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PROJECT PERFORMANCE ASSESSMENT REPORT

ARGENTINA

NATIONAL HIGHWAYS REHABILITATION AND MAINTENANCE PROJECT (LOAN 4295-ARG)

July 1, 2007

Sector, Thematic and Global Evaluations
Independent Evaluation Group (World Bank)

Currency Equivalents (annual averages)

Currency Unit = Argentine Peso (A$, through end 2001, AR$ from January 2002)

1998	US$1.00	A$1.00
1999	US$1.00	A$1.00
2000	US$1.00	A$1.00
2001	US$1.00	A$1.00
2002	US$1.00	AR$3.06
2003	US$1.00	AR$2.90
2004	US$1.00	AR$2.92
2005	US$1.00	AR$2.90
2006	US$1.00	AR$3.00

Abbreviations and Acronyms

ADT	Average Daily Traffic
CAS	Country Assistance Strategy
COT	Build, Operate and Transfer (Construír, Operar, Transferir)
DNV	National Highway Directorate (Dirección Nacional de Vialidad)
DPV	Provincial Highway Department (Dirección Provincial de Vialidad)
IDB	Inter-American Development Bank
ICR	Implementation Completion Report
INT	Department of Institutional Integrity of the Bank
IRI	International Roughness Index
M&E	Monitoring and Evaluation
OCCOVI	Concession Regulating Agency (Organo de Control de las Concesiones Viales)
PAD	Project Appraisal Document
PCU	Project Coordination Unit
PROBAS	Engineering Design at Bid Stage
PRODEF	Final Design Prepared by Contractor
vpd	Vehicles per Day

Fiscal Year

Government: January 1 to December 31

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IEGWB Mission: Enhancing development effectiveness through excellence and independence in evaluation.

About this Report

The Independent Evaluation Group assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, IEGWB annually assesses about 25 percent of the Bank's lending operations through field work. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons.

To prepare a Project Performance Assessment Report (PPAR), IEGWB staff examine project files and other documents, interview operational staff, visit the borrowing country to discuss the operation with the government, and other in-country stakeholders, and interview Bank staff and other donor agency staff both at headquarters and in local offices as appropriate.

Each PPAR is subject to internal IEGWB peer review, Panel review, and management approval. Once cleared internally, the PPAR is commented on by the responsible Bank department. IEGWB incorporates the comments as relevant. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

About the IEGWB Rating System

IEGWB's use of multiple evaluation methods offers both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. IEGWB evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (additional information is available on the IEGWB website: http://worldbank.org/ieg).

Outcome: The extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently. The rating has three dimensions: relevance, efficacy, and efficiency. Relevance includes relevance of objectives and relevance of design. Relevance of objectives is the extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). Relevance of design is the extent to which the project's design is consistent with the stated objectives. Efficacy is the extent to which the project's objectives were achieved, or are expected to be achieved, taking into account their relative importance. Efficiency is the extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. The efficiency dimension generally is not applied to adjustment operations. Possible ratings for Outcome: Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Risk to Development Outcome: The risk, at the time of evaluation, that development outcomes (or expected outcomes) will not be maintained (or realized). Possible ratings for Risk to Development Outcome: High Significant, Moderate, Negligible to Low, Not Evaluable.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry of the operation and supported effective implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of supported activities after loan/credit closing, toward the achievement of development outcomes. The rating has two dimensions: quality at entry and quality of supervision. Possible ratings for Bank Performance: Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower (including the government and implementing agency or agencies) ensured quality of preparation and implementation, and complied with covenants and agreements, toward the achievement of development outcomes. The rating has two dimensions: government performance and implementing agency(ies) performance. Possible ratings for Borrower Performance: Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Contents

This report was prepared by Hernan Levy, Consultant who assessed the project in March 2007. Romayne Pereira provided administrative support.

Principal Ratings

	*ICR**	*ICR Review**	*PPAR*
Outcome	Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Institutional Development Impact**	Modest	Modest	
Risk to Development Outcome	-	-	Moderate
Sustainability***	Likely	Likely	
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Moderately Satisfactory

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible Bank department. The ICR Review is an intermediate IEGWB product that seeks to independently verify the findings of the ICR.
**As of July 1, 2006, Institutional Development Impact is assessed as part of the Outcome rating.
***As of July 1, 2006, Sustainability has been replaced by Risk to Development Outcome. As the scales are different, the ratings are not directly comparable.

Key Staff Responsible

Project	*Task Manager/Leader*	*Sector Manager*	*Country Director*
Appraisal	M. Mekan	Krishna Challa	Myrna Alexander
Completion	Juan Gaviria	Jose Luis Irigoyen	Axel van Trotsenburg

Preface

This is a Project Performance Assessment Report (PPAR) for the **Argentina: National Highways Rehabilitation and Maintenance Project** (Loan 4295-ARG), for which the World Bank approved a loan in the amount of US$450.0 million equivalent on March 17, 1998. The loan was closed on December 31, 2005, two years later than planned. US$1.3 million that were undisbursed at closing were canceled.

The project was selected for assessment because of its financing of multi-year, performance-based contracts for road rehabilitation and maintenance (the CREMA contracts) carried out by private contractors, a model that is being replicated in other countries, the large size of the loan and the project, and also to assess evolution of the CREMA model since the IEG assessed in 2001 the project (Loan 3611-Arg) that first launched the CREMAs.

The report is based on a review of project documents, including the ICR, Project Appraisal Document (PAD), Memorandum to the President, the Loan Agreement (and its revisions) and project files, as well as on discussions with Bank staff involved in the project. An IEG mission visited Argentina in March 2007 to review project results and met with officials representing a broad range of stakeholders, including the national highway directorate (in Buenos Aires as well as Mendoza); the association of, as well as several individual, civil works contractors; users represented by the association of truckers; and the highway agency of the Mendoza provincial government. The mission also briefed and exchanged views with officials from the Ministry of Economy responsible for World Bank projects. The IEG mission made field visits in Mendoza to roads being maintained under CREMA contracts.

The IEG gratefully acknowledges the courtesies and the logistical support received from the National Highways Directorate, especially its Project Coordination Unit, and its Planning and Works Supervision Departments, and the Bank's country office in Buenos Aires.

Following standard IEG procedures, copies of the draft PPAR was sent to government officials and agencies for their review and comments but none were received.

Summary

This is the Project Performance Assessment Report (PPAR) for the *Argentina: National Highways Rehabilitation and Maintenance Project (Ln.4295-Arg)*, approved in 1998. At an estimated cost of US$ 929 million (and final cost of $ 860 million), this project aimed to help the government continue the program of rehabilitation and maintenance of its national highway system that had been started in the 1990s. The project supported multi-year, performance-based maintenance contracts, known as CREMAs (for Contract for Rehabilitation and Maintenance), which had originally been started under a preceding Bank operation (Loan 3711-Arg).). A PPAR[1] of that operation found that the CREMAs had been highly successful as tools of highway maintenance management. Complementing the CREMAs, another project component, accounting for about a quarter of the project cost and expected to be solely financed by the budget, intended to finance execution of maintenance through other maintenance management methods. The project also aimed to help strengthen the management of the national highway system through studies, technical assistance and training.

