

Indonesia

Rehabilitation of Ampera Bridge on Musi River Project

Report Date : October 2002

Field Survey : July 2001

1. Project Profile and Japan's ODA Loan



Project Location Map



Ampera Bridge

1.1 Background

At the time of the project appraisal, the Ampera Bridge was the only bridge connecting both sides of the Musi River in Palembang. The bridge, built in 1965 and somewhat superannuated, had assumed an increasingly important role in the road network of Palembang. Palembang City planned to build a second bridge (the Second Musi River Bridge) in order to address the ever-increasing traffic demand, but budget constraints had prevented its construction.

The preliminary survey in 1987 noted that the Ampera Bridge suffered from very serious underwater damage to its piers; consequently, renovation was needed urgently to maintain safety and to enhance the durability of the bridge.

1.2 Objectives

To maintain the road networks of Palembang City in good condition by rehabilitating the Ampera Bridge.

1.3 Project Scope

The Ampera Bridge rehabilitation project includes;

- Civil works to rehabilitate the bridge (repair of sidewalk in center span, replacement of concrete deck slab, repair and reinforcement of piers), and
- Consulting services for detailed survey and design, and for supervision of civil works.

1.4 Borrower/Executing Agency

Republic of Indonesia/Directorate General of Highways (BINA MARGA)

1.5 Outline of Loan Agreement

| | |
|---------------------------------|---------------------|
| Loan Amount | 1,804 million yen |
| Loan Disbursed Amount | 1,695 million yen |
| Exchange of Notes | April 1988 |
| Loan Agreement | July 1988 |
| Terms and Conditions | |
| Interest Rate | 3.0 % p.a. |
| Repayment Period (Grace Period) | 30 years (10 years) |
| Procurement | General Untied |
| Final Disbursement Date | September 1993 |

2. Results and Evaluation

2.1 Relevance

As the capital city of South Sumatra Province, Palembang has become an increasingly important administrative, commercial, industrial and educational center. The city is divided into two areas, defined as the north and south sides of the Musi River. The Ampera Bridge, which crosses the Musi River in the city center, was the only bridge connecting the both sides of the river and had been used rather heavily. At the time of the project appraisal, the Ampera Bridge was in deteriorated condition, damaged by heavy traffic and by drift timbers, particularly around the sub-structure of the piers. The risk of collapse was, at that time, a crucial issue for residents of the city, and the bridge rehabilitation project was relevant. Palembang City developed its road network, including the land used for that network, based on a master plan prepared in the late 1980s. The Ampera Bridge is now regarded as a city symbol, and at the same time functions as a part of the main street of Palembang City. In the current National Development Program (2000–2004), the rehabilitation and maintenance of existing infrastructure are given priority over new construction. Accordingly, the rehabilitation project still remains relevant at present.

2.2 Efficiency

(2.2.1) Project Scope

The planned project scope consisted of rehabilitation of the Ampera Bridge and consulting service. The actual scope was the same as planned.

(2.2.2) Implementation Schedule

The implementation of the project was originally scheduled to take place over a 42-month period, from January 1988 to June 1991. With an eight-month delay, it actually was completed in February 1992. The delay was caused by survey difficulties: -- underwater inspection of pier conditions and the additional work required for the engineering study, site trials and reassessment of construction methods -- none of which had been included or anticipated in the planning of the original contract. The actual construction period lasted from May 1990 to February 1992, which was two months

shorter than the originally planned construction schedule¹.

According to the Project of Planning & Supervision of Roads and Bridges (P3JJ) of South Sumatra Province, traffic flow over the bridge was well controlled during the rehabilitation of the bridge surface, with congestion a little heavier than usual on both sides. While one lane was under construction, the other lane was used for two-way alternate traffic.

(2.2.3) Project Cost

The project cost, originally estimated to be 2,088 million yen, was actually 1,754 million yen, generating a cost under-run of about 300 million yen. The cost underrun was made possible partly by the change in the exchange rate of the rupiah against the yen, and partly by the unexpectedly good condition of the piers and foundations underwater, which could not be known in advance of the site surveys conducted at the engineering stage.

2.3 Effectiveness

(2.3.1) Traffic Volume Across the Musi River

At the time of project appraisal, the prediction for traffic volume on the Ampera Bridge was 88,000 vehicles per day for the year 1996. This projection was based on the assumption that the Second Musi River Bridge would not be built before the target year of the project. This bridge, however, was built in 1994 with funds financed by the ADB.

