Republic of Indonesia

Ex-Post Evaluation of a Japanese ODA Loan

"North Java Corridor Flyover Construction Project"

External Evaluator: Hideyuki TAKAGI, Ernst & Young Sustainability Co., Ltd.

0. Summary

This project was implemented under the conditions in which the transport capacity had declined along the North Java Corridor and its alternative routes that connect the northern part of Java from east to west, due to bottlenecks caused by traffic congestion at intersections and commercial activity at roadside stalls. The objective of this project is to expand transport capacity and alleviate traffic congestion on the roads by constructing flyovers at six locations, thereby contributing to the economic development of Java by improving the investment climate in the region.

This project is highly relevant to the development policy of Indonesia and development needs, as well as Japan's ODA policy. In terms of effectiveness, the project has contributed to the alleviation of traffic congestion: the average time to pass an intersection has been substantially reduced at the all locations where the flyovers were constructed. The qualitative effects of the project have been seen in the improvement of safety and convenience. As for the impacts, there seems to be no increase in the traffic volume of trucks at these locations. However, economic effects have become apparent to some extent, in that a contribution to more convenient transportation at a ferry terminal which connects Java and Sumatra has been observed. With all these facts taken into consideration, the project effectiveness and impacts are considered to be high. Due to the price rise in construction materials, the project costs significantly exceeded the plan. As a result, the project outputs were reduced by half, and flyovers were constructed at three locations (Merak, Balaraja, Geban). The project period also exceeded the plan; therefore the efficiency of the project is low. The sustainability is considered to be fair because maintenance of the flyovers at Merak and Balaraja had not been implemented as scheduled, and there is room for improvement in the technical aspects of maintenance of the drainage system of the flyovers. In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description

Project location (FO: Flyover)

A distant view of Merak flyover

1.1 Background

The transportation system in Indonesia has been largely depending on roads for both passenger and cargo; therefore, the expansion of the road network has been an important policy for the transportation sector. As a result, both the transport capacity and extension of the road network were expanded rapidly for upwards of ten years until the time of project appraisal. The development of the road network was also a priority agenda item for economic development in the national medium-term development plan at the time of project appraisal. In particular, the North Java Corridor is a main road that supports the economic activities of the country. The road connects the large industrial cities (Jakarta, Surabaya etc.) in the northern part of Java from east to west, where many companies and factories, including Japanese ones, are located. However, the transport capacity of the road had been reduced along with the increase in traffic volume due to the importance of this road, as mentioned above, and traffic congestion spots along the road hindered smooth traffic flows. Therefore, the transportation sector was listed in the plan for expansion of the traffic capacity of the North Java Corridor as one of the targets at the time of project appraisal.

Under the circumstances, the Ministry of Public Works implemented a feasibility study (hereinafter referred to as the F/S) aiming to expand transportation capacity and alleviate traffic congestion along the road by constructing flyovers where bottlenecks which were caused by traffic congestion at the intersections of the road and railroad as well as commercial activity at roadside stalls existed. In the F/S, 14 locations were selected as the most congested points and then studied, based on traffic censuses and requests from the surrounding areas. The special assistance for project formulation (hereinafter referred to as SAPROF) by the Japanese International Cooperation Agency (hereinafter referred to as JICA) followed the F/S. Based on the needs and feasibility of each plan, it was agreed with the Government of Indonesia to select six locations, Merak, Balaraja, Nagreg, Gebang, Peterongan and Tanggulangin, as the targets for

road development by ODA loan project.

1.2 Project Outline

The objective is to increase transport capacity and alleviate traffic congestion by constructing flyovers at six locations along the North Java Corridor and on its alternative routes, thereby contributing to the economic development of Java by improving the investment climate in the region.

Loan Approved Amount / Disbursed Amount	JPY 4,287 million/JPY 2,880 million
Exchange of Notes Date / Agreement Signing Date	March 2005 / March 2005
Terms and Conditions	Interest Rate: 0.4% Repayment Period: 40 years (Grace Period: 10 years) Condition for Procurement: Tied (Special Terms for Economic Partnerships (STEP))
Borrower / Executing Agencies	Republic of Indonesia / Directorate General of Highways (DGH), Ministry of Public Works
Final Disbursement Date	July 2011
Main Constructors (Over 1 billion yen)	PT. Waskita Karya (Indonesia) / Tokyu construction Co., Ltd. (Japan) (JV)
Main Consultants (Over 100 million yen)	PT. Virama Karya (Indonesia) / PT. Binatama Wirawredha Konsultan (Indonesia) / PT Hasfarm Dian Konsultan (Indonesia), PT. Indec Internusa (Indonesia) / PT. Pola Agung Consulting (Indonesia) / PT. Anugerah Kridapradana (Indonesia) / Katahira & Engineers International Inc.(Japan) (JV)
Related Studies (Feasibility Study) etc.	Feasibility study for the North Java Corridor flyover project (F/S) (Ministry of Public Works, Indonesia, 2003) Special Assistance for Project Formulation (SAPROF) (2004) Detailed Design Study for the North Java Corridor Flyover Project (Detailed Design: D/D) (2006)
Related Projects	N/A

2. Outline of the Evaluation Study

2.1 External Evaluator

Hideyuki TAKAGI (Ernst & Young Sustainability Co., Ltd.)

2.2 Duration of the Evaluation Study

Duration of the study: January 2014 – November 2014
Field study: April 14 – May 10, 2014 and August 25 – September 6, 2014

3. Results of the Evaluation (Overall Rating: C[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance to the Development Policy of Indonesia

1) Relevance to the national development policy

During the time from the project appraisal to this ex-post evaluation, the development of the road infrastructure has been a priority agenda item in both the national medium-term development plan and the country's economic policy of Indonesia. At the time of project appraisal, development of the infrastructure was one of the priority sections in the national medium-term development plan (2004 – 2009) in which the extension of the road network was promoted as a means of achieving 6–7% annual average economic growth. In addition, the comprehensive economic policy at that time stated that development of the infrastructure in areas where the economic potential was high was the development target of the transportation sector. At the time of the ex-post evaluation, the national medium-term development plan (2010 – 2014) is promoting the strengthening of traffic and transportation systems and the network formed by the four major cities, including Jakarta and Surabaya, in its priority development target in the infrastructure section. In addition, the master plan for the acceleration and expansion of economic development (2020 – 2025) puts emphasis on the development of the infrastructure (especially electric power and transportation) as the basis of economic development.

