Socialist Republic of Viet Nam

FY2018 Ex-Post Evaluation of Japanese ODA Loan Project

"Transport Sector Loan for National Road Network Improvement (I) (II)"

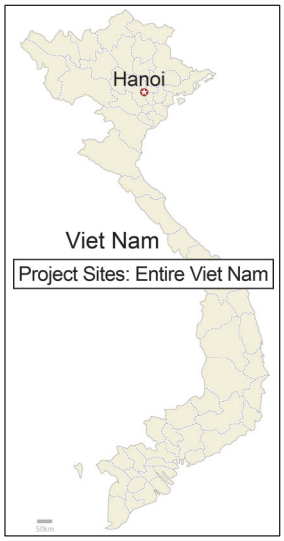
External Evaluator: Toshihisa Iida, OPMAC Corporation

## 0. Summary

The objective of this project was to develop a safe, smooth, and reliable road network by repairing and rebuilding weak bridges on Viet Nam's national and provincial roads, thereby contributing to the socio-economic development of Viet Nam's urban and rural areas. This objective was consistent with the development policy of Viet Nam, its development needs, and with Japan's ODA policy, and thus its relevance is high. The definition of the operation and effective indicators, which were annual average daily traffic volume and a travel time saving compared with travel time using a detour route when a bridge was damaged in 10 sample bridges for monitoring, was not clear at the time of appraisal. Therefore, it was difficult to confirm the degree to which the target values of these indicators were achieved. However, the qualitative effects of this project including improvement of traffic safety on the bridges, the securement of smooth road transport, and the improvement of access were identified through key-informant interviews and so on in the on-site field survey. In addition, the project has positively contributed to socio-economic development in the project target area including the promotion of existing/new businesses and the increase in productivity and income levels of local farmers around the bridges, and an improvement in the living standards of local residents. Furthermore, a positive impact on the reduction of the risk of natural disasters by the project has been also identified. There was no negative impact on the natural environment, and the land acquisition and resettlement for the project were properly executed according to the related laws and regulations in Viet Nam. Thus, its effectiveness and impact are high. While the project cost was lower than planned, the project period was significantly longer than planned. Thus, the efficiency of the project is fair. Lastly, the current status of the operation and maintenance of the project in terms of the institutional, technical, and financial aspects has no problem. Therefore, the sustainability of the project is high.

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

## 1. Project Description




Project Location

Dak Pri bridge (Dak Nong province) rebuilt by this Project

### 1.1 Background

The transport system in Viet Nam consists of: a total road network of over 210,000 km, a total railway network of about 2,650 km, inland waterway transport centered upon the Red River and the Mekong River, maritime transport in 7 large and other ports including Saigon port and Hai Phong port, and civil aviation transport. As for modes of transport in 2001, road transport accounted for 63.9 % of total freight volume (cargo weight), followed by inland waterways at 21.9 %, maritime transport at 9.8 %, and railways at 4.4 %. For the total number of passengers, road transport accounted for 82.2 %, followed by inland waterways at 16.0 %, railways at 1.4 %, and air aviation at 0.4 %. As such, road transport dominated both passenger and freight traffic.

While the importance of road transport in passenger and freight traffic in Viet Nam was high, the conditions of the road network for national, provincial, and local roads were poor due to damage suffered in wars and inadequate maintenance and repair due to budget constraints. While more than 70 % of national roads were paved with asphalt and/or concrete, more than 70 % of provincial roads, which are main roads within regions, were unpaved and/or low cost pavement, which indicated that the road conditions in local areas were poor. The condition of bridges was as poor as that of the roads. Viet Nam had approximately 8,300 bridges on both national and provincial roads. The strength of many of these bridges had not met the design criteria due to damage suffered in war and inadequate maintenance and repairs due to budget constraints. In addition, there were many makeshift bridges, as well as bridges with weight limitations necessitated by the bridge's obsolescence and bridges that were much narrower than the standard road width. This situation resulted in problems with safety and transport efficiency.

1.2 Project Outline

The objective of this project was to develop a safe, smooth, and reliable road network by repairing and rebuilding weak bridges on Viet Nam's national and provincial roads, thereby contributing to the socio-economic development of Viet Nam's urban and rural areas.

