

Indonesia

South Sumatra Roads Rehabilitation Project

Report Date : October, 2002

Field Survey : July, 2001

1. Project Profile and Japan's ODA Loan



Location Map of the Project



Lubuklinggau - Lahat

1.1 Background

An increase in traffic volume, particularly the growth of heavy vehicle traffic, has caused severe deterioration to the shoulders and asphalt pavement of the Kotabumi–Lubuklinggau road section, which was improved from April 1977 to August 1984 with JBIC's finance. In order to cope with increasing traffic demand, proper rehabilitation and improvement was required.

1.2 Objectives

To reduce traffic congestion and accidents, and to encourage development of the regional economy by means of the rehabilitation of the roads and replacement of old bridges damaged by rapidly increasing traffic volume in South Sumatra, particularly in the Kotabumi - Lubuklinggau section.

1.3 Project Scope

A. Lubuklinggau–Muara Enim

1. Rehabilitation of Pavement and shoulders
 - 1) Overlay
 - 2) Priming on shoulders
2. Bridge Replacement

B. Muara Enim–Kotabumi

1. Rehabilitation of Pavement and shoulders
 - 1) Overlay with widening
 - 2) Overlay and priming on shoulders
 - 3) Overlay in town areas

- 2. Bridge Replacement
- C. Scope of works of consultants
 - Supervision of Civil Works

1.4 Borrower/Executing Agency

Republic of Indonesia/Directorate General of Highways, Ministry of Public Works

1.5 Outline of Loan Agreement

Loan Amount	5,458 million yen
Loan Disbursed Amount	5,410 million yen
Exchange of Note	September, 1986
Loan Agreement	January, 1987
Terms and Conditions	
Interest Rate	3.5% p.a.
Repayment Period (Grace Period)	30 years (10 years)
Procurement	Partially Untied
Final Disbursement Date	January, 1992

2. Results and Evaluation

2.1 Relevance

Since the 1970's, the Government of Indonesia has developed a network of trunk roads, in an effort to promote economic growth, and this road network has become one of the most important components of the infrastructure supporting the Indonesian economy. The project road is a part of the Trans-Sumatra Highway, which is the most important trunk road in Sumatra, connecting Bakhauni at the south end and Medan at the north end. However, rapid growth in traffic more than expected, particularly the growth of heavy vehicles, had caused deterioration to the project section. As most of the other trunk roads had also been damaged heavily, the government of Indonesia reviewed and changed its road development policy, shifting investment priority from new investment to rehabilitating existing roads, rather than building new ones. This change in policy was expressed in the five-year development plan REPELITA IV (1984 - 1988), and has been maintained until the present, as clearly described in the current national development policy, PROPENAS (2000 - 2004).

Accordingly, the project was appropriate at the time of project appraisal and currently remains consistent with the national development policy.

2.2 Efficiency

(2.2.1) Project Scope

The project scope for the rehabilitation work comprises two road sections, those of

Lubuklinggau–Muara Enim and Muara Enim–Kotabumi. In the first section, the original scope had been on priming the shoulders of the road over a 140km distance, including an overlay of 5.5 km and the replacement of 20 bridges. The actual condition required additional scope, including widening of 169km and overlaying of 181 km of roads. The length of the shoulders and the number of bridges slated for rehabilitation also increased significantly. For the second section as well, the actual scope grew significantly compared to the initial plan. The length to be widened increased from 141 km to 253 km, and that to be overlayed increased from 141 km to 267 km. The shoulder rehabilitation distance also increased from 126 km to 282 km. The main reasons for these changes in scope were as follows:

- a. Even between the time of project appraisal and the time of tender, the deterioration of the road surface had increased as a result of unexpectedly rapid growth in traffic volume, which was brought about by the completion of the connecting roads and the establishment of a large ferry vessel operation between Java and Sumatra. Accordingly, the project scope had to be expanded in order to cope with increasing traffic volume.
- b. Since the traffic volume of heavy trucks was increased rapidly, the carriageway width of 5.5m in the original plan became insufficient. In order to enable two trucks to pass safely each other, the road was widened to a standard of 6m except for the sections that are restricted to 5.5m owing to surrounding conditions.

