation. Average roughness in terms of the international roughness index (IRI) was reduced from about 7.8 to about 3.4 m per km. The average journey time was reduced from about 5 hours to about 2.5 hours.

59. Average VOC were significantly reduced. For example, the estimated VOC for 2005 were 20% lower for five-axle trucks, 19% lower for three-axle trucks, 18% lower for cars, and 21% lower for pickups. Details of VOC are in Appendix 8. Since both freight and bus services are privately operated, with prices determined through competition, it is likely that much of the VOC savings have been passed on to customers in the form of lower transport prices.

³⁵ The consultant and contractor were familiar with FIDIC contracts not only providing a means for carrying out construction according to design and specification, but also providing a mechanism for amending design and construction during implementation when unforeseen problems occurred through no fault of the contractor or consultant. However, MOTC was uneasy with notion of the consultant's independence, and with allowing the contract, design, and specification to be varied to address problems encountered. It was especially uneasy about considering proposals from the consultant and contractor that might require increases in the contract amount. This made it difficult for MOTC to accept some of the advice offered by the consultant, including proposals for addressing defects before they became serious.

³⁶ ADB has agreed to use modified versions of FIDIC in some other developing member countries, including India.

60. Traffic on the rehabilitated road is slightly lower than forecast at appraisal. Between 1995 and 2005, average annual daily traffic rose from 1,295 to 1,617. This was equivalent to average annual growth of 2.2%, compared with 4% forecast at appraisal. While reliable traffic counts are not available for the intervening years, it seems that there was little traffic growth in the early years of this period as a result of economic adjustment and slow economic growth during the initial transition from the FSU. However, consistent with the economic recovery, traffic growth has picked up in recent years and may now be around 3–4%. Trucks and buses continue to account for a relatively high proportion of traffic, although the share of cars and pickups has risen. In 1995 about 48% of vehicles were trucks, 4% buses, and 48% cars and pickups. By 2005 this had changed to 36% trucks, 7% buses, and 57% cars and pickups. This reflects the gradual modernization of the vehicle fleet, with international models replacing obsolete Soviet models and private vehicle ownership increasing in the market economy. Details of traffic are in Appendix 8.

61. Some short stretches of the rehabilitated road were first opened to traffic in 1998; additional totals were opened in 1999 and 2000; the final stretches were opened in 2001. The rehabilitated sections have been in operation between 4 and 7 years, or an average of 5–6 years, which amounts to 25–30% of the 20-year useful economic life expected at appraisal.

62. The OEM did not find evidence to support the suggestion of the PCR that transverse cracking would necessitate partial reconstruction by 2008 (para. 3). The PCR had drawn upon the report of the technical audit conducted in 2002 (para. 28). Yet nearly 3 years later the road is performing adequately and carrying the expected levels of traffic. In order to optimize economic returns, decisions about the extent and timing of rehabilitation works should be based on economic analysis rather than on engineering solutions taken in isolation. The OEM considers it unlikely that there is economic justification for the partial reconstruction proposed in the PCR.

63. In the RRP it was expected that the annual cost of routine maintenance would be \$540,000 equivalent (all figures were in 1996 constant prices and would be substantially higher in 2005 prices), and that periodic maintenance costing around \$6 million equivalent would be required in the 7th and 14th years of operations. Actual routine maintenance expenditure has been well within the appraisal estimate and has been sufficient to ensure road performance. Since parts of the road will soon approach the 7th year of operations, it is expected that some surface deterioration will have occurred and that periodic maintenance to retain riding quality and preserve the road will be required within 1–2 years. The timing of periodic maintenance should be based on economic analysis.

64. While the rehabilitated road is generally performing adequately, several adverse side effects and less-effective-than-expected outcomes justify a rating of less effective rather than effective. MOTC expressed reservations that “... *the expected project impact for efficient freight and passenger traffic as well as improvement of political environment have not been achieved to the extent that was expected.*”³⁷ Rehabilitation of the most important road in the country was always likely to have an overall outcome that was favorable, but to what extent was the full outcome potential realized?

65. Although the rehabilitated road is performing adequately, pavement defects were clearly not expected at appraisal, and have led to additional costs and rigorous routine maintenance requirements that should have been avoided. While the OEM found no reason to predict more rapid deterioration in future, this possibility cannot be completely ruled out since the causes of the cracking are not well understood. Such a risk was not expected at appraisal.

³⁷ Letter dated 15 July 2005.

66. Another reason the road rehabilitation was less effective than planned is that, as a result of construction problems, the improved performance of the project road was realized about 1–2 years later than expected, on average.

67. The failure of the project design to incorporate measures to address MOTC's unfamiliarity with international standards, FIDIC, and ADB procedures further detracted from the effectiveness of the Project. This had the following adverse consequences: (i) there were extended contractual disputes, initially between the Government and the consultant, and subsequently between the Government and the contractor; these resulted in the Government incurring associated transaction costs; (ii) controversy over the condition of the road is believed to have contributed to the problem of rapid turnover of ministers and staff in the Executing Agency; and (iii) instead of providing a good practice model, the project experience may have set back the adoption of international standards, FIDIC, and ADB procedures in Kazakhstan.

68. The Project resulted in adverse effects on road safety because of increased vehicle speeds and traffic growth. Data on road accidents for the Gulshad–Akshatau road indicates that since rehabilitation there has been a sharp rise in the number of accidents and related injuries and fatalities. The total number of accidents increased from 28 in 2002 to 52 in 2004; fatalities rose from 17 to 40, and injuries rose from 33 to 86. The annualized rate of growth in accidents on the road between 2002 and 2004 was 36%, compared with an overall growth rate of 7% in accidents on all national highways over the same period. The sharp rise in accidents on the Gulshad–Akshatau road was likely caused by an increase in driving speeds. Poor driver knowledge and widespread disregard of road safety practices—which in turn are linked to a lack of adequate road safety and driver training programs and weak traffic-law enforcement—increased the risk of accidents. There is a lack of signage encouraging safe driving, promoting seat belt use, and warning drivers of the dangers of drunken driving. Road accident data is in Appendix 9.

69. **Support for Road Maintenance.** This support was generally effective in maintaining the traffic-handling performance of sections of the Almaty–Astana corridor. This contributed to an overall reduction in average journey time between Almaty and Astana (1,220 km) from 30–40 hours to about 16 hours.³⁸ The domestically financed routine maintenance contracts were carried out satisfactorily. According to Kazakhavtodor officials interviewed by the OEM, the road maintenance equipment procured through the Project has generally performed adequately and has been in regular use. An exception was the snow ploughs, which were unsuitable for climatic conditions in Kazakhstan. Initially, there were also problems resulting from a lack of locally available suppliers of spare parts for some of the equipment. However, these problems were overcome by building up stocks of spare parts obtained from foreign suppliers.

70. **Institutions and Policy Support.** This component was ineffective. None of the expected outcomes indicated in the design and monitoring framework were realized (Appendix 1). With respect to improving institutional capacity, the Executing Agency did not adopt (i) the proposals developed by the ADTA for improving systems for management information, accounting, and project management in the state and *oblast* road authorities; (ii) the human resource development plan prepared by the ADTA; and (iii) the routine road maintenance system for maintenance depots that was prepared by the supervision consultant. With respect to improving the policy support environment, the Project had no significant outcomes in terms of: (i) increasing road user charges; (ii) updating legislation based on the ADTA review of legislation; and (iii) implementing reforms to improve road sector performance, based on the RSPS.

³⁸ The reduction in journey time is due to a series of rehabilitation and maintenance improvements along the corridor, not all of which were financed under the Project.

71. The Government has made progress in some aspects of road sector institutional development and policy reform. For example, a maintenance management system is being developed under an ongoing World Bank project; road maintenance budgets have been increased; there has been substantial outsourcing of road construction and maintenance to the private sector; and road legislation was updated in 2001 and 2004. However, ADB did not contribute to these important reforms. Neither the RSPS nor the support provided by the Project played a significant role in bringing about such progress.

72. Based on opinions expressed by Government officials, IFI representatives, and ADB staff, it appears that the RSPS never had the level of support and approval required to become a guiding policy statement for the sector. It seems more likely that that it reflected in large part what ADB considered appropriate, with little buy-in or ownership on the part of MOTC. These weaknesses presented little difficulty for MOTC as long as the commitment to implement the RSPS remained vague. It is therefore not surprising that the expected outcomes were not realized.

73. The design of these aspects of the Project failed to recognize the difficulty of effecting institutional and policy change, and failed to introduce an intervention mechanism appropriate for local conditions that could help bring about such change.³⁹ Without Government ownership, the proposals for change were unlikely to succeed. Establishing ownership would have required an extensive dialogue between ADB and the Government during processing of the Project, but it appears there was little substantive dialogue of this kind. The timeframe for implementing change was expected to be 2–3 years, whereas 5–10 years may have been more realistic. The modality used for the ADTA was largely one of outside experts carrying out studies. Little attempt was made to support or influence nationally led change processes. Substantive loan covenants or other mechanisms to retain the Government and ADB's interest in accomplishing the changes were not put in place. During implementation, ADB review missions gave little attention to the performance of the support for institutions and policy.

D. Efficiency

74. The Project was rated as *efficient*. The road rehabilitation component was rated highly efficient, the road maintenance program was rated *efficient*, and the institutions and policy support was rated *inefficient* (Table 1).

75. **Road Rehabilitation.** This component was rated highly efficient. The assessment of efficiency was based on reestimation of the EIRR. The EIRR compared the costs and benefits to traffic with and without rehabilitation. To support reestimation, the OEM conducted updated traffic surveys at three locations on the Gulshad–Akshatau section, and obtained updated estimates of VOC. Details of the economic reestimation are in Appendix 8.