2) Relevance to the sector development policy

At the time of both project appraisal and this ex-post evaluation, plans for the country's transportation sector and the Ministry of Public Works have included the improvement of the North Java Corridor. In the government's activity plan in 2005, the expansion of the transport capacity of the North Java Corridor was listed in the targets of the transportation sector. In addition, number 53 of the direction of the Minister of Transport issued in 2000 indicated a policy of having crossings with an overpass or underpass at railroad intersections. At the time of ex-post evaluation, the strategic plan of the Ministry of Public Works (2010 – 2014) is promoting the development of the national roads including the construction of the flyovers in this project in its Java Island road plan, aiming at the construction of a reliable, unified and sustainable road network for the purpose of economic growth and social development.

With respect to the policy regarding the construction of an overpass or underpass at railroad

1 A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
2 (3): High, (2): Fair, (1): Low

intersections, however, only one location (Merak) meets the conditions since the project was implemented at two other locations (Balaraja and Geban) without consideration for this policy.

3.1.2 Relevance to the Development Needs of Indonesia

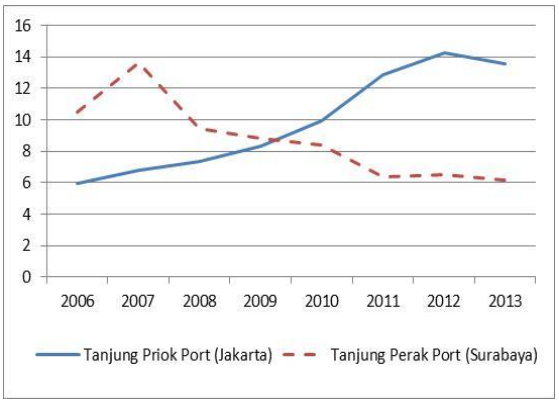
3.1.2.1. Development needs of the North Java corridor as a whole

From the time of the project appraisal to the ex-post evaluation, the North Java Corridor has supported the country's economic activity as a main road that connects the large industrial cities (capita city of Jakarta, the second largest city of Surabaya, etc.) in the northern part of Java from east to west, where many companies and factories, including Japanese ones, are located. The transport capacity of the road had declined due to the increase in traffic volume and bottlenecks caused by traffic congestion at intersections and commercial activity at roadside stalls. Under this situation, it was expected that flyovers would be constructed along the road to expand transport capacity and alleviate traffic congestion. At this ex-post evaluation, the development needs of the North Java Corridor as a whole were reviewed by analyzing the "current situation of the major industrial cities in Java Island" and the "changes in the traffic volume of the North Java Corridor", for the purpose of examining whether its role as a main road connecting the northern part of Java from east to west has been maintained.

1) Present condition of the major industrial cities in Java Island

According to the data of "cargo handling in major international ports" by Indonesia Statistics Bureau, exports from Jakarta have been increasing, whereas those from Surabaya have been decreasing. In addition, industrial parks seem to be spreading centered on the Jakarta metropolitan area if you look at a distribution map in each province of Java Island. From this point of view, it is considered that economic activity in Java Island has been concentrated on the Jakarta metropolitan area.

(Unit: Million ton)



Source: Indonesia Statistics Bureau (BPS)

Figure 3.1-1 Trends in cargo handling at the major international ports

2) Changes in the traffic volume of the North Java Corridor

The traffic volume of the North Java Corridor was observed for the road sections where the flyovers were constructed. According to this, the traffic volume has increased about 1.7 times at Merak, about 4.4 times at Balaraja and 1.2 times at Gebang from the time of project appraisal in

2003 to ex-post evaluation in 2013. While the rate of increase is different for each location, the greatest increase in traffic volume was seen at Balaraja, which is located near Jakarta.

Table 3.1-1 Comparison of the volume of traffic at the time of appraisal and Ex-post evaluation

(Unit: Number of vehicles/day)

	Baseline at the project appraisal (2003)	Actual traffic at the ex-post evaluation of the project (2013: 1 year after completion)	Increase	% increase from 2003
	(a)	(b)	(b) – (a)	(b) / (a)
Merak	8,901	14,942	6,041	167%
Baralaja	11,928	52,268	40,340	438%
Geban	25,035	29,909	4,874	120%

Source: Inter-urban Road Management Central System Database (IRMS) of the DGH, Ministry of Public Works and calculation by the external evaluator

3.1.2.2. Development needs of the locations of the three flyovers

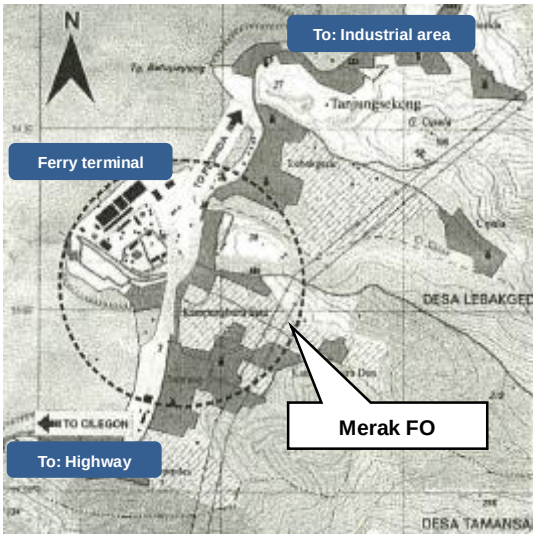
As mentioned above, it is considered that economic activity in Java Island has been concentrated on the Jakarta metropolitan area. Changes in the traffic volume along the North Java Corridor reflect this situation, and the rate of increase is higher at Balaraja among these project sites. In addition, while the improvement of the North Java Corridor has been promoted as its capacity and functions are reaching their limit due to its geographical importance, the construction of the "Trans-Java Toll Road" was already ongoing at the time of the project appraisal for the purpose of complementing the functions of this main road connecting Java Island from east to west[3]. With these points taken into consideration, an analysis was conducted on the development needs of the three locations where the flyovers were constructed at the ex-post evaluation, in addition to the analysis on the role of the North Java Corridor as a main road connecting the northern part of Java Island from east to west. As a result of the analysis, it is concluded that the need for the alleviation of traffic congestion has been high at each location, therefore the development needs of the project has been maintained.

1) Location of the Merak flyover

The Merak flyover has entrances at a ferry terminal in a port located at the west end of the Trans-Java Toll Road and at a road connecting to an industrial area along the coast (Refer to Figure 3.1-2).

[3] At the time of the project appraisal, development of the Trans-Java Toll Road had been delayed due to the slow economic recovery from the Asian financial crisis.

The flyover is one-way traffic from the two entrances at the ferry terminal and the road from the industrial area, and after the junction it connects to the North Java Corridor headed to the entrance of the toll road in Merak. The traffic at the location of the Merak flyover consists mainly of vehicles using the ferry between Java and Sumatra or the comings and goings to the industrial area. Traffic congestion before the construction of the flyover had adversely affected the area especially by hindering the convenience of the ferry users; therefore the development needs for this project are considered high.

