EX-POST EVALUATION REPORT OF JAPANESE ODA LOAN PROJECTS 2009 (INDONESIA V, THAILAND III)

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2007. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

November 2010

Atsuro KURODA
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA.

Minor amendments may be made when the volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

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Republic of Indonesia

Ex-Post Evaluation of Japanese ODA Loan Project
Construction of Railway Double Tracking of Cikampek-Cirebon

Takako Haraguchi, International Development Associates

1. Project Description

Project site

Express train passing over the new track and bridge

1.1 Background

Railways in Indonesia are located in the islands of Java and Sumatera. The total railway length is 6,441km of which 4,500km is in Java. Among the three major lines in the island of Java, namely the North Line, the South Line and the Bandung Line, the North Line connects Jakarta (the capital city) and Surabaya (the second largest city in the country) in the east of the island via Semarang. The total length of the North Line is 751km, which is almost equivalent to the railway distance between Tokyo and Okayama in Japan.

On the North Line, a section near Jakarta (57km length between Bekasi and Cikampek)[1] had been double tracked by the time of the appraisal of this project, but all the rest was still single track. Thus, the single track section between Cikampek and Cirebon, which is also used by the South Line (828km-long line connecting Jakarta and Surabaya via Solo), was significantly congested.

In 1992, the number of trains run between Cikampek and Cirebon exceeded the line capacity, and the average delay time per train was 26 minutes. Under such circumstances, double tracking was needed to accommodate trains that were expected to further increase.

[1] In addition, the Jakarta-Bekasi section connected to the mentioned section had been double tracked as part of the JABOTABEK Line, the mass rapid transit system.

1.2 Project Outline

The objective of this project is to increase the number of trains and ensure safe, rapid and accurate railway transportation by constructing a new track along the existing track on the section between Cikampek and Haurgeulis (54km length), as a part of double tracking on the section between Cikampek and Cirebon (134km length), thereby contributing to the economic development of the region.

Approved Amount/ Disbursed Amount	7,234 million yen / 7,201 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	November, 1994/ November, 1994
Terms and Conditions	Interest Rate: 2.6% Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower/ Executing Agency	Republic of Indonesia/ Directorate General of Railways (DGR), Ministry of Transportation
Final Disbursement Date	June, 2007
Main Contractor (Over 1 billion yen)	PT. Adhi Karya (Indonesia) - PT. John Holland Con (Indonesia) - Itochu Corporation (Japan) (JV)
Main Consultant (Over 100 million yen)	Japan Transportation Consultant (Japan) − Pacific Consultants International (Japan) - PT.Dardela Yasa Guna (Indonesia) (JV)
Feasibility Studies, etc.	Railway sector study, JICA, October 1993
Related Projects (if any)	JICA, Java North Line Track Rehabilitation Project (L/A signed in 1989) JICA, Java North Line Bridge Rehabilitation Project (1)(2) (L/A signed in 1992 and 1995) Railway Double Tracking of Cikampek-Cirebon (2) (L/A signed in 1998)

2. Outline of the Evaluation Study

2.1 External Evaluator

Takako Haraguchi, International Development Associates Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: January 2010 – November 2011

Duration of the Field Study: April 1, 2010 – April 10, 2010 and May 9, 2010 – May 26, 2010

2.3 Constraints during the Evaluation Study

A careful consideration is required when analyzing project effect indicators: the double tracking of the Cikampek-Cirebon section consisted of the three projects, namely, (i) Segment 1

between Cikampek and Haurgeulis (this project), (ii) Segment 2 between Haurgeulis and Kadokangabus (project funded by the Government of Indonesia), and (iii) Segment 3 between Kadokangabus-Cirebon (funded by a Japanese ODA loan project "Railway Double Tracking of Cikampek-Cirebon (2)" approved in 1997/98, hereafter referred to as "the Phase 2 project"). Double tracking was completed for all of these three segments. This evaluation study first planned to collect and analyze effect indicators for Segment 1 only and for the entire Segments 1-3 separately. However, it was difficult to specify the effects of this particular project because data specifically about Segment 1 (especially about delay times, waiting times and transportation volumes) were not available and most of the baseline data (needed for the before-after comparison) were about the entire Segments 1-3.

In addition, it should be noted that in general, the positive trends of some effect indicators related to punctuality and safety of railway transportation do not directly mean the effectiveness of this project, for improved punctuality and safety can be attributed to many other factors such as the conditions of other infrastructures (e.g., existing track and bridges, which were partly rehabilitated in other Japanese ODA loan projects in case of this project), quantity and quality of locomotives and cars/wagons, and conditions of terminal facilities. For example, delays of trains did not improve much, even on the project section, after the double tracking because the train schedule was adjusted with consideration of the number of available locomotives and the train situation of other sections.

3. Results of the Evaluation (Overall Rating: A)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Indonesia

The objective of this project is in line with Indonesia's development policies at the time of the appraisal as well as the ex-post evaluation. When looking at the national development plans issued by the National Development Planning Agency, the Sixth Five Year Development Plan (Repelita VI: 1994-1998) clearly mentioned the Cikampek-Cirebon section as one of the subjects of double tracking or new construction. In the Medium-term National Development Plan (RPJM: 2010-2014), the national development plan at the time of the ex-post evaluation, the infrastructure development program aims to increase transport capacity. The specific objectives the railway sector include enhancing safety and reliability and expanding the railway networks by such measures as track rehabilitation (239km), restoration of abandoned track (534km), new track construction including double tracking (954km), purchase of rolling stocks, improvement of signaling systems and electrification.

The master plan of the Directorate General of Railways (DGR) (January 2010) accordingly holds optimum utilization of existing railway networks, double tracking and electrification of

Java major lines and enhanced access to key industrial areas as its objectives. It also mentions land acquisition for a high speed train line to be constructed in parallel to the Java North Line.

However, high priority is not given to medium- and long distance railway transportation: although DGR was set up in 2005 by separating a directorate from Directorate of Land Transportation, the budget share of the railway sector from the Ministry of Transportation (approximately 3 trillion rupiah or 0.7% in 2010) is much lower than other transportation sectors such as road transport[2] (42%), maritime transport (17%) and air transport (22%). Moreover, while budgets for other transportation sectors are generally increasing, the budget for the railway sector is on a downward trend both in terms of share and value[3].

3.1.2 Relevance with the Development Needs of Indonesia

Since the railway traffic at the time of project planning had already exceeded the line capacity, a need for increasing line capacity by double tracking was justifiable. In 1992, the number of trains run between Cikampek and Cirebon was 63 per day in normal months and 75 per day in peak months, though the average line capacity was 62 per day. Thus, the delay time in the same year was 26 minutes per train, and the waiting time to give ways to passing- or oncoming trains was 13 minutes per train. Also, a head-on train collision on the Bogor Line in 1993 further raised the needs for double tracking including improvement of signaling and communication facilities.

On the other hand, railway demand is weaker than assumed at the time or the appraisal. Repelita VI envisaged the growth rate of railway transportation to be 7% per year during the target period. The actual annual average growth rates between 1991 and 2008 were the same 7% for passengers but 2% for freight. When only looking at the period between 2000 and 2008, moreover, the growth rates are much lower at 0.8% for passengers and 0.4% for freight (Figure 1). Also, while transportation volume shows an upward trend in all modalities including railway, road, air and water (among which the railway passengers and freight volume increased from 114 million persons to 197.8 million persons and from 16.4 million tons to 19.6 million tons, respectively) during the period from 1994 to 2008, the share of railway transportation[4] have decreased from 52% to 21% (or 8% excluding the JABOTABEK Line) for passengers and from 6% to 2% for freight (Figure 2). As for the North Line, while details of transportation volume are discussed in *3.3 Effectiveness*, the annual average growth rates between Jakarta and Surabaya during the 2000-2008 period are negative at -6.7% for freight and -0.1 for passengers.

[2] Development of road infrastructure is under the responsibility of the Ministry of Public Works.

[3] The budget for railway infrastructure development is increasing and reached 2.3 trillion Rupiah in 2010. However, approximately 33% of it was to be allocated to the development of the JABOTABEK Line, the commuter train system in the Jakarta metropolitan area, and the budget for medium- to long-distance transportation (such as this project) does not show a rising trend.

[4] RPJM holds the national targets for railway shares at 23% for passengers and 7% for freight.

Source: DGR

Figure 1: Trend of railway transportation in Indonesia

Note: Percentage shows the share of each means of transportation.
Source: DGR

Figure 2: Trend of transportation volume by means of transportation

As the reasons for such a slow or negative increase in railway demand, RPJM mentions poor services, underdevelopment of inter modal transportation, and declining transport capacity due to poor operation and maintenance. In addition, DGR points out the shift of freight transportation from railway to road due to the rapid development of road networks and the shift of passenger transportation to air after the emergence of low-cost air carriers.

Nevertheless, it is viewed that there are demands for railway transport at the time of the ex-post evaluation as well considering the fact that more than 16 million people still use the North Line (in 2008) and that trains were almost fully occupied when the evaluator visited the project site.

3.1.3 Relevance with Japan's ODA Policy

The country assistance strategy for Indonesia (agreed in 1994) held the improvement of industrial infrastructure as one of the five priority areas, and assistance in the transportation sector was positioned in the area. In that way, this project was consistent with the Japan's ODA policy at the time of the appraisal.

This project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: b)

3.2.1 Project Outputs

The planned outputs, consisting of the civil works (double tracking of the 54km-long section between Cikampek and Haurgeulis and installation of signaling for eight stations) and the

consulting services, were mostly produced with some modifications (see *Comparison of the Original and Actual Scope of the Project* at the end of this report).

The double tracking works included the construction of permanent way, track and bridges. The major modifications and their reasons are as follows:

- Permanent way: roadbed works were partly redesigned and soil improvement was added to cope with more soft soil uncovered than planned.
- Bridges: the number of box culverts increased from 15 in the original plan to 95 as a result of the recount to include small open channels at the detailed design. As for steel bridges, 16 bridges were planned but 12 of them were constructed by this project because the rest had been constructed by another Japanese ODA loan project (Java North Line Bridge Rehabilitation Project (1), with the loan agreement signed in 1992).

The design and installation of the signaling system followed the system that had been used for the existing track between Cikampek and Cirebon. Therefore, no problem was seen about consistency of the new system with the existing connecting sections. The installed signaling system consists of centralized traffic control (CTC), automatic block system, and electric interlocking system[5].

The consulting services including detailed design, tender assistance and construction supervision were provided as planned. In addition, final handover supervisory services and monitoring during the warranty period were provided. The work volume of the consultants increased due to the above-mentioned additional services and the extended implementation period (see *3.2.2.1 Project Period*).

Existing (left) and newly-constructed (right) steel bridges

Centralized traffic control (CTC) device as part of auto signaling system (Cipunegara station)

[5] CTC is a system to remotely control courses and operation of trains on the designated sections from the control center (located at Cirebon station). Automatic block system is to automatically control signals so that only one train can exist on a certain section. Electric interlocking system is to interlock signals and switch machines through CTC device at each station.

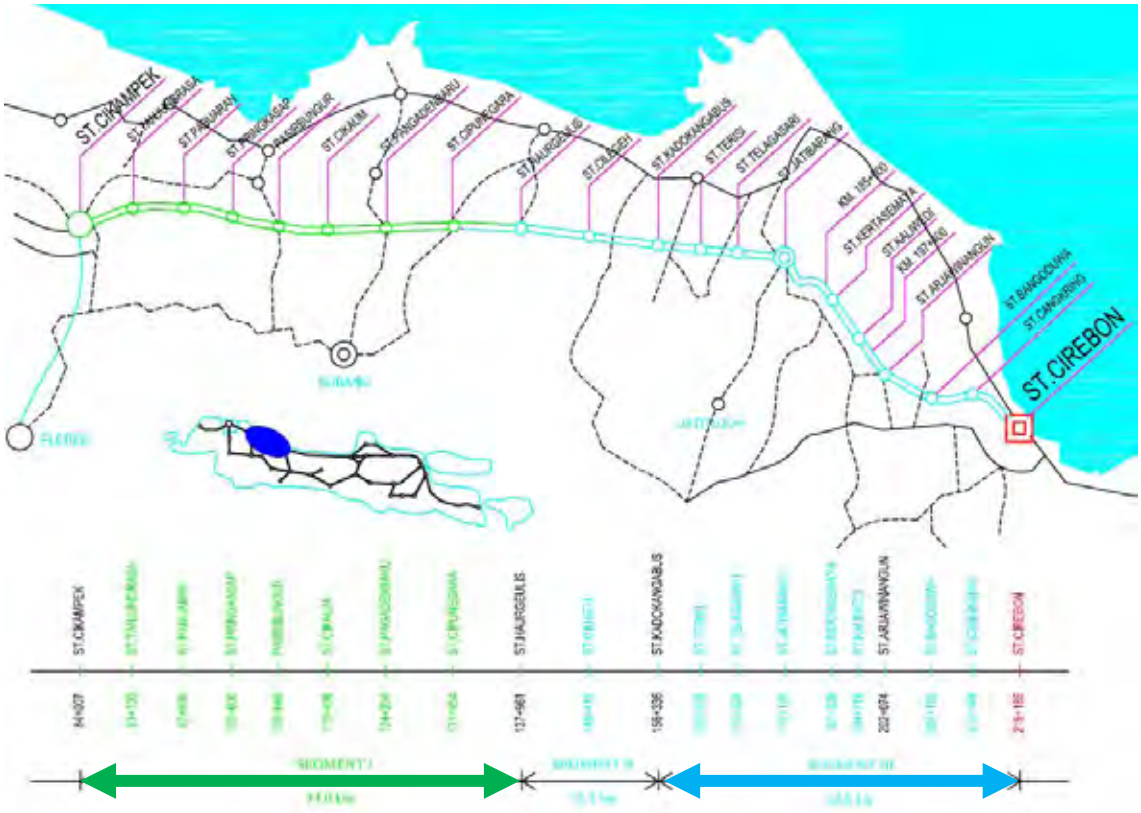


Figure 3: Map of sections under this project and related projects

3.2.2 Project Inputs

3.2.2.1 Project Period

In the appraisal, the project period was planned to be 76 months from November 1994 (signing on the loan agreement) to February[6] 2001. The actual project duration was longer than planned – 114 months from November 1994 to April 2004, or 150% of the plan. According to the executing agency, the reasons for delays include the prolonged procedures of tender and its approval[7] and the political confusion following the Asian currency crisis.

Nonetheless, the civil works portion was completed earlier than planned: the actual duration was 73% of the original plan (30 months). This may be because of the following two factors: first, the site clearance and the bridge piers for this project had been completed by a proceeding project (JICA, Java North Line Bridge Rehabilitation Project (1)), which lessened the workload of this project. Second, an engineer of the Indonesia Railways (PT. Kereta Api Indonesia or hereafter PT.KAI), the agency in charge of operation and maintenance of railways, joined the

[6] In this project, the project completion date was defined as the commencement date of commercial operation.

[7] It is reported that there were 8 months delay after the project followed the procedures within the Ministry of Transportation, and 33 months delay due to re-tender after the first tender failed.

project implementation team from the start of the project till the completion. This enabled construction works to progress efficiently through prompt and on-site solutions to technical problems such as soft soils and by maintaining normal train services.

In consequence, the section between Cikampek and Cikaum (34km length) was open in December 2003, earlier than the opening of the entire section in 2004, by the President of Indonesia at the official ceremony held right before *lebaran*.

3.2.2.2 Project Cost

The planned total project cost estimated at the appraisal was 8,511 million yen, and the actual cost was lower than planned at 7,607 million yen. The Japanese ODA loan approved amount was 7,234 million yen, and the disbursed amount, 7,201 million yen, was almost same. The rest of the cost was paid by the Indonesian government. The major reason for the decrease in the project cost was the depreciation of the local currency[8].

Although the project cost was lower than planned, the project period was longer than planned, therefore efficiency of the project is fair.

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Number of trains and traffic volume

The double tracking and automation of signaling increased the line capacity between Cikampek and Haurgeulis, the target section of this project, more than threefold compared to before the project. The line capacity of the entire section between Cikampek and Cirebon also increased after 2007, when the Phase 2 project completed double tracking up to Cirebon. Accordingly, the number of trains that actually operate increased up to approximately 80-90% of the planned level in 2008 (five years after the project completion). The increase in trains is particularly noteworthy during the peak season (*lebaran*), when passenger transportation demand is concentrated (Table 1).

[8] See Comparison of the Original and Actual Scope of the Project at the end of this report.

Table 1: Average line capacity and number of trains operating on the Java North Line

(Unit: trains/day)

	Baseline (1992)	Planned (2006 = five years after completion)	Actual (ratio against plan)	
			2006 = three years after completion	2008 = five years after completion
Average line capacity				
- Cikampek-Haurgeulis	62	N.A.	192	192
- Cikampek-Cirebon	62	N.A.	85	170
Number of trains operating between Cikampek and Cirebon	63	101	80 (79%)	80 (79%)
- Normal season	75	122	104 (85%)	107 (88%)
- Peak season				

Source: DGR, PT.KAI

The passenger volume (Jakarta-Surabaya), after a downward turn in the 2000s, has increased again in 2004 when more than half of the project section was double tracked. In 2008, it reached 16 million[9] or 80% of the planned volume (approximately 20 million).

Similarly, the freight volume was in a downward trend in early 2000s. It then turned into a slight increase, too, but the throughput in 2008 was approximately 920 thousand tons, which was less than 30% of the plan.

The number of trains and transportation volume were lower than planned due to the following reasons:

Source: PT.KAI

Figure 4: Transportation volume of the North Line (Jakarta-Surabaya)

- Weak railway demand. Besides the economic crisis and shifts to road and low-cost air transportation, freight transportation is particularly facing problems of underdevelopment of terminal facilities and limited access to freight stations (e.g., congested roads and lack of lines extended up to cargo ports).
- Difficulty to increase the number of trains due to lack of locomotives. Out of 269 locomotives owned by PT.KAI for operation in Java, only 191 are ready to use.