| Phase | (I) | (II) |
|---|---|---|
| Loan Approved Amount / Disbursed Amount | 9,534 million yen / 7,614 million yen | 17,918 million yen / 17,842 million yen |
| Exchange of Notes Date / Loan Agreement Signing Date | March 2004 / March 2004 | March 2009 / March 2009 |
| Terms and Conditions | Interest Rate: 1.3 % (Project and Consulting services)<br>Repayment Period (Grace Period): 30 years (10 years)<br>Condition for Procurement: General untied | Interest Rate: 1.2 % (Project) / 0.01 % (Consulting services)<br>Repayment Period (Grace Period): 30 years (10 years)<br>Condition for Procurement: General untied |
| Borrower / Executing Agencies | The Government of the Socialist Republic of Viet Nam / Directorate for Roads of Viet Nam, Ministry of Transport | |
| Project Completion | January 2012 | June 2015 |
| Target Area | Viet Nam in its entirety | |
| Main Contractor (Over 1 billion yen) | None | |
| Main Consultant (Over 100 million yen) | Katahira & Engineers International (Japan) | |
| Related Studies (Feasibility Studies, etc.) | • JICA SAPROF (August 2003)<br>• "Pre-Feasibility Study" by Ministry of Transport Viet Nam (2003) | • JICA SAPROF (August 2007) |
| Related Projects | [ODA Loan]<br>• Cuu Long (Can Tho) Bridge Construction Project (March 2001)<br>• Binh Bridge Construction Project (March 2000)<br>• Second Transport Sector Loan for National Road Network Improvement (March 2013)<br>[Technical Cooperation]<br>• The Project for Capacity Enhancement in Road Maintenance (September 2011 – April 2014)<br>• The Project for Capacity Enhancement in Road Maintenance Phase 2 (February 2015 – April 2018)<br>[World Bank]<br>• Road Network Improvement Project (2004 – 2012)<br>• Road Asset Management Project (2014 – 2020) | |

## 2. Outline of the Evaluation Study

2.1 External Evaluator

Toshihisa Iida, OPMAC Corporation

2.2 Duration of Evaluation Study

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

Duration of the Study: September, 2018 – November, 2019

Duration of the Field Study: November 19, 2018 – December 21, 2018,
April 22, 2019 – April 26, 2019

2.3 Constraints during the Evaluation Study

1) At the time of appraisal, the operation and effective indicators, which were (i) annual average daily traffic volume and (ii) a travel time saving compared with travel time using a detour route when a bridge was damaged, as well as 10 bridges to monitor these indicators (hereinafter, "sample bridges"), were set up. However, the definition of these indicators, such as counting points of traffic volume at which the baseline and target values were set up and detour routes, was not clearly identified at the time of the ex-post evaluation. In addition, as for (i), it was also difficult to set up new baseline and target values due to the frequent relocation of counting points of traffic volumes near the sample bridges. As for (ii), attempts to identify the detour routes which showed the target travel saving time were made in the on-site field survey around sample bridges through interviews with staff of Provincial Departments of Transport (hereinafter, "PDOTs"), District People's Committees (hereinafter, "DPCs"), road maintenance and management companies, and bridge users near the bridges such as transporters. However, it was difficult to confirm the detour routes due to a significant improvement in the road network around the sample bridges including the widening of existing roads and the establishment of new roads since the time of appraisal. Thus, these data limitations made it hard to strictly compare the target values with the actual values by objective quantitative data in the ex-post evaluation. For this reason, the evaluation judgement in project effectiveness had to be mainly made by using the quantitative data available and the qualitative effects identified in the ex-post evaluation.

2) A total of 145 bridges in 36 provinces and 3 cities were repaired and rebuilt under this project. At the ex-post evaluation, information about the project effect and impact, and the current status of each bridge were collected by sending questionnaires to all provinces and cities where the bridges repaired and rebuilt under the project were located. While the questionnaires were returned from 27 provinces and 2 cities (a 74 percent response rate in terms of the number of provinces/cities, and a 63 percent response rate in terms of the

number of bridges), most of the questionnaires were only partly responded and that made it difficult to collect missing data and check uncertain information. Thus, for the evaluation results of the project's qualitative effect and impact, as well as the current status of bridges, it was necessary mainly to rely on the results of the on-site interviews conducted when bridges were visited[1].

## 3. Results of the Evaluation (Overall Rating: A[2])

### 3.1 Relevance (Rating: ③[3])

#### 3.1.1 Consistency with the Development Plan of Viet Nam

The national development policy of the Vietnamese government at the time of appraisal, the *Ten-year Socio-Economic Development Strategy (2001-2010)*, focused on improvement of National Highway No.1, the building of the Ho Chi Minh Highway, and the upgrading and building of roads connecting to industrially developed district, together with the improvement of major bridges. In addition, the *National Transport Development Master Plan (-2010)* required continuous investment in road network development.

At the time of the ex-post evaluation, the national development policy of the Vietnamese government, the *Ten-year Socio-Economic Development Strategy (2011-2020)*, emphasized the importance of infrastructure development, especially traffic system development, as one of three strategic pillars to make Viet Nam a modern oriented industrial country by 2020. The concreate plan of the strategy, The *Five-Year Socio-Economic Development Plan (2016-2020)*, also prioritized the development of the infrastructure system, focusing on continuous road development. In addition, in response to satisfy the increasing demand for cargo and passenger transport, the building and expanding of the road network for both national and provincial roads in order to serve heavy traffic and ensure smooth road transport, is included in *Adjusted Planning for Road Traffic Development in Viet Nam by 2020, and The Orientation Towards 2030*, which was approved by the Vietnamese government in 2013.