(2.2.2) Implementation Schedule

The project was implemented in two phases, emergency work and main work.

The emergency work had been originally scheduled from June 1986 to July 1987, while the actual period was from May 1986 to July 1989. The delay was caused by additional scope.

As a result, the main construction work was re-scheduled to commence from July 1988, and other substantial construction work from October 1988. Because of the increase in scope, including the additional changes in the overlay thickness and the pavement width, the actual construction period was 43 months, which was 19 months longer than originally projected. Consequently, the main work was completed in April 1992 with a delay of two years and nine months.

(2.2.3) Project Cost

Although the original cost estimate was 5,875 million yen at the time of project appraisal, the actual cost was 9,396 million yen, resulting in a cost overrun of 3,521 million yen. This overrun was caused by a large increase in the project scope based on the design change, and was covered by the budget of Government of Indonesia.

2.3 Effectiveness

(2.3.1) Traffic Volume on the Project Road

The traffic volume on the project road in 2000 is as shown in Table 1. The average growth rate of the traffic volume by section during the years from 1986 to 2000 was about 6% to 8% per annum. Although the Directorate General of Regional Infrastructure (formerly BINA MARGA) has compiled traffic data in its IRMS (Integrated Road Management System), this data is somewhat controversial, particularly for recent years. For this reason, the traffic data for 2000 was collected from the P3JJ (Project of Planning & Supervision of Roads and Bridges) of the provincial government. The actual traffic volume exceeded the volume originally projected.

Table 1: Traffic Volume on the Project Roads

					(Unit: veh/day)
Section	Actual				Forecast (1995)
	1986	1995	2000	Ave. Annual Growth Rate (1986 ~ 2000)	Original Projection
Lubuklinggau–Lahat	2,656	5,136	7,783	8.3%	1,073
Lahat–Baturaja	2,960	5,268	7,476	6.8%	1,666
Baturaja–Kotabumi	5,166	4,036	12,846	6.7%	2,124

Source: 1986=Consultant Progress Report (1991), 1995=IRMS, 2000=P3JJ

As for the heavy vehicles, the growth rate of traffic volume on the majority portion of the project road seems to be higher than that of the national average, estimated by the growth rate of registered heavy vehicles. The higher growth is particularly significant for the Baturaja–Kotabumi section, as shown in Table 2.

Table 2: Traffic Volume of Heavy Vehicles

Section	(Unit: veh/day)			
	1986	1995	2000	Annual Growth (%)
	1988	1995	1999	
Lubuklinggau–Lahat	1,588	-	3,896	6.6
Lahat–Baturaja	1,817	-	3,362	4.5
Baturaja–Kotabumi	2,177	-	6,672	8.3
Total Number of Registered Heavy Vehicles in Indonesia (Unit: vehicles)	1,278,312	2,024,702	2,376,603	5.8

Source: 1986: Consultant Progress Report (1991), 2000: P3JJ

Number of Registered Heavy Vehicles: Statistical Yearbook Indonesia

(2.3.2) Running Speed

According to the provincial government, vehicle running speed has increased significantly owing to the project implementation. Ranging from 20 to 40 km/hr before the project, it equaled or surpassed 60 km/hr after the project completion for all project sections.

Table 3: Changes in Running Speed (km/hr)

Road Section	Before the project	After the project
Lubuklinggau–Muara Enim	20 – 40	60 - 80
Muara Enim–Baturaja	20 – 40	60 - 80
Baturaja–Kotabumi	20 – 40	60 - 80

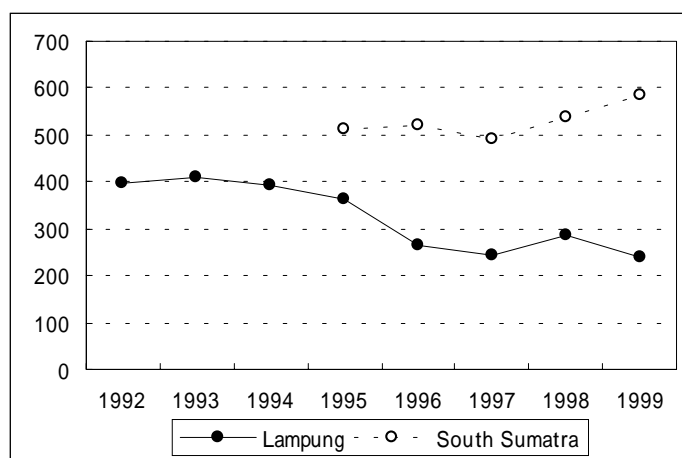
Source: Dinas Bina Marga of South Sumatra Province

(2.3.3) Traffic Accidents

At the time of project appraisal, it was widely recognized that traffic accidents would increase without the project.

