Republic of Indonesia

FY2019 Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for Construction of Bridges in the Province of Nusa Tenggara Barat"

"The Project for Construction of Bridges in the Province of Nusa Tenggara Barat, Phase II"

"The Project for Construction of Bridges in the Province of Nusa Tenggara Barat, Phase III"

External Evaluator: Takayuki Ishikawa, Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

The objective of this project[1] is to improve a function of the South Ring Road as an arterial road in the southern region of Sumbawa Island by constructing and rehabilitating bridges, thereby contributing to the improvement in living standard of the neighbouring residents and the economic development of that area. The project is highly relevant to Indonesia's development plan, development needs and Japan's ODA policy at the time of the project planning and ex-post evaluation. Therefore, its relevance is high. Although the project cost was as planned or within the plan in each project phase, the project period exceeded the plan in the Phase III project. Part of the road and small bridge constructions planned to be handled by Nusa Tenggara Barat (hereinafter referred to as "NTB") is yet to be completed. Therefore, efficiency of the project is fair. As a result of the project implementation, the targeted sectors became always passable and the transit time significantly reduced, resulting in improved access to public services and markets, as well as improved living standards of the neighbouring residents. This project has mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high. No negative impacts on the natural environment or land acquisition have been observed. Some minor problems have been observed in terms of the technical aspect and current status of operation and maintenance. Therefore, sustainability of the project effects is fair.

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

[1] In this ex-post evaluation, the project, which consists of three phases, is evaluated as a whole. When the analysis is made dividing into each individual phase, a specific phase is indicated. When the analysis is made as a whole, then the project is stated in a singular form.

1. Project Description

Project Location

Project Bridge

1.1 Background

NTB in Indonesia is one of the least developed regions in the country[2] where the correction of economic disparities is an issue to be tackled. The southern region of Sumbawa Island in NTB has a high development potential in mining, but the lack of transportation infrastructure has been a constraint to economic development. On a ring road which connects the major cities of the region's east and west (Tano and Sumbawa Besar) (hereinafter referred to as the "South Ring Road"), a smooth traffic was hampered because bridges were simple and temporary ones, so became impassable when the water level of river rose, or because they were already destroyed or washed away, so the users needed to detour. Under these circumstances, the Government of Indonesia has been developing the South Ring Road in order to improve the traffic situation in that area. Of these, in the Sejorong–Tongoloka sector (hereinafter referred to as the "Phase I sector/project"), the Tongoloka–Tatar sector (hereinafter referred to as the "Phase II sector/project") and the Tatar–Lunyuk sector (hereinafter referred to as the "Phase III sector/project"), the Government of Indonesia requested the Government of Japan to provide assistances for the construction of bridges which were technically and financially difficult to build.

1.2 Project Outline

The objective of this project is to improve a function of the South Ring Road as an arterial road in the southern region of Sumbawa Island by constructing eight new bridges as well as by rehabilitating one existing bridge (Phase I project), and four new bridges which are technically

[2] The gross regional domestic product per capita in NTB is lower than most of the other provinces, according to *"Statistical Yearbook of Indonesia 2020."*

difficult to build (Phase II project), and 10 new bridges which are equal to or longer than 20 meters in length and technically difficult to build (Phase III project), thereby contributing to the improvement in living standard of the neighbouring residents and the economic development of that area.

Grant Limit/Actual Grant Amount	Phase I: 794 million yen/793 million yen Phase II: 492 million yen/299 million yen Phase III: 961 million yen/843 million yen
Exchange of Notes Date /Grant Agreement Date	Phase I: July 2006/N.A. Phase II: December 2009/January 2010 Phase III: March 2013/March 2014
Executing Agencies	Ministry of Public Works and Housing, Directorate General of Highways West Nusa Tenggara Province Sumbawa Regency West Sumbawa Regency
Project Completion	Phase I: March 2009 Phase II: December 2011 Phase III: December 2016
Target Area	Sumbawa Island, West Nusa Tenggara Province
Main Contractors	Phase I and II: Hazama Corporation Phase III: Takenaka Civil Engineering & Construction Co., Ltd.
Main Consultants	Katahira & Engineers International
Procurement Agency	N.A.
Basic Design/Preparatory Survey	Phase I: June 2004–February 2005 Phase II: May 2010–December 2010 Phase III: November 2011–March 2012
Related Projects	<u>ODA Loan</u> - "Road Maintenance Improvement Project (2)" (December 1996–December 2001) <u>Grant Aid</u> - "The Project for Bridge Construction in the Province of NUSA TENGGARA TIMUR" (August 2005–April 2008) <u>Others</u> - "Eastern Indonesia Region Transport Project-1" (IBRD, November 2001–June 2006) - "Eastern Indonesia Region Transport Project-2" (IBRD, June 2004–September 2011)

2. Outline of the Evaluation Study

2.1 External Evaluator

Takayuki Ishikawa, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: October 2019–January 2021

Duration of the Field Study: January 9, 2020–January 29, 2020

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

3.1 Relevance (Rating: ③[4])

3.1.1 Consistency with the Development Plan of Indonesia

The National Medium-Term Development Plans (2000–2004, 2005–2009, 2010–2014), developed by the Government of Indonesia at the time of the project planning for each phase, continuously identified the poverty alleviation and the reduction of economic disparities between cities and rural areas as one of the key issues, and emphasized the importance of infrastructure development in the rural areas to resolve these issues. In response to *the National Medium-Term Development Plans*, the Ministry of Public Works and Housing has developed a series of *the Strategic Plans (2000–2004, 2005–2009, 2010–2014)* and, as a policy for the road sector, has facilitated the improvement and development of the road networks in the rural, isolated and remote areas to support economic activities.

