

**ASIAN DEVELOPMENT BANK**

**PPA: INO 21169  
PPA: INO 22265**

**PROJECT PERFORMANCE AUDIT REPORT**

**ON THE**

**TENTH AND ELEVENTH ROAD (SECTOR) PROJECTS  
(Loans 966/1115-INO)**

**IN**

**INDONESIA**

**April 2002**

## CURRENCY EQUIVALENTS

Currency Unit – rupiah (Rp)

		<b>At Appraisal</b>		<b>At Project Completion</b>		<b>At Operations Evaluation</b>
		Loan 966-INO (March 1989)	Loan 1115-INO (July 1991)	Loan 966-INO (July 1994)	Loan 1115-INO (June 1997)	(December 2001)
Rp1.00	=	\$0.00056	\$0.00051	\$0.00046	\$0.00041	\$.00010
\$1.00	=	Rp1,773	Rp1,963	Rp2,200	Rp2,445	Rp10,448

### ABBREVIATIONS

ADB	–	Asian Development Bank
ADB10	–	Tenth Road (Sector) Project
ADB11	–	Eleventh Road (Sector) Project
BBNKB	–	Bean Balik Nama Kendaraan Bermotor (transfer of vehicle ownership fee)
DGH	–	Directorate General of Highways (Bina Marga)
DGRI	–	Directorate General of Regional Infrastructure
EIRR	–	economic internal rate of return
FSU	–	Feasibility Study Unit
IBMS	–	Indonesian Bridge Management System
IIRMS	–	Indonesian Integrated Road Management System
IRI	–	International Roughness Index
km	–	kilometer
m	–	meter
MOC	–	Ministry of Communications
OEM	–	Operations Evaluation Mission
PBBKB	–	Pajak Bahan Bakar Kendaraan Bermotor (surcharge on fuel sales for road transport)
PCR	–	project completion report
PKB	–	Pajak Kendaraan Bermotor (annual vehicle registration tax)
PPAR	–	project performance audit report
PSAP	–	policy statement and action plan
REPELITA	–	Rencana Pembangunan Lima Tahun (Five-Year Development Plan)
TA	–	technical assistance

### NOTES

- (i) The fiscal year (FY) of the Government and the executing agencies ended on 31 March until FY1999. After a transitional period of 9 months in FY2000 (April-December), the fiscal year was aligned with the calendar year. From January 2001 the fiscal year ends on 31 December. FY before a calendar year denotes the year in which the fiscal year begins.
- (ii) In this report, "\$" refers to US dollars.

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**BASIC DATA**  
**Tenth Road (Sector) Project (Loan 966-INO)**  
**Eleventh Road (Sector) Project (Loan 1115-INO)**

**PROJECT PREPARATION/INSTITUTION BUILDING**

Loan/ TA No.	Name	Type	Person- Months	Amount (\$ million)	Approval Date
Loan 725-INO	Technical Assistance Program Loan—Multisector Program <sup>1</sup>	TA Loan	—	25.00	18 Dec 1984
TA 1193-INO	North Java Transport Corridor Study <sup>2</sup>	PPTA	—	0.25	10 Aug 1989
TA 1194-INO	Environmental Management of Road projects <sup>2</sup>	ADTA	6.4	0.22	10 Aug 1989

ADTA = advisory technical assistance, PPTA = project preparatory technical assistance, TA = technical assistance.

**KEY PROJECT DATA (\$ million)**

	Loan 966-INO		Loan 1115-INO	
	As per ADB Loan Documents	Actual	As per ADB Loan Documents	Actual
Total Project Cost	213.00	212.53	250.00	216.00
Foreign Exchange Cost	112.60	111.18	140.59	124.68
ADB Loan Amount/Utilization	120.00	109.21	150.00	130.75
Foreign Exchange Cost	81.80	80.30	140.59	124.68
ADB Loan Amount/Cancelation		10.79		19.25

**KEY DATES**

	Loan 966-INO		Loan 1115-INO	
	Expected	Actual	Expected	Actual
Fact-Finding		14 Nov–9 Dec 1988		22 Apr–15 May 1991
Appraisal		2–22 Mar 1989		8–27 Jul 1991
Loan Negotiations		11–12 Jul 1989		9–11 Oct 1991
Board Approval		10 Aug 1989		7 Nov 1991
Loan Agreement		13 Sep 1989		20 Dec 1991
Loan Effectiveness	12 Dec 1989	3 Nov 1989	20 Mar 1992	17 Feb 1992
First Disbursement		21 Dec 1990		1 Jun 1992
Project Completion	31 Dec 1993	31 Jul 1994	30 Jun 1996	30 Jun 1997
Loan Closing	30 Jun 1994	15 Oct 1994	30 Jun 1997	6 Apr 1998
Months (effectiveness to completion)	49	57	52	64

<sup>1</sup> Subproject No. 1: Road Improvement Project, for \$2.48 million, approved on 4 March 1985.

<sup>2</sup> Attached to Loan 966-INO.

**ECONOMIC INTERNAL RATE OF RETURN (%)<sup>a</sup>**

	Loan 966-INO			Loan 1115-INO		
	Appraisal	PCR	PPAR	Appraisal	PCR	PPAR
Road Betterment:						
Average	48	n.c.	36	n.c.	n.c.	49
Range	15–182	14–100	neg.–78	18–73	12–45	5–84
Bridge Replacement:						
Average	46	n.c.	n.c.	n.c.	n.c.	n.c.
Range	12–170	23–126	n.c.	38–248	41–159	n.c.
Developmental Road				21	24	n.c.

n.c. = not calculated, neg. = negative, PCR = project completion report, PPAR = project performance audit report.

<sup>a</sup> As calculated for part of subprojects.

**BORROWER** Indonesia

**EXECUTING AGENCY** Directorate General of Regional Infrastructure<sup>3</sup>

MISSION DATA	Loan 966-INO		Loan 1115-INO	
	No. of Missions	Person-Days	No. of Missions	Person-Days
Project Processing:				
Reconnaissance	0	0	1	24
Fact-Finding	1	61	1	110
Appraisal	1	62	1	100
Total	2	123	3	234
Project Administration:				
Inception	0	0	1	10
Review	6 <sup>4</sup>	118	8 <sup>4</sup>	83
Special Project Administration	1	8		
Project Completion	1	39	1	51
Total	8	165	10	144
Operations Evaluation <sup>5</sup>	1	24	1	24

<sup>3</sup> The original Executing Agency for the Project was the Directorate General of Highways (Bina Marga) within the Ministry of Public Works.

<sup>4</sup> Includes multiproject review missions.

<sup>5</sup> The Mission comprised K.E. Seetharam (Evaluation Specialist/Mission Leader), R. Thurlow (Staff Consultant/Transport Economist), and Dadan Rusli (Domestic Consultant). The Mission visited Indonesia from 5-12 December 2001 to evaluate both projects.

## EXECUTIVE SUMMARY

Under the Five-Year Development Plan (REPELITA V, FY1989–1993), the Government of Indonesia aimed to improve national, provincial, and district roads, and bridges to bring them up to a technically sound standard. The Government also gave more attention to improving road capacity in high-traffic corridors, particularly in Java and Sumatra, and to expanding the network in the less developed islands of eastern Indonesia. Two Asian Development Bank (ADB) projects, the Tenth Road (Sector) Project (ADB10) and the Eleventh Road (Sector) Project, (ADB11)<sup>3</sup> were formulated, largely based on work carried out under an ADB-financed project preparatory technical assistance (TA),<sup>4</sup> as sector loans to support the implementation of this road development program under REPELITA V. The Directorate General of Highways (DGH), a branch of the Ministry of Public Works, was the Executing Agency for both projects.

ADB10 was to help implement the road development program during the first 2 to 3 years of REPELITA V, and ADB11 during the last 3 years. The subprojects were located in 18 provinces, including 13 in eastern Indonesia. The common components of the two projects at appraisal comprised (i) road betterment of about 4,200 kilometers (km) of selected national and provincial roads; (ii) replacement of about 7,600 meters (m) of bridges; and (iii) consulting services for design review, construction supervision, and institutional strengthening of DGH. ADB10 also included 30 portable weighbridges to assess axle load patterns, computer hardware and software to establish an integrated project monitoring system for the road network, and a study on selling DGH's surplus equipment inventory to the private sector. Two TA grants were attached to ADB10 to prepare a feasibility study on the north Java transport corridor, and to strengthen the capacity of DGH to assess the environmental impact of road projects.<sup>5</sup> ADB11 included construction and upgrading of about 280 km of developmental roads, consulting services to strengthen the Feasibility Study Unit of DGH, and fellowships and overseas training to master's degree level for DGH staff.

The main objective of road betterment was relevant to the Government's revised strategy of improving national and provincial roads so that the network could be preserved. The designs used were generally appropriate for this purpose, with some exceptions. In some cases, the designs were revised before implementation, but changes were not always carried out, or were insufficient.

The main component of the two projects, the civil works, was largely implemented as planned. Under ADB10, 1,637 km of national and provincial roads were improved, compared with the appraisal target of 1,900 km. Under ADB11, 2,032 km were improved, compared with the target of 2,300 km. The reductions in project scope were largely the result of cost increases, which limited civil works that could be completed with the funds allocated. The bridge replacement components achieved 1,961 m in ADB10, compared with a target of 2,500 m, and 4,830 m in ADB11, compared with a target of 5,100 m. Out of the 280 km of the developmental roads envisaged at appraisal, 129 km, all on one road in South Sulawesi, were upgraded under ADB11. The rest of the developmental roads were upgraded under the subsequent ADB-financed project.<sup>6</sup> The other components—supply of equipment, consulting services, and training—were implemented as envisaged. TA 1194-INO improved DGH's environmental management capacity. TA 1193-INO successfully prepared an ADB project for the north Java transport corridor.<sup>7</sup>

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<sup>3</sup> Loan 966-INO: *Tenth Road (Sector) Project*, for \$120 million, approved on 10 August 1989. Loan 1115-INO: *Eleventh Road (Sector) Project*, for \$150 million, approved on 7 November 1991.

<sup>4</sup> *Subproject No. 1: Road Improvement Project*, for \$2.48 million, approved on 4 March 1985, under Loan 725-INO: *Technical Assistance Program Loan-Multisector Program*, for \$25 million, approved on 18 December 1984.

<sup>5</sup> TA 1193-INO: *North Java Transport Corridor Study*, for \$250,000; and TA 1194-INO: *Environmental Management of Road Projects*, for \$220,000; both approved on 10 August 1989.

<sup>6</sup> Loan 1335-INO: *Eastern Islands Roads (Sector) Project*, for \$180 million, approved on 29 November 1994.

<sup>7</sup> Loan 1428-INO: *North Java Road Improvement Project*, for \$150 million, approved on 23 January 1996.

The costs for road betterment were kept within the estimates by reducing the length of roads improved. There was little variation in the unit costs of the bridge works. The actual total cost of ADB10 was \$212.5 million, close to the appraisal estimate of \$213 million. In contrast, the actual total cost of ADB11 was \$216 million, well below the appraisal estimate of \$250 million. The cost underrun was mainly due to the transfer of the major portion of the developmental road component to the follow-on project (footnote 4). Implementation delays were less serious compared with the four previous ADB-financed road projects in Indonesia, which had required loan extensions of 2 years or more. All civil works completed were of satisfactory quality.

As the civil works components of both projects were important elements of the road development program under REPELITA V, DGH was fully committed to their implementation. DGH could have shown an equal commitment to the other components as well. Overall, both domestic and international consultants performed satisfactorily.

The Operations Evaluation Mission (OEM), which visited Indonesia in December 2001, carried out surveys on a random sample of 56 subprojects in four provinces. The overall performance of the road betterment subprojects has been good. The surveys showed that most road sections were in good condition and carrying significant volumes of traffic. The widening element also produced benefits. Since almost all the roads already had asphalt surfaces before their betterment, the benefits largely consisted of road-user cost savings.

The OEM observed that routine and some periodic maintenance was carried out on the road sections surveyed. Some road pavement was damaged in all provinces surveyed due to inadequate design and inappropriate or delayed maintenance rather than poor work by the project contractors. All the bridges inspected were in good condition.

At project completion, the Government fully complied with all the covenants of ADB10, and 10 out of 16 covenants of ADB11. Important sector policies were changed (e.g., road-user charges and cost recovery), although subsequent events, in particular the 1997 Asian financial crisis, have reversed many of them. Five covenants of ADB11 were only partly complied with: notably, DGH did not formally implement the project benefit monitoring and evaluation using independent reviews. The only case of noncompliance under ADB11 was the inability to maintain the average level of maintenance expenditures in real terms at the FY1992 level.

The economic internal rate of return (EIRR) has been estimated for all the surveyed road betterment subprojects. The EIRRs of individual subprojects range from a negative value to over 80%. The overall EIRR for the sample is 39%. Without reliable information on the condition and standard of the original bridges, and the total economic cost of replacement, including that of the superstructure, it is difficult to calculate EIRRs for the bridge replacement component. The surveys indicate, however, that the EIRRs must have been high. As for the 129 km of developmental road upgraded under ADB11, observed traffic volume on the road was over 300 vehicles/day, and the road was in good condition, validating the high EIRR of 24% calculated in the project completion report. The OEM's interviews also confirmed that the socioeconomic impact of the projects was positive. The environmental impacts were minimal since the road works involved betterment of existing paved roads.

The projects did not significantly improve road safety. The OEM is also concerned about their long-term sustainability as a result of the reduction in expenditure on road maintenance since the mid-1990s. The recent administrative changes, which have transferred responsibility for maintenance of the provincial roads to regional governments, raise even more concern about the future funding of road network maintenance. Both projects were implemented within the existing organizational setup and institutional arrangements. Their institutional development and other impacts were modest.

Overall, both the projects are rated successful. TA 1194-INO is rated successful, as well. TA 1193-INO will be evaluated together with Loan 1428-INO (footnote 5). One of the main lessons emerging from this evaluation is that the sector loan approach has resulted in successful road sector projects. The Executing Agency's capacity is the crucial factor for replicating such success in other developing member countries. Adequate attention needs to be paid during implementation to subproject selection and civil works quality, followed by adequate routine maintenance.

