

Democratic Socialist Republic of Sri Lanka

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

“The Project for Reconstruction of 5 Bridges in Eastern Province”

External Evaluator: Koichi Akimoto, OPMAC Corporation

0. Summary

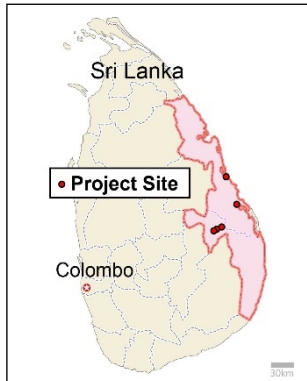
The objective of this project is to increase transportation capacity and safety for the targeted 5 bridges in the Eastern Province affected by civil war, by improving the condition for 4 deteriorated small and medium sized bridges on A005 national highway and Panichchankeni causeway¹ and a bridge on A015 national highway, thereby contributing to improve living environment of local communities and to improve access and logistics between Eastern Province and neighboring Provinces.

The project was consistent with the development plan and development needs of Sri Lanka, both at the time of planning and ex-post evaluation, as well as with Japan’s ODA policy at the time of planning. Therefore, the project relevance is high. As for the project effects, it is confirmed that the project brought positive effects for increase in transportation capacity and safety for the targeted bridges and neighboring roads such as an increase in average daily traffic volume, an increase in the passable weight (tons) of heavy trucks and an increase in the average driving speed of vehicles in the project areas. In addition, improvement in traffic accessibility and the safety of pedestrians in the project bridges has also been confirmed. Through these positive effects, it is considered that there has been an improvement in the lives and economic activities of locals along with an improvement in service accessibility to schools, hospitals, and markets. The project is found to have contributed to these improvements, and thus, its effectiveness and impacts are high. However, the effectiveness and impacts are considered not only to have been achieved by reconstruction of the targeted 5 bridges, but also through various other road improvement projects. Projects by the Road Development Authority (hereinafter called the RDA), and other donors such as the World Bank, the Asian Development Bank and the Agence Française de Développement contributed to the results around the project areas in Eastern Province as external factors. Meanwhile, even though the project cost was in accordance with the plan, the project period slightly exceeded the plan. Therefore, the efficiency of the project is fair. The sustainability of project effects is high since no major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system for the Executing Agency.

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

¹ A causeway is a road or railway on top of an embankment which is built in a water area or wetland.

1. Project Description



Project Location
(the Eastern Province is marked in red)



Vehicles passing over the Chenkalady Bridge
(Bridge No.4) after reconstruction.

1.1 Background

The Eastern Province of Sri Lanka was affected by civil war for more than 20 years with fighting between the government and an antigovernment force, the Liberation Tigers of Tamil Eelam (herein after called LTTE). Even though the province was freed from the control of LTTE by government forces in July 2007, infrastructure such as roads and bridges had suffered serious damage from the civil war, which lasted for many years, and from the Indian Ocean Tsunami which occurred in December 2004. In particular, bridges were scattered which posed a problem for smooth transport in the province since some of the bridges had been constructed more than 60 years ago during the British colonial period, and there had been no sufficient implementation of operation and maintenance of the bridges during the civil war. In addition, deterioration/corrosion of bridge girders, damaged bridge abutments and piers, collapsed revetments, and damaged bridge railings were observed in the targeted 5 bridges of project, which were in a dangerous situation.

In response to this situation, the Japan International Cooperation Agency (herein after called JICA) implemented a technical cooperation project “Recovery, Rehabilitation and Development Project for Tsunami Affected Trunk Road” (2005-2006), and implemented a Japanese yen loan project, the “Pro-Poor Eastern Infrastructure Development Project” (2006-2013) for an improved transport system in the Eastern Province. Under these circumstances, the government of Sri Lanka requested that the government of Japan provide grant aid cooperation for reconstruction of 4 small and medium sized bridges on the A005 national highway which connects the central areas of Sri Lanka and the Eastern Province, and the Panichchankeni causeway and a bridge on A015 national highway, thereby contributing to improved access to the Eastern Province.

1.2 Project Outline

To increase transportation capacity and safety for the targeted bridges in the Eastern Province, by improving the condition for 4 deteriorated small and medium sized bridges on A005 and causeways and a bridge on A015 national highway, thereby contributing to improve living environment of local communities and to improve access and logistics between the Eastern Province and neighboring provinces² affected by civil war.

E/N Grant Limit / Actual Grant Amount	(Detailed Design): 29 million yen / 28 million yen (Main Works): 1,217 million yen / 1,052 million yen
Exchange of Notes Date / Grant Agreement Date	(Detailed Design): January 2010/ January 2010 (Main Works): November 2010/ November 2010
Executing Agency	Road Development Authority (RDA)
Project Completion Date	June 2013
Main Contractor	Daiho Corporation
Main Consultants	Joint Venture (Oriental Consultants Co., Ltd. Japan Bridge & Structure Institute, Inc.)
Basic Design	February 2009 - October 2009
Related Projects	<p><u>Technical Cooperation</u></p> <ul style="list-style-type: none"> • Recovery, Rehabilitation and Development Project for Tsunami Affected Trunk Road (2005 - 2006) • The Project for Capacity Development on Bridges (2015 - 2018) <p><u>ODA Loan</u></p> <ul style="list-style-type: none"> • Pro-Poor Eastern Infrastructure Development Project (2006 - 2013) • Provincial/Rural Road Development Project (Eastern Province) (2010 - 2013) <p><u>Other International Agencies and Donors</u></p> <ul style="list-style-type: none"> • Asian Development Bank (herein after called ADB): Eastern and North Central Provincial Road Project (2009 - 2016)

² The project objectives at the planning stage were “To improve the condition of small and medium sized bridges on the A005 and causeways and a bridge on A015 national highways, and to provide smooth transport to the Eastern Province, thereby contributing to establishment of peace for those people who were affected by conflict”. However, at the ex-post evaluation, the evaluator reviewed the project background and necessity, the implication of the target bridges in the Eastern Province, the scope/scale of the project, and the relevance (logic) of direct/indirect effects as the result of project implementation. Consequently, the evaluator rearranged/interpreted the direct effects as “Increase in transportation capacity” and “Improvement in safety”, and the indirect effects as “Improvement in the access/logistics in the Eastern Province and with neighboring provinces” and “Improvement in the living environment of locals around the project site areas”, then summarized the project objective.