In *the National Medium-Term Development Plan (2015–2019)* at the time of the ex-post evaluation, the Government of Indonesia indicates that it continues to tackle the issues of poverty and economic disparity as before. The government tackles the improvement of connectivity in rural areas for the purpose of connecting remote sites to nearby economic cities by developing infrastructures such as road to support economic activities in those areas. The connectivity improvement in the rural areas is also stipulated in *the Strategic Plan (2015–2019)* by the Ministry of Public Works and Housing, which emphasizes, *inter alia*, the significance of project implementation in geographically disadvantaged and remote sites to aim for a balanced development across regions. Therefore, even at the time of the ex-post evaluation, the implementation of this project is consistent with the development plan of Indonesia.

3.1.2 Consistency with the Development Needs of Indonesia

At the time of the project planning, the eastern region of Indonesia, including NTB, was one

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

[4] ③: High, ②: Fair, ①: Low

of the least developed regions, with the NTB's gross regional domestic product (GRDP) per capita being about a half of the national average. At the time of the ex-post evaluation, the economic performance of the province compared to the national average does not improve, where a large disparity still exists.

Table 1: Transition of GRDP per Capita (in Thousand IDR)

Province	At the Time of the Project Planning		At the Time of the Ex-Post Evaluation	
	2005	2006	2018	2019
DKI Jakarta	33,205	34,838	165,872	174,137
NTB	3,660	3,697	18,029	18,542
National Average	7,688	7,982	39,722	41,231

Source: Statistical Yearbook of Indonesia 2009 (at the time of the project planning) and 2020 (at the time of the ex-post evaluation)
Note: Values of GRDP per capita are in constant market price of 2000 (at the time of the project planning) and 2010 (at the time of the ex-post evaluation)

At the time of the project planning, in Sumbawa Island, NTB, which is the target area of the project, the national road passing through the northern end of Sumbawa Island (from Tano Port to Sumbawa Besar and further to eastern part of the island) played a major role in logistics of the island, but the South Ring Road was also being developed as an access road to the southern region. The South Ring Road was once fully opened in 2002, but it was difficult for vehicles to pass the road except for some flat sections, since the constructed bridges were simple and temporary ones at that time, having made it difficult to cross these bridges when the water level of river rose, and moreover, some of the bridges had already been destroyed or washed away. Therefore, the movement of neighbouring residents and logistics in the east-west direction in the southern region of Sumbawa Island was not functioning well, which was one of the factors that hindered the development of the region. In addition, we have confirmed the importance of the South Ring Road in socio-economic perspectives through the field study during the ex-post evaluation.[5] The executing agencies pointed out that the connectivity of the South Ring Road would have been still poor without the contributions from this project, so the region would have fallen further behind in terms of the economic development, and as a result, the economic gap might have been wider than it was. Therefore, even at the time of the ex-post evaluation, the importance of this project is still high, and the project is consistent with the development needs of Indonesia.

[5] The evaluator interviewed National Road Implementation Agency (BPJN) and Technical Road Planning Section, General Highways Division, Public Works and Spatial Planning Agency, NTB Province.

3.1.3 Consistency with Japan's ODA Policy

The Japan's *Country Assistance Program for the Republic of Indonesia (November 2004)* at the time of the project planning of Phase I and II projects stated that Japan would assist Indonesia in the development of public services necessary from the viewpoint of rural or regional development (e.g., water and sanitation, roads, electricity, etc.) and the improvement in the system for operation and maintenance of such services, for creating democratic and fair society. In addition, at the time of the ex-ante evaluation for Phase III project, the subsequent Japan's *Country Assistance Program for the Republic of Indonesia (April 2012)* also stipulated the correction of imbalances and the creation of a safe society as a priority area in the assistance, stating that Japan would support Indonesia for the development of major transportation and logistics networks and for the improvement of connectivity in rural areas. This project is also in line with the above-mentioned principles because it aims to improve the function of the South Ring Road as an arterial road in the southern region of Sumbawa Island by constructing and rehabilitating bridges, thereby contributing to the improvement in living standard of the neighbouring residents and the economic development of that area. Therefore, the project is consistent with the Japan's ODA Policy.