76. In calculating the EIRR, both the RRP and the PCR limited the quantified economic benefits to savings in VOC. However, taking into account the relatively advanced state of economic development in Kazakhstan, it is clear from the traffic observed by the OEM that the EIRR should also have quantified time savings.⁴⁰ In reestimating the EIRR, the Mission included time savings, although one sensitivity test case excluded time savings.

³⁹ The Kazakhstan road sector was, in Soviet times, considered very successful, providing roads superior to contemporary roads in Russia. Thus changing the roles of the agencies responsible for the road sector would not have been widely accepted.

⁴⁰ Typically, VOC savings account for the majority of economic benefits of road improvement in less developed countries. However, in industrialized countries, where value of people's time is high, VOC savings are typically outweighed by time savings.

77. According to OED's evaluation guidelines (para. 1), if the reestimated EIRR exceeds 18% a project is normally rated highly efficient.⁴¹ The reestimated EIRR for road rehabilitation is 19.8%. This is slightly less than the EIRR of 21.5% estimated at appraisal, but higher than the base case EIRR of 14.7% estimated by the PCR. The main reason that the EIRR exceeds the PCR estimate—other than the inclusion of updated traffic and VOC data⁴²—is the inclusion of benefits for traffic on road sections opened to traffic in 1999–2001. This was based on detailed information that the OEM obtained from staff of the supervision consultant and contractor (Appendix 4).

78. Sensitivity tests were used to separately consider the effects of the following possible adverse scenarios: (i) benefits reduced by 20%, (ii) no traffic growth after 2005, (iii) no time savings, (iv) 100% increase in periodic and routine maintenance costs in the "with project" case, (v) \$20 million partial reconstruction in 2008, and (vi) life of rehabilitated road reduced to 10 years full operations. The latter three tests consider the effect on the EIRR if the pavement were to rapidly deteriorate. In each case the EIRR remains in the range of 15.9–18.8%, well above the normal threshold level of 12%. This indicates that the economic viability of the Project is robust.

79. The OEM recognizes that the estimated EIRR does not fully reflect the transactional and other costs resulting from the implementation problems associated with the road rehabilitation component (para. 67). Such costs are difficult to quantify.

80. **Support for Road Maintenance.** This component is rated efficient. There was insufficient information for the OEM to estimate the EIRR for road maintenance support (the RRP and PCR also did not estimate this). This rating takes into account that the component was generally implemented as planned, and was rated effective, and reflects ADB's experience that investments of this kind in road maintenance generally produce satisfactory economic returns.

81. **Institutions and Policy Support.** Since the activities of this component had few lasting outcomes, its use of resources in achieving outcomes is rated inefficient.

E. Sustainability

82. The Project was rated *likely to be sustainable*. Both the road rehabilitation and road maintenance components were rated likely to be sustainable. The institutions and policy support was rated unlikely to be sustainable (Table 1). The assessment of sustainability considers the likelihood that human, institutional, financial, and other resources will be sufficient to maintain the project outcomes over the life of the Project.

83. The prospects for sustainability of the road rehabilitation and road maintenance components are good. In the past 5 years the improvement of the Government's fiscal position⁴³ has led to sharp increases in annual road maintenance budgets.⁴⁴ Since the Government considers the Almaty–Astana corridor high priority, it will likely provide sufficient financing for routine and periodic maintenance of project roads.

⁴¹ Highly efficient > 18%; efficient 18% ≥ E ≥ 12%; less efficient 12% > LE ≥ 6%; inefficient < 6%.

⁴² The PCR relied on a previous traffic and VOC data.

⁴³ Since 2000, the general budget deficit has not exceeded 1% of gross domestic product. According to the *Asian Development Outlook 2005* (ADB, 2005. *Asian Development Outlook 2005*. Manila.), growing oil revenues and improvements in tax administration are expected to keep the deficit within this level over the medium term.

⁴⁴ MOTC's budget for routine and midterm maintenance doubled from T5,220 million in 2001 to T10,536 million in 2004.

84. The *oblast* road authority has sufficient technical competence to carry out maintenance, as evidenced from the high standard of existing routine maintenance. The main limitation concerns the programming of periodic maintenance, which continues to be based on the rules-based systems inherited from the FSU, rather than on a through economic assessment of road conditions and traffic. However, the European Bank for Reconstruction and Development and the World Bank have been encouraging the Government to adopt a pavement management system for programming periodic maintenance expenditures.

85. In the case of the institutions and policy component, there is no prospect of sustainability. Since this component did not achieve its outcomes, there are no outcomes to sustain.

IV. OTHER ASSESSMENTS

A. Impact

1. Assessment of Impact

a. Impact on Institutions

86. **Institutional Capacity.** Because of weaknesses in formulation of the support for institutions and policy, the Project achieved few of its intended impacts on institutions (para. 70).

87. **Governance.** Whereas the project implementation arrangements were expected to improve upon the approaches followed under the FSU, in practice there was considerable confusion over the use of FIDIC and adoption of international technical standards (para. 67). It is likely that over much of the implementation period, MOTC, the consultant, and the contractor had different understandings of their respective roles, authorities, and contractual responsibilities. Such misunderstandings had a negative effect on the accountability, predictability, and transparency dimensions of governance. Under FIDIC, the quality and timeliness of performance will be at risk if, for example, the client does not strictly respect the contract or interferes with the consultant's role in detailed design or supervision. There can also be increased susceptibility to corruption if, for example, the client deals directly with the contractor without considering the technical advice of the consultant. While the OEM did not identify any specific allegations of malpractice or corruption, it finds that the weaknesses in project design increased the risks of such governance problems. Moreover, the Project did not realize its potential for demonstrating the advantages of FIDIC and international standards as tools for improving road sector governance.

b. Socioeconomic Impact

88. Road projects have two main types of socioeconomic impacts: (i) immediate impacts in the form of improved transport for communities directly served by the road, and (ii) indirect impacts related to economic growth for a wider catchment area.

89. In the case of the road rehabilitation component, there have been few immediate impacts along most of the project road sections, since most of these areas are uninhabited because of the harsh climate, high salinity, and low soil fertility. There is little agriculture in these areas. Apart from the town of Balkash, which has a population of about 80,000, the road-influenced area includes only two secondary centers (Akshatau [population 6,000] and Gulshad [population 1,000]) and a few small settlements.

90. In conjunction with the traffic survey, the OEM commissioned a rapid beneficiary assessment of residents of small settlements near Akshatau and Akzhal, of truck and bus drivers, and of bus passengers. Those interviewed said the road improvements had resulted in several positive impacts. In particular: (i) for drivers the main impacts were reduced journey times, more reliable road conditions, and reduced breakdowns; (ii) bus passengers indicated that the road improvements had led them to switch from trains to buses, which had become quicker as well as cheaper; and (iii) the few roadside inhabitants indicated that the better roads had improved their access to markets (e.g. for sale of livestock), increased their ability to commute to obtain work outside their home location, and improved their access to hospitals and other social services in Balkash.

91. The OEM traffic survey indicated that the frequency of bus services had increased substantially since rehabilitation. Average annual daily traffic for buses rose from 47 in 1995 to 106 in 2005. Most of these buses provide through services to and from urban centers north and south of the project road (including Astana, Karaghandy, and Almaty), and serve Balkash.

92. Measurement and attribution problems make it difficult to measure the indirect impacts of individual highway improvements.⁴⁵ Nevertheless, it is possible to speculate that the Project had several significant indirect impacts. The rehabilitated road is strategically important. It links Kazakhstan's capital with Almaty, the country's leading commercial center, and has served the capital during a period of heavy investment and rapid expansion. It is also part of the country's main north-south route. Against this backdrop, the indirect impacts of more efficient transport on economic growth could have been significant, leading to growth in incomes and employment.

93. Since the project investments involved rehabilitation and maintenance of existing roads, there were no requirements for land acquisition and resettlement.

c. Environmental Impact

94. The Project has had no significant environmental impact.

B. ADB Performance

95. ADB's performance is rated *less satisfactory*. After Kazakhstan became a member of ADB in 1994, ADB moved quickly to provide PPTA and then process the project loan. However, in formulating the Project ADB did not adequately take into account the special context of Kazakhstan as a country in transition from the FSU. Rather than simply transplanting a set of standard arrangements for implementation and management of road projects—including use of international standards, FIDIC, and ICB—ADB should have examined the need for other mechanisms to make sure the arrangements would be workable. Other weaknesses in ADB's performance during project formulation included insufficient dialogue with the Government to ensure genuine ownership of institutional and policy reforms, unrealistic scope and timeframe for change, and a lack of attention to road safety issues.

96. ADB's performance during implementation was also less satisfactory. In view of the concerns expressed in the PPTA report about limitations in the experience of domestic engineering consultants, ADB should have objected to MOTC's proposal to dilute the role of the international consultant in supervising all aspects of detailed design. Weaknesses in project formulation could have been better addressed if ADB had devoted sufficient staff resources to

⁴⁵ Cook, Cynthia C., Tyrrell Duncan, Somchai Jitsuchon, Anil Sharma, and Wu Guobao. 2005. *Assessing the Impact of Transport and Energy Infrastructure on Poverty Reduction*. Manila: ADB.

project administration. Since the country and its road sector were in the middle of a difficult transition, and MOTC's experience was limited to the standards and systems of the FSU. ADB could have added considerable value through careful monitoring of implementation and by being regularly available to assist MOTC in addressing problems. However, during the main period of implementation, ADB project administration missions visited the Project site once a year at most, usually for less than a week, and seldom visited the site. During the most difficult period of construction—between 1997 and 1999—there was an 18-month gap between missions. A review of the back-to-office reports of the review missions indicates that these missions were too short and superficial to make a substantive contribution to the success of the Project. In particular, (i) all the missions during the main construction period reported that there were no significant issues and that work was proceeding satisfactorily, and (ii) there was little further dialogue about the RSPS and the process of reforming institutions and policy.⁴⁶ During the OEM, Government officials commented on the shortcomings on ADB's performance during implementation and indicated that it was important for ADB to address these weaknesses in current and future operations.