2. Outline of the Evaluation Study

2.1 External Evaluator

Koichi Akimoto, OPMAC Corporation

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: September 2016 – September 2017

Duration of the Field Study: January 5 – 18, 2017 – May 1– 6, 2017

2.3 Constraints during the Evaluation Study

While the project was implemented for the reconstruction of bridges, other donors also implemented road improvement/reconstruction projects for national roads and outer roads which are connected to the bridges targeted by the project. It is considered that these projects also made a contribution that was reflected in the effectiveness and impact of this project, but when evaluating, it was difficult to separate the direct effects of the project and the contributions (external factors) of the other donor projects. Therefore, although there is no specific indication later in this report, the effectiveness/impact confirmed at the ex-post evaluation was achieved both by the project and by the road improvement/reconstruction projects of other donors.

3. Results of the Evaluation (Overall Rating: A³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Consistency with the Development Plan of Sri Lanka

The *10 Years' National Development Plan (Mahinda Chintana)* (2006-2016) that was the basic policy of Sri Lanka at the time of planning, stated the need for restoring income gaps and the regional balance. In addition, the development plan included the “Northern/Eastern Tsunami Reconstruction Continuous Implementation Program” especially for the Eastern region, which was targeted for regional development and poverty reduction by the improvement of basic infrastructure including access roads. In addition, the *National Road Master Plan (2007-2017)* was formulated in December 2007, the aim of which was the improvement of road sector for promoting economic development within Sri Lanka and the restoration of regional balance.

At the time of ex-post evaluation, in addition to the *10 Years National Development Plan (Mahinda Chintana)* (2006-2016) and the *National Road Master Plan (2007-2017)* previously mentioned, the Prime Minister also introduced the “Economic Policy Statement” (an outline of mid-term policy under the new administration) (November 5th, 2015) after a regime changed

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ③: High, ②: Fair, ①: Low

in 2015 which referred to the improvement of transport and accommodation facilities for the promotion of tourism from both home and abroad. Finally, in the *Public Investment Plan (2017-2020)* introduced in February 2017, investment for the road sector accounted for the largest ratio which was approximately 20% of the whole budget. Thus, improvement of the road sector has been continuously of high priority out of all 28 sectors.

3.1.2 Consistency with the Development Needs of Sri Lanka

At the time of planning, as indicated in “1.1 Background”, bridges in the Eastern Province had suffered serious damage and posed a problem for the smooth transport of vehicles and locals; in addition to negatively affecting people’s lives and economic activities, there was also a safety concern.

At the time of the ex-post evaluation, road transport was one of the main methods of transportation in Sri Lanka, and a high priority has continuously been placed on the development of road infrastructure as previously mentioned in the *Public Investment Plan*. The bridges reconstructed by the project were the Mahaoya Athuganga Bridge (No.1 Bridge), the Mundeni Bridge (No.2 Bridge), the Pulavady Bridge (No.3 Bridge), and the Chenkalady Bridge (No.4 Bridge), located on the A005 national highway, which runs east and west for 276 km from Peradniya city in the internal region of Sri Lanka to Chenkalady city in the eastern coast region. On the other hand, the Panichchankeni Bridge (No.5 Bridge) is located on the A015 national highway, it runs south and north for 199 km from Batticaloa city, which is the one of the main cities in the eastern coast region, to Trincomalee city, which is the capital city of the Eastern Province. Thus, the targeted 5 bridges reconstructed by the project are located on A005 and A015 national highways which are major highways connecting the Eastern Province and neighboring provinces in Sri Lanka, and they play a crucial role in the movement of people and logistics within the Eastern Province and neighboring provinces.

As shown in Table 1 below, the population of the Eastern Province increased from 1,561,000 to 1,615,000 in the 3 years from 2012 to 2015, with a yearly average increase rate of 1.2%. One of the reasons for this increase is thought to be that the evacuees temporarily moved outside of the province during the civil war gradually returned to the Eastern Province after the war ended in 2009. GDP per capita in the Eastern Province increased from 306 thousand LKR (2012) to 415 thousand LKR (2015), and showed a consistent economic growth of a 12% yearly average increase rate for these 3 years. The number of motor vehicle registrations in the Eastern Province increased from 215,088 (2012) to 286,234 (2015), showing an 11% yearly average increase rate. Meanwhile, the number of vessel entries was 161 in 2012. This number temporarily decreased between 2013 to 2014, then recovered to 164 in 2015. These examples show that logistics were continuously active in the Eastern Province. Economic activities in the Eastern Province were therefore active after the reconstruction

period, and the major roads, including the project bridges in the Eastern Province, have continuously played an important role from the perspective of promoting economic activities in the Eastern Province, which is a less developed area, as well as restoring the regional balance within Sri Lanka.

Table 1: Eastern Province 2012-2015 Yearly Statistical Information

Item	2012	2013 (Project Completion)	2014	2015
Population	1,561,000	1,575,000	1,593,000	1,615,000
GDP per capita (LKR)	306,471	344,701	379,471	415,331
Number of motor vehicle registrations	215,088	227,109	239,238	286,234
Number of vessel entries at Trincomalee Port	161	134	127	164

Source: Central Bank of Sri Lanka

3.1.3 Consistency with Japan's ODA Policy

At the time of planning, *Japan's Country Assistance Plan for Sri Lanka* (formulated in April 2004) specified two pillars which are "Assistance for the consolidation of peace and reconstruction process" and "Assistance that in line with the country's long term development vision", as the direction of assistance programs for Sri Lanka in the next 5 years. One of the focus areas for the "Consolidation of peace and reconstruction process" was the "Development of economic infrastructure (improvement in the power industry, development of the transport infrastructure network, improvement in the urban environment)". As the aim of the project was to strengthen the traffic infrastructures in the Eastern Province, which had been affected by civil war, therefore, the project fell under the focus of the above mentioned "Development of economic infrastructure".

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The outputs of the project for the Japan side and the Sri Lanka side were the planned reconstruction of 5 project bridges, land acquisition, the relocation of public facilities etc. These were mostly implemented according to the plan. The outputs of the project for Japan side and Sri Lanka side are shown in Table 2 below.