[9] The period of the early 2000s when the passenger traffic was declining was also the period when the double tracking works of this project was going on. However, this decrease should not be associated with the construction works considering the fact that passenger traffic in the entire Indonesia showed a similar declining or stagnant trend during this period, and the double tracking works were carried out in a way to avoid disrupting operation on the existing track. Meanwhile, the number of passengers who used each of the stations on the double tracked section between Cikampek and Cirebon are generally increasing though comprehensive data were not available.

(2) Punctuality

As shown in Table 2, the average delay times on the fully double tracked section between Jakarta and Cirebon in 2008 were 5 minutes on departure, 26 minutes on arrival about passengers, and 13 minutes on departure and 28 minutes on arrival about freight. Among these figures, delay times on arrival of both passenger and freight trains and on departure of freight trains are shorter than the national averages. Quantitative comparison of delay times before and after the project was difficult due to lack of data of the North Line before double tracking. However, since PT.KAI adjusts train schedule to handle delays on bottleneck sections elsewhere[10], double tracking does not always lead to reduction of delays.

Comparable data of waiting time to let other trains pass at stations were not available either[11]. However, average travel times of express trains between Jakarta and Cirebon in 2008 – 15 minutes (eastbound) and 19 minutes (westbound) shorter than in 2002 – possibly suggest the reduction of waiting time.

Table 2: Average delay times of the Java North Line

(Unit: minutes/train)

	Baseline 1992	Actual			
		2006		2008	
		Departure	Arrival	Departure	Arrival
Average delay time					
- Passenger Jakarta-Cirebon	26*	5	28	5	26
- Freight Jakarta-Cirebon		11	30	13	28
(Reference) Passenger national average		7	46	5	37
(Reference) Freight national average		90	90	97	111
Travel time (Cirebon Express)	(2002)				
- From Jakarta to Cirebon	126	107		111	
- From Cirebon to Jakarta	114	111		95	

Note: The baseline data of average delay time are about Cikampek-Cirebon, and no distinction is made between passengers and freight and between departure and arrival.

Source: DGR, PT.KAI

On a visit to the project site for the ex-post evaluation, the evaluator observed that trains operated almost on schedule and did not need to stop at a station to let other trains pass on the section between Cikampek and Haurgeulis (the project section). The signaling system operated well, helping improve punctuality. The measured average speeds of a limited express train from

[10] DGR points out the JABOTABEK section between Jakarta and Bekasi and single track sections east of Cirebon as the bottle necks.

[11] The recorded waiting time before the project is 13 minutes per train between Cikampek and Cirebon in 1992. As for after the project, the only available data were the waiting time at the Cirebon station, which showed an increase from 6.7 minutes in 2006 to 25.8 minutes in 2008. DGR explained this increase that the track layout at the Cirebon station was inefficient thus could not handle the increased number of trains, and that the layout was being improved using the unused balance of the loan for the Phase 2 project.

Jakarta to Cirebon the evaluator rode on were 90km/h on Segment 1 (the section double tracked by this project), 85km/h on Segment 2 and 82km/h on Segment 3, which were satisfactory. Also, this particular train departed and arrived exactly on time.

(3) Safety

The number of accidents on the North Line was zero in 2006 and six in 2008. These six accidents were all derailment, and no direct causal relationship was identified between them or accident cases in other years (including causes for accidents) and this project. On the other hand, as shown in *3.3.2 Qualitative Effects*, interviewed railway passengers felt the improved safety of railway transportation after the double tracking.

3.3.1.2 Results of Calculations of Internal Rate of Return (IRR)

(1) Financial internal rate of return (FIRR)

At the time of the appraisal, the FIRR of this project was calculated at 9.6%, with the project life of 35 years and taking the project cost and operation and maintenance cost as the cost items and the passenger fee revenue as the benefit item. At the time of the ex-post evaluation, the evaluator recalculated the FIRR substituting the actual figures of cost and benefit. The value turned out to be 2.01% when including passenger revenue only in the benefit (as done in the appraisal), and 7.56% when including both passenger and freight revenues[12]. The recalculated FIRRs were lower than planned possibly because the use of railway transport was not as high as planned. However, this value should only be regarded as a rough reference value because the reliability or accuracy of some data about railway revenues was low (in particular, revenues from the North Line were not clearly specified among those from the sections shared by other lines).

(2) Economic internal rate of return (EIRR)

The planned EIRR value calculated at the appraisal was 12.5%. The cost items included the cost for double tracking and operation and maintenance for the entire section between Cikampek and Cirebon, and the benefit items included the savings of waiting time due to double tracking and the time savings of future passengers who would not have to switch to alternative transportation means (i.e., buses) due to increased railway transport capacity. At the end of the project, the executing agency recalculated the EIRR to be 16.1%, which was higher than the planned value. This recalculation was different from the calculation made at the appraisal in that

[12] The project cost for Segment 2 (funded by the Indonesian government and completed in 1998) was not included because data were not available. Also, the only available data on benefits were those on revenue from the Jakarta-Cirebon section, not the Cikampek-Cirebon section. In other words, the cost items substituted at the time of the ex-post evaluation were smaller than those used at the appraisal, and the benefit items were bigger; therefore, if the value of each of those items was the same as the plan, the recalculated value would have been higher than planned.

it included the cost and benefit of this project (Segment 1) only. At the ex-post evaluation, the evaluator did not recalculate the EIRR because the traffic or time saving data on the project section were not fully available.

3.3.2 Qualitative Effects

(1) Increase in the number of limited express and express trains

The double tracks enabled the increase in the number and travel distance of limited express and express trains between Jakarta and Cirebon. For example, the Cirebon Express, one of the major express trains on the North Line, used to run four times a day between Jakarta and Cirebon before the project, and it now runs seven times a day between Jakarta and Brebes (east of Cirebon).

(2) Opinions of railway customers on punctuality and safety

In the beneficiary survey conducted at the ex-post evaluation[13], most of the interviewed customers of the North Line (passengers and freight owners) said that safety and punctuality of railway transportation had improved after the double tracking (Table 3).

Table 3: Opinion of the North Line customers on safety and punctuality

(Percentage of the interviewees who had used the North Line before the double tracking and answered "yes" to each question)

	Safety was improved after double tracking	Delays were reduced after double tracking
Freight owners (n=11)	100%	82%
Passengers (n=50)	96%	92%

Interviewing with passengers
(Haurgeulis station)

Loading freight on the North Line
(Jakarta Kota station)

[13] The outline of the beneficiary survey conducted at the ex-post evaluation is as follows: location – project site; respondents – total 184 persons (36 freight owners, 112 passengers and 36 residents, shop owners or drivers along the project section); data collection method – questionnaire-based structured interview conducted by Indonesian consultants.

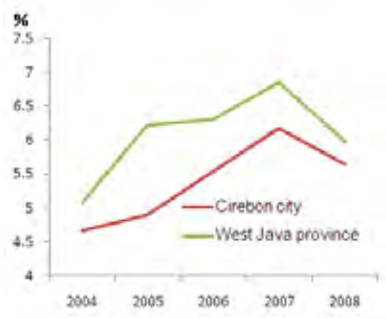
This project has largely achieved its objective, therefore its effectiveness is high. Although the freight transport volume was far below the planned level, other quantitative and qualitative information showed more than 80% achievement of the plan on more direct indicators such as the number of trains run, punctuality and safety. Thus, the overall effectiveness can be judged as "high".

3.4 Impact

3.4.1 Intended Impacts

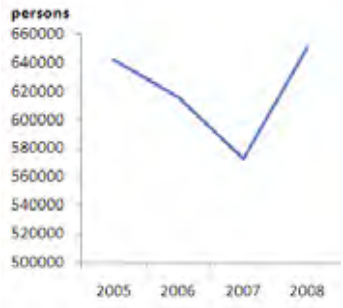
According to DGR, the double tracking of the North Line and the following increase in limited express and express trains have improved access to Cirebon city (population: approx. 300 thousand), thus contributing to the economic development such as the increased investment.

However, statistics from Cirebon city do not clearly show a connection between the economic development after the project and railway transportation. The gross regional domestic product (GRDP) growth rate of the city fluctuated between 4.7% and 6.2% during the period from 2004 to 2008. Although this level is lower than the entire West Java province where Cirebon city is located (4.8-6.5%), an increasing trend is observed except the year 2008. On the other hand, the number of medium- and large-scale enterprises in Cirebon city generally continues to be flat around 60 enterprises (the new investment amount was not available about large-scale enterprises and 2.1 billion Rupiah about medium- and small-scale enterprises in 2008). During the same period, the number of passengers using the Cirebon station fluctuated between 570 thousand and 650 thousand per year, though a clear upward trend is not seen.



Source: Statistical Bureau of Cirebon city

Figure 5: Trend of GRDP growth rate in Cirebon city



Source: Statistical Bureau of Cirebon city

Figure 6: Trend of passengers who used the Cirebon station

In addition, out of the interviewed 19 shop owners or taxi (cars or motorcycles) drivers, only three persons said that their income increased due to more passengers and trains after the double tracking (and other three persons mentioned a very slight increase in their income), while most

of them said that their income have not changed.

Therefore, it can be concluded about the intended impact that although this project is inferred to have supported economic activities in the region through strengthening transportation infrastructures, it has not given big changes.

3.4.2 Other Impacts

(1) Impacts on natural environment

By the nature of this project that was to construct a new track besides the existing one, there were no obvious environmental problems. During the construction works, the consultants monitored dusts and other effects of the disposal sites for excavated materials.

(2) Land acquisition and resettlement

No particular problems are found. Although the land for the new track all belonged to PT.KAI (State Railway Corporation (PERUMKA) at the time of the appraisal of this project), 91 houses (8,367.5m^2) near the Cikampek station had to be relocated. The project planned to start the civil works after it obtained the consent of owners of those houses to evacuate in accordance with the concerned laws and procedures. In addition, a large part of the construction site was illegally used as farmland. The project was to gain the acceptance of such illegal occupants as well before starting the construction.

In implementing the project, the relocation of the 91 houses was completed without problems. As this project did not have a component to develop resettlement sites in its scope, affected people moved to new sites themselves after they received compensation. Negotiations with illegal occupants were handled by the central and local governments, and no problems are reported. Although the information were not available on whether they prepared a resettlement action plan and whether the resettlement was proceeded in accordance with the plan, the executing agency reported that the compensation and resettlement process followed the designated laws and procedures

(3) Other positive and negative impacts

In the beneficiary survey for the ex-post evaluation, none of the 36 interviewed residents, shop owners or drivers said they were negatively affected by this project.

Other information and reports collected for the evaluation also indicate that there were no particular negative impacts of this project. At the same time, positive impacts other than mentioned above were not found either.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance (O&M) of all railway infrastructures including this project are carried out by PT.KAI, a 100% state-owned enterprise. The ownership of railway infrastructures and facilities follows the two-tiered system: Article 13 of the 1992 Railway Law stipulates that tracks, bridges and signals are owned by the government and leased without charge to PERUMKA, the predecessor of PT.KAI, while rolling stocks, railcar shops and stations are owned by PERUMKA.

PERUMKA, after established as a public corporation from the national railways in 1991, became a state-owned company with the new name PT.KAI. The O&M of railway infrastructures and facilities is still based on the two-tiered system.

PT.KAI continued to use the track maintenance system of PERMUKA: the section constructed by this project is under the responsibility of the Operation Area I (DAOP I; up to the Cikampek station) and the Operation Area III (DAOP III; after the Cikampek station). DAOP III is responsible for track maintenance of 410km length including the Cikampek-Cirebon section, and assigns a track manager for every 30km. Private sector is not involved in the O&M of railways.

As seen above, there is no drastic change in ownership, management and O&M system of railway infrastructures and facilities even after the O&M agency was converted to a state-owned company, and no serious problem is found.

3.5.2 Technical Aspects of Operation and Maintenance

Technical problems are not seen either. Each DAOP has 24 technical staffs. They are required to receive trainings of 300-350 hours every year. Trainings are provided by the PT.KAI training center, universities and government training centers.

Operators of the CTC system always carry the standard operating procedures in small size so that they could soon refer to it in case of trouble.

3.5.3 Financial Aspects of Operation and Maintenance

O&M budget for railways is determined based on track length. The government provides subsidy for O&M of railway infrastructures to PT.KAI, but that is offset by the rent for the infrastructures paid by PT.KAI to the government. Therefore, the O&M cost for railways is substantially borne by PT.KAI[14].

[14] The total O&M budget of PT.KAI (excluding indirect cost) for the fiscal year 2009 was approximately 2.6 trillion Rupiah, and the government subsidy for O&M (which was offset by the rent for infrastructures) was approximately 990 billion Rupiah. According to the ex-post evaluation of Java North Line Bridge Rehabilitation Project (2005), the O&M subsidy provided by the government is

As for the section developed under this project, the approved O&M budget (excluding indirect cost) for the fiscal year 2004 was approximately 1.6 billion Rupiah while the requested amount was approximately 1.4 billion Rupiah. The approved budget for the fiscal year 2008 was approximately 3.9 billion Rupiah, which were increased reflecting the double tracking.

As of the project appraisal, PERUMKA had been continuously in a deficit since the time of the national railways. After becoming a state-owned enterprise, PT.KAI turned a profit. In the fiscal year 2009, the current profit reached 200 billion Rupiah (equivalent to approx. 2 billion yen) and the net profit after tax 150 billion Rupiah. However, PT.KAI points out the following cost constraint in railway management:

- Subsidy for economy class fares: currently, the fares for economy class are kept very low, given the Public Service Obligation (PSO) subsidy provided by the government to PT.KAI to cover losses[15]. However, the amount of PSO subsidy is smaller than the operation cost of economy class trains[16].

Therefore, although there is a point where government subsidies are not enough, the financial status of PT.KAI is relatively good compared to the time of the appraisal of this project, covering the cost necessary for the O&M of this project.

3.5.4 Current Status of Operation and Maintenance

Track and bridges are subject to the following O&M program:

- Track: maintenance is applied for provision of ballast, ballast compaction and sleepers and fasteners once a month or depending on the condition.
- Bridges: maintenance is applied for superstructure, steel component, bearing shoe, piers, rivet abutment and painting.

According to DGR, the infrastructures and facilities developed by this project are in good conditions. Damages or defects were not found on the site visit at the time of the ex-post evaluation.

To strengthen the freight transport capacity, DGR and PT.KAI respectively plan and implement several projects as follows. It is considered that those projects will positively affect the future effectiveness of this project.

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about a third of the needed amount.

[15] For example, the economy class tariff between Jakarta and Tegal (approx. 330km length) is 11,500 Rupiah, equivalent to approximately 115 yen as of April 2010.

[16] There was a newspaper report that with the insufficient subsidies, PT.KAI was considering a fare raise for economy class (*Jakarta Post*, 22 December 2009), though PT.KAI did not provide a clear comment on this raise. On the other hand, a documentation from the government (DGR) showed that 96% of the required PSO was subsidized, which is contradictory to the above-mentioned press report.

- By DGR: construction of 5km-long railway from Tanjung Priok (Pasoso station) to the premise of the Tanjung Priok port; double-double tracking of the section between Jakarta and Bekasi; and double tracking of the section between Cirebon and Keroya (the South Line) (partly completed).
- By PT.KAI: development of freight handling facilities at the Jakarta and Surabaya stations (planned to start in 2011); and purchase of rolling stocks (200 cars and 150 locomotives planned in 2011).

No major problems have been observed in the operation and maintenance system, therefore sustainability of this project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

While the efficiency of this project is fair due to implementation delays, the other evaluation items all satisfy the criteria for high marks in spite of some concerns such as slowdown of demands and budget for the railway sector, especially for medium- and long distance transport (relevance), and little growth in freight traffic on the North Line.

In the light of above, this project is evaluated to be (A) highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency and the O&M Agency

DGR, the executing agency is recommended to eliminate the bottlenecks on the North Line (i.e., west of Bekasi and east of Cirebon) by carrying out the planned infrastructure development projects.

PT.KAI, the O&M agency is recommended to further promote the use of railways by carrying out the planned projects such as the development of freight facilities and the purchase of rolling stocks.

4.2.2 Recommendation to JICA

In order to identify effectiveness and impact of railway development more precisely, JICA is recommended to consider an ex-post evaluation of all development projects for the North Line, including track rehabilitation, bridge rehabilitation and double tracking, after the Phase 2 project is completed.