As stated above, this project has been highly relevant to Indonesia's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

There was no significant change between planned and actual project outputs. The project was mostly implemented as planned. The only major change was that the Japanese side built seven bridges excluding Puna I bridge, as the Indonesian side had built it by the time of detailed design though the original plan of the Phase I project was to build eight bridges including the Puna I. Although there were some other minor changes in bridge substructure and approach road length throughout the Phase I to III projects, it can be said that the changes were appropriate to meet actual conditions of the ground during construction.[6] A comparison between the planned and actual project outputs by the Japanese side is shown in Table 2 to Table 4.

[6] In the Phase III project, in order to change the designs of bridge substructure and the height, the executing agency sought approvals by JICA on the changes through the consultant in line with the *"Procurement Guidelines for the Japanese Grants (Type I)"* and received approval letters issued by JICA.

Table 2: Comparison between Planned and Actual Project Output by the Japanese Side
(Phase I: Sejorong–Tongoloka Sector)

Bridge	Item	Project Output	
		Originally Planned	Actual
Tanaman I	Superstructure	Single-span PC-T Girder	As Planned
	Bridge Length	35.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	145.0 m	
Puna I	Superstructure	Single-span RC-T Girder	Excluded
	Bridge Length	11.2 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	88.0 m	
Puna III	Superstructure	Single-span PC-I Girder	As Planned
	Bridge Length	23.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	77.0 m	100.0 m
Tabisu I	Superstructure	Single-span PC-I Girder	As Planned
	Bridge Length	24.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	116.0 m	156.0 m
Tabisu III	Superstructure	Single-span RC-T Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	130.0 m	
Tabisu IV	Superstructure	Single-span RC-T Girder	As Planned
	Bridge Length	22.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	98.0 m	108.0 m
Tabisu V	Superstructure	Single-span RC-T Girder	As Planned
	Bridge Length	22.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	88.0 m	100.0 m
Tongoloka	Superstructure	2-span Connected PC-I Girder	As Planned
	Bridge Length	48.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments and 1 Pier (Spread Footing)	
	Approach Road Length	147.0 m	
Tabisu II	Superstructure	Single-span RC-T Girder	As Planned

(Replacement of superstructure)	Bridge Length	15.6 m	
	Road Width	6.0 m	
	Substructure	Existing Foundation	
	Approach Road Length	350.0 m	400.0 m

Source: Documents provided by JICA and interviews with the consultant

Table 3: Comparison between Planned and Actual Project Output by the Japanese Side (Phase II: Tongoloka–Tatar Sector)

Bridge	Item	Project Output	
		Originally Planned	Actual
Air Keruh I	Superstructure	RC Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	130.0 m	
Air Keruh II	Superstructure	RC Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	90.0 m	
Negene	Superstructure	Plate Girder	As Planned
	Bridge Length	35.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	104.4 m	
Tatar Loka	Superstructure	Plate Girder	As Planned
	Bridge Length	55.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments and 1 Pier (Steel Tubular Pile + Shallow Caisson)	Additional Tubular Piles Used[7]
	Approach Road Length	125.0 m	As Planned

Source: Documents provided by JICA and interviews with the consultant

Table 4: Comparison between Planned and Actual Project Output by the Japanese Side (Phase III: Tatar–Lunyuk Sector)

Bridge	Item	Project Output	
		Originally Planned	Actual
Mone I	Superstructure	RC Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	109.5 m	
Telonang I	Superstructure	Plate Girder	As Planned
	Bridge Length	50.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments and 1 Pier (Steel	Additional

[7] Additional tubular piles were used, as the condition of the ground differed from predictions.

Bridge	Item	Project Output	
		Originally Planned	Actual
		Tubular Pile)	Tubular Piles Used
	Approach Road Length	119.5 m	119.6 m
Sepang	Superstructure	Plate Girder	Bridge Height Increased[8]
	Bridge Length	40.0 m	As Planned
	Road Width	4.5 m	
	Substructure	2 Abutments (Steel Tubular Pile)	Additional Tubular Piles Used
	Approach Road Length	148.0 m	145.0 m
Bontong	Superstructure	RC Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	130.0 m	
Blengkon (Tebil)[9]	Superstructure	RC Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	4.5 m	
	Substructure	2 Abutments (Spread Footing)	
	Approach Road Length	120.0 m	
Lamar	Superstructure	Plate Girder	As Planned
	Bridge Length	55.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments and 1 Pier (Steel Tubular Pile + Shallow Caisson)	Shallow Caisson Changed into Steel Tubular Pile[10] Additional Tubular Piles Used
	Approach Road Length	149.7 m	As Planned
Petain III	Superstructure	RC Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Spread Footing)	Base Concrete Placed[11]
	Approach Road Length	108.9 m	As Planned
Molong	Superstructure	RC Girder	As Planned
	Bridge Length	20.0 m	
	Road Width	6.0 m	

[8] The bridge height increased, as the estimated water level of the river at the time of flood rose compared to the prediction. This was because the water of the river was hampered to flow into the sea by sand deposited in the estuary.