It is recommended that the successor of DGH, the Directorate General of Regional Infrastructure, prepare and implement specific programs in 2002 and 2003 for improving road safety and the Indonesian Integrated Road Management System.



## I. BACKGROUND

### A. Rationale

1. Through successive Five-Year National Development Plans (REPELITAs), the Government of Indonesia accorded high priority to the improvement and adequate maintenance of road infrastructure. Under REPELITA V (FY1989–1993), the Government aimed to bring national, provincial, and district roads, and bridges up to a technically sound standard. At the same time, increased attention was given to improving road capacity in high-traffic corridors, particularly in Java and Sumatra, and to expanding the network in the less developed islands of eastern Indonesia. Two Asian Development Bank (ADB) projects—the Tenth Road (Sector) Project (ADB10) and Eleventh Road (Sector) Project (ADB11)<sup>1</sup>—were formulated together as sector loans to support the road development program under REPELITA V. The Directorate General of Highways (DGH), also known as Bina Marga, a branch of the Ministry of Public Works, was the Executing Agency for both projects (para. 8). DGH had demonstrated satisfactory performance in two previous road sector loans to Indonesia.

### B. Formulation

2. The projects were formulated by DGH, largely based on work carried out under an ADB-financed project preparatory technical assistance (TA).<sup>2</sup> DGH screened the entire national and provincial road network of Indonesia, at the time some 46,000 kilometers (km) long, using the Road Maintenance Management System. This set priorities for maintenance and improvement of the network for 1988–1992. This system has been developed since then and is now known as the Indonesian Integrated Road Management System (IIRMS). The bridge component, consisting of the replacement of bridges on national and provincial roads, was reported as having been selected using the Indonesian Bridge Management System (IBMS). However, the input data required for this were not available at the time of appraisals, and bridges were included on an ad hoc basis.

3. Most of the road works were classified as betterment.<sup>3</sup> Standard pavement designs for the road betterment works were made by the regional betterment offices of the provincial public works departments using the computerized Simplified Final Engineering Design developed by DGH. Normally, these standard designs were reviewed before implementation, taking into account the conditions at each location.

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<sup>1</sup> Loan 966-INO: *Tenth Road (Sector) Project*, for \$120 million, approved on 10 August 1989; and Loan 1115-INO: *Eleventh Road (Sector) Project*, for \$150 million, approved on 7 November 1991.

<sup>2</sup> *Subproject No. 1: Road Improvement Project*, for \$2.48 million, approved on 4 March 1985, under Loan 725-INO: *Technical Assistance Program Loan-Multisector Program*, for \$25 million, approved on 18 December 1984.

<sup>3</sup> In Indonesia, “road betterment” typically involves strengthening the base course, widening, providing a new asphalt wearing course, and improving drainage. In most cases, the road will already have an asphalt pavement. Betterment is therefore distinct from rehabilitation (which restores a road to its original standard), upgrading (which normally involves sealing a gravel or earth road, or widening a two-lane road to four-lane standard), or periodic maintenance (which essentially involves only surface treatments).

### C. Purpose and Outputs

4. The projects aimed to help implement the road development program during REPELITA V. ADB10 was to help implement the program during the first 2–3 years, and ADB11, during the last 3 years of REPELITA V.<sup>4</sup> The subprojects were located in 18 provinces, including 13 in eastern Indonesia (Maps).<sup>5</sup> The improvement of the national and provincial roads and bridges was expected to lead to safer and more reliable all-weather travel, less costly transport, and more efficient distribution of goods and services. By including developmental roads, ADB11 also intended to enhance mobility of the underserved, low-income communities, particularly in eastern Indonesia.

5. The principal components of the two projects at appraisal, taken together, comprised the following:

- (i) road betterment of about 4,200 km of selected national and provincial roads;
- (ii) replacement of about 7,600 meters (m) of bridges; and
- (iii) consulting services for design review, construction supervision, and institutional strengthening of DGH.

6. ADB10 also included 30 portable weighbridges for assessing axle load patterns, computer accessories to establish an integrated project monitoring system for the road network, and a study on privatizing the surplus equipment inventory of DGH. Accompanying TA grants helped the preparation of a feasibility study on the north Java transport corridor, and strengthened the capacity of DGH to assess the environmental impact of road projects.<sup>6</sup> ADB11 also included construction and upgrading of about 280 km of developmental roads, consulting services to strengthen the Feasibility Study Unit (FSU) of DGH, and fellowships and overseas training to master's degree level for DGH staff.

### D. Cost, Financing, and Executing Arrangements

7. The total project cost for ADB10 was estimated at appraisal as \$213.0 million equivalent, of which \$112.6 million was the foreign exchange cost. ADB provided a \$120 million loan to finance \$81.8 million and \$38.2 million equivalent of the foreign exchange and local currency costs, respectively. The Export-Import Bank of Japan (Japan Bank for International Cooperation) provided cofinancing of \$50 million, which was to be equally divided between foreign exchange and local currency costs. The total project cost for ADB11 was estimated at \$250.0 million, comprising \$140.6 million in foreign exchange and \$109.4 million equivalent in local currency costs. The ADB loan for \$150 million was to finance all the foreign exchange cost and \$9.4 million equivalent of the local currency cost. The balance of funds for both projects was to be provided by the Government as part of the normal funding arrangements for national and provincial road expenditure.

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<sup>4</sup> ADB10 and ADB11 represented 4.8% and 5.5%, respectively, of the road investment program under REPELITA V.

<sup>5</sup> Subprojects under ADB10 were located in Central and East Java; Yogyakarta; Bali; East and South Kalimantan; North, Central, South, and Southeast Sulawesi; West and East Nusa Tenggara. Subprojects under ADB11 were located in West, Central, and East Java; West, Central, East, and South Kalimantan; North, Central, South, and Southeast Sulawesi; West and East Nusa Tenggara; Maluku; Irian Jaya; and Timor Timur.

<sup>6</sup> TA 1193-INO: *North Java Transport Corridor Study*, for \$250,000, approved on 10 August 1989; and TA 1194-INO: *Environmental Management of Road Projects*, for \$220,000, approved on 10 August 1989.

8. Before the projects started, DGH was responsible for the entire national and provincial road network. In 1987, a gradual transfer of road functions to level I (provincial) and level II (district and municipal) regional governments began. During implementation of the projects, the provinces were given responsibility for development and maintenance of primary collector roads, although most funding was provided by the Government and road planning was still a responsibility of DGH. The directors of implementation for the central and east regions implemented ADB10. The provincial offices of DGH implemented ADB11, with technical control by the regional betterment office. In 1999, as part of wide-ranging changes in the Government and major restructuring of several ministries, the duties of DGH were transferred to a newly established Directorate General of Regional Infrastructure (DGRI). Further reorganization took place in 2000, but DGRI remained as the central government agency responsible for the road network.

## **E. Completion and Self-Evaluation**

9. All disbursements under ADB10 were completed by October 1994 and under ADB11 by April 1998. Separate project completion reports (PCR) were prepared for the projects.<sup>7</sup> Both PCRs concluded that the projects had been implemented largely as appraised, with minor reductions to the length of road works and number of bridges completed. ADB10 suffered only minor delays. ADB11 had a 20-month delay at start-up of the road betterment component due to institutional constraints and slow processing of contracts. The Project was completed 12 months behind the appraisal schedule.

10. The PCRs were comprehensive, giving details of civil works carried out and other components implemented and their actual costs, together with assessments of the performance of contractors and consultants. Changes from the projects as appraised were identified. The reevaluations contained in the PCRs were based on the project benefit monitoring and evaluation reports. These were not well done, but the overall conclusion that the projects achieved high rates of return was not disputed. The PCRs included appropriate recommendations for sustaining the performance of the projects. Both the projects were rated generally successful.<sup>8</sup>

## **F. Operations Evaluation**

11. This project performance audit report (PPAR) assesses the relevance, efficacy, efficiency, sustainability, and institutional and other development impacts of the projects. It also identifies lessons and follow-up actions for ADB's ongoing and future operations in the road sector. The PPAR represents the findings of the Operations Evaluation Mission (OEM) that visited Indonesia in December 2001, and the surveys carried out on a random sample of 56 subprojects,<sup>9</sup> out of 188 subprojects actually implemented. The PPAR incorporates information obtained in discussions with officials of DGRI and consultants working in the road sector at central and provincial levels, plus comments received at workshops held in Jakarta and ADB headquarters to discuss preliminary findings of the OEM. Copies of the draft PPAR were provided to the Government, the Executing Agency, and concerned ADB staff for review and comments, which were considered in finalizing the PPAR.

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<sup>7</sup> PCR: 966-INO: *Tenth Road (Sector) Project*, 28 December 1995. PCR: 1115-INO: *Eleventh Road (Sector) Project*, 31 December 1998.

<sup>8</sup> Under the previous three-category rating system (generally successful, partly successful, unsuccessful).

<sup>9</sup> Including 39 road sections, 16 bridges, and 1 developmental road, in East Java, South Sulawesi, South Kalimantan, and East Nusa Tenggara.

## II. PLANNING AND IMPLEMENTATION PERFORMANCE

### A. Formulation and Design

12. The road transport sector plays a key role in Indonesia's national development. Its share in gross domestic product doubled in the 20 years before the projects. Expansion of the road network to meet the requirements of the economy was often carried out using minimum design standards to reduce the cost per kilometer and achieve the maximum number of kilometers for the given budget. Therefore, despite the major investment in roads, the condition of the national and provincial network remained poor due to various reasons, including generally weak pavement, high traffic growth, and inadequate maintenance. The projects were designed to (i) support the program of road betterment, (ii) improve the quality of the roads, and (iii) lessen the need for frequent maintenance to preserve the roads. Thus, the main objective of the projects was relevant to the Government's revised strategy of improving national and provincial roads to preserve the network. The designs used were generally appropriate, with some exceptions. As noted in the PCR for ADB10, the most common problem encountered—expansive clay soil base material—was already well known to DGH. In some cases, the designs were revised before implementation but changes were not always carried out or were insufficient.

### B. Achievement of Outputs

13. The main component of the two projects, the civil works, was largely implemented as planned at appraisal. In ADB10, a total of 1,637 km of national and provincial road betterment in 10 provinces was achieved, compared with 1,900 km planned in 12 provinces. In ADB11, 2,032 km of betterment in 13 provinces was achieved, compared with a target of 2,300 km in 16 provinces. The reductions were largely the result of cost increases (in dollar terms), which reduced the number of kilometers of works that could be completed with the funds allocated. The bridge replacement components achieved 1,961 m in 10 provinces under ADB10, compared with a target of 2,500 m in 12 provinces, and 4,830 m in 14 provinces under ADB11, compared with a target of 5,100 m in 16 provinces. Upgrading of 129 km, all on one road in South Sulawesi, was achieved in ADB11 out of the 280 km of the developmental roads envisaged. This was largely as a result of the late start in implementation because of the unsatisfactory feasibility study originally prepared by local consultants, which was subsequently replaced by one carried out by consultants appointed under ADB11 to strengthen the FSU of DGH.<sup>10</sup> Because of the delay, the balance of the developmental road works proposed was transferred to the subsequent ADB-financed project.<sup>11</sup> The other components, relating to the supply of equipment, consulting services, and training were implemented as appraised. Overall, the projects have satisfactorily achieved their physical targets. Given the large number of individual subprojects involved, some changes to the program were unavoidable. It was prudent to reduce the target length when the costs of appropriate works were found to be higher than expected at appraisal, rather than attempt to reach the target length using inadequate standards.

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<sup>10</sup> The feasibility study executed by the consultants was for the Pontianak-Tayan road, Phases 1 and 2 in West Kalimantan. The results were acceptable to ADB but were submitted late. A major extension of the loan closing date would have been required to accommodate the time required for bidding and construction of this developmental road.

<sup>11</sup> Loan 1335-INO: *Eastern Islands Roads (Sector) Project*, for \$180 million, approved on 29 November 1994.

### C. Cost and Scheduling

14. The actual cost of ADB10 was \$212.5 million, close to the appraisal estimate of \$213.0 million. Disbursements from the ADB loan were \$109.2 million,<sup>12</sup> which was used to fund \$80.3 million of the foreign exchange costs and \$28.9 million of the local currency costs. The actual cost of ADB11 was \$216.0 million, compared with \$250.0 million at appraisal. The largest cost savings were \$23.6 million in civil works and \$8.1 million in consulting services. The former was mainly incurred in the developmental road component (para.16). Of the \$150 million loan, ADB disbursed \$130.8 million, which financed the entire foreign exchange cost of \$124.7 million and \$6.1 million of the local currency cost. The remaining loan proceeds were canceled at loan closing. A comparison of the actual costs with the appraisal estimates is in Appendix 1.

15. The average cost of the betterment works according to final contract amounts was Rp180 million/km (or approximately \$90,000/km at average exchange rates during implementation), ranging from Rp81 million to Rp328 million/km. Such a range is normal given the difference in road function, terrain, and traffic levels. The average cost, when compared with that for such works in other countries, was reasonable. Widening also contributed significantly to cost variations in some cases; these variations were clearly justified for all roads surveyed.

16. The total costs for the betterment works were kept within the estimates, despite the substantial increases in cost after design reviews, by reducing the number of kilometers of works implemented.<sup>13</sup> There was little variation in the unit costs of the bridge works. Most of the bridges were steel truss bridges. The superstructures were provided under Australian grant assistance. As a result, the cost of the bridge component of the two projects comprised only the cost of substructures and installation. For the developmental road component, the actual unit cost per kilometer was only half the appraisal estimate. This reduction, together with the reduction of scope of work to 129 km, less than half the originally envisaged 280 km, brought the actual cost down to only \$6.1 million compared to the appraisal figure of \$26.8 million. ADB allowed the Government to transfer \$5.7 million from this component to cover the cost overruns in 18 road betterment subprojects. The Government financed cost overruns in 20 other subprojects.