In fact, the actual project outputs changed slightly and some additional works were carried out. Specifically, the height of the abutment of Pulavady Bridge (No.3 Bridge) was extended by 1.8m, countermeasure work for soft ground was added for Chenkalady Bridge (No.4 Bridge), the height of the abutment of Panichchankeni Causeway and Bridge (No.5 Bridge) was shortened by 1.5m, the construction of No.5 Bridge causeway was changed to the rubble

mound method, and railings were extended for all bridges in consideration of transit safety etc. Also, even though it was planned that the demolition of the existing Pulavady Bridge (No.3 Bridge) would be implemented by the Sri Lanka side, it was conducted by the Japan side as the Sri Lanka demolition work was delayed and it was necessary to complete the project within the construction period. These changes and additional outputs were implemented in consideration of the construction and budget situation of the time, and were relevant to the objective of the project.

As for the civil works of the Sri Lanka side, the demolition of the existing Chenkalady Bridge (No.4 Bridge) was not carried out. According to the Executing Agency, the existing bridge remains as a historic structure since it was built in the British colonial era and has preservation value. The existing bridge continues to be used as a pedestrian bridge by the locals.

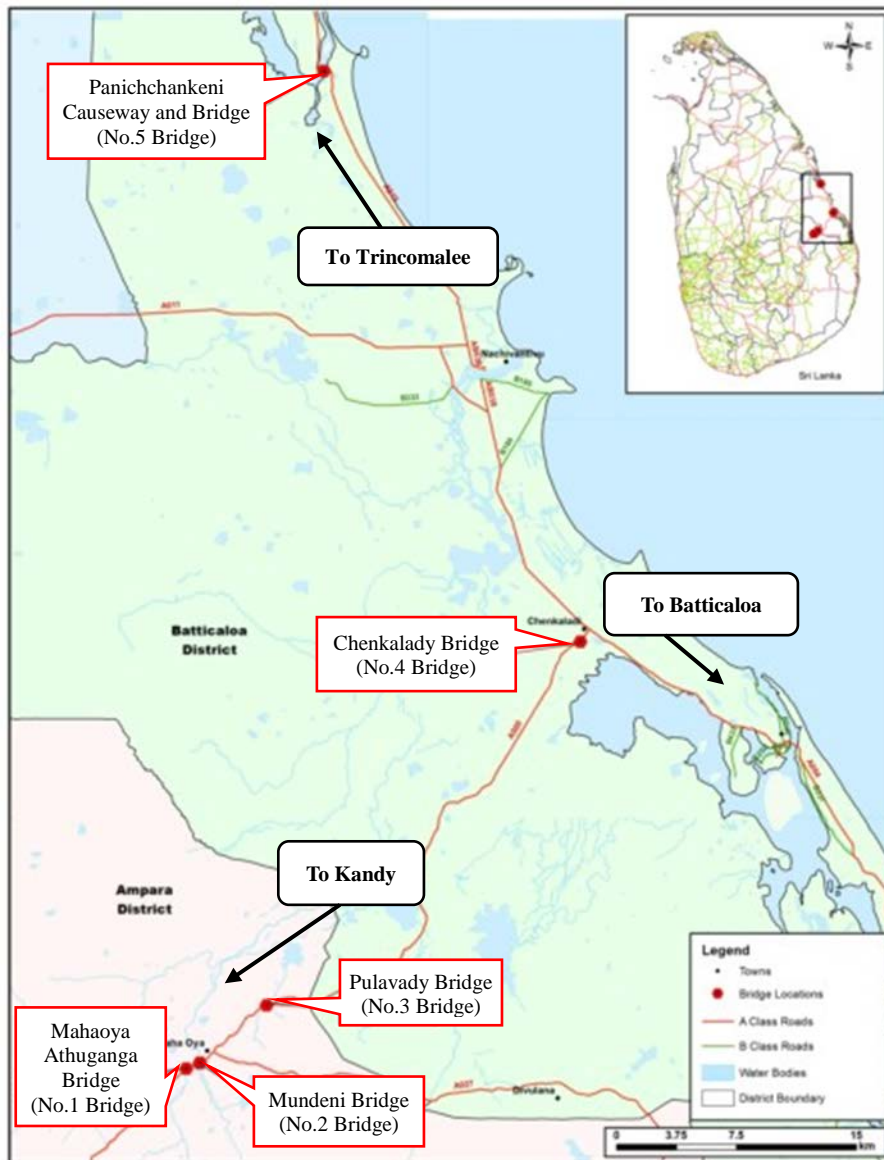
Table 2: Planned and Actual Project Outputs

Item	Plan	Actual
[Japan side] Civil Works	<ul style="list-style-type: none"> • Reconstruction of Mahaoya Athuganga Bridge (No.1 Bridge, Length of bridge: 26m) on the A005 national highway • Reconstruction of Mundeni Bridge (No.2 Bridge, Length of bridge: 85m and Box culvert 7m) on the A005 national highway • Reconstruction of Pulavady Bridge (No.3 Bridge, Length of bridge: 16m) on the A005 national highway • Chenkalady Bridge (No.4 Bridge, Length of bridge: 36m) on the A005 national highway • Panichchankeni Causeway and Bridge (No.5 Bridge, Length of bridge: 133m, Length of causeway on the left bank: 82m, Length of causeway on the right bank: 82m) on A015 national highway 	<ul style="list-style-type: none"> • As planned • As planned • Mostly as planned (height of abutment changed) • Mostly as planned (countermeasure work for soft ground added) • Mostly as planned (height of abutment changed) <p>*Cross Section (All bridges in common) 10.4m=1.5m (Sidewalk) +3.7m² (Roadway) +1.5m (Traffic segregation:Mount up type⁵) <Additional works></p> <ul style="list-style-type: none"> • Traffic safety facility added for all 5 bridges (extended railing) • Demolition of existing No.3 bridge
[Sri Lanka side] Civil Works	<ul style="list-style-type: none"> • Relocation of public facilities (buried telephone wires, telephone poles) • Demolition of existing 2 bridges (No.3 bridge, No.4 bridge) 	<ul style="list-style-type: none"> • As planned • Demolition of No.3 bridge was conducted by the Japan side • Demolition of No.4 bridge was not carried out
Construction of facilities and procurement for Operation & Maintenance	<ul style="list-style-type: none"> • Acquisition of construction sites for 5 bridges • Acquisition of temporary yard camp site • Lending and transporting of construction material for Bailey bridge 	<ul style="list-style-type: none"> • As planned • As planned • As planned

Source: JICA internal documents and response to interviews with RDA

⁵ Sidewalks are located higher than the roadway, and the gateways of each sidewalk are rounded down for easier access by pedestrians.