The traffic volume of the Ampera Bridge and the Second Musi Bridge actually recorded in 2000 was 77,573 and 6,994 vehicles/day, respectively. The aggregated traffic volume of 84,567 vehicles/day was slightly lower than 88,000, the original target for the year 1996, however the Ampera Bridge continues to be used by heavy traffic (which showed a 75% increase between 1986 and 2000), as traffic diversion to the new bridge was less than expected. The location of the new bridge was about 5 km upstream from the Ampera Bridge, so the new bridge was used only by through traffic, leaving the Ampera Bridge used mainly by intra-urban traffic. More than 80% of the traffic of the Ampera is comprised of either ordinary automobiles/vans or motorcycles.

Although the actual growth rate of the traffic volume in the city was lower than the original target, the demand for crossing the Musi River almost doubled during the 14 years from 1986 to 2000. It is also noteworthy that the Ampera Bridge was still the preferred route of Palembang City residents, even after the completion of the new bridge.

¹ See "Comparison of Original Plan and Actual Scope" at the end of this report.

Table 1: Traffic Volume on the Ampera Bridge and the Second Musi River Bridge
(Unit: Vehicles/day)

| Year | Ampera Bridge | | Second Musi River Bridge |
|------|----------------------|--------|--------------------------|
| | Original Target | Actual | Actual |
| 1986 | 43,991 | 43,991 | - |
| 1996 | 88,000 ¹⁾ | n.a. | - |
| 2000 | n.a. | 77,573 | 6,994 |

Source: 1) Original Target is quoted from JBIC's project appraisal documents.

2) The actual volume is the data from the P3JJ of South Sumatra Province.

It seems that Traffic demand for the Ampera has already been reached the bridge's traffic capacity, with the peak hour traffic volume exceeding 4,000 vehicles/hr for one direction. Theoretically, this exceeds the recommended capacity/volume of 3,000 to 3,500 vehicles/hr.

In fact, traffic congestion during peak hours is getting serious; during those hours, it takes about 30 to 40 minutes to travel between the centers of the north and south sides of Musi, compared to only 10 to 15 minutes during off-peak hours.

(2.3.2) Results of Interviews with Beneficiaries of the Project

An interview survey on the project's effects was conducted in July 2001, with a population sample of 100 persons randomly selected from among users of the Ampera Bridge. Among other findings, the following results illustrate the direct effects of the project.

a. Changes in accessibility before and after the project²

Nearly 70 % of the respondents replied that access between the two sides of the Musi River had become smoother than before the project.

b. Travel time saved

Among the respondents, 46 % replied that travel time had decreased.

c. Traffic safety enhanced

Among the respondents, 21 % pointed out that the number of traffic accidents had decreased.

2.4 Impact

(2.4.1) Social Impacts on the Local Residents

The project has contributed positively, based on the master plan, to urban development. This plan's objectives, intended to enhance urban function of Palembang City, highlighted the need for renovating the administrative, commercial and cultural center on the north side of the Musi River, while fostering development on the south side by expanding residential land use and stimulating commercial activities. Reflecting the economic development, the population of Palembang City has increased at a rate of 4% per annum (average 1985-99), presumably much higher than the province's average of 2.16% (for 1991-99, "South Sumatra Statistical Yearbook", South Sumatra Province). The

² The interview survey included two separate questions on the users' perception of project effect and on the actual time-saving effect, corresponding to a. smoothness and b. travel time herein, respectively.

population growth of the southern bank of the river, with an access via the Ampera Bridge to the central district of the city on the northern bank, was particularly considerable.

Table 2: Population Growth

| Area | 1985 | 1999 | Average Annual Growth Rate |
|------------------------------|---------|-----------|----------------------------|
| Palembang City | 827,468 | 1,428,334 | 4.0 % |
| South side of the Musi River | 275,823 | 430,669 | 3.2 % |

Source: "Palembang Statistical Yearbook 1999", Palembang City

(2.4.2) Impacts on the Environment

According to the provincial government, no significant impact on the environment occurred either during the rehabilitation work or after the completion of the project.