17. The awarding of contracts for ADB10 was delayed by about 7 months, largely because DGH took a longer time than expected to prepare the contract documents. Extensions were given to some contracts so that in some cases works continued to the loan closing date. In the case of ADB11, the delay in awarding contracts was longer—more than 1 year—due largely to the time DGH took to compile a list of prequalified contractors, and the typical 6 months needed by the Coordinating Minister for Economic, Financial, Industrial, and Development Affairs to approve all contracts with a value of more than Rp3 billion (around \$1.7 million).<sup>14</sup>

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<sup>12</sup> The Government prepared withdrawal applications based on the net contract values (excluding the 10% contract tax). The appraisal report assumed that withdrawals would be based on the gross values (including the 10% contractor's tax). This resulted in the Government not utilizing \$10.8 million of the ADB loan, which was canceled at loan closing.

<sup>13</sup> The lesson from these cost overruns was taken into account in the subsequent Loan 1335-INO: *Eastern Islands Roads (Sector) Project* by the international consultants. The consultants reviewed designs and conducted inspection of each road link after initial selection by IIRMS, before the subproject containing the link was approved.

<sup>14</sup> DGH responded that such delays will occur less frequently in future projects, as Presidential Decree 18/2000 allows the project manager to approve contracts of values up to Rp50 billion (\$4.8 million equivalent).

18. The contractors mobilized quickly and generally carried out the work in a timely manner. Some delays occurred, especially in completing additional work recommended during the design reviews. Overall, ADB10 was completed 7 months behind schedule and ADB11, 12 months. This was a significant improvement over the four previous ADB-financed road projects in Indonesia, which had all required loan extensions of about 2 years or longer.

#### **D. Procurement and Construction**

19. The contracts for the civil works in ADB10 were procured using international competitive bidding procedures. The road betterment works were distributed over 25 contract packages, with individual package lengths varying from 34 to 103 km and final contract amounts ranging from \$1.7 million to \$12.8 million. The bridge works involved the replacement of 60 bridges, which were divided into 11 contract packages ranging in value from \$260,000 to \$1.7 million. Because of the small size of individual packages, no international contractors submitted bids, and local contractors carried out all work. With one exception, all contracts were finished within 4 months of the planned completion dates. The situation was similar with ADB11. The betterment works were divided into 46 contract packages, for which international competitive bidding procedures were used. Individual package lengths ranged from 13 to 98 km, with final contract values ranging from \$950,000 to \$6.7 million. Again, no international contractors bid for the work, and local contractors were used for all works. For the bridge works and the developmental road component, local competitive bidding procedures were used. The 105 bridge replacements were divided among 28 contract packages, which ranged in value from \$260,000 to \$1.9 million, and the 129 km of development road among 3 packages.

20. All civil works completed were of satisfactory quality. Most faults detected in the completed roads are believed to be the result of design inadequacies rather than of poor work by the contractors. The PCR for ADB10 assessed that most contractors discharged their work adequately, noting that only 3 out of 23 did not complete works fully or did work of poor quality. The PCR for ADB11 concluded that 95% of contractors engaged were generally acceptable as a main contractor. However, more than half the contractors were rated marginal to poor in their skills for site supervision, cash flow management, and equipment maintenance. In the OEM's view, larger contract packages could have been prepared to attract competent international contractors and thus enable a comparison of performance between the local and international contractors, especially in relation to contract management.

#### **E. Organization and Management**

21. The civil works components of the projects were important elements of the road development program under REPELITA V, and DGH was fully committed to their implementation. However, DGH showed less commitment to the other components. The consulting contract to provide services to enhance the FSU within DGH did not operate as envisaged because no full-time DGH staff members were assigned to the FSU for training. DGH was unaware of the status of the portable weighbridges that had been reportedly transferred to the Ministry of Communications (MOC).

22. For each Project, DGH appointed a core team of international consultants to supervise the civil works packages, with staff based in Jakarta and provincial capitals. In addition, five or six local consulting firms were appointed to provide field staff. Recruitment of consultants was delayed several months, which had the most impact on supervision of the betterment projects, where the consultants were in the field up to 10 months later than planned, after the awarding of construction contracts and, in some cases, after construction began. Slow consulting contract negotiations and the difficult approval process within DGH caused these delays. The local consultants had difficulty providing staff for the more remote locations. In the case of one package in North Sulawesi, the engineer was not on site until two years after the start of

ADB10. The local consultants were demobilized quickly at or before the provisional handover of completed works, making it difficult to identify defects and have them corrected by the contractors. Overall, the consultants, domestic and international, performed satisfactorily.

23. Additional consulting contracts were awarded for strengthening the FSU, training DGH staff in environmental management of road projects, conducting a study to privatize surplus equipment of DGH, and under one of the attached TAs (footnote 6) conducting the feasibility study of the north Java transport corridor. Again, recruitment of consultants was sometimes delayed and a number of problems arose with respect to their work. In particular, the team leader of the international consultants for the TA feasibility study was replaced after a year because of his lack of technical leadership, and language problems. The original methodology used was unsatisfactory and was changed after review by ADB. The feasibility studies for the developmental road component of ADB11, undertaken by local consultants, were unsatisfactory, delaying implementation and much reducing the program of works (para. 13). The TA for the environmental management of road projects (footnote 6) was successful. DGH adopted the recommendations to formulate its guidelines for environmental impact assessment. The strengthening of the FSU was also done well, although its long-term impact is difficult to assess.

### III. ACHIEVEMENT OF PROJECT PURPOSE

#### A. Operational Performance

24. The overall performance of the road betterment subprojects, which were by far the largest components of the two projects, has been good. All 71 contract packages involved national or provincial road links. In many cases, these packages included more than one road link, and in some cases these links do not form continuous sections and should be regarded as comprising more than one subproject. Given the large number and the wide geographical spread of the subprojects, they inevitably have varied functions and traffic levels. In Java, the roads have high traffic levels, often more than 10,000 vehicles/day, and have produced major benefits. On the other islands, traffic levels are often much lower but generally still high enough to generate significant road-user cost savings. Despite the financial crisis and severe economic downturn in Indonesia in 1998, there is no evidence that traffic levels have decreased on the project roads. It is difficult to determine traffic growth rates because traffic count data is unreliable, but there is evidence that traffic is substantially higher on almost all road sections than it was before the projects, as forecast at appraisal.

25. The OEM's surveys showed that most road sections are in good condition and carry significant volumes of traffic (Appendix 2, Tables A2.1 and A2.2). The main benefits from betterment relate to road-user savings obtained from a smoother road surface, with additional savings from reduced road maintenance costs. Widening has also produced benefits. In some cases the widening was from 3.5–4.0 to 4.5–5.0 m, thus providing two lanes and benefits in the form of reduced travel time and reduced vehicle operating costs from eliminating use of the shoulder for passing. In the case of widening from 4.5–5.0 to 6.0–7.0 m, the benefits are again reduced travel times, particularly reduced congestion in higher-traffic sections.

26. Nonetheless, given that almost all the roads already had asphalt surfaces before the projects, the benefits have been limited to road-user cost savings, and the other development benefits from generated traffic have been marginal.<sup>15</sup>

27. The OEM's review included 40 road sections under 23 contract packages, representing 28% of the total length of the betterment subprojects. Table A2.2 summarizes the basic information collected about these roads. Overall, 90% of the road length of almost 1,040 km surveyed was in good or fair to good condition.<sup>16</sup>

28. Longitudinal cracking of pavements in areas of expansive clays was found on Links 36 and 38 in East Java and Link 24 in South Sulawesi. Pavement damage from lack of side drainage was found on Links 28 and 34 in South Kalimantan, Link 52.1 in South Sulawesi, and Link 22 in East Nusa Tenggara. Overall, only two roads in the surveyed sample were in poor condition; Link 52.1 in South Sulawesi and Link 27 in East Nusa Tenggara suffered from general pavement failure. For most roads, the average surface roughness levels were estimated to be below International Roughness Index (IRI) 5.

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<sup>15</sup> Generated traffic is that resulting from additional trips made only after the road project has been implemented as a response to the lower cost of travel. That is, more trips will be made in the same way that consumption of a product generally increases if the price is lowered. Betterment projects do not normally produce such significant cost reduction that is required to generate additional traffic.

<sup>16</sup> It was difficult to generally group the road links according to condition because most road defects were localized. Thus, a 20 km road in generally good condition but with four sections of pavement failure each 250 m long was classified as 20 km in fair condition, or 19 km in good condition plus 1 km in bad condition.



29. The road pavement damage found in all provinces surveyed was due to inadequate design in some cases and inappropriate or delayed maintenance. The design problems mainly relate to lack of drainage, or problems of material quality in areas of expansive clays, where moisture-driven expansion and contraction in the subbase material causes extensive longitudinal cracking of pavement. Due to delays in appointing consultants, it was difficult to collect data, set up field laboratories, and ensure the use of proper materials.<sup>17</sup> The effects of all these problems began to appear quickly, and were noted in the project benefit monitoring and evaluation reports and in the PCRs. Consultants for an ongoing project<sup>18</sup> pointed out to the OEM that they do not approve designs or completed works. Their duties include only monitoring and advice, and their advice is not always followed. As similar arrangements were in place for ADB10 and ADB11, it is possible that even where the consultants identified deficiencies in the standard designs, these may not have been amended.

30. The OEM observed that routine and some periodic maintenance had been carried out on the road sections surveyed. In some cases, overlays had also been applied, but this was expected as it had been about 8 years since some ADB10 works were completed. However, it was difficult to find details of the works carried out, their timing, and level of expenditure. In some cases road maintenance had been inadequate. For example, damage of pavement due to inadequate drainage, or defects in the base course, had been repaired only with patching or thin overlays. All the provincial works offices visited during the surveys reported that the budget available for road maintenance was inadequate.

31. DGH reported that very little maintenance had been carried out on the bridges since their replacement under the projects. All 16 bridges inspected by the OEM are still in good condition.

32. The OEM could not get additional information from DGH on the condition and use of the weighbridges and computer equipment (para. 21) provided under ADB10. Due to the reorganization of DGH, the recipients of the fellowship and training under ADB11 had been transferred to other departments.

## **B. Performance of the Operating Entity**

33. At project completion, the Government fully complied with all the covenants of ADB10, and with 10 out of 16 covenants of ADB11. The covenants achieved long-standing sector policy changes, for example, in road-user charges and cost recovery, although subsequent events, in particular the 1997 financial crisis, have reversed much of the change. Five covenants under ADB11 were only partly complied with. Notably, DGH did not formally implement the project benefit monitoring and evaluation using independent reviews. Since FY1994, the maintenance expenditures, in real terms, were not maintained at the FY1992 level as covenanted.<sup>19</sup> Details of expenditure in the road sector are given in Appendix 3, Table A3.

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<sup>17</sup> The road subprojects were designed initially using standards specified by the Directorate of Planning within DGH. These standard designs cover pavement design only, and do not include drainage. The official procedure is that designs are reviewed, and amended if necessary, before implementation. However, the international and domestic consultants for both projects were appointed late. As a result, all preconstruction activities were deleted from their services and design review was hampered and delayed. Although design changes were made, increasing the cost considerably in some cases, this delay probably contributed to designs that were inadequate in some cases.

<sup>18</sup> Loan 1428-INO: *North Java Road Improvement Project*, for \$150 million, approved on 23 January 1996.

<sup>19</sup> Expenditures on road maintenance of national and provincial roads declined from Rp563 billion in FY1991 to an average of about Rp320 billion per year during FY1994 to FY1999.

34. Government expenditure in the road sector in recent years has concentrated mainly on betterment of existing roads (Appendix 3, Figures 3.1 and 3.2). At the end of REPELITA V (March 1994), 90.0% of the then 20,000 km of national roads had been improved to a maintainable standard; by 2000, 96.8% of 25,919 km had been improved. The corresponding figures for the 37,372 km of provincial roads are 85.0% in 1994 and 89.2% in 2000. In contrast, the condition of district roads has deteriorated: only 37% are in good or fair condition, leaving more than 134,000 km, which have not been routinely maintained, in an unsustainable condition. Table 2 summarizes the condition of the country's public network, excluding some 500 km of privately constructed toll roads.<sup>20</sup> The conditions of the surveyed roads were better than the network's national and provincial roads, with more considered good rather than fair.

**Table 2: Road Conditions in 2000**  
(percent of total length, excluding toll roads)

Road Class	Length	Good	Fair	Poor	Bad
	(km)				
National	25,919	66	30	2	1
Provincial	37,372	56	33	7	4
District	213,064	7	30	10	53
Municipal	15,214	9	87	4	0
<b>Total</b>	<b>291,569</b>	<b>19</b>	<b>33</b>	<b>9</b>	<b>39</b>

Source: Directorate General of Regional Infrastructure Annual Report 2000.

35. The Government has long claimed a commitment to cost recovery in the transport sector, even before the first policy statement and action plan (PSAP1) for land transport in 1989. The latest detailed analysis of cost recovery was done in 1998. Like others before it, it found that the contribution made through annual vehicle registration charges (PKB), the change in vehicle ownership tax (BBNKB), and the existing surcharge on fuel sales (PBBKB) was less than the cost of developing and maintaining road infrastructure. The individual contributions covered the corresponding costs only for cars and pickups. Heavy commercial vehicles were heavily subsidized, largely through the diesel fuel subsidy. PSAP1 recommended restructuring PKB to reflect the potential pavement-damaging nature of heavy vehicles, reducing the significance of BBNKB, and progressively increasing the price of diesel. The aim was to make each type of vehicle pay the share of road costs it was responsible for. Due to the financial crisis, these recommendations were not implemented, but the draft PSAP3 and a new national road law (replacing Law 3/1980) being prepared continue to be committed to cost recovery and the earmarking of user charges for road maintenance.

36. For some time after 1998, however, the fuel subsidy has mushroomed, reflecting the currency's collapse and a dramatic increase in the world price of oil during 1998–2001. Even after the 12% retail fuel price increases in October 2000 and the 30% fuel price increases in June 2001, Indonesia's current fuel prices—Rp1,450 (\$0.14)/liter for gasoline and Rp900 (\$0.09)/liter for diesel—are among the lowest in the world. The all-inclusive retail pump price of diesel in Indonesia is now equivalent to less than \$14/barrel, compared with the wholesale world price, before transport, distribution, and taxation, of \$25–30/barrel in December 2001. The fuel subsidy in 2000 was Rp22.5 trillion, or 2.5% of GDP. The Government budgeted Rp41.3 trillion for fuel subsidies in 2001, which is as large as the Government's annual development budget.