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[1] If provinces and cities where on-site field survey were conducted are included, the questionnaire was returned from 29 provinces and 3 cities (82 percent of total) for 120 bridges (81 percent of total). Interviews in the on-site field survey were conducted for 42 bridges in 15 provinces and 2 cities (a 43 percent at the number of province/city-bases and a 20 percent at the number of bridge-bases), including: (North East region) Thai Nguyen province, Bac Giang province; (Red River Delta region) Nam Dinh province, Hai Phong city; (North Central region) Nghe An province, Thanh Hoa province, Ha Tinh province; (South Central region) Quang Ngai province, Binh Thuan province, Da Nang city; (Central Highland region) Dak Nong province; (East South region) Tay Ninh province; (Mekong River Delta region) Ca Mau province, Dong Thap province, Ben Tre province, Vinh Long province, Tien Giang province. A geographical balance was considered in selecting the provinces/cities visited, and road type (national road/provincial road), size of bridge and location of bridge (city/rural) were considered in the selection of bridges visited in the selected provinces/cities.

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

[3] ③: High, ②: Fair, ①: Low

### 3.1.2 Consistency with Development Needs of Viet Nam

At the time of appraisal, the strength of many bridges on national and provincial roads had not met the design criteria due to damage suffered in wars and inadequate maintenance and repairs due to budget constraints. There were many makeshift bridges, bridges with weight limitations necessitated by the bridge's obsolescence, as well as bridges with a much narrower width than the road standard. This resulted in problems with safety and transport efficiency. Thus, degraded bridges had to be repaired and replaced to accommodate the anticipated increase in traffic volume, to ensure road safety and create an efficient road network. A total of 640 out of 4,131 bridges on national roads and 592 out of 4,218 bridges on provincial roads were identified as urgently needing to be replaced. At the same time, while demand increased for road and bridge maintenance and management such as large scale repairs due to a bridge's obsolescence and daily inspection, the budget allocation for maintenance and management was limited to 30 - 40 % of the required amounts. Increasing the budget allocation for the maintenance and management as well as the strengthening of a system for bridge maintenance and management that would ensure efficient utilization of limited budget resources were urgent. It was essential that a comprehensive long-term maintenance and management plan, including for the maintenance and management of bridges, would be developed.

At the time of the ex-post evaluation, both passenger volume and freight volume carried by road transport in Viet Nam as a whole increased by about 3 times from 2005 to 2017, while the composition rate of road transport in the total transport system increased from 86.9 % in terms of passenger volume and 64.8 % in terms of freight volume in 2005 to 94.1 % and 77.6 % in 2017 respectively (Table 1). This indicates that the importance of road transport in the transport sector has been increasing continuously. Similarly, the passenger volume and the freight volume carried by road transport in the provinces where weak bridges were repaired and rebuilt under this project increased by 2.9 times and 3.4 times respectively from 2005 to 2016, which is almost the same level as the increase in the country as a whole.

Table 1: Volume of Passengers and Freight Carried by Road Transport

Unit: passenger (million persons/year), freight (million tons/year)

| | | 2005 | | 2010 | | 2015 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Composition ratio | | Composition ratio | | Composition ratio | | Composition ratio |
| Road Transport (Whole country) | Passenger | 1,173.4 | 86.9 | 2,132.3 | 92.1 | 3,104.7 | 93.8 | 3,760.0 | 94.1 |
| | Freight | 298.0 | 64.8 | 587.0 | 73.3 | 877.6 | 76.5 | 1,070.6 | 77.6 |
| Road Transport (target provinces of this project (Note)) | Passenger | 694.6 | 51.5 | 1,354.9 | 58.5 | 1,834.4 | 55.4 | 1,982.9 | NA |
| | Freight | 180.4 | 39.2 | 368.5 | 46.0 | 570.4 | 49.7 | 632.0 | NA |
| Total Transport (Whole country) | Passenger | 1,349.6 | 100 | 2,315.2 | 100 | 3,310.5 | 100 | 3,994.1 | 100 |
| | Freight | 460.1 | 100 | 800.9 | 100 | 1,146.9 | 100 | 1,379.0 | 100 |

Source: Statistical Yearbook of Viet Nam, DRVN

Note: The volume of passenger and freight in the target provinces of this project in the column for 2017 shows the numbers for 2016. The composition ratio of road transport (target provinces of this project) for 2017 are not available.

According to the executing agency, there were 268 weak bridges to be repaired and replaced out of about 6,300 bridges on national roads in 2017. The number of weak bridges has been declined since many weak bridges on national roads have been repaired and rebuilt under this project, the follow-on ODA Loan project (Second Transport Sector Loan for National Road Network Improvement) as well as under other donor support projects. On the other hand, there are still about 1,500 weak bridges out of a total of about 5,500 bridges on provincial roads[4]. The need for repair and replacement of weak bridges on national and provincial roads continues to be recognized with the increasing importance of road transport in the transport sector. As for the maintenance and management of roads and bridges, as mentioned later in "3.4.3 Financial Aspect of Operation and Maintenance", the need to strengthen the system for the maintenance and management for roads and bridges continues to be high in order to efficiently execute the limited budget for maintenance and management under the situation where 100% of the necessary maintenance and management costs are not covered.