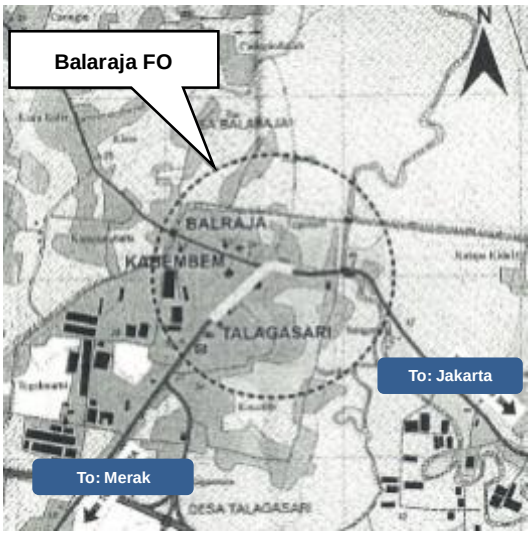


Source: JICA internal material

Figure 3.1-2 Sketch map of Merak FO

2) Location of the Balaraja flyover

The Balaraja flyover is located at an intersection of the North Java Corridor and a road connecting to it, and it runs along the North Java Corridor with two-way traffic (refer to Figure 3.1-3). To complement the functions of the North Java Corridor, the Trans-Java Toll Road for this section was already constructed before the implementation of this project. Despite the toll road, the traffic volume of the North Java Corridor at this section has increased substantially in comparison to that at the time of the project appraisal. The area surrounding the location of the flyover is near Jakarta and there are many industrial parks, thus it is considered that the number of cargo trucks coming and going between the toll road and industrial parks and/or between factories around the area has risen and local traffic has also expanded due to the development of the surrounding area and the population increase. It is therefore considered that the development needs at this location are high from the viewpoint of the alleviation of traffic congestion due to the increase in local traffic.



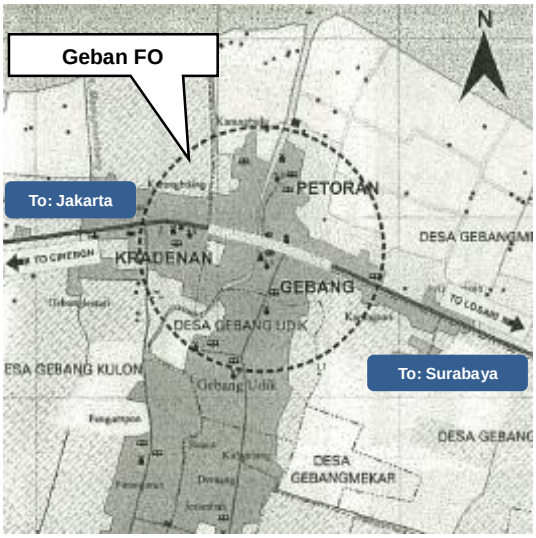
Source: JICA internal material

Figure 3.1-3 Sketch map of Balaraja FO

3) Location of the Geban flyover

The Geban flyover is located on the north Java coast connecting Jakarta and Surabaya (refer to Figure 3.1-4). The Trans-Java Toll Road for this section was already constructed before the implementation of this project, as with the Balaraja flyover. However, since the toll road has still only been partially opened, vehicles going the northern part of Java from east to west need to use the North Java Corridor even if they use the toll road at this section. Therefore, it seems that the convenience and merit of using this part of the toll road is not high. Furthermore the toll rate is set high, thus not many vehicles choose to use this section of the toll road, whereas the traffic volume on the North Java Corridor has increased to 120% from the time of the project appraisal.

In terms of the increase in the volume of local traffic, the volume generated in the Geban area seems not to be so high from the situation of its surrounding area, unlike Merak and Balaraja where there is a ferry terminal or industrial parks nearby. On the other hand, it is considered that the role of the North Java Corridor as a main road connecting the northern part of Java from east to west has been maintained because the convenience of the toll road is not high yet, therefore the development need for this project is high.



Source: JICA internal material

Figure 3.1-2 Sketch map of Gebang FO

3.1.3 Relevance to Japan's ODA Policy

As the basic policy of Japanese ODA towards Indonesia, the Country Assistance Policy for Indonesia (2004) stated that "sustainable growth led by the private sector" was one of its priority areas, and listed the "development of the economic infrastructure" for the improvement of the investment environment as one of the supporting measure. The project is for the development of the basic infrastructure in the transportation sector and it was therefore relevant to the Japan's Country Assistance Policy for Indonesia at the time of the project appraisal.

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

3.2 Effectiveness[4] (Rating: ③)

At this ex-post evaluation, the external evaluator re-examined the effectiveness and impact indicators based on the project effects assumed at the appraisal. With respect to the quantitative effect, the "average time needed to pass the intersections" was set as the most important indicator to examine the project's contribution to alleviating traffic congestion. For the qualitative effect and impact, the improvement of safety and convenience and the "increase in the volume and amount of cargo transportation" are regarded as important indicators, respectively.

3.2.1 Quantitative Effects (Operational and Effect Indicators)

Indicator 1: "Average time needed to pass the intersections"

This indicator was not set at the project appraisal but newly added through the re-examination of indicators at the ex-post evaluation. For this reason, no baseline or target for the indicator had been set before the project implementation. At the ex-post evaluation, the rate of time saving was examined for the average time needed to pass the intersections at each location of the flyover. The benchmarks for evaluation were 1) whether vehicles can pass the flyover without traffic congestion and 2) whether vehicles can pass the intersection under the flyover in around a few minutes without excessive traffic congestion. A comparison was made of the time needed to pass the intersections between the time of the project appraisal and ex-post evaluation, based on the information gathered by the beneficiary survey. Replies to the survey were weighted and the average time to pass the intersections was compared separately for peak hours and normal hours.

According to the results of the beneficiary survey[5], the average time needed to pass the intersection was more than 1 hour at peak hours and more than 30 minutes at normal hours at each location before the construction of the flyovers as shown in Table 3.2-1. After the construction, there has been no traffic congestion on the flyovers; therefore vehicles can pass there at the normal driving speed. Under the flyovers, it takes around 30 to 40 minutes at peak hours and around 10 to 20 minutes at other times. In addition, the situation at the site visited during the ex-post evaluation (as of April 2014) was better somehow than the results of the beneficiary survey at each location: during normal hours, vehicles were going slow or it took a

[4] The evaluation results of the project impacts are incorporated into the Effectiveness rating.