4.3 Lessons Learned

(1) Involvement of the O&M agency in project implementation

An important factor for the early completion of the civil works was that an engineer of PT.KAI, the O&M agency of this project had been continuously present in the consultant team together with staffs of the executing agency, and provided his opinions to solve construction problems promptly on site. In this way, options to solve technical problems on site could be proposed and implemented more promptly during the project implementation by involving an engineer of the O&M agency in the construction supervision team.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs Double tracked section:	54km length between Cikampek and Haurugeulis	Same as planned
Civil works: - Permanent way	Embankment length 54km; average height 2.5m	Mostly same as planned
- Track	Main line 54km; siding 5km	Mostly same as planned
- Bridges	15 box culverts (RC); 16 steel bridges (span>5m)	95 box culverts (including open channels); 12 steel bridges
- Signaling	Centralized traffic control (CTC) for 8 stations; automatic block system; electric interlocking system	Mostly same as planned
Consulting services	Foreign engineers 243M/M Local engineers 532M/M	Foreign engineers 261M/M Local engineers 662M/M
2. Project Period	November 1994 – February 2001 (76 months)	November 1994 – April 2004 (114 months)
3. Project Cost Amount paid in Foreign currency	4,229 million yen	5,260 million yen
Amount paid in Local currency	4,282 million yen (85,640 million Rupiah)	2,347 million yen (179,704 million Rupiah)
Total	8,511 million yen	7,607 million yen
Japanese ODA loan portion	7,234 million yen	7,201 million yen
Exchange rate	1 Rupiah＝0.05 yen (As of April 1994)	1 Rupiah＝0.013 yen (Average between 1996 and 2006)

Third party opinion

28 October 2010

Ex-post evaluation of Japanese Oda loan project

Construction of railway double tracking of Cikampek-Cirebon

Aristides Katoppo

Railways in Indonesia has been lagging in development and investment compared to road contraction. This project was intended to increase capacity and ensure safe, rapid and reliable railway transportation in an important segment Cikampek-Cirebon of the strategic north line linking the major port cities in Java, especially Jakarta-Surabaya. Although there are questions about weak growth in demand, especially for freight, in general, all criteria about relevance, effectiveness, efficiency and sustainability are quite positive. Also many lessons learned about enhancing project management such as the need to involve key stakeholders during the contract implementation. Another important related lesson perhaps is for the user to boost demand by a promotion campaign explaining the increased availability of more capacity. Noting the fact that in the same time period there was multiple increase in air traffic including intensive competition through marketing/advertising. Of course improved tracks with subsequent increase of carriages/locomotives are also essential. Also often voiced demand for freight is that loading facilities needs equal dispatch, especially direct connection to port loading embarkation points. The question is whether this aspect could be addressed in subsequent design, if the intended result is increased servicing capacity for freight delivery. One significant benefit is that this project has provided learning experience for the recipient about the pitfalls, potential problems and unforeseen challenges in implementing and quality control of projects.

Republic of Indonesia

Ex-Post Evaluation of Japanese ODA Loan Project
Urban Arterial Roads Improvement in Metropolitan and Large Cities Project

Takako Haraguchi, International Development Associates

1. Project Description

Project site

Pramuka Flyover alongside toll road (left) (Jakarta)

1.1 Background

Traffic congestion of the Jakarta metropolitan area is becoming worse year by year. The government has made efforts to improve the urban traffic conditions by taking various measures including development of expressways (toll roads) and improvement of intersections. However, the increase in urban population and vehicles has worsened the traffic: at the time of the appraisal of this project, many arterial roads had daily traffic of 40,000 to 100,000 vehicles. With the further population increase, the traffic congestion in Jakarta and its surroundings was expected to be extremely serious in near the future. On the other hand, widening and new construction of arterial roads were difficult due to land acquisition and other problems. Under such circumstances, there was an increasing need to develop more grade-separated crossings

1.2 Project Outline

The objective of this project is to ensure smooth traffic in metropolitan and large cities around Jakarta by constructing flyovers/ underpasses at six intersections where traffic congestion is heavy, and by providing engineering services for the toll road traffic information system, thereby contributing to the economic development of the region.

Approved Amount/Disbursed Amount	12,558 million yen / 7,906 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January 1998 / January 1998
Terms and Conditions	Interest Rate: 2.7% (2.3% for Consulting Services) Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower/ Executing Agency	Republic of Indonesia / Directorate General of Highways, Ministry of Public Works
Final Disbursement Date	February, 2008
Main Contractor (Over 1 billion yen)	Obayashi Corporation (Japan) / PT. Wijaya Karya (Indonesia) / PT. Hutama Karya (Indonesia)
Main Consultant (Over 100 million yen)	Pacific Consultants International (Japan)
Feasibility Studies, etc.	Feasibility Study by Indonesian Consultant, 1997
Related Projects (if any)	-

2. Outline of the Evaluation Study

2.1 External Evaluator

Takako Haraguchi, International Development Associates Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: January 2009 – November 2010

Duration of the Field Study: April 1, 2010 – April 10, 2020 and May 9, 2010 – May 26, 2010

2.3 Constraints during the Evaluation Study

Comparative assessment of effectiveness was difficult because only limited quantitative information were available about both before and after the project. As for the ex-post data, no organization practiced regular measurement of basic indicators such as traffic volume of the project sites: the evaluator used data measured by an on-going JICA technical cooperation project as part of the project activities together with the data measured in the travel speed survey conducted for the ex-post evaluation, though those data did not fully cover the indicators needed for the evaluation.

3. Results of the Evaluation (Overall Rating: A)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Indonesia

The objective of this project is in line with Indonesia's development policies at the time of the

appraisal as well as the ex-post evaluation. The Sixth Five Year Development Plan (Repelita VI: 1994-1998) planned and implemented urban road development in 30 target cities including the Jakarta metropolitan area. In the Medium-term National Development Plan (RPJM: 2010-2014), the national development plan at the time of the ex-post evaluation, specific policy objectives such as improvement of national roads (19,370km), construction of ring roads bypasses (37km) and construction of flyovers and underpasses (11km), to maintain and increase road capacity.

3.1.2 Relevance with the Development Needs of Indonesia

At the appraisal of this project, as mentioned in *1.1 Background*, there was a high demand for flyovers or underpasses on congested junctions to alleviate the worsening traffic congestions in the Jakarta metropolitan area. At the time of the ex-post evaluation, both urban population and the number of registered motor vehicles continue to increase: the population of the JABODETABEK area[1] grew by 140% from around 17 million in 1990 to around 24 million in 2008, at the annual average growth rate of approximately 2%. Traffic continues to heavily depend on road transport, which accounts for 98% of transport in the area. The motor vehicle registrations sharply increased by approximately 370% from 3,160 thousand in 2000 to 12,160 thousand in 2008, at the annual average growth rate of approximately 18%). Under such circumstances, traffic congestions are worsening and needs for grade-separate crossings are increasing as already described in *1.1 Background*.

At the planning stage, there was another concern on the worsening of traffic on toll roads following the planned full opening of the inner and outer ring roads in 2000 but without provision of proper traffic information. Therefore, it was relevant to include some works for the introduction of the toll road traffic information system. At the time of the ex-post evaluation, too, it was seen that vehicles on toll roads were increasing as fast as those on public highways, thus the development needs for toll roads were still high. However, the component of the toll road traffic information system was excluded from this project due to the following reasons: first, it became premature to introduce the information system within the project period because of the delays of the construction of the outer ring road, following the Asian currency crisis that happened in 1997 (the outer ring road has not been fully open till now); second, the Directorate General of Highways (DGH) or Ministry of Public Works, the executing agency of this project, became no longer responsible for toll roads after the reorganization of central government ministries in 2002[2]. Those reasons are rational and thus the exclusion of the component is considered relevant.

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[1] JABODETABEK is a name given to the Jakarta metropolitan area. It consists of the initial letters of each of the municipalities/ regencies included in the area – Jakarta, Bogor, Depok, Tangerang and Bekasi. The area used to be called JABOTABEK without Depok, but was expanded later.

[2] Directorate General of Regional Infrastructure of the Ministry of Public Works became responsible for toll roads.

3.1.3 Relevance with Japan's ODA Policy

The country assistance strategy for Indonesia (agreed in 1994) held the improvement of industrial infrastructure as one of the five priority areas, and assistance in the transportation sector was positioned in the area. In that way, this project was consistent with the Japan's ODA policy at the time of the appraisal.

This project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: b)

3.2.1 Project Outputs

(1) Construction of flyovers and underpasses

The originally-planned outputs of this project were completed mostly as planned except a few details. In addition, more flyovers and underpasses were constructed using the unused balance of the Japanese ODA loan. Finally, the number of intersections covered by this project increased from six (in the original plan) to thirteen.

Table 1: Planned and actually-constructed flyovers and underpasses

Name	Location	Planned		Actual			
		No. of lanes[1)]	Length	No. of lanes[1)]	Length	Year of completion	Package No.
Originally-planned							
Cikokol Flyover	Tangerang	4x1FO	430m	4x1FO	630m[2)]	2002	1
Suprapto Flyover	Jakarta	3x2FO	500m	3x2FO	1,556m[3)]	2007	2
Pramuka Flyover and Underpass	Jakarta	3x2FO, 1UP	550m	3x2FO			
Tanjun Barat Flyover	Jakarta	3x2FO	500m	3x2FO	840m	2005	3
Raya Bogor Flyover	Jakarta	2x2FO	700m	4x1FO			
Bekasi Flyover	Bekasi	4x1FO	500m	4x1FO, 1 bridge, UP	1,800m	2004	4
Additionally-constructed							
Cut Meutia Flyover[4)]	Bekasi			4x1FO, 3 bridges	1,350m	2009	5
Ciputat Flyover[5)]	Tangerang			4x1FO, approach road	1,325m	2008	6
Arief Rahman Hakim Flyover	Depok			4x1FO, approach road	1,150m	2008	7
Sudirman Flyover[5)]	Tangerang			4x1FO	350m	2008	8
Cileduk Underpass	Tangerang			4x1UP	425m	2008	9
Semplak Underpaass[5)]	Bogor			4x1UP, widening	1,725m	2008	10
Cikarang Flyover[5)]	Bekasi			2x1FO, surface improvement	1,900m	2008	11

Source: DGH

Notes:
1) FO: flyover; UP: underpass; 2FO means two flyovers.
2) Including a loop ramp constructed with the flyover.
3) Including a loop ramp constructed with Suprapto FO and two loop ramps with Pramuka FO.
4) For Cut Meutia FO, this project did design only, and the construction was carried out by the Indonesia government using their own budget.
5) Ciputat FO, Sudirman FO, Semplak UP and Ciakarang FO were not completed by the closure of the loan agreement (February 2008) but all completed within the same year using the budget from the Indonesian government.

Source: DGH

Figure 1: Map of the intersections where flyovers or underpasses were constructed

The major changes in the project outputs and the reasons for the changes are as follows:

- Additional construction of a bridge and an underpass with Bekasi Flyover: they were developed with the flyover in an integrated manner to alleviate the congestion around an exit of a toll road, and this addition is considered as justifiable.
- Unconstructed ramp of Suprapto Flyover: as the land was not cleared[3], a loop ramp to approach the flyover was not constructed. According to the executing agency, the project consultant and the Special Capital Territory of Jakarta (DKI Jakarta) (the agency in charge of land acquisition for this flyover), the absence of a ramp has not seriously affected the traffic so far, though it would be a problem in case of further traffic increase (possibly in five years).
- Cancellation of Pramuka Undrapass: the underpass was cancelled to avoid a large-scale land acquisition, and is thus justifiable.
- Design modification of Raya Bogor Flyover from 2 lanes x 2 flyovers to 4 lanes x 1 flyover: the design was modified to the one that could reduce the number of piers to avoid a large-scale land acquisition, and is thus justifiable.
- Construction of additional flyovers and underpasses at seven intersections: with the unused balance of the Japanese ODA loan (see *3.2.2.2 Project Cost*), additional flyovers and underpasses were constructed at intersections that were given high priority, after the

[3] The land has not been cleared yet, because several residents are fighting over land ownership in court (see also *3.4.2 Other Positive and Negative Impacts* for details).

originally-targeted ones, by DGH to handle the growing traffic demand. This addition is considered to be justifiable.

Ciputat Flyover (Tangerang City)

Semplak Underpass (Bogor City)

(2) Consulting services for flyovers and underpasses

The work volume of the services such as the review of the detailed design, tender assistance and construction supervision increased following for the construction of additional flyovers and underpasses. Also, detailed design and preparation of the implementation plan for the urgent improvement of Sudiyatmo Toll Road[4] (access road to the Jakarta International Soekarno-Hatta Airport) were added to the consulting services.

(3) Engineering services for the toll road traffic information system

As mentioned in *3.1.2 Relevance with the Development Needs of Indonesia*, this component was excluded from this project, and was incorporated into Tanjung Priok Access Road Construction Project (1) (another Japanese ODA loan project based on the loan agreement signed in March 2005)[5].

3.2.2 Project Inputs

3.2.2.1 Project Period

In the appraisal, the project period was planned to be 72 months from November 1997 (signing date on the loan agreement) to October 2003[6]. The actual project duration spent for the original scope was significantly longer than planned – 120 months from January 1998 (signing date on the loan agreement) to December 2007, or 167% of the plan. The completion date of the

[4] This addition was in response to an urgent request to take a measure against the obstructed access to the airport due to a flood. The construction works were carried out by the Indonesian government and completed in 2008.

[5] The detailed design for the system was made as part of Tanjung Priok Access Road Construction Project (1). The construction works are included in Tanjung Priok Access Road Construction Project (2).

[6] This project defines the completion date as the completion date of construction works and consulting services.

entire project including the additional outputs was August 2008.

The biggest factor for the overrun was the delays in land acquisition for Suprapto Flyover and Pramuka Flyover, which were constructed as Package 2. The land acquisition process for this package took 129 months (April 1997-December 2007) as against the planned 12 months (April 1997-March 1998) in the following circumstances: first, the commencement of the land acquisition was postponed from 1997 to 2002 due to the design modification to minimize the land area to be acquired and its approval[7]; second, the acquisition process itself faced great difficulties because consent was not obtained from some residents who claimed ownership of the land (see *3.4.2 Other Positive and Negative Impacts* for details). As a result, the entire duration of the construction works, including all packages, were also largely prolonged (90 months as against the planned 36 months). Nevertheless, the construction works of the additional packages took only 23 months as the project further tried to avoid land acquisition and the target intersections were all located outside Jakarta, where land issues are less serious than Jakarta.

Other reasons for delays pointed out by the executing agency include organizational changes following changes of government and poor performance of contractors (Package 2); delays in approval of tender results (additional packages); and delays in relocation of utilities (additional packages).

Table 2: Plan and actual periods of land acquisition and construction

	Planned at appraisal	Actual
Land acquisition for 6 original sites (Packages 1-4)	April 1997-March1998 (12 months)	April 1997-December 2007 (129 months)
Construction works for 6 original sites (Packages 1-4)	January 2000-October 2003 (36 months)	July 2000-December 2000 (90 months)
Construction works for 7 additional sites (Packages 5-11)	-	October 2006-October 2008 (23 months)

Note: The actual periods spent for land acquisition for the additional sites was not available as they are reported together with those for the original sites.

Source: DGH

3.2.2.2 Project Cost

The planned total project cost estimated at the appraisal was 16,743 million yen, and the actual cost was lower than planned at 13,490 million yen. The Japanese ODA loan approved amount was 12,580 million yen, but the disbursed amount was much lower at 7,960 million yen. The major reason for the decrease in the project cost was the depreciation of the local currency. As most of the construction cost was spent in local currency, the fluctuation of exchange rates

[7] The original design included four loop ramps for Suprapto Flyover and two loop ramps and one underpass for Pramuka Flyover. However, the number of loop ramps was reduced to two at each flyover to minimize the land area to be acquired.

strongly affected this project.

Although the project cost was lower than planned, the project period was significantly longer than planned, therefore efficiency of the project is fair.

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

To measure how smooth the traffic became after the construction of flyovers/overpasses, the evaluator tried to collect a set of indicators, namely, hourly traffic inflows and outflows at an intersection (and its ratio to design capacity), congestion lengths, and pass time/ pass speed. However, the data collected were very limited: a complete set of data, including the baseline data at the time of the appraisal, the planned value (target) and the actual value at the time of the ex-post evaluation, was not available for any of the 13 locations under this project[8]. Also, many of the data presented at the time of the appraisal lacked the information on the basis of measurement, thus making comparison with the ex-post data difficult.

Table 3 shows the data that were comparable in any way. With the rapid increase in traffic[9], the travel speed around intersection is a little lower than the baseline. However, it is inferred that without this project, the same volume of traffic would have flown into the roads that had three or four less lanes than with the project, and thus the traffic would have been much worse than it is now. In this way, the evaluator decided that the project was effective even with the indicators showing a worsening trend, if it was logically inferred that the trend would have been even worse without the project[10].

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8 According to the executing agency and transportation officials of a municipal government, although they are in charge of conducting traffic surveys, locations are limited and in some cases surveys are not regularly conducted. They also said that compared to surveys for project planning such as feasibility studies, surveys after the completion of the project are relatively inadequate.

9 For example, the 24-hour weekday traffic around Bekasi Flyover increased from approximately 57,000 vehicles in 2000 to 92,000 vehicles in 2008 (excluding motorcycles). For reference, the 24-hour weekday traffic at some points in Tokyo where congestion is particularly bad is: approx. 75,000 vehicles around Shimo Takaido, Suginami Ward, along the national highway No.20; and approx. 82,000 vehicles around Tsuruma, Machida City, on the national highway No.16 (2005).

10 For example, the rapid travel speed survey conducted at the time of the ex-post evaluation showed that the average speed to travel from Enggano Street to Cawang Junction on the longitudinal arterial in the center of Jakarta (Suprapto Flyover and Pramuka Flyover are located on the mentioned section), decreased from 28.5km/h in 2000 (before the project) to 19.8km/h in 2008 (after the project).
When considering benefits to people and the socio-economy of the region, the fact that vehicles can now pass the concerned junction in shorter time does not mean the achievement of the project objective, if roads ahead of the junction are as congested as before. From this viewpoint, it is desirable to check whether travel time and speed improved on surrounding roads as well (i.e., to assess a link effect or a network effect). Such an assessment however requires a large-scale survey that was impossible in the framework of this ex-post evaluation. Therefore, this evaluation solely focused on a more direct effect of the project, namely, the extent of alleviation of congestions at the intersections covered by the project.

Table 3: Traffic volume and travel speed at the intersections under the project

Site	Indicator (unit)	Baseline (1994 or 2000 with "*")	Actual (2008 for traffic volume = 1-4 years after completion. 2010 for travel speed)
Suprapto	Traffic volume (PCU/h)	N-S 7,700 E-W 5,800	N-S N.A. E-W 6,912
	Average travel speed (km/h)	*N-S 24.0 E-W N.A.	N-S 22.4 E-W N.A.
Pramuka	Traffic volume (PCU/h)	N-S 7,600 E-W 7,800	N-S N.A. E-W 8,240
	Average travel speed (km/h)	*N-S 29.3 E-W N.A.	N-S 23.7 E-W 26.2
Bekasi	Traffic volume (PCU/h)	N-S 2,856 E-W N.A.	N-S 7,860 E-W N.A.
	Average travel speed (km/h)	N-S N.A. E-W N.A.	N-S 45-60 E-W N.A.
Cikarang	Traffic volume (PCU/h)	*N-S 3,919 E-W N.A.	N-S 5,450 E-W N.A.