C. Borrower Performance

97. The Borrower's performance is rated *satisfactory*. In spite of considerable implementation difficulties, it completed the Project and the Project is rated successful. There were some shortcomings in the Borrower's performance. During project formulation, the Borrower apparently agreed to the implementation arrangements without fully considering their implications, and made commitments to implement a sector policy agenda that lacked national ownership. During implementation, partly as a result of unfamiliarity, the Borrower did not always strictly follow the agreed-to FIDIC procedures for the road rehabilitation component. Although the Borrower has pursued various initiatives to improve its road sector institutions and policies, it implemented little of the sector policy agenda linked to the Project and few of the ADTA proposals. However, the evaluation finds that most of the weaknesses in the Borrower's performance had to do with shortcomings in project formulation, for which ADB bears primary responsibility.

D. Technical Assistance

98. The attached PPTA to conduct feasibility studies for priority road sections is rated *successful*. The attached ADTA to support institutional strengthening of the road sector is rated *unsuccessful*. Both were highly relevant to the country's priorities and to ADB's strategy. While the PPTA was appropriately designed, the design of the ADTA relied too much on recruiting expert consultants to prepare reports. It also gave too little attention to ensuring sufficient Government ownership and providing support for national processes that could bring about the intended institutional, legislative, and policy improvements. The PPTA was generally effective and efficient in achieving its outcomes. Projects to improve the road sections identified were subsequently designed using consulting services provided under the Project. The road investments prepared by this work are now being financed by the ongoing ADB-financed Almaty–Bishkek Road Rehabilitation Project.⁴⁷ In the case of the ADTA, although the consulting services

⁴⁶ Other ways to assist the Government in project implementation could have involved including an engineer in the staff of ADB's Kazakhstan Resident Mission, or making greater use of staff consultants to supplement ADB's limited staff.

⁴⁷ ADB. 2000. *Report and Recommendation of the President to the Board of Directors on Proposed Loans and Technical Assistance Grants to the Republic of Kazakhstan and to the Kyrgyz Republic for the Almaty–Bishkek Regional Road Rehabilitation Project*. Manila.

were performed satisfactorily, the ADTA was neither effective nor efficient, as few of the resulting proposals for institutional, legislative, and policy improvements were implemented.⁴⁸

99. The ADTA was previously rated successful by a technical assistance performance audit report covering six TAs for support of road sector institutions.⁴⁹ The technical assistance performance audit report recognized that the ADTA had played little part in bringing about institutional, legislative, and policy improvements, but it assigned a successful rating on the basis that the consultant services were competently performed. The project performance evaluation report has downgraded the rating to unsuccessful since the effectiveness, efficiency, and sustainability ratings should be related to achievement of outcomes, not outputs, and since the relevance rating should take into account not only relevance in relation to the strategic objectives of the Government and ADB, but also appropriateness of TA design for meeting those objectives.

V. ISSUES, LESSONS, AND FOLLOW-UP ACTIONS

A. Issues

100. The main issue identified by the evaluation concerns the risk of future pavement deterioration on the Gulshad–Akshatau road. The evaluation found that there is extensive transverse cracking, but that it is being well maintained and is handling traffic adequately. While the evaluation found no reason to predict rapid deterioration in the future, this possibility cannot be completely ruled out since the causes of the cracking are not well understood. In addition to carrying out appropriate routine and periodic maintenance, the Government should continue to carefully monitor the road's condition, with a view toward quickly identifying any rapid deterioration that should occur and determining the most economical remedy.

101. More can be done to improve understanding of the specifications and methods for working with materials such as aggregate and bitumen in road construction in Kazakhstan. Some information of this nature may be available from other countries with similar climates, but it needs to be adapted and supplemented to meet the conditions of Kazakhstan. Drawing upon the experience of the Project, ADB has contributed to the revision of technical standards and specifications through an ADTA for Road Asset Management attached to the Aktau–Atyrau Road Rehabilitation Project,⁵⁰ and through regional technical assistance for review of road design and construction standards.⁵¹ In June 2004 MOTC introduced national specifications for road construction and repair. In 2003–04 it established 46 national standards to harmonize the national and international technical requirements; it is preparing an additional 16 standards.

B. Lessons

102. It is difficult to bring about overall change in policies, processes, and standards. An extended timeframe is often required. The design of the Project assumed that international systems for road design, construction, and maintenance—as well as road sector policies and institutions—could be quickly transferred to Kazakhstan to replace those of the FSU. In practice, the road sector institutions and their professional and technical capacities were deeply aligned

⁴⁸ According to the PCR, one of the reasons for the lack of influence of the ADTA was that, when the capital was moved from Almaty to Astana in 1997, there was an almost complete turnover of personnel in the Executing Agency and Implementing Agency.

⁴⁹ ADB. 2002. *Technical Assistance Performance Audit Report on Institutional Strengthening and Policy Support to the Road Sector in Kazakhstan, Kyrgyz Republic, and Mongolia*. Manila.

⁵⁰ ADB. 2000. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Republic of Kazakhstan for the Aktau–Atyrau Road Rehabilitation Project*. Manila.

⁵¹ ADB. 2000. *Technical Assistance for a Review of Road Design and Construction Standards*. Manila.

with FSU systems and could not be changed as quickly as ADB anticipated. In Soviet times they had been considered very successful, so it was difficult for them to accept the need to change.

103. A comprehensive institutional and policy reform agenda requires intense policy dialogue and a high degree of engagement to ensure that the agenda has national ownership and is well supported by ADB during implementation.

104. Rehabilitation of roads using existing embankments, roadbeds, and drainage inherited from the FSU may involve uncertainties that could adversely affect the stability of the road base. In some cases these uncertainties may affect the life and economic returns of rehabilitation investments. This should be assessed when preparing new investment projects in FSU countries.

105. The following are specific lessons regarding the use of FIDIC contract methods in transition countries: (i) detailed designs and specifications should be of a high standard, since these will become the basis of the construction contract and cannot be changed subsequently without contract variation; and (ii) the Government may require regular advice and support to ensure that it understands its role as employer, understands the roles of the consultant and contractor, and understands how to use FIDIC provisions to address problems encountered during construction—including problems not foreseen in the contract, design, and specification.

106. The design of subsequent ADB road projects and TAs in Kazakhstan incorporated some of these lessons. The two projects (footnotes 47 and 50) adopted more modest policy and institutional agendas. A regional TA was provided for review of road design and construction standards.⁵² This was followed by an ADTA for improving the technical standards for pavements (para. 101). The two projects did not make provisions for strengthening of implementation arrangements. By the time of their approval, in 2000 and 2003 respectively, the Government was implementing several other projects with IFI support, and had gained more experience in the use of consultants and contractors under FIDIC.

C. Follow-Up Actions

107. Based on the evaluation findings, several follow-up actions are proposed for Government consideration.

⁵² ADB. 1997. *Regional Technical Assistance for a Review of Road Design and Construction Standards*. Manila.

Follow-Up Action	Responsibility
For Government Consideration	
1. Routine Maintenance. To limit surface deterioration resulting from defects, the present diligent approach to routine maintenance and present levels of budgets for crack sealing should be continued.	Ministry of Transport and Communications
2. Road Safety. The <i>oblast</i> road authority, together with the police, should ensure that clearly visible warning signs and other appropriate signage are provided at the 5–10 short sections of severely deteriorated road surface. It should also ensure that the road condition is regularly monitored and that further signage is quickly erected in the event that more potentially accident-causing pavement deterioration suddenly occurs, especially in winter.	Ministry of Transport and Communications; Traffic Police
3. Reconstruction. The short sections of severely deteriorated road surface should be reconstructed. This should be preceded by conducting an engineering investigation to examine the causes of deterioration, particularly drainage and structural strength.	Ministry of Transport and Communications
4. Periodic Maintenance. Since parts of the project road will soon have been in use for 7 years, and the RRP envisaged periodic maintenance at 7-year intervals, the Government should plan to carry out periodic maintenance within 1 to 2 years. A first step in planning this will be to prepare an economic analysis of the optimal scope and timing of such maintenance.	Ministry of Transport and Communications

DESIGN AND MONITORING FRAMEWORK

Design Summary	Project Targets/Indicators	Result	Data Sources/Reporting Mechanisms	Assumptions and Risks	
Impact					
Rehabilitate and maintain roads to arrest the ongoing decline in the potential for future sustainable development.	1.	Deterioration of about 600 kilometers (km) of road section in Almaty–Astana corridor arrested through rehabilitation and maintenance.	Rehabilitated and maintained.	Project completion review and subsequent project administration (PA) missions.	
	2.	Department of Roads (DOR) capability improved for project management and supervision, contract administration, and road maintenance.	Some improvement, but this was only partly due to influence of the Project.	Project midterm review (MTR) and subsequent PA missions.	Government will improve civil service conditions to retain trained staff. (assumption)
	3.	Road sector policy environment improved to enable participation of private sector.	Some improvement, but influence of the Project was small.	Project MTR, subsequent PA missions, and project processing missions.	Government will continue to open its economy. (assumption)
Outcome					
1. Improve the road infrastructure through rehabilitation and maintenance for efficient movement of freight and passengers.	1.1	Economic internal rate of return (EIRR) of about 21.5% on the project road achieved by 2000.	EIRR of 19.8%.	EIRR assessment in benefit monitoring and evaluation report.	
	1.2	International roughness index of the roads maintained under the Project measured less than 4 meters per kilometer.	Achieved.	Road roughness assessment in benefit monitoring and evaluation report.	
2. Improve institutional capacity.	2.1	The systems (management information, accounting, and project management) in State Road Authority (SRA) and selected <i>oblast</i> road authorities (ORAs) established.	Ministry of Transport and Communications (MOTC) did not adopt proposals developed by the advisory technical assistance (ADTA).	PA missions and progress report of the consultants.	Government will continue to address and recognize the importance of capacity building issues by mobilizing adequate resources. (assumption)
	2.2	Routine road maintenance management system on selected road maintenance depots (RMDs); about six RMDs established.	MOTC did not adopt proposals developed by the supervision consultant.	PA missions and progress report of the consultant.	
	2.3	Medium-term human resources development (HRD) plan adopted.	HRD plan prepared by ADTA but not adopted.	HRD plan.	
3. Improve the policy support environment. ^a	3.1	Improved road user cost recovery.	Road user charges not increased.		