[5] (Beneficiary survey) Target groups: residents, administrative facilities such as schools, hospitals and police offices, and companies at the project sites or in the surrounding area. Survey objectives: time to pass the intersection (before and after the construction of flyovers), improvement of safety, convenience and environment of the roadside (improved or worsen), other positive and negative impacts. Number of samples: around 40 at each location covering the surrounding area widely; total of 121 samples from the 3 location (89 from residents (74%), 21 from administrative facilities (17%), 11 from companies (9%). Methodology: a local assistant asked the questions and wrote down the answers on the questionnaire.

few minutes to pass the intersections. In conclusion, the "average time needed to pass the intersections" at each location has been shortened considerably by the construction of the flyovers.

Table 3.2-1 Comparison of the average time needed to pass the intersections (under the flyovers) before and after the construction of the flyovers

(Unit: Minutes)

	Before the construction of the flyover	Average time needed to pass the intersections under the flyover		
		After the construction of the flyover	Reduction in the time	% of time reduced
	(a)	(b)	(c) = (a) - (b)	(d) = (c) / (a)
Merak:				
During the peak hours (about 2.4 h/day)	104	29	75	72%
Normal hours	40	9	31	78%
Balaraja:				
During the peak hours (about 2.0 h/day)	82	41	41	50%
Normal hours	36	18	18	50%
Gebang:				
During the peak hours (about 2.9 h/day)	100	46	54	54%
Normal hours	48	18	30	63%

Source: Calculation based on the results of beneficiary survey (weighted average of the replies for the time to pass the intersection and the length of the peak hours)

It is observed, however that the roads under the flyovers are still crowded, and traffic congestion still occurs during peak hours. In particular, traffic congestion is observed during the peak hours at Balaraja and Geban, caused by the lines of commercial vehicles such as mini buses waiting for passengers and the fish market opening during noon, respectively. Regarding the situation at Balaraja, countermeasures should be taken to ensure smoother traffic flows, such as by setting up bus stops, guiding the drivers to wait for passengers a certain distance away from intersections and controlling the parking of vehicles around the intersections. Regarding the situation at Geban, this is expected to become better if a plan for moving the fish market is implemented. According the local government that is proceeding with the plan, it is now seeking a contractor capable of implementing the moving of the fish market. Although it is not certain about the completion of the moving of the fish market, there has been land secured along the road and the local government intends to find a contractor and implement the plan

immediately. The traffic condition at Merak is not as crowded as it is called traffic congestion at the time of the ex-post evaluation.

Photo 1. Trucks with heavy loads passing over the flyover (Balaraja FO)

Photo2. Traffic congestion under the Geban flyover (the line of vehicles extends from the fish market ahead)

Indicator 2: "Average volume of traffic per day"

At the time of the ex-post evaluation, the traffic volume at the 3 locations achieved the target as shown in Table 3.2-2 (the target was calculated using an expected rate of increase of 40%[6]). The levels of achievement at each location are 120% at Merak, 313% at Balaraja and 85% at Geban.

Table 3.2-2 Comparison of the volume of traffic per day at the time of the appraisal and ex-post evaluation

(Unit: Number of vehicles/day)

	Baseline at The project appraisal (2003)	Target (3 years after project completion)	Actual traffic at The ex-post evaluation (2013: 1 year after project completion)	Achievement of the target
	(a)	(b) = (a) × 140%	(c)	(c) / (b) × 100%
Merak	8,901	12,461	14,942	120%
Baralaja	11,928	16,699	52,268	313%
Geban	25,035	35,049	29,909	85%

Source: IRMS of the DGH, Ministry of Public Works and calculation by the external evaluator

Aside from the achievement of the target, there has been no substantial increase in the traffic volume in comparison with the situation before and after the construction of the flyovers. As shown in Table 3.2-3, the traffic volume has slightly increased at Merak to 1.1 times and stayed

6 At the project appraisal, the target for the traffic volume was set based on the baseline data of 2013, and 140% of the baseline was assumed as the target 3 years after completion of the project. However, since the baseline data was not correct, the target was recalculated using the correct data, and 140% of the correct baseline was set as the target.

almost the same at Balaraja and Gebang, from the time before the construction (2010) to the ex-post evaluation (2013). It is considered that the increase in the traffic volume has not been as a result of the project, but is the natural increase by external factors, since it had already been increasing before the construction of the flyovers.

Table 3.2-3 Comparison of the traffic volume before and after the construction of the flyovers

(Unit: Number of vehicles/day)

	Traffic before the construction of the FO (2010)	Actual traffic at The ex-post evaluation (2013: 1 year after project completion)	Increase	% increase from 2010
	(a)	(b)	(b) – (a)	(b) / (a)
Merak	13,106	14,942	1,836	114%
Baralaja	51,019	52,268	1,249	102%
Geban	28,823	29,909	1,086	104%

Source: IRMS of the DGH, Ministry of Public Works and calculation by the external evaluator

3.2.2 Qualitative Effects

Information on the project's qualitative effects was gathered by the beneficiary survey conducted at each location of the flyovers.

1) Improvement of safety

According to the results of the beneficiary survey, most respondents including the residents feel there have been an improvement in safety since the construction of the flyovers at all the project locations (93% at Merak, 88% at Balaraja and 95% at Gebang). The respondents stated that the number of traffic accidents at the intersections had decreased compared to before the construction of the flyovers.

2) Improvement of convenience

According to the results of the beneficiary survey, most respondents including the residents feel that there has been an improvement in convenience after the construction of the flyovers at all the project locations (95% at Merak, 90% at Balaraja and 90% at Gebang). The respondents stated that as the crowded situation there had improved, both cars and pedestrians could easily go through the intersection.

3) Improvement of the roadside environment (mitigation of noise, air pollution, etc., caused by traffic congestion)

According to the results of the beneficiary survey, most respondents including the residents do not consider there has been much improvement of the environment along the road after the construction of the flyovers at all the project locations (improvement of noise: 35% at Merak, 18% at Balaraja and 7% at Gebang; improvement of vibration: 33% at Merak, 15% at Balaraja and 10% at Gebang; improvement of air pollution: 18% at Merak, 18% at Balaraja and 15% at

Gebang). It is considered that these replies from the respondents concerning the roadside environment relate to the increase in traffic volume such as cargo trucks at each location compared to before, rather than any inadequacy of the construction of the flyovers to generate environmental improvements. (Refer to the section on “Other Positive and Negative Impacts”).