2.5 Sustainability

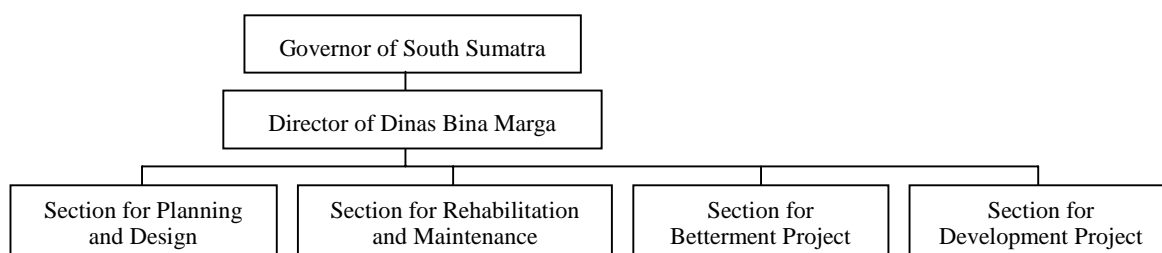
(2.5.1) Operation and Maintenance

a. Organization for maintenance

The maintenance and rehabilitation section of the Public Work Section (Dinas Bina Marga) of South Sumatra Province is responsible for the maintenance of the Ampera Bridge, as part of the national road network. As for road betterment and rehabilitation projects, the role of the Regional Betterment Office (RBO), under the Department of Public Works (Bina Marga), has been taken over by the Project of Planning & Supervision of Roads and Bridges (P3JJ), established under the Public Work Section of the provincial government in accordance with the decentralization scheme.

The organization of the Public Work Section of South Sumatra Province is illustrated, in simplified form, in Figure 1.

Figure 1: Organization of the Dinas BINA MARGA in South Sumatra Province



b. Present Condition of Ampera Bridge

In February 2000, the pier of the center span on the left side was damaged when a ship loaded with 5,500 DWT of coal crashed into it. The damage caused by the ship is about 2m in length and 10cm in depth. The ship was drawn by a tug-boat, which encountered difficulty in guiding the ship because the flow of the river was considerably fast, about 1.1-1.2 m/second at a depth of

1.0m.

Ships periodically operate out of the river port upstream from the Ampera Bridge, and travel toward the ocean. Although the damage does not seriously impair the structural safety of the bridge, repair work is urgently required to prevent greater danger should such accidents occur in the future.

At this moment, there is no specific regulation for the weight of heavy vehicles, while the maximum allowable weight for a design axle load is 10 tons. In order to avoid extra damage, traffic regulations prohibit the use of heavy vehicles on the Ampera Bridge from 6:00 p.m. to 6:00 a.m., which means heavy vehicles, as well as through traffic, must use the Second Musi Bridge at night.

(2.5.2) Technical capacity

Bridge maintenance work is composed of routine maintenance and periodic maintenance. The former includes painting the metal parts of the tower, cleaning drainage and conducting daily inspections, including but not limited to checking the lighting system. The latter includes plastering small cracks on the concrete slab, replacing lost and damaged accessory parts, and inspecting such structures as piers, foundations and towers. This work, conducted in accordance with the maintenance manual, should be carried out by the Dinas Bina Marga of South Sumatra. Under the project manager of the road/bridge maintenance section, approximately 120 persons, including five engineers, are engaged in maintenance work. Approximately 15 persons every year participate in on-the-job training covering daily inspection and management of construction equipment. The equipment generally functions well. Larger-scale repair work is usually implemented by private contractors. However, maintenance work conducted in past years was not carried out adequately, as seen from the cases stated below.

In 1998, a ship ran into a pier, and a detailed inspection of the bridge followed in 1999. It was the first inspection after the completion of the rehabilitation project in 1992 and revealed some damage to the pier and to the shoes. Also, there were holes in the rusted metal part of the substructure inside the towers. The corrosion of the metal was not related to the collision with the ship, caused instead by the inflow of rainwater and by long-term exposure to urine. In 2000, repair work was implemented on the shoes and on the substructure of the towers.

(2.5.3) Financial Status

The Dinas Bina Marga is suffering from an insufficient maintenance funds for the bridge. Except for the above repair work, only Rp 2.5 million was spent on painting the metal parts and related areas of the bridge in 2000. Even when inspection was carried out, it was only after an accident. It is recommended that the foundation of the piers be inspected, since there is a possibility that it may have been scored by sand flow in the wake of dredging work periodically undertaken at the upstream port.

In need of prevention measures against ship collision, which has occurred twice already, the P3JJ

of South Sumatra Province has come up with a bridge protection plan, which consists of adding piles around the piers and using navigational signals to make the piers visible to oncoming vessels. The protection plan has been submitted to the Central Government (the Ministry of Settlement and Regional Infrastructure) as a part of the bridge repair plan, with a request for special credit that the Central Government can provide in the case of a large-scale project. As of the present, however, no budget allocation has been made. According to the P3JJ, the total cost of the repair, including the protection work, is estimated to be Rp 16.7 billion.