<sup>20</sup> At the end of FY1999, Indonesia's designated road network had a total length of 291,569 km, of which 25,919 km (8.9%) were national roads, 37,372 km (12.8%) provincial roads, 213,064 km (73.1%) district (*kabupaten*) roads and 15,214 km (5.2%) municipal (*kota*) roads. About 42% of the network is paved, comprising 90% of national roads, 75% of provincial roads, and only 32% of district roads.

Although the June 2001 price increases and the reduction of crude oil prices during 2001 have reduced the level of subsidy, it still represents a major diversion of revenue from other purposes. There is an urgent need to improve road asset management and ensure adequate sector revenues for this purpose.

37. The OEM also observed some weaknesses in the capabilities of DGH. A major effort has been made over approximately 15 years to establish IIRMS, and the complementary IBMS for bridges, and the Urban Road Management System for urban roads, to determine appropriate works and set priorities and budget allocations nationally for the road sector. These systems have been developed exclusively by continuous services from international consultants, with support from the World Bank. However, the systems suffer from very poor data quality.<sup>21</sup> DGH also still relies heavily on consultants for technical support for operating these systems. The newly established Evaluation Section in DGRI uses only consultants for all studies despite having a permanent staff of more than 20 members.

### **C. Economic Reevaluation**

38. The economic internal rate of return (EIRR) was estimated for all the surveyed road betterment subprojects. The reevaluation followed the standard approach of comparing the with-project condition with a possible without-project situation. Given the large number of subprojects to be evaluated, and the limited time and amount of data available, a simplified method was used based on IIRMS parameters. A price index<sup>22</sup> was used to convert final construction costs to 2001 price levels. The quantified benefits were road-user savings, that is, vehicle operating cost and travel time savings.

39. The EIRRs of individual subprojects ranged from over 80% in the case of the best to a negative value in the case of the worst. The value of the EIRR was largely determined by the traffic level, but high costs per kilometer for civil works also caused low EIRRs in some cases. The average EIRR for all the surveyed roads was 39%; for ADB10, 36%; and for ADB11, 49%. A summary of the results and more information on the EIRR calculations are in Appendix 4.

40. As for the bridge replacement component, the method used originally by DGH and in the appraisal reports and PCRs was unsatisfactory. That method assumed that a detour of 5 km would be required for any bridge not replaced and that the detour route would have a surface roughness with an IRI of 4 higher than the original route. The present system used in IBMS estimates benefits using the cost of providing temporary bridges and of delays caused by single-lane operations. Because of the lack of information on the condition and standard of the original bridges, and the total economic cost of replacement, including that of the superstructure, the OEM did not estimate EIRRs for the bridge replacement component. Nonetheless, the evidence from the surveys is that the EIRRs have been high.

41. As for the 129 km of developmental road constructed under ADB11, observed traffic volume on the road was over 300 vehicles/day, as forecast in the PCR. The road is in good condition. The OEM concurred with the EIRR of 24% calculated in the PCR.

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<sup>21</sup> Much of the basic information is still inaccurate. Major discrepancies were identified in IIRMS during the Technical Assistance Program Loan Project in 1985 (footnote 2) and some of them continue. The quality of the traffic data, which should be collected annually, is particularly bad. For example, the OEM observed cases in East Nusa Tenggara in which DGH has made no serious attempt to rectify errors in the data that were used to justify works.

<sup>22</sup> The index of wholesale prices of public works in roads, bridges, and ports, published by the Central Bureau of Statistics.

#### **D. Sustainability**

42. The OEM is concerned about the long-term sustainability of the two projects as a result of the reduction in expenditure on road maintenance since the mid-1990s. The recent administrative changes, which have transferred responsibility for maintenance of the roads to regional governments, raise more concerns on the future funding of maintenance of the road network.

43. The road sector has always accounted for a significant share of government development expenditure. The share exceeded 20% in the early 1990s, but has gradually fallen to 10–11% since then. Only in the last year have budgets increased slightly, with some evidence of recovery from the crisis of 1997. A particularly disturbing feature of expenditure trends in the road sector has been the fall in the budget for road maintenance after FY1993, both in nominal and real terms and as a proportion of the total. This fall is shown clearly in two graphs produced in a recent report on the establishment of road funds in Indonesia.<sup>23</sup>

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<sup>23</sup> *Road Funds—Are They Appropriate for Indonesia?* Final Report, PT Hasfarm Dian Konsultan, Jakarta, March 2001. The figures are in Appendix 3.

## **IV. ACHIEVEMENT OF OTHER DEVELOPMENT IMPACTS**

### **A. Socioeconomic Impacts**

44. The OEM observed, based on interviews, in all road impact areas surveyed that shops have more goods (and more people can afford to buy goods), there is more employment, more children attend school, and people visit town more often. However, there was no evidence to link these changes directly with the projects. In 80% of the cases, the OEM noted that some local people had obtained jobs during implementation. There was no evidence that passenger fares and freight rates were affected by the projects.<sup>24</sup> Transport charges were reported as being determined by drivers' or owners' associations, in some cases by the Traffic and Road Transport Office, a division of MOC.

45. The OEM's interviews also confirmed that the projects reduced poverty, although without baseline socioeconomic data or time to undertake extensive surveys, it was not possible to know by how much. The significant reduction nationally in the numbers of people below the poverty line from 1976 to 1996, the equally sharp increase due to the 1997 financial crisis, and the recent partial recovery, make it difficult to isolate the projects' impacts.

46. The projects did not improve road safety, which was not considered in the road designs or during implementation. Safety audits were not carried out, and are not carried out on other ongoing projects visited by the OEM. The major safety concern is that the higher-traffic roads have been widened to the maximum width possible within the existing right-of-way, without regard to the impact on pedestrians and nonmotorized traffic. This causes serious potential conflict between different road users where roads pass through villages and small towns and the speed of motorized traffic is not restricted.

### **B. Environmental Impact**

47. Almost all the road works involved betterment of existing paved roads. The one development road subproject under ADB11 involved the upgrading of an existing road, and the bridge works were all replacement of existing bridges. Therefore, the environmental impacts of the projects have been minimal.

### **C. Impact on Institutions and Policy**

48. Major changes have taken place in the institutional arrangements for the road sector since the two projects were completed. Since 1987, road functions have been transferred gradually to level-I (provincial) and level-II (district and municipal) regional governments, albeit with considerable central control over resource allocation. The provinces, through the provincial public works departments, were given responsibility for development and maintenance of primary collector roads. Level-II regions, through district public works departments, looked after urban secondary roads and primary local roads, as well as any primary collector and secondary roads that were not national or provincial roads. This decentralization of functions was accelerated dramatically by the passage of Laws 22 and 25 in 1999.<sup>25</sup>

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<sup>24</sup> Road condition is an important factor in setting the level of charges for some operating cost savings to be passed on to users. However, the amount would be small, as the projects comprised betterment-type works.

<sup>25</sup> With Laws 22 and 25, Indonesia embarked on a dramatic and far-reaching change in its system of government administration. The two laws took effect from the start of 2001, marking a fundamental shift away from the earlier highly centralized system. Central Government's role is now substantially reduced. Law 22/1999 transferred authority to the regions—with districts and municipalities being the primary focus—for all government responsibilities except foreign policy, defense, justice, fiscal and monetary affairs, religious affairs, and strategic national planning. The vertical offices of central Government agencies are being merged now with the respective agencies of regional governments, with all relevant staff and assets transferred to regional control.

49. Most road responsibilities are being decentralized and many already have been. Planning, financing, and executing the development, rehabilitation, and maintenance of provincial and district roads will be carried out by autonomous governments, with or without the assistance of central Government. The responsibility for road development, operation, and management has been vested in the new DGRI under a new Ministry of Settlements and Regional Infrastructure.<sup>26</sup> The current organization structure of DGRI is in Appendix 5. Its detailed functions, organization structure, arrangements for policy coordination and relationships with lower levels of government have yet to be fully clarified.

50. It is too early to determine the impact of these changes on the level and quality of maintenance and other operations carried out on the national and provincial road network. The transfer of responsibilities is to be accompanied by corresponding budgets, infrastructure, and staff. Law 25/1999 states in very broad terms how the new regional government responsibilities are to be funded.<sup>27</sup> Law 18/1997, amended by Law 34/2000, governs local taxes and charges that can be levied at provincial and district levels. From road users, provincial governments are empowered to levy the PKB, BBNKB, and PBBKB. The amended law regulates the rates for each of these and specifies that not less than 30% of PKB and BBNKB revenues and not less than 70% of PBBKB revenues should be passed on to the *kabupaten/kota* (district/municipal) in which they were collected. Nonetheless, there is no requirement that these revenues should be used for road-related purposes, and PKB and BBNKB have long been regarded as a form of wealth tax, contributing a major share of general regional tax revenues. The central Government cannot earmark its general grants to the provincial governments for specific purposes, such as road maintenance.

51. A recent World Bank-funded study on establishing a road fund (footnote 23) estimated that to minimize total (agency and user) costs, Indonesia should be spending an average of Rp6.6 trillion/year on maintaining and rehabilitating roads. This estimate excludes toll roads but includes a major reconstruction and rehabilitation effort to bring damaged parts of the network to a stable and maintainable state. Current expenditure is less than Rp5.5 trillion/year, of which Rp1.89 trillion is from foreign sources. The study also concluded that although some provinces will have adequate funds for road maintenance and rehabilitation from road-user charges, others will not and will rely heavily on allocations from the central Government.<sup>28</sup>

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<sup>26</sup> In November 1999, the State Ministry of Public Works was established to provide policy guidance to the sector in conjunction with similar functions carried out for land, sea, and air transport by MOC, but it was abolished after less than a year.

<sup>27</sup> Until the changes of 2001, the draft road development budget for national and provincial roads was prepared by DGH, and then discussed with the BAPPENAS (National Planning Development Agency) and the Directorate General of Budget, Ministry of Finance. This process will change under the new decentralization arrangements, but the details are still being worked out.

<sup>28</sup> This suggests a need for continued assistance from ADB to support the priority maintenance of the road infrastructure, while the Government rebuilds the economy to generate sufficient revenues for this purpose.

## V. OVERALL ASSESSMENT

### A. Relevance

52. The projects were fully consistent with the Government's strategy of developing an efficient transport system, of which increasing the proportion of the road network to a maintainable standard was a significant component. However, the projects did not specifically target poverty reduction through appropriate subproject selection. Overall, both projects are rated relevant.

### B. Efficacy

53. Both projects largely achieved the physical targets set for the road betterment and bridge replacement components, and were completed without major delays. Many subprojects carry high volumes of traffic. ADB11 implemented less than half the length envisaged at appraisal for the development road component, but the balance was successfully completed under a subsequent ADB road project. Both projects are rated efficacious.

### C. Efficiency

54. The overall EIRR estimated from the sample of subprojects surveyed is 39%. ADB10 is rated efficient because of the wide variation in the individual EIRRs of subprojects, with several well below 12%, including two with negative values. ADB11 is rated highly efficient.

### D. Sustainability

55. Most of the roads and bridges are in good or fair condition, and the proportion of the entire national and provincial road network in this condition has increased in recent years. However, there are questions regarding the long-term sustainability of the projects. The maintenance of the subprojects has not always been adequate or has been delayed. The impact of the sudden decentralization of authority for the road network to regional governments cannot yet be determined and the ability of some provinces to obtain sufficient funding to maintain the roads for which they are now responsible is a matter of concern. On balance, sustainability is rated likely for both projects.

### E. Institutional and Other Development Impacts

56. The consulting services provided under the projects and TA 1194-INO were beneficial in planning and environmental management, respectively. TA 1194-INO is rated successful.<sup>29</sup> Both projects were sector loans that supported the program under REPELITA V. They provided funding that enabled a significant amount of additional work to be carried out, but the projects were essentially implemented within the then existing system and institutional arrangements, which subsequently changed due to the Government reorganization. Therefore, the institutional development and other impacts of both projects are rated moderate.

### F. Overall Project Rating

57. Overall, both projects are rated successful.<sup>30</sup>

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<sup>29</sup> TA 1193-INO will be evaluated together with Loan 1428-INO.

<sup>30</sup> Under the current four-category rating system (highly successful, successful, partly successful, unsuccessful).

## **G. Assessment of ADB and Borrower Performance**

58. The performance of ADB and the borrower is rated satisfactory. ADB conducted seven review and other project administration missions for ADB10 and nine for ADB11, although several were combined. These missions took a total of 219 person-days. Site visits were also carried out satisfactorily, but the scale of the projects and the wide geographical spread of subprojects meant that it was not possible to inspect all works. DGH generally implemented the projects satisfactorily, except for the delays in awarding contracts. There were also isolated cases in which unsuitable or low-priority subprojects were selected, largely as a result of poor data.

## **VI. ISSUES, LESSONS, AND FOLLOW-UP ACTIONS**

### **A. Key Issues for the Future**

#### **1. Selection of Roads**

59. The road subprojects were selected by DGH, with justification based on the results of an annual screening of the whole national and provincial road network, using the process now operating as IIRMS. This is a comprehensive planning system designed to optimize budget allocations for road betterment and periodic maintenance across the whole network. IIRMS has been developed over many years and is considered a good basis for selecting such projects, but still suffers from inaccurate survey data, especially on traffic levels. This will inevitably lead to an incorrect setting of priorities and, in some cases, of appropriate works.<sup>31</sup> The traffic counts by the OEM showed major discrepancies between actual traffic levels and the current IIRMS traffic data in the case of three roads in East Nusa Tenggara. Such discrepancies have been noted for many years and it is likely that some subprojects, which were included in the projects using inaccurate data, did not yield a satisfactory EIRR.

#### **2. Approach to Routine and Periodic Maintenance**

60. A key objective of the projects was to improve road sections to a standard that enable them to be routinely maintained and thus reduce overall maintenance costs. However, the Government's maintenance budget has been severely cut, resulting in inadequate maintenance. Current maintenance allocations are only about one third of the amount needed to keep the roads in good condition. Where maintenance has been carried out, the OEM observed that it was often inappropriate, involving only superficial repairs and not addressing serious problems with drainage or base material. Alternative methods of funding and managing maintenance should be investigated, including road funds; road asset management contracts, where contractors for betterment or upgrading could be responsible for future maintenance; and possible privatization of road management.

