

FY2022 Simplified Ex-Post Evaluation Report of Japanese Grant Aid Project

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Duration of the Study: November 2022–January 2024

Duration of the Field Study: 28 March–11 April 2023

Country Name	<b>&lt; The Project for the Reconstruction of the Bridges on National Road No.9 &gt;</b>
Lao People’s Democratic Republic	



Location of the Project Site



Xe Kum Kam Bridge

**I. Project Outline**

Background	National Road No.9 in Laos, a land-locked country, is part of the East-West Economic Corridor (EWEC), which crosses the Indochina Peninsula and connects Laobao on the Vietnamese border to Savannakhet on the Thai border, and is an important international trunk road for socioeconomic development not only in Laos but also in ASEAN as a whole. However, at the time of planning of the Project, it became obvious that many bridges on National Road No. 9 developed in the 1980s were showing signs of deterioration. In particular, both the Xe Kum Kam Bridge and Xe Tha Mouak Bridge, the target bridges of this project, were constructed with the support from the former Czechoslovak Republic over 30 years ago. The main girders had significant deflection due to overloaded vehicles and other factors. Both bridges were temporarily reinforced with temporary girder supports; however, due to the difficulty of ensuring adequate safety through permanent repairs, the urgent reconstruction (replacement) of the bridges is deemed necessary, leading to the implementation of this project.			
Objectives of the Project	The objective of this project was to secure safe and stable traffic flow on National Road No.9 by reconstruction of the deteriorated two bridges (the Xe Kum Kam Bridge and Xe Tha Mouak Bridge) on National Road 9, which is a part of the EWEC, thereby contributing to the development of the infrastructure and economy of the surrounding regions along the EWEC.			
Contents of the Project	<ol style="list-style-type: none"> <li>1. Project Site: Savannakhet province</li> <li>2. Japanese side: <ol style="list-style-type: none"> <li>1) Civil works Replacement of the Xe Kum Kam bridge (90m) and Xe Tha Mouak bridge (160m), and rehabilitation of approach roads</li> <li>2) Consulting services Detail design, construction supervision, soft component (guidance on bridge maintenance and management, transfer of Japanese technology (bridge replacement planning, and safety management)</li> </ol> </li> <li>3) Lao side: Compensation for relocation of houses from construction sites and provision of new land for relocation destination with the required infrastructure, acquisition of construction sites and land necessary to perform temporary works, removal or relocation of public utilities, such as electric cables, telephone cables, UXO, etc. installation of traffic control and road signs, permission for obtaining borrowed materials, tax exemptions on materials and equipment imported for the project and customs clearance, exemptions from custom fees, taxation and the others for Japanese and third-party nationals entering Laos for the project, bearing of all expenses, other than those covered by this project</li> </ol>			
Implementation Schedule	E/N Date	November 24, 2015 (Detailed design) May 4, 2016 (Main component)	Disbursement Date	—
	G/A Date	January 13, 2016 (Detailed design) July 8, 2016 (Main component)	Completion Date	June 28, 2019 (Completion of the construction)
Project Cost	E/N Grant Limit / G/A Grant Limit: 2,598 million yen (70 million yen (Detailed design), 2,528 million yen (Main component))			

	Actual Grant Amount: 2,489 million yen: (61 million yen (Detailed design), 2,428 million yen (Main component))
Executing Agency	Department of Roads (DOR), Ministry of Public Works and Transport,
Conditions (Loan only)	–
Borrower (Loan only)	–
Contracted Agencies	Main Contractors: Hazama Ando Corporation/JFE Engineering Corporation (JV) Main Consultants: Oriental Consultants Global Co., Ltd./International Development Center of Japan (JV) Agent: None