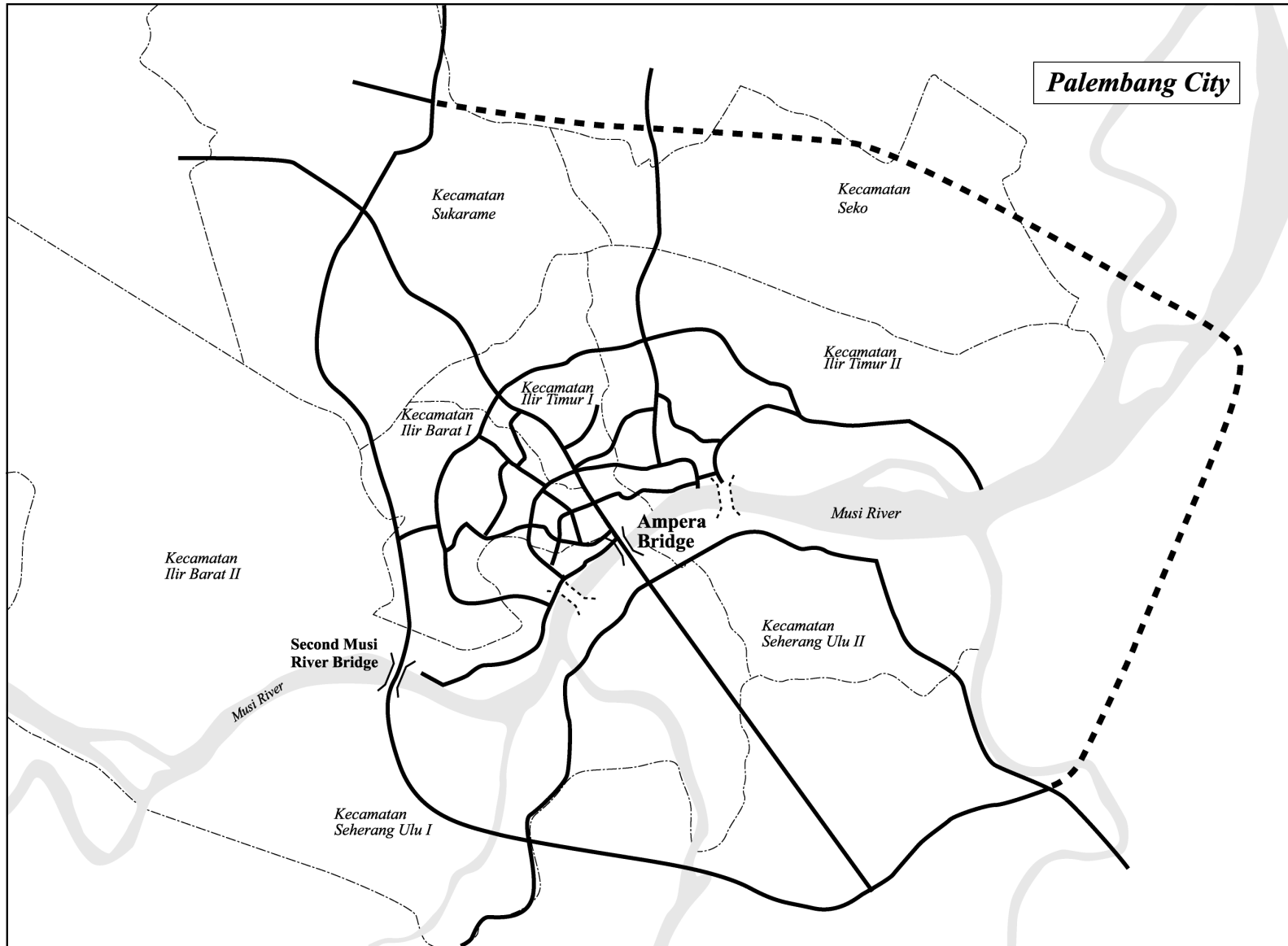
(2.5.4) City Planning and Traffic Demand

The structural plan of Palembang City was prepared in 1973 and modified several times from the late 1980s to the early 1990's. Based on the master plan, public facilities, including the urban road network, have been developed since then. The construction of the Second Musi River Bridge and of the Outer Ring Road are identified as the main road projects in the master plan. The P3JJ has decided to complete the eastern part of the Outer Ring Road, which includes the construction of a third long bridge over the Musi River. These projects aim to disperse the traffic currently concentrated in the urban area, particularly the central district. In addition to the third bridge project on the eastern half of the Outer Ring, the P3JJ has a construction plan for two more bridges crossing the Musi. The proposed construction sites are located near the Ampera Bridge. Unlike the case with the Second Musi Bridge that has not become a mitigation of traffic congestion on the Ampera Bridge, construction of new bridge at a closer point to the Ampera Bridge should be more effective in accommodating the growing traffic demand in the city center.