Design Summary		Project Targets/Indicators	Result	Data Sources/Reporting Mechanisms	Assumptions and Risks	
	3.2	Comprehensive updating of road legislation and regulations.	Legislation updated and decrees issued, but influence of Project was small.			
	3.3	Reforms to improve road sector performance based on the road sector policy statement (RSPS).	Some reforms carried out, but RSPS was not used as reform agenda.			
Outputs						
1.	192 km section of deteriorated paved national road rehabilitated; feasibility study and detailed design developed for about 200 km of other road sections.	1.1	Rehabilitation of 192 km road section completed by end of 1999.	Rehabilitated.	PA missions and progress reports.	Inadequate budget allocation for rehabilitation and maintenance in general. (risk)
		1.2	Feasibility study and detailed design of 200 km of roads prepared by end of 1998.	Done.	PA missions and consultants' feasibility study and design reports.	
2.	Maintenance of selected sections of the road in Almaty–Astana corridor.	2.	Maintenance of about 600 km of road progressing satisfactorily and other road maintenance depots identified for introduction of road maintenance system.	Almaty–Astana road maintained.	PA missions and progress reports.	
3.1	Strengthening of DOR by establishing an SRA and 19 ORAs.	3.1.1	Number of staff under DOR increased.	Staffing reduced.	PA missions.	
		3.1.2	Qualified staff mobilized under DOR.	Not done; capacity strained by frequent staffing changes and reorganizations.	PA missions.	
		3.1.3	Quality of DOR's project output improved.	Not done.	PA missions.	
3.2	Enhancement of SRA's capability to implement projects.	3.2	International consultants for construction supervision completed on-the-job training of counterpart staff and exposed domestic consultants to project management, supervision, and administration.	Used International Federation of Consulting Engineer client–consultant–contractor relationship in Kazakhstan for first time. Trained counterparts, domestic consultants.	PA missions and progress reports.	Language problems limited ability of counterpart staff to learn and accept new ideas and knowledge. (risk)
3.3	Enhancement of the road maintenance capacities of SRA and ORAs.	3.3	Road maintenance standards prepared, maintenance training conducted, maintenance equipment delivered, and maintenance program implemented and being expanded to include more roads.	Not adopted by MOTC.	Maintenance manuals, standards, PA missions, and progress reports.	Adequate fund allocation from Road Fund for road maintenance in general. (assumption)

Design Summary	Project Targets/Indicators	Result	Data Sources/Reporting Mechanisms	Assumptions and Risks
3.4 Implementation of HRD plan.	3.4.1 Improved institutional structure and setup implemented.	HRD plan from ADTA not adopted by MOTC.	MTR and PA missions.	
	3.4.2 Number of staff being trained within and outside the country increased.	HRD plan from ADTA not adopted by MOTC.	MTR and Project Completion Report (PCR) missions.	
4.1 Adoption of road sector policy statement (RSPS).	4.1.1 Progressively greater responsibility and autonomy being given to state-owned and private enterprises.	Some growth in role of private sector, but RSPS not used as basis for road sector policy reform.	ADTA consultants' final report.	
	4.1.2 Committee for legal reform formed by 30 June 1997.	Not formed.	PA review missions and ADTA consultants' report.	
	4.1.3 National transport advisory committee established by 31 December 1997.	Not formed.	PA review missions and ADTA consultants' report.	
4.2 Implementation of Road Fund decree.	4.2 Road Fund collected in accordance with the Road Fund estimate.	Road Fund abolished in 1998. User charges not increased.	Budget document of DOR.	Difficulty in collecting Road Fund. (risk)
4.3 Adoption of recommendations for rationalized road user cost recovery practices.	4.3 Improved cost recovery measures adopted by 31 December 1997 and incorporated in the updated Road Act.	Adopted but abandoned when Road Fund abolished in 1998. Government did not support user-charge increases.	Road Act.	Government opposition to increased tax on fuels. (risk)
4.4 Implementation of the updated Road Act.	4.4.1 Organizational jurisdictions of road sector institutions defined and clarified.	Legislation updated and decrees issued, but influence of Project was small	PA missions.	
	4.4.2 Road infrastructure classified.		DOR's road standards and specifications.	
	4.4.3 Policies regarding road industry licensing, tariffs, and fares updated.		Freight tariffs and passenger fares.	
	4.4.4 Policies regarding motor vehicles registration, licensing, inspection, and weight and dimension control updated.		PA missions.	
	4.4.5 Policies regarding road user cost recovery adopted.		DOR's budget and tax returns of the items through which cost recovery has been proposed.	

Design Summary	Project Targets/Indicators	Result	Data Sources/Reporting Mechanisms	Assumptions and Risks
Activities with Milestones				
1.1 Providing adequate counterpart funds for project implementation.	Funds allocated from Road Fund.	Yes.	DOR budget estimate.	In case of shortage, Government will allocate additional funds. (assumption)
1.2 Recruiting of detailed design and construction supervision consultant.	Consultant recruited in August 1996.	December 1996.	Contract documents.	
1.3 Carrying our survey and design.	Survey and detailed designs completed by October 1996.	February 1997.	Survey and design reports.	Limited international competition. (risk)
1.4 Awarding of contracts.	Civil works contracts awarded by March 1997.	November 1997.	Progress reports and PA missions.	
1.5 Carrying out road rehabilitation and maintenance of selected road sections.	Rehabilitation completed by October 1999 and routine road maintenance continues to be performed satisfactorily.	August 2001.	Progress reports and PA missions.	
1.6 Supervising the construction and on-the-job training of counterpart staff.	Construction supervision completed by October 1999 and DOR, SRA, and ORA staff trained in construction supervision and contract administration.	Consultant's contract completed September 2002.	Progress reports; PA, MTR, PCR, and future Asian Development Bank (ADB) missions.	
2.1 Establishing an SRA and 19 ORAs.	Decree no. 1598 establishing SRA and ORAs Issued on 27 November 1995.	Yes.	Completed.	
2.2 Recruiting ADTA consultants.	ADTA consultants recruited by mid-1996.	December 1996.	Contract documents.	
2.3 Introducing accounting, financial, and management information systems in SRA and ORAs.	Systems introduced in DOR from the beginning of 1998.	Not adopted.	PA missions.	
2.4 Recruiting road maintenance assistance consultant.	Consultant recruited by mid-1996.	December 1996.	Contract documents.	
2.5 Preparing road maintenance standards and manuals.	Maintenance manual prepared and approved for implementation by the end of 1997.	April 1998.	PA missions and progress reports.	
2.6 Training of road maintenance staff.	Training continued until mid-2000.	Not done.	MTR and PCR missions and progress reports.	
2.7 Procuring road maintenance equipment.	Equipment procured by September 1997.	November 2000.	Contract documents and PA missions.	

Design Summary	Project Targets/Indicators	Result	Data Sources/Reporting Mechanisms	Assumptions and Risks
2.8 Reviewing and properly defining organizational structure, roles, responsibilities, and functions of DOR, and preparing HRD plan for DOR.	HRD plan prepared; four DOR staff trained abroad.	HRD plan prepared by ADTA.	Consultant's final report.	
3.1 Preparing and adopting RSPS.	MOTC adopted RSPS, effective from 31 March 1996.	MOTC agreed to RSPS but did not use it as basis for policy.	Completed.	
3.2 Enacting Road Fund Decree.	Road Fund Decree No. 2701 issued on 27 December 1995.	Enacted.	Completed.	
3.3 Carrying out the road user cost recovery study by ADTA consultants.	Cost recovery proposals reviewed by ADB and Government and incorporated in the Road Act.	Carried out.	ADTA consultant's report.	
3.4 Updating Road Act with the help of ADTA consultants.	Road Act reviewed by ADB and the Government; Road Act approved by Government by December 1997.	Updated.	Draft Road Act, MTR and PA missions	

Inputs		Project Costs (\$ million) (including taxes)	
		Estimate	Actual
1.	Civil Works	36.2	41.2
2.	Road Maintenance, Equipment, Materials, and Human Resources	19.0	22.2
3.	Consulting Services		
	(i) Detailed Design, Construction Supervision, Maintenance Assistance, and Benefit Monitoring	4.7	4.6
	(ii) Detailed Design of Selected Roads	0.4	0.9
4.	Contingencies	10.5	0.0
5.	Interest During Construction	6.2	9.1
	Total	77.0	78.0

^a Project targets shown at outcome level for improving policy support environment were included by the Operations Evaluation Mission based on covenants in the loan agreement relating to the RSPS.

Source: PCR; Operations Evaluation Mission.