## II. Result of the Evaluation

### Summary

The project was implemented with the aim to secure safe and stable traffic flow on National Road No.9 by reconstruction of the deteriorated two bridges (the Xe Kum Kam Bridge and Xe Tha Mouak Bridge) on National Road 9, which is a part of the EWEC, thereby contributing to the development of the infrastructure and economy of the surrounding regions along the EWEC. Its purpose is consistent with Lao's development policy at the time of planning, which has emphasized infrastructure development that contributes to economic growth, its development needs to improve aging bridges on international trunk roads, which are important for socioeconomic development, and Japan's development cooperation policy. Contribution to raising awareness of maintenance management among staff in charge of maintenance management of the target bridges through collaboration with JICA's Technical Cooperation project (TC project) has been confirmed, and is consistent with Goal 9 of the SDGs. Therefore, its relevance and coherence are high. The outputs were mostly as planned, and the project cost was within the plan while the project period slightly exceeded the plan; thus efficiency of the project is high. The traffic volume counted around the target bridges temporarily fell below the pre-project level due to the impact of COVID-19. However, there was a recovery trend by 2023, and the total traffic volume was significantly higher than before the project. It was also confirmed that the safety of the bridges was improved by replacing the bridges, improving the curves of the approach road, and installing nighttime lights. Additionally, the positive effects confirmed such as increased sales at agricultural stores, general merchandise stores and restaurants near the bridges, the ease of purchasing daily necessities, easier access to and from work and school and hospitals, as well as facilitating visits to family and acquaintances. The fact that the axle weight limit for vehicles was relaxed on the target bridges after replacement, allowing more cargo to be transported also contributed to facilitating distribution. There is little negative long-term social, environmental or economic impact. Therefore, the effectiveness and impacts are high. Regarding operation and maintenance, although there are no concerns in terms of policy/system and institutional/organizational aspects, some issues have been observed in the technical, financial aspects, and the current status of operation and maintenance, and they are not expected to be resolved. Therefore, sustainability is judged to be moderately low.

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

<b>Overall Rating<sup>1</sup></b>	<b>B</b>	<b>Relevance &amp; Coherence</b>	③ <sup>2</sup>	<b>Effectiveness &amp; Impacts</b>	③	<b>Efficiency</b>	③	<b>Sustainability</b>	②
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### <Special Perspectives Considered in the Ex-Post Evaluation/Constraints of the Ex-post Evaluation>

- In this project, the traffic volume of each of the Xe Kum Kam Bridge and Xe Tha Mouak Bridge was set as an indicator to measure its effectiveness. However, since no traffic volume survey was conducted at the target bridges, traffic volume counted at a point 17 km from the Xe Kum Kam bridge was checked as an alternative indicator. According to the executing agency, there are no major detours or access roads between this point and the Xe Kum Kam bridge, and between Xe Kum Kam and Xe Tha Mouak Bridges. Therefore, it was judged that there was no problem in considered to be almost equivalent to the traffic volume of the two bridges.

### 1 Relevance/Coherence

#### <Relevance>

- Consistency with the Development Policy of Lao at the Time of Ex-Ante Evaluation

The Lao government formulated the *8th National Socio-Economic Development Plan (2016-2020)*, which has a goal of sustainable and inclusive growth through international regional integration as one of its goals, and set the improvement of roads connecting to neighboring countries, including the Mekong Subregional Corridor, Asian Highway, East-West Corridor, and North-South Economic Corridor as a priority activity. Moreover, the *Development Plan for the National Road (2011)*, developed by the Ministry of Public Works and Transport (MPWT) at the time, focused on strengthening road links in four areas: "economic growth", "safety and rural development", "security and peace", and "society and culture".

- Consistency with the Development Needs of Lao PDR at the Time of Ex-Ante Evaluation

National Road No.9, where the target bridges of this project are located, is part of the EWEC that crosses the Indochina Peninsula, connecting the Vietnam border to the Thai border via the Second Mekong Bridge, and is an important international trunk road for the socio-economic development of the entire ASEAN. However, at the time of planning of this project, many bridges along this line were aging bridges built in the 1980s and did not meet standards at that time in terms of structure, width, and load capacity. The two target bridges of this project also suffered from structural defects such as insufficient bearing capacity of the main girders and broken main girders at the intermediate piers, which interfered with smooth traffic flow. Moreover, in 2012, the limit of vehicle axle weight was eased in Laos, allowing

<sup>1</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>2</sup> ④ : Very High ③: High, ②: Moderately low, ①: Low

heavier weight vehicles than before to travel. This raised concerns about potential structural issues with bridges, necessitating early responses to ensure traffic safety.