Notes: 1) In all sites mentioned in this table, flyovers are built in a north-south direction, and the north-south traffic was all measured on flyovers.
2) Both traffic volume and speed are about peak hours (average of traffic at 7:00-8:00 hours and 18:00-19:00 hours).

Sources: Appraisal document (for baseline data as of 1994); The Study on Integrated Transportation Master Plan for JABODETABEK (SITRAMP) (JICA technical cooperation) (for baseline data as of 2000); JABODETABEK Urban Transport Policy Integration Project in Indonesia (JICA technical cooperation) (for actual data as of 2008); travel speed survey at the time of the ex-post evaluation (for actual data as of 2010); Road Office of Bekasi City (for travel speed on Bekasi Flyover).

3.3.1.2 Results of Calculations of Internal Rate of Return (IRR)

The EIRR of the flyover/underpass components calculated for the appraisal ranged from 23% to 40% by intersection. The cost items included the construction cost, routine maintenance cost and periodic repair cost, and the benefit items included vehicle operation cost saving and travel time saving. At the time of the ex-post evaluation, EIRR was not recalculated due to unavailability of sufficient data for any of the intersections.

3.3.2 Qualitative Effects

(1) Improvement of traffic

As a result of the beneficiary survey conducted at the time of the ex-post evaluation, 97% of the 96 respondent drivers who passed the flyovers/ underpasses developed by the project said the traffic improved after this project. The common answers about time saving and cost saving with the project were 10-15 minutes and 10,000-20,000 Rupiah (approx. 100-200 yen) per month, respectively (answers from drivers to other questions related to road conditions are shown in *3.5 Sustainability*).

In the interviews with residents and shops around the project sites, 98% of the 28 respondents said that the flyovers or underpasses constructed by the project were capable of handling the current traffic (*3.4 Impact* describes other answers from residents and shops, related to environmental impacts).

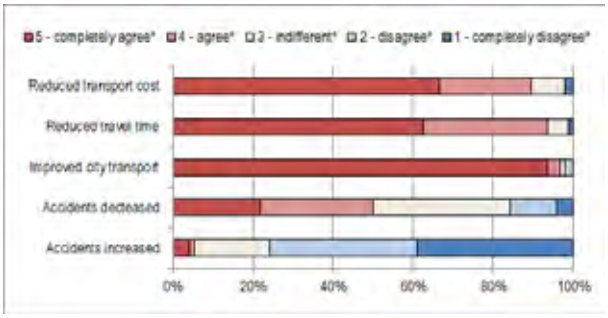

Figure 2: Changes that happened after this project (answers from 96 drivers)

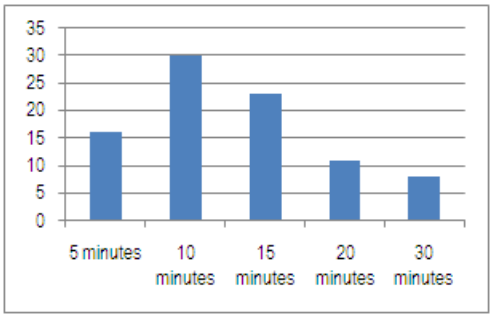

Figure 3: Time saving by flyovers/ underpasses (answers from 88 drivers)

According to some municipalities where the project sites are located (Departments of Public Works of DKI Jakarta and Bekasi City, Depok City and Bogor City of West Java Province), the flyovers and underpasses significantly improved the traffic: although all of them said that quantitative measurement of the improvement was difficult, some examples were raised such as flyovers or underpasses at highway-railway intersections (Arief Raman Hakim Flyover and others), which clearly shortened travel time by eliminating the waiting time at railroad crossings. All of the interviewed municipalities said they planned projects to develop surrounding roads together with this project. DKI Jakarta and Bekasi City implemented some of them[11], which have brought combined effects on traffic improvement. On the other hand, Bogor City and Depok City said they have not yet implemented their plans due to budgetary constraints. Also, a municipality pointed out that there was a difficulty coordinating road development designs between DGH and the municipality, because their development plans were not adequately shared.

(2) Improvement of convenience in surrounding areas

In the beneficiary survey, 82% of the 28 interviewed residents or shops around the flyovers or underpasses said the environment around the project site improved after the project. Specific positive changes they mentioned include the improvement of traffic on existing roads with the flyover or underpass, better scenery and improved security, though some respondents also mentioned negative changes such as streets that are now more crowded with mini buses and motorcycles waiting for their customers under the flyovers.

This project has largely achieved its objective, therefore its effectiveness is high.

[11] The interviewed municipality mentioned some cases of completed construction or improvement works for roads near the site of this project, including construction of Yos Sudarso Flyover in the north of Suprapto Flyover and Panjaitan Underpass in the south of Pramuka Flyover (implemented by DKI Jakarta), improvement of Kali Malang Street and widening and improvement of Pukayan Jaya Street, both connecting to Bekasi Flyover (implemented by Bekasi City).

3.4 Impact

3.4.1 Intended Impacts

The gross regional domestic products (GRDPs) are increasing at annual growth rates around 6% in 2004-2008 in all municipalities or regencies where the sites of this project are located. As the flyovers and underpasses constructed by this project are all connected to important artery roads in respective region, they are contributed to have been contributed to the mentioned economic growths.

As a particular case, Cikarang Flyover, located on a road to connect major industrial parks in JABODETABEK and toll roads, contributes to the transport of raw materials and products (from parts factories in one industrial park to assembly factories in another industrial park[12], or between factories and the Tanjung Priok Port or other regions of the country via toll roads).

3.4.2 Other Impacts

(1) Impacts on environment

For all of the project sites, the environmental impact assessment (EIA) was approved by the Environmental Impact Management Agencies of the concerned municipalities before the start of the construction works.

The environmental measures taken by the project during the construction include: control of dusts by providing water (e.g., sprinkler spraying); measures against noises such as getting the public understanding by providing information on the construction schedule and introducing special construction methods (e.g., according to the project, the pre-boring method was introduced in all construction sites, and then complaints from residents about noise stopped); river protection from waste water inflow from the construction sites; and installation of pumping systems to underpasses. Also, as the traffic management and safety measures, the project installed signs, lamps and barricades during the construction and placed the roads in service as soon as the construction works were finished. To ensure smooth progress of the construction on narrow streets or the site where buildings were closely-built, the project did not use cranes but ion girders to place materials. For residents in particular, the project provided information on the construction kept watchmen at the sites all the time.

Monitoring of air quality at the project sites is not conducted. For reference, the results of the regular monitoring by DKI Jakarta (2008) shows that values of nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) are within the standards, while total suspended particles (TSP) exceeded

[12] For example, an interviewee working with an automobile electric parts manufacturer in the JABOBEKA Industrial Park said that the transport of their products to Japanese or other automobile factories in the East Jakarta Industrial Park became smoother after Cikarang Flyover had improved the traffic flow to get on the toll road.

the standard in some locations mainly due to emissions from industries[13].

As a result of the interviews with nearby residents conducted at the time of the ex-post evaluation, 24, 24 and 16 persons out of 28 respondents said there were no negative changes on air, noise and vibration, respectively, after the project. These numbers are much larger than the numbers of respondents who said environment was worsened (1 person about air, 3 persons about noise and 1 person about vibration).

(2) Land acquisition and resettlement

As this project was to be implemented in large cities, the JICA side carefully examined land acquisition issues on all proposed sites and excluded the sites that either (i) required a large-scale mew land acquisition or (ii) required land acquisition but negotiations with residents had not shown progress, from the scope of the loan.

Also, the government of Indonesia secured 2.6 billion Rupiah as compensations for illegal settlers in the fiscal 1997 budget, and to carry out the compensation in a prompt manner.

Table 4: Performance of land acquisition and compensation

Pkg	Municipality/ regency in charge	Land area acquired (m^2)	Compensation (million Rupiah)
1	DKI Jakarta	None	None
2	DKI Jakarta	55,430	60,442
3	DKI Jakarta	None	1,700
4	Bekasi City	N.A.	5,750
6	Tangerang Kab.	15,320	30,000
7	Depok City	15,745	29,437
8	Tangerang City	1,461	N.A.
9	Tangerang Kab.	2,136	N.A.
10	Bogor City	N.A.	N.A.
11	Bekasi City	None	None
Total		90,092	127,329

Notes: "Kab."=Kabpaten (Regecy); "Total" includes available data only (the amount mentioned by DKI Jakarta (approx. 90 billion Rupiah) was bigger than the figures in the table.

Sources: DGH, project consultant.

The actual performance of land acquisition and compensation is shown in Table 4. The acquisition and compensation plan was made and implemented by the Department of Public Works of each responsible local government based on the agreement with DGH. Compensation was funded from respective local government budget. The project did not develop resettlement sites, and affected people received compensation and moved themselves in accordance with lows of Indonesia.

Overall, the compensation amount increased mainly because the numbers of land/ property owners and residents increased over a prolonged period of time, from the appraisal to the execution of land acquisition, due to delays in project implementation following design modifications. (see *3.2.2.1 Project Period* for details of the delays).

As described in *3.2.2.1*, land acquisition was extremely difficult in some packages. The followings are the outlines of those difficulties, which are different from each other in timing and situation:

[13] According to DKI Jakarta, *Laporan Status Lingkungan Hidup Provinsi DKI Jakarta 2008*, NO_2 was measured at 17.92-91.80μg/m^3 (standard: less than 92.00μg/m^3/24 hours); SO_2 was measured at 6.596-10.015μg/m^3 (standard: 260μg/m^3/24 hours); and TSP was measured at 142-378μg/m^3 (standard: less than 230μg/m^3/24 hours).

- Suprapto Flyover (Package 2): (i) the company that had agreed to contribute their land subject to the acquisition sold that land to another company, and the new owner (company) refused to provide the land; (ii) the construction of one loop ramp had to be given up due to unsettled ownership problems such as a number of people claiming ownership of a same piece of land (and fighting each other in court).
- Pramuka Flyover (Package 2): after all the construction works were completed, a resident claimed ownership of the land surrounded by a loop ramp. As the Ministry of Public Works had been regarded as the owner of that land in the construction stage, the Ministry and the resident were fighting over in court. The resident blocked the lamp so that vehicles could not pass. Therefore, approaches to the flyover are limited at present.
- Ciputat Flyover (Package 6): as the land acquisition was not completed, the right of way on one side was narrower than planned.

Some common characteristics or situations were observed in the sites where land acquisition was difficult: first, both Suprapto Flyover and Pramuka Flyover (Package 2) had problems in acquiring land for loop ramps, which tended to be larger than straight sections; second, in case of Ciptat Flyover (Package 6), the flyover itself is curved, and it was the land for widening the existing road section under the curved part of the flyover where the problem in land acquisition arose. In all the other cases, the project acquired narrow stripes of land mainly for widening existing roads, where, according to concerned local governments, negotiations with residents were hard (most of the disputes were over the amount of compensation that was paid in accordance with rules and regulations, and some of the cases were brought to court) but kept at a controllable level. Finally, all issues were solved by the start of the construction works.

(3) Other positive and negative impacts

(i) Decrease in railroad accidents: according to the executing agency, the construction of Semplak Underpass eliminated a level crossing with railroad (the Jakarta-Bogor line) and so did accidents at the crossing (specific data were not available). On the other hand, the Indonesian Railway Company, the railway operator, pointed out that even without underpasses, people continue to cross the railroad and thus accidents could not be eliminated.

(ii) Impact on informal sector: before the project, many street vendors used to do business on road shoulders and carriageways around the project sites. In the beneficiary survey at the ex-post evaluation, some interviewees said their income decreased because traffic jams were reduced by this project (8 out of 18 valid responses). No measures such as income restoration for informal sector seemed to be taken.

As stated above, this project has supported economic activities in the Jakarta metropolitan area. There existed a big problem of land acquisition. However, as it was an inhibiting factor to the implementation process and the degree of completion of this project, the evaluation rating of effectiveness was not downgraded.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

Particular problems were not observed. The operation and maintenance (O&M) of the flyovers and underpasses built on national roads (Suprapto, Pramuka, Tanjung Barat, Raya Bogor, Bekasi, Cut Meutia, Ciputat and Semplak) were carried out by the Project Unit of Preservation of Jakarta Metropolitan Roads under the Directorate of Freeways and Urban Roads of DGH, the directorate that was directly in charge of the implementation of this project. From 2010, this Project Unit is under the command of the Balai Jakarta (Jakarta project office), while still having coordination with the Directorate of Freeways and Urban Roads. A maintenance team consists of six Road Managers, each in charge of 269km[14].

The O&M of the flyovers and underpasses built on local roads (Cikokol, Sudirman and Cileduk in Tangerang City, Arief Rahman Hakim in Depok City and Ciakrang in Bekasi City) are under responsibility of the City Department of Public Works (DPUK) of respective cities.

3.5.2 Technical Aspects of Operation and Maintenance

Technical problems on O&M were not seen, either. In case of the flyovers and underpasses under the responsibility of DGH, a maintenance team of engineers, technicians and skilled workers is organized under each Road Manager. According to DGH, the number of and capabilities of those staffs are sufficient[15]. As for the flyovers and underpasses under local O&M responsibilities, DPUKs explained that similar routine maintenance works to those for other arterial roads are given without any technical problems. This was confirmed on the site visits for the ex-post evaluation.

3.5.3 Financial Aspects of Operation and Maintenance

Upon completion of the project, the executing agency roughly estimated the total annual O&M cost for the 11 flyover/underpass packages under this project to be 3,610 million Rupiah, assuming that 0.5% of the construction costs would be required annually. The executing agency also reported that the actual amount expended (shown below) were sufficient for the O&M of each package.

[14] The unit length will be 544km in 2011 after the planned inclusion of Puncak and Cianjur in West Java Province.
[15] 16 engineers and 19 technicians are in charge of the O&M of this project.

The accurate cost estimation for O&M of highways, including the flyovers and underpasses developed by this project, is based on the unit cost per kilometer and the actual conditions of the road. The conditions of each road section are reported in June and October every year, and then the O&M budget is decided. In 2009, 10 out of the 13 flyovers/ underpasses were designated as the subject of the O&M works, and the total O&M expenses for them was 1,195 million Rupiah, which accounted for 33% of the rough estimation mentioned above.

The budget allocated for each site ranged from approximately 8 million Rupiah (cleaning of drainage channels at Cikarang Flyover) to approximately 315 million Rupiah (replacement of joints at Tanjung Barat Flyover). The flyovers/underpasses not taken up as the O&M subject were considered to be in good conditions. Repair works that cost more than 50 million Rupiah are outsourced by tender.

The O&M cost for flyovers/ underpasses under DPUKs are funded from local budget. In case of Depok City, for example, the Department of Public Works of the City said that they spend approximately 4.5 million Rupiah while 8 million Rupiah is required annually.

The O&M funding sources are national budget (for roads and bridges under DGH) and local budget (for those under DPUKs). Although the above-mentioned O&M expenses are far below the estimated amount, in practice they are deemed acceptable considering that the budget is allocated if necessity for O&M is confirmed by the inspection results and that costs are kept low by outsourcing high-cost maintenance works.

3.5.4 Current Status of Operation and Maintenance

According to DGH, there are no serious problems on the conditions of the flyovers/ underpasses after they were put in operation. In general, maintenance works consist of the following three stages: (i) inspection (routine, periodic and special or urgent); (ii) maintenance (cleaning, replacement of damaged traffic facilities, minor repair of pavement and drainage facilities, etc.); and (iii) repair (re-pavement, repair of structures, etc.). While DGH stated that such a system was minimum required, no big problems have arisen so far.

It was observed on the site visits for the ex-post evaluation that structures and facilities in all project sites were relatively in good conditions. On Bekasi Flyovers where traffic is extremely heavy and Ciakrang Flyovers where industrial parks were located nearby and thus heavy vehicles pass a lot, the road surface seemed more damaged than others, though serious damages and deterioration were not found. A prompt response by O&M agencies to a problem was observed: at Semplak Underpass (maintained by DGH), the problems of loss of an iron drain cover and water leakage from the side wall found on the first site visit in April were already fixed on the second visit in May (the Department of Public Works of Bogor City found the problems and informed DGH).

In the beneficiary survey with 96 drivers, 98% said the surface conditions of the flyover or underpass that each of them passed were very good or good, and 99% said that the surface was kept in the same conditions as it had been at the completion.

No major problems have been observed in the operation and maintenance system, therefore sustainability of this project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

While the efficiency of this project is fair due to implementation delays, the other evaluation items all satisfy the criteria for high marks. On relevance, the objective of this project is consistent with development policies and needs. On effectiveness and impacts, although the project did not eliminate traffic congestions due to the rapid increase in traffic volume, the expanded road capacity limited further aggravation of traffic jams and thus contributed to the economic development. High satisfaction of road users with the project was also observed. On sustainability, no problems are seen in the system and the practice of O&M.

In the light of above, this project is evaluated to be (A) highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

DGH is recommended to continue its efforts to solve the problem on the loop ramp at Pramuka Flyover (blocked by a resident who are claiming over title of the land). As for the problem on the unconstructed loop ramp at Pramuka Flyover (due to multiple ownership claimed), even though it might be difficult for DGH to directly intervene the matter, it is expected that negotiation about the acquisition and the construction be started as soon as the land title is decided.

In order to maximize the benefits of this project, it is effective to develop roads and flyovers/ underpasses around the project sites as well. Therefore, DGH is recommended to keep communications with local government in charge of those development works, provide necessary information on related projects give advises on development plans, and make future development plans in an coordinated manner with plans of local governments.