### 3.1.3 Consistency with Japan's ODA Policy

At the time of appraisal, *the Country Assistance Program for Viet Nam* (June 2000) by Ministry of Foreign Affair listed the development of economic infrastructure, including power and transport, as one of the priority targets. The *Medium-Term Strategy for Overseas Economic Cooperation Operations* by JICA (former JBIC's) (April 2002 - March 2004) mentioned "to continue to provide support to promote economic growth by improving economic and social infrastructure" and "to provide intellectual cooperation that actively advises and recommends to the government of developing countries in order to improve the operation and management

[4] Weak bridges includes ones that have low load capacity and a narrower width than road standard, those which are damaged, and those for which major repair and replacement are required.

system after project completion" with regard to "infrastructure improvement for economic growth", which was a priority area. In addition, in the transport sector of JICA's (former JBIC's) *Country Assistance Strategy for Vietnam* (2003), keeping the development of a comprehensive distribution system for freight and passenger transport, JICA's assistance would be provided to projects in which infrastructure development, institutional reform, and human resource development are organically effective having taken into account the project's economic efficiency as well as urgency. This project, which repairs and rebuilds weak bridges on national and provincial roads with the aim of developing a safe, smooth, and reliable road network, was consistent with Japan's ODA policy at the time of appraisal.

### 3.1.4 Relevance to Appropriateness of Project Planning and Approach

At the time of appraisal for Phase (I), bridges to be repaired and rebuild under this project were selected based on the following criteria: (i) the economic aspect (traffic volume, importance of roads, contribution to regional economic development (land productivity) and (ii) the technical aspect (load capacity carriageway width on bridge, year constructed). In addition, bridges damaged by war, important bridges on major roads contributing to smooth traffic and regional economic development, and unimproved bridges on improved roads were also considered in the selection. Based on the criteria, scores were given to all weak bridges on national and provincial roads and 141 bridges with more than a certain number of points were selected as targets of this project. At the time of appraisal for Phase (II), the priority bridge list submitted by the executing agency was scored according to the same criteria and the target bridges were selected. These bridge selection criteria considered not only the safety aspect of bridges but also the economic importance of bridges on the road network and factors that adversely affect smooth road transport such as vehicle weight restriction, etc. This is considered appropriate as selection criteria for the project with the objective of achieving social and economic development.

Some of the bridges selected at the time of appraisal for Phase (II) were repaired and rebuilt by the Vietnamese government's own funds or other donor funds for reasons such as the urgency of bridge repairs due to the delay in the ODA loan agreement of the Phase (II)[5]. Alternative bridges were added to the project during the implementation of Phase (II). According to the executing agency, these newly added bridges were not selected through scoring based on the selection criteria employed at the time of appraisal, since these bridges were ones on major trunk national roads[6], and ones with low load capacity and narrow bridge width which were constructed before 1975. It was difficult for large vehicles such as large trucks to pass over these

[5] At the time of appraisal for Phase (II) of the project, the loan agreement was scheduled to be signed in March 2008, however, due to the investigation works after Can Tho bridge collapsed in 2007, the signing was delayed by one year.
[6] Bridges added during the project implementation of Phase (II) were on National Road No. 1, which connects Viet Nam to the north and south, on National Road No. 57, which links Ben Tre province to the east and west, connecting with surrounding provinces, and on major trunk roads such as National Road No. 24 and National Road No. 19.

bridges, which created bottlenecks. It is judged that repairing and rebuilding these bridges met the need for socio-economic development that was the project purpose through securing a safe, smooth and reliable road network, and that these works do not inhibit the manifestation of the effects and impacts expected through the project.

In addition, during the implementation of the Phase (I) and (II), the following consulting services were added to the project: (i) review of the detailed design and construction method of the Can Tho Bridge[7], (ii) inspection of the pavement and a feasibility study (hereinafter referred to as "F/S ") of the pavement rehabilitation of Thang Long Bridge[8], and (iii) detailed design, bidding support, and construction supervision for the rehabilitation of Binh bridge[9]. Urgent restoration for these bridges was needed since they occupied an important position on the surrounding road network, and smooth road transport was hindered by the damage. Thus, these consulting services were also in line with the purpose of this project.

In light of the above, this project has been highly relevant to Viet Nam'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 project output is shown in Table 2 below. At the time of appraisal for Phase (I), 141 bridges were selected for repair and replacement under the project. However, as described in "3.2.2.1 Project Cost" below, it was found out that the project costs foreseen at the time of appraisal for Phase (I) would be significantly insufficient due to a major review of the standard construction unit price by the Vietnamese government during Phase (I). Therefore, Phase (II) was implemented. At the time of appraisal for Phase (II), a total of 154 bridges including the bridges which could not be repaired and rebuilt in Phase (I) and newly added bridges for Phase (II) were selected for the whole of Phase (I) and Phase (II)[10]. In addition, technical assistance for construction supervision and capacity building for O&M (consulting services) was continuously added through the project.