- Appropriateness of Project Design/Approach

In the implementation, this project took advantages of lessons learned, such as the fact that the past similar cases highlighted challenges in the maintenance and management status due to the lack of certain expected scheduled inspection items. In response to this, this project sought to improve the periodic inspection and maintenance manuals for bridges, etc., which could be applied, in the TC project “Capacity enhancement of Road management”. These manuals were then used in the soft component trainings of this project, along with activities such as workshops related to bridge inspection, repair, and traffic safety.

<Coherence>

- Consistency with Japan’s ODA Policy at the Time of Ex-Ante Evaluation

In the *Country Assistance Program for Laos* at the time of planning this project, one of the four key areas was “Economic and Social Infrastructure Development”. In the area, assistance was provided through the transportation and logistics network development program. In addition, the development of National Road No. 9 was included in the “transportation and logistics network development”, which was identified as a priority issue in the *JICA Country Analysis Paper for Laos*. This project replaced bridges located on National Road No. 9, which would contribute to strengthening ASEAN connectivity, and is recognized as consistent with Japan’s development cooperation policy.

- Internal Coherence

In this project, it was assumed that improvements in periodic inspection and maintenance plans for bridges, etc., that could also be applied to this project, would be carried out under the TC project “Project for Improvement of the Road Management Capability”. As expected, based on the bridge maintenance manual prepared by the above-mentioned TC project, the project implemented activities such as on-site bridge inspections, repairs and workshops related to traffic safety through on-the-job training (OJT), contributing to fostering awareness among maintenance staff regarding appropriate management practices. Moreover, at the time of ex-post evaluation, the ongoing TC project, “Project for Capacity Development on Bridge Maintenance and Management Strengthening Bridge Maintenance Capacity”, is currently implementing the transfer of knowledge regarding the daily and periodic bridge inspections through OJT in the pilot area. Since Savannakhet province is included in the pilot area, the staff in charge of maintenance and management of the bridges replaced under the project are involved in the pilot activities to learn the know-how of periodic inspections, etc., which are expected to be utilized in future bridge maintenance and management activities. The Grant Aid Project “the Project for Improvement of the National Road Route 9 as East-West Economic Corridor of the Mekong Region”, which improved the national road where the target bridges of this project are located, didn’t directly collaborated with this bridge reconstruction project during its implementation, but both projects shared a common objective of achieving safe and stable traffic on the same road. Therefore, both projects were essential for the achievement of their respective objectives; thus it is recognized that they have relevance.

- External Coherence

In the transportation and traffic sector, the World Bank, the Asian Development Bank, and others provided support for National Road No.9, but no support, specific collaboration or coordination was confirmed. In relation to the international framework, this project aims to achieve safe and stable transportation through the replacement of the bridges located on the international trunk road, which can be said as consistent with the SDG Goal 9: “Industry, Innovation and Infrastructure” (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation).

<Evaluation Result>

In light of the above, the relevance and coherence of the project are high<sup>3</sup>.

2 Effectiveness/Impacts<sup>4</sup>

<Effectiveness>

-Quantitative effects

Since the traffic volume for each target bridge set at the time of planning as the quantitative effect indicator of the project was not available, traffic volume data counted near the target bridges by DPWT Savannakhet was used as an alternative indicator<sup>5</sup>. The actual value from 2020 through 2022 was lower than the one before the project was implemented. According to the executing agency, the decrease in traffic volume may be attributed to the impact of COVID-19, which restricted domestic and international travel<sup>6</sup>. National Road No.9 is an international trunk road connecting Thailand and Vietnam, hence the impact on heavy vehicle traffic was particularly significant. The traffic volume of large vehicles in 2023 has remained below the pre-project level, but has shown a recovery trend along with a decrease in the impact of COVID-19, and the total traffic volume has greatly exceeded the level before the project implementation<sup>7</sup>. The reason for the increase in total traffic volume despite the traffic volume of heavy vehicles was below the baseline data is that total traffic volume includes motorcycles, pickup trucks, and other vehicles used by neighborhood residents on a daily basis. The significant relaxation of domestic travel restrictions since 2023

<sup>3</sup> Relevance:③, Coherence:③

<sup>4</sup> When providing the sub-rating, Effectiveness and Impacts are to be considered together.

<sup>5</sup> See <Special Perspectives Considered in the Ex-Post Evaluation/Constraints of the Ex-post Evaluation> for details.