[9] The plate showing the name of the bridge is marked as "Tebil Bridge." It is estimated that the name has been swapped from the time of the project planning.

[10] Due to the lack of ground hardness, the shallow caisson foundation was changed into steel tubular pile to ensure the stability of the pier.

[11] Due to the lack of ground hardness, the base concrete was used instead of spread footing on the unstabilized ground.

Bridge	Item	Project Output	
		Originally Planned	Actual
	Substructure	2 Abutments (Spread Footing)	Base Concrete Placed
	Approach Road Length	140.0 m	As Planned
Emang	Superstructure	Plate Girder	As Planned
	Bridge Length	45.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments and 1 Pier (Steel Tubular Pile)	Additional Tubular Piles Used
	Approach Road Length	97.8 m	As Planned
Kalbir	Superstructure	Plate Girder	As Planned
	Bridge Length	25.0 m	
	Road Width	6.0 m	
	Substructure	2 Abutments (Steel Tubular Pile)	Additional Tubular Piles Used
	Approach Road Length	97.3 m	97.4 m

Source: Documents provided by JICA and interviews with the consultant

Project Bridges (Left: Lamar Bridge; Right: Emang Bridge)

On the other hand, some of the construction works by the Indonesian side are yet to be completed at the time of the ex-post evaluation. During the field study, we have confirmed that the pavement of roads and construction of small bridges, which should be borne by NTB, have generally been completed, but there are still some unpaved roads and temporary bridges in the Phase II and III sectors. In detail, there are one unpaved section between Negene and Tatar Loka bridges in the Phase II sector and another unpaved section near the end of the Phase II sector (on the Tatar side), and two sites in the Phase II sectors and three sites in the Phase III sector where permanent small bridges are to be constructed. According to NTB, to complete a construction at these sites, tenders for the construction are to open in 2020 and the construction work is expected to be completed in 2022. With regard to land acquisition by Sumbawa Regency and West Sumbawa Regency, we have been unable to obtain direct

testimonies or documents that prove the land acquisition was carried out at the right timing through interviews with the two regencies during the field study. However, through interviews with some of the landowners who provided their lands, we have confirmed that the land acquisition for the bridge, temporary detour and base camp was carried out appropriately. Also, no problems related to the land acquisition have been heard from the consultant. Therefore, it can be considered that the land acquisition was carried out without particular problems.


Unpaved Sector and Small Bridge Construction Site

3.2.2 Project Inputs

3.2.2.1 Project Cost

At the time of the project planning, the project cost of each phase was planned as 794 million yen (Phase I), 492 million yen (Phase II) and 961 million yen (Phase III) for the Japanese side, and 6 million yen (Phase I), 500 million yen (Phase II) and 190 million yen (Phase III) for the Indonesian side. The actual costs are 793.1 million yen (Phase I), 299.7 million yen (Phase II), and 843.8 million yen (Phase III) for the Japanese side, each of which is 100% (Phase I), 61% (Phase II), and 88% (Phase III) of the plan, respectively; therefore, the project cost is as planned or within the plan. It is not possible to evaluate actual project costs of the Indonesian side because necessary data are not available, since the cost spent only in this project is not recorded and administered separately from the entire costs spent in the South Ring Road.

Table 5: Comparison between Planned and Actual Project Cost (in Million JPY)

Phase	Side	Planned	Actual
Phase I	Japanese Side	794	793.1
	Indonesian Side	6	N.A.
Phase II	Japanese Side	492	299.7
	Indonesian Side	500	N.A.
Phase III	Japanese Side	961	843.8
	Indonesian Side	190	N.A.

Source: Documents provided by JICA

3.2.2.2 Project Period

The project period of each phase was planned as 32 months (Phase I), 38 months (Phase II) and 26 months (Phase III). The actual period for each is 32 months (Phase I), 24 months (Phase II), and 34 months (Phase III), each of which was 100% (Phase I), 63% (Phase II), and 131% (Phase III) of the plan, respectively; therefore, the project periods of Phase I and II projects are as planned or within the plan while that of the Phase III project exceeds the plan. When we asked the consultant about reasons for the increase and decrease in the actual project periods in the Phase II and III projects, they pointed out a possibility that the actual period of the Phase II project became shorter than the plan since the overall schedule of the Phase II project may have been set up with a certain degree of margin. Regarding the Phase III project, it was pointed out that it took longer period than expected to start the detailed design after the signing on the Grant Agreement (hereinafter referred to as “G/A”), as the Indonesian side requested a review on disclaimer clauses of the agreement for all grant aid projects, which pushed back the entire schedule.