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[7] After Can Tho bridge's collapse in 2007, reviews of detailed design and construction methods for the restoration by a third party was added to the consulting services in Phase (I) and Phase (II).

[8] Smooth traffic was hampered by cracks in the pavement after the large-scale pavement restoration works in 2009, and urgent and comprehensive restoration of pavement was needed. Thus, this work was added to the consulting service in Phase (II).

[9] A F/S for restoration of Binh bridges, in which smooth traffic was impeded due to the damage by ship collisions during the typhoon of July 2010, was added to the consulting service in Phase (II) for urgent restoration.

[10] At the time of appraisal for Phase (II), 68 bridges were repaired and rebuilt in Phase (I), and it was planned that a total of 86 bridges would be repaired and rebuilt in Phase (II). These 86 bridges included 66 bridges which were planned but not repaired and rebuilt in Phase (I) other than those that were to be repaired and rebuilt in other projects, and a newly added 20 bridges including those related to the roads and other bridges supported by the World Bank from those additionally presented by the executing agency. As a result, a total of 154 bridges in Phase (I) and Phase (II) had been targeted by the project at the time of appraisal for Phase (II).

Table 2: Planned and Actual Output

| Items | Plan | Actual |
|---|---|---|
| (1) Repair and Replacement of existing bridges on national and provincial roads | (At the time of appraisal for Phase (I))<br>• 141bridges<br>(At the time of appraisal for Phase (II)<br>• 154 bridges (Phase (I): 68 bridges, Phase (II): 86 bridges<br>• Procurement of bridge inspection equipment: 5 units | • 145 bridges (Phase (I): 77 bridges, Phase (II): 68 bridges)<br>• Procurement of bridge inspection equipment: as planned |
| (2) Consulting services (construction Supervision) | (Scope)<br>Review of detailed design, bidding assistance, construction supervision, in-county and overseas training | (Scope)<br>Almost as planned (transferred some part of overseas training to in-country training) |
| | (Input)<br>• International Consultant: 184 M/M (Phase (I): 86 M/M, Phase (II): 98M /M)<br>• Local Consultant: 5,547 M/M (Phase ((I): 2,149 M/M, Phase (II): 3,398 M/M) | (Input)<br>• International Consultant: 230 M/M (Phase (I): 110M/M, Phase (II): 120 M/M)<br>• Local Consultant: 4,779 M/M (Phase (I): 1,938 M/M, Phase (II): 2,841 M/M) |
| (3) Consulting service (capacity building for Operation and Maintenance (hereinafter, "O&M") | (Scope)<br>• Development of database necessary to formulate a long-term O&M plan<br>• Capacity building for O&M (renewal of bridge inspection standard, In-country and overseas training, support for development of long-term O&M plan, etc.) | (Scope)<br>Almost as planned (transferred some part of overseas training to in-country training) (Note) |
| | (Input)<br>• International Consultant: 32 M/M (Phase (I): 10M/M, Phase (II): 22 M/M)<br>• Local Consultant: 376 M/M (Phase (I): 25 M/M, Phase (II): 351 M/M) | (Input)<br>• International Consultant: 25 M/M (Phase (I): 10 M/M, Phase (II): 15 M/M)<br>• Local Consultant: 322 M/M (Phase (I): 25 M/M, Phase (II): 297 M/M) |
| (4) Consulting services (others) | (Scope)<br>NA | (Scope)<br>• Review of detailed design and construction methods of Can Tho bridge<br>• Inspection on pavement status and feasibility study for Thanh Long bridge pavement rehabilitation<br>• Detailed design, bidding assistance and construction supervision for the rehabilitation of Binh bridge |
| | (Input)<br>NA | (Input)<br>• International Consultant: 34.7 M/M<br>• Local Consultant: 46 M/M |

Sources: Documents provided by the executing agency
Note: The Viet Nam Bridge Maintenance System (hereinafter, "VBMS") for bridge maintenance and management on national roads was developed and the database in the system including bridge data profiling for about 4,900 bridges (bridge specification, current status, and repair history) was completed by this project.

In this project, a total of 145 bridges in 36 provinces and 3 cities were repaired and rebuilt at the end (Phase (I): 77 bridges, Phase (II): 68 bridges) (Table 3). The factors behind the difference in the number of bridges from that planned at the time of appraisal for Phase (II) are: (i) some bridges for which urgent repairs and replacement were required were supported by other donor financed projects and so on due to the delay of the ODA Loan agreement of Phase (II), which was caused by works to investigate the detailed causes of the Can Tho Bridge collapse in 2007;

(ii) there were some bridges where works could not be implemented due to difficulties in acquiring land and eliminating obstacles; and (iii) additional bridges were repaired and rebuilt with funding surplus arising from Phase (I) and (II)[11].

It is considered that the changes caused by excess cost due to the increase in the standard construction unit price in Phase (I) and the delay of the ODA Loan agreement in Phase (II) were unavoidable. In addition, the bridges added to this project during the implementation of Phase (II) were all on main roads, and they were weak bridges which impeded smooth road transport. Thus, this change was in line with the purpose of the project. It should be noted that there were multiple bridges where the project could not be implemented due to difficulties in acquiring land, but it can be considered that it could have been possible to avoid some of them if more accurate scoping work had been carried out in the F/S.