<sup>6</sup> In Lao PDR, Prime Minister's Order (No. 06/PM) was issued in March 2020 on measures against COVID-19, and measures were taken to restrict people's movement, such as restriction on outings, banning gatherings of 10 people or more, temporarily shutting down factories, and stopping individuals from traveling to and from international border crossings.

<sup>7</sup> According to the executing agency, the reason for the rapid increase in traffic in 2023 can be attributed to the fact that the impact of COVID-19 has decreased in Laos since early 2023 and people have become more mobile in Lao.

has resulted in more active travel by neighborhood residents in surrounding areas. While the target value set at the time of planning was approximately 1.6 times the baseline value, it can be confirmed that the actual value of the alternative indicator of total traffic volume in 2023 has increased to approximately twice (on average) the value before project implementation. The residents in the neighborhood and drivers also reported an increase in traffic volume on the target bridges after the replacement<sup>8</sup>; thus it can be said that the expected effects were generally achieved as planned. Moreover, the average speed on each bridge improved as shown in the table below, since the road surface of the bridge became flatter and easier to travel on, and the steep curves on the approach road were improved to gentle curves, eliminating the need to reduce travel speeds.

Table 1: <Quantitative Effects> Quantitative Effects Indicators of the Project Set at the Time of Planning

Indicators		Baseline 2015	Target 2022	Actual 2020	Actual 2021	Actual 2022
		Baseline Year	3 Years after Completion	1 Year after Completion	2 Year after Completion	3 Years after Completion
(1) Traffic volume (Large Class) (vehicles/day)	Xe Kum Kam bridge	456	726	No traffic volume studies have been conducted on the target bridges.		
	Xe Tha Mouak	452	724			
(2) Traffic volume (All Class) (vehicles/day)	Xe Kum Kam bridge	1,840	2,966			
	Xe Tha Mouak	4,861	8,358			
(Reference (3)) Travel speed (km/h)	Xe Kum Kam bridge	30	60	60	60	60
	Xe Tha Mouak					

Source: Ex-ante evaluation, preparatory survey report, document provided by Department of Public Works and Transport, Savannakhet

Table 2: <Quantitative Effects> Alternative Indicator: Traffic Volume at 17 km from the Xe Kum Kam bridge

Indicators	Baseline 2012	Actual 2020 1 Year after Completion	Actual 2021 2 Year after Completion	Actual 2022 3 Years after Completion	Actual 2023 4 Years after Completion
(1) Traffic volume (Large Class) (vehicles/day)	1,191	427	549	621	1,029
(2) Traffic volume (All Class) (vehicles/day)	2,398	1,165	2,174	1,951	7,826

Source: Document provided by Department of Public Works and Transport, Savannakhet

#### - Qualitative effect

##### [Improvement in bridge safety]

According to the executing agency and the nearby residents and drivers who use the target bridges, the safety of the two target bridges has significantly improved after their replacement. Specifically, it can be said that improved alignment of the approach road, enhancement of road surface on the bridges, ensuring proper sidewalks, and installation of nighttime lights have contributed to the improvement of safety at the target bridges, as follows.

##### - Improvement of the curve of the approach road

Before the project was implemented, there was a sharp curve in the approach road leading to the Xe Kum Kam Bridge, which was considered an accident-prone area. When the bridge was replaced, the curve in the approach road was changed to a more gradual alignment, allowing drivers to drive from the approach road to the bridge more safely.

##### - Improvement of road surface of the bridge

Before the bridge was replaced, the road surface of the Xe Tha Mouak bridge had large undulations in several places, making it unsafe for drivers to drive on. After the bridge was replaced, the bridge road was flattened and improved to make it easier and safer to drive on it.

##### - Installation of sidewalks with adequate width

Several communities are located near the Xe Tha Mouak bridge, and significant number of pedestrians use the bridge daily. Before the bridge was replaced, the sidewalks were narrow and unsafe for both pedestrians and drivers. The sidewalks were widened when the bridge was replaced, allowing pedestrians to cross the bridge safely.

##### - Installation of nighttime lights

Lights were installed on both target bridges for nighttime use, allowing people can use them safely at night. Accordingly, the number of bridge users at night also has increased.