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<sup>31</sup> The most recent ADB project (Loan 1798-INO: *Road Rehabilitation (Sector) Project*, for \$190 million, approved on 11 December 2000) proposes to reevaluate the subprojects selected by IIRMS using another software such as the World Bank's Highway Design and Maintenance Standards Model.



### **3. Road Safety**

61. Road safety statistics in Indonesia are very poor, and the OEM could not undertake a detailed analysis. However, there is evidence that the accident rate is high, and that the authorities and many road users have little regard for road safety. No road safety concerns were addressed in the projects, either in the designs or as an aspect of institutional strengthening. Measures taken under ADB's more recent projects such as improvements in vehicle inspection and testing, and elimination of black spots will address some of the road safety problems but are not sufficient.<sup>32</sup>

#### **B. Lessons Identified**

62. The OEM has identified two lessons:

- (i) Road betterment works in Indonesia have been effective in that they have compensated for delayed or poor routine maintenance. However, they cannot solve problems relating to the long-term sustainability of roads in Indonesia.
- (ii) The sector-lending approach has resulted in successful road sector projects in Indonesia. The capacity of the Executing Agency is the most crucial factor for achieving this success in other developing member countries. However, ADB and the Borrower need to pay adequate attention to better selection of subprojects and better quality of civil works during implementation, followed by adequate attention to routine maintenance.

#### **C. Follow-Up Actions**

63. At the workshops in Jakarta and ADB, participants discussed immediate measures and steps to improve the performance of completed and ongoing ADB projects in response to reorganization and decentralization in Indonesia. It is recommended that DGRI prepare and start to implement in 2002 and 2003 specific programs to improve road safety and upgrade IIRMS. Maintenance works could be organized into contracts that can involve the private sector. They can be either included as "guarantee" in the original civil works or awarded as supplementary works for selected subprojects.

64. ADB's Southeast Asia Infrastructure Division is advised to process by 2003 a TA to help DGRI improve IIRMS through, for example, incorporating elements of the more powerful Highway Design Model 4, which ADB has developed in cooperation with several other aid agencies and which is being used to design projects in many developing member countries. At the time of project appraisal, baseline data should be created to monitor the poverty impact of roads for selected subprojects.

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<sup>32</sup> Loans 1335-INO (footnote 11), 1428-INO (footnote 18), and 1798-INO (footnote 31).

### SUMMARY OF PROJECT COSTS

Component	Appraisal (\$ million)			Actual (\$ million)			Change (%)		
	Foreign Exchange	Local Currency	Total	Foreign Exchange	Local Currency	Total	Foreign Exchange	Local Currency	Total
<b>A. Loan 966-INO</b>									
1. Right of way	0.00	0.50	0.50	0.00	0.00	0.00	0	0	(100)
2. Civil works	71.50	71.55	143.05	81.77	94.82	176.59	14	(25)	23
3. Consulting services	5.05	9.65	14.70	5.40	5.41	10.81	7	78	(26)
4. Weigh bridges	0.40	0.00	0.40	0.35	0.00	0.35	(13)	0	(13)
5. Contingencies	12.08	17.27	29.35	0.00	0.00	0.00	(100)	0	(100)
6. PPTA	1.17	1.43	2.60	2.00	1.11	3.11	71	29	20
7. Service charges	22.40	0.00	22.40	21.66	0.00	21.66	(3)	0	(3)
<b>Subtotal (A)</b>	<b>112.60</b>	<b>100.40</b>	<b>213.00</b>	<b>111.18</b>	<b>101.34</b>	<b>212.52</b>	<b>(1)</b>	<b>(1)</b>	<b>(0)</b>
<b>B. Loan 1115-INO</b>									
1. Civil works	105.08	90.30	195.38	93.02	78.78	171.80	(11)	15	(12)
2. Consulting services	8.51	19.01	27.52	6.85	12.54	19.39	(20)	52	(30)
3. Fellowship and trainings	1.10	0.10	1.20	1.09	0.00	1.09	(1)	0	(9)
4. Service charges	25.90	0.00	25.90	23.73	0.00	23.73	(8)	0	(8)
<b>Subtotal (B)</b>	<b>140.59</b>	<b>109.41</b>	<b>250.00</b>	<b>124.68</b>	<b>91.32</b>	<b>216.00</b>	<b>(11)</b>	<b>20</b>	<b>(14)</b>
<b>Total (A+B)</b>	<b>253.19</b>	<b>209.81</b>	<b>463.00</b>	<b>235.86</b>	<b>192.66</b>	<b>428.52</b>	<b>(7)</b>	<b>9</b>	<b>(7)</b>

PPTA = project preparatory technical assistance.

Source: Asian Development Bank project completion reports.

PERFORMANCE OF SURVEYED ROAD SUBPROJECTS

Table A2.1: Traffic Volume

Package	Links	Traffic Volumes (12-hour survey)											
		Motor-cycle	Sedan	Minibus	Pickup	Small Bus	Large Bus	Light Truck	Medium Truck	3-axle Truck	Truck/Trailer	Semi Trailer	ADT
<b>Loan 966-INO (ADB10)</b>													
P4	038, 036	2,478	746	1,021	667	25	444	538	359	131	0	0	3,931
P5-1	059.2, 058, 060	7,577	2,852	3,255	1,247	0	70	1,277	819	382	0	0	9,902
P5-2	072	5,630	1,256	2,003	1,067	40	856	824	549	981	37	0	7,613
P9	020, 022, 023, 028, 031, 033.1	2,515	441	1,072	371	4	8	367	268	1	1	6	2,539
P10	008, 033.2, 034	2,112	478	530	303	5	530	303	5	10	0	0	2,164
P11-1	009	105	40	28	9	33	68	31	17	0	0	1	227
P11-2	013, 014, 015, 016	1,265	265	766	140	72	50	128	65	1	0	0	1,487
P12-1	021	50	1	30	15	4	0	10	5	0	0	0	65
P12-2	022	288	8	161	0	0	0	42	28	0	0	0	239
P13	034, 036	140	1	33	4	0	0	6	4	0	0	0	48
P23	004.1, 004.2	508	124	691	151	39	13	20	12	2	0	0	1,052
P24	005	352	85	488	96	28	10	13	9	1	0	0	730
P25	006	1,167	466	890	258	58	103	63	326	12	0	0	2,176
<b>Loan 1115-INO (ADB11)</b>													
U-15	030	1,139	480	828	288	57	15	146	98	2	0	0	1,914
U-43	024	325	200	283	144	56	35	67	44	37	0	0	866
U-45	052.1	362	31	315	24	30	10	78	52	2	0	0	542
U-64	025	2,487	355	860	466	0	0	248	166	2	0	0	2,097
U-68	027	136	12	94	0	37	0	37	24	0	0	0	204
U-78	029	228	163	369	159	87	36	56	38	6	0	0	914
U-85	003.2	1,244	1,265	1,942	551	37	39	124	1,625	9	1	2	5,595
U-99	019	2,209	274	322	248	1	0	42	29	0	0	0	916
U203-1	005, 006	2,383	604	1,445	545	393	0	251	167	3	0	0	3,408
U203-2	008	1,582	24	94	57	80	0	71	47	0	0	0	373

ADB10 = Tenth Road (Sector) Projects, ADB11 = Eleventh Road (Sector) Projects, ADT = average daily traffic.

Note: Contract package numbers starting with P were funded by ADB10 and those beginning with U by ADB11.

Source: Operations Evaluation Mission Surveys, 2001.

**Table A2.2: Basic Data and Road Condition**

Province/ Package No./ Link No.	Length (km)	Width (m)	Contract Price (Rp million)	Construction Dates		Present Condition		General Comments
				Start Month/Year	End Month/Year	Length in Good Condition (%)	Average IRI	
East Java/ P5-2/072	24.5	7.0	4,381	May 1991	Nov 1993	100.0	4.0	National collector road providing access to the major town of Kediri, in the southwest of the province, mostly though flat terrain. Several sections were overlaid in 2001.
East Nusa Tenggara/ P12-1/021	50.3	4.5	10,845	May 1991	Feb 1994	100.0	5.0	Provincial collector road providing access from Bajawa to north coast of Kabupaten Ngada. Passes through undulating terrain, generally used for low-intensity agriculture, but with some plantations. Pavement cracking in some sections.
East Nusa Tenggara/ P11-2/013, 014, 015, and 016	26.6	5.0-10.0	7,621	May 1991	Jun 1994	100.0	4.0	Section of the main east-west national road across Flores. Road passes through Maumere, the largest town in Flores. Much heavier traffic on Link 16, the section east of Maumere, than the rest of the road.
East Nusa Tenggara/ U203-2/008	9.0	5.0	1,166	Sep 1993	Feb 1996	100.0	4.0	National road, part of the east-west link across Flores near the center of the island.
South Kalimantan/ U-99/019	26.5	4.5	6,079	Feb 1993	Jun 1995	100.0	4.2	Provincial collector road providing access to the river port of Negara. The road passes through swamp areas for almost the whole length. The road is built on an embankment above a peat layer. There are settlements along the road every 2 kilometers. In many places there is no space for a shoulder.

IRI = International Roughness Index, km = kilometer, m = meter.

Province/ Package No./ Link No.	Length (km)	Width (m)	Contract Price (Rp million)	Construction Dates		Present Condition		General Comments
				Start Month/Year	End Month/Year	Length in Good Condition (%)	Average IRI	
South Sulawesi <sup>a</sup> / U-301/54.087/U-302/ 54.0872/U-303/54.068	128.8	6.2	14,791	Sep 1995	Jun 1997	100.0	5.0	Because of the remoteness of the area, and the security conditions at the time of the field surveys, additional data on this road could not be collected.
South Kalimantan/ U-64/025	17.0	4.5	3,187	Feb 1993	Mar 1995	100.0	4.0	Provincial collector in the north of the province. Passes through flat to undulating terrain. Land use along the road is dominated by small settlements and plantations.
South Sulawesi/ P25/006	47.5	5.0	7,331	Jan 1991	Apr 1993	100.0	4.0	National collector road in the north of the province. Passes through hilly terrain. Land use along the road is mixed farming and paddy fields, with isolated farm houses.
South Sulawesi/ P5-1/004.1 and 004.2	78.9	4.5-8.0	12,405	Jan 1991	Aug 1993	98.7	4.0	National collector road through the central part of the province. Land-use along the southern half of the link is mixed farming and rice cultivation; the northern half is mostly forest.
South Sulawesi/P23/ 004.1 and 004.2	78.9	4.5-8.0	12,405	Jan 1991	Aug 1993	98.7	4.0	National collector road through the central part of the province. Land-use condition along the southern half of the link is mixed farming and rice cultivation; the northern half is mostly forest.
South Kalimantan/ P10/008,033.2, and 034	89.3	4.5-6.0	11,834	Mar 1991	Sep 1993	96.6	5.0	Although classified as a national arterial link, the first two links, from Kelua to Mabuun, now serve a more local function. A large amount of urban development is located along the road. There is a four-lane section through the town of Tanjung. The final link, from Mabuun to Batubabi continues the route of Package P9 in providing the main route to East Kalimantan. Some pavement damage, probably the result of inadequate drainage.

<sup>a</sup> Developmental road component under the Eleventh Road (Sector) Project. Data provided by provincial staff of the executing agency.

Province/ Package No./ Link No.	Length (km)	Width (m)	Contract Price (Rp million)	Construction Dates		Present Condition		General Comments
				Start Month/Year	End Month/Year	Length in Good Condition (%)	Average IRI	
South Sulawesi/ P24/005	75.0	6.0	19,295	Jan 1991	Sep 1993	92.0	4.2	National collector road in central area of the province, passing through an area of intensive fruit and vegetable production.
South Sulawesi/ U-78/029	59.5	6.0	8,369	Sep 1993	Feb 1996	89.3	4.2	Provincial collector road forming an east-west link in the center of the province. Main land use along the road is farming, especially rice production, with areas of secondary forest.
South Kalimantan/ U-85/03.2	41.7	6.0	5,114	Feb 1993	Apr 1995	88.1	4.3	Section of the national road providing the main north-south link through the province. Passes through mostly small settlements on flat terrain. Cases of depression and cracking, possibly caused by coal trucks operating along the link.
East Nusa Tenggara/ U-203-1/006 and 005	89.0	5.0	11,527	Sep 1993	Feb 1996	87.6	4.2	National road, part of the east-west link across Flores, near the center of the island. Passes through hilly terrain close to the south coast. Very little economic activity.
South Sulawesi/ U-43/024	67.8	6.0	9,756	Sep 1993	Mar 1996	85.5	4.3	Provincial collector road in the east of the province. It passes through flat to undulating terrain. Typical land use in the area served is mixed farming, but with paddy fields in the southern section. Extensive cracking in the south.
East Java/P5-1/ 059.2, 058, and 060	17.0	6.0-7.0	3,040	May 1991	Nov 1993	70.0	4.6	Provincial collector road beginning in the outskirts of Surabaya, the provincial capital. Serves many industries along the road, which are part of almost continuous urban development. Parallel to the main national road route from Surabaya to the southwest of the province, crossing this road where it bypasses Krian. Carries high level of traffic.

Province/ Package No./ Link No.	Length (km)	Width (m)	Contract Price (Rp million)	Construction Dates		Present Condition		General Comments
				Start Month/Year	End Month/Year	Length in Good Condition (%)	Average IRI	
East Nusa Tenggara/ P12-2/022	20.7	4.5	4,338	May 1991	Feb 1994	64.3	6.1	Provincial collector road providing access to the minor port in Maumbawa on the south coast of Flores. Extensive sections of pavement have failed and are being rehabilitated.
East Nusa Tenggara/ P13/034 and 036	20.7	5.0	6,790	Apr 1991	Jan 1994	64.3	4.7	Two provincial collector roads providing local access to the area south of Maumere. They serve an area of food and tree crop plantations in undulating terrain. Very low traffic levels. Defects in some sections.
South Kalimantan/ U-15/030	31.9	4.5	5,952	Mar 1993	Jan 1996	64.3	5.3	Provincial collector road connecting Kecamatan Halong to the national network. Many small settlements and plantations are located along the road. Minor surface cracking along almost the whole length of the road, which could be repaired by an overlay.
South Sulawesi/ U-45/052.1	48.0	5.0	3,896	May 1993	Oct 1995	54.6	6.7	National arterial road along the coast in the northwest of the province. The terrain is flat. Serves area of low density population. Activity is mostly mixed farming and small plantations. Pavement distress in the center section.
South Kalimantan/ P9/020, 022, 023, 028, 031, and 033.1	67.7	4.5-6.0	7,792	Mar 1991	Feb 1993	39.9	5.6	Section of the national road providing the main north-south link through the province and the access route to East Kalimantan, which was developed as a shorter and better aligned alternative to the original route further west. Passes through mostly small settlements. Occasional cases of pavement damage, probably as a result of poor drainage.