Please refer to Figure 1 for the site and bridge location of the project in Eastern Province.



Source: RDA

Figure 1: Map of Project Site

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual project cost was 1,269.4 million yen, which was within the planned project budget of 1,456.0 million yen (87.2% against the plan). Please refer to the breakdown of each expense for the Japan side and the Sri Lanka side in Table 3 below.

Table 3: Planned and actual project costs

Item	Plan	Actual	Compared to the plan
Japan side (Detailed Design)	29.0 million yen	28.5 million yen	98.3%
Japan side (Main works)	1,217.0 million yen	1,052.9 million yen	86.5%
Japan side (Total)	1,246.0 million yen	1,081.4 million yen	86.8%
Sri Lanka side	210.0 million yen ^(Note 1)	188.0 million yen ^(Note 2)	89.5%
Total	1,456.0 million yen	1,269.4 million yen	87.2%

Source: JICA internal documents, RDA internal documents

Note 1: The exchange rate used: USD 1 = JPY 95.94, USD 1 = LKR 111.31 (April, 2009)

Note 2: The exchange rate used: JPY 1 = LKR 1.41 (Based on the response to the ex-post evaluation from RDA, date of exchange rate unknown)

The main reason for the actual project cost being 13% lower than the planned cost was that, the construction cost of the main works was lower than the estimated price due to competitive bidding, and the demolition of the existing No.3 bridge and No.4 bridge as initially planned were not implemented by the Sri Lanka side (at the time of planning: the demobilization cost was calculated as LKR 14.5 million). The actual project cost of the Sri Lanka side was consequently 10% lower than the planned project cost.

3.2.2.2 Project Period

The planned project period was identified as 38 months from February 2010 to March 2013, including the period for the exchange of notes/detailed design/bid tender/construction. In fact, the actual project period was identified as 42 months, which was slightly longer than planned (a ratio against the plan of 110.5%)

The main reasons for the 4 months prolongation of the project were, the delay in mobilization for the construction of No.1, No.2, No.4, and No.5 bridges due to a large-scale flood which occurred in December 2012 (delayed for a total 60 days), and the delay in the start of tendering for the main contractor due to the Great East Japan Earthquake (March 11, 2011).

Table 4: Planned and Actual Project Period

Plan	Actual
February 2010 (E/N) – March 2013: Total 38 months (Detailed Design: 6 months, Bid tender/Construction: 24 months) *No indication for the remaining 8 months in the Ex- ante evaluation report and Feasibility report)	E/N and G/A date for Detailed Design: January 2010
	Detailed Design: February 2010 – October 2010
	E/N and G/A date for Main Works: November 2010
	Contract agreement date for Consultant: January 2011
	Contract agreement date for Contractor: April 2011
	Completion date (project period): June 2013 (42 months)

Source: JICA internal documents

In the light of above, the project cost of both the Japan side and the Sri Lanka side was as planned, while the project period slightly exceeded the plan. The output of the Japan side was

implemented mostly as planned, including slight changes and additional works based on the site situation. The output of Sri Lanka side was conducted as planned except the demolition of the existing Bridge No.4. Therefore, the efficiency of the project is fair.

3.3 Effectiveness⁶ (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

The Operation and Effect Indicators of the projects were, the annual average daily traffic volume (number/day), the passable weight (tons) of heavy vehicles, and the average driving speed of vehicles (Km/h). The results are shown in Tables 5, 6, and 7 below.

(1) Annual Average Daily Traffic Volume

The baseline value and target value of the average daily traffic volume were not provided at the time of planning. Looking at the transition of traffic volume at each bridge between the years 2013 - 2017 for 4 years after project completion, the traffic volume of Pulavady Bridge (No.3 Bridge) remained mostly unchanged but the volume for the other bridges increased between 30% - 70% (Table 5). The reason for this increase was the reconstruction of the targeted bridges and the improvement in the neighboring roads which became more convenient, with increase of driving speeds for each vehicle, increase in the passable weight of vehicles, and a decrease in the number of road closures due to flooding etc.

Table 5: Average Daily Traffic Volume for the 5 Bridges

Unit: number/day

Name of Bridge	Baseline	Target	Actual		
	2009	2016	2013	2016	2017
	Planned Year	3 Years After Completion	Completion Year	3 Years After Completion	4 Years After Completion
Mahaoya Athuganga Bridge (No.1 Bridge)	N/A	N/A	2,952	N/A	4,909
Mundeni Bridge (No.2 Bridge)	N/A	N/A	2,952	N/A	4,909
Pulavady Bridge (No.3 Bridge)	N/A	N/A	963	N/A	976
Chenkalady Bridge (No.4 Bridge)	N/A	N/A	1,388	N/A	1,867
Panichchankeni Causeway and Bridge (No.5 Bridge)	N/A	N/A	1,313	1350	1,972

Source: JICA internal documents, RDA internal documents

Note 1: The above traffic data was collected on the road 50m - 100m distant from each bridge. It is considered that the traffic volume of the targeted bridges should match the above data, since there were no major branch roads around the bridges.

Note 2: The measuring time was for 16 hours, between 6am - 10pm.

Note 3: According to RDA who provided the traffic data, it is currently collected once every 2 - 3 years. As for the above traffic data for 2017, RDA specifically collected it for ex-post evaluation purposes.

In association with the project, other donors also implemented projects for the improvement of roads/bridges in the Eastern Province. An existing 370km of provincial roads in the Eastern

⁶ The sub-rating for Effectiveness is also evaluated with consideration of Impact.