#### <Impacts>

##### (1) Intended Impacts

###### 1) Contribution to the livelihood of local residents

At the time of planning, it was expected that the access to clinics, hospitals, schools, markets, and other facilities improved by replacing the two target bridges, thereby increasing convenience for local residents. According to nearby residents, the main purposes of using the bridges were to go to farmland and markets, commute to work and school, visit friends and family, etc. Although there was no significant change in the frequency of its use except for some residents, daily shopping for food and other items, commuting to work and school, visiting clinics and hospitals, and visiting and interacting with family members and friends became easier after the bridges were replaced. Furthermore, the improved strength of the bridges and the installation of nighttime lights have made it possible to drive and commute across the bridges safely even at night. Due to the increased traffic, there have been increases in the sales volume and revenue of agricultural products and other products at restaurants and roadside stands located near the bridges. Therefore, it can be said that this project has contributed to the revitalization of the

<sup>8</sup> 11 community members and 13 drivers were interviewed around the target bridges during the site visit.

local economic activity.

2) Contributing to the promotion and facilitation of logistics in the EWEC

The two bridges replaced under the project were designed to meet the reduced axle weight limit for vehicles (from 9.6 to 11.0 tons) based on the international agreement with Thailand and Vietnam. DOR and Department of Public Works and Transport (DPWT) Savannakhet officials explained that after the bridge replacement, the eased axle weight limit for vehicles has allowed more cargo to be transported, contributing to facilitating logistics. Most of the interviewed drivers also stated that the improved road conditions of the entire National Road No. 9, including the target two bridges, contributed to the smooth transportation of cargo. Furthermore, while the improvement in bridge strength by the replacement and the relaxation of vehicle axle weight restrictions have contributed to the safety, reliability of users, and the promotion of logistics, there have been instances of large vehicles with a total weight of 30 to 40 tons or more running on the road. From the perspective of road and bridge maintenance management, it can be said that this situation raises concerns. (See “4. Sustainability -Preventative Measures to Risks”).

(2) Other Positive and Negative Impacts

1) Impacts on the Environment

This project was classified as Category B based on *the JICA Guidelines for Environmental and Social Considerations* (promulgated in April 2010) since it was judged that the project does not fall into the large-scale bridge sector and the undesirable effects on the environment are not significant, and it does not pertain to characteristics and regions that are prone to the impacts outlined in the same guidelines. The Initial Environmental Examination (IEE) was approved (June 2016) by the Agency for Natural Resources and Environment in Laos. During the project implementation, designated mitigation measures, as well as monitoring of specified air quality, water quality, waste, and noise, were conducted and it was confirmed through the interview with executing agency and site visits that no negative environmental impacts associated with the implementation of the project occurred during and after the project implementation.

2) Impact on Social Environment (Resettlement and Land Acquisition)

In implementing this project, a land acquisition of 26,000m<sup>2</sup> (one owner) was made for the realignment of the approach road. 485,366,000 kip (approx. 3,774,000 yen) was paid to the land owner in accordance with Lao domestic law, *the JICA Guidelines for Environmental and Social Considerations*, and the agreement with the landowner, and the process was completed without any issues. No resettlement occurred in the course of the project implementation.

3) Gender Equality, Marginalized People, Human Rights, Social Systems and Norms, and Human Well-being

At the time of planning, it was assumed that activities for gender equality would be implemented, such as ensuring women’s participation in stakeholder meetings, etc. Women in the local community were actually involved in the discussions; thus measures were made to address expected gender equality considerations. However, no notable impact has been generated through the activities since then. No specific impacts also could be identified for marginalized people/human rights, social systems and norms, and human well-being.

<Evaluation Result>

Regarding the quantitative effect indicator (traffic volume), traffic volumes for the two target bridges were not counted, therefore it was not possible to accurately analyze the degree of achievement of the actual values in the target year. On the other hand, the traffic volume counted around the target bridges was lower than the pre-implementation traffic volume for a certain period due to COVID-19; however, there was an increasing trend at the time of the ex-post evaluation, and the total traffic volume was much higher than the one before implementation. The results are consistent with the responses of interviews with nearby residents and drivers, and it can be said that the expected effects were generally achieved as planned. Additionally, it has been confirmed that the improvement in the condition of the bridges and approach roads has resulted in increased travel speeds. Furthermore, the replacement has enhanced the safety of the bridges for driving and passing, contributing to improved convenience for nearby residents and facilitating the promotion and smooth flow of logistics through the relaxation of vehicle axle weight regulations. Taking the above into consideration, the expected outcomes and impacts of the project have generally been achieved as planned, and there are few negative impacts in terms of social (including human rights and gender equality), environmental, and economic aspects in the long term. Therefore, the effectiveness and impacts of the project are high.