Province/ Package No./ Link No.	Length (km)	Width (m)	Contract Price (Rp million)	Construction Dates		Present Condition		General Comments
				Start Month/Year	End Month/Year	Length in Good Condition (%)	Average IRI	
East Java/ P4/038 and 036	69.2	6.5	13,179	May 1991	Jun 1994	17.9	5.3	Provincial collector road serving the northeast of the province and connecting to the main North Java route at Babat. Passes through flat terrain used extensively for rice cultivation. Passes through one major town, Bojonegoro, approximately halfway along the link. Areas of cracking caused by expansion of base material during the rainy season.
East Nusa Tenggara/ U-68/027	49.6	4.5	7,538	Mar 1993	May 1996	10.3	7.0	Provincial road through hilly terrain providing access to north coast area of Kabupaten Ende. Pavement failure in many locations.
East Nusa Tenggara/ P11-1/009	9.8	5.0	2,406	Apr 1991	Jun 1994	0.0	6.0	National road, part of the east-west link across Flores. Land use in the area ranges from forest to food and tree crop plantations. Road passes through undulating terrain.



**PUBLIC EXPENDITURE IN THE ROAD SECTOR**  
**Table A3: Government Expenditures on Roads, 1987–2000** (Rp billion)

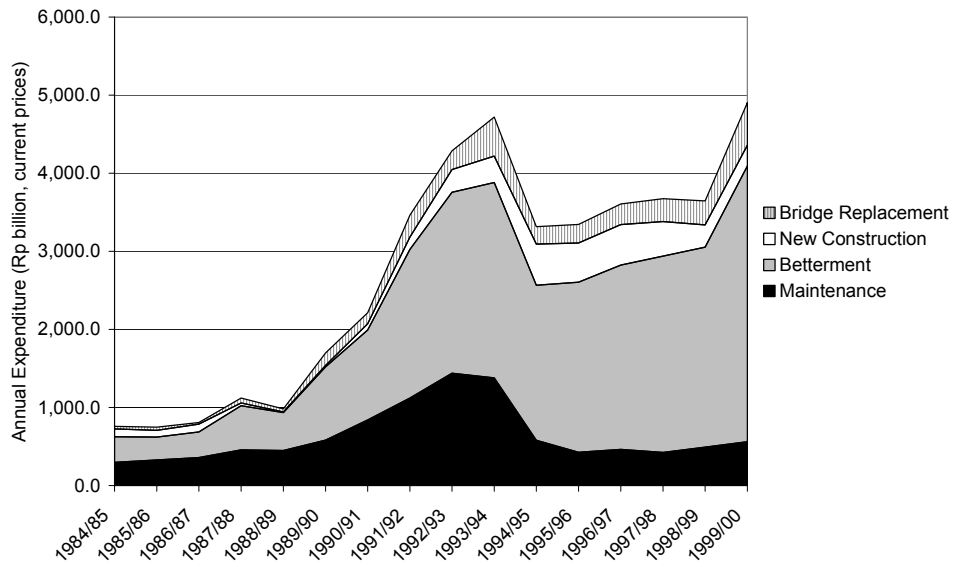
Road Class and Activity Source of Funds	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00
<b>A. National and Provincial Roads</b>													
Maintenance	259	188	313	449	563	615	766	317	327	303	301	310	350
Betterment	380	211	558	651	1,140	1,413	1,407	940	1,074	1,229	1,211	1,309	1,629
New Construction	34	9	20	79	157	291	337	525	500	516	441	285	267
Bridge Replacement	63	39	158	141	281	238	500	221	238	264	295	309	546
TA/Supplies/Equipment/Materials	235	175	181	205	411	370	426	561	445	598	437	605	602
<b>Subtotal</b>	<b>971</b>	<b>621</b>	<b>1,230</b>	<b>1,524</b>	<b>2,552</b>	<b>2,926</b>	<b>3,435</b>	<b>2,564</b>	<b>2,584</b>	<b>2,909</b>	<b>2,685</b>	<b>2,817</b>	<b>3,393</b>
Central Government Funds (APBN)	140	101	362	676	1,177	1,392	1,827	1,863	1,585	1,625	1,372	838	1,748
APBD I	121	49	119	118	169	287	324						
IPJP			74	206	290	346	406	406	431	513	624	626	508
Foreign	710	472	675	525	918	902	879	879	568	770	689	1,353	1,137
<b>Subtotal</b>	<b>971</b>	<b>621</b>	<b>1,230</b>	<b>1,524</b>	<b>2,553</b>	<b>2,926</b>	<b>3,435</b>	<b>3,147</b>	<b>2,584</b>	<b>2,909</b>	<b>2,685</b>	<b>2,817</b>	<b>3,393</b>
<b>B. District Roads</b>													
IPJK	130	222	294	454	667	827	967	703	897	934	1,064	1,084	1,147
Inpres Dati II	200	263	269	391	558	825	613	264	101	162	125	183	213
Other Local Funds	1	4	3	6	7	2							
Foreign	54	47	83	43	90	76	130	343	207	197	238	166	753
<b>Subtotal</b>	<b>385</b>	<b>536</b>	<b>650</b>	<b>893</b>	<b>1,322</b>	<b>1,729</b>	<b>1,710</b>	<b>1,311</b>	<b>1,205</b>	<b>1,293</b>	<b>1,426</b>	<b>1,433</b>	<b>2,113</b>
<b>Total (A+B)</b>	<b>1,356</b>	<b>1,157</b>	<b>1,880</b>	<b>2,417</b>	<b>3,874</b>	<b>4,656</b>	<b>5,144</b>	<b>3,875</b>	<b>3,789</b>	<b>4,202</b>	<b>4,112</b>	<b>4,251</b>	<b>5,506</b>
Domestic	592	638	1,122	1,849	2,866	3,679	4,135	3,236	3,013	3,235	3,185	2,731	3,616
Foreign	764	519	758	568	1,007	977	1,009	639	776	967	927	1,519	1,890
<b>C. Toll Roads<sup>a</sup></b>													
Central Government Funds	0	310	167	236	139	102	249	189	134	63	40	66	7
Jasa Marga	112	83	101	114	124	150	171	45	72	91	118	128	171
Foreign	121	110	118	67	10	6	12						
<b>Subtotal</b>	<b>234</b>	<b>502</b>	<b>386</b>	<b>417</b>	<b>273</b>	<b>258</b>	<b>432</b>	<b>234</b>	<b>206</b>	<b>154</b>	<b>158</b>	<b>194</b>	<b>178</b>
<b>Total (A+B+C)</b>	<b>1,590</b>	<b>1,659</b>	<b>2,265</b>	<b>2,834</b>	<b>4,147</b>	<b>4,914</b>	<b>5,576</b>	<b>4,109</b>	<b>3,995</b>	<b>4,356</b>	<b>4,270</b>	<b>4,444</b>	<b>5,684</b>
Domestic	705	1,030	1,390	2,199	3,129	3,931	4,556	3,469	3,219	3,389	3,343	2,925	3,794
Foreign	885	629	876	635	1,018	983	1,021	639	776	967	927	1,519	1,890
Total Government Development Expenditure	9,472	12,251	13,834	19,452	19,998	22,912	25,227	27,398	30,785	34,503	38,928	41,108	52,448
<b>Road Sector Share (%)</b>	<b>16.8</b>	<b>13.5</b>	<b>16.4</b>	<b>14.6</b>	<b>20.7</b>	<b>21.4</b>	<b>22.1</b>	<b>15.0</b>	<b>13.0</b>	<b>12.6</b>	<b>11.0</b>	<b>10.8</b>	<b>10.8</b>

APBD I = provincial budget, APBN = national budget, Inpres Dati II = central Government grants to *kabupaten* for road maintenance, IPJK = central Government grants to *kabupaten* for road construction, IPJP = central Government grants to provinces for road works, TA = technical assistance.

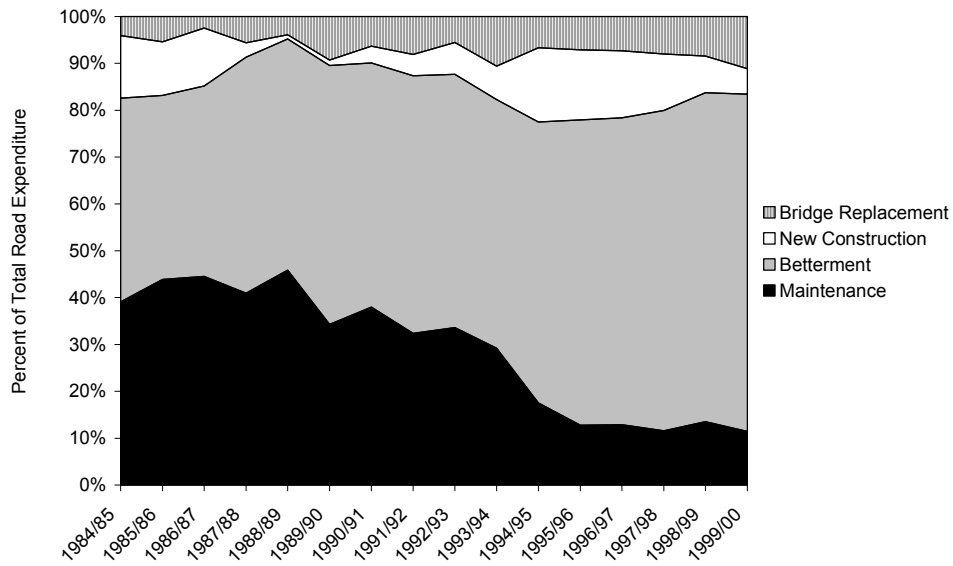
<sup>a</sup> Excluding private-sector expenditures.

Source: Directorate General of Regional Infrastructure and Development, July 2000, quoted in ADB RRR *Road Rehabilitation (Sector) Project*, September 2000.

**Figure A3.1: Expenditure on National, Provincial, and District Roads by Program**



**Figure A3.2: Distribution of Expenditure on National, Provincial, and District Roads**



## ECONOMIC REEVALUATION

### A. Basic Approach

#### 1. Introduction

1. The general approach used to reevaluate the sample of roads funded by the Tenth and Eleventh Road Projects (ADB10 and ADB11) follows the conventional economic appraisal methodology for road projects, which compares the “with project” and “without project” cases. The analysis of completed projects considered actual construction costs and also, for at least part of the analysis period, observed traffic levels, road conditions, and road maintenance costs. The Operations Evaluation Mission (OEM) also estimated, using assumptions, the scenario in the without-project case. The results of the evaluations are given in terms of the economic internal rate of return (EIRR).

2. The evaluation takes into account factors that can be quantified, such as the road construction and maintenance costs, traffic levels, and the potential level of benefit in terms of cost savings to road users. Benefits for each road section have been considered over a 10-year period, the typical design life of betterment works of the type carried out. The first year of benefits has been taken as the year following completion of works. The analysis does not include benefits obtained before this from completion of some sections or costs to road users caused by disruptions to traffic during construction. The overall evaluation period is from 1991, the first year in which costs were incurred for ADB10, to 2005, the final year of the 10-year benefit period for ADB11.

#### 2. Road Sections Evaluated

3. The sample of roads has been evaluated in most cases as contract packages, because final construction cost figures are available for these packages. Usually contracts involved one road link, but some involved a number of contiguous links forming a continuous section of road. Because these sections are generally homogeneous in terms of type of works, year of implementation, and traffic level, they have been evaluated as a single subproject. In the case of three contract packages, the road links that were included were not contiguous and thus have different traffic levels and other characteristics. These road links have been divided into separate sections for reevaluation purposes, with costs estimated for each by allocating total contract costs per kilometer. In each case, the package was divided into two sections.

4. The road sections evaluated are in Table A4.1.

**Table A4.1: Road Sections Evaluated**

Province	Package	Road Link Number	Link Name	Length (km)
<b>ADB10</b>				
East Java	P4	038, 036	Babat – Pandangan	69.2
	P5-1	059.2, 058, 060	Bambe – Krian	17.0
	P5-2	72	Kertosono – Kediri	24.5
South Kalimantan	P9	020, 022, 023, 028, 031, 033.1	Pambawang – Mabuun	67.7
	P10	008, 033.2, 034	Kelua – Batu Babi	89.3
East Nusa Tenggara	P11-1	9	Wologai – Junction	9.8
	P11-2	013, 014, 015, 016	Hepang – Kewapante	26.6
	P12-1	21	Bajawa – Poma	50.3
	P12-2	22	Malanusa – Maumbawa	20.7
	P13	034, 036	Nita – Koting – Maumere	20.7
South Sulawesi	P23	004.1, 004.2	Makale – Palopo	78.9
	P24	5	Enrekang – Makale	75.0
	P25	6	Rappang – Enrekang	47.5
				<b>597.2</b>
<b>ADB11</b>				
South Kalimantan	U-15	30	Paringin – Halong	31.9
	U-64	25	Amuntai – Lampihong	17.0
	U-85	3.2	Simpang Empat – Rantau	41.7
	U-99	19	Kandangan – Negara	26.5
South Sulawesi	U-43	24	Ujung Lamuru – Bojo	67.8
	U-45	52.1	Majene – Tameroddo	48.0
	U-78	29	Pakae – Takkalala	59.5
East Nusa Tenggara	U-68	27	Detusoko – Maurole	49.6
	U203-1	005, 006	Gako – Ende	89.0
	U203-2	8	Detusoko – Wologai	9.0
				<b>440.0</b>

ADB10 = Tenth Road (Sector) Project, ADB11 = Eleventh Road (Sector) Project.