4.2.2 Recommendations to JICA

It is recommended that JICA keep in contact with DGH about the progress of the land issues described above.

As for the development of surrounding road networks mentioned above, in case where local

governments of the JABODETABEK area (except Jakarta) lack development budgets, JICA is expected to consider assisting them as well as possibilities of other funding sources[16].

4.3 Lessons Learned

(1) Minimization of land acquisition in urban road projects

Since land acquisition issues in flyover/underpass construction projects in a large city affect not only owners/residents of the concerned lands but also urban traffic as a whole, it is important to keep efforts to minimize the lands to be taken as this project did.

In particular, when a project needs to take larger area of land than the one for straight roads, as in the case of construction of loop ramps or curved flyovers, the design adequacy in the light of the traffic situations and the feasibility of the land acquisition should be carefully reconciled in order to avoid a kind of difficulties faced by this project (i.e., due to re-design, long time passed since the agreement on the land issue was reached, and thus the situation of the site changed from the situation in the appraisal stage).

(2) Elaboration of construction methods in urban road projects

In order to ensure smooth progress of the construction works in areas where buildings and traffic are dense, the construction methods that were effective in this project (such as pre-boring method and erection girders) can be considered.

(3) Effect measurement in flyover construction projects

In this ex-post evaluation, use of the following two types of indicators, depending on the degree of their directness, was considered for the measurement of effects of flyovers/ underpasses (i.e., smoothened traffic):

(i) Measurement of the direct effect (outcome) – alleviation of traffic congestions at the project intersections (indicators for this include the ratio of traffic volume to designed capacity, congestion lengths and pass time)

(ii) Measurement of the achievement of the project objective – traffic improvement of the area as a whole (indicators for this is difficult to collect during a short-term study, but a minimum set including traffic volumes and travel speeds on the road where the flyover was built and on some connecting roads was considered)

[16] JICA, the World Bank and the Asian Development Bank (ADB) are major donor agencies in Indonesia's road sector. Recent road sector assistance from the World Bank and ADB is directed mainly to rural road development and administration reform (e.g., strengthening of local governments' financing and management capacity).
When considering assistance by JICA, possibilities of providing sub-loans from the central government to local governments should be carefully examined.

As already mentioned, however, data were available only on very limited part of the indicators in the first category: the baseline data were not fully available and the ex-post data were not collected by any organizations. Meanwhile, the second category indicators measure effects that cannot only be attributed to this project but to many other factors such as land use patterns, urban development situation, and traffic policies. Also, a short-term study can neither set the baseline nor collect the performance data in the second category. Therefore, it was unavoidable that this ex-post evaluation only collected qualitative information (i.e., interview survey results).

When planning a similar project in future, one should clearly state the baseline data of the first category in the appraisal documents. The documentation should also include the information on whether those data are the ones regularly measured by the executing agency or other organizations, or they cannot be collected without separate studies such as feasibility studies. These notes will be useful for making a data collection plan for future monitoring and evaluation works[17]. In case of road projects in the JABODETABEK area, it was learned from this ex-post evaluation that separate studies are needed to collect necessary data. This point should be noted when planning and evaluating a project in this area.

[17] With the data for all of the three kinds of indicators under the first category, evaluation of fuel-saving effects and CO_2 reduction effects, which were not possible in this ex-post evaluation, can be done.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs Construction of flyovers	6 flyovers	Original: mostly same as plan. Additional: 5 flyovers and 2 underpasses
Consulting services on flyover construction	Foreign engineers 184M/M Local engineers 720M/M F/S review, detailed design, tender assistance.	Foreign engineers 396.21M/M Local engineers 1,533.35M/M Additional: detailed design and preparation of implementation plan for urgent improvement of Sudiyatmo Toll Road.
Engineering services on toll road traffic information system	Foreign engineers 80M/M Local engineers 60M/M F/S review, detailed design, tender assistance	Cancelled.
2. Project Period	November 1997 – October 2003 (72 months)	January 1998 – December 2007 (120 months)
3. Project Cost		
Amount paid in Foreign currency	8,039 million yen	5,000 million yen
Amount paid in Local currency	8,704 million yen (167,385 million Rupiah)	8,490 million yen (666,640 million Rupiah)
Total	16,743 million yen	13,490 million yen
Total ODA loan portion	12,558 million yen	7,906 million yen
Exchange rate	1 Rupiah = 0.052 yen (As of April 1997)	1 Rupiah = 0.013 yen (Average between 1997 and 2006)

Third party opinion

28 October 2010

Urban Arterial Roads Improvement

Aristides Katoppo

Jakarta traffic has become so jammed that the president asked for a study to move the capital. The vice president suggested about 18 steps to alleviate the problem. The president was irked that critics decried the use of police escorts that created even more extensive snarl- up in its wake. It is not hard to get car and motorbike users to appreciate fly-overs and under passes to help untangle the massive snarl-ups. The “Urban Arterial Roads Improvement Project” clearly demonstrated its usefulness as an essential and necessary component to bring relieve. And even though there is some joking that these fly-overs and underpasses only makes you reach the next traffic jam ten to fifteen minutes earlier, most welcome it with high praise.. Everybody agrees that: the more of these, the better. It is rare in project experience that disbursement is less, closer to half of agreed loan (12,5 to 7,69 million yen).It is also exceptional that the scope of construction doubled (from original 6 to plus 5 additional flyovers and 2 underpasses). There were extraordinary happenings and changed circumstance: financial crises in Asia in the late nineties and when the Rupiah crashed and devalued drastically. Nevertheless, it is a tribute to both partners that despite turbulent political turmoil and economic/financial crises, the project was completed with such high positive output.

Kingdom of Thailand

Ex-Post Evaluation of Japanese ODA Loan Project
Industrial Ring Road Construction Project

Yasuhiro Kawabata, Sanshu Engineering Consultant

1. Project Description

Location of Project Site

Chao Phraya River Crossing Bridge

1.1 Background

The southern and western area adjacent to the project site in the Metropolitan Bangkok was particularly designated as an industrial zone of Samut Prakarn District. Its development as an industrial zone has been promoted although the economic development attained during late 80s through early 90s (the GDP growth rate was about 10 percent) was not expected. Bangkok Klongtoey Port, located in the north of the project site, was a hub port for transporting materials to be used and products completed in the above industrial zone and has been handling the largest amount of cargoes, even though it is a river port. It was strategically an important area, which could handle cargoes, particularly industrial materials and products used or completed in Bangkok and its vicinities.

At the time of appraisal (1997), there was no bridge crossing the Chao Phraya River toward downstream from the existing Rama IX Bridge. The only mode connecting both banks was a ferry. The road connecting Bangkok Port and the industrial zone in the Samut Prakarn District has one lane in each direction, and Rama IX Bridge and roads around ferry terminals have been heavily congested attributing to trucks traveling between the industrial area and Bangkok Port. There was daily traffic congestion along the corridor connecting the industrial area in Samut Prakarn District and Bangkok Port along Chao Phraya River due to lack of capacity of roads, bridges and ferries, and the transport efficiency for cargo and passengers has substantially declined. By connecting the North South Road with Bangkok Outer Ring Road, which traverses in the south of the project site, roads were also expected to function as part of the Bangkok road

network.

1.2 Project Outline

The project objective is to contribute to the economic development in the southern Bangkok by alleviating traffic congestion, enhancing transport efficiency, and improving the road network by constructing Chao Phraya River crossing bridges, improving the existing old railway road, and constructing the extended segment to the Bangkok Outer Ring Road in the Samut Prakarn District in Metropolitan Bangkok. The location of the project site is shown in Figure 1.

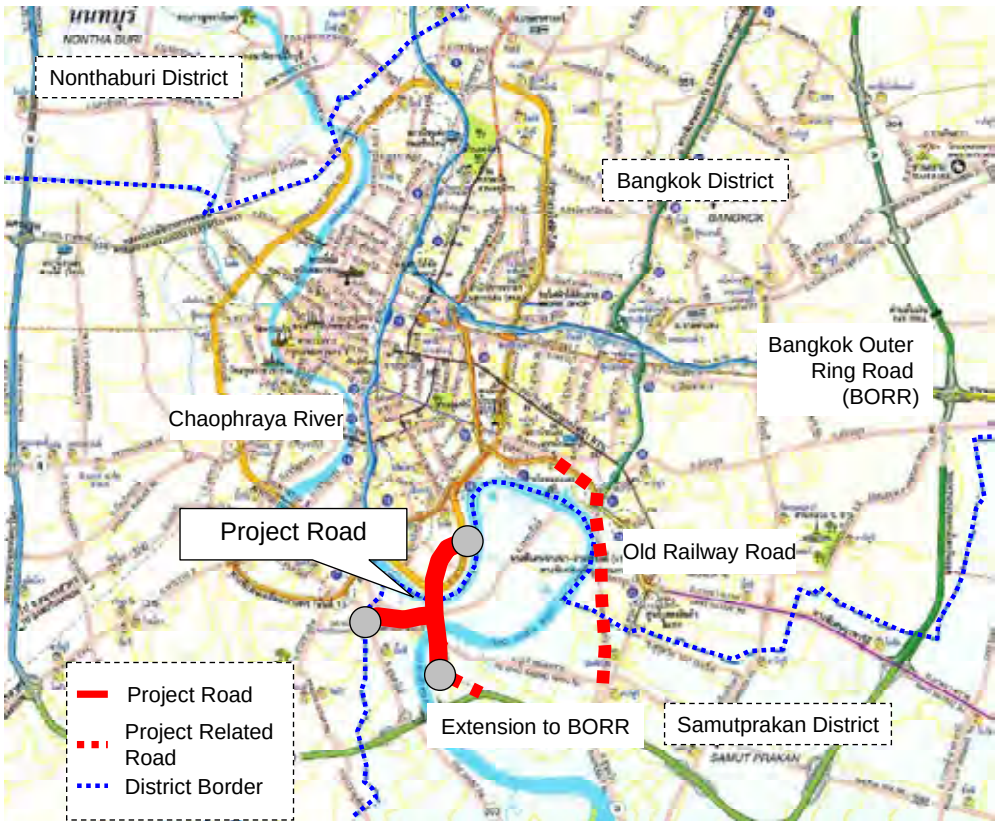

Figure 1 Location of Project Site

Approved Amount / Disbursed Amount	14,887 million yen / 14,886 million yen
Exchange of Notes Date / Loan Agreement Signing Date	September 1997/ September 1997
Terms and Conditions	Interest Rate: 2.7%; Repayment Period: 25years (Grace Period: 7 years) ; Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of Kingdom of Thailand / Department of Rural Roads, Ministry of Transport[1]
Final Disbursement Date	January 2008
Main Contractors (Over 1 billion yen)	Kajima Construction Co. Ltd. (Japan)/Tokyu Construction Co. Ltd. (Japan)/Unique Engineering and Construction Co. Ltd. (Thailand) (JV), Nishimatsu Construction Co. Ltd. (Japan) /Taisei Construction Co. Ltd. (Japan)/Nippon Steel co. Ltd. (Japan)//Sino-Thai Engineering and Construction Public Co. Ltd. (Thailand) (JV)
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	F/S by Department of Public Works, Ministry of Interior (January 1996)
Related projects	None

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

Duration of the Study: December 2009 – November 2010

Duration of the Field Study: March 21 – 27, 2010 and May 8 – 17, 2010

3. Results of the Evaluation (Overall Rating: A)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Thailand

Following the financial crisis in July 1997, Thailand's 8th National Economic and Social Development Plan focused on the following four agenda: (1) reconstruction of economy and assurance of stability; (2) alleviation of impacts to the people; (3) reform the economic

[1] Originally, the executing agency was the Public Works Department (PWD) of the Ministry of Interior. However, due to reorganization of the Thai central government in October 2002, the responsibility for the project was transferred to the Department of Rural Roads of the Ministry of Transport.

structures; and (4) establishment of superior government. Under such social and economic conditions, development projects in Bangkok Metropolitan area, which is the center of political and economic activities, were needed to reconstruct the country's economy and assure stability. Implementation of infrastructure development, particularly alleviation of traffic congestion in Bangkok, was one of the top priority agendas. The subject project was one of three bridge projects in the Bangkok area, which was classified as high priority project under the 7th National Economic and Social Development Plan (1992-1996).

The current 10th National Economic and Social Development Plan (2007-2011) focuses on the sustainable economic development seeking establishment of well-balanced communities, or "communities filled with green and happiness". In order to achieve this target, five strategies were established. One of the strategies is regarding national economy, focusing on "development of competitive economy, creation of value-added goods while retaining Thai identity, and improvement of economic and investment infrastructures to attract foreign direct investment". In particular, the importance of infrastructure development (including development of efficient transport network in the Bangkok Metropolitan area and its vicinity) is emphasized.

According to the 2008 National Regional Plan, prepared by the Department of Public Works and Department of Town and Country Planning of the Ministry of Interior, Bangkok is proposed to be a: (1) compact city; (2) world-class city (a global city); and (3) hub for Bangkok regional economy, export and transport. Samut Prakarn District is planned under the project as an airport-related business and industry development district because of its proximity to the international airport.

The infrastructure development was a prioritized agenda in the national development plans both at appraisal and at post evaluation. The project is also in accordance with the policies and strategies stated in the 2008 National Regional Plan at the time of post evaluation.

3.1.2 Relevance with the Development Needs of Thailand

At the appraisal time (1997), there was no bridge crossing the Chao Phraya River toward downstream from the existing Rama IX Bridge. The only mode connecting both banks was a ferry. As the demand to transport industrial materials and products has been increasing along the corridor connecting the industrial area in Samut Prakarn District and Bangkok Port along Chao Phraya River, daily traffic congestion in bridges and ferries occurred due to lack of road capacity and the transport efficiency for cargo and passengers have substantially deteriorated.

Both the North-South and East-West roads, which were constructed under the project, connect between the central Bangkok area and Samut Prakarn District in the south, function as important links to form the arterial road network in the southern Bangkok, and supplement the Outer Ring Road. Thus, the need for road development under the project was/is high both at

appraisal and at post evaluation.

3.1.3 Relevance with Japan's ODA Policy

The previous Official Development Assistance (ODA, 1992) Charter stated the close relationship between Japan and the East Asian region (including ASEAN) and has put priority on Asian region. The infrastructure improvement was listed as one of its priority issues. Since the subject project was prepared before the Country Assistance Programs were introduced in 1998, a Country Assistance Program focusing on Thailand was not available.

This project has been highly relevant with the Thailand's development plan and needs, as well as Japan's ODA policy. Therefore, its relevance is considered high.

3.2 Efficiency (Rating: b)

3.2.1 Project Outputs

Both the East-West Road and North-South Road were constructed almost as planned, while the interchanges were constructed as planned.

Table 1 Comparison of Outputs (planned and actual)

Component	Planned	Actual
① Construction of Chao Phraya River Crossing Bridge	・ North-South section (North bridge 581m, South bridge 707m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps	as planned ・ North-South section (North bridge 576m, South bridge 702m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps
② Improvement of Old Railway Road (not JICA financed)	・ Bangkok Port East Gate - Poochao Saming Road with a length of about 7.5 km: improvement and widening from current 2 lanes to 4 lanes	Cancelled
③ Extension to Bangkok Outer Ring Road (not JICA financed)	・ South end of Chao Phraya River Crossing Bridge - Bangkok Outer Ring Road with a length of 1.2 km : 4 lanse plus ramps	Under construction. to be completed by June 2011.

Source: Responses to the questionnaire

Construction of Chao Phraya River crossing bridges was implemented almost as planned. However, improvement of the old railway road, of which about 2 km section is located in the Samut Prakarn District and the rest in the Metropolitan Bangkok out of a total 7.5 km section, and which was to be originally funded locally, was canceled from the project at the early stage of project implementation. The cancellation was determined necessary due to extreme difficulty

to acquire land and resettle people, and the houses and factories were densely constructed causing problems in widening the existing roads. Given the resettlement and social issues, the original plan to widen the existing road to four lanes in the densely populated area is considered to be extremely difficult. A comprehensive review and planning of the improvement project is needed, including alternative studies on construction of a new road on new alignments considering how the road development in the subject area should be implemented. Construction of the extension road to the Bangkok Outer Ring Road is being implemented by the Expressway Authority of Thailand and it is expected to be completed by June 2011.

For construction supervision of the project, five local consulting firms were employed with local funds. As discussed later, the contract period for consulting services was longer than the original plan due to extension of the project period.

Chao Phraya River Crossing Bridge
East-West section

Chao Phraya River Crossing Bridge
North-South section

3.2.2 Project Input

3.2.2.1 Project Period

The project period substantially exceeded the planned period. The planned period at appraisal was from September 1997 (Loan Agreement signing) to July 2002 (project completion), with a total period of 59 months. The actual project period was from September 1997 (Loan Agreement signing) to September 2006 (open to traffic), with a total period of 109 months, which is 185% of the planned period. The delay in project implementation is mainly due to the delay in land acquisition activities, which required about three years till commencement of selection of contractors. The loan was signed right after the Asian financial crisis, and consequently the Thai government could not allocate the budget for the land acquisition and resettlement activities in time. As a result, the land acquisition and resettlement activities could not commence as planned; and in addition, negotiation with land owners on the amount for compensation to be paid took longer.

The planned schedule for selection of contractors to the completion of civil works was from January 1998 to July 2002, with a total length of 55 months, while the actual period was from September 2000 to August 2006, with a total length of 72 months, exceeding by 20% in terms of number of months. The delay in land acquisition affected the work implementation schedule and the construction period was further extended from 520 to 590 days in three contract sections. After the work commenced, the project implementation was further delayed due to the following reasons: ①civil works under Contract No. 2 could not be implemented as planned because of the delay in relocating the power lines by the Metropolitan Electric Authority along Petchahueng Road at the central interchange area; and②design changes and variation of construction method were necessary to avoid the Islamic Cemetery in the southern section along the North-South Road.