Table 3: Provinces and Cities in which Bridges Repaired and Rebuilt under This Project Are Located

| Region (number of bridges) | Provinces (number of bridges) |
|---|---|
| North West (1) | Hoa Binh province (1) |
| North East (14) | Thai Nguyen province (4), Bac Giang province (4), Bac Kan province (2), Phu Tho province (3), Lao Cai province (1) |
| Red River Delta (12) | Bac Ninh province (1), Thai Binh province (1), Nam Dinh province (4), Hai Duong province (1), Hung Yen province (1), Ninh Binh province (2), Hanoi city (1), Hai Phong city (1) |
| North Central (27) | Quang Tri province (1), Nghe An province (5), Thanh Hoa province (12), Thua Thien-Hue province (6), Ha Tinh province (3) |
| South Central (32) | Khanh Hoa province (2), Quang Ngai province (7), Quang Nam province (5), Binh Dinh province (3), Phu Yen province (2), Ninh Thuan province (6), Binh Thuan province (6), Da Nang city (1) |
| Central Highland (1) | Dak Nong province (1) |
| South East (1) | Tay Ninh province (1) |
| Mekong River Delta (57) | An Giang province (4), Vinh Long province (10), Ca Mau province (3), Kien Giang province (5), Tra Vinh province (6), Tien Giang province (4), Hau Giang province (1), Bac Lieu province (3), Ben Tre province (7), Dong Thap province (14) |

Source: Documents provided by the executing agency

As for consulting services, in order to cope with the increase in the construction supervision period due to the delay in project implementation period, the work volume of international consultants for the construction supervision as for building bridges increased. The overseas training which was planned to strengthen construction supervision and maintenance and management capacity was replaced with domestic training, taking into consideration the government's fiscal situation, etc. In addition, as mentioned previously, the following works were added to the consulting services: (i) a review of the detailed design and construction

[11] In addition, the rehabilitation of Binh bridge that was damaged by a typhoon in July 2010, and which was obstructing efficient physical distribution in northern Viet Nam due to traffic restrictions imposed thereafter, was implemented by the project, utilizing project contingency.

methods of Can Tho bridge; (ii) pavement inspection and F/S for the pavement rehabilitation of Thang Long bridge; and (iii) detailed design, bidding support, and construction supervision for the repair and rehabilitation of Binh bridge.

Bridges Repaired and Rebuilt under This Project


But bridge (Thanh Hoa province)


Tan Loc bridge (Ca Mau province)


Cho Lach bridge (Ben Tre province)

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The total actual cost amounted to 35,590 million yen, which was lower than the total planned cost of 49,930 million yen at the time of appraisal of Phase (II) (71.2 % of the planned cost) (Table 4). The main factors behind the lower total cost were; (i) the actual construction costs were lower than the planned costs as the result of bidding and (ii) changes in the foreign exchange rate. As mentioned previously, Phase (II) was implemented as a result of the significant lack of funds during the implementation of Phase (I). Considering this fact, the total actual cost for the 77 bridges repaired and rebuilt in Phase (I) was 9,592 million yen[12], which was 135.8 % of the planned total cost of 7,064 million yen for the 77 bridges[13, 14]. The total actual cost for Phase (II) was 21,846 million yen[15], which was lower than the total planned cost of 40,388 million yen, which derived from the total planned cost at the time of appraisal of Phase (II) minus the actual project cost of Phase (I). This was 54.2 % of the total planned cost for Phase (II). The weighted average of these two for the actual number of bridges (77 bridges in Phase (I) and 68 bridges in Phase (II)) was 97.5 %.

The factors behind cost overrun in Phase (I) were: (i) significant increases in the construction costs by reviewing the construction standard unit price of public works resulting from the government's review of minimum wages and price hikes of construction materials and (ii)

[12] The applied exchange rate was the average rate (1 VND = 0.00569 yen) from the L/A of Phase (I) to the completion of Phase (I) (from March 2004 to June 2012).
[13] The planned project cost for 77 bridges repaired and rebuilt in Phase (I) was calculated as follows: (i) the planned construction cost for the 77 bridges, plus (ii) the cost of each item derived from dividing the planned cost of each item by the construction cost ratio or bridge number ratio.
[14] The actual project cost in Phase (I) included the costs for land acquisition and resettlement related to bridges which were transferred from Phase (I) to Phase (II).
[15] The applied exchange rate was the average rate (1 VND = 0.00466 yen) from the L/A of Phase (II) to the completion of Phase (II) (from March 2009 to June 2015)

design changes, such as structure resizing and construction method changes, are made to reflect the actual situation and demands of the area at the detailed design stage for multiple bridges. According to the executing agency, among these factors, (i) contributed to about 80% of the overall cost increase (the construction standard unit prices increased by about double) and (ii) contributed to 20 % of the overall cost increase. It is considered that this was unavoidable since it was difficult to foresee the possibility of standard price revisions at the time of appraisal. As for the design changes, it is considered that a more detailed setting of model bridges considering different geographical factors at the time of F/S stage was necessary.