3 Efficiency

<Output>

The output of the project was generally implemented as planned (as described in “I. Outline of the Project”). Although there were changes in construction methods and design, there were no changes that would affect the project’s effectiveness. On the items covered by the Laos side, all have been implemented.

<Input>

While this project was planned to cost 2,755 million yen (2,598 million yen on the Japanese side, 157 million yen on the Laos side), the actual project cost was 2,610 million yen (2,489 million yen on the Japanese side, 121 million yen on the Laos side), within the plan (95% of the original plan: 96% of the plan on the Japanese side and 77% of the plan on the Laos side). The main reasons why the cost of the Lao side was less than 80% of the planned cost were that the cost of land acquisition was less than planned and that the allowance for the project director and others was estimated to be more at the time of planning.

The project period including the detailed design was 42 months, slightly exceeding a planned period of 39 months (108% of the plan) due to the delay in the conclusion of the Grant Agreement. On the other hand, the project period for the main construction was within the plan while responding to changes in some construction methods and designs. According to the consultant, the consultant and the contractor worked

closely together to minimize the impact of the project on the critical path<sup>9</sup> by allocating the necessary personnel, equipment, and safety considerations, and by making every effort to avoid delays, which enabled the project to be completed within the time frame.

<Evaluation Result>

Although the project cost was within the plan, project period slightly exceeded the plan. Therefore, efficiency of the project is high.

4 Sustainability

- Policy and System

In April 2023, the *Agreement on the Maximum Gross Weight of the Truck* was put into effect by the MPWT. The Agreement specifies a vehicle axle weight of 11 tons and sets a maximum total weight for each bridge, among other measures, which can be said to contribute to ensuring sustainability in terms of road and bridges safety and maintenance conditions.

- Institutional/Organizational Aspect

DOR is in charge of national roads and bridges located on national roads, and DPWT is in charge of roads and bridges on provincial roads and other local roads, for planning, design, construction management, and maintenance. Meanwhile, DPWT collaborates with DOR and the Office of Public Work and Transport (OPWT) even for the national roads in regional areas. DPWT oversees maintenance and the supervision of outsourced maintenance, while OPWT, as a subordinate organization of DPWT, conducts inspections and supervision of routine maintenance operation and road inspections. At the time of the ex-post evaluation, DPWT Savannakhet, which is mainly responsible for the maintenance of the target bridges, has 23 staff engaged in Operation and Maintenance (O&M) of the road, and nine of them are engaged in O&M of National Road No. 9, including the bridges. Furthermore, one person from each of the nine offices of OPWT is assigned to O&M of National Road No.9, and one person from each of OPWT Phalanxai district and Phin district is engaged in O&M of the two target bridges.

As mentioned above, the O&M structure and division of roles are clear, and the DOR, DPWT, and OPWT are well coordinated. Although the number of staff engaged in O&M is limited, there is no problem because actual O&M activities are outsourced. Therefore, it is judged that there are no major issues with the O&M structure of the project.

- Technical Aspect

The staff of DPWT Savannakhet responsible for the maintenance of the target bridges have acquired the necessary knowledge for conducting proper bridge inspections through the soft component training of this project. This training covered the proper bridge inspections by learning the concept of prolonging the lifespan through repairs and reinforcements, as well as maintenance manuals and evaluation criteria, all of which encompass the concept of lifecycle cost. Furthermore, Savannakhet province is also part of the pilot areas for the ongoing TC project at the time of ex-post evaluation. The knowledge acquired through the mentioned training serves as the foundation for ongoing technology transfer through OJT. Although they have not yet reached the point where each inspection and repair can be carried out independently due not only to technical issues but also to lack of equipment and budget, it can be said that technical capabilities are improving through the soft component training of the project and the support currently being provided. Regarding OPWT, interviews conducted during site visits revealed a limited level of involvement in O&M activities, and there was also a lack of clear understanding of the specified O&M items and their frequencies. Considering the weak maintenance management system in Laos before the implementation of the project, it is considered that it will take some time for a sufficient improvement in understanding and technical capacity related to O&M to reach the local level.