APPRAISAL AND ACTUAL COSTS AND FINANCING
(\$ million)

Components	Appraisal									Actual								
	ADB			Government			Total			ADB			Government			Total		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. Civil Works (Gulshad-Akshatau Road)	19.50	7.50	27.00		9.20	9.20	19.50	16.70	36.20	22.24	7.12	29.36		11.81	11.81	22.24	18.93	41.17 ^a
B. Road Maintenance	5.50		5.50		13.50	13.50	5.50	13.50	19.00	9.84		9.84		12.39	12.39	9.84	12.39	22.23
1. Equipment	5.50		5.50		0.30	0.30	5.50	0.30	5.80	9.84		9.84		1.66	1.66	9.84	1.66	11.50
2. Materials					9.30	9.30	0.00	9.30	9.30					10.73	10.73		10.73	10.73
3. Human Resources					3.90	3.90	0.00	3.90	3.90									
C. Consulting Services	3.70	1.10	4.80		0.30	0.30	3.70	1.40	5.10	4.56		4.56	0.52	0.39	0.91	5.08	0.39	5.47
1. Detailed Design and Construction Supervision of Road Rehabilitation, Road Maintenance, and Benefit Monitoring and Evaluation	3.40	1.00	4.40		0.30	0.30	3.40	1.30	4.70	4.56		4.56				4.56		4.56
2. Detailed Design of Other Selected Priority Selected Road Sections	0.30	0.10	0.40				0.30	0.10	0.40				0.52	0.39	0.91	0.52	0.39	0.91 ^b
D. Contingencies	5.10	1.40	6.50		4.00	4.00	5.10	5.40	10.50									
1. Physical	2.87	0.85	3.72		2.30	2.30	2.87	3.15	6.02									
2. Price	2.23	0.55	2.78		1.70	1.70	2.23	2.25	4.48									
Subtotal	33.80	10.00	43.80		27.00	27.00	33.80	37.00	70.80	36.65	7.12	43.77	0.52	24.59	25.11	37.17	31.71	68.87
E. Interest and Other Charges During Construction	6.20		6.20				6.20		6.20				9.12		9.12	9.12		9.12
Total	40.00	10.00	50.00		27.00	27.00	40.00	37.00	77.00	36.65	7.12	43.77	9.64	24.59	34.23	46.29	31.71	78.00

^a \$41,169,622.24 paid against the contract as of 1 November 2002. Contractor is still claiming an additional \$3,318,887.67 (reference: Borrower's PCR, p. 5).

^b Detailed design for ADB. 2000. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grants to the Republic of Kazakhstan for the Almaty-Bishkek Regional Road Rehabilitation Project*. Manila (Loan 1774-KAZ).

Source: ADB. 2004. *Project Completion Report on the Road Rehabilitation Project (Loan 1455-KAZ) in Kazakhstan*. Manila.

APPRAISAL AND ACTUAL IMPLEMENTATION SCHEDULE

	1996				1997				1998				1999				2000				2001				2002				2003			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
A. Road Rehabilitation Civil Works																																
Prequalification and Tendering			—	—	—	—	—	—																								
Mobilization			—	—	—	—	—	—																								
Construction								—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Defects Liability																																
B. Road Maintenance Equipment																																
Tendering			—	—	—	—	—	—																								
Supply																																
C. Consulting Services																																
Detailed Design and Supervision ^a																																
Recruitment		—	—	—	—	—	—	—																								
Services		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Detailed Design of Selected Road Sections																																
Recruitment																																
Services																																
D. Technical Assistance																																
Institutional Strengthening of Road Sector																																
Recruitment		—	—	—	—	—	—	—																								
Services		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Feasibility Study of Selected Road Sections																																
Recruitment																																
Services																																
E. ADB Missions																																
				●				●																								

Q1 = first quarter, Q2 = second quarter, Q3 = third quarter, Q4 = fourth quarter.

^a Including road maintenance assistance and benefit monitoring services.

— Projected

■ Actual

Source: ADB. 2004. *Project Completion Report on the Road Rehabilitation Project (Loan 1455-KAZ) in Kazakhstan*. Manila; Operations Evaluation Mission

CHRONOLOGICAL NARRATIVE OF CIVIL WORKS IMPLEMENTATION

Date	Description
Feb 1996	Final report of feasibility study consultant, ^a which identified suitable material sources at: km 638 – quarries 10 kilometers (km) east (E) and 19 km west (W) of highway km 783 – stone deposit 8 km E of highway km 853 – stone deposit 5 km E of highway km 913 – stone deposit 2 km E of highway km 986 – quarry 10 km E of highway km 1033 – quarry 6 km W of highway
23 Aug 1996	ADB approved the prequalification of contractors.
2 Dec 1996	Commencement of services of the supervision consultant (JOC-WSA). The outline terms of reference (TOR) in the Report and Recommendation of the President (RRP) envisaged that the supervision consultant would supervise all detailed design tasks and conduct suitable checking and testing of all elements of the design and specifications, including identifying material sources and preparing tender documents. However, detailed design was already well advanced by the time the supervision consultants were selected and called to Almaty to negotiate detailed terms of the engagement. This work had been carried out by a local consultancy consortium assigned by the Department of Roads. During the negotiation of the supervision consultant contract from 11 to 14 November 1996, the TOR were reviewed, clarified, and agreed to by the Executing Agency and the supervision consultant. Shortly after the supervision consultants were mobilized on 2 December 1996, they were presented with a large volume of draft contract documents, both in English and Russian, for review. ^b Contract documents in an internationally acceptable format were approved by Asian Development Bank (ADB) for tender purposes on 24 April 1997.
5–9 Dec 1996	ADB Loan Inception Mission. No significant issues were identified.
9 Jan 1997	ADB approved a 2-month extension of loan effectiveness from 16 January to 16 March 1997.
21 Jan 1997	Replacement of consultant's project manager because of illness.
27 Feb 1997	ADB approved replacement of consultant's project manager and resident engineer.
31 Mar 1997	Loan became effective.
24 April 1997	ADB approves release of contract documents for tender. After this release, any changes in the contract documents are effectively subject to agreement with the successful bidder. Under Fédération Internationale des Ingénieurs Conseils (FIDIC), contract documents cannot be changed unilaterally by the Executing Agency.
24 Jun 1997	Bid opening for civil works contract.
31 Jul 1997	ADB approved awarding of the civil works contract.
7–9 Oct 1997	ADB Loan Review Mission 1. No significant issues identified other than delay in signing the works contract.
Aug–Oct 1997	Negotiations between the employer and the successful bidder. The issue of the use of Kounrad mine waste rock was first raised during these negotiations. It appears that the successful bidder proposed to use the mine waste on financial grounds; the Executing Agency may have been less enthusiastic. The Kounrad mine waste dump is located at km 649, east of and adjacent to the existing highway. ^c

Date	Description
6 Nov 1997	Civil works contract signed. The contract conditions and material specifications were unchanged from the tender documents, as released on 24 April 1997.
17 Feb 1998	ADB approved replacement of consultant's project manager.
26 Feb 1998	ADB approved replacement of consultant's resident engineer.
4 Mar 1998	ADB approved replacement of consultant's soil/material engineer.
May 1998	Commencement of civil works.
25 Jun 1998	ADB approved replacement of consultant's resident engineer.
Winter (Nov) 1998	At the end of the first construction season only 12 km of road had been completed; wearing surface had been applied to only 8 km. ^d The sealed sections carried traffic during the winter of 1998–99.
26 Feb 1999	ADB approved replacement of consultant's resident engineer. ADB expressed concern regarding the frequent turnover of the consultant's personnel.
Spring (Mar) 1999	The suitability or otherwise of aggregate from Kounrad quarry (mine waste) used in the asphaltic concrete came into question after the first constructed sections had gone through the first winter. There was widespread appearance of raveling in the finished asphaltic concrete surfaces (in 1–2 square meter [m ²] patches). The Kazakhstan Road Science Research Institute (Kazdornii) was approached for technical opinions. Under Soviet Standards (GOST), the Kounrad quarry material may not have been acceptable, although it was deemed acceptable under the American Association of State Highway and Transportation Officials (AASHTO) standards referenced in the contract specifications. ^e Transverse cracking was observed on the 12 km constructed, but it was not considered critical. At this stage it was thought that raveling was the most critical problem. The cause of the transverse cracking was thought to be the construction methods used in the first season (placement of asphaltic concrete pavement in 100–200 m lengths), rather than temperature effects.
12–16 Mar 1999	ADB Midterm Review Mission. No significant issues identified.
27 May 1999	ADB approved the revised manning schedule, additional site inspector, and the replacement of consultant's maintenance manager.
15 Jul 1999	ADB approved the replacement of the consultant's maintenance manager and the appointment of a new soils/materials engineer.
Winter (Nov) 1999	At the end of construction for 1999, km 596–678 (82 km) of road was constructed and opened to winter traffic. However only km 596–644 (48 km) had a wearing course applied to provide full-strength pavement (13-centimeter [cm] asphaltic concrete). An 8 cm base course—a weaker structure—was applied to the remaining 34 km (km 645–678).
Spring (Mar) 2000	More extensive transverse cracking was observed in the previous works when construction recommenced in spring. The sections where the base course had been applied appeared to exhibit less cracking than the sections with the wearing course. Raveling was the main concern during the summer of 2000. Cracking was not seen as a critical issue.
22 Mar 2000	ADB received a copy of the Executing Agency's approval of appointment of a new deputy resident engineer.
10–14 Apr 2000	ADB Loan Review Mission 3. No significant issues identified, except that civil works were behind schedule.