3.2.2.2 Project Cost

The total project cost estimated at appraisal was 85.089 billion yen (of which the Japanese ODA loan amount was 14.887 billion yen and the rest was to be locally funded), while the actual total project cost was 42.418 billion yen (of which the Japanese ODA loan amount was 14.886 billion yen and the rest was to be locally funded). Comparison between planned and actual project costs was made by using the reduced costs as the base cost, 75.368 billion yen (15.867 billion baht), which was derived by excluding the cost for the cancelled old railway road component from the planned total project cost. The actual project cost was lower than planned (56% of the planned amount). In terms of local currency, the total project cost slightly exceeded the planned amount (105% of the planned amount). The main reasons for the increase in project cost are: ①delay of the total project implementation and construction work; and ② design changes, implementation of additional work, and variation orders during the construction work period. The main reasons for reduction of construction cost in Japanese yen are: ① efficient awarding results through competitive bidding, particularly for contract sections 1 and 2 (North-South Road); and ②the foreign change rate had substantially depreciated (from 1 baht = 4.75 yen to 1 baht = 2.54 yen).

Although the project cost was lower than planned, the project period was significantly longer than planned, and therefore efficiency of the project is considered moderate.

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Impacts

3.3.1.1 Results from Operation and Effect Indicators

(1) Passing traffic volume

The passing traffic volume on the subject road and bridges is shown in Table 2.

Table 2 Passing Traffic Volume

(unit: pcu/day)

	2007	2008	2009 July
Chao Phraya River Crossing Bridge: south bridge	n/a	n/a	53,000 (0.60)
Chao Phraya River Crossing Bridge: north bridge	45,500 (0.51)	51,200 (0.58)	67,500 (0.76)
East-West Road	n/a	n/a	65,000 (0.73)

Source: Based on the raw data (2009) provided by DRR, the evaluation team analyzed the data and calculated the actual traffic volume. Data on 2007 and 2008 is one provided by Bangkok Metropolitan Office.

Note 1: Figures in ( ) shows the ratio (congestion degree) against the highway capacity (88,000 vehicles/day)

Note 2: PCU = passenger car unit

Since a basic indicator to measure operational effects of a road project is traffic volume, it is therefore appropriate to compare the projected traffic volume made at appraisal and the actual current volume. However, since no bureau/division of DRR has regularly recorded the traffic count, the data provided by the Bangkok Metropolitan Office was used. In addition, based on the raw data provided by DRR, the evaluation team analyzed the data and calculated the actual traffic volume. In the feasibility study carried out in January 1996, projection of traffic volume was made assuming that all the roads (North South Road, East West Road, Old Railway Road, and Extension to the Bangkok Outer Ring Road) would be completed at the same time in 2001. Since the assumptions were substantially different, the evaluation team determined that the projected traffic volume comparison was not appropriate, and instead checked the level of achievement of the project objectives by comparing the actual traffic volume to the highway capacity (level of congestion). The congestion level of East West Road and North South Road (north bridge section) in three years after the project completion has reached 0.73 and 0.76, respectively, and considered traffic volume high. The traffic volume in the south bridge section was slightly lower. However, upon completion of the extension to the Outer Ring Road in June 2011, the traffic volume is expected to increase rapidly.

(2) Reduction of travel time

Since no data on travel time between two specific locations before the project is available, the current required time to travel between two selected locations was surveyed on two different routes and results were compared under this post evaluation. Two selected locations were around the gate for Bangkok Port as the beginning point in the north, and about 1.3 km east from the North South Road along Phuchao Saming Road as the ending point in the south.

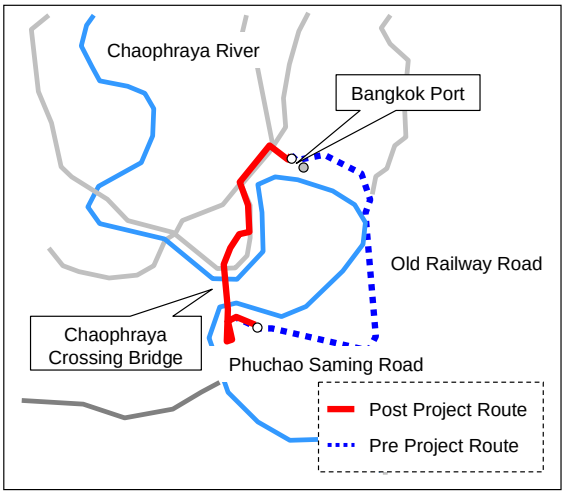

Figure 2 Specific Two Locations on both sides of Chao Phraya River

Table 3 Required Time to Travel the Specific Segment along the North South Road Corridor before and after the Project

	Segment (Route)	Length (km)	Require time (minutes)
Before the Project	Old Railway Road, Poochao Saming Road	17.3	90
After the Project	Rama III Road, North-South Road (project road), Poochao Saming Road	11.7	21

Source: Actually measured time by the evaluation team during 8:00 AM − 10:00 AM on May 14, 2010

Note: Required time was measured by 2 teams by traveling the route clockwise and counterclockwise.

The required time to travel between two specific locations after the project completion has been reduced by about one hour ten minutes compared to that before the project. Reduction of travel time could be due to shorter travel distance and reduction of traffic congestion level. However, the results should be for reference only since the current road/transport and social-economic conditions are quite different from those in 1997, when the project was prepared. Meanwhile, the result of the beneficiary survey showed that the travel time of road users was reduced by 30 minutes in average after the project was completed.

3.3.1.2 Results of Calculations of Internal Rate of Return (IRR)

Economic Internal Rate of Return (EIRR)

The Economic Internal Rate of Return (EIRR)at appraisal was estimated at 18.9%, assuming that construction costs, consulting services fees and maintenance costs required for the project (only Chao Phraya River Crossing Bridge) are considered as “cost”; and savings of vehicle operating costs and travel time saving costs are considered as “benefit”; and that the project life is twenty four years. The EIRR at post evaluation was estimated at 28.4%. In order to make this calculation, the following assumptions were made. Costs are actual construction costs, actual consulting services fees, and maintenance costs increased by the project (based on the projected costs made by DRR, costs required for the 24-year project life period, used at appraisal were re-estimated). Quantitative benefits are savings of vehicle operating costs and travel time savings (based on the projected benefits made by DRR, benefits to accrue for the 24-year project life period, used at appraisal were re-estimated). The reasons for higher EIRR than the original estimate were because the project cost was lower than planned, the actual traffic volume was higher than projected, and the traffic volume during the remaining period of the project life was much higher than projected due to a 4-year delay in project completion against the original schedule.

Table 4 Economic Internal Rate of Return (EIRR)

	EIRR
At appraisal	18.9%
At post evaluation	28.4%

Source: Responses to the questionnaire

3.3.2 Qualitative Effects

Beneficiary surveys, through interviews, were conducted in the project area. The number of respondents was 159 persons. Responses were collected from road users (80 drivers and passengers), and/or local residents/workers (79 persons), and/or all respondents depending on the contents of questions. The classification of respondents by sex was 35% female and 65% male.

Eighty-five (85) percent of respondents perceive that the traffic congestion in the project area has improved and 95% of road users responded that the travel/commuting time has been substantially reduced. Eighty (80) percent of drivers/road users perceive that the transport cost was reduced particularly due to reduction in fuel costs (73%), and consider ferriage (23%) as the main factor for lower transport costs. It was concluded that the project has greatly contributed to the enhancement of transport efficiency and alleviation of traffic congestion.

Upon completion of the project, Samut Prakarn District was directly connected with the central Bangkok area, and the project contributed to the enhancement of Bangkok road network.

This project has largely achieved its objectives, and therefore its effectiveness is considered high.

3.4 Impact

3.4.1 Intended Impacts

Population of Metropolitan Bangkok as of 2008 is about 5.71 million and that of Samut Prakarn district, which is the subject project area, is about 1.15 million.

Fifty-four (54) percent among all the respondents (159 persons) perceive that the project contributed to the regional economy, and 35% no impact. The people who perceive no impact considers the current economic depression/unstable political situation at the national level as more dominant.

Sixty-six (66) percent of local residents/workers (79 persons) perceive that there was no major change in the household income before and after the project. However, 18% say that the income has increased. Positive answers were provided mainly by business executives and owners. The reason for the positive answer could be that accessibility to the central Bangkok area has improved and their businesses have been promoted. These results indicate that the impact and contribution of the project to the economic development (i.e., increasing the household income) in southern Bangkok area is limited.

Sixty-three (63) percent of local residents/workers perceive that the land in the region has been more effectively used and none of respondents perceive any negative impact. Regarding the land price, 44% of respondents perceive that it has increased upon completion of the project. In order to clarify the facts, the land price (government declared value) of the project area before/after the project was investigated. Results are shown in Table 5.

Table 5 Change of Land Price in the Project Area

(unit: baht/4m^2)[2]

Subject area	Government declared price for 2004-2007 (before project)	Government declared price for 2008-2011 (after project)
Along Phuchao Samingprai Road in Samut Prakarn District at south end of North-South Road	30,000 – 40,000 (35,000)	30,000 - 40,000 (35,000)

Source: Treasury Department, Ministry of Finance

[2] Thai specific unit indicating the government declared land price.

Comparison of land prices (government-declared price) of the project area before/after the project indicate that there is no change in land price. The reason for no change in land price could be that the Samut Prakarn district is already a dense and developed commercial district.

Sixty (60) percent of all the respondents recognize that the project contributed to the promotion of tourism. People perceive that since Chao Phraya River Crossing Bridge (cable stayed) is aesthetically attractive, hence it is already a best tourist spot (particularly for photographing) for international and domestic tourists.

3.4.2 Other Impacts

(1) Impacts on the natural environment

Countermeasures for traffic noise were implemented in the embankment and low viaduct sections almost as planned and thus, no environmental issues have emerged. Among all the respondents to the beneficiary surveys, 16% of respondents perceive that the urban environment has improved, but 52% say that there has been no change. Twenty-three (23) % recognize that the environment has worsened. Thus, their responses/opinions are split. It seems that the negative responses came mainly from people who live around the high viaduct sections, where the countermeasures for noise protection were difficult.

(2) Land acquisition and resettlement

At the beginning of the project, the Thai government could not timely allocate the budget for land acquisition required for bridge construction and resettlement activities, and negotiations on the compensation amount with some land owners took longer time. However, the process and procedures for land acquisition were implemented properly. The estimated land area to be acquired at appraisal was 581,000 ㎡, while the actual land area acquired was about 576,000 ㎡, which is almost as planned. Resettlement of 599 households was planned at appraisal based on preliminary designs. However, based on detailed designs, 472 households were actually resettled, which is slightly lower than planned. The total cost spent for land acquisition and resettlement was 6,356 million baht (5,027 million baht for land acquisition and 1,329 million baht for compensation), which was about 97% of the planned.

(3) Other impacts

Regarding effective land use, the beneficiary survey confirmed that with the construction of parks, a field track, and a museum under the project, the project contributed to improvement of the living and cultural environment for local residents.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

The Rehabilitation and Maintenance Division (staffed with 649 persons) of Public Works Department of the Ministry of Interior (PWD) was to be responsible for maintenance upon completion of the project. However, in October 2002 the central government was reorganized and the responsibility for this project was transferred to the Department of Rural Roads (DRR) of the Ministry of Transport. DRR consists of 11 Bureaus and the Regional Bureau (with 18 District Offices). The number of regular and non-regular staff as of 2008 is about 5,700. In principle, the Bureau of Maintenance is responsible for maintenance work after a project was completed and the number of staff assigned to the Bureau is about 200. Maintenance Bureau has 10 maintenance offices throughout the nation. Since the constructed bridge is a high technical cable-stayed bridge that requires special technology for maintenance, it was considered appropriate that the unit staffed with specialists in the subject sector will be in charge; exceptionally a field office of the Bridge Construction Bureau (staffed with 100 specialists and workers), which was responsible for construction is responsible for operation and maintenance of the bridge section as well. Since there is no cable-stayed bridge under the responsibility of DRR, the technical assistance is sought as needed by the Bangkok Metropolitan Authority (operating Rama 8 bridge) and Expressway Authority of Thailand (operating Rama 9 bridge), which have been operating and maintaining cable-stayed bridges. The field office is staffed with engineers (two civil engineers, one electrical engineer, and one mechanical engineer), technicians (two civil, one electrical and one mechanical staff), and 60 workers. It is considered that the organizational setup for maintenance of the completed project is appropriate.

North-South Road – connecting point with Rama III Road (north end)

Traffic control monitoring room (Field office)

3.5.2 Technical Aspects of Operation and Maintenance

The number of professional staff of DRR is about 1,700. The Bureau of Training and Participation is responsible for staff training, and training is carried out by senior engineers of each Bureau and Division and in-house consultants. Training subjects are prepared for each stage of project implementation, including design, construction, and maintenance/operation. Training for maintenance and operation focuses on process and procedures for maintenance of ordinary rural roads.

There were no comprehensive technical standards guidelines and manuals documented on maintenance techniques and procedures in detail have been prepared. Maintenance of pavement was undertaken referring to various manuals of American Association of State Highway and Transportation Official. The technical level of the executing agency in charge of operation and maintenance was considered appropriate.

3.5.3 Financial Aspects of Operation and Maintenance

The annual budget of DRR for the past four years is shown in Table 6.

Table 6 Budget of DRR by Year

(unit: million baht)

Item	2006	2007	2008	2009
New construction/ improvement	13,694	9,624	8,705	13,088
Operation/maintenance	5,180 (24%)	5,752 (32%)	6,436 (37%)	6,853 (31%)
Others (including capacity building)	2,569	2,482	2,163	2,429
Total	21,442	17,859	17,304	22,370

Source: Draft SAPROF Final Report for the Chao Phraya River Crossing Bridge at Nonthaburi 1 Road Construction Project, November 2009

Note 1: Fiscal year starts in October and ends in September (FY2009: October 2008 – September 2009)

Note 2: Numbers in ( ) are share of operation/maintenance budget among the total DRR budget

The share of budget for operation and maintenance against the DRR total budget for the past three years is more than 30%, which was considered appropriate. However, according to the persons in charge, the budget for maintenance is not sufficient to procure heavy equipment. The Maintenance Bureau currently has only 5 types of equipment with six units in total, which is considered insufficient. Since the roads constructed under the project are essential links in the Metropolitan Bangkok road network, priority is given to these roads in terms of budget allocation within the limited budget resources. Budget is allocated as needed; there is no criteria for budgeting, such as cost per kilometer or by type of pavement.

3.5.4 Current Status of Operation and Maintenance

Regular maintenance work (daily inspection, routine maintenance, periodic maintenance (minor repair) and major rehabilitation) have been carried out according to the simple maintenance and management work manuals of DRR. Daily inspection is carried out during the day and night on weekdays and only during the day on weekends. Condition of the pavement surface and traffic management facilities is visually inspected and monitored. Daily routine maintenance includes minor repairs such as patching pot holes, cleaning pavement surfaces, and inspection/cleaning of lighting facilities, as needed. Periodic maintenance includes repainting of markings (in principle every other year), overlay every four years, and change of expansion joints of bridges every five years. However, due to budget constraints, maintenance work has been implemented based on priority schedule from daily inspection results and the amount of traffic volume. Major rehabilitation is implemented depending on the degree of deterioration of road and bridge structures. Major repair works, more than periodic maintenance have been entrusted to two private companies on the annual contract basis since 1997.

Up to now since project completion, no major repairs have been implemented, except for repairs on some approach ramps and pavement resurfacing, and the road surface has been well maintained. No cracks, pot holes and damaged joints were found on the surface of bridge and viaducts sections, and thus it is considered that maintenance has been properly undertaken.

However, as traffic volume increases, it is essential to check the bridge deck from the back whether or not it has been damaged. This kind of inspection should be also carried out on other existing bridges. Thus, procurement of a bridge inspection vehicle needs to be considered.

No major problems have been observed in the operation and maintenance system, therefore sustainability of this project is considered high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project has been highly relevant with the development policies and needs of Bangkok, Thailand, as well as Japanese aid policies. The project cost was within the planned cost, but the project period substantially exceeded the plan. Therefore, the evaluation for efficiency is considered moderate. The project has largely achieved its objectives, and its effectiveness is highly satisfactory. No major problem has been observed in the capacity of the executing agency nor its operation and maintenance system. Therefore, sustainability of this project is considered high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendation

4.2.1 Recommendations to the Executing Agency

As previously recommended (under the post evaluation (2006) for the related ODA project, Wat Nakorn-In Bridge and Connecting Road Construction Project (1)(2)), it is essential to start conducting regular traffic count as soon as possible at the same location and same time of the year. Data on traffic volume is essential in planning and programming the maintenance and management work and for preparation of future road development plans. Maintenance Bureau of DRR could be an appropriate unit responsible for collecting data on traffic count, and analyzing and storing the data.