Implementation of the project was carried out under difficult circumstances. An economic crisis that had started in the mid to late 1990s, deepened in 2001 and 2002. The crisis, which led to a devaluation of the Argentine currency, the peso, from parity to about three pesos per dollar, caused extreme budget constraints and had serious repercussions on the project. The government was unable to provide counterpart funding at the level required. Thus, the loan had to be amended twice to increase the Bank's disbursement ratio in order to lighten the burden on the national treasury and allow the project to proceed forward. The economic crisis was accompanied by a political crisis. The head of national highway Directorate (DNV) of Argentina was changed 5 times during the project period, and so was the head of the project's coordination unit (PCU).

The outcome of the project is rated **moderately satisfactory**. The condition of the national network was improved, and reached and surpassed strict standards set at project appraisal. The proportion of the non-concessioned paved network in good condition was 82.8% at project closing, against a goal of 65%. The improved highway system turned out to be essential to support the major boost in exports that followed the currency devaluation and improved terms of trade. The project-financed investment in rehabilitation and maintenance had a high economic rate of return (the estimated average for a sample of road segments was 57%). CREMA contracts continued to be successful and the DNV introduced several changes in bidding and contract design that made the contracts more cost-effective and broadened their scope, notably improving their focus on environmental and safety concerns. Due to financial constraints, however, the percentage of the network managed under CREMA contracts could not be expanded as expected. Improved budgetary conditions have resulted in a significant increase in the DNV budget in 2007, and the same is expected for the following years. A new round of expansion of the coverage of the highway network through CREMAS is currently planned. The

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[1] PPAR Report number 22479, dated June 27, 2001.

institutional objective was not achieved, as successive changes in the DNV management had not taken ownership of the objective and activities planned to support it. Government restrictions on the signing of contracts in foreign currency hampered the recruitment of consultants and were an additional barrier to adequate funding for road maintenance.

The risk to development outcome is rated **moderate**. All roads improved and maintained under the project-financed CREMA contracts are being maintained, mostly through extended or through new CREMA contracts. The increase in the DNV budget expected in the next few years should ensure that the road network will continue to be well maintained. However, given past experience, adequate funding for maintenance in the longer term is less certain, especially if the international financiers now supporting the DNV maintenance program reduce their support level. The recovery of the Argentine economy, which has resulted in a major increase in highway traffic levels, means that the benefits of the improved condition of the highway network will remain.

Bank performance is rated **satisfactory**. The project was well prepared and had well conceived objectives and components, although it had overoptimistic targets regarding the extent of expansion of the role of the private sector and of the CREMA system that was possible within the project's timeframe. The project included a simple but well targeted Monitoring and Evaluation system. Supervision was outstanding. The project team guided and adjusted the project during a long and deep economic and political crisis, and had to deal with constant changes in DNV's senior personnel. The team reacted quickly to difficult conditions, and took fast and appropriate action. This included alerting the government and the Bank when a large package of bids in 2004 showed unusual results.

Borrower performance is rated **moderately satisfactory**. Despite the economic and political crisis, the Borrower managed to implement the project reasonably well and substantially improved the condition of the highway network. CREMAs were selected following a rigorous technical and economic analysis. Supervision of the contracts and compliance with the benchmarks was generally correct. There were two areas, however, where the Borrower and/or the DNV did not perform well. First, the institutional objective was not achieved, as the large majority of the several activities supporting the objective were not carried out. Second, during the project period, about a quarter of the highway network was maintained through force account, while a commitment under the project stated that up to 90 percent of the maintenance would be contracted with private operators through CREMAs or other road maintenance methods.

This PPAR confirms an important lesson identified in the PPAR of the preceding project, which supported the launching of the CREMA approach. That lesson was that contracts such as CREMAs tend to be given higher priority in budgetary allocations than maintenance works carried out under traditional or contracts or force account. Thus, reflecting that lesson, despite the deep economic crisis during the early 2000s, the government still managed to provide some counterpart funding for the execution of the CREMA contracts, even if such contribution was lower than originally expected.

The following new lessons emerge from this project:

a) Performance-based contracts for road maintenance, such as the CREMAs, are an efficient tool of maintenance management, and likely to be of interest to other countries looking for ways to increase the effectiveness of their road maintenance management systems.

b) A road maintenance strategy should include a menu of management options with maintenance carried out by the private sector, thus improving efficiency and reducing the extent of maintenance carried out by force account. Over time, the road network should ideally be maintained largely by performance type contracts.

c) Project components which are fully locally-financed are useful parts of a project as they provide the Bank with a more complete understanding of the sector assisted by a project, yet they are difficult to monitor.

Vinod Thomas
Director-General
Evaluation

1. Background and Context

THE SECTOR

1.1 Starting in the late 1990s, Argentina suffered a major economic and social crisis, which reached a peak in 2001-2002. In these two years, the country's GDP fell by 4.4 percent and by 10.9 percent, respectively. In 2002, after many years of a fixed and stable exchange rate, the currency was devalued from parity to the dollar to about one third of the value.

1.2 The crisis had serious effects in the allocation of funding for public infrastructure, including the road system. In 2002, the budget of the National Highway Directorate (DNV) was only US$150 million, or about a quarter what it had been for a few years in the mid-1990s, when the government had decided to boost support for priority road sector investments and for preserving the existing road assets. This temporary increase in funding, in turn, followed many years (in the 1980s and beginning of the 1990s) when funding for the road sector was severely curtailed, leading to deterioration of the road network. In 1990, Argentina had the lowest share of paved road in good condition among middle-income countries.

1.3 In the early 1990s, in response to the lack of funding and to the poor condition of the road network, the government launched a program aimed at increasing private sector participation in the rehabilitation and maintenance of the national roads network. The DNV concessioned to private contractors the operations and maintenance of 9,800 kilometers of high traffic highways (over 2,000 vehicles per day), or about one quarter of the paved national road network. A new entity (OCCOVI) was created to handle such concessions. At about the same time, the DNV transferred to the provinces the responsibility to maintain most of the unpaved national road network. The private operators under OCCOVI were allowed to charge tolls for the use of the roads they managed, making the concessions self-financed, without requiring government support. In 1996, the DNV launched another innovative program of road maintenance, consisting of multiyear, performance-based contracts for subnetworks covering some 100-200 kilometers per contract, known as CREMAs (Contracts for Rehabilitation and Maintenance).

BANK SUPPORT FOR THE SECTOR

1.4 The Bank over the last decade has strongly supported Argentina's road sector, focusing especially on the preservation of the network with a view to improving its quality thus helping reduce transport costs. The improved terms of trade following the currency devaluation make transport cost a key variable for trade.

1.5 In the past, the Bank concentrated its support mainly for the national road network managed by the DNV. In recent years it has also started to help the provinces maintain and improve their own provincial networks. At the federal level, the project under review was followed by an Adaptable Program Loan (APL, US$ 200 million loan), whose first phase was approved in 2004, and a second phase is being prepared for

approval during FY07. At the provincial level, two projects were approved in FY07, first a loan for US$ 75 million for the Cordoba province, and then a loan for US$ 126.7 million, for the Santa Fe province.