Figure 1 shows the record of past accidents in the two provinces related to the project road. The number of traffic accidents has a decreasing tendency in the province of Lampung, whereas it is increasing in South Sumatra province. As for the growth rate of vehicle registration in the South Sumatra province during the years from 1995 to 1999 was 9.5% per annum, which is much higher than that of traffic accidents in the province. Therefore, when taking into consideration the relation between vehicle traffic growth and vehicle registration, however, one can see that the traffic accident rate has decreased substantially for both of the provinces.

Figure 1: Number of Traffic Accidents



Source: State Police of Lampung Province (Lampung)
Police Office Directorate of Traffic South Sumatra (South Sumatra)

(2.3.4) Internal Rate of Return

The economic internal rate of return was re-estimated using the actual project cost and the actual traffic volume on the project road. Future traffic volume was forecast on the basis of past trends. All the other conditions were assumed to be same as in the original estimation at the time of project appraisal. The re-estimated EIRR resulted in 15.2%, while the original estimate was 16.3%.

The slight decrease in the EIRR can be attributed to the continuously rapid traffic growth to date, in spite of an increase in project cost by as much as 60% over the original estimate.

2.4 Impact

(2.4.1) Impacts on Regional Economy

The objective of the project was to improve transport conditions on the trans-Sumatra highway, and thereby to facilitate development of the regional economy. Although the project road section covers only two provinces, South Sumatra and Lampung, the neighboring provinces of Jambi and Bengkulu may also be covered under the impact area when considering the importance of the project road in Sumatra. The project road supports the regional economy as the road is used as the main corridor for inland cargo coming from and going into Java, and in 1992, when the project was completed, the GRDP showed an increase of 2% to 3% over the previous year. Lampung province has enjoyed the highest growth, 3.6%, because of its location advantage. It is the nearest province to Java Island.

Table 3: GRDP of the Related Provinces at 1983 prices

	1991 (Before the Project)	1992 (After the Project)	Change
South Sumatra	5,112,900	5,588,900	3.01%
Lampung	2,024,700	2,247,900	3.55%
Jambi	892,000	947,700	2.04%
Bengkulu	497,500	533,900	2.38%
Indonesia	119,896,100	131,184,800	3.05%

Source: Statistical Yearbook Indonesia

Owing to the improvement of the condition of the road some new industries have emerged in related provinces. For instance, a cassava processing industry was established near Martapura in the mid-1990s. The cement factory at Baturaja was expanded in production scale to a total employee base of 5,000 persons. These factories are located at strategic points along the project road, utilizing raw materials available in the adjacent area.

(2.4.2) Impacts on the Environment

There was no problem reported by the executing agency.

(2.4.3) Social Impacts

There was no problem reported by the executing agency. No resettlement was required in this project.

(2.4.4) Results of the Interview Survey to the Beneficiaries of the Project

The respondents were selected on a random, voluntary basis from among the residents and local enterprises that were using the South Sumatra Road at the time of interview survey, July 2001.