Province and the North Central Province was reconstructed and improved by the ADB “Eastern and North Central Provincial Road Project” (2009 - 2016). One of the targeted provincial roads of this ADB project was Henseman Road, which is located between Pulavady Bridge (No.3 Bridge) and Chenkalady Bridge (No.4 Bridge) and connects with the A005 national highway. Thus, it is considered that the ADB project also contributed to the increase in traffic volume for the 2 bridges. In addition, ADB implemented the “Peradeniya – Badulla – Chenkaladi Road Improvement Project” which improved 4km of road around the Chenkalady Bridge (No.4 Bridge) on the A005 national highway. This certainly contributed to the increase of traffic volume around the bridge.

Meanwhile, the Agence Française de Developpement (herein after called AFD) implemented the “Thirikkadndiyamadu – Traincomalee Road Improvement Project” which improved 99km of road around Panichchankeni Causeway and Bridge (No.5 Bridge) on the A015 national highway. The World Bank (herein after called WB) implemented the “Jayanthipura – Tirikkandiyamadu Road Improvement Project” which was for improvement of 19km of road on the A011 national highway, located on the near side of the Panichchankeni Causeway and Bridge (No.5 Bridge) on the A015 national highway. It is considered that these AFD and WB projects also contributed to the increase in traffic volume for each project bridge.

(2) Passable Weight (Tons) of Heavy Vehicles

The passable weight of vehicles for the targeted 5 bridges increased to more than 25 tons and 3 axle vehicles after project completion, which means that the target value was achieved (Table 6). The designed load of each bridge provided for an HB Load of 30 units (maximum axle weight: 30.6 tons) by the British Standard, so after project completion, it was possible for vehicles of more than 25 tons to cross the bridges without problems.

Table 6: Passable Weight (Tons) of Vehicles for the 5 Bridges

Unit: tons

Name of Bridge	Baseline	Target	Actual		
	2009	2016	2013	2016	2017
	Planned Year	3 Years After Completion	Completion Year	3 years After Completion	4 years After Completion
Mahaoya Athuganga Bridge (No.1 Bridge)	10 (less than 2 axle)	25 (more than 3 axle)	25 (more than 3 axle)		
Mundeni Bridge (No.2 Bridge)	10 (less than 2 axle)	25 (more than 3 axle)	25 (more than 3 axle)		
Pulavady Bridge (No.3 Bridge)	10 (less than 2 axle)	25 (more than 3 axle)	25 (more than 3 axle)		
Chenkalady Bridge (No.4 Bridge)	10 (less than 2 axle)	25 (more than 3 axle)	25 (more than 3 axle)		
Panichchankeni Causeway and Bridge (No.5 Bridge)	10 (less than 2 axle)	25 (more than 3 axle)	25 (more than 3 axle)		

Source: JICA internal documents, RDA internal documents

(3) Average Driving Speed of Vehicles

Since the average driving speed of vehicles for the 5 project bridges has not been measured by the Executing Agency (RDA), it was not possible to collect quantitative data (Table 7). However, RDA recognized a remarkable increase in the driving speed of each vehicle, and vehicles were able to cross the bridges smoothly as a result of the lanes of the project bridges increasing from 1 lane to 2 lanes after the project completion. Also based on their experiences, RDA recognized vehicles were able to pass across the targeted bridges at 40 – 70 km/h same as general road after the project completion. According to the Focus Group Discussions⁷ (herein after called FGD) and Key Informant Interviews, the neighbors of each bridge and frequent bridge users saw vehicles regularly cross the bridges at 40 - 70 km/h. The evaluator crossed each project bridge by vehicle and confirmed that the driving speed was around 60 km/h. Taking into consideration the factors mentioned above, it can be said that the target value for the average driving speed 40 – 70 km/h for vehicles on the targeted 5 bridges was achieved.

Table 7: Increase in Average Driving Speed of Vehicles for the 5 Bridges

Unit: km/h

Name of Bridge	Baseline	Target	Actual		
	2009	2016	2013	2016	2017
	Planned Year	3 Years After Completion	Completion year	3 years After Completion	4 years After Completion
Mahaoya Athuganga Bridge (No.1 Bridge)	40	40-70	N.A.		
Mundeni Bridge (No.2 Bridge)	40	40-70	N.A.		
Pulavady Bridge (No.3 Bridge)	40	40-70	N.A.		
Chenkalady Bridge (No.4 Bridge)	40	40-70	N.A.		
Panichchankeni Causeway and Bridge (No.5 Bridge)	40	40-70	N.A.		

Source: JICA internal documents, RDA internal documents

Note: As RDA did not measure the driving speed of vehicles for each bridge, it was not possible to collect quantitative data.

3.3.2 Qualitative Effects (Other Effects)

(1) Increase in transportation capacity

The ex-post evaluation conducted a beneficiary survey with local residents and businesses located near the project bridges. According to the FGD conducted with 57 local residents near the bridges, increase in traffic volume and passable weight of vehicles was recognized for the

⁷ For the targeted 5 bridges of the project, FGD was conducted three times with local residents in the villages near 2 bridges on the A005 national highway (Mahaoya Athuganga Bridge: No.1 Bridge & Chenkalady Bridge: No.4 Bridge) and 1 bridge on the A015 national highway (Panichchankeni Causeway and Bridge: No.5 Bridge). These included 31 people (No.1 Bridge), 12 people (No.4 Bridge), and 14 people (No.5 Bridge) (total: 28 Male, 29 Female), in order to confirm the effectiveness of the project. Participants in the discussion were chosen from an residents assembly in the public offices close to No. 1 Bridge. As for No. 4 Bridge and No. 5 Bridge, participants agreed to take part in FGD were chosen from villages located near these bridges with the assistance of the local leader in each area. Even though it was a non-random selection, attention was paid so as to be unbiased in gender ratio and age composition.

roads located near the project bridges from the viewpoint of one who lives in the vicinity and based on their actual observations.

Also based on interviews with RDA, the Executing Agency for the project, as well as key informant interviews with 2 rice-mill companies, 1 dairy production company, 1 CBO⁸ (PALM Foundation⁹), 2 owners of bus companies, 3 bus drivers, all of whom regularly use Mahaoya Athuganga Bridge (No.1 Bridge), Mundeni Bridge (No.2 Bridge), Pulavady Bridge (No.3 Bridge) and Chenkalady Bridge (No.4 Bridge), it was confirmed that the project had had a positive effect on the increase in transportation capacity on the bridges and neighboring roads. Additionally, since the bridges only had 1 lane and a vehicle load limit for less than 10 tons before the project it used to take a lot of time to cross the bridges as it was necessary to stop before the bridge in order to wait for oncoming cars. However, through the project the bridges were enlarged to 2 lanes and the passable weight of vehicles increased to 25 tons and therefore it is no longer necessary to wait for oncoming cars anymore and 2 vehicles are able to cross the bridge at the same time.