3.3 Impact

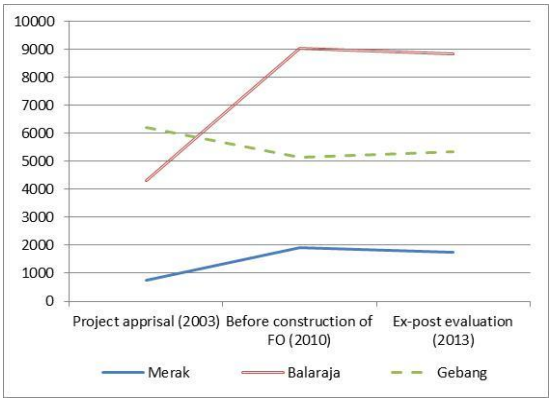
3.3.1 Intended Impacts

1) Economic effects from the improvement of cargo transportation

Indicator 1: “Increase in the volume and amount of cargo transportation”

Since no information was obtained regarding the volume and amount of cargo transportation, as an alternative, an analysis was conducted on changes in the volume of truck traffic. From the time of the project appraisal (2003) to the ex-post evaluation (2013), the volume of truck traffic has increased considerably at Merak and Balaraja by more than two times, whereas that at Gebang it has slightly decreased. In the comparison before and after the construction of the flyovers, however, the volume of truck traffic has decreased slightly at Merak and stayed almost the same at Balaraja and Gebang. In other words, there has been no substantial increase in the volume of truck traffic after the construction of the flyovers.

(Unit: Number of vehicles/day)



Source: IRMS of the DGH, Ministry of Public Works

Figure 3.3-1 Trends in the volume of truck traffic

With respect to the economic effects due to improvements to cargo transportation, an analysis was also conducted of the improvement in convenience when using the ferry terminal at Merak. Since the construction of the Merak flyover, traffic congestion around the entrance has been greatly alleviated.

Photo 3. Merak ferry terminal (The FO contributes to the movement of goods and people between Java and Sumatra)

As shown in Table 3.3-1, the number of vehicles using the ferry terminal has been increasing, and the improved traffic conditions have contributed to improving convenience for the movement of goods and people. The traffic congestion alleviated by the project has contributed especially significantly to the improvement of cargo transportation between Java and Sumatra, since almost half of the vehicles using the ferry terminal are trucks.

Table 3.3 -1 Trends in the number of vehicles using the ferry terminal

(Unit: Number of vehicles/year)

	2010	2011	2012	2013
Passenger cars	269,296	286,977	299,847	299,653
Buses	609,112	655,026	696,965	695,941
Trucks	895,264	1,022,722	1,049,140	1,013,757
Total	1,773,672	1,964,725	2,045,952	2,009,351

Source: A ferry company "PT. ASDP Indonesia Ferry"

Indicator 2: "Increase in the number of corporations in the nearby industrial cities and the amount of investment"

This indicator was excluded from the analysis of the project's impact for the following reasons. For the purpose of complementing the functions of a main road connecting Java Island from east to west, the construction of the Trans-Java Toll Road had already been proceeding; therefore the construction of the flyovers is not strongly related to the increase the number of corporations in the nearby industrial cities and the amount of investment.

2) Impacts from the improvement of safety

Indicator 1: "Decrease in the number of traffic accidents"

The data on the number of traffic accidents could not be obtained because the local police office does not record this information. Therefore, a decision was made for this indicator to be assessed based on the information gathered by the beneficiary survey. According to this information, it seems that the number of traffic accidents has decreased since the construction of the flyovers at all three locations (% of replies to the question "traffic accidents have decreased" were 95% at Merak, 88% at Balaraja, 98% at Gebang).

3.3.2 Other Impacts

1) Impacts on the Natural Environment

According to the environmental monitoring[7] conducted after the completion of the project, no specific issues were reported regarding air pollution, noise and vibration. Although negative

[7] Source: JICA internal material

results were reported on the examination of water quality in nearby rivers and waste water conducted during the monitoring, these were caused by industrial effluent. The monitoring report concluded that there were no environmental impacts from the project.

2) Land Acquisition and Resettlement

As it is shown in Table 3.3-2, the number of houses moved by the resettlement increased compared to the plan of the project in all three locations. The factors that caused this increase are the changes in the specification from 1 to 2 bridges at Merak (Refer to the Efficiency section) and a population increase along the road at Balaraja and Gebang. According to the interviews with the residents at the project sites, there were no specific issues in the process of land acquisition; therefore there was no negative impact on the residents moved by this project. Regarding the scale of land acquisition, it was almost as planned except for Merak for which the specifications for the flyover were changed. At Balaraja, a part of the school site adjoining the intersection was subject to land acquisition. According to a teacher at the school, it has secured a sufficient number of class rooms by constructing a school building on the school site, utilizing the sufficient amount of compensation provided by the land acquisition.

Table 3.3-2 Comparison between the plan and the actual situation of resettlement and land acquisition

	Resettlement (number of houses)			Land acquisition (m²)		
	Plan	Actual	Difference	Plan	Actual	Difference
Merak	8	88	80	891	3,151	2,260
Balaraja	15	35	20	2,621	2,140	-481
Geban	23	98	75	3,929	3,928	-1

Source: JICA internal material

3) Unintended Positive/Negative Impact

In the beneficiary survey, complaints from the residents in the surrounding areas were heard at all three locations about exhaust gas and dust that are considered to be caused by the increase in traffic volume and the drainage system of the flyovers, which has not functioned well. Regarding the air pollution, it is not considered as an impact of the flyovers because the traffic volume had largely increased before the construction (Refer to the Sustainability section for the function of the drainage system). At Balaraja, it was pointed out by the school adjoining the intersection that the speed of vehicles is higher when they pass the flyovers, which causes a danger for school children when they cross the road on the way to school. Countermeasures should be taken to cope with such a situation, such as setting up pedestrian crossings and signs and giving a safety education to the school children.

As described above, the project has contributed to shortening the average time to pass the intersection and has improved convenience and safety. As for the impacts, it has contributed to an increase in the number of vehicles using the ferry terminal and a decrease in the number of traffic accidents. With all these facts taken into consideration, it is concluded that this project has largely achieved its objectives. Therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ①)

3.4.1Project Outputs

1) Construction work

The outputs of the project were reduced from the construction of flyovers at the originally planned six locations to the three locations of Merak, Balaraja and Geban. The reasons for excluding the other planned three locations were the significant price rise in construction materials, unsuccessful biddings due to the high bid prices and volcanic activity (Refer to Table 3.4-2). The specifications for the flyovers at the implemented three locations are as follows, which were finalized through the detailed design study for the North Java Corridor flyover project (hereinafter referred to as D/D) during the project period. The design of the Merak flyover was originally planned as one bridge but was changed to two bridges. The final designs for the other two locations are almost the same as the original plan.