1.6 A PPAR (report 33479 of June 27, 2001), of the preceding federal road project (Loan 3411) which helped finance the first CREMAs, found that the project had been highly successful, leading to a reduction of the federal road network in poor condition and to an improved overall condition of the federal roads. In addition, there was much institutional progress, such as extension of outsourcing, better enforcement of environmental safeguards and a major restructuring of the DNV making it leaner and more effective.

1.7 The CREMA concept has been replicated, with modifications, in other Latin American and in other regions. This PPAR, based on the assessment of the Argentina experience, includes in Annex B a brief list of conditions required for the successful design and implementation of CREMA contracts. The purpose of the list is to provide guidance that may be useful to countries considering the use of performance-based contracts for road maintenance.

2. The Project

2.1 The project's overall objective was to help Argentina preserve its national road network. Specific objectives were the following:

- Stabilize the physical condition, arrest further deterioration of the non-concessioned road network, and reduce the long-term economic costs for rehabilitation and maintenance of the national road network

- Increase the participation of the private sector in road rehabilitation and maintenance activities

- Adapt its role and further strengthen the DNV's capabilities for planning, contracting, and efficient supervision of rehabilitation, maintenance and concession programs.

2.2 The project components as listed in the PAD are shown in the table below:

Table 2.1 Project Components and Cost

Component	Actual	Appraisal			
	Total Cost (US$ million)	Total Cost (US$ million)	Percent of Total (%)	Bank financing (US$ million)	Percent financed by the Bank (%)
Phase I CREMA: contracts let under ongoing Bank loan 3611, covering: 4,026 km of rehabilitation 11,815 km of maintenance	486	544	58	370	68
Phase II CREMA: new contracts covering an additional: 1,459 km of rehabilitation 2,581 km of maintenance	106	130	14	65	50
Rehabilitation and maintenance of the remaining network: 2,379 km of rehabilitation 5,106 km of maintenance	240	240	26	0	0
Works of Remaining Network with Partial Bank Financing	27				
Institutional and consultant support: Strengthen DNV organization Supervision of CREMA Unit Cost Study Engineering Studies Laboratory Equipment Knowledge Based Programs	1	15	2	15	100
TOTAL AT APPRAISAL		929	100	450	48
TOTAL AT COMPLETION	860	860	100	449	52

2.3 The three objectives were coherent and aimed to improve the condition of the road network while continuing to encourage a higher effectiveness in the management of road maintenance. The preceding project had helped the DNV improve the condition of the national road network, but the condition of the network at the start of that project was very poor, and by its completion the network, while improved, was still far from being satisfactory. Thus, there was still a considerable margin to further improve the road network and, correspondingly, further reduce the cost of road transport, both trucking and passenger services. During project preparation, an alternative was considered consisting of the transfer of the non-concessioned road network to the provincial authorities, rather

than support the DNV-managed maintenance contracts, but this alternative was rejected due to the uneven capacity of the provincial highway departments..

2.4 The objective to increase private sector participation in the maintenance of the national road network, and especially through CREMA contracts, was sound. However, the specific targets to be achieved at the end of the project, notably 70 percent of the network to be managed under CREMA contracts appeared to be overly ambitious, given financial, technical and administrative constraints.

2.5 A surprising element in the project is the increase in the percentage of the rehabilitation part relative to the total length of the CREMA contract, when Phase I and Phase II are compared. In the CREMA-I subnetworks, that is those that had been bid under the previous loan, rehabilitation accounted for 34 percent of the total road length to be covered by the CREMAs. In the CREMA-II subnetworks, which cover roads different from those in CREMA-I, this percentage had increased to 57 percent.[2] An obvious consequence is that, since rehabilitation is more expensive than routine maintenance, the unit costs of the CREMA had necessarily to go up. DNV officials and Bank staff indicated that the reason for increasing the percentage of rehabilitation was that overall rehabilitation needs were larger than those at the time of the CREMA-I. Also that CREMA-I contracts were designed in the late 1990s under tight budget constraints, which were not expected to continue when the project under review was prepared.

2.6 The project had a large institutional development component. In the preceding project, a similar component had had a successful outcome, suggesting that the DNV might be interested in continuing the institutional efforts it had started under that project.

3. Implementation

QUALITY AT ENTRY (QAE)

3.1 An assessment made by the Bank's Quality Assessment Group (QAG) found the project's QAE to be satisfactory. This PPAR concurs, with the reservation on the targets for private sector participation noted in the preceding section.

IMPLEMENTATION EXPERIENCE

3.2 *Loan Amendments and Extensions.* The project turned out to be approved and implemented at a critical time, since it was launched at the start of the economic crisis, and the crisis deepened a few years later. On the political side, during project implementation the head of the DNV was changed five times, and so was the head of the project's coordination unit (PCU). On the economic side, when the crisis peaked in 2001 and 2002, the national budget was severely reduced, leading to a significant shortfall in

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[2] Source: PAD, Annex 1

the government's counterpart contribution to the project. In order to ensure adequate funding for carrying out the project, the loan was amended to increase the Bank's share of project financing, the first time (September 1999) to increase disbursement for the CREMA-I component from 68 percent to 83 percent, and the second time (January 2003) to include Bank financing for a limited time of 75 percent of the physical component (rehabilitation and maintenance of the remaining network), originally intended to be financed solely by the government, and to increase disbursement for the CREMA-II component from 50 percent to 75 percent. At the same time, the devaluation of the peso required major adjustments in the ongoing CREMA contracts.

3.3 The budget constraint made the funding provided by the loan an essential source to minimize the risks that the sharply reduced government ability to support infrastructure would lead to a new round of deterioration of the road network. Without such support, the CREMA program would have been in serious risk of collapse.

3.4 The project-provided funding was instrumental in helping the CREMA program proceed at a good pace, although slower than originally anticipated. Mainly due to the budget constraints, but also in part to problems with contractors, some contracts in the CREMA-I program were rescinded, others frozen ("neutralizados"), and yet others were cancelled and later rebid. Launching of the CREMA-II program was delayed due to the need to establish a formula for price adjustment to be included in the contracts, which was not necessary when there was a fixed parity between the peso and the dollar, but which became required in view of the break-up of the parity and the ensuing inflation.

3.5 *Project Extension.* Due to implementation delays, which started with a delay in effectiveness (achieved nine months after Board approval of the loan), and continued with several problems, including counterpart funding and contract readjustment following the devaluation, the closing date was extended by two years to the end of 2005.

3.6 *DNV abolition scare.* In July 2001, as part of its policy of decentralizing public services, the government prepared a decree that would have abolished the DNV, and transferred responsibility for the entire non-concessioned, paved, national network to the provincial governments. Similar actions were taken regarding the decentralization of education and health, and such measures were enforced. Yet, the DNV decree was never signed, likely because key stakeholders, including DNV personnel as well as road users, expressed well reasoned views against such move. Had the DNV actually been abolished, this would have created major problems for the implementation of the project.

3.7 The locally-financed component, intended to finance rehabilitation and maintenance of national roads not covered by the CREMAs to insure that the entire national road network was properly cared for, was difficult to monitor, as the component consisted of works dispersed over the whole road network. Monitoring became easier when the loan was amended, temporarily, to allow loan financing of this component. While the supervision reports always reviewed the progress with this component, at the end of the project it was difficult to sum up the total amount of works carried out.