Table 4: Planned and Actual Project Cost

| Items | Planned (at the time of appraisal for Phase (II) (Total of Phase (I) and Phase (II)) | | | Actual (Total of Phase (I) and Phase (II)) | | |
|---|---|---|---|---|---|---|
| | Foreign currency (million yen) | Local currency (million yen) | Total (million yen) | Foreign currency (million yen) | Local currency (million yen) | Total (million yen) |
| 1. Construction Works | | | | | | |
| Construction works for Phase (I) | 3,882 | 6,047 | 9,929 | - | 6,970 | 6,970 |
| Construction works for Phase (II) | 9,474 | 14,210 | 23,683 | - | 20,393 | 20,393 |
| Bridge inspection equipment | 43 | - | 43 | | 34 | 34 |
| Construction works for Binh bridge rehabilitation | - | - | - | 494 | 58 | 552 |
| Total of Construction works | 13,398 | 20,257 | 33,655 | 494 | 27,455 | 27,949 |
| 2. Price Escalation | 655 | 1,644 | 2,299 | - | - | - |
| 3. Physical Contingency | 703 | 1,095 | 1,798 | - | - | - |
| 4. Consulting Services | 1,301 | 1,849 | 3,150 | 1,131 | 2,465 | 3,776 |
| 5. Land Acquisition and Resettlement | 0 | 1,772 | 1,772 | - | 2,651 | 2,651 |
| 6. Administration Cost | 0 | 1,681 | 1,681 | - | 418 | 418 |
| 7. Taxes | 0 | 3,931 | 3,931 | - | - | - |
| 8. Interest during Construction | 1,519 | - | 1,519 | 796 | - | 796 |
| 9. Commitment Charge | 125 | - | 125 | - | - | - |
| Total | 17,701 | 32,229 | 49,930 | 2,421 | 33,168 | 35,590 |

Source: Documents provided by the executing agency
Note: The foreign exchange rate (planned): 1 VND = 0.00759 yen (October 2007). The foreign exchange rate (actual): 1 VND = 0.00565 yen (average rate from March 2004 to June 2015)

3.2.2.2 Project Period

The total planned project period including Phase (I) and Phase (II) at the time of appraisal of Phase (II) was 95 months (from March 2004 to January 2012). The actual project period was 136 months (from March 2004 to June 2015), which was 143 % of the planned period. As analyzed in the section concerning project cost above, in the comparison between the planned and actual period for 77 brides repaired and rebuilt in Phase (I), and comparison between the planned and actual period for bridges repaired and rebuilt in Phase (II), the planned period for the 77 bridges was 60 months (from march 2004 to February 2009) and the actual period for

the 77 bridges in Phase (I) was 100 months (from March 2004 to June 2012), which was 167 % of that planned. While the planned period for Phase (II) was 35 months, starting from March 2009 and ending in January 2012, the actual period for Phase (II) was 76 months, starting from March 2009 and ending in June 2015, which was 217% of that planned. The weighted average of these two based on the actual number of bridges repaired and rebuilt in each phase (77 bridges in Phase (I) and 68 bridges in Phase (II)) was 190.3 %, which was significantly longer than the planned. The reasons for the project delay were identified as follows:

- Coordination with related organizations and people affected required more time than expected since some of the district's compensation committees in charge of land acquisition and resettlement had limited practical experience in the procedures of land acquisition and resettlement;
- There were some project delays in multiple packages due to insufficient technical, financial, and management capacity of construction contractors;
- Some bridges were additionally repaired and rebuilt at a late stage of the project period in Phase (I) and (II) as the fund surpluses were identified in the end[16];
- Due to inadequate technical capacity and insufficient quality of design work of local consultants who participated in the detailed design, corrections of the design were required during construction.

In the case of delays caused by land acquisition and resettlement, it is considered necessary to incorporate mitigation measures to avoid delay risk , such as confirming the knowledge and experience related to land acquisition procedures of the responsible agencies and including training programs as a part of project at the time of appraisal. In addition, it is considered necessary to establish a coordination system such as the holding of regular meetings for closer coordination among related agencies at the time of appraisal. With regard to the delays related to construction contractors, contracts with a large number of construction contractors are considered to be one of the main factors since this project initially planned to repair and replace 141 bridges in 38 provinces over a five-year period[17]. It is thought that it would be desirable to take measures to avoid project delays caused by contractors, including the division of work into phases in project areas with similar weather and geographical conditions.

[16] At the time of appraisal for Phase (II), a total of 68 bridges were planned to be repaired and rebuilt in Phase (I), however, due to the fund surplus identified at the end of Phase (I), the repair and replacement of 9 bridges that were planned for Phase (II) were implemented in Phase (I). As a result, a total of 77 bridges were repaired and rebuild in Phase (I). Also, in the Phase (II), additional 20 bridges besides the bridges planned at the time of appraisal of Phase (II) were repaired and rebuilt since there was a fund surplus following the bridge repairs and replacements originally planned.