In light of the above, in terms of the technical aspects of O&M in the project, it can be said that the understanding of the maintenance staff of DPWT Savannakhet has deepened through the soft component of the project and the training provided by the TC project. However, it is necessary to continue improving the implementation of O&M activities, including maintenance, involving personnel at the local level in the future.

- Financial Aspect

The O&M budget request for roads and related facilities is applied by each regional office on an annual basis, and budget allocation is determined based on the urgency of the needs each fiscal year. Although the amount for each bridge is not available, the budgets related to National Road No. 9 for the recent years are shown in the table below.

Table 3: Maintenance Budget for the Road and Bridges on National Road No.9  
(Unit: million kip)

	2019	2020	2021	2022	2023
Roads	3,322	5,004	6,707	2,811	9,161
Bridges	997	878	862	1,516	3,291

Source: Questionnaire answers

The maintenance cost of the target bridges per year indicated at the time of planning was 364 million kips. The amount listed in the table is the maintenance budget for the entire National Road No.9 and all bridges, which is not sufficient for the maintenance of the approximately 240 km road from Savannakhet city to the Vietnam border and 51 bridges. The budget necessary to implement appropriate O&M activities has not been obtained, which has hindered appropriate O&M activities. For example, if a crack appears in the road, temporary repairs are being made to address them. The budget for the MPWT is allocated by the Road Maintenance Fund (RMF)<sup>10</sup>. Table 4 shows the budgets for

<sup>9</sup> A work path that is critical to completing all project steps in the shortest time. By identifying critical tasks, schedule flexibility can also be determined.

<sup>10</sup> The RMF was introduced in 2001 to enable sustainable maintenance of the road network in Laos. The main source of funding for RMF is fuel taxation, which accounts for approximately 95% of its revenue.

the maintenance of national roads in recent years. Although the budgets have tended to increase, the bridge maintenance budget has been limited to 1 to 2% of the total budget.

As mentioned above, the necessary budget for appropriate O&M activities has not been secured and it causes challenges to the actual implementation of O&M activities, which can be said as one of the concerns in terms of the maintenance and management for the future.

Table 4: Annual Budget of RMF for National Road

(Unit: 100 million Kip)

	2020	2021	2022
Routine maintenance	14.2	-	13.8
Periodical maintenance	221.5	336.2	446.6
Rehabilitation works	96.3	77.9	14.5
Emergency works	37.1	24.4	27.0
Bridge maintenance works	7.8	10.0	4.9
Total	376.9	448.5	506.8

Source: Documents provided by the executing agency

- Environmental and Social Aspect

No negative environmental and social impact impacts are identified.

- Preventative Measures to Risks

In preparation for the risk of traffic accidents, the installation of traffic signs and nighttime lighting in the vicinity of the target bridges was planned during the project planning phase, and those items were properly implemented. Meanwhile, regarding measures such as overloading prohibition and enforcement, which was encouraged to maintain the lifespan, a weighting station was set up on National Road No. 9. However, at the time of ex-post evaluation, enforcement against overloading has not been conducted due to the malfunction of the weight scale. Cases of vehicles that appear to be overloaded have been observed traveling on the target bridges and National Road No.9, and it can be said as one of the concerns for future maintenance.

- Current Status of Operation and Maintenance

Both bridges are in generally good maintenance condition; however, the following damages were identified during the site inspection of each bridge.

- Xe Kum Kam bridge: Cracks in the approach road, malfunctioning of nighttime lights (2 out of 5 lights), theft of drain covers (5 covers).
- Xe Tha Mouak bridge: Cracks in the approach road, malfunctioning of nighttime lights (5 out of 14 lights), theft of rubber parts from the expansion joints on the sidewalk.