According to the interview with the rice-mill companies, the capacity of their delivery vehicles has risen to 12 tons - 15 tons from 7 tons as the bridges reconstructed by the project allow large-sized vehicles to cross. Similarly, according to the interview with the dairy production company, as large-sized vehicles are able to cross the bridges after the project completion, the transportation volume of the company has increased with the amount of milk they are able to collect from farmers per day increasing to 1,500 liters from 450 liters. The project has clearly contributed to increase in transportation capacity.

(2) Improvement in Safety

Based on the key informant interviews mentioned above, RDA recognized that the safety of pedestrians on the bridge has improved since the number of minor collisions between vehicles and pedestrians decreased thanks to the installation of a mount up type sidewalk on both side of the carriage way by the project. Traffic signs on the targeted bridges were also installed by the project, and RDA confirmed that these had also contributed to the reduction in accidents as they are especially helpful for night driving. All of the local residents who participated in FGD agreed that the safety of pedestrians on the bridge has improved thanks to the mount up type sidewalks installed by the project.

In addition to this, it was found through the key informant interview that, even though before the project, the project bridges used to be frequently closed for floods in the rainy season, following project completion, vehicles have been able to cross the bridge throughout the year

⁸ CBO: Community Based Organization

⁹ A local non-governmental organization in the Ampara district, Eastern Province which focuses on community development.

with no closures in the rainy season dependent on the weather. Also before the project started, there were accidents on the project bridges between oncoming cars and with vehicles crashing to the bridge etc. due to the fact that there was only a one lane road which was not wide enough to have passing traffic. Through the interview with RDA, it was confirmed that such accidents did not happen after the bridge became two lanes through the project.

Meanwhile, vehicles drive at greater speed as a result of reconstruction of the bridges and the improvement of neighboring roads. Thus, the drivers of vehicles or buses need to be careful about their driving speed, and the local residents need to walk carefully paying attention to passing vehicles when they cross the bridge.



Mahaoya Athuganga Bridge (No.1 Bridge) after reconstruction



Mundeni Bridge (No.2 Bridge) after reconstruction



Pulavady Bridge (No.3 Bridge) after reconstruction



Chenkalady Bridge (No.4 Bridge) after reconstruction



Panichchankeni Causeway and Bridge (No.5 Bridge) after reconstruction



Large-sized vehicle passing across Panichchankeni Bridge

3.4 Impacts

3.4.1 Intended Impacts

(1) Impact on the improvement of access/logistics in the Eastern Province and with neighboring provinces:

According to the key informant interview with 2 rice-mill companies, before the project started the project bridges used to frequently close because of floods in the rainy season which made it difficult for them to make deliveries for several days until the bridges were re-opened. In those cases, they had to reject delivery orders in far distance. However, the above problems have been solved since the reconstruction of the bridges by the project and the improvement of neighboring roads. In addition, the delivery time for the rice-mill companies has shortened. For example, the transportation time between Mangalagama (Eastern Province) and Kandy

(Central Province) (approximately 150km) shortened to 6 hours from 7 hours, and the transportation time between Rajagalathenna (Eastern Province) and Kandy (Central Province) (approximately 170 km) shortened to 5 hours from 6 hours. The companies feel that a part of the time saving comes from the impact of the reconstruction of the bridges by the project. As already mentioned, it became possible for large-sized vehicles to cross the bridges, and the delivered quantity of rice-mill at one time has increased to 12 - 15 tons from 7 tons. Moreover, intermediary agents from distant places such as Colombo and Kandy have begun to travel over to purchase their rice-mill, and these new customers have contributed to the sales growth of the rice-mill companies.

From the key informant interview with 2 owners of bus companies and 3 bus drivers, it was found that the transportation time of regular bus routes shortened thanks to the reconstruction of the bridges and improvement of neighboring roads. For example, the route between Kandy (Central Province) and Ampara (Eastern Province) (approximately 200km) shortened to 4 hours 15 minutes from 4 hours 45 minutes, and the route between Batticaloa (Eastern Province) and Pullumalai (Eastern Province) (approximately 43km) shortened to 1 hour from 1 hour 30 minutes. Accordingly, as the number of bus services and the passengers per day increased, the sales of the bus company also increased. In addition, because of the reconstruction of the bridges and improvement of neighboring roads, the frequency of repairs to rice-mill delivery trucks and buses also decreased and those interviewed recognized that the project had had a certain impact on the reduction in maintenance costs of vehicles.

To summarize, as the result of key informant interviews, it was confirmed that the project has contributed to the improvement of access/logistics in the Eastern Province and with neighboring provinces.

(2) Impact on the improvement of the living environment of local residents around the project site:

Through the FGD of 57 local residents in three different areas of the project bridges, the following impacts on the improvement of the living environment of local residents around the project site were confirmed.

(i) Improvement in traffic accessibility

Before the year 2013 (completion year of the project), as the bridges had only one lane, it took a long time to cross since it was necessary to wait for oncoming cars and thus there was traffic congestion around the bridge areas. Also, there was inefficiency in using the bridges at the time of floods as the bridges were closed at those times. However,



Focus Group Discussion with local residents.

after the project was implemented, vehicle transportation became remarkably more efficient as there was no traffic congestion thanks to the bridges having two lanes and not being closed anymore by floods.

(ii) Improvement of service accessibility

After project implementation, service accessibility to hospitals, markets and education improved thanks to reconstruction of the bridges, and, importantly, it became possible to go to city areas at any time to purchase food and daily necessities. Moreover, it became easier to access hospitals in the case of an emergency, and students were able to commute to distant private schools in the search for a better education.

(iii) Increase of service facilities

The number of retail stores increased around the project bridges, and various service facilities such as banks, hotels, private hospitals were built.

(iv) Other Impacts

Some local residents have been employed at a garment factory built near a project bridge since project completion. Even though most local residents at the project sites used to use only bicycles, recently the number of residents who possess at least a motorcycle or small car has increased.