Table 6: Comparison between Planned and Actual Project Period

Phase	Item	Planned	Actual
Phase I	Total	32 months	32 months (August 2006–March 2009)
	D/D and Tendering	6 months	5 months (August 2006–December 2006)
	Construction	26 months	26 months (February 2007–March 2009)
Phase II	Total	38 months	24 months (January 2010–December 2011)
	G/A	N.A.	1 month (January 2010)
	D/D and Tendering	N.A.	7 months (January 2010–July 2010)
	Construction	N.A.	17 months (August 2010–December 2011)
Phase III	Total	26 months	34 months (March 2014–December 2016)
	G/A	N.A.	9 months (March 2014–November 2014)
	D/D and Tendering	N.A.	4 months (November 2014–February 2015)
	Construction	N.A.	23 months (February 2015–December 2016)

Source: Documents provided by JICA and interviews with the consultant
Note: D/D denotes "Detailed Design." The start of the project period is set to "starting month of D/D" (Phase I) or "contracting month of G/A" (Phase II and III), and the end of the project period to "completing month of construction."

As stated above, although the project cost was as planned or within the plan in each project phase, the project period exceeded the plan in Phase III. Therefore, efficiency of the project is fair.

3.3 Effectiveness and Impacts[12] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

The quantitative effects of the project were set at the time of the project planning as "impassable period for common vehicles (2-wheels vehicles) (unit: month/year)" and "transit time for 4-wheels vehicles on Tongoloka–Lunyuk sector (60 km) (unit: hour)." The baseline, target and actual values for each indicator are shown in Table 7. The actual values have been collected at the time of the ex-post evaluation through interviews with residents (for the impassable period) and by actual measurements (for the transit time) during the field study,

[12] Sub-rating for Effectiveness is to be put with consideration of Impacts.

since monitored data by the executing agency could not be obtained.

Table 7: Quantitative Effects of the Project

Indicator	Baseline	Target	Actual
	2011	2019	2020
		3 Years After Completion	4 Years After Completion
Impassable Period for Common Vehicle (2-Wheels Vehicle) [month/year]	12 months/year	0 months/year	0 months/year
Transit Time for 4-Wheels Vehicle on Tongoloka–Lunyuk Sector [hour]	Approximately 4.5 hours (When Passable)	Approximately 3 hours (Anytime)	Approximately 1.75 hours
Reference (Transit Time on the Phase I Sector)			
Transit Time for 4-Wheels Vehicle on Sejorong–Tongoloka Sector [hour]	N.A.	N.A.	Approximately 0.25 hour

Source: Ex-ante evaluation report, interviews with residents, and actual measurement
Note: Regarding the transit time, a targeted sector on the ex-ante evaluation report of the Phase II project (Tongoloka–Labi sector) is included in a sector set out on the ex-ante evaluation report of the Phase III project (Tongoloka–Lunyuk). In order to find a quantitative effect of this project as a whole, the effectiveness of the project was assessed focusing on the wider sector, Tongoloka–Lunyuk.
Additionally, neither indicators nor their baseline and target values were set out on the ex-ante evaluation report of the Phase I project. Therefore, the transit time on Sejorong–Tongoloka sector was treated as a reference record and was not considered in the scope of the ex-post evaluation for effectiveness.

Regarding the impassable period for 2-wheels vehicle, we have confirmed through the interviews with residents that they can cross rivers regardless of weathers and seasons, which means the sectors are always passable. In other words, the impassable period is 0 months per year, so the target has been achieved at 100%. However, it was also pointed out through the interview that in the Phase I and II sectors, which are located in mountainous terrain, the road becomes temporarily impassable in the event that landslides occur due to heavy rainfall.[13]

Regarding the transit time for 4-wheels vehicle, we have confirmed through the actual measurements during the field study that the transit time on Tongoloka–Lunyuk sector (Phase II and III sectors) is about 1 hour and 45 minutes, much faster than the target. It takes about 45 minutes to pass the Tongoloka–Tatar (Phase II sector) and about 1 hour on the Tatar–Lunyuk (Phase III sector). As a reference, it takes about 15 minutes to pass from Sejolong to Tongoloka (Phase I sector). We have also confirmed through the interviews with those living in villages near the starting point of the Phase I sector (Tatar and Aekangkung villages) that the transit time from the villages to Lunyuk is about 2 hours[14], which is a similar scale to our measurement result. The

[13] An avoidance of landslide is out of scope of this project. Hence, the impassable period attributed to the landslides was not considered in the scope of the ex-post evaluation for effectiveness.
[14] This is the transit time for 2-wheels vehicle, not 4-wheels.

weather condition was fine at the time of our self-measurement, but there is a possibility that it may take longer time to pass the Phase II sector when it rains, because a steep unpaved sector exists in the Phase II sector.

3.3.2 Impacts

3.3.2.1 Intended Impacts

There were three elements set out as an impact of this project: “improve an access to public services and markets,” “serve as a detour in case of disasters” and “improve a living standard of residents.” We have conducted an evaluation on these elements by interviewing residents living near the project sites.[15]

(1) Improve an access to public services and markets

We have confirmed through the interviews with residents that roads and bridges had been in a poor state before the implementation of this project, having made it difficult for the residents to use motorcycles and cross rivers when the water level rose in rainy weather. On the other hand, the roads and bridges were greatly improved after the completion of this project, allowing them to use the motorcycles and cross the river regardless of the seasons as well as weathers, thereby improving an access to schools, health centers and agricultural markets. Especially, the impact on those living near the end of the Phase II sector (Tatar side), surrounded by the rivers, is significant. We have confirmed some cases that whereas it used to take school children five to six hours to get to their schools by foot, the transit time dropped to one to two hours since they became able to be picked up and dropped off by their families using motorcycles thanks to the improved road and bridge conditions.