For Residents

Resident respondents were selected randomly in Lahat, Buturaja, Martapura and others along the Road. About 80 people were interviewed in person.

a. Changes in travel speed on the South Sumatra Road before and after the project

About 66 % of the respondents replied that travel speed on the South Sumatra Road had become faster than before the project.

b. Positive effects on daily life

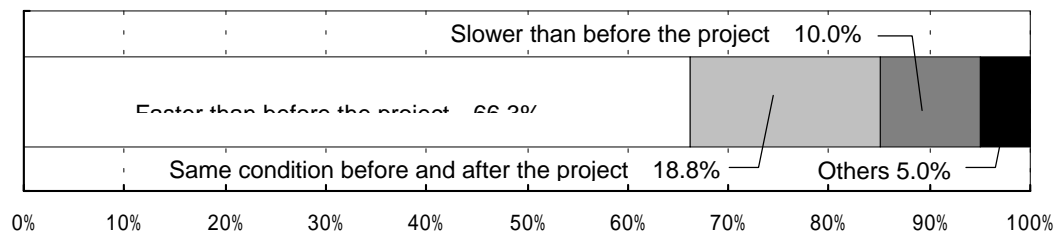
As for the effects on the daily life of residents, 32% pointed to easier access to emergency medical services, 21% to improved police service and another 14% to disaster prevention.

c. Satisfaction with road rehabilitation

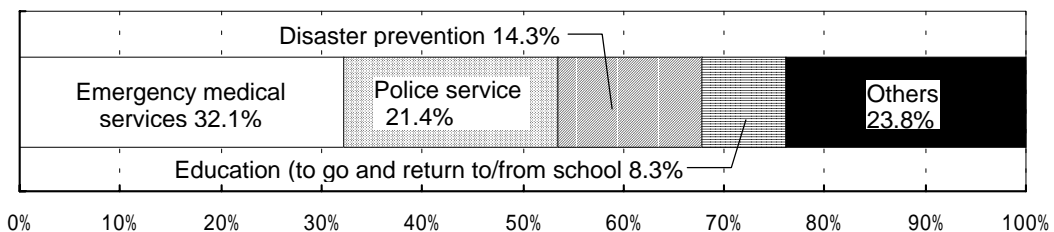
Among the respondents, 54% replied that they were either “dissatisfied” or “less satisfied with the road improvement”. Regarding the reasons for this dissatisfaction, over 60% replied that the reinforcement was not sufficient due to the current condition of the project road. In fact, 83% of respondents felt that further improvement/rehabilitation is still necessary.

Figure 2: Results of the Interview Survey for Residents

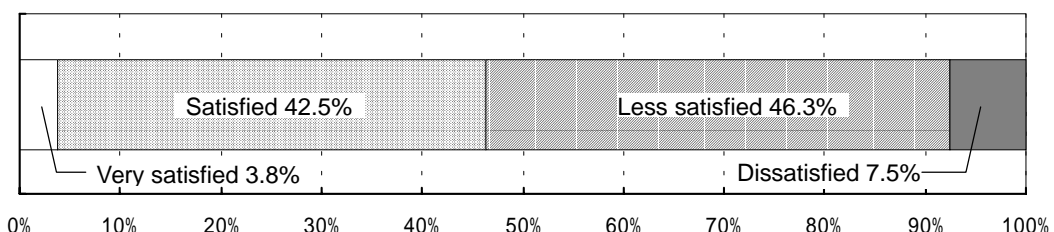
Q. What do you think about the operation speed of the South Sumatra Road (Kotabumi – Lubuklingau), before and after the project?



Q. Have you seen any positive effects on daily life as result of the road rehabilitation?



Q. Are you satisfied with the road and bridge improvements made by this project?



Note: Figures do not add up due to rounding.

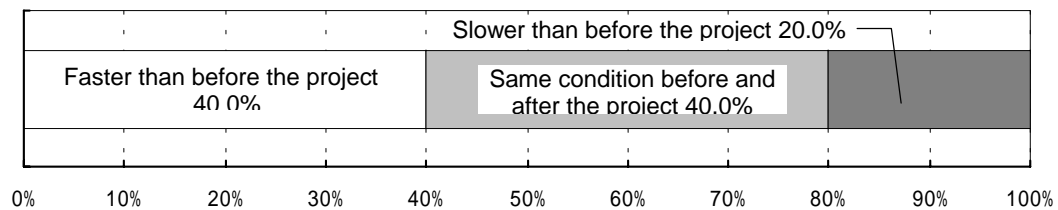
For Enterprises

The respondents for enterprises were selected from business located in Palembang and Baturaja. Representatives from 20 companies in the transportation sector were interviewed in the same fashion as the residents. As a result, similar tendencies were observed.