4.3 Lessons Learned

One of the project components, improvement of the old railway road was cancelled during project implementation. Because this component was not to be financed by the ODA loan, review on the safeguard issues (environment, and land acquisition/resettlement) and the implementation plan was excluded from the project appraisal. In addition, the environmental guidelines at appraisal time (1997) did not clearly state how the guidelines should be applied to this project component. Regardless of whether or not a project component would be financed by the ODA loan, it should be reviewed and appraised at the same level of detail applied to the main project component, when appraising a future proposed project.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Outputs		
		as planned
1) Construction of Chao Phraya River Crossing Bridge	・ North-South section (North bridge 581m, South bridge 707m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps	・ North-South section (North bridge 576m, South bridge 702m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps
2) Improvement of Old Railway Road (not JICA financed)	・ Bangkok Port East Gate - Poochao Saming Road with a length of about 7.5 km: improvement and widening from current 2 lanes to 4 lanes	cancelled
3) Extension to Bangkok Outer Ring Road (not JICA financed)	・ South end of Chao Phraya River Crossing Bridge - Bangkok Outer Ring Road with a length of 1.2 km : 4 lanse plus ramps	under construction. to be completed by June 2011.
② Project Period	September 1997 – July 2002 (59 months)	September 1997 – September 2006(109 months)
③ Project Cost		
Amount paid in foreign currency	24,560 million yen	14,886 million yen
Amount paid in local currency	60,619 million yen (12,762 million baht)	27,532 million yen (10,839 million baht)
Total	85,089 million yen	42,418 million yen
Japanese ODA loan portion	14,887 million yen	14,886 million yen
Exchange rate	1 baht＝4.75 yen (as of January 1997)	1 baht＝2.54 yen (September 29, 2000, fixed during the contract period at the rate as of the date, 28 days before submission of bids.)

Second Opinion Report on
Industrial Ring Road Construction Project, Thailand

Associate Professor Chuvej Chansa-ngavej, PhD
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Shinawatra University (SIU International)
Thailand

The interpretation of data in the ex-post evaluation report appears to have been done with professional care. Both objective data and subjective questionnaire survey results are used to complement each other. The survey questionnaire has been well-designed to cover all important aspects. However, in the report it was found that a large number of respondents (35%) perceived no impact of the project on local economy because the "unstable political situation at the national level is more dominant". An explanation for such perception could be because the questionnaire survey was most likely conducted around the time of political unrest in Bangkok during the second quarter of 2010. In normal situation, the perception of the project impact would have been much more positive.

The relevance of the project with the development needs of Thailand cannot be overstated. Although it is not in one of the fastest growing areas in Bangkok metropolitan area in terms of housing and commercial development, the project is of strategic importance in linking the industrial area with the Bangkok port and the outer ring road. The aesthetic design of the bridges is also invaluable for enhancement of the public perception of the area. However, a lesson learned is that future design of roads should avoid such sensitive areas as cemeteries in the first place, otherwise costly design changes or re-alignment of roads would be needed upon its implementation.

Kingdom of Thailand

Ex-Post Evaluation of Japanese ODA Loan Project
Pak Kret Bridge and Connecting Road Construction Project

Yasuhiro Kawabata, Sanshu Engineering Consultant

1. Project Description

Location of Project Site

Pak Kret Bridge

1.1 Background

Thailand's 7th National Economic and Social Development Plan (1992−1996) have three major goals: (1) maintenance of sound economic growth; (2) dispersion of income to regional areas; and (3) promotion of human resources development, environmental protection, and improvement in quality of life. The succeeding 8th National Economic and Social Development Plan (1997−2001), recognizing "human beings" as key, focused on economic development, as well as achievement of other development targets and objectives in order to emphasize social aspects more. However, due to the financial crisis that occurred in July 1997, the 9th Plan has to be revised substantially. The revised Plan was to focus on the following four agenda: (1) reconstruction of economy and assurance of stability; (2) alleviation of impacts to the people; (3) reform the economic structures; and (4) establishment of superior government.

At the time of appraisal in 1997, as the capital city, Bangkok was developing and expanding, the population of Nonthaburi District in the Northern Bangkok area had been increasing rapidly. Although the west bank area of Chao Phraya River was mostly agricultural land, the land development was expanding along the Bangkok Outer Ring Road. Thus, development of a residential area was anticipated in the neighboring areas. While high traffic demand was anticipated in the west bank area of Chao Phraya River as population increased, there was only a small number of bridges spanning Chao Phraya River in the northern Bangkok area compared with that in the central area, and traffic flow for the east-west direction was restricted. Moreover, Bangkok Outer Ring Road was the only major road for the north-south direction in the western

bank area, and the road network had not been well established.

1.2 Project Outline

The project objective is to contribute to the economic development in Nonthaburi District in the northern Bangkok area by alleviating traffic congestion in the project target area, promoting development and activating land use, and improving the road network by constructing the east-west (including Pak Kret Bridge) and the north-south roads in Nonthaburi District. The location of the project site is shown in Figure 1.

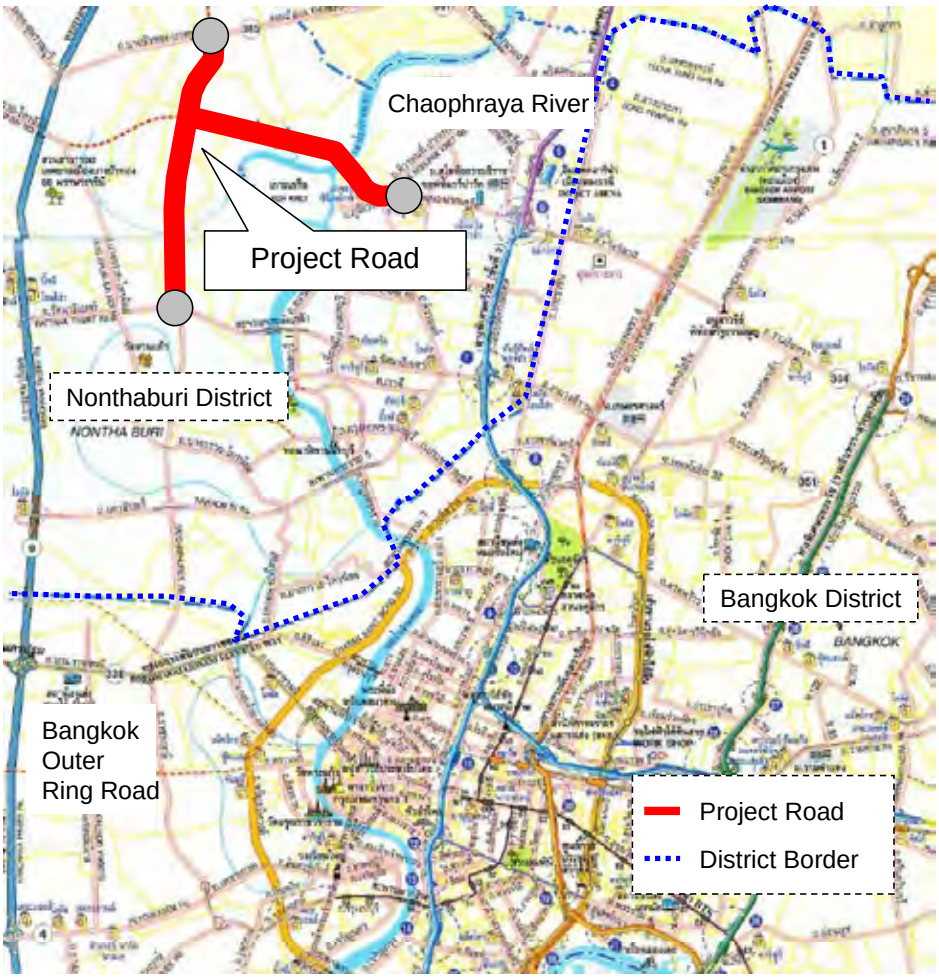

Figure 1　Location of Project Site

Approved Amount / Disbursed Amount	6,807 million yen / 4,964 million yen
Exchange of Notes Date / Loan Agreement Signing Date	September 1997/ September 1997
Terms and Conditions	Interest Rate: 2.7%; Repayment Period: 25years (Grace Period: 7 years) ; Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of Kingdom of Thailand / Department of Rural Roads, Ministry of Transport[1]
Final Disbursement Date	September 2007
Main Contractors (Over 1 billion yen)	Taisei Construction Co. Ltd. (Japan)/Sino-Thai Engineering and Construction Public Co., Ltd. (Thailand) JV/Mitsui Sumitomo Construction Co. Ltd. (Japan)
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	F/S by Department of Public Works, Ministry of Interior (January 1994)
Related projects	Wat Nakornin Bridge and Connecting Road Construction Project (I) (II) (Japanese ODA funded in 1995-1996, post evaluated in 2006)[2]

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

Duration of the Study: December, 2009 - September, 2010

Duration of the Field Study: March 21st – 27th , 2010 and May 8th – 17th , 2010

3. Results of the Evaluation (Overall Rating: A)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Thailand

Following the financial crisis in July 1997, Thailand's 8th National Economic and Social Development Plan focused on the following four agenda: (1) reconstruction of economy and

[1] Originally, the executing agency was Public Works Department (PWD) of the Ministry of Interior. However, due to reorganization of the Thai central government in October 2002, the responsibility for the project was transferred to Department of Rural Roads of the Ministry of Transport.

[2] The North-South Road included in the project is connected with Ratcha Phruk Road (North-south Road) included in the Wat Nakornin Bridge and Connecting Road Construction Project in the southern extended section.

assurance of stability; (2) alleviation of impacts to the people; (3) reform the economic structures, and (4) establishment of superior government. Under such social and economic conditions, development projects in Bangkok Metropolitan area, which is the center of political and economic activities, were essential for reconstruction of the country's economy and assurance of stability. Implementation of infrastructure development, particularly alleviation of traffic congestion in Bangkok, was one of the top priority agenda. The subject project was one of three bridge projects in the Bangkok area, which was classified as high priority project under the 7th National Economic and Social Development Plan (1992-1996).

The current 10th National Economic and Social Development Plan (2007-2011) focuses on the sustainable economic development seeking establishment of well-balanced communities, or "communities filled with green and happiness". In order to achieve this target, five strategies were established. One of the strategies is regarding national economy, focusing on "development of competitive economy, creation of value-added goods while retaining the Thai identity, and improvement of economic and investment infrastructures to attract foreign direct investment". In particular, the importance of infrastructure development (including development of efficient transport network in the Bangkok Metropolitan area and its vicinity) is being emphasized.

According to the National Regional Plan (2008), prepared by the Department of Public Works and Department of Town and Country Planning of the Ministry of Interior, Bangkok is proposed to be a: (1) compact city; (2) world-class city (a global city); and (3) hub for Bangkok's regional economy, export and transport. Nonthaburi District is planned as a residential and civic center district under the project.

The infrastructure development was a prioritized agenda in the national development plans both at appraisal and at post evaluation. The project is also in accordance with the policies and strategies of the National Regional Plan, prepared by Department of Public Works and Department of Town and Country Planning of Ministry of Interior, at the time of post evaluation.

3.1.2 Relevance with the Development Needs of Thailand

At the time of appraisal (1997), as Bangkok was developing and expanding, the population of Nonthaburi District in the Northern Bangkok area had been increasing rapidly. Particularly, the west bank area of Chao Phraya River in the northern area was developing, and neighboring areas were also expected to develop as residential areas. With the increase of population, high traffic demand was projected in the west bank area. However, the number of crossing bridges in

the northern area was fewer than that in the central area, and the traffic flow for the east-west direction was disrupted / constrained. The road network was not well developed, with the Bangkok Outer Ring Road as the only road serving the north-south traffic in the west bank area of the northern district. The project objectives to alleviate the traffic congestion and enhance the road network development in the subject district are in accordance with the country's development needs.

The east-west road, including Pak Kret Bridge constructed under the project, is an important link to connect the developing Nonthaburi District with the east bank area of the Chao Phraya River. The north-south road is serving as the link to the road network in the west bank of Chao Phraya River, which also supplements the parallel Bangkok Outer Ring Road. Work extension of the east-west road to the west and of the north-south road to the north is currently being implemented to connect these roads with the Outer Ring Road. Importance of these roads is well recognized, and the need for the project is highly relevant in terms of development of major road network in Bangkok.

Both the east-west and north-west arterial roads, which were constructed in project area of Nonthaburi District, are important links to form the arterial road network in Bangkok, and the need for road development was/is high both at appraisal and at post evaluation.

3.1.3 Relevance with Japan's ODA Policy

The previous Official Development Assistance (ODA, 1992) Charter stated the close relationship between Japan and the East Asian region (including ASEAN) and has put priority on Asian region. The infrastructure improvement was listed as one of its priority issues. Since the subject project was prepared before the Country Assistance Programs were introduced in 1998, a Country Assistance Program focusing on Thailand is not available. ,

This project has been highly relevant with the country's development plan and needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: b)

3.2.1 Project Outputs

The actual project length of both the east-west and north-south roads is almost as planned (original length of 13.3 km against actual length of 13.8 km). The actual length of each road (east-west and north-south roads) differs from the original plan, because the length of each road section depends on in which contract section the section around the junction connecting both the east-west and north-south roads was included. Interchanges were constructed as planned.

Table 1　Comparison of Outputs (planned and actual)

Component	Planned	Actual
① East-west road	・ Pak Kret bridge (6-lane、206m) ・ East-west road (about 7.7 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section in the east bank of Chao Phraya River)	Almost as planned ・ Pak Kret bridge (6-lane、278m) ・ East-west road (about 5.8 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section (about 1.8 km) in the east bank of Chao Phraya River)
② North –south road	・ about 6.1 km from Route 345 – Route 302: number of lanes is 6	Almost as planned ・ about 7.5 km from Route 345 – Route 302: number of lanes is 6
③ Interchanges	・ 3 locations (around Pak Kret intersection (east-west road), a junction connecting the east-west and the north-south roads, and an interchange connecting the north-south road and Route 345 (north-south road)	As planned

Source: Responses to the questionnaire

Main changes of outputs are described below. For safety reasons of the marine transport along the Chao Phraya River, the central span of the Pak Kret Bridge was widened from 94 m to 134 m. Since the west bank area of Chao Phraya River is a soft ground area, settlement was anticipated. Thus, the originally proposed cement concrete pavement was changed to asphalt pavement for easier maintenance after project completion.

Regarding consulting services, a local consultant was employed during July 2002 – January 2007 to assist in the bidding process and construction supervision. These consulting services were not financed by the ODA loan.

Starting point of the East-West Road
(West bound)

Junction connecting between
East-West and North-South Roads

3.2.2 Project Input

3.2.2.1 Project Period

The project period substantially exceeded the planned period. The planned period at appraisal was from September 1997 (Loan Agreement signing) to September 2001 (project completion), with a total period of 49 months. The actual project period was from September 1997 (Loan Agreement signing) to December 2006 (open to traffic), with a total period of 112 months, which is 229% of the planned period. The delay in project implementation is mainly due to delay in land acquisition activities, which required about four and half years till commencement of selection of contractors. The loan was signed right after the Asian financial crisis, and consequently the Thai government could not allocate the budget for the land acquisition and resettlement activities in time. As a result, the land acquisition and resettlement activities could not commence as planned and negotiation with land owners on the amount for compensation also took longer.

The planned schedule for selection of contractors to completion of civil works was from January 1998 to September 2001 with a total length of 45 months, while the actual period was from July 2002 to December 2006 with a total length of 54 months, exceeding the plan by 20% in terms of number of months. The delay in project implementation after commencement is due to extension of the project period to allow for the widening of the Pak Kret Bridge from 94 m to 134 m.

3.2.2.2 Project Cost

The total project cost estimated at appraisal was 18.636 billion yen (of which the Japanese ODA loan amount was 6,807 million yen and the rest was to be locally funded), and the actual total project cost was 11,808 million yen (of which the Japanese ODA loan amount was 4,960 million yen and the rest was to be locally funded), which is lower than planned (63% of the planned amount). However based on local currency, the total project cost slightly exceeded the planned amount (108% of the planned amount). The increase of project costs are mainly because of: ①change of structures at a bridge approach section and substructures of the viaduct section at the east bank of Pak Kret Bridge; ②additional works for relocation and construction of ducts with manholes for telephone cables; ③enlargement of a central span of Pak Kret Bridge due to safety reasons for navigation; and ④countermeasure works in the soft ground areas in the Chao Phraya River west bank area. The reduced project costs in Japanese yen are due to drop of the foreign exchange rate (1 baht=4.75 yen at appraisal to 2.80 baht at post evaluation).

Although the project cost was lower than planned, the project period was significantly longer than planned, and therefore efficiency of the project is considered moderate.

3.3 Effectiveness (Rating : a)

3.3.1 Quantitative Impacts

3.3.1.1 Results from Operation and Effect Indicators

(1) Passing traffic volume

The passing traffic volume on roads improved/constructed under the project is shown in Table 2.

Table 2 Passing Traffic Volume

(Unit: passenger car unit/day)

	2007	2008	2009	2010
East-West Road	28,500 (48,000)	n/a	n/a	81,000 (53,000)
North-South Road	77,500 (54,000)	n/a	n/a	105,500 (61,000)

Source: Counted numbers by DRR Maintenance Bureau

Note 1: Numbers in ( ) are projected figures in the F/S report (1994)

Note 2: Counted traffic volume on the North-South Road, funded by the project is not available. Volume shown in the table is the one counted at the location 2 km south of the project ending point.

No bureau/division of DRR has regularly undertaken traffic count at fixed stations. Counted data for 2007 and 2010 were actually available. There was no data available on traffic volume for the North-South Road section covered under the project, the data counted at the location 2 km south of the project ending point was used for analysis. In about three and half years (March 2010) after the project completion, the traffic volume on both East-West and North-South roads substantially exceeded the projected volume. The current volume in East-West Road is approaching the basic design capacity for 6-lane highway (88,000 vehicles per day). The current traffic volume in the North-South Road has exceeded the capacity, and traffic congestion occurs during the peak hours. The reason why the traffic volume on the East-West Road has tremendously increased for the past three years (2.8 times higher than that in 2007) could be that a huge government complex (the total number of in-out persons is about 50,000 per day) was completed about 3 km east of the Chao Phraya River along Chaengwattana Road in 2007.

The reason for higher traffic volume on North-South Road is that after the project completion, the area rapidly became more residential and commercial, along with the construction of numerous restaurants and shops along the corridor.

Interchange connecting between North-South Road and Route 345

North-South Road

(2) Reduction of travel time

Since data on travel time between two specific locations before the project is not available, the current required time to travel between two selected locations was surveyed on two different routes and results were compared under this post evaluation. The two selected locations are the interchange connecting between East-West Road and North-South Road in the west bank area of Chao Phraya River, and the 1.5 km east along Chaengwattana Road in the east bank area.