Note: 1. Contract package numbers starting with P were funded by ADB10 and those beginning with U by ADB11.  
2. The total length of the sample surveyed was 1,037 km, approximately 28% of the length of road sections included in the two projects.

### 3. Road Condition

5. Cost savings to road users have been determined from vehicle operating and time costs calculated from estimates of road surface roughness and typical travel speed. Surface roughness has been estimated in terms of the International Roughness Index (IRI). For the without-project initial road roughness, figures were taken from the network inventory contained in the Technical Assistance Program Loan study report,<sup>1</sup> which is considered to be the most reliable source of information about the network at the end of the 1980s. It was assumed that routine and recurrent maintenance (mostly pothole filling) would have been carried out, but that

<sup>1</sup> Loan 725-INO: *Technical Assistance Program Loan—Subproject No. 1: Road Improvement Project*, Kampsax International a/s, 1988.

pavement deterioration would lead to progressively increasing roughness at a rate of 0.2 IRI/year, to a maximum of 16 IRI.

6. For the with-project case an estimate of current roughness was made from the general condition observed in the surveys undertaken by the OEM. It was assumed that initial roughness had increased to the present level from an original IRI of 3–4 for machine-laid asphalt surfaces or IRI 6 for other types of asphalt surface. Where there was information that the road had received periodic maintenance in the form of an overlay, the roughness progression was amended.

#### **4. Traffic**

7. Annual traffic levels required for benefit calculation have been estimated generally by applying an assumed growth rate of 9%/year to current traffic levels. The implied base year traffic level was compared with the traffic data in the TAPL study and, in some cases, to traffic data for intermediate years to verify that traffic levels assumed over the analysis period were of the correct order of magnitude. Current traffic levels were taken from the traffic counts from the OEM surveys, or from the latest Indonesian Integrated Road Management System (IIRMS) data where a count was not carried out. In one case the IIRMS figures were reduced as they appeared too high compared with field observations, and there is evidence that the IIRMS count data in East Nusa Tenggara are unrealistically high for some links. Vehicles were classified using the IIRMS. This differentiates between the 10 vehicle types that are used in the IIRMS evaluation procedure, plus motorcycles and nonmotorized vehicles. Although motorcycles, and sometime nonmotorized vehicles, are recorded in significant numbers on some sections of road, these vehicles normally operate over short distances, and appropriate numbers are difficult to determine for an evaluation. The benefits to them are also small compared to other vehicle types and so excluding them has little impact on the result.

#### **5. Construction Costs**

8. The capital costs taken into account in the evaluations were the final contract values for construction costs. No allowance for additional costs such as design costs and consultancy costs for supervision were included. These costs were taken from the project completion reports (PCRs). For the evaluation, costs and benefits have been calculated from unit prices expressed in economic terms. Economic construction costs were estimated from contract costs by applying the standard conversion factor of 0.943 as used in the PCR for ADB11.

9. The economic evaluation was conducted using the domestic price numeraire, with the net benefits converted to 2001 constant price levels. This conversion was made using the index of wholesale prices of public works in roads, bridges, and ports, which was published by the Central Bureau of Statistics. This index has shown a more than threefold increase from 1991 to 2001. A residual value of 15% of the cost of betterment works was applied at the end of the evaluation period.

#### **6. Maintenance Costs**

10. Road maintenance costs comprise annual routine maintenance plus periodic maintenance. It is reported that approximately Rp3 million–Rp5 million/kilometer (km)/year is spent on national and provincial roads for routine maintenance, but actual maintenance costs are difficult to determine in Indonesia. In South Sulawesi, information on actual costs on the sample roads was obtained, showing average annual maintenance costs of about Rp3 million/year in most cases. It is probable that routine maintenance costs are lower in the case of improved roads because of the reduced need for patching, and the cost saving can be

considered as a benefit. However, the impact on the results would be small and no allowance for such maintenance savings has been included. Periodic maintenance costs have been applied where there was evidence that such maintenance has been carried out. Where actual costs could not be determined, a standard cost of Rp170 million/km has been assumed.

## 7. Benefits

11. The only benefit quantified and incorporated in the economic evaluation of the projects has been road-user savings, that is, vehicle operating cost (VOC) savings and travel time savings. The road-user cost savings were calculated using the IIRMS method and current unit values. Road-user benefits can be divided into three categories—as benefits to normal, diverted, and generated traffic. There is very little scope for traffic diversion benefits in the case of the roads evaluated, and none has been included. Where road condition is improved significantly there can also be generated traffic: the traffic resulting from additional trips made only after the road project has been implemented as a response to the lower cost of travel. That is, more trips will be made in the same way that consumption of a product generally increases if the price is lowered. Because a significant cost reduction is required to generate additional traffic, and betterment projects do not normally produce such savings, no generated traffic has been assumed. Thus, only benefits to normal traffic were included.

### B. Road-User Costs

#### 1. Introduction

12. VOCs have been derived using a model that predicts the consumption of resources for each component of VOC, such as the number of liters of fuel consumed and amount of tire wear per kilometer. This is done for representative vehicle types according to the surface condition and geometry of the roads under study and the characteristics of the vehicles. When multiplied by the appropriate unit prices, such as rupiah per liter of fuel and rupiah per tire, this consumption is converted to a cost per kilometer. The total cost of all components is the VOC. Travel time savings are obtained when road improvements lead to an increase in vehicle speeds, thus reducing the journey time of passengers. A value of time per hour per passenger is applied as a unit cost to journey times to produce passenger time costs. Because the calculation of vehicle speeds is an integral part of the derivation of VOCs and travel time is simply the reciprocal of speed, it is normal to derive VOCs and passenger time costs together, and refer to the total as road-user costs.

#### 2. Vehicle Speeds

13. Average travel speed of vehicles  $V$  was calculated using the following formula, which was developed during the project benefit monitoring and evaluation (PBME) study for the Ninth Road (Maintenance) Sector Project.<sup>2</sup>

$$V = \text{Base} - 3.215 \cdot \text{IRI}$$

Where:  $V$  is average speed (km/hour)  
 $\text{IRI}$  is the International Roughness Index (m/km)

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<sup>2</sup> Loan 863-INO: *Ninth Road (Maintenance) Sector Project*, for \$150 million, approved on 24 November 1987.

14. In the current analysis, a base speed of 65 km/hour has been used for the without-project case and 70 km/hour for the with-project case. This is to reflect the higher speeds normally found on wider roads. The betterment works normally included widening from 3.5 to 4.5 or 5.0 m in the case of low-traffic roads, providing a two-lane carriageway, or from 5 to 7 m in the case of high-traffic roads, reducing the congestion effects of nonmotorized traffic.

### 3. Vehicle Operating Costs

15. In IIRMS the VOCs are calculated as a function of road roughness and vehicle speed using the following expression:

$$\text{VOC} = \text{Base Cost} (a_0 + a_1 / V + a_2 V^2 + a_3 \text{IRI} + a_4 \text{IRI}^2)$$

Where: VOC is the vehicle operating cost in Rp/km  
 Base Cost is the minimum VOC on smooth roads  
 a0 is a constant  
 a1 to a4 are coefficients  
 V is average speed (km/hour)  
 IRI is the International Roughness Index (m/km)

16. Values to determine the base costs and VOCs for a range of roughness and speed conditions for each vehicle type are calculated using the World Bank Highway Design Model III VOC model. Multiple regression is then applied to the results to obtain values for the coefficients. The current values used by IIRMS, which have been adopted for this reevaluation, are in Table A4.2.

**Table A4.2: Vehicle Operating Cost Base Cost (Rp/km) Coefficients**

	Base Cost	a0	a1	a2	a3	a4
Car	1,566	1	0.8321	0.000003	0.006416	0.000314
Utility – Freight	451	1	27.1220	0.000012	0.028612	0.001289
Utility – Passenger	451	1	27.1220	0.000012	0.028612	0.001289
Small Bus	860	1	28.1395	0.000030	0.043078	(0.000089)
Large Bus	1,464	1	16.8094	0.000030	0.023033	0.001249
2-axle Truck – Light	714	1	29.9636	0.000028	0.040377	0.000748
2-axle Truck – Medium	1,000	1	27.7770	0.000069	0.042622	0.000055
3-axle Truck	1,342	1	22.3294	0.000059	0.044725	0.000127
Truck + Trailer	2,274	1	17.3360	0.000022	0.053797	(0.000039)
Tractor + Semitrailer	2,274	1	17.3360	0.000022	0.053797	(0.000039)

Rp/km = rupiah per kilometer.

### 4. Passenger Time Costs

17. The number of passengers and time costs per hour are included in the IIRMS to assess time-saving benefits for vehicle passengers resulting from higher speeds attained on improved roads. These are in addition to the time value of the vehicle itself and crew costs for commercially operated vehicles. Travel time costs for passengers are not always included in road evaluations, but generally it is considered appropriate to do so, and they can represent a significant proportion of total benefits. There are difficulties in determining values for passenger time, and it is impossible to do so precisely. They are normally related to average wage rates or,

if a significant proportion of the working population is not in paid employment, as in Indonesia, to the level of gross domestic product per head. Very low time values have normally been applied in Indonesia, but following work on time values carried out for Java Arterial Roads Network Study (JARNS)<sup>3</sup> between 2000 and 2001, the values currently applied in IIRMS are significantly higher than those used in previous years.

18. The IIRMS time values per vehicle, which have been adopted for this analysis, are shown in Table A4.3. Those for the car, buses, and the passenger utility are based on passenger time values. For freight vehicles it is the value of time placed on the vehicle by the consignor, as estimated by stated preference surveys. It is noted in the JARNS Report that this reflects the value of the vehicle and the load and should therefore represent a reasonable estimate of the overall value to society (the cost of drivers' and helpers' wages are included in VOCs and so were subtracted from the vehicle time values to avoid double counting).

**Table A4.3: Values of Time for Economic Evaluation**

	Value per Vehicle (Rp/hour)
Car	20,000
Utility – Freight	8,000
Utility – Passenger	29,000
Small Bus	120,000
Large Bus	120,000
2-axle Truck – Light	38,000
2-axle Truck – Medium	41,500
3-axle Truck	45,500
Truck + Trailer	45,500
Tractor + Semitrailer	45,500

### C. Evaluation Results

19. The summary of the rates of return calculated are shown in Table A4.4. The details of the results are shown in Table A4.5. It can be seen that there is a very wide range in the EIRRs, from –9% to 84%, with the overall sample having a return of 39%. The overall EIRR, without including the passenger time cost savings, is 35%.<sup>4</sup>

<sup>3</sup> *Java Arterial Roads Network Study—Technical Report No. 7—Value of Time for Modelling and Evaluation*, Carl Bro International as stated under contract to Directorate General of Regional Infrastructure, Jakarta, May 2001.

<sup>4</sup> The OEM was concerned that there would still be some double counting of benefits from higher speeds in relation to freight vehicles by using the JARNS' time and VOC data, because higher annual utilization of vehicles as a result of time savings is assumed when capital and other fixed costs of the vehicle are incorporated into the calculation of costs per kilometer. Passenger time costs only have a small impact on the results of the reevaluation because of the relatively low proportion of freight vehicles on most road sections and the greater impact of roughness reduction than speed increase on the overall level of benefits.



**Table A4.4: Summary of Evaluation Result**

<b>Contract Package</b>	<b>Road Link Number</b>	<b>Name</b>	<b>EIRR (%)</b>
<b>A. ADB10</b>			
P4	038, 036	Babat – Pandangan	58
P5-1	059.2, 058, 060	Bambe – Krian	78
P5-2	072	Kertosono – Kediri	76
P9	020, 022, 023, 028, 031, 033.1	Pambawang – Mabuun	38
P10	008, 033.2, 034	Kelua – Batu Babi	52
P11-1	009	Wologai – Junction	22
P11-2	013, 014, 015, 016	Hepang – Kewapante	19
P12-1	021	Bajawa – Poma	0
P12-2	022	Malanusa – Maumbawa	(2)
P13	034, 036	Nita – Koting – Maumere	(9)
P23	004.1, 004.2	Makale – Palopo	27
P24	005	Enrekang – Makale	9
P25	006	Rappang – Enrekang	45
<b>Overall EIRR (ADB10)</b>			<b>36</b>
<b>B. ADB11</b>			
U-15	030	Paringin – Halong	48
U-43	024	Ujung Lamuru – Bojo	30
U-45	052.1	Majene – Tameroddo	44
U-64	025	Amuntai – Lampihong	46
U-68	027	Detusoko – Maurole	5
U-78	029	Pakae – Takkalala	38
U-85	003.2	Simpang Empat – Rantau	71
U-99	019	Kandangan – Negara	18
U203-1	005, 006	Gako – Ende	84
U203-2	008	Detusoko – Wologai	30
<b>Overall EIRR (ADB11)</b>			<b>49</b>
<b>EIRR for the Sample Road Subprojects</b>			<b>39</b>

ADB10 = Tenth Road (Sector) Project, ADB11 = Eleventh Road (Sector) Project, EIRR = economic internal rate of return.

- Note:
1. Contract package numbers starting with P were funded by ADB10 and those beginning with U by ADB11.
  2. The high rates tend to be associated with the higher traffic levels, but construction cost per km and the road roughness level in the without-project case are also significant.