(2) Serve as a detour in case of disasters

Through interviews with the National Road Implementation Agency (hereinafter referred to as the “BPJN”) and NTB, we have confirmed that there has never been a situation where the South Ring Road served as a detour when a disaster occurred on the North Ring Road. The reasons are that there has never been a major disaster that would make the North Ring Road impassable for a long period of time, and also a detour is likely to be built and landslides to be removed immediately in the event of the landslide on the North Ring Road, the main road in Sumbawa Island.

[15] We conducted the interviews in the following villages: Tatar and Aekangkung villages located before the beginning of the Phase I sector (on the Sejolong side); Talonang and Lemar Lempu villages located near the end of the Phase II sector and near the beginning of the Phase III sector (on the Tatar side); and Sempar Bontong and Emang villages located in the Phase III sector. 21 people were interviewed in total, including farmers, fishermen, mining workers, landowners, village heads and other village officials in each village.

(3) Improve a living standard of residents

Through the interviews with the residents, we have confirmed some cases that the sales volume of agricultural produces became almost twofold. One of the reasons is that the farmers became able to access new agricultural markets thanks to the improved road and bridge conditions by this project. We have also confirmed other cases that this project brought positive impacts on living standards of the residents; for instance, gasoline could be purchased at 60% of the previous price, and the quality of crops advanced and their sales price increased by one and a half to two times thanks to improved opportunities to purchase fertilizers, both of which are partly attributed to the improved logistics network by the project.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

It was judged that this project did not fall in large-scale ones in road sector in line with the *Guidelines for Environmental and Social Considerations* of Japan International Cooperation Agency (published in April 2004) and would have no significant negative impact on natural environment, and also that this project did not fall in ones implemented with sensitive characteristics or in sensitive areas. Therefore, this project was classified as Category B in terms of environmental and social considerations. In the implementation of the project, the Initial Environmental Examination (IEE) was conducted for the Phase I project, and the Environmental Management and Monitoring Efforts (UKL/UPL) was developed for the Phase II and III projects, where it was confirmed that the negative impacts on the environment were minor. As a result, Environmental Research Agency (Badan Lingkungan Hidup dan Penelitian) of NTB approved the UKL/UPL and issued recommendations on the monitoring. We have confirmed by referring to some of the monitoring reports submitted during the project that no negative impacts such as air and water pollutions occurred and that appropriate countermeasures[16] were taken place during the construction. In addition, we interviewed the residents regarding the occurrence of negative environmental impacts, but their answers were that no such impacts had been found during the construction.

(2) Resettlement and Land Acquisition

At the time of the project planning, Sumbawa Regency and West Sumbawa Regency were to be in charge of acquiring necessary lands, removing stuffs and clearing the lands, and securing lands for temporary construction (e.g., lands for detours, base camps, and material storages). At the time of the ex-post evaluation, we have tried to interview Sumbawa Regency and West Sumbawa Regency on these matters, but could not obtain relevant information on the land

[16] Air pollution (dust) control measures included sprinkling water on unpaved road and limiting traffic speed, water and soil pollution control measures included the installation of sewage treatment tanks at the base camp and the installation of protective concrete base around fuel tanks.

acquisition and resettlement, as well as information whether a series of processes related to the land acquisition were properly implemented in accordance with national laws and regulations, since a key person in charge of the project had already been transferred and the related information had not been handed over to his successor. On the other hand, when we interviewed two landowners who had provided their lands for this project, we have confirmed that they had provided a land of about 100 m^2 for free of charge in each case and that no resettlement had occurred in these two cases. In addition, we have heard from them that a stakeholder consultation meeting was held regarding the land acquisition, where a head of the Emang village, in which the lands subject to the land acquisition are located, asked to provide the lands for this project free of charge, and they agreed on his request without complaint considering the benefits of the project.

As stated above, this project has mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional/Organizational Aspects of Operation and Maintenance

Since the South Ring Road is a provincial road, an operation and maintenance of the road is carried out by NTB. Main departments involved are the Technical Road Planning Section, General Highways Division, and the Implementation of Maintenance Section, Balai of Provincial Road Maintenance of Sumbawa Island Region, both of which are under the Public Works and Spatial Planning Agency of NTB Province. At the time of the ex-post evaluation, four of the nine staff members working in the Technical Road Planning Section are responsible for the maintenance of the bridges. The Implementation of Maintenance Section has an office in Sumbawa Besar, where 22 staff members are in charge of the maintenance of the South Ring Road. Considering the frequency of routine maintenance is once a year, the number of staffs can be deemed adequate.