Date	Description
31 May 2000	ADB approved the recruitment of a new maintenance management computer specialist.
Summer 2000	<p>Two test sections of pavements were laid in an attempt to reduce cracking:</p> <p>(i) 300–400 m section was laid with 8 cm of base course and 5 cm of wearing surface;</p> <p>(ii) 1.2 km was laid in a single layer.</p> <p>The consultant and the contractor concluded that the 13 cm single-layer construction was superior in terms of cold weather crack resistance, and submitted estimates for this variation to the employer. The proposed variation might have resulted in cost savings, but it was rejected by the employer, perhaps because the employer's greatest concern was raveling, not cracking, and the proposed variation did not address raveling.</p> <p>The solution adopted to address raveling was to surface-dress affected areas. For more deeply affected areas, the surface material was removed and replaced.</p>
June 2000	Employer presented a claim for \$951,570 against the consultant for pavement defects.
4 Jul 2000	ADB approved Modification No. 2 for: (i) extension of construction supervision from 30 November 1999 to 27 June 2000, (ii) extension of road maintenance consultants from December 1999 to June 2000, and (iii) increase in contract cost from \$3.7 million to \$4.34 million.
August, 2000	About this time (or earlier) Scott Wilson Kirkpatrick, on behalf of the employer, tested the aggregates from the Kounrad quarry. The test program included test not specified in the contract documents. These tests indicated that the material may have undesirable properties when used in asphaltic concrete subject to extreme winter–summer temperature variations.
7 Aug 2000	ADB approved extension of the loan closing date by 12 months, from 30 November 2000 to 30 November 2001.
Winter (Nov) 2000	<p>By the end of the construction season, base course had been laid for km 678–788 (110 km), but wearing course had been laid on only 10 km (km 645–655). When interviewed by the Operations Evaluation Mission, the contractor stated that inability to obtain timely delivery of suitable bitumen was the main reason wearing course had not been laid on the rest of this section the wearing course had not been laid within a fixed period.</p> <p>The contract is believed to specify that after application of the base course, the application of the wearing course is subject to inspection and approval by the Executing Agency and may require preparation and/or remedial works at the contractor's expense.</p> <p>Some sections of base course laid in 1999 carried traffic but did not receive the wearing course until 2001.</p>
28 Nov 2000	ADB approved Modification No. 3 extending the date of completion of consulting services from 28 June 2000 to 30 November 2000, at no increase in the contract amount of \$4.34 million.
Spring (Mar) 2001	<p>Winter of 2000/2001 was exceptionally cold, with very little snow (which has a slight insulating affect if sufficiently thick) and temperatures that dipped to minus 30–35 degrees Celsius.</p> <p>In April–May 2001, transverse cracks (about 100 to 150 cracks per km) were observed in the base course sections. However the main area of concern at this stage was still raveling, and emphasis was not placed on transverse cracking.^f</p>
21 May 2001	Snowy Mountains Engineering Consultant took samples of aggregates from the Kounrad quarry for testing and reported on 29 May that the samples met contract specifications.
15 Jun 2001	ADB approved modification No. 4 extending the consulting services to 30 September 2001 and increasing the contract amount to \$4.79 million.

Date	Description
14 Aug 2001	The consultant issued the "substantial completion" certificate (effective 14 August 2001). The defect liability period also commenced on this date.
29 Aug–5 Sep 2001	ADB Loan Review Mission 4. Based on field inspections, the Mission found that works had been satisfactorily completed and that all quality issues had been resolved and all failed sections had been satisfactorily repaired.
13 Sep 2001	Ribbon cutting ceremony for the substantial completion of km 596–km 787+700.
22 Oct 2001	ADB approved the (i) second extension of the loan closing date by 9 months, from 30 November 2001 to 30 September 2002; and (ii) extension of the consultant's services for construction supervision by 10.5 months, from 30 September 2001 to 15 August 2002, in order to allow supervision during the defects liability period.
22–26 Apr 2002	ADB Loan Review Mission 5.
27 Aug–6 Sep 2002	ADB Loan Review Mission 6. The Mission reported that several government agencies were refusing to accept the consultant's final statement (satisfactory completion of civil works), and it was likely that the matter would go to arbitration. The Implementing Agency was to inform ADB of its decision before 30 September 2002. ADB advised the Implementing Agency to consult with the consultant and the contractor in engaging an internationally recognized expert to report on the road section, the engineer's statement, and the contractor's claims.
27 Sep 2002	ADB approved a third extension of the loan closing date, from 30 September 2002 to 31 March 2003, to allow for the settlement of disputes regarding the contractor's final claim for civil works.
1 Nov 2002	As of this date, \$41.170 million had been paid against the contract. The contractor had outstanding claims for an additional \$3.319 million. ⁹
4 Nov 2002	Commencement of independent technical audit by Finnroad.
11 Dec 2002	Loan closing.
18 Mar 2003	<p data-bbox="427 1146 1308 1173">ADB received a copy of the report by Finnroad. The main conclusions were</p> <ul style="list-style-type: none"> <li data-bbox="427 1192 1352 1251">(i) Cracking was caused by low resistance of the asphaltic concrete to cold temperatures. <li data-bbox="427 1270 1463 1388">(ii) This low resistance may have been due to the chemical composition of the binder (perhaps from overheating during preparation of the asphaltic concrete), its reaction to the aggregate (for example, high contents of asphaltenes or catalytic metals), or a combination of both. <li data-bbox="427 1407 1459 1465">(iii) Low bitumen content and variable compaction may also have reduced the fatigue resistance of the asphaltic concrete (at cold temperatures). <p data-bbox="427 1484 1325 1512">The Finnroad report also ventured into contractual issues by concluding that:</p> <ul style="list-style-type: none"> <li data-bbox="427 1530 1435 1648">(i) The contractor and the supervision consultant should have taken the climate of the area into account when selecting the bitumen and determining the mix design, and, furthermore, should have checked the past performance of the bitumen in a similar environment. <li data-bbox="427 1667 1438 1755">(ii) Since the transverse cracks appeared "already during the first construction season," the contractor and the supervision consultant knew the seriousness of the problem. However, they "were not able to solve this problem." <li data-bbox="427 1774 1357 1833">(iii) The defect can be most economically repaired permanently by full-depth reclamation, with a layer of hot mix asphalt concrete on top of it.

Date	Description
9–16 Jul 2003	ADB Project Completion Review Mission. Project was rated partly successful.
21 Sep 2003	The employer withdraws claim for \$951,570 against the engineer over pavement defects.

GOST = Gosudarstvennye Standarty (Soviet Standards), JOC = Japan Overseas Consultants, WSA = Wilbur Smith Associates.

^a Louis Berger International in association with Kazdorproekt.

^b This appears to have established a modus operandi by which the supervision consultant was called on to document and justify changes, which were then resubmitted to the design consultant, who would make the changes. This arrangement appears to have been neither efficient nor effective, and there is evidence that communications were occasionally strained.

This arrangement may have diluted the lead role intended for the supervision consultant, and seems to have resulted in a confrontational relationship with the local consultants, rather than the cooperative role envisaged in the terms of reference.

Much of the changes to the detailed design and contract documents reported at this stage appear to be associated with presenting them in a form suitable for international bidding. This concentration on documentation may have preempted more detailed reviews of technical aspects of project design and materials specifications.

^c Aggregate specifications finalized on 24 April 1997 may not have taken into consideration the possibility of using material such as aggregate from the Kounrad quarry, and use of this material was not identified in the feasibility study. It appears from later testing carried out by SMEC (21 May 2001) that the material specifications agreed to at contract signing may not have been sufficiently rigorous to identify undesirable properties of the Kounrad mine material.

^d Bituminous material was laid in two layers. These comprised 8 or 9 cm of coarse graded asphaltic concrete base course overlain with a denser graded 4 or 5 cm layer of wearing course, for a 13 cm total depth of asphaltic concrete (actual depths were varied to suit existing formation conditions).

^e The Operations Evaluation Mission confirmed that during Soviet times, this source of aggregate was not considered suitable for asphaltic concrete because of wide variations in its composition. However, discussions with the supervision consultant project manager indicated that quarrying operations at the Kounrad site were being closely observed, and that the consistency of the materials extracted was as good as any normal quarry material. The position taken by the consultant at this stage, which adhered strictly to the contract, stated that: (i) the aggregate met contract specifications, and (ii) there was no contractual basis to reject the use of this material. Thus, any substitution of aggregate was ex-contract and would require a variation order which could result in claims from the contractor. It appears that detailed cost estimates for using a substitute material were not discussed with the Executing Agency. Neither the Executing Agency nor the contractor prepared or submitted a cost estimate to provide alternative aggregate, nor was the possibility of submitting a variation request discussed.

By way of contrast, in the World Bank-funded section of the Almaty-Karaganda-Astana road, when a similar situation arose requiring a variation to the contract and an increase in cost, the Government asked the consultant to conduct appropriate techno-economic reviews, and then accepted the recommendations and requested the World Bank to provide additional funding.

^f Note that the more northern sections of the road (nearer Akshatau, km 788) were paved with asphaltic concrete prepared with aggregate that did not originate at the Kounrad mine quarry. Cracking appears to be equally prominent on these northern sections.

^g Borrower's Project Completion Report, p. 5.

Source: Operations Evaluation Mission.

SUMMARY OF PHYSICAL ACCOMPLISHMENTS

A. Road Rehabilitation

1. The main objective of the Kazakhstan Road Rehabilitation Project was to rehabilitate a 192-kilometer (km) section of the Almaty–Astana road between Gulshad and Akshatau (km 596 to km 788). Indications were that this heavily damaged road had received very little maintenance work during the 1990s. Typical damage included:

- (i) rutting on long, continuous sections—particularly in the right-hand lanes used by heavily loaded northbound traffic;
- (ii) local depressions that were extensive enough in places to force vehicles to the shoulder in order to avoid heavily damaged stretches of pavement;
- (iii) potholes and edge break sufficient to affect driving speed and riding comfort; and
- (iv) extensive bleeding during hot weather—probably as a result of surfacing dressing techniques (spray bitumen and chip seal) used for periodic maintenance.

2. However, road shoulders were in reasonable condition.

3. The road was rehabilitated to 7 meters (m) surfaced width with generally 8 centimeters (cm) of coarse graded asphaltic concrete base, overlain with 5 cm of dense asphaltic concrete wearing course. Shoulders were constructed to a 2.5 m width.