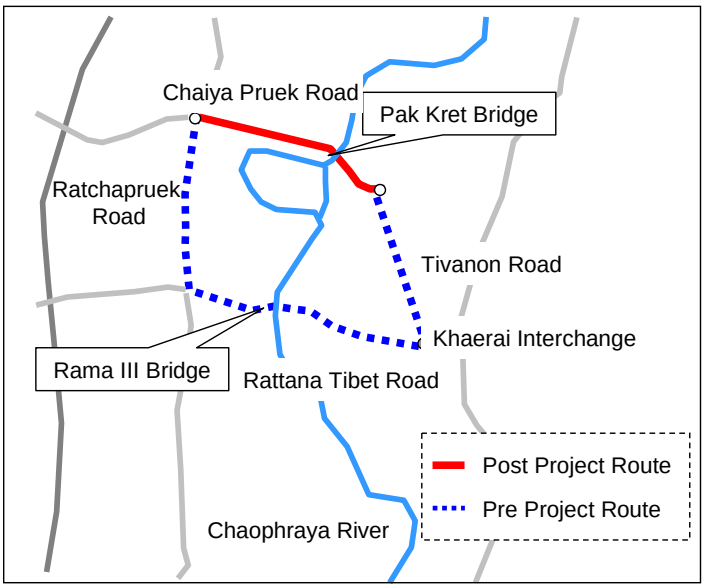

Figure 2 Specific Two Locations on both sides of Chao Phraya River

Table 3 Required Times to Travel the Specific Segment along the East West Road Corridor before and after the Project

	Segment (Route)	Length (km)	Required time (minutes)
Before the Project	Tivanon Road, Rattana Tibet Road, Rama III Bridge, Ratchapruek Road	19.6	Average 37 min. (47 min., 28 min.)
After the Project	Chaiya Pruek Road (East-West Road under the project)	6.5	Average 5 min. (5 min, 5 min)

Source: Actual figures surveyed by the evaluation team during 6 AM – 7AM on May 14, 2010
Note: Required time for round trip was surveyed by two teams who traveled firstly in the clockwise and counterclockwise directions and time for each route was averaged.

The required time to travel between the two specific locations after the project completion was reduced by about 30 minutes compared to that before the project. Reduction of travel time could be due to shorter travel distance and reduction of traffic congestion level. However, the results are only for reference since the current road/transport and social- economic conditions are quite different from those in 1997, when the project was prepared. Meanwhile, the result of the beneficiary survey showed that travel time of road users was reduced by 30 minutes in average after the project was completed.

(3) Stimulation of land use

Stimulation of land use in the project subject area was expected under the project. The land price (government declared value) of the project area before/after the project was investigated.

Table 4 Change of Land Price in the Project Area

(unit: baht/4m^2)[3]

Subject Area	Government declared price for 2004-2007 (before project)	Government declared price for 2008-2011 (after project)
East-West Road (Chao Phraya River East Bank Area)	30,000 – 96,000 (63,000)	96,000
North-South Road (Chao Phraya River West Bank Area)	10,000	40,000

Source: Treasury Department, Ministry of Finance

Comparison of land prices (government declared price) in the project area before/after the project indicate that price increased by 1.5 times in the Chao Phraya east bank area along East-West Road, and by 4 times in the Chao Phraya west bank area along North-South Road. In addition, the area became more residential and commercial, and land price rose.

[3] Thai specific unit indicating the government declared land price.

Rate of increase in population in the project area (Pak Kret district) at the project commencement (2003) was 2,000 persons per year. However, in 2008 upon completion of the project, population increased by 5,000 persons per year, which indicates that the area has been more residential. The amount of migration in the project area (Pak Kret district) is shown in the following table.

Table 5 Amount of Migration in the Project Area (Pak Kret district)

(unit: persons)

	Migration	Out-migration	Increase
Year 2003 (Project commencement)	17,300	15,300	2,000
Year 2008	20,500	15,500	5,000

Source: Public Administration Dept., Ministry of Interior

3.3.1.2 Results of Calculations of Internal Rate of Return (IRR)

The Economic Internal Rate of Return (EIRR) at appraisal was estimated at 23.8%, with the assumptions that construction costs, consulting services fees and maintenance costs are considered “cost”; savings of vehicle operating costs and travel time saving costs are considered “benefit”; and project life is twenty years. In order to calculate EIRR at post evaluation, the following assumptions were made. Costs are actual construction costs, consulting services fees (actual), and maintenance costs increased by the project (based on the projected costs made by DRR, costs required for the 20-year project life period, used at appraisal were re-estimated). Quantitative benefits are savings of vehicle operating costs and travel time savings (based on the projected benefits made by DRR, benefits to accrue for the 20-year project life period, used at appraisal were re-estimated). It was estimated at 30.0%. The reason for higher EIRR than originally estimated is that the actual traffic volume is higher than projected, and the traffic volume during the remaining period of the project life is much higher than projected since the project completion was delayed by 5 years against the original schedule.

Table 6 Economic Internal Rate of Return (EIRR)

	EIRR
At appraisal	23.8%
At post evaluation	30.0%

Source: Calculated based on responses to the Questionnaire

3.3.2 Qualitative Effects

Beneficiary surveys, through interviews, were conducted in the project area. The number of respondents was 160 persons. Responses were collected from road users (80 drivers and passengers), and/or local residents/workers (80 persons), and/or all respondents depending on the contents of questions. The classification of respondents by sex was 45% female and 55% male.

Sixty-eight (68) percent of respondents perceive that the traffic congestion in the project area has improved, and 79% of road users responded that the travel/commuting time has been substantially reduced. Sixty-five (65) percent of drivers/road users perceive that the transport cost has been reduced, and particularly because of substantial reduction in fuel costs (92%) and other maintenance costs (17%). Therefore, it is considered that the project has contributed to alleviation of traffic congestion.

East West Road, including Pak Kret Bridge, is a major link connecting between the Nonthaburi district and the Chao Phraya River east bank area, while the North South Road is the link leading to the central Bangkok supplementing the parallel Outer Ring Road. Both arterial roads constructed under the project contributed to the enhancement of the Bangkok road network.

Results of beneficiary surveys indicate that the project's objectives were achieved based on alleviation of traffic congestion, and enhancement of road network. Only 40% of local residents and workers perceive that the project contributed to stimulation of land use in the project subject area. The reason for less positive response could be that the project road provided more benefits to the passing road users rather than to local residents.

This project has largely achieved its objectives, and therefore its effectiveness is considered high.

3.4 Impact

3.4.1 Intended Impacts

Population of Metropolitan Bangkok as of 2008 is about 5.71 million and that of Nonthaburi district, which is the subject project area is about 1.05 million.

Forty-nine (49) percent among all the respondents (160 persons) perceive that the project has contributed to the regional economy, while 18% has no impact, and 16% has negative impact. The people who perceive without or negative impact considers the current economic depression/unstable political situation at the national level as more dominant.

Forty-nine (49) percent of local residents/workers (80 persons) perceive that there was no major change in the household income before and after the project. However, 18% said that the

income has increased, while 25% said that income has decreased. The reason income has not changed or has decreased is because the project site is located in the residential area rather than in the business/industrial district. In addition, local residents seemed to be suffering more from the current economic depression.

Thirty-eight (38) percent of local residents/workers perceive that the land in the region has been more effectively used. However, 28% say that there has been no change, and 14% say that stimulation of land use has worsened. The reason provided by people who perceive either no change or worst is that the subject roads provided more benefits to passing road users rather than local residents. The local residents along the corridor are also not keen by its negative impacts (traffic noise, disruption of local community, increase of traffic rules violating vehicle, congestion on service roads and others).

Regarding the land price, 36% of respondents perceive that it has increased upon completion of the project. Fifty-eight (58) percent of all the respondents recognize that the project contributed to promotion of tourism.

3.4.2 Other Impacts

(1) Impacts on the natural environment

According to the beneficiary surveys, since project roads are ordinary 6-lane highway at ground, except for Pak Kret Bridge and some viaduct sections, thirty-eight (38) percent of local resident and workers complained about the increase in traffic noise due to substantial increase of traffic volume, while 40% said no changes and 14% said that it has improved. Currently, enforcing traffic rules (speed, parking, exhaust sound and other traffic violations) has been implemented. However, stricter enforcement (speeding and exhaust sound) is needed, especially at night.

(2) Land acquisition and resettlement

Regarding land acquisition, at the beginning of the project the Thai government could not timely allocate budget for land acquisition and resettlement activities, and negotiations on the compensation amount with some land owners took longer time. However, the process and procedures were implemented properly. The estimated land area to be acquired at appraisal was 863,000 ㎡, while the actual acquired land area was about 869,000 ㎡, which is almost as planned. Resettlement of 117 households was planed at appraisal, while 120 households were actually resettled, which is almost as planned. The total cost spent for land acquisition and resettlement was 865 million baht (709 million baht for land acquisition and 156 million baht for compensation), about 112% of the plan.

(3) Other impacts

According to the beneficiary surveys, 66% of road users perceive that the road safety has improved. Regarding traffic accidents, 34% said that accidents have been reduced and 53% said no change. Regarding integration of community, 38% of respondents say that it has worsened since the community has been divided and crossing the highway became difficult after the construction of the arterial highway. Thus, it is evident that efforts to address environmental issues and consideration to the community were not sufficient.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

The Rehabilitation and Maintenance Division (staffed with 649 persons) of Public Works Department, Ministry of Interior (PWD) was originally to be responsible for maintenance upon completion of the project. However, in October 2002 the central government was reorganized and the responsibility for this project was transferred to Department of Rural Roads (DRR), Ministry of Transport.

Main Entrance of DRR

DRR consists of 11 Bureaus and the Regional Bureau (has 18 District Offices). The number of regular and non-regular staff as of 2008 is about 5,700. In principle, Bureau of Maintenance is responsible for maintenance work after a project was completed and the number of staff assigned to the Bureau is about 200. Maintenance Bureau has 10 maintenance offices throughout the nation and No. 1 Maintenance Office is responsible for the road sections constructed under the project. No. 1 Maintenance Office is staffed with one senior engineer, one civil engineer, one electrical engineer, and 70 workers. It is considered that the organizational setup for maintenance of the completed project is appropriate.

3.5.2 Technical Aspects of Operation and Maintenance

The number of professional staff of DRR is about 1,700. Bureau of Training and Participation is responsible for staff training, and training is provided by senior engineers from each Bureau and Division and in-house consultants. Training subjects are prepared for each stage of project implementation, including design, construction, and maintenance/operation. Training for maintenance and operation focuses on process and procedures for maintenance of ordinary rural roads.

Although there are no comprehensive technical standards guidelines and manuals

documented on maintenance techniques and procedures have been prepared, maintenance of pavement was undertaken referring to various manuals of American Association of State Highway and Transportation Official. The technical level of the executing agency in charge of operation and maintenance is considered appropriate.

3.5.3 Financial Aspects of Operation and Maintenance

The annual budget of DRR for the past four years is shown in Table 7.

Table 7 Budget of DRR by Year

(unit: million baht)

Item	2006	2007	2008	2009
New construction/ improvement	13,694	9,624	8,705	13,088
Operation/maintenance	5,180 (24%)	5,752 (32%)	6,436 (37%)	6,853 (31%)
Others (including capacity building)	2,569	2,482	2,163	2,429
Total	21,442	17,859	17,304	22,370

Source: Draft SAPROF Final Report for the Chao Phraya River Crossing Bridge at Nonthaburi 1 Road Construction Project, November 2009

Note 1: Fiscal year starts in October and ends in September (FY2009: October 2008 – September 2009)

Note 2: Numbers in ( ) are share of operation/maintenance budget among the total DRR budget

The share of budget for operation and maintenance versus the DRR total budget for the past three years is more than 30%, which is considered appropriate. However, according to persons in charge, the budget for maintenance is not sufficient to procure heavy equipment, and the Maintenance Bureau currently has only 5 types of equipment with six units in total, which is considered insufficient. However, roads constructed under the project are essential links in the Metropolitan Bangkok road network, thus priority is given to these roads within the limited budget sources. Budget is allocated as needed; there is no criteria for budget allocation, such as cost per kilometer or by type of pavement. Some sections along North –South Road have been rehabilitated after it was observed during field inspection that the pavement has deteriorated due to settlement.

3.5.4 Current Status of Operation and Maintenance

Regular maintenance work (daily inspection, routine maintenance, periodic maintenance for minor repair and major rehabilitation) have been carried out according to the simple maintenance and management work manuals of DRR. Daily inspection is carried out during the day and night on weekdays and only during the day time weekends. Condition of the pavement

surface and traffic management facilities is visually inspected and monitored. Daily routine maintenance includes minor repairs, such as filling pot holes, cleaning pavement surfaces, and inspection/cleaning of lighting facilities, as needed. Periodic maintenance includes repainting of markings (in principle, every other year), overlay every four years, and change of expansion joints of bridges every five years. However, due to budget constraints, maintenance work has been implemented based on priority schedule from daily inspection results and the amount of traffic volume. Major rehabilitation is implemented depending on the degree of deterioration of road and bridge structures. Major repair works, more than periodic maintenance have been entrusted to two private companies since 1997 on an annual basis.

Until now since project completion, no major repairs have been implemented, except for repairs of pavement surface in some road sections, the road surface has been well maintained. No cracks and pot holes were found on the bridge surface and viaduct sections, and thus it is considered that maintenance has been properly carried out.

No major problems have been observed in the operation and maintenance system, therefore sustainability of this project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project has been highly relevant with development policies and needs of Bangkok, Thailand, as well as Japanese aid policies. The project cost was within the planned cost, but the project period exceeded the plan substantially. Therefore, the evaluation for efficiency is considered moderate. The project has largely achieved its objectives, and its effectiveness is highly satisfactory. No major problem has been observed in the capacity of the executing agency nor its operation and maintenance system. Therefore, sustainability of this project is considered high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

1. As previously recommended (under the post evaluation (2006) for the related ODA project, Wat Nakorn-In Bridge and Connecting Road Construction Project (1)(2)), it is essential to immediately start conducting regular traffic counts (i.e., same location and same time of the year). Data on traffic volume is essential in planning and programming the maintenance and management work and for preparation of future road development plans. Maintenance Bureau of DRR could be an appropriate unit responsible for collecting data on traffic count, and analyzing and storing the data.

2. Through beneficiary surveys, it was noted that the project roads provide more benefits to the passing road users than local residents and the negative impacts (including noise, disruption of community, increase of traffic rules violating vehicle, congestion on service roads and others) are worse for local residents along the corridor. In order to improve the current living and social environment issues, measures such as enforcing traffic rules (speed, parking, exhaust sound and other traffic violations), installation of additional signs, landscaping and planting along the corridor, and installation of over-bridges, could be implemented immediately.

4.3 Lessons Learned

1. It seems that detailed studies were carried out in planning the main carriageway of the project. However, more attention should have been given to other items and issues such as: 1) disruption to community due to construction of an arterial road (crossing a road became harder and the travel distance to the crossing points became longer), and 2) construction of a viaduct and narrower service roads, which resulted in traffic congestion on service roads. More studies on the issues of disruption to community and traffic management on service roads should be carried out at the project preparation stage. Issues/items to be addressed include: installation of crossing structures (over bridges and culvert boxes) with a proper interval, traffic signs to ensure the smooth traffic flow, paint markings on pavement, and enhancement of law enforcement.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Outputs		
1) East-west road	・ Pak Kret bridge (6-lane、206m) ・ East-west road (about 7.7 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section in the east bank of Chao Phraya River)	Almost as planned ・ Pak Kret bridge (6-lane、278m) ・ East-west road (about 5.8 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section (about 1.8 km) in the east bank of Chao Phraya River)
2) North-south road	・ about 6.1 km from Route 345 – Route 302: number of lanes is 6	Almost as planned ・ about 7.5 km from Route 345 – Route 302: number of lanes is 6
3) Interchanges	・ 3 locations (around Pak Kret intersection (east-west road), a junction connecting the east-west and the north-south roads, and an interchange connecting the north-south road and Route 345 (north-south road)	As planned
② Project Period	September 1997 – September 2001 (49 months)	September 1997 – December 2006 (112 months)
③ Project Cost		
Amount paid in foreign currency	6,807 million yen	4,960 million yen
Amount paid in local currency	11,829 million yen (2,490 million baht)	6,848 million yen (2,446 million baht)
Total	18,636 million yen	11,808 million yen
Japanese ODA loan portion	6,807 million yen	4,960 million yen
Exchange rate	1 baht＝4.75 yen (as of January 1997)	1 baht＝2.80 yen (March 24, 2003, fixed during the contract period at the rate set 28 days before the bid submission date)

Second Opinion Report on

Pak Kret Bridge and Connecting Road Construction Project, Thailand

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Given the scarcity of traffic data in Thailand up to now, it is fair to obtain the subjective opinion from beneficiary surveys of road users and local residents/workers to provide recommendations on improving the living and social environment for the sake of the local communities. The proportion of respondents who are road users and those who are local residents/workers as well as the composition of the sex of the respondents are also appropriate. For future projects, however, it is expected that numerical data on traffic congestion and road accidents before the project start and after the project completion would be readily available from government and other sources through satellite imaging and computerized data collection techniques. Therefore such objective data should be used in the future if they are available. Opinions of local community leaders could also be sought to confirm the recommendations.

The relevance of the project with the development needs of Thailand cannot be overstated. The project location in the Nonthaburi area, especially on the west bank of Chao Phraya River, is one of the fastest growing areas in Bangkok and its vicinities in terms of housing and commercial development. It would seem that apart from road networks, more mass transit and public transportation projects would soon be needed to meet the rapid increase in transportation demand in the area.