When a bridge needs to be repaired, the Technical Road Planning Section submits to the head of General Highways Division a report outlining planned repairs and expected costs. From there, the report is further forwarded to the governor of NTB for his/her final approval. In case the governor approves the repairs and the work is carried out, a contractor is selected through bidding process. By the time of the ex-post evaluation, this decision-making process had never been taken on the project bridges since no major maintenance issues had arisen. However, considering that the above decision-making process are used for all bridges managed by NTB and that issues from the past regarding this process are not heard from the Technical Road Planning Section, it can be deemed that this process is functioning without problems. Based on the above, there are no major problems in the institutional or

organizational aspect of operation and maintenance.

3.4.2 Technical Aspects of Operation and Maintenance

This project was implemented in a remote area with limited accessibility, so maintenance-free structures were adopted for the constructed bridges in order to eliminate the need for maintenance as much as possible.[17] Therefore, it is not necessary to carry out major repair works frequently or to always have highly skilled personnel on duty.

On the other hand, the personnel should have technical skills at a level necessary to carry out routine maintenance, such as bridge inspection and cleaning. However, we are concerned that the staff members, particularly working in the Technical Road Planning Section and in charge of inspection and assessment of bridge conditions, are not skilled enough since we have confirmed some cases through the field study that they seemed to overlook bridges in high need for repairs. According to the Technical Road Planning Section, criteria for assessing the condition of the bridges and items to be inspected are left to the subjectivity of the staff in charge. Hence, we have seen the needs for capacity building, such as the establishment of an inspection and assessment manual.

3.4.3 Financial Aspects of Operation and Maintenance

Through interviews with the Technical Road Planning Section, we have found that the actual allocation and expenditure of road and bridge related budgets, including this project, are as shown in Table 8. These are provincial-wide budgets, and a cost of the routine and periodic maintenance for the project only is not separately administered. There are three sources for the road and bridge related budgets: provincial budget, national budget, and aid from other donors. The table below shows the total amount combining these sources. In the year of 2019, the actual allocation and expenditure significantly decreased because most of the provincial budget was spent on recovery from earthquake damage happened that year, so the allocation to road and bridge related budget was reduced.

[17] Examples of the maintenance-free structures include the omission of expansion and contraction devices and bearings that require regular maintenance, the galvanizing of steel girders, and the adoption of measures to prevent clogging of drains (making slopes to prevent the accumulation of debris on the bridge surface) and measures to prevent salt damage (enlarging concrete covers).

Table 8: Allocation and Expenditure of Road and Bridge Related Budgets (in Million IDR)

	2016	2017	2018	2019
Allocation				
Total	404,410	576,951	417,392	112,198
New Construction, Rehabilitation and Replacement	281,842	491,093	395,809	99,075
Routine and Periodic Maintenance	122,568	85,858	21,583	13,123
Expenditure				
Total	401,222	575,767	416,000	111,393
New Construction, Rehabilitation and Replacement	278,705	489,909	394,417	98,269
Routine and Periodic Maintenance	122,517	85,858	21,583	13,123

Source: Interviews with the Technical Road Planning Section

At the time of the project planning, the annual cost to be needed for the maintenance of the project bridges was estimated about 234 million IDR (55 million IDR for the bridges in the Phase I project, and 179 million IDR in the Phase II and III projects). This is an amount that can be adequately covered by the budget related to roads and bridges at the time of the ex-post evaluation. Therefore, there are no major problems in the financial aspects of operation and maintenance. On the other hand, it should be noted that the amount of budget allocated to routine and periodic maintenance has been in decreasing trend, and there is a possibility that a necessary budget for maintenance could not be secured in future years. According to the Technical Road Planning Section, a large part of the budget is directed to the new construction, rehabilitation and replacement because their priority is a construction of new bridges and an expansion of road network, and this trend will likely continue.[18] Therefore, they pointed out that it would be difficult to secure a full budget for the maintenance from provincial budget in future, and a shortfall may be supplemented by national budget or cooperative funds from other donors. Based on the above, there may be challenges in securing a stable maintenance budget in the long term.

3.4.4 Status of Operation and Maintenance

Through interviews with the Technical Road Planning Section, we have heard that no major problems had happened in the project bridges by the time of the ex-post evaluation, and accordingly, there were no plans to repair the bridges. In contrast, we have checked the condition of each project bridge through the field study and found abutment protections

[18] In fact, it seems that the budget allocation to “new construction” is prioritized among the new construction, renovation, replacement budget in the table.

collapsed and road surface deteriorated in some of the bridges. We then asked back the Technical Road Planning Section about these matters, and they answered that they had not been aware of the problems but would carry out repair works on the said bridges within the scope of the FY2020 budget. One of the reasons for their overlooking could be attributed to a lack of bridge inspection/assessment manual. The criteria for assessing the condition of bridges and the items to be inspected are not clearly defined, so even if a bridge was in a condition that an inspector should report as “repairs required,” it might have been overlooked by the inspector due to his/her subjective judgment. Additionally, inspection results are not necessarily recorded on paper or electronic media, suggesting there is a need for improving the way of information management. The Technical Road Planning Section is also aware of the need to develop the bridge inspection/assessment manual and seeks a support for establishing such manual.