According to the local residents near the project bridges mentioned above, there have been improvements in traffic accessibility, service accessibility such as to hospitals, markets, educational services, as well as an increase in various services facilities such as retail stores, banks, hotels, and hospitals since project completion. It has also been confirmed that employment opportunities have been created at factories around the project site, and there has been an increased ownership ratio for motorcycles and small cars among local residents. There have thus been various positive impacts on the improvement in the living environment of local residents around the project site. It is considered that these positive impacts have arisen from activation of the movement for people and logistic thanks to the reconstruction of the bridges and the improvement of neighboring roads.

3.4.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

This project was the reconstruction of existing bridges, and was given a Category B based on the *JICA Guidelines for Environmental and Social Considerations (2004)* as there were minor unfavorable impacts during the construction such as water pollution, waste generation

and noise. The Environment Impact Assessment (EIA) was conducted in September 2008, although environmental approval and license for the project was not required according to the domestic law of Sri Lanka.

Through the interviews and beneficiary surveys with the Executing Agency (RDA) and consultants in this ex-post evaluation, it was confirmed that during the construction large-sized sandbags were piled at foot of slopes in construction yards for water pollution control, and that the slopes were protected with blue-sheets to prevent sediment discharge and diffusion. Laying-leveling was conducted around the project sites for No.1 Bridge to No.4 Bridge since a small amount of surplus soil remained. Laying-leveling for the surplus soil of No. 5 Bridge was conducted after it had been carried out at the lower level of ground at the request of local residents. The waste provided by this project was delivered to designated areas of RDA.

The monitoring of air quality, water quality, and noise was conducted by RDA during construction, but RDA has not continued this monitoring since project completion. According to the interviews with RDA and FGD with local residents, no issues have been observed for air quality, water quality, and noise since project completion.

To summarize, no negative impacts on the natural environment were observed.

(2) Land Acquisition and Resettlement

There was neither land acquisition nor resettlement by the project since it was a project for the reconstruction of the project bridges.

As stated above, the expected effects of this project have been mostly realized as planned. Therefore, effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The Road Development Authority (RDA) which belongs to the Ministry of Higher Education and Highways is responsible for the operation and maintenance (herein after called O&M) of the project. The RDA Ampara District Office (in charge of Bridge No. 1, Bridge No. 2, Bridge No.3) and the RDA Batticaloa District Office (in charge of Bridge No. 4, Bridge No. 5) are directly responsible for the O&M of the project bridges. Tables 8 and 9 below indicate each department and staff allocation for O&M of the RDA Ampara and Batticaloa District Offices as of May 2017. Since Ampara District has a larger area and has to take care of longer distance roads compared to Batticaloa District, there are more staff in the RDA Ampara District Office. According to RDA, the number of staff in each RDA District Office is enough for O&M purposes and no issues have been observed in terms of the institutional aspect of O&M.

Table 8: Organizational structure for O&M in the RDA Ampara District Office

Person / Department in charge	Responsibility	Numbers
Provincial Director	In charge of overall operation maintenance and management, construction of road networks in Ampara District.	1
Chief Engineers	In charge of operation maintenance and management, construction of road networks in the Ampara Region (280 km) and the Akkaraipattu Region (316 km).	2
Executive Engineers	In charge of operation maintenance and management, construction of road networks in the Ampara Region (280 km), the Kalmunai Region (312 km), and the Akkaraipattu Region (184 km).	3
Engineers	In charge of assisting the Provincial Director, Chief Engineers and Executive Engineers for maintenance, management and construction of road networks.	15
Technical Officers	In charge of the management, maintenance, and construction of road networks at work sites.	18
Technical Assistants	In charge of assisting Technical Officers at work sites.	24
Labor Supervisors	In charge of supervising road maintenance work at work sites.	8
Road Maintenance Labor	In charge of road maintenance work at work sites.	137
Total		208

Source: RDA internal documents

Table 9: Organizational structure for O&M in the RDA Batticaloa District Office

Person / Department in charge	Responsibility	Numbers
Provincial Director	In charge of overall operation maintenance and management, construction of road networks in Batticaloa District and Trincomalee District.	1
Chief Engineer	In charge of operation maintenance and management, construction of road networks for A class roads (A004, A005, A015) and B class roads.	1
Executive Engineer	Same as Chief Engineer.	1
Engineers	In charge of assisting the Provincial Director, Chief Engineers and Executive Engineers for maintenance, management and construction of road networks.	6
Technical Officers	In charge of management, maintenance, and construction of road networks at work sites.	6
Technical Assistants	In charge of assisting Technical Officers at work sites.	19
Labor Supervisors	In charge of supervising road maintenance work at work sites.	4
Road Maintenance Labor	In charge of road maintenance work at work sites.	128
Total		166

Source: RDA internal documents

3.5.2 Technical Aspects of Operation and Maintenance

The engineers (Chief Engineers, Executive Engineers) of the RDA Ampara and Batticaloa District Offices have a higher level of academic background than university level, and also are qualified as "Official Engineers", which is certified by the Sri Lanka Engineers Association. Other technical staff such as Technical Officers and Labor Supervisors, have the technical capability to accomplish basic O&M works without any problems, as instructed by the Chief Engineers or Executive Engineers. Moreover, the O&M works are implemented according to the *Road/Bridge Standard Specifications for Construction, Operation and Maintenance* –

November 2008, which are RDA standard provisions.

Even though training in relation to O&M has not been conducted recently, it is expected that the organizational ability for O&M capacity for bridges in RDA will improve through the JICA Technical Cooperation Project, The Project for the Capacity Development of Bridge Management (2015 – 2018)¹⁰ which was in progress at the time of ex-post evaluation and *Bridge O&M Policy* will be developed and Bridge Management Systems etc. created through the project. The model Provinces of this project are the Central Province, the Western Province, and the Southern Province. However, other Provinces, such as the Eastern Province, are planning to utilize the Bridge O&M program including O&M training by the second half of 2018.