Table 3.4-1 Specifications for the flyovers

Pkg. 1	Merak 1	railroad intersection	Length of bridge: 345m, lanes: 1~2 (width: 6.75~11.17 m), PC・steel gilder
	Merak 2	railroad intersection	Length of bridge:145m, lanes: 1 (width: 7 m), PC・steel girder
	Balaraja	road intersection	Length of bridge: 221m, lanes: 2 (width: 13 m), PC・steel girder
Pkg. 2	Geban	non-intersection	Length of bridge: 385m, lanes: 2 (width: 9m), PC・steel girder

Source: JICA internal material

Out of the originally planned six locations, construction of the flyovers at the three locations of Nagreg, Peterongan and Tanggulangin were canceled for the following reasons and excluded from the project scope.

Table 3.4-2 Reasons for the cancellation of the three flyovers

Nagreg	The main reason of the cancellation of the Nagreg flyover was the sharp price increase in construction materials, especially steel, oil-related products, cement, etc. The total construction costs for five flyovers exceeded the loan amount (excluding Tanggulangin, which had already been excluded from the project's targets).
Peterongan	There was no bid submission on the rebidding process for this flyover. As it became difficult to implement the project within the loan period, the executing agency decided to exclude this location from the project's targets and to implement it under the national

	budget for 2011. (The construction of Peterongan was completed by the time of this ex-post evaluation.)
Tanggulangin	A mud flow volcano has been active since May 2006 in the Sidoarjo Regency, where the planned site of the Tanggulangin flyover was located. Due to the effects from the eruption, this location was excluded from the project at the bidding stage of the implementation.

Source: JICA internal material

2) Application of the special terms for economic partnership

In this project, there were problems caused by the effort fulfilling the requirement under special terms for economic partnership (hereinafter referred to as STEP): the construction cost increased compared to that without applying STEP; some bidding was unsuccessful because there was no tender from Japanese companies, and the construction of the flyovers was cancelled. The department in charge of overseas cooperation of the executing agency points out that from the technical point of view, the necessity for the application of STEP was relatively low in the case of constructing a small scale flyover like this project; therefore an application for a general untied loan was preferable. In addition, it states opinions for the future implementation of a project applying STEP. It is expected that, in the process of procurement, the requirements for the participation in bidding are relaxed so that more Japanese contractors can tender, and in the process of the construction work, the office procedures are more flexible.

3) Consulting services

Among the originally planned consulting services, the detailed design of the flyovers was excluded since it was prepared with the budget from JICA (D/D completed in December 2006). The other consulting services were implemented as planned.

3.4.2 Project Inputs

3.4.2.1 Project Costs

Comparison of the project costs was made for the construction work and consulting services of the three completed flyovers. Details of the planned and actual project costs are as follows. The actual project cost of 2,880 million yen was significantly higher than the plan of 1,895 million yen (152% of the planned costs). The main reason that the actual costs exceeded the planned costs was a sharp price increase in construction materials.

Table 3.4-3 Comparison of the planned and actual project costs

(Unit: Million yen)

Component	Plan (total of 3 FOs)			Actual (total of 3 FOs)			Difference
	Foreign	Domestic	Total (a)	Foreign	Domestic	Total (b)	(b) – (a)
Construction work:							

Pkg. 1 (Merak & Balaraja)	313	652	965	437	1,184	1,621	656
Pkg. 2 (Geban)	312	329	641	332	613	944	303
Sub-total	625	981	1,606	769	1,797	2,565	959
Consulting services	—	—	*289	184	131	315	26
Total	—	—	**1,895**	**953**	**1,928**	**2,880**	**985**

Source: JICA internal material

Notes: The sum for the construction work and consulting services of the planned and actual amounts were compared since information on the actual costs for administration and land acquisition was not obtained. / * The planned cost of the consulting services for the three flyovers above was calculated by dividing the total amount proportionally based on the ratio of the construction work costs for each flyover.

3.4.2.2 Project Period

The actual period[8] of the project as a whole was 85 months, which exceeded the plan of 63 months (135% of the planned period). The planned and actual project period are compared in Table 3.4-4 below. The start of the construction work was delayed for 17 months, mainly due to unsuccessful bidding as an effect of a sharp price rise in construction work, and the long time taken for the office procedures to approve the bidding results and the contracts as well. After the start of the construction work, the transfer of underground facilities at the project sites and the insufficient capacity of the contractors caused 5 months of delay until the completion.

Table 3.4-4 Comparison of the planned and actual project periods

Step	Plan	Actual	Difference (cumulative delay in months)
L/A signing date	March 2005	March 2005	No difference
Start of construction	June 2008	November 2009	17 months
Completion of construction	May 2009	March 2011	22 months
End of warranty period	May 2010	March 2012	22 months
Total period in months	63 months	85 months	22 months

Source: JICA internal material

3.4.3 Results of Calculations of the Internal Rates of Return (Reference only)

Financial Internal Rate of Return (FIRR)

The project does not relate to an increase in income as a financial benefit from the investment. Therefore, the calculation of the FIRR was excluded from the appraisal and the ex-post evaluation of this project.

Economic Internal Rates of Return (EIRR)

Recalculation of the EIRR was made at the time of the ex-post evaluation, based on the

[8] The completion of this project is defined as the end of the warranty period after 1 year from the completion of the construction work.

actual project costs and the difference between the annual average traffic volume and the planned target[9]. As a result, the recalculated rate far exceeds that at the time of the appraisal for Balaraja, where the annual average of traffic volume has increased significantly. On the other hand, the recalculated rates of Merak and Gebang are almost equal to the social discount rate indicated by international agencies for general public works, which range from 10 - 12%, mainly because the project costs exceeded the plan.

Table 3.4-5 Comparison of the planned and actual EIRR

	Appraisal	Ex-post evaluation	Notes
Merak	15.08%	about 12%	The annual average traffic volume was 120% of the target; however the project cost far exceeded the plan due to the change of the specifications to two bridges. As a result, the recalculated rate is lower than that at the appraisal.
Balaraja	29.24%	about 170%	The annual average traffic volume was more than 300% of the target, whereas the increase in the project cost was relatively small. As a result, the recalculated rate far exceeded that at the appraisal.
Geban	15.12%	about 10%	The annual average traffic volume was lower than the target (85%) and the project cost was higher than the plan. As a result, the recalculated rate is lower than that at the appraisal.