4. The road rehabilitation objectives were accomplished over a 4-year period, about 22 months longer than originally scheduled.

5. The civil works contract was signed on 6 November 1997. The works were completed to the issue of the final "taking over certificate" (substantial completion) on 14 August 2001. The 1-year defects liability period began on 14 August 2001.

6. The progress of works completion can be observed by looking at the issue dates of interim "taking over certificates," as follows:

Table A5.1: Progress of Works Completion

From	To	Length (km)	Date of Issue of Taking Over Certificate
km 596+000	km 644+000	48.0	22 October 1999
km 644+000	km 664+500	20.5	18 October 2000
km 766+700	km 787+700	21.0	1 July 2001
km 745+000	km 766+700	21.7	16 July 2001
km 695+800	km 745+000	49.2	3 August 2001
km 664+500	km 695 +800	31.3	14 August 2001

Source: Interim consultant's report; Operations Evaluation Mission.

7. The contractor's progress in the first year of construction, 1998, was slow. Only 12 km of surfaced road was constructed and none to a finished handover stage. More progress was achieved in 1999, when some 48 km was completed and an additional 34 km was completed to base course. All 94 km was opened to traffic during the winter of 1999/2000.

8. At the end of the next construction season (autumn 2000), substantial progress was made. While only an additional 20.5 km of road was completed up to the "taking over certificates" stage, 100 km of road was formed up to laying of the base course asphaltic concrete, and this 100 km carried traffic over the winter of 2000/2001.

9. The remaining 123.2 km of road was completed to "taking over" stage during the 2001 construction season.

10. The completed road sections have now carried traffic for 4–7 years, about 25–30% of the useful economic life expected at appraisal. The older sections are approaching the normal age at which periodic maintenance (resurfacing, as required) is scheduled.

11. Average vehicle speeds have increased substantially and traffic flows more freely on the rehabilitated road sections. The major defects observed during a drive over project-affected roads by the Operations Evaluation Mission were: (i) significant transverse cracking, spaced at about one to three car lengths (100–150 cracks per km); and (ii) short sections of severely deteriorated road surface at 5–10 locations within the 192 km section of project-rehabilitated road, each about 10–20 m in length.

12. The transverse cracking was being addressed through routine maintenance procedures that appeared to be very effective. No untreated cracking was identifiable at driving speeds, and ride comfort (road roughness) was not affected by the cracks. Trucks and buses were maintaining speeds of 80–100 km per hour (kph), and some cars were observed traveling at speeds well in excess of 150 kph. Aesthetically, the appearance of frequent transverse cracks filled with darker sealant made surface damage appear more serious than ride performance indicated it was.

13. However, the short sections with severely damaged surfaces do detract from highway performance. These sections represent a hazard to vehicles traveling at normal highway speeds in the summer, and have serious potential to cause accidents in the winter, when frost and frozen surface water may accumulate in the shallow deformations and depressions and cause drivers to lose control of their vehicles. These damaged sections are being maintained with routine patching techniques and do not represent a hazard at low speeds (less than 20–30 km per hour). But while these sections severely limit speeds, they have only a minimal effect on the performance of the entire 192 km.

14. The major consequence of the observed defects—both cracking and the occasional severely damaged short section—is that they have to be continually maintained. If maintenance is neglected or cracked sections are subjected to particularly severe rain–frost–thaw cycles, these cracked sections could quickly disintegrate.

15. The severely damaged sections should be reconstructed. The cause of this severe damage was not investigated. An engineering investigation of what caused the drainage and structural problems should be carried out before any localized reconstruction is planned.

16. Speeds over the few short, damaged sections should be limited until these sections are rehabilitated. Small warning signs have been placed in the shoulder, but speeding or inattentive drivers are unlikely to notice these signs. In, for example, North America, such hazardous road damage would warrant more prominent signage—perhaps flashing red lights or a long series of brightly lit warning signs. Effective policing would also be necessary to reinforce the signage, particularly at night and during the winter.

17. Finally, it is noted that the contractor had been paid approximately \$41 million of the construction contract as of 1 November 2002, but it was still owed some \$3.3 million (8% of the total contract value) in outstanding claims.

B. Road Maintenance

18. The main maintenance objectives of the Project were to ensure provision of routine maintenance to sections of the Almaty–Astana road that were not being rehabilitated (by either ADB, the Islamic Development Bank, or the World Bank); to procure road maintenance equipment; and to develop a new road maintenance system.

19. Under the loan, \$9.84 million of road maintenance equipment was procured by Kazakhavtodor, the state road contractor, which continues to operate and service this equipment as part of their normal road maintenance operations.

20. Counterpart funds worth \$12.39 million were used for road materials and routine road maintenance, including \$1.66 million for maintenance equipment. Road maintenance contracts worth \$10.73 million were awarded in 1999–2002 using local bidding procedures, as planned at appraisal. These included a \$6 million contract for Kazakhavtodor and \$0.5 million contracts for three semi-private companies.

21. A maintenance operations manual was prepared by the supervision consultant and was submitted to the implementing agency on roads, but it is believed that the implementing agency did not adopt this manual, preferring to develop its own approach with the assistance of other international financial institutions.

PHOTOGRAPHS OF REHABILITATED ROAD

A. Typical Rehabilitated Section



Typical road section performing adequately in carrying high-speed traffic, but showing some transverse cracking.

B. Transverse Cracking



Typical road section showing transverse thermal cracking. The cracks have been sealed during normal maintenance operations. Although the road appears somewhat unsightly considering its age, the roughness of the road has not been significantly affected and traffic moves at high speeds.

C. Localized Section of Severe Degradation



One of the 5–10 localized sections of severe degradation, each of roughly 10–20 m in length.

ASSESSMENT OF OVERALL PERFORMANCE

A. Road Rehabilitation

55% weighting in overall rating

Criterion	Weight ^a	Assessment	Rating Value (0-3)	Weighted Rating
1. Relevance	20%	Relevant	2	0.4
2. Effectiveness	30%	Less Effective	1	0.3
3. Efficiency	30%	Efficient	3	0.9
4. Sustainability	20%	Likely	2	0.4
Total	100%	Successful		2.0

B. Road Maintenance

25% weighting in overall rating

Criterion	Weight ^a	Assessment	Rating Value (0-3)	Weighted Rating
1. Relevance	20%	Highly Relevant	3	0.6
2. Effectiveness	30%	Effective	2	0.6
3. Efficiency	30%	Efficient	2	0.6
4. Sustainability	20%	Likely	2	0.4
Total	100%	Successful		2.2

C. Policy and Institutions

20% weighting in overall rating

Criterion	Weight ^a	Assessment	Rating Value (0-3)	Weighted Rating
1. Relevance	20%	Partly Relevant	1	0.2
2. Effectiveness	30%	Less Effective	0	0.0
3. Efficiency	30%	Less Efficient	0	0.0
4. Sustainability	20%	Unlikely	0	0.0
Total	100%	Unsuccessful		0.2

D. Overall Rating

Criterion	Weight ^a	Assessment	Rating Value	Weighted Rating
1. Relevance	20%	Highly Relevant	2.1	0.4
2. Effectiveness	30%	Less Effective	1.1	0.3
3. Efficiency	30%	Efficient	2.2	0.6
4. Sustainability	20%	Likely	1.6	0.3
Overall	100%	Successful		1.6

^a Weighted average of rating values for each component rounded to whole numbers.

Highly Successful (HS): Overall weighted average (OWA) is > 2.7. Successful (S): OWA is between $1.6 \leq S \leq 2.7$.

Partly Successful (PS): OWA is between $0.8 \leq PS < 1.6$. Unsuccessful (US): OWA is < 0.8.

Source: Operations Evaluation Mission.

ECONOMIC REESTIMATION

A. Introduction

1. Economic reestimation was carried out by comparing the costs and benefits of the "with project" and "without project" cases. In the "without project" case, the 192-kilometer (km) road from Gulshad to Akshatau would have remained in poor condition, resulting in high vehicle operating costs (VOC) and relatively low speeds. With the Project, the road was rehabilitated, resulting in improved road condition, reduced VOC, and higher speeds.

2. The economic internal rate of return (EIRR) compared the annual streams of economic capital and operating costs and benefits using the Highway Design and Maintenance Model Version 4 (HDM4), adjusted for the conditions of the project area. The analysis period covered the construction period and the following 20 years of operation. Costs and benefits were expressed in 2005 constant prices, excluding taxes and duties.

B. Traffic

3. Project traffic was analyzed for the road sections between Akshatau and Balkhash (the 150 km northern section of the project road), and between Balkhash and Gulshad (the 42 km southern section of the project road). The Operations Evaluation Mission (OEM) conducted 24-hour traffic counts for 3 days at three locations: (i) between Karaganda and Akshatau (immediately north of the project road), (ii) between Akshatau and Balkhash, and (iii) between Balkhash and Gulshad. An additional count and a moving-observer survey were conducted to verify the 24-hour counts. Seasonal adjustment factors were applied to estimate average annual daily traffic (AADT) for 2005.

4. Table A8.1 summarizes the AADT for 1995 and 2005 based on the 1995 traffic counts prepared by the project preparatory technical assistance (PPTA) and the OEM traffic counts. These indicate that total AADT rose from 1,295 to 1,617 vehicles. There were some significant shifts in vehicle composition, notably (i) a decline in three-axle trucks from 25% to 9% of traffic, (ii) a rise in five-axle trucks from 11% to 18% of traffic, and (iii) a rise in pickups from 1% to 10% of traffic. These reflect gradual modernization of the vehicle fleet through introduction of Western models, and the phasing out of obsolete models dating from the former Soviet Union.