3.8 The institutional component never did get the required support from DNV authorities, and only a minor part of its activities were in the end carried out. A major factor may have been restrictions placed by the government to the signing of contracts in foreign currency. In fact, the only two studies carried out under the project were done by a local contractor, the University of Cordoba.

3.9 *Contract extensions*. Most of the CREMA-I contracts that expired during implementation of the project were extended for two years, the first year extension financed by the Bank, and the second-year extension financed by the government. Extensions were low cost as they covered the routine maintenance part of the contract only, while the expensive part of the contract (rehabilitation or periodic maintenance) had been carried out at the start of the original, 5-year contract.

3.10 *Contractors pre-qualification*. Since 2003, in order to expedite execution of the project, the Bank and the DNV agreed that there would be no prequalification of contractors for the remainder of the project. This decision appeared to have no consequences on the quality of the work done by the contractors selected after this decision.

3.11 The relatively steady program of CREMAs during the project period provided the local construction industry with a stable demand for their services, and helped strengthen the capacity of the industry. Around one hundred different contractors (121 in 2004 and 97 in 2005)[3] submitted bids under the various highway programs of the DNV, of which the CREMAs were the most significant. On the other hand, it is surprising, considering that major international civil works contractors, both from Latin America and from other regions are active in different countries of Latin America, that no foreign contractor submitted a bid, or even bought the bid documents, for any of the highway contracts. Advertising of the project and invitation to bid for specific contracts was done in accordance with international competetitive bidding rules.

3.12 The program developed earlier and faster in some provinces than in others. For example, in the national road network located in the Mendoza province, development of CREMAs initially was slower than in other provinces because: (i) most roads were in relatively good condition, requiring less major maintenance works than roads in other provinces, (ii) some of the roads were undergoing major repairs under conventional input contracts, and were therefore not available for a CREMA contract, (iii) some road sections of especially difficult, and variable from year to year, winter maintenance (mainly snow removal), were difficult to include in CREMA contracts because of the high degree of uncertainty in the works required, and therefore in contract prices. (This was finally solved by leaving winter maintenance outside the CREMA contract, and to be done by DNV's force account). Estimates for 2007 show that the percentage of the national road network in the Mendoza province to be maintained by CREMAs will almost double the percentage in the first half of the 2000 decade.

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[3] Source: Camara Argentina de la Construccion, 2006: Estudio de las Capacidades y Problemas en la Industria de la Construccion de Infrastructuras. Informe Final.

3.13 *Problems with bids*. Bids for 28 CREMA contracts in April and May 2004 were highly unusual in two main ways: (i) in practically all the bids, differences in the price offered by the lowest bidder and the other bidders were abnormally small, and (ii) the lowest bidder had an almost perfect distribution, with only two contractors winning two bids. In addition to these factors, prices offered were substantially higher than estimated in the DNV budget estimate: the lowest bidders had prices ranging from 13 percent to 68 percent higher than the estimate, with a median of 23 percent. Factors such as increases in the price of asphalt and other tradable inputs, and delays between the preparation of the bid documents and the actual bidding time may explain some of the cost differences between the bid prices and the DNV estimates. However, they are unlikely to explain all of the differences found, especially those bids with prices two thirds higher than the DNV estimate. The above results raise the possibility of a non-competitive market, since, taken together, they would be highly improbable in a well-functioning market. The issue was reported by a Bank supervision mission in May 2004. In June 2005, a similar situation occurred with a package of bids under the follow-on loan, the National Highway Asset Management Project (Loan 72420-Arg). The LAC Region then submitted both cases for review by the Department of Institutional Integrity (INT). The INT investigation, while concluding that there was no compelling evidence of market sharing arrangements, made a number of recommendations regarding actions that could be taken to avoid such occurrences in future. Most of the recommendations had already been identified by the LAC region and implemented. Annex C provides more details and analysis of the results of these bids, carried out during the preparation of this PPAR.

4. Monitoring and Evaluation

DESIGN

4.1 The design of the project's M&E for the investment part of the project (accounting originally for 98 percent of the project's cost) was well thought out. In particular, the selection of the international roughness index (IRI) to assess the overall condition of the (non-concessioned, paved national) road network, rather than the more complex Condition Index (useful for planning maintenance activities) utilized by the DNV was a sound choice. The reason is that the IRI is a key indicator used worldwide, and values can therefore be compared with road condition in other countries. At the contract level, the CREMA specified a number of variables and targets that needed to be met (monthly for the routine maintenance, quarterly benchmarks and IRI at the completion of the works for the rehabilitation or periodic maintenance part) in order to determine compliance with the contract or otherwise establish penalties.

4.2 The original project included an important component (amounting originally to a quarter of overall project costs) for rehabilitation and maintenance to be financed solely by the budget. This component was to be monitored through periodic reporting by the DNV on project progress. However, in practice, a project component that receives no Bank financing is difficult to monitor, since it does not go through the usual Bank disbursement and other procedures which allow to keep track of execution. The fact that

the IRI target in the project's performance indicators covered the overall non-concessioned, national, paved network, (including the roads to be maintained by the government-financed component) compensated in part for the difficulties in assessing progress in the execution of the locally-financed component.

IMPLEMENTATION

4.3 During 2000-2002, when local resources were more limited, the scope of the network condition surveys to measure IRI was significantly curtailed, hampering monitoring of the compliance with the targets. Estimates were made during this period by DNV's technical staff. When measurements were again taken at end of the project, estimates turned out to be overly optimistic. The implication is that Bank missions were not provided with actual data and that remedial measures, should they have been needed, could not be identified.

4.4 A performance indicator for the institutional development component of the project (number of trainee-weeks) was based on data to be produced by a Human Resources Study to be financed by the Inter-American Development Bank (IDB). Due to implementation delays in the execution of the study, and the lack of baseline and targets, this indicator was not monitored.

UTILIZATION

4.5 Bank missions used the performance indicators to assess compliance with project targets. While the overoptimistic estimates made by the DNV when actual data was not collected could have hampered the mission's efforts to ensure compliance, surveys taken by project closing showed that the expected targets had been achieved.

4.6 Enforcement of targets in the performance-based CREMA contracts required periodic assessment of the variables included in the contracts. Information from such assessments was used to enforce contract penalties, or to prod the contractor to ensure compliance with the targets in the cases where the assessment provided no clear-cut data. For the routine maintenance part of the contract, there is a long list of variables to be monitored, such as surface cracking and potholes; condition of shoulders; drainage; road signs. If two of the indicators do not meet the targets, contractors receive only 70 percent of the contract amount specified for the period. If three indicators are not met, only 30 percent of the amount is paid.

4.7 Overall, the project's M&E is rated **substantial**.

5. Other Issues

EVOLUTION OF THE CREMA CONTRACTS

5.1 Since the CREMAs were first launched in 1996, the DNV has amended the CREMA design several times with the purpose of making it more responsive as a maintenance management tool. This section summarizes the main changes in the CREMA contracts during this period.