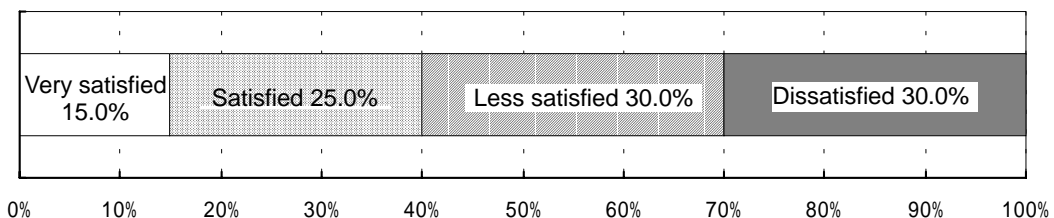
- a. Changes in operation speed on the South Sumatra Road before and after the project
About 40% of the respondents replied that the operation speed had become faster than before the project, while 40% of them said that it remained the same
- b. Satisfaction with the road rehabilitation
Among the respondents, 60% replied that they were either dissatisfied or less satisfied with the road improvements due to the current condition of project road, which they felt needed further improvement/rehabilitation.

Figure 3: Results of the Interview Survey for Enterprises

Q. How do you think about the operation speed of the South Sumatra Road (Kotabumi – Lubuklingau), before and after the project?



Q. Are you satisfied with the road and bridge improvement by the project?



2.5 Sustainability

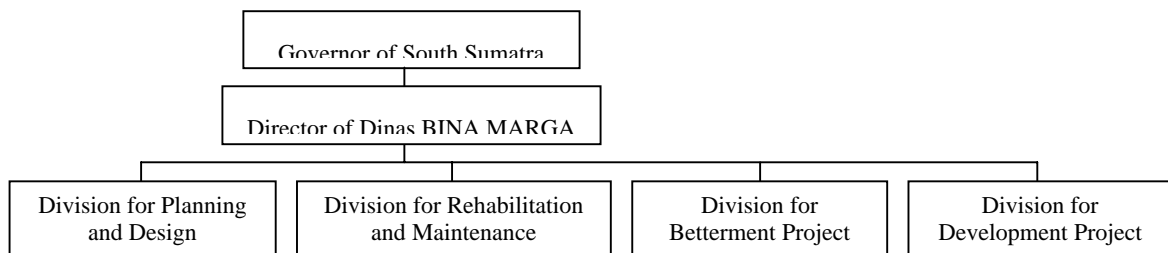
(2.5.1) Organization of O&M

The maintenance and rehabilitation division of the Dinas BINA MARGA (Public Works

Dept.) of South Sumatra Province and Lampung Province are responsible for the maintenance of the sections of the project road in their respective areas as sections of national road. As for the road betterment and rehabilitation projects, the roles of the RBO (Regional Betterment Office) under the BINA MARGA (Ministry of Public Works) have, since 2000, been taken over by the P3JJ established under the Dinas BINA MARGA of the provincial government in accordance with the decentralization scheme.

The organizational structure of the Dinas BINA MARGA of South Sumatra province is illustrated in Figure 4 (Refer to the attached organization chart for more detail).

Figure 4: Organization of Dinas BINA MARGA of South Sumatra Province



(2.5.2) Current Maintenance Conditions

Maintenance work has been carried out frequently on the project road, but some sections do not seem to be maintained at a level acceptable for a trunk road.

(2.5.3) Technical Capacity

Road maintenance work consists of routine and periodic maintenance. Routine maintenance includes small-scale patching work with asphalt, grass cutting, cleaning of drainage and daily inspections.

Periodic maintenance includes larger-scale patching work, protection work for slopes, and the repair of shoulders and bridges. All this work is undertaken based on the manual provided by the Dinas BINA MARGA of the corresponding province. In the case of South Sumatra Province, approximately 120 people, including five engineers, are engaged in maintenance work under the authority of the project manager of the road/bridge maintenance section. There is a training program for maintenance workers provided by the Dinas BINA MARGA. Approximately 15 persons receive on-the-job training every year for daily inspection and for the management of construction equipment. The equipment generally functions well. As a consequence, the maintenance capability should be adequately retained in terms of engineering level, staff numbers and expertise.