Table A8.1: Traffic Level and Composition, 1995 and 2005

Vehicle Type	Average Annual Daily Traffic		Composition (% of total traffic)	
	1995	2005	1995	2005
2-axle trucks	103	83	8	5
3-axle trucks	329	142	25	9
4-axle trucks	42	29	3	2
5-axle trucks	148	287	11	18
6+ axle trucks	0	52	0	3
Light buses	20	47	2	3
Heavy buses	27	59	2	4
Motorcycles	12	4	1	0
Pickups	8	154	1	10
Cars	601	758	46	47
Other	5	2	0	0
Total	1,295	1,617	100	100

Sources: ADB. 1995. *Technical Assistance to Kazakhstan for Preparation of a Road Rehabilitation Program*. Manila; and Operations Evaluation Mission.

5. In the absence of reliable counts for the years between 1995 and 2005, and to avoid overestimating traffic,¹ the annual AADT for these intervening years was estimated by extrapolating between the 1995 and 2005 actuals. This required development of traffic growth rate assumptions for 1995–2005 that would be consistent with the 2005 AADT actuals. Different growth rates were assumed for the periods before and after full completion of construction: (i) 1.8% for 1995–2002, and (ii) 3% for 2002–2005. For forecasting traffic growth for 2005–2021, a growth rate of 3% was assumed. The forecast traffic growth rate was the same rate used in the project completion report (PCR), and was based on normal traffic only (no allowance for generated traffic). This is considered conservative in view of the sustained high rates of growth in gross domestic product (GDP) over the past 5 years.² A traffic growth rate of 4% was assumed at appraisal.

C. Costs

6. The investment costs of the Project were based on actual costs adjusted to 2005 prices. With the Project, routine and periodic maintenance costs were estimated on the basis of maintaining an international roughness index (IRI) value of less than about 3.4 over the remainder of the analysis period. This would require routine maintenance of \$3,000 per km every year, and periodic maintenance of \$39,000 per km every 7 years. Without the Project, routine and periodic maintenance were estimated on the basis of maintaining an average IRI of 7.8. This would require routine maintenance of \$6,000 per km every year, and periodic maintenance of \$17,000 per km every 3 years.

¹ The OEM decided not to make use of official traffic data and the 2002 traffic survey prepared by the project supervision consultant for the benefit monitoring and evaluation (BME) report. The official data, prepared four times annually, appeared to significantly overestimate traffic levels, and did not adequately reflect changes in vehicle composition categories. The BME estimates, based on 14-hour counts, were more representative in terms of vehicle composition, but the overall AADT estimates appeared too high and could not be reconciled with the OEM traffic survey findings for 2005.

² Annual growth in GDP was 9.8% in 2000, 13.5% in 2001, 9.8% in 2002, 9.3% in 2003, and 9.4% in 2004.

D. Benefits

7. The quantified project benefits were savings in vehicle operating costs and user time savings. VOC in the with and without cases were derived by the HDM4 model, using 2005 vehicle cost data. These are shown for traffic in 2005 in Table A8.2. The value of user time was taken as the average hourly rate for all wage sectors in April 2005. The value of non-working time was taken as one third of working time. It should be noted that the Report and Recommendation of the President and the project completion report did not consider time savings. The OEM considered this an omission, since users considered the shorter journey times to be a significant benefit of the Project, and since time savings are generally included for countries with levels of economic development and labor force participation comparable to Kazakhstan's.

Table A8.2: Vehicle Operating Costs by Vehicle Category, 2005
(\$ million, 2005 constant prices)

Vehicle Type	Vehicle Operating Costs in 2005	
	With Project	Without Project
2-axle trucks	1.64	2.04
3-axle trucks	4.32	5.35
4-axle trucks	1.35	1.69
5-axle trucks	12.03	15.10
6+ axle trucks	2.61	3.29
Light buses	0.76	0.91
Heavy buses	4.58	4.98
Pickups	1.02	1.30
Cars	5.75	6.98

Source: Operations Evaluation Mission.

8. Based on the OEM traffic survey findings, it was assumed that international transit traffic accounts for 5% of traffic, and this was excluded from the traffic forecasts used for economic analysis.

9. Benefits covered the period 1999–2021, which included the 20 years of full operation following substantial completion of civil works in 2001.³ It also included the construction period for rehabilitated road sections, which were progressively opened to traffic starting in 1999. In estimating traffic during construction, it was assumed that VOC on sections of road under temporary construction were the same as VOC on sections of non-rehabilitated road in the "without project" case.

E. Economic Returns

10. As shown in Table A8.3, the reestimated EIRR was 19.8%. This was less than the EIRR of 21.5% estimated at appraisal, but higher than the base case EIRR of 14.7% estimated by the PCR. The difference between the PCR and OEM estimates was largely because the latter

³ Parts of the road were opened to traffic in 1999. The entire road was opened to traffic in 2000, although the final wearing course was not completed until 2001. The economic appraisal therefore includes some benefits in 1999, and near completion-level benefits in 2000.

included benefits for 1999–2001, based on detailed information that the OEM obtained from staff of the Project supervision consultant and contractor (Appendix 4).

Table A8.3: Economic Internal Rate of Return
(\$ million, 2005 constant prices)

Year	Agency Costs			Benefits		Net Benefits
	Capital Cost	Routine Maintenance ^a	Periodic Maintenance ^b	Vehicle Operating Cost Savings	Time Savings	
1996	(0.14)	0.00	0.00	0.00	0.00	(0.14)
1997	(0.97)	0.00	0.00	0.00	0.00	(0.97)
1998	(11.12)	0.00	0.00	0.00	0.00	(11.12)
1999	(13.41)	0.00	0.00	0.47	0.14	(12.80)
2000	(20.76)	0.00	0.00	8.13	0.95	(11.68)
2001	(10.45)	0.00	3.26	8.88	1.20	2.89
2002	(0.92)	0.58	0.00	7.36	0.66	7.68
2003	0.00	0.58	0.00	8.04	0.84	9.46
2004	0.00	0.58	3.26	8.73	1.05	13.62
2005	0.00	0.58	0.00	7.60	0.71	8.89
2006	0.00	0.58	0.00	8.12	0.89	9.59
2007	0.00	0.58	3.26	8.69	1.12	13.65
2008	0.00	0.58	0.00	7.45	0.77	8.80
2009	0.00	0.58	(7.50)	7.92	0.97	1.97
2010	0.00	0.58	3.26	10.70	1.22	15.76
2011	0.00	0.58	0.00	9.73	0.85	11.16
2012	0.00	0.58	0.00	10.59	1.05	12.22
2013	0.00	0.58	3.26	11.53	1.31	16.68
2014	0.00	0.58	0.00	10.43	0.92	11.93
2015	0.00	0.58	0.00	11.21	1.14	12.93
2016	0.00	0.58	(4.23)	11.90	1.42	9.67
2017	0.00	0.58	0.00	11.61	1.00	13.19
2018	0.00	0.58	0.00	12.64	1.24	14.46
2019	0.00	0.58	3.26	13.74	1.53	19.12
2020	0.00	0.58	0.00	12.55	1.09	14.22
2021	0.00	0.58	0.00	13.55	1.35	15.48

EIRR = 19.8%

^a Cost savings resulting from higher routine maintenance of "without project" case compared with "with project" case.

^b Periodic maintenance costs and savings based on 7-year cycle for "with project" case, and 3-year cycle for "without project" case.

Source: Operations Evaluation Mission.

F. Sensitivity Analysis

11. The sensitivity tests examined the effect on the EIRR of the following changes: (i) benefits reduced by 20%, (ii) no traffic growth after 2005, (iii) no time savings, (iv) 100%

increase in periodic and routine maintenance costs in the "with project" case, (v) \$20 million partial reconstruction in 2008, and (vi) fully operational life of rehabilitated road reduced to 10 years full operations. The latter three tests consider harsh scenarios that might arise if the pavement were to experience rapid deterioration. The EIRR remains well above the estimated opportunity cost of capital of 12% in each of the sensitivity tests. The sensitivity tests are shown in Table A8.4.

Table A8.4: Results of Sensitivity Analysis

Scenario	EIRR (%)
Base Case	19.8
Sensitivity Tests	
(i) Benefits 20% lower	15.9
(ii) No traffic growth after 2005	18.7
(iii) No time savings benefits	17.9
(iv) 100% increase in periodic and routine maintenance costs in with case	18.3
(v) \$20 million partial reconstruction in 2008	18.8
(vi) Asset life reduced to 10 years full operations	16.2

Source: Operations Evaluation Mission.

12. Test (v) reflects a scenario considered likely by the PCR (but not found to be justified by the OEM). This was that cracking would cause rapid deterioration of the road that would necessitate partial reconstruction in 2008. Under this scenario the PCR estimated that the EIRR would fall to 10.5%. On this basis, the overall economic viability of road rehabilitation was brought into question. However, as Table A8.4 indicates, based on updated traffic and VOC information, and taking into account the road sections opened for traffic in 1999–2001, at reappraisal the EIRR remains attractive even under this scenario.

ROAD ACCIDENT STATISTICS

Table A9.1: Kazakhstan Road Accident Statistics 2000-2004

Incident	2000	2001	2002	2003	2004^a
Total number of accidents	11,304	12,162	12,966	14,013	14,822
Accidents in settlements	8,593	9,292	9,856	10,736	11,312
Accidents on national roads	1,535	1,673	1,965	2,139	2,263
Accidents on local roads	1,176	1,197	1,145	1,138	1,247

^a Based on 9 months data, annualized.

Table A9.2: Gulshad-Akshatau Road Accident Statistics, 2002-2005

Incident	2002	2003	2004	2005^a
Number of accidents	28	39	52	48
Number of deaths	17	17	40	21
Number of injured	33	53	86	105

^a Based on 4 months data, annualized.

Source: Operations Evaluation Mission.