3.5.3 Financial Aspects of Operation and Maintenance

The O&M budgets of the RDA, Ampara District Office and Batticaloa District Office for the past 3 years (2014 - 2016) are shown in Tables 10, 11 and 12. In government organization in Sri Lanka, it is common to allocate an actual budget less than the planned budget. A part of the O&M budget for RDA which included the project bridges had been allocated from the “Road Maintenance Trust Fund¹¹”. However, the fund recently has not functioned and instead the Treasury Department annually allocates LKR 4,000 million for the RDA O&M budget and this is expected to continue at the same amount for the time being. According to RDA, no major issues have been observed in terms of the financial aspect of O&M.

Table 10: Annual Budget and the Budget for O&M in RDA (2014 – 2016)

Unit: LKR Million

	2014		2015		2016	
	Planned	Actual	Planned	Actual	Planned	Actual
Annual Budget of RDA	31,478.2	30,991.1	44,871.9	42,963.1	43,482.0	40,549.2
The Budget for O&M in RDA	6,047.0	4,772.0	6,303.0	5,477.0	4,320.0	2,736.0

Source: RDA internal documents

¹⁰ The expected outcomes of “The Project for the Capacity Development of Bridge Management” are follows: (i) Development of Bridge O&M Policy; (ii) Reconstruction of the organizational structure of the RDA headquarters and local offices; (iii) A revised Bridge Inspection and Diagnosis Manual; (iv) The creation of a Bridge Management System; and (v) Deepened basic technical knowledge on the part of the staff of the RDA headquarters and in model provinces through seminars and on the job training (OJT).

¹¹ The “Road Maintenance Trust Fund” was established in December 2005 by the Government of Sri Lanka, for collecting the revenue for the O&M of the road sector. The revenue is collected from LKR 1 for 1 liter of gasoline, and LKR 0.5 for 1 liter of diesel at the selling price.

Table 11: Annual Budget and the Budget for O&M in the RDA Ampara District Office
(2014 – 2016)

Unit: LKR Million

	2014		2015		2016	
	Planned	Actual	Planned	Actual	Planned	Actual
Annual Budget of the Ampara District Office	1,360.64	972.87	779.79	725.52	614.13	398.10
The Budget for O&M in the Ampara District Office	555.96	394.22	404.25	394.22	494.13	234.10

Source: RDA internal documents

Table 12: Annual budget and the Budget for O&M in the RDA Batticaloa District Office
(2014 – 2016)

Unit: LKR Million

	2014		2015		2016	
	Planned	Actual	Planned	Actual	Planned	Actual
Annual Budget of the Batticaloa District Office	288.37	146.06	151.64	193.40	231.26	104.93
The Budget for O&M in the Batticaloa District Office	88.37	109.06	51.64	36.40	131.26	48.93

Source: RDA internal documents

3.5.4 Current Status of Operation and Maintenance

The daily maintenance and regular maintenance have been conducted by the inspection item accordingly, as mentioned in Table 13, by RDA Ampara and Batticaloa District Office. After the project completion, the 5 project bridges have been kept in good condition and no issues have been observed in terms of the current status upon the visual site inspection at the ex-post evaluation.

Table 13: Maintenance Program of O&M for the 5 bridges

	Inspection item	Frequency
Daily Maintenance	<ul style="list-style-type: none"> • Carriageways • Shoulders & road sides • Drainage systems • Surface dressing & surfacing • Clearing vegetation 	Everyday
Regular Maintenance	<ul style="list-style-type: none"> • Traffic signs, road marking & painting • Bridges • Down pipes 	Every 3 months
Others	<ul style="list-style-type: none"> • Painting uprights & confirming handrails 	Once a year

Source: RDA internal documents

In the light of above, no major problems have been observed in the institutional, technical and financial aspects and current status of the operation and maintenance system. Therefore sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of this project is to increase in transportation capacity and safety for the targeted bridges in the Eastern Province where is affected by civil war, by improving the condition for deteriorated small and medium sized 4 bridges on A005 national highway and Panichchankeni causeway and a bridge on A015 national highway, thereby contributing to improve living environment of local communities and to improve access and logistics between Eastern Province and neighboring provinces.

The project was consistent with the development plan and development needs of Sri Lanka, both at the time of planning and ex-post evaluations, as well as with Japan's ODA policy at the time of planning. Therefore, the project relevance is high. In addition, it is confirmed that there have been improvements in transportation capacity and the safety of the project bridges and neighboring roads, along with positive effects in the lives and economic activities of local residents together with an improvement in service accessibility to schools, hospitals, and markets.

Thus, the effectiveness and impacts of the project are high. The effectiveness and impacts are considered not only to have been achieved by the project, but also through the various road improvement projects of RDA, and of other donors such as WB, ADB, AFD which have also contributed to the results as external factors around the project areas in the Eastern Province. The project cost was in accordance with the plan, although the project period slightly exceeded that planned. Therefore, the efficiency of the project is fair. The sustainability of project effects is high since no major problems were observed in the institutional, technical and financial aspects of the operation and maintenance system for the project.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

The Importance of Coordination/Demarcation with Other Donors

The project was to reconstruct deteriorated bridges which had been the traffic bottlenecks. It contributed to improvements in transportation capacity and safety of the target bridges. Also the impacts such as the improvement in accessibility and logistics between the Eastern Province and neighboring provinces, the improvement in the living environment of locals, etc. were confirmed.

Therefore, the effectiveness of the project was realized as originally expected. The Eastern Province was significantly affected by the civil war, as was the Northern Province. There had been a delay in the rehabilitation and development of economic and social infrastructure including the road sector, and it was the area where reconstruction assistance was fully launched only after the end of the civil war in 2009. It had been difficult to maintain and repair the bridges for a long time during war which led to deterioration, and the creation of transport bottlenecks around the project areas. The project was consistent with the development needs of the project areas as it dealt with solving the issues. Additionally, there was sufficient coordination/demarcation with other donors for in the implementation of the project, such as the improvement of one of the road networks in the Eastern Province by improving the project bridges and connected roads. The impact of the project was seen extensively not only in the local communities around the project bridges, but also it spread to outside of the Eastern Province. As the result, the project is considered to have been successful in understanding the appropriate development needs and having coordination with the projects of other donors, such as ADB, at the planning stage. It is expected that the same kind of coordination will take place in similar projects in the future. Specifically, it is recommended that there is demarcation with other donors before a project starts in the case where other donors also plan to implement a project. Information about the project site (roads, bridges) including road networks should be shared with an awareness of the synergy effect between each project.

<End>