5.2 The changes introduced to the CREMAs can be broadly classified in three categories: (i) content and coverage, (ii) structure of payments and penalties, (iii) contractor qualifications

5.2 *Content and Coverage.* This in turn can be divided between (a) the rehabilitation/periodic maintenance part of the contract, and (b) the routine maintenance part. On part (a), the original CREMAs focused on the rehabilitation of the road surface, in part because there were monetary limits to the value of the contracts. As the budgetary situation improved, CREMAs were broadened in scope, to include such things as road intersections, circles, bridge defenses. In particular, the new CREMAs increasingly included items that improved road safety, such as road widening in critical sections, addition of guardrails in curves and installation of emergency telephones. The current CREMAs also have a stronger environmental management plan than was included in the early CREMAs.

5.3 On the routine maintenance part, there was also a broadening of scope, both regarding the performance items to be controlled and the physical area of the road's right-of-way covered.

5.4 A result of the broader scope of the major maintenance works is an increase in the unit costs of the CREMAs. Costs also are increasing as a higher proportion of the CREMA road sections will undergo major maintenance works, relative to the sections with only routine maintenance. For example, in the CREMA 314 in Mendoza, two thirds of the network (100 kilometers out of a total of 150 kilometers) were resurfaced. More recently, up to 90 percent of the length of the CREMA road network may be subject to rehabilitation or periodic maintenance.

5.5 *Payments and penalties.* In the early CREMAs, payment to the contractors for the major maintenance works, whose execution was planned for one year, was done in three installments during the execution of the works (amounting to about 60 percent of the cost of the works) and the remainder in monthly installments over the last 4 years of the contract. This payment structure resulted in the contractor having to prefinance much of the work done. This translated into a finance charge being included in the contractor's offer, raising the price of it. In current CREMAs, contractors are paid as work is carried out, thus reducing the contractor's finance charges. This has required an increase in the warranties and the retention of the warranties during the whole period of the contract. A formula for price adjustment during execution of the contract has been introduced, further

reducing financial risks to the contractor. Penalties for non-compliance of benchmarks have been increased, and enforced more regularly than in the past.

5.6 *Contractor qualifications.* Current CREMAs are more demanding in the requirements that contractors must meet to qualify for a contract. A contractor needs to demonstrate experience in CREMA contracts, or in major maintenance works comparable to the scale of the works included in the contract.

CREMAs AND THE ROAD MAINTENANCE STRATEGY

5.7 During the project period, the DNV's road maintenance strategy for the non-concessioned network included the use of different management techniques, CREMA being the most prevalent. Other methods include force account for routine maintenance (covering some 30 percent of the total network length), modular (which also includes a part for rehabilitation), kilometer-month (limited to routine maintenance), transfer to provincial highway departments, and non-tolled concessions.

5.8 In the project reviewed in this PPAR, it was expected that by the completion of the project 70 percent of the non-concessioned national road network would be maintained with CREMA contracts. Under the follow-up APL project, currently under execution, it was expected that the proportion of CREMAs would increase substantially more. The experience with the project under review suggests that it will be increasingly difficult to augment the proportion of the non-concessioned road network maintained under CREMA contracts. Some of the constraints that hamper the further expansion of the CREMA system may be solved, but a more gradual approach than currently conceived may be required.

5.9 As noted in the section on Ratings, below, the 70 percent target for the percentage of the network to be covered by CREMAs was not attained. While the economic crisis and budget constraints were major factors, there are other reasons that hamper reaching a high percentage of maintenance done by CREMAs.

5.10 On the financial side, CREMAs are expensive contracts because they include major maintenance works so that budget constraints severely affect the amount of CREMAs that the DNV can undertake. As the new CREMAs include a higher proportion of the roads to undergo rehabilitation or periodic maintenance, the cost of the individual CREMA contracts will increase, making the financial factor more critical. In the next 2-3 years, financial constraints do not appear to be likely, but over the longer term such constraints are certain to reappear. Experience during the period of the project under review is that a quarter of the CREMAS subnetworks financed under the project are currently being maintained under low-cost, extended CREMA contracts (Table 7.1). Extensions are low cost because they only cover routine maintenance.

5.11 On the technical side, there is normally a one-year period between the end of one CREMA contract and the signing of the subsequent CREMA. This delay stems from the time needed to prepare the engineering documents to proceed with the bidding process once the ongoing CREMA contract is completed, and the time required to award and sign the contract. While in theory it would be possible to advance preparation of the

documentation and shorten the time between the end of one CREMA contract and the start of the following one, in practice it would be difficult to shorten the time. Another factor is that it will not be always possible to find enough road sections that require rehabilitation or periodic maintenance, which are the core of the CREMA contracts. Still another factor is that some roads are being improved with new construction such as addition of lanes, and this type of work has not to date been considered appropriate for inclusion in CREMAs.

5.12 One way to overcome the technical constraints would be to try longer-term CREMA contracts, for example 10 to 12 years. Performance-based maintenance contracts of this duration are being used in other countries (e.g., Australia and New Zealand). Such longer-term contracts involve a higher degree of uncertainty for the contractor, presumably leading to higher bid prices. On the other hand, a longer term contract may allow to better time the rehabilitation or periodic maintenance works, possibly leading to postponing some investments. This could counteract the higher uncertainty. Since longer-term contracts would be one way to facilitate the expansion of the CREMA concept, it might be useful for the DNV to try pilots along these lines.

5.13 On the economic side, when the CREMAs were first launched, it was assumed that this maintenance management system had a niche in traffic range from about 750 vehicles per day (vpd) to 1,500-,2000 vpd. Roads with higher traffic levels lend themselves to concessions to private, toll-road operators. Roads with lower traffic levels were amenable to maintenance by other management methods, such as the kilometer-month (multi-year contracts for routine maintenance only). Extending CREMA contracts to road sections with low traffic levels will require to use appropriate, low-cost technology, such as single bituminous treatment, if the investments are to have a satisfactory economic rate of return. Such type of technology is not always well received by the users.

5.14 Thus, there appears to be serious limits to achieving a substantial expansion in the use of CREMAs for the maintenance of the national road network. On the other hand, the percentage by force account remains high. In order to improve the cost-efficiency of the maintenance effort, the DNV should aim, together with increasing the percentage of CREMAs, at reducing the percentage done by force account, by using other management approaches that rely on private operators.

6. Ratings

OUTCOME.

6.1 Outcome is rated ***moderately satisfactory***. This rating results from the analysis of the three dimensions discussed below, relevance, efficacy and efficiency.