Source: JICA internal material (appraisal), re-calculation by the evaluator (ex-post evaluation)

The project period exceeded the plan, and the project cost significantly exceeded the plan. Therefore the efficiency of the project is low.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

1) Supervising the operation and maintenance

The operation and maintenance of the national roads is supervised by the Ministry of Public Works as the executing agency of the project. The actual work of the maintenance of roads is undertaken by its local offices at each location of the flyovers. With respect to the institutional aspects of the operation and maintenance of the project, it has been improved in comparison to that at the time of project appraisal because the governance for the Ministry's regional operation has been more systematic as a result of its organizational change as follows, and the staff allocation has been expanded as well. The department in charge of this project has been changed to the Directorate General of Highways from the Directorate General of Regional Infrastructure at the time of the project appraisal. Following the organizational change, it established an "Agency for National Road Implementation" (hereinafter referred to as BBPJN) under a Ministerial regulation in 2010 at 10 locations across the country. These are under the

[9] Approximate recalculated rates are shown here, which reflect only the actual project costs and the annual average traffic volume among the factors for the calculation of the EIRR since some parts of the calculation at the time of the appraisal are not clearly identified.

jurisdiction of the Directorate General of Highways, which oversees the regional operations of the Ministry. The BBPJN undertakes, under the direct control of the Directorate General of Highways, the supervision of the development and maintenance of the national roads. The operation and maintenance of the flyovers at Merak, Balaraja and Geban constructed by this project is supervised by the BBPJN IV, which has jurisdiction over the special capital region of Jakarta and the provinces of West Java and Banten.

2) Implementation of the Maintenance

Among the local offices of the Ministry of Public Works, maintenance of the flyovers is implemented by the Tangerang office for Merak and Balaraja, and by the Cirebon office for Gebang. The local offices outsource the maintenance work of the national roads including flyovers along the roads, and maintenance teams are formed by full-time workers at each local office. According to the BBPJN IV, each local office has a sufficient number of maintenance staff, and there are no specific issues identified in the structural aspects of maintenance.

Meanwhile, regarding the structural aspects of maintenance, Merak and Balaraja flyovers were not cleaned or repaired appropriately at the site visits during the 1st field study as mentioned below in the Current Status of Operation and Maintenance section. The inappropriate maintenance at these flyovers was due to an emergency where the maintenance workers were busy for recovery work. There should be improvement in the structural aspects to avoid shortages of manpower from now on, whenever they need to deal with an emergency.

3.5.2 Technical Aspects of Operation and Maintenance

1) Technical aspects of the maintenance of national roads in general

The maintenance work for the flyovers is conducted in the same manner as for other sections of national roads, which consists mainly of cleaning and the patch repair of damaged road surfaces. According to the local offices of the Ministry of Public Works, there are no specific issues identified in the technical aspects of maintenance of the national roads in general since experienced workers are hired and they take training courses at a training center of the BBPJN IV and in-house training. The local offices control the maintenance teams by obligating them to report the results of the work and the schedule for the next day to the office every day.

2) Technical aspects of the maintenance of the drainage system of the flyovers

As the maintenance of flyovers is different from the maintenance of national roads in general, problems were observed regarding the maintenance of the drainage system of the flyovers during the site visits. Specifically, the lid of the drainage ditch cannot be opened in some places due to damage and curved road surface caused by a large traffic volume of trucks with heavy cargo and patch repair. In addition, there are places where sand had covered the drainage ditch

due to the lack of cleaning, and drainpipes seemed to be clogged with sand. In order to recover the functions of the drainage system, the maintenance methods for flyovers as a whole should be improved by reviewing how to repair damaged road surfaces and how to clean the inside of drainage systems.

Photo5. Road side of Balaraja FO (sand still remains inside the drainage system after cleaning)

Photo6. Patch repair and drainage ditch. The lid of the ditch cannot be opened (Geban FO)

3.5.3 Financial Aspects of the Operation and Maintenance

The budget for the maintenance of the national roads is allocated to the executing agency from the state budget, in which the maintenance of flyovers is included. For the regular maintenance of the national roads, approximately 90 million rupiah (about 800,000 yen) has been allocated per 1 km in the fiscal year 2014, which is spent on inspections, repairs, etc. (Refer to the table 3.5-1). According to the executing agency, the budget allocation has tended to increase, and it is sufficient for regular maintenance. Therefore, it is concluded in this evaluation analysis that there are no specific issues regarding the financial aspects of the operation and maintenance. However, it was also heard that in the case of an emergency where a large amount of the budget needs to be used for recovery work as described in the following section, this sometimes causes restrictions on the budget for regular maintenance of the national roads.

Table 3.5-1 Changes in the budget allocation for the maintenance of national roads

(Unit: Million rupiah)

FO	Road section	Distance (km)	2013	2014	
			Budget allocation	Budget allocation	Per 1 km
Merak	Merak – Cilegon	8.5	510	777	91.4
Balaraja *	Serang – Tangerang	54.14	40,374	24,309	449.0
Geban	Cirebon – Loasi	27.68	2,491	2,555	92.3

Source: The DGH, Ministry of Public Works

Notes: * Among the data provided by the executing agency, the budget amount of Balaraja includes that for the development of roads under conditions of increasing traffic volume. Therefore, there is a large difference in the amount between the above two years.

3.5.4 Current Status of the Operation and Maintenance

Problems were seen at all three flyovers at the site visits, especially Merak and Balaraja where the condition of the cleaning and repairs did not seem sufficient at the time of the 1st field study. The main reason for such inappropriate maintenance was an emergency: in recent years, recovery work has been prioritized to implement measures for flooding and collapsed sediment that occur during the rainy season, and the maintenance teams could not undertake regular maintenance of the roads in accordance with the schedule for a prolonged period of time. Summarizing the interviews with the residents in the surrounding area regarding the operation and maintenance of the flyovers, the road surface seems to be damaged by the passing of trucks with heavy loads when a pool of rain water is on the road surface. The road surface is therefore damaged most during the rainy season, and the malfunction of the drainage system due to inappropriate maintenance is considered one of the causes of the damage. Especially at Balaraja, the road surface was badly damaged near the exit of the flyover. Vehicles had to avoid the damaged points, thus the smooth traffic flow was disturbed. These flyovers are currently being maintained as of the time of the 2nd field study, and the damaged road surface is under pavement construction. The current conditions of each flyover are as follows.

1) Merak flyover:

The road surface is good, whereas there are accumulations of sand on the road side and inside the drainage system. According to the residents in the surrounding area, because of the malfunction of the drainage system pools of rainwater form at the entrance and exit of the flyover. As of the 2nd field study, the maintenance of the flyover has been in process mainly by cleaning, whereas removal of the sand inside the drainage system has not yet been completed.

2) Balaraja flyover:

The road surface is curved and damaged probably due to the large volume of truck traffic carrying heavy loads, and patch repairs for the damage and unrepaired large hollows were identified. In addition, sand has accumulated on the roadside and inside the drainage system. The maintenance condition seems worst among the three flyovers. As of the 2nd field study, the maintenance of the flyover has been in process mainly by patch repair and cleaning of the roadside, and the badly damaged road surface near the exit of the flyover is under pavement construction. However, removal of the sand inside the drainage system has not yet been completed.