The cracks in the approach road are considered to be caused by the passage of overloaded vehicles. As for the failure of the nighttime light, the electrical connection is thought to be the problem, and DPWT Savannakhet has not been able to ascertain the details and will need to confirm and address this issue in the future. Drain covers have been repeatedly stolen after restoration. Thefts of rubber parts have not been addressed since it was pointed out during the defect inspection. According to the DPWT Savannakhet, it is highly likely that the drain covers and rubber parts were stolen by local residents. To prevent such incidents from repeating in the future, it will be necessary to take measures such as engaging with the gaining the understanding of the local residents through communication and outreach efforts. Materials and parts required for maintenance and management can be available, but they may not be able to obtain them due to budget shortfalls<sup>11</sup>. On the other hand, technology for bridges that can efficiently reduce life cycle costs was introduced in the project, in consideration of the burden of maintenance and management costs, where bridges were generally built using concrete girders due to the country's weak maintenance and management system. For example, the bottom and side plates are made of weather-resistant steel suitable for bridge materials that require semi-permanent strength characteristics. Furthermore, in a country where securing the budget for maintenance is challenging, it is also difficult to allocate funds for road lighting electricity costs. Therefore, solar-powered LED lighting has been installed for nighttime use.

Maintenance activities for the target bridges are handled by a subcontracted company under the supervision of DPWT and OPWT. According to the DPWT Savannakhet, inspections are conducted by manual, and cleaning is carried out monthly. However, during the site visit, it was observed that the area near the drainage ditch and other areas were not cleaned sufficiently. Upon checking with OPWT, it was also confirmed that the subcontracted company would clean the drain pipes if they were clogged during the inspections; however, if it was dirty (not clogged), they would only check the pipes, and no adequate measures were taken.

<Evaluation Result>

Therefore, the sustainability of the project effects is moderately low.

**III. Recommendations & Lessons Learned**

- Recommendations to Executing Agency
- The target bridges and approach roads were designed to comply with the axle weight restriction limit, and measures such as prohibition of overloading and enforcement were encouraged to maintain their lifespan. At the time of the ex-post evaluation, no measurements were taken due to equipment failure of the weighting station installed on National Road No. 9, where the target bridges are located. According to transport company and drivers, frequent passages of large vehicles, apparently overloaded, and it has caused cracks in the approach road to

<sup>11</sup> Source: Interview with the DPWT Savannakhet

the target bridges. DOR should promptly address equipment repairs and take measures to enforce overloading regulations, striving to prevent deterioration of the bridges and approach roads.

- While the maintenance conditions of the two target bridges are generally good, there have been issues identified such as cracks in the approach roads, malfunctioning of nighttime lights, theft of drain covers, and theft of rubber parts from the expansion joints on the sidewalk. The thefts of drain covers and rubber parts have continued to occur even after repairs were made. It is highly likely that local residents, including young people, are involved in these thefts. Therefore, it is advisable for DPWT and OPWT to arrange meetings to explain to the local residents and seek their cooperation to prevent similar thefts from recurring in the future.

- Recommendations to JICA

None

- Lessons Learned

- Formation of the project considering the maintenance management system in the target country

During the planning phase of the project, there was a lack of understanding regarding bridge maintenance in Laos, and the country has consistently faced difficulties in securing maintenance budgets. Following this situation, the project incorporated measures considering this situation and the fragility of the country's bridge maintenance system and ensure sustainability after the replacement of the two target bridges. For example, the use of weather-resistant steel materials and the installation of solar-powered LED lighting were applied to reduce maintenance needs. Furthermore, through training and workshops, efforts were made to enhance the understanding among maintenance staff on the importance of maintenance and reinforcement. This included technology transfer related to know-how for routine inspections as well as periodic inspections. Even after the completion of the project, support from the TC project has continued, and assistance for practical implementation is ongoing. As it takes a certain period to instill an understanding of maintenance and translate it into practice, the executing agency has not yet reached a stage where they can independently carry out maintenance. However, the series of support activities tailored to the local context has significantly contributed to the improvement of the bridge maintenance system in the country.

#### **IV. Non-Score Criteria**

- Performance

- Objective Perspective

None

- Additionality

None





Xe Tha Mouak Bridge



Approach Road to Xe Kum Kam Bridge



The Crack of Approach Road (Xe Tha Mouak Bridge)



Stolen rubber parts of from the expansion joints on the sidewalk  
Drainage covers (Xe Tha Mouak Bridge)