(2.5.4) Financial Status

At the time of project appraisal, the maintenance cost of the project road had been estimated at Rp. 1,498 million for routine maintenance every year, and Rp. 14,338 million for periodic maintenance to be conducted, every five years. Table 4 shows the actual expenditures for maintenance and rehabilitation of the project road in fiscal year 1999/2000. The total cost is calculated to be Rp. 26,104 million, which is equivalent to Rp 4,315 million at 1985 prices when adjusting for inflation. The actual costs, were implemented as rehabilitation projects, and thus, should be compared to the periodic maintenance cost at the time of project appraisal. The actual cost was only 30% of the originally estimated periodic maintenance cost. According to the Dinas Bina Marga, the actual routine maintenance cost for the national road is approximately Rp 1.2 million per km on average, indicating a total of about Rp. 600 million for the project road. This is equivalent to only Rp. 100 million at 1985 prices, which is about 7% of the original estimate at the time of appraisal. The Dinas BINA MARGA is suffering from a maintenance budget shortfall, which explains the gradual deterioration of the road network. Yet heavily damaged roads require more money for maintenance/rehabilitation. This vicious cycle allocated funds trying to keep pace with road surface atrophy, yet never being enough, is repeated. The implementation of a new rehabilitation work will be required, however, prior to the work, it's more important how O&M will be conducted both in effective and efficient ways under the limited human resources and budget.

In 2001, an additional rehabilitation project is scheduled for the 60 km section between Sugihwaras and Baturaja, using an IBRD loan of Rp.8.4 billion.

Table 4: Actual Maintenance/Rehabilitation Costs in 1999/2000

Section	Cost (Mil. Rp.)	Financial Source
Ma.Beliti–Lb.Linggau	1,180	INP-23
Tb.Tinggi–Ma.Beliti	1,591	INP-23
Lahat–Tb.Tinggi	4,900	INP-23
Muara Enim–Lahat	8,215	JBIC Loan
Ma.Enim–Km.30	1,125	APBN
Ma.Enim–Km.30	2,620	JBIC Loan
Ma.Enim–Buturaja	500	INP-23
Ma.Enim–Buturaja	1,700	INP-23
Martapura–Bts.Lampung Sp.Sugihwaras–Buturaja	1,069	INP-23
Buturaja–Martapura	970	APBN
Buturaja–Martapura	313	World Bank
Town Area	35	APBN
Town Area	1,887	JBIC Loan
Total	26,104	

Source: Road and Bridge Rehabilitation Project of South Sumatra Province (1999/2000)

(2.5.5) Improvement measures

In the Lubuklinggau-Rahat (150 km) section, some holes and cracks can be found on the road surface. The carriageway also has been damaged in some sections due to the expanded collapses

of shoulders, particularly so for the sections with cutting slopes. The deterioration of bridges has also progressed: For instance a slab of the Pasai bridge, which was outside the project scope, has been heavily damaged, threatening collapse. For the section between Sugihwaras and Baturaja, the road surface has many large holes and has been stripped away in some sections.

There are two reasons why some sections of the project road are not in good condition: one is the insufficient maintenance budget as mentioned above, and the other is an increase in the number of overloaded heavy vehicles. The central government (Directorate General of Regional Infrastructure) is aware of this situation, and consequently is either taking or considering the following measures:

- a. The heavily damaged sections are to be rehabilitated using loan projects
- b. For securing the financial resources, the annual vehicle tax will be increased.
- c. The vehicle weight checking system will be made more active and strict.

In addition, the following measures should be examined in the case of the project road:

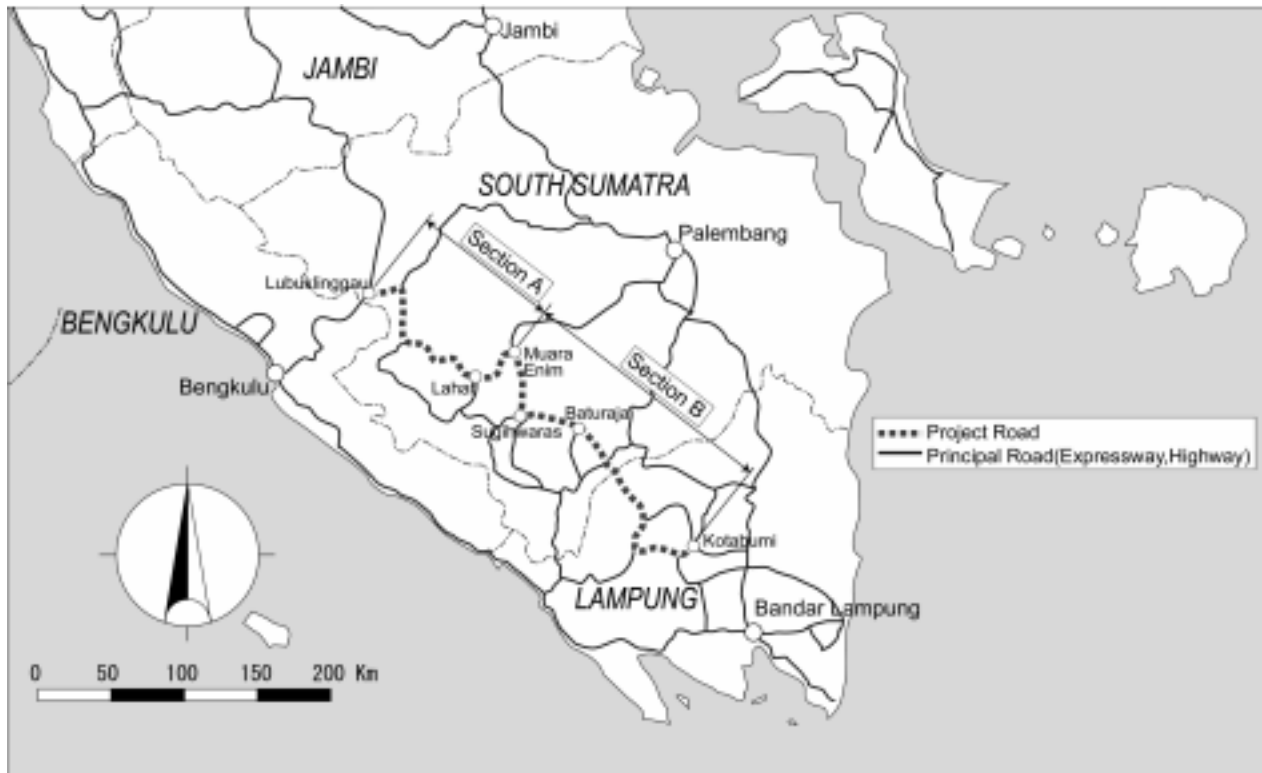
- a. Upgrading of the project road to a heavy loaded road
- b. Measures to reduce traffic demand

The project road is the only trans-Sumatra highway, therefore, it is often utilized by the heavy trucks with heavier axle loads mainly from/to Java, where higher design axle load has been employed for the truck road. It may be necessary to upgrade the design axle load from 8 tons to 10 tons in order to cope with the increase in the number of overloaded heavy vehicles. (Although a short stretch of the project road has already been upgraded to 10 tons, as of the present time the rest remains designed for 8 tons) It may also be necessary to examine steps to reduce traffic volume on the project road by dispersing traffic to other roads or diverting commuters to other transport modes. The completion of a parallel road like the Sumatra East Coast Highway, for instance, would contribute to the reduction of traffic demand.

3. Lessons Learned

The project had large cost over-runs due to the rapid deterioration of the road from the time of the project appraisal to the tender. It is important to minimize the preparation period to reduce the progress of such deterioration. Appropriate measures to enforce tighter control on limits on speeding and loadage must be applied as well. However, in order to cope with the overall growth in traffic, it is inevitable to keep in mind not only the whole road network but also other transport modes so that adequate dispersion of traffic may be achieved.