RELEVANCE

6.2 Relevance of the project is rated substantial. The project objectives were fully consistent both with the CAS at the time the project was prepared and appraised and with

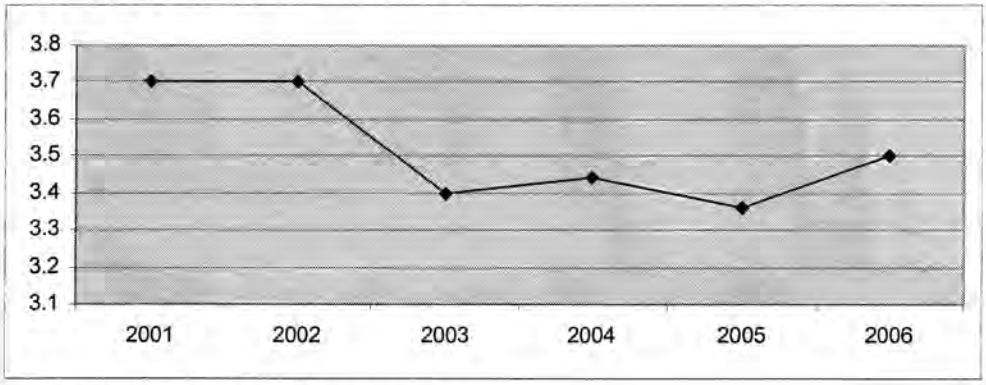
the current CAS. The former CAS stated as one of the objectives to rebuild and upgrade infrastructure. The current CAS (May 2006) is self-defined as a Performance-Based CAS. This CAS notes that one of the main development challenges is to close the infrastructure gap, and notes that logistics cost in Argentina are the second highest in Latin America. The CAS identifies road network management, rehabilitation and maintenance through performance-based contracts (such as the CREMAs) as an area that should receive strong support. The project components supported well the project objectives. It is not clear, however, the extent of ownership at the time of appraisal of the institutional development component included in the project.

EFFICACY

6.3 ***Objective 1: Physical condition of the network.*** Achievement of this objective is rated high. The three targets relating to the physical condition of the non-concessioned paved network by project closing were met, and exceeded by a significant amount:

(a) the average roughness of the network, measured in IRI, was expected to be below 3.5, starting from 3.70 in 1998. By the original closing date in 2003 the IRI was 3.40 and by the actual closing in 2005 it was 3.36. A provisional estimate for 2006 is 3.5
(b) the percentage of roads in poor condition (IRI >5) was expected to be below 6 percent. By the original closing date it was 5.36 percent, and by 2006 it was 4.20 percent.
(c) the proportion of the network in good condition (IRI<4) was expected to be at least equal to 65 percent. By the original closing date it was 82.8 percent, and by 2006 it was 84.5 percent.

Chart 6.1 Values of IRI: 2001-2006



Source: DNV and LAC Region estimates

6.4 ***Objective 2: Participation of the Private Sector in Road Rehabilitation and Maintenance.*** Achievement of this objective is rated as substantial. Due to the economic crisis, the CREMA-II program, originally expected to be launched in 1999, only started, and modestly, in 2001, with little progress during the following years. At the same time, CREMA-I contracts started to expire in 2002. While most of these contracts were extended for up to two years, the overall length of roads maintained under CREMAs decreased by 2005. The overall percentage of private sector participation remained at a fairly high level over 70 percent until 2001 thanks mainly to the use of the kilometer-month system, also a private sector-managed maintenance method. However, this

approach also started to be reduced from 2002. As result, both the percentage of the network covered by CREMAs and overall by the private sector declined in the later years of the project. This trend is now being reversed. By March 2007, 11 CREMAs where under bidding process, and another 11 CREMAs are expected to be put for bidding by the first half of 2007. This would represent an extra 3,000 kilometers put under CREMAs in the first semester of 2007.

6.5 ***Objective 3: Institutional Development.*** Achievement of this objective is rated modest. The component supporting this objective was drastically curtailed. Seven of the original eight studies were dropped. The start of the training program was delayed several years, and in the end only a small part of the expected program was carried out. This is reflected in the amounts allocated for the component: while the appraisal estimate was US$13.2 million, only US$0.8 was actually spent. Overall, there was clearly a lack of ownership by the DNV of this component.

EFFICIENCY

6.6 Efficiency of the project-financed investments is rated high. Using the same methodology (the Bank's HDM-III model) employed in the PAD, and applying it to a sample of 14 sample networks representing different geographic areas and different CREMA phases (I and II), the DNV estimated economic rates of return ranging from 13 percent for the sections with low traffic to 129 percent for the sections with middle or high traffic. The average ERR for the 47 road sections analyzed with the HDM-III model was 57 percent.

6.7 Economic efficiency could have been even better if lower prices had been obtained for the works. Two critical factors for achieving lower prices are likely to have been at play in the CREMA contracts. The first has to do with the design of the CREMA bid documents and contracts. According to the contractors interviewed during the preparation of this PPAR, their prices included a margin to cover financial charges the contractor had to assume, including, for example, delayed payments by the DNV that happened during the peak economic crisis, and risks stemming from inflexibility in the quarterly benchmarks required to be met in the major works component of the contracts. Still, contractors noted that Bank-financed contracts had a better structure, especially regarding financial risks after changes were introduced in the CREMA contracts in 2003, than were budget-financed CREMA contracts.

6.8 A second factor was the extent of competition in CREMA contract bids. As noted in the Implementation chapter, 28 CREMA bids in 2004 raised the prospect of a non-competitive market and therefore of prices higher than necessary. It is worthwhile to note that the PAD was concerned about bidding, as it listed (Annex 1, Project Design Summary) a critical risk regarding the increased private participation that...."private sector....does not overbid in the future". This assessment in the PAD was not based on past lessons, but it was the judgment at the time that this could constitute a critical risk.

6.9 Another dimension of efficiency is the efficiency of the DNV. By transferring responsibility for routine maintenance to the CREMAs rather than executing such maintenance by force account, the DNV is a leaner organization than it was before.

RISK TO DEVELOPMENT OUTCOME

6.10 The risk to development outcome is rated ***moderate.***. As shown in the table below, all roads improved and maintained under project-financed CREMAs are now being maintained, mostly under extended or new CREMA contracts.

Table 6.1 Current Maintenance of Roads Improved and Maintained under Loan 4295

	CREMA-I	CREMA-II
Total number of subnetworks (contracts) financed by Ln 4295	***61***	***18***
Contract extended, budget financed	16	3
New CREMA contract, budget financed	1	13
Under a different maintenance management system	4	2
New CREMA contract, with external financing (bidding process or under way)	40	-
TOTAL	61	18

6.11 In 2007, the overall DNV investment budget was substantially increased, and is some US$ 800 million. This budget should provide ample margin to assure the counterpart funding to the ongoing CREMA contracts assisted by the Bank and other international lenders. However, given past experience, funding at adequate levels of road maintenance over the long-term is less certain, especially if funding from other financiers were not as available as it is at present. Even today, part of the budget-financed CREMAs is for contract extensions, which cover routine maintenance only Overall, the DNV remains a strong institution with broad support[4], and there is no reason to believe that the abolition scare of 2001 would be repeated.

6.12 The recovery of the Argentine economy has resulted in significant increases in traffic levels. From 2002 to 2006, the average traffic increase in all DNV's fixed traffic counting stations has been 41 percent. This trend means that the benefits of the improved roads will remain or increase.

6.13 The increase in the DNV budget, coupled with support by other external financiers beyond the Bank, suggests that the proportion of the non-concessioned road network that is maintained under CREMA contracts will increase.

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[4] During discussions of the PPAR mission with staff of the Ministry of Economy, staff from that Ministry noted that the road projects executed by the DNV could be considered the best implemented projects of the Bank's portfolio.