3) Gebang flyover:

The condition is similar to that of Balaraja, where the road surface is curved and damaged, and maintained with a patch repair. According to the local office of the Ministry of Public

Works, the lid of the drainage ditch cannot be opened due to the curved road surface and problems in the repairs to the damaged points, therefore the inside of the drainage system cannot be cleaned to remove the sand. As a result, the malfunction of the drainage system causes pools of rain water at the entrance and exit of the flyover in the rainy season.

Some problems have been observed in terms of institutional and technical aspect of operation and maintenance system. Therefore the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented under conditions in which the transport capacity had declined along the North Java Corridor and its alternative routes that connect the northern part of Java from east to west. This decline was due to bottlenecks caused by traffic congestion at intersections and commercial activity at roadside stalls. The objective of this project is to expand the transport capacity and alleviate traffic congestion on the roads by constructing flyovers at six locations, thereby contributing to the economic development of Java by improving the investment climate in the region.

This project has been highly relevant to the development policy of Indonesia and development needs, as well as Japan's ODA policy. In terms of effectiveness, the project has contributed to the alleviation of traffic congestion: the average time to pass the intersections has been substantially reduced at all the locations where the flyovers were constructed. The qualitative effects of the project have been seen in the improvement of safety and convenience. As for the impacts, there seems to be no increase in the volume of truck traffic at these locations. However, the economic effects have become apparent to some extent, considering its contribution to convenient transportation at the ferry terminal that connects Java and Sumatra. With all these facts taken into consideration, the project's effectiveness and impacts are considered to be high. Due to the price rise in construction materials, the project cost significantly exceeded the plan. As a result, the project outputs were reduced by half, and flyovers were constructed at three locations (Merak, Balaraja, Geban). The project period also exceeded the plan; therefore the efficiency of the project is low. The sustainability is considered to be fair because maintenance of the flyovers at Merak and Balaraja had not been implemented as scheduled, and there is room for improvement in the technical aspect of maintenance of the drainage system of the flyovers. In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agencies

1) To improve the institutional aspects of the operation and maintenance in the case of an emergency

At the Merak and Balaraja flyovers, appropriate cleaning and repairs had not been carried out for a prolonged period of time due to an emergency where the maintenance workers were busy with recovery work that was prioritized to support measures to deal with flooding and collapsed sediment which has occurred during the rainy season in recent years. Not only regarding these two flyovers, there should be improvement in the institutional aspects to avoid a shortage of manpower from now on whenever it is necessary to deal with an emergency. For example, the executing agency can create a system in which each BBPJN forms a team for emergency measures in each jurisdiction area (in the case of BBPJN IV, the special capital region of Jakarta and the provinces of West Java and Banten). Dispatching the emergency team would avoid an excessive burden on the local maintenance teams so that the regular maintenance work can be appropriately managed.

2) To improve the maintenance of the drainage system of the flyovers

There are problems regarding the maintenance condition of the drainage system of the flyovers: the lid of the drainage ditch cannot be opened in some places due to damage, such as a curved road surface caused by a large volume of truck traffic with heavy loads and patch repairs. There are also places where sand covers the drainage ditch due to the lack of cleaning and the drainpipes also seem to be clogged with sand. In order to recover the functions of the drainage system, the maintenance method of the flyovers as a whole should be improved by reviewing how to repair damaged road surfaces and how to clean the inside of the drainage system.

3) Traffic control and safety measures surrounding the flyovers

There are problems regarding the traffic control and safety measures surrounding the flyovers especially at Balaraja. Traffic congestion caused by lines of parked commercial vehicles such as mini buses during the peak hours hinders smooth traffic flows. In addition, the school adjoining the intersection pointed out that the speed of vehicles is higher when vehicles pass over the flyovers, which causes a danger for the school children when they cross the road on the way to school. Countermeasures should be taken by the administrative bodies for traffic control and safety measures surrounding the flyovers. For example, the following measures are expected to cope with vehicles stopping around intersections: the setting up of bus stops, guiding the drivers to wait for passengers at a certain distance away from intersections and controlling the parking of vehicles around intersections, which should be executed in coordination with the local government and police stations, etc. To improve the safety of pedestrians, countermeasures should be taken such as the setting up of pedestrian crossings and signs and giving safety education to the school children, in coordination with the local

government, police stations, schools etc.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

1) Application of the STEP

In this project, there were problems caused by the effort fulfilling the STEP requirement: the construction cost increased compared to that without applying STEP; some bidding was unsuccessful because there were no tenders from Japanese companies, and the construction of flyovers was cancelled. The department in charge of overseas cooperation of the executing agency points out that from the technical point of view, the necessity for the application of STEP was relatively low in the case of constructing a small scale flyover like this project; therefore an application for a general untied loan was preferred. In addition, it states opinions for the future implementation of projects applying STEP. It is expected that in the process of procurement, the requirements for participation in bidding are relaxed so that more Japanese contractors can tender, and in the process of the construction work, the office procedures should be more flexible.

Based on the suggestions from the counterpart regarding the efficiency of the loan project under the STEP, measures are considered necessary to cope with the high bidding prices and the small number of bidders, with a single bid being typical. In addition, there should be confirmation and agreement regarding the necessity of applying STEP to the future ODA loan project through careful consideration based on the contents and scale of the project objectives together with due consideration of the requirements of the borrower (counterparty government) and the executing agency. For example, a comparative review should be made regarding the application of STEP and general untied loans at the planning stage of a project, from the viewpoint of the financial and cost benefit analysis. The study results are explained to the executing agency and through discussions an agreement is made.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
(1) Project Outputs	Construction of flyovers at the following six locations: ・ Merak (railroad intersection) ・ Balaraja (road intersection) ・ Nagreg (non-intersection) ・ Gebang (non-intersection) ・ Peterongan (road intersection) ・ Tanggulangin (railroad intersection)	Construction of flyovers at the following three locations: ・ Merak (railroad intersection) ・ Balaraja (road intersection) ・ Gebang (non-intersection)
(2) Project period	March 2005 – May 2009 (63 months)	March 2005 – March 2012 (85 months)
(3) Project cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 1,441 million yen 4,315 million yen (359,779 million rupiah) 5,756 million yen 4,287 million yen 1 rupiah＝0.012 yen (As of September 2004)	 935 million yen 2,215 million yen (235,048 million rupiah) 3,168 million yen 2,880 million yen 1 rupiah＝0.0094 yen (March 2007 to July 2011, average of the lending period)