3. Lessons Learned

This bridge suffered damage by a couple of vessel collisions. For the similar sort of bridge construction projects in the future, the executing agency should also consider effective measures for navigation safety from the planning stage, in cooperation with the relevant authorities, so that the bridge facilities could avoid physical damage caused by accidents.

Project Location Map



Comparison of Original and Actual Scope

| Item | Original Scope | Actual Scope |
|---|--|--------------------|
| (1) Project Scope | | |
| i) Rehabilitation works of the bridge (length: 354m) | - Repair of sidewalk in center span | Same as left |
| | - Replacement of concrete deck slab | Same as left |
| | - Repair and reinforcement of piers | Same as left |
| ii) Consulting service | - Detail designing and supervision for rehabilitation works (212 m/m) | Same as left |
| (2) Implementation Schedule | | |
| Selection of Consultant | Jan 1988 – Feb 1988 | Jan 1989 |
| Consultant Services for D/D | Feb 1988 – June 1991 | June 1988-Mar 1992 |
| Tender Process | Oct 1988 – June 1989 | Aug 1989-Mar 1990 |
| Civil Works | July 1989 – June 1991 | May 1990-Feb 1992 |
| (3) Project Cost | | |
| Foreign currency | 1,236 million yen | 1,137 million yen |
| Local currency | 825 million yen | 617 million yen |
| Total | 2,088 million yen | 1,754 million yen |
| ODA Loan Portion | 1,804 million yen | 1,661 million yen |
| Exchange Rate | 1 Rp = 0.088 yen | 1 Rp = 0.079 yen |

Independent Evaluator's Opinion on
Rehabilitation of Ampera Bridge on Musi River Project

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1. Relevance

The main objective of the project was to rehabilitate the Ampera Bridge, which was, for a long time, the only bridge connecting the northern and the southern parts of the City of Palembang. Although a second bridge connecting the two parts of the city has been built, there are at least two reasons as to why the objective is still relevant today and will remain so in the foreseeable future. First, Palembang has been expanding rapidly in recent years, with a population growth rate of around 4 % per year between 1985 and 1999. Meanwhile, the number of vehicles in the city has also experienced a rapid growth rate. Between 1997 and 2000, the number of registered vehicles (including motorcycles) in South Sumatra grew around 4.9 percent per annum, from 390,927 to 452,518³. It is fair to assume that most of those vehicles are to be found in Palembang. Moreover, most of the traffic in the city (around 92 % in 2000) still goes through the Ampera Bridge.

Second, one of the main highways connecting the northern part of Sumatra and Lampung in the southern Sumatra (and for that matter, Java) passes through Palembang. That means that the two bridges in the city also serve as main conduits for through traffics carrying passengers and goods from Java to northern part of Sumatra and vice versa. As such, the project was also inline with the government objective to promote development outside Java, in this case in Sumatra.

2. *Impact*

The Ampera Bridge serves as the main channel connecting the administrative, commercial and cultural center on the north side of the Musi River and the south side that the city planner would like to develop into residential and commercial areas. The rehabilitation of the bridge has definitely enhanced the implementation of the plan and facilitated the through traffic flows between northern Sumatra and Java. It may be argued therefore that the project has provided benefits to local community as well as to people resided beyond the City of Palembang.

As pointed out in the report, it seems that the project did not have any significant negative economic, social, or environmental impact on the local community. The project, for instance, did not require any additional rights of way, which might result in involuntary resettlement and land acquisition. However, it seems that the second bridge has failed to divert the traffic from the Ampera Bridge. One, of course, cannot blame the project under the discussion for the failure. One should nevertheless be concerned with the possibility of increasing traffic congestion in the city center and of increasing environmental problem there as a result. The report points out that to address this concern, traffic regulation in the city prohibits heavy vehicles and through traffic on the Ampera Bridge at night (6:00 p.m. to 6:00 a.m.). One wants to question the wisdom of the regulation, however. It is during the day that one would expect heavy traffic over the Ampera Bridge and, hence, it would be more appropriate to prohibit heavy vehicles and through traffic to use the bridge during that time.

* 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.

³ Source: *Statistical Year Book of Indonesia 2000*.