Figure 5: Project Location Map



Comparison of Original and Actual Scope

Item	Plan	Actual
Project Scope		
A. Lubuklinggau–Muara Enim	Total length: 184.9 km	Total length: 187.2 km
1. Road Rehabilitation of Pavement & Shoulders		
1) Overlay & priming on shoulders	5.5 km (incl. Realign. 3.0km)	187.2km
2) Priming on shoulders	140.0km	180.6 km
3) Overlay		6.6 km
4) Realignment		168.9 km
5) Widening		16 nos.
6) Box culvert		
2. Bridge Replacement		
1) New/Replacement	20 bridges (212 m)	13 bridges (209.7 m)
2) Repair/Rehabilitation		9 bridges (321.7 m)
B. Muara Enim–Kotabumi	Total length: 282.5 km	Total length: 282.4 km
1. Rehabilitation of Pavement & Shoulders		282.4 km
1) Overlay with widening	141.0 km	(shoulder rehabilitation)
	(incl. Realignment of 5 km)	266.5 km (overlay)
- carriageway	4.5 to 5.5 m	253.3 km (widening)
- shoulders	0.75 to 1.0 m	5.5 to 6.0 m
2) Overlay & priming on shoulders	126.0 km	1.0 m
3) Overlay in town areas	15.5km	282.0 km
4) Realignment		20.8km
5) Box culvert		3 nos.
2. Bridge Replacement		
1) New/Replacement	6 bridges (103 m)	11 bridges (452,6 m)
2) Repair/Rehabilitation		7 bridges (95.6 m)
Implementation Schedule	June 1986 ~ July 1987	May 1986 ~ April 1992
Project Cost		
Foreign currency	3,821 million yen	5,458.0 million yen
Local currency	2,054 million yen	3,937.6 million yen
Total	5,875 million yen	9,395.6 million yen
ODA Loan Portion	5,458 million yen	5,410.0 million yen
Exchange Rate	1 Rp. = 0.18 yen	1 Rp. = 0.077 yen

Independent Evaluator's Opinion on South Sumatra Roads Rehabilitation Project

Raymond Atje*

Senior Researcher, Department of Economics, CSIS, Jakarta

The objective of the project i.e., to reduce traffic congestions and accidents, and to encourage development of regional economy by improving the conditions of roads and bridges in the project areas remains relevant to the national development program. The conditions of the sections of road under consideration (including bridges in the sections) are very crucial for the transportation in Sumatra as whole because those sections are parts of the tans-Sumatra highway route.

The report claims that the project had had a positive impact on the economies of the four provinces that are included in the impact area: Lampung, South Sumatra, Jambi and Bengkulu. It argues in particular that the real gross regional domestic products of those provinces had increased as a result of the project. In addition, the establishment of some industries, such cement factory and cassava processing industry were also attributed to improvement of the road condition. However, there were many other factors that might have contributed to these changes. Instead of using the above indicators, other indicators such as changes in transportation cost, changes in traveling time may be used as alternatives to measure the impacts of the project.

However, one of the most interesting parts of the report was the field survey (interview) to assess local residents' and local enterprises' opinions on the impact of the project. It was clear that the project provided significant positive impacts to the society (residents and business). It is interesting to note that the respondents were not satisfied with the road improvement. Implicitly, they believed that the project could have been done in a better way. Unfortunately the surveyor did not pursue further on this issue.

There is a possibility that project may not be sustainable. As mentioned in the report, the road was not suitable for heavy-loaded vehicles. However, a significant portion of the traffic on the project roads comprises of heavy-loaded vehicles. The sustainability of this kind of project depends on the capacities of concerned regional (provincial) institutions to undertake the specific assignments. As mentioned in the report the responsibility to undertake road development, road betterment and rehabilitations, and road maintenance projects go to at least three different institutions. Under such an arrangement coordination failures are likely to happen. In addition, the sustainability of the project will depend also on technical capabilities of those institutions to undertake their specific assignments. Finally, it will also depend on the availability of funds to maintain the existing roads. The last factor will become increasingly important issue as various government tasks are being sifted from the central to the regional and district governments. Some regional and district governments will face difficulties to raise enough funds to road development and maintenance programs.

We second the recommendation given the report to undertake various countermeasures to improve the road standard to accommodate axle load of 10 tons as well as to make vehicle checking system more active and stricter.

* I have benefited from discussions with Ms Titik Anas who has been kind enough to provide some insightful comments about the report. The usual disclaimer applied.