Collapsed Abutment Protection (Mone I)

Deteriorated Road Surface (Telonang I)

Regarding routine maintenance, the Technical Road Planning Section and the Implementation of Maintenance Section conduct an inspection and cleaning once a year. During the inspection by the Technical Road Planning Section, they assess the conditions of all bridges and grade them on a 5-point scale (0 = excellent, 1 = good, 2 = fair, 3 = damaged but can easily be repaired, 4 = severely damaged, 5 = collapsed). For bridges graded with 3 to 5, the Technical Road Planning Section prepares a report outlining planned repairs and expected costs, but as mentioned above, such reports have never been prepared as for the

project bridges by the time of the ex-post evaluation. The Implementation of Maintenance Section located in the Sumbawa Island cleans the bridges, briefly checks their conditions and reports to the Technical Road Planning Section if any problems are found. The frequency of inspection and cleaning was assumed to be once a year at the time of the project planning, so they are carried out as planned. On the other hand, repairs such as sealing of pavement cracks and patching of pavement pot holes were expected to be carried out twice a year at the time of the project planning, but they do not seem to be carried out as planned, judging from the deteriorated road surface of some bridges confirmed through the field study.

As stated above, some minor problems have been observed in terms of the technical aspect and current status. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of this project is to improve a function of the South Ring Road as an arterial road in the southern region of Sumbawa Island by constructing and rehabilitating bridges, thereby contributing to the improvement in living standard of the neighbouring residents and the economic development of that area. The project is highly relevant to Indonesia's development plan, development needs and Japan's ODA policy at the time of the project planning and ex-post evaluation. Therefore, its relevance is high. Although the project cost was as planned or within the plan in each project phase, the project period exceeded the plan in the Phase III project. Part of the road and small bridge constructions planned to be handled by NTB is yet to be completed. Therefore, efficiency of the project is fair. As a result of the project implementation, the targeted sectors became always passable and the transit time significantly reduced, resulting in improved access to public services and markets, as well as improved living standards of the neighbouring residents. This project have mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high. No negative impacts on the natural environment or land acquisition have been observed. Some minor problems have been observed in terms of the technical aspect and current status of operation and maintenance. Therefore, sustainability of the project effects is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Complete the construction works by NTB

In the Phase II and III sectors, there are still sections of road and small bridges for which NTB were in charge of construction but has not yet paved or constructed by the time of the ex-post evaluation. NTB aims to complete the constructions by the end of 2022, which will further reduce the transit time. Therefore, NTB should proceed with the work as planned.

(2) Establish the bridge inspection/assessment manual

As for the maintenance of bridges, criteria for assessing conditions of the bridges and items to be inspected are not clearly defined and are largely left to the subjectivity of individual inspectors. As a result, bridges in a condition that the inspector should report as “repairs required” may be overlooked due to his/her subjective judgment. Therefore, NTB should establish a bridge inspection/assessment manual and have objective criteria for the assessment, and then conduct such inspections/assessments. It is also important to secure every year a budget for the maintenance of roads and bridges so as to ensure that the inspections and repairs are carried out steadily.

(3) Establish the information management system

Records of bridge inspections and cleanings carried out by NTB are not created or stored on paper or electronic media. In addition, important evidence that would affect the effectiveness and impact of the project, such as operation and effect indicators, and a series of documents related to land acquisition and resettlement, is not recorded and stored, which implies an information management is not appropriately carried out. Therefore, NTB should establish an information management system so that information will not be lost due to personnel changes in projects which have a long implementation period and require long-term maintenance in future years.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

<u>Technology transfers on bridge construction and maintenance</u>

Through interviews with the executing agencies, we heard many comments about the importance of technology transfer through the project. They emphasized their needs for the technology transfers and capacity buildings, from Japanese contractor and consultant to executing agencies and employees of local contractor, on construction of maintenance-free

bridges, maintenance methods, project management and safety management methods, etc. In particular, the transfer of technology from the Japanese side regarding the maintenance of bridges is considered the most important. There are two problems in the current maintenance by the Indonesian side other than financial issues: “unclear assessment criteria on bridge conditions” and “lack of uniformity in inspection method among the persons in charge.” Therefore, it is important for the Japanese side to provide supports for the capacity building on maintenance in parallel with construction work, in order for the Indonesian side, together with the Japanese side, to establish a common understanding of the assessment of bridge condition and inspection items, and then, to unify them into common inspection/assessment manuals among the staffs in charge. Therefore, as a lesson for similar projects in future, it is recommended that the technology transfers and capacity buildings also be implemented together with infrastructure development, where the Japanese side gives supports for the creation of maintenance manuals and trainings for staffs in charge.