**Table A4.5a: Evaluation Results**  
(Rp million, constant 2001 prices)

Loan Package Links Name	ADB10 P4			ADB10 P5-1			ADB10 P5-2			ADB10 P9		
	038, 036			059.2, 058, 060			072			020, 022, 023, 028, 031, 033.1		
	Babat - Pandangan			Bambe - Krian			Kertosono - Kediri			Pambawang - Mabuun		
	Net			Net			Net			Net		
	Costs	Benefits	Benefits	Costs	Benefits	Benefits	Costs	Benefits	Benefits	Costs	Benefits	Benefits
1991	7,887		(7,887)	1,819		(1,819)	2,622		(2,622)	4,663		(4,663)
1992	14,928		(14,928)	3,444		(3,444)	4,962		(4,962)	8,826		(8,826)
1993	13,974		(13,974)	3,223		(3,223)	4,645		(4,645)	8,262		(8,262)
1994		26,247	26,247		9,906	9,906		13,309	13,309		8,257	8,257
1995		29,831	29,831		11,261	11,261		15,184	15,184		9,451	9,451
1996		33,897	33,897		12,796	12,796		17,315	17,315		10,809	10,809
1997		38,510	38,510		14,537	14,537		19,735	19,735		12,356	12,356
1998		43,745	43,745		16,509	16,509		22,482	22,482		14,115	14,115
1999		49,686	49,686		18,744	18,744		25,602	25,602		16,116	16,116
2000		56,429	56,429		21,278	21,278	2,000	32,429	30,429		18,393	18,393
2001		64,084	64,084		24,149	24,149		36,783	36,783		20,983	20,983
2002		72,774	72,774		27,402	27,402		41,715	41,715		23,928	23,928
2003	(5,518)	82,643	88,162	(1,273)	31,090	32,363	(1,834)	47,302	49,136	(3,263)	27,277	30,540
		<b>IRR</b>	<b>58%</b>		<b>IRR</b>	<b>78%</b>		<b>IRR</b>	<b>76%</b>		<b>IRR</b>	<b>38%</b>

ADB10 = Tenth Road (Sector) Project, IRR = internal rate of return.

Note: Contract package numbers starting with P were funded by ADB10.

Loan Package Links Name	ADB10 P10			ADB10 P11-1			ADB10 P11-2			ADB10 P12-1		
	008, 033.2, 034			009			013, 014, 015, 016			021		
	Kelua – Batu Babi			Wologai – Junction			Hepang – Kewapante			Bajawa – Poma		
	Net			Net			Net			Net		
	Costs	Benefits	Benefits	Costs	Benefits	Benefits	Costs	Benefits	Benefits	Costs	Benefits	Benefits
1991	7,082		(7,082)	1,440		(1,440)	4,561		(4,561)	6,491		(6,491)
1992	13,405		(13,405)	2,725		(2,725)	8,632		(8,632)	12,284		(12,284)
1993	12,548		(12,548)	2,551		(2,551)	8,080		(8,080)	11,499		(11,499)
1994		19,929	19,929		1,265	1,265		3,549	3,549		1,661	1,661
1995		22,658	22,658		1,443	1,443		4,022	4,022		1,913	1,913
1996		25,755	25,755		1,647	1,647		4,556	4,556		2,080	2,080
1997		29,267	29,267		1,881	1,881		5,162	5,162		2,262	2,262
1998		33,253	33,253		2,152	2,152		5,847	5,847		2,459	2,459
1999		37,774	37,774		2,464	2,464		6,625	6,625		2,674	2,674
2000		42,905	42,905		2,824	2,824		7,505	7,505		2,908	2,908
2001		48,727	48,727		3,242	3,242		8,504	8,504		3,162	3,162
2002		55,335	55,335		3,728	3,728		9,636	9,636		3,438	3,438
2003	(4,955)	62,835	67,790	(1,007)	4,294	5,301	(3,191)	10,920	14,111	(4,541)	3,737	8,279
		<b>IRR</b>	<b>52%</b>		<b>IRR</b>	<b>22%</b>		<b>IRR</b>	<b>19%</b>		<b>IRR</b>	<b>0%</b>

ADB10 = Tenth Road (Sector) Project, IRR = internal rate of return.

Note: Contract package numbers starting with P were funded by ADB10.

**Table A4.5b: Evaluation Results**  
(Rp million, constant 2001 prices)

Loan Package Links Name	ADB10 P12-2 022		ADB10 P13 034, 036		ADB10 P23 004.1, 004.2		ADB10 P24 005		
	Malanusa – Maumbawa		Nita – Koting – Maumere		Makale – Palopo		Enrekang – Makale		
	Net		Net		Net		Net		
	Costs	Benefits	Costs	Benefits	Costs	Benefits	Costs	Benefits	
1991	2,596	(2,596)	4,064	(4,064)	7,424	(7,424)	11,548	(11,548)	
1992	4,914	(4,914)	7,691	(7,691)	14,052	(14,052)	21,856	(21,856)	
1993	4,600	(4,600)	7,199	(7,199)	13,153	(13,153)	20,459	(20,459)	
1994		446		337		8,588		5,080	
1995		507		386		9,775		5,736	
1996		575		443		11,121		6,478	
1997		653		509		12,552		7,316	
1998		741		569		14,170		8,264	
1999		841		619		16,000		9,335	
2000		955		673		18,071		10,547	
2001		1,084		731		20,415		11,919	
2002		1,232		795		23,069		13,471	
2003	(1,816)	1,399	3,215	(2,843)	864	3,708	(5,194)	26,077	
		IRR		-2%	IRR		-9%	IRR	
						IRR		27%	
								IRR	
									9%

ADB10 = Tenth Road (Sector) Project, IRR = internal rate of return.

Note: Contract package numbers starting with P were funded by ADB10.

Loan Package Links Name	ADB10 P25 006		ADB11 U-15 030		ADB11 U-43 024		ADB11 U-45 052.1		
	Rappang – Enrekang		Paringin – Halong		Ujung Lamuru – Bojo		Majene – Tameroddo (km 350)		
	Net		Net		Net		Net		
	Costs	Benefits	Costs	Benefits	Costs	Benefits	Costs	Benefits	
1991	4,387	(4,387)							
1992	8,304	(8,304)							
1993	7,773	(7,773)	3,156	(3,156)	5,172	(5,172)	2,065	(2,065)	
1994		10,111		6,009		(9,850)		3,933	
1995		11,450		5,399		(8,850)		3,534	
1996		12,965		7,827		6,602		6,602	
1997		14,682		8,863		8,863		7,518	
1998		16,625		10,038		10,038		8,559	
1999	5,700	18,826	13,126	11,369	11,369	9,743	9,743	6,962	
2000		22,737		12,880		12,880		11,091	
2001		25,707		14,595		14,595		12,623	
2002		29,070		16,542		16,542		14,367	
2003	(3,070)	32,878	35,948	18,753	18,753	16,352	16,352	10,080	
2004				21,267	21,267	18,612	18,612	8,907	
2005			(2,185)	24,126	26,311	(3,581)	21,186	24,767	
		IRR		45%	IRR		48%	IRR	
						IRR		30%	
								IRR	
									44%

ADB10 = Tenth Road (Sector) Project, ADB11 = Eleventh Road (Sector) Project, IRR = internal rate of return.

Note: Contract package numbers starting with P were funded by ADB10 and those beginning with U by ADB11.

**Table A4.5c: Evaluation Results**  
(Rp million, constant 2001 prices)

Loan Package Links Name	ADB11 U-64 025 Amuntai – Lampihong			ADB11 U-68 027 Detusoko – Maurole			ADB11 U-78 029 Pakae –Takkalala			ADB11 U-85 003.2 Simpang Empat – Rantau		
	Costs	Benefits	Benefits	Costs	Benefits	Benefits	Costs	Benefits	Benefits	Costs	Benefits	Benefits
1993	1,690		(1,690)	3,996		(3,996)	4,437		(4,437)	2,711		(2,711)
1994	3,218		(3,218)	7,610		(7,610)	8,450		(8,450)	5,163		(5,163)
1995	2,891		(2,891)	6,837		(6,837)	7,591		(7,591)	4,639		(4,639)
1996		3,872	3,872		1,196	1,196		7,922	7,922		12,378	12,378
1997		4,406	4,406		1,369	1,369		8,956	8,956		14,173	14,173
1998		5,013	5,013		1,565	1,565		10,124	10,124		16,214	16,214
1999		5,704	5,704		1,790	1,790		11,447	11,447		18,536	18,536
2000		6,490	6,490		2,046	2,046		12,943	12,943		21,177	21,177
2001		7,386	7,386		2,338	2,338		14,638	14,638		24,178	24,178
2002		8,406	8,406		2,671	2,671		16,557	16,557		27,589	27,589
2003		9,569	9,569		3,052	3,052		18,730	18,730		31,464	31,464
2004		10,894	10,894		3,486	3,486		21,194	21,194		35,868	35,868
2005	(1,170)	12,407	13,576	(2,767)	3,983	6,750	(3,072)	23,987	27,059	(1,877)	40,869	42,746
		<b>IRR</b>	<b>46%</b>		<b>IRR</b>	<b>5%</b>		<b>IRR</b>	<b>38%</b>		<b>IRR</b>	<b>71%</b>

ADB11= *Eleventh Road (Sector) Project*, IRR = internal rate of return.

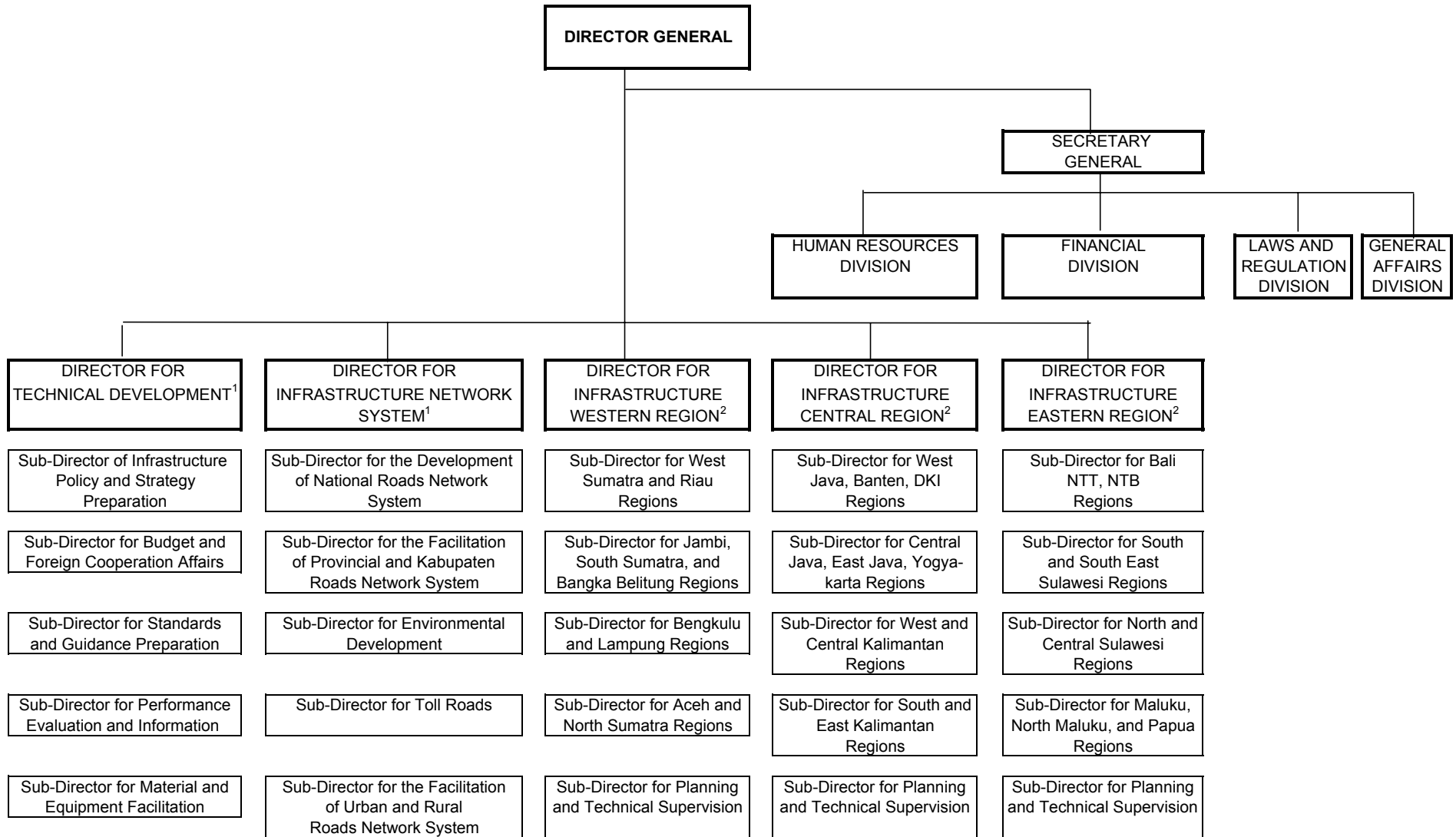
Note: Contract package numbers beginning with U were funded by ADB11.

Loan Package Links Name	ADB11 U-99 019 Kandangan – Negara			ADB11 U203-1 005, 006 Gako – Ende			ADB11 U203-2 008 Detusoko – Wologai		
	Costs	Benefits	Benefits	Costs	Benefits	Benefits	Costs	Benefits	Benefits
1991									
1992									
1993	3,223		(3,223)	6,111		(6,111)	618		(618)
1994	6,137		(6,137)	11,638		(11,638)	1177		(1,177)
1995	5,514		(5,514)	10,456		(10,456)	1,058		(1,058)
1996		2,453	2,453		37,511	37,511		789	789
1997		2,772	2,772		42,423	42,423		896	896
1998		3,132	3,132		47,978	47,978		1,017	1,017
1999		3,540	3,540		54,262	54,262		1,155	1,155
2000		4,001	4,001		61,372	61,372		1,311	1,311
2001		4,522	4,522		69,418	69,418		1,490	1,490
2002		5,112	5,112		78,527	78,527		1,693	1,693
2003		5,780	5,780		88,841	88,841		1,925	1,925
2004		6,537	6,537		100,524	100,524		2,190	2,190
2005	(2,231)	7,394	9,625	(4,231)	113,762	117,992	(428)	2,492	2,920
		<b>IRR</b>	<b>18%</b>		<b>IRR</b>	<b>84%</b>		<b>IRR</b>	<b>30%</b>

ADB11= *Eleventh Road (Sector) Project*, IRR = internal rate of return.

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## ORGANIZATIONAL STRUCTURE OF DIRECTORATE GENERAL OF REGIONAL INFRASTRUCTURE



DKI = Jakarta, NTB = Nusa Tenggara Barat, NTT = Nusa Tenggara Timur.

<sup>1</sup> Share the functions of the old director of planning.

<sup>2</sup> Asian Development Bank projects are implemented by these directors.