6.14 One factor that could potentially affect sustainability would be the non-realization of timely surveys of road condition, since only surveys carried out periodically can provide flags on road condition to ensure that problems are addressed as they occur, rather than later at much higher costs. Such problem occurred during implementation of the project. However, the strong increase in maintenance budgets is likely to bring with it a higher likelihood that funding for the conduct of timely road surveys will be available.

BANK PERFORMANCE

6.15 Bank performance is rated ***satisfactory.*** The project was well prepared, and had well conceived objectives and components, although it had overoptimistic targets regarding the expansion of the role of the private sector and of the CREMA system that was possible within the project's timeframe. The project had a simple and well targeted M&E system. Supervision deserves to be considered as outstanding. The project team guided and adjusted the project during a long and deep economic crisis and had to deal with constant changes in the DNV's and the PCU's senior staff. The team reacted quickly to the difficult conditions and took fast and appropriate action. The increase in disbursement percentages was instrumental in securing the achievement of the target on the condition of the road network. Staff of the DNV interviewed during preparation of this PPAR highly praised the Bank's supervision team, notably for its strong task management from the Buenos Aires office and for the efficient and high quality support from the technical staff in headquarters.

6.16 The supervision team and the divisional management were right in alerting the government and the Bank management when a large package of bids in 2004 showed unusual results

BORROWER PERFORMANCE

6.17 Borrower performance is rated ***moderately satisfactory***. Despite the economic and political crisis, and the constant changes in the DNV's and PCU's heads, the Borrower managed to implement the project reasonably well and as a result to substantially improve the condition of the national road network. The selection of CREMA subnetworks was done following a rigorous technical and economic analysis. Supervision of the contracts was generally correct with, in most DNV's provincial offices, well trained technical personnel that followed closely the execution of the contracts and the compliance with the benchmarks. During the project period, the government maintained its support for the CREMAs, even as it cancelled contracts with private operators for the management of other infrastructure services.

6.18 There were, however, two areas where the Borrower and/or the DNV performance was not good. First, the institutional development objective of the project, that was not achieved. It would have been understandable that some change of views could have occurred in the DNV as a result of changes in its management. Yet, the fact that seven of the eight original studies included in the project were dropped, and that training carried out was a much scale down of the intended program, suggests that the

DNV as an institution had no interest in using the proposed project activities to strengthen its management. Second, the DNV during the project implementation period maintained a high proportion of the routine maintenance of the network done under force account, while it had committed under the project that at least 90 percent of the non-concessioned network would have been contracted to the private sector.

7. Lessons

7.1 This PPAR confirms an important lesson identified in the PPAR of the preceding project. That lesson was that contracts such as CREMAs tend to be given higher priority in budgetary allocations than maintenance works carried out under traditional contracts or by force account. Thus, reflecting that lesson, despite the deep economic crisis during the erly 2000s, the government still managed to provide some counterpart funding for the execution of the CREMA contracts, even if such contribution was lower than originally expected.

7.2 The following new lessons emerge from the project under review:

a) *Performance-based contracts for road maintenance, such as the CREMA contracts, are an efficient tool of maintenance management, and likely to be useful to other countries looking for ways to increase the effectiveness of their road maintenance management systems.* CREMA-type contracts would be especially suitable for middle-income economies with a well developed highway agency and contracting industry.

b) *A road maintenance strategy should include a menu of management options with maintenance carried out by the private sector, thus improving efficiency and reducing the extent of maintenance carried out by government personnel. Over time, the road network should ideally be maintained largely by performance type contract.* The process is likely to be gradual, as financial, economic, technical and administrative constraints need to be overcome.

c) *Project components which are fully locally-financed are useful parts of a project as they provide a more complete perspective of the sector assisted by a project, yet they are difficult to monitor.* The large locally-financed component in the project (a quarter of total costs) was intended to finance road maintenance works dispersed over several thousand kilometers. Thus, they were difficult to monitor. And because such works did not include Bank financing (except for a short period following a loan amendment), the usual loan recording documentation did not apply. Yet, these locally financed components are useful in that they provide a more complete perspective of the overall road maintenance effort.

Annex A. Basic Data Sheet

NATIONAL HIGHWAYS REHABILITATION AND MAINTENANCE PROJECT (LOAN 4295)

Key Project Data *(amounts in US$ million)*

	Appraisal estimate	*Actual or current estimate*
Total project costs	929.0	859.8
Loan amount	450.0	448.7
Cofinancing	-	-
Cancellation	-	1.3
Economic Rate of return %	83	57

Project Dates

	Original	*Actual*
Identification/Preparation	-	
Appraisal/Negotiation	-	11/24/1997
Board Approval	-	03/17/1998
Effectiveness	-	12/15/1998
Closing	12/31/2003	12/31/2005

Staff Inputs (staff weeks)

	Actual/Latest Estimate	
	N° Staff weeks	*US$(000)*
Identification/Preparation	14.3	107
Appraisal/Negotiation	5.7	43
Supervision	65.4	467
ICR	5.0	39
Total	90.4	636

Mission Data

	Date (month/year)	No. of persons	Specializations represented	Performance rating	Rating trend
Identification/Preparation	6/1997	1	Eng		
	10/1997	5	Eng (3),FinAn, Prof		
Appraisal/Negotiation	6/1998	1	Eng		
Supervision	12/1998	1	Eng	S	S
	3/1999	1	Eng	S	S
	11/1999	1	Eng	S	S
	3/2000	2	Eng, Ass	S	S
	6/2000	1	Eng	S	S
	12/2000	2	Eng, Econ	S	S
	6/2001	2	Eng, Econ	S	S
	12/2001	2	Eng, Econ	S	S
	3/2002	2	Eng, Econ	S	S
	6/2002	3	Eng (2), FinAn	S	S
	12/2002	5	Eng (2), Econ, FinAn, Proc	S	S
	6/2003	4	Eng (2), Econ, Proc	S	S
	10/2003	4	Eng (2), Econ, Proc	S	S
	5/2004	3	Eng (2), Econ	S	S
	2/2005	3	Eng (2), Econ	S	S
	11/2005	3	Sector Chief, Eng (2)	S	S
ICR	3/2006	1	Eng		

Eng=Engineer, FinAn=Financial Analyst, Econ (Economist), Proc (Procurement Specialist), Ass=Assistant

Annex B. Crema Contracts – Under What Conditions Are They Appropriate?

The success of the CREMA approach in Argentina has prompted other countries in Latin America, as well as in other continents, to adopt, with variations, a similar model to outsource routine maintenance in a way that is cost-effective and is attractive to private contractors.

IEG's evaluations aim, in addition to assessing the performance of Bank operations, to facilitate transfer of experience among developing countries by extracting lessons from its evaluations. This Annex intends to help facilitate such transfer by focusing on the factors that make the CREMA approach feasible and desirable.

CREMA Contracts

CREMA contracts, while normally referred to as performance contracts, really consist of two parts: (i) an input-based contract for the major maintenance works (rehabilitation or periodic maintenance, specifically resurfacing), and, (ii) a performance-based (output) contract for the routine maintenance part of the contract, which involves the road section not being rehabilitated or resurfaced, and the remaining of the road section under the contract once the major works have been completed. The performance part of the contract includes several variables for which standards are pre-defined and which are controlled periodically to ensure compliance.

Key Conditions for Success of CREMA-type Contracts for Road Maintenance

The Argentine experience provides useful hints as to the conditions where performance-based maintenance contracts such as CREMAs can be successfully replicated. Such conditions are summarized below.[5]

A political will to improve the cost-effectiveness of resources allocated to road maintenance, including to outsource the execution of routine maintenance. Routine maintenance traditionally has been carried out by force account, in developed and developing countries. While this is not a cost-effective manner to carry out routine maintenance, there are several reasons why it continues to be done this way in most countries. Such reasons include: (i) the political economy of resistance to change, since there is no clear constituency for a change, but there is a strong constituency for keeping the status-quo (the established organizations and personnel in charge of maintenance); (ii) often lack of interest of private

[5] For more details of the CREMA contracts, see: Gerard Liautaud, 2001: Maintaning Roads - The Argentina Experience with Output-Based contracts. Note number 231. Public Policy for the Private Sector. Private Sector and Infrastructure Network, The World Bank Group.

operators in taking over routine maintenance, a low cost activity with potentially many uncertainties that can affect costs, (iii) circumstances that make finding private operators even more difficult, or where the cost of mobilizing a private operator would be enormous, such as remote regions or areas with extremely inclement weather conditions, (iv) the tasks of routine maintenance are sometimes difficult to define.

The CREMA contracts, with their component of major maintenance which is of interest to private contractors, strike a good balance between incentives to private operators and achieving a cost-effective routine maintenance. At the same time, the CREMA contracts have shown that most staff previously working as employees (permanently or temporary) of a highway organization for the purposes of carrying out road maintenance will find employment with the contractors executing CREMA contracts. Further, CREMA contracts result in leaner, more effective highway agencies.

Still, governments need to show a strong political will to improve the cost-effectiveness of routine maintenance, if they wish to embark on maintenance contracts that will entrust the job to private operators on a multi-year basis.

A highway department that has the capacity, or is willing to supplement its own capacity through the recruitment of outside consultants, to design and implement CREMA contracts. There are two aspects. First, the design of a CREMA contract, including good quality engineering to properly identify and specify benchmarks for the major maintenance part of the contract, and to establish the performance indicators for the routine maintenance part of the contract. The design involves testing several rehabilitation strategies, and subjecting the proposed works to rigorous economic analysis to ensure that the investments provide a satisfactory return for the investments. Second, is the supervision of the contract. This requires highly qualified personnel, with sound technical knowledge as well as judgment. This is necessary to ensure proper supervision of the works and to enforce penalties or otherwise work together with the contractor when gray areas call for solid professional judgment that can withstand independent technical audits.

A private contracting industry that has contractors capable of engineering design and execution, and of carrying out self-quality controls. Design capacity is necessary to prepare the final engineering design for the rehabilitation or periodic maintenance part of the contract, since the bid documents include a basic engineering design while the contractor is required to prepare the final design. Sometimes, there are major changes in conditions since the basic design was done, such as greater road deterioration and increased traffic levels, that may require significant changes to the basic design. Execution capacity required to carry out the major maintenance works of a CREMA-type contract, include a capacity to self-control the quality of the works. The contracting industry should not only have major civil works contractors, who will essentially take charge of the major maintenance works, but also small enterprises capable of carrying out under contract with the main contractor all or parts of the routine maintenance activities in the contract.

Annex C. Unusual Crema Bids In 2004

In April and May 2004, DNV received bids for 28 separate road subnetworks to be managed under CREMA contracts. These bids were unusual in three respects, as described below.

1) ***Very small differences in the price of the bids*** .

Table C1. Analysis of CREMA Bids April-May 2004

Contractor Code	Contract Price over DNV Estimate (%)	Price of Second Bidder Over Lowest Bidder (%)	Price of Third Bidder Over Lowest Bidder (%)	Price of Highest Bidder Over Lowest Bidder (%)
B	67.7	4.6	6.1	9.2
R	43.6	4.5		
D	32.1	4.1		
F	27.8	1.9		
N	25.9	1.4		
G-G	25.4	1.3	2.5	7.7
A	25.1	4.8	7.2	
L-L	25.0	4.8	5.7	10.6
R-R	24.5	2.0	2.0	4.0
U	24.5	1.2	6.9	
S	24.0	5.3		
Y	24.0	2.4	5.3	
A-A	24.0	0.9	2.9	3.2
C-C	23.8	5.7		
P	23.8	1.1	2.9	4.4
E	23.4	0.5	1.3	5.1
X	23.2	2.3	2.7	
F-F	22.8	20.9	24.4	24.6
Q	22.0	2.5		
Z	22.0	2.9		
K	21.9	5.4	8.3	
F	21.8	2.6	3.1	14.3
C	21.7	1.4	1.5	4.8
I-I	21.1	3.0	4.1	9.0
P	19.1	0.6		
N-N	18.5	5.4	5.6	7.8
P-P	13.3	10.2	14.1	

Table C1 above shows the bids received, and the price differences between the lowest bidder and the other bidders. Very small differences between the bids normally is indicative of distortions in the market. For example, a guideline by the US Federal Highway

Administration[6] noted that differences between the first and the second bid within 6 percent would raise concerns. Of the 27[7] CREMA bids shown in the table, only in two bids was the difference higher than 6 percent. The guidelines also says that differences between the lowest bidder and the third place bidder of less than 9 percent also raise concerns. Of the 27 CREMA bids, again there were only two bids where the difference exceeded 9 percent.

2) Distribution of Winning Bids Among Bidding Contractors

Only two bidders won two bids instead of one. All other winning bidders won only one bid. Thus, the ratio of number of contracts to bid winners is 28/26=1.08[8]. This is an unusually low ratio. In fact, a study of the civil works contracting industry carried out by the Argentine Association of Contractors in 2006[9] of overall highway bids in Argentina showed that the ratio was 1.45 in 2004 and 1.27 in 2005. Thus, the ratio of April-May 2004 bids would be a major exception when compared to the overall 2004 or 2005 highway bids.

3) Price of Bids Compared to Estimates by the DNV

As shown in Table C1, the price differences between the DNV estimate and the winning bid were large. Differences range between 67.7 percent and 13.3 percent. It is possible that DNV may not have fully updated the changes in prices of key inputs such as asphalt when preparing the estimates, and that, in some cases, other factors may also have intervened. However, it appears unlikely that all those factors could have accounted for the large differences encountered between the bid prices and the DNV estimates.

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[6] US Department of Transportation. Federal Highway Administration, 1983. Suggestions for the Detection and Prevention of Contract Bid Rigging.

[7] The Table only shows 27 bids, rather than 28 that actually took place, due to conflicts in data when comparing different data sources, such as the supervision report, a government audit report, and the Bank's record in the Controler's Department.

[8] Since the bid not considered in the table had a winner that would not repeat, whichever source of data was used, it is safe to consider all 28 bids in establishing the ratio of total bids to bid contractors who won bids.

[9] Cámara Argentina de la Construcción, 2006. Estudio de las Capacidades y Problemas en la Industria de la Construcción de Infrastructuras. Informe Final.