[17] A total of 24 companies were contracted in a total of 56 procurement packages in the Phase (I) and (II).

Table 5: Planned and Actual Project Period

| | Plan | | Actual (Phase (I)/Phase (II)) |
|---|---|---|---|
| | At the time of appraisal for Phase (I) | At the time of appraisal for Phase (II) | |
| 1. L/A signing date | March 2004 | March 2008 | March 2004 / March 2009 |
| 2. Bidding and contract for consulting services | March 2004 – September 2004 | January 2008 – March 2008 | June 2004 – December 2004 / November 2009 |
| 3. Bidding and contract for construction contractors | September 2005 – February 2006 (6 months) | April 2008 – December 2008 (9 months) | September 2005 – September 2009 (49 months) / June 2009 – November 2012 (42 months) |
| 4. Construction | September 2005 – February 2008 (30 months) | June 2008 – April 2011 (35 months) | April 2006 – June 2011 (63 months) / June 2009 – June 2015 (73 months) |
| 5. Consulting Services | October 2004 – October 2008 (49 months) | April 2008 – April 2011 (37 months) | January 2005 – February 2011 (74 months) / June 2009 – June 2015 (73 months) |
| 6. Land acquisition and resettlement | February 2005 – February 2006 (13 months) | February 2005 – December 2008 (37 months) | September 2004 – February 2011 (78 months) /June 2009 – July 2015 (74 months) |
| 7. Services during defect liability | September 2007 – February 2009 | May 2011 – April 2013 | December 2008 – June 2012 /September 2011 – March 2017 |
| 8. Project completion | February 2009 (Note 1) | January 2012 (Note 2) | June 2012 (note 1) /June 2015 (Note 2) |
| 9. Total period | March 2004 – February 2009 (60 months) | March 2009 – January 2012 (35 months) | March 2004 – June 2012 (100 months) / March 2009 – June 2015 (76 months) |

Source: Documents provided by the executing agency and JICA
Note 1: The definition of project completion was the end of services during defect liability
Note 2: The definition of project completion was the completion of construction

### 3.2.3 Results of the Calculations for Internal Rates of Return (Reference only)

Table 6 shows the preconditions for and the results of the recalculation of the Economic Internal Rate of Return (hereinafter "EIRR") at the time of appraisal and at the ex-post evaluation. At the time of the ex-post evaluation, a comparison of the EIRR between at the time of appraisal and at the time of the ex-post evaluation could not be done, since it was difficult to obtain specific assumptions and calculation models of the EIRR at the time of appraisal[18], and to obtain the data necessary for the EIRR recalculation for all bridges. Therefore, at the time of the ex-post evaluation, the EIRR was recalculated for only the sample bridges based on the information obtained at the time of on-site field survey. Of the 10 sample bridges, 8 bridges had an EIRR with 35% or more. However, the EIRR of 2 bridges (Dak Pri bridge and Tan Lock bridge) were negative since both bridges had negative time saving effects due to the development of new detour routes around the bridges as mentioned in "3.3.3.1 (3) Effect

[18] At the time of appraisal, the effects of travel cost savings and travel time savings were estimated based on traffic volume and travel time savings compared to the detour route at the time of bridge closures as a project benefit. At the time of the ex-post evaluation, it was not possible to confirm the traffic volume counting points and the detour routes used at the time of appraisal.

Indicators: a travel time saving compared with travel time using a detour route when a bridge was damaged (Time for each bridge)".

Table 6: Preconditions for and Results of the EIRR Recalculation

| | At the time of appraisal | At the ex-post evaluation |
|---|---|---|
| EIRR | More than 9 % for all bridges | More than 35 % for sample bridges except for Dak Pri bridge and Tan Loc bridge, both of which have negative EIRR due to the negative time saving effect |
| Benefits | Effect in reducing travel costs and saving travel time | Effect in reducing travel costs and saving travel time |
| Costs | Construction costs | Construction costs |
| Project life | 25 years | 25 years after the L/A |

Source: Documents provided by JICA

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

## 3.3 Effectiveness and Impacts[19] (Rating: ③)

### 3.3.1 Effectiveness

#### 3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

(1) Sample bridges

At the time of appraisal, 10 sample bridges were selected as the target bridges to monitor the quantitative effect, taking into consideration bridge length, location (city area/rural area), geographical dispersion, etc. so that the effect of the whole project was roughly represented[20] (Table 7). The sample bridges were selected from 10 provinces in 6 regions out of a total of 8 regions, and these bridges have a bridge length ranging from 6 m to 66 m. Furthermore, these bridges are located in a city area (suburb) for 4 bridges and in a rural area for 6 bridges[21]. No new sample bridges were selected during the project implementation although two sample bridges were selected but transferred to another projects. Thus, in this ex-post evaluation, two bridges were added as alternative sample bridges according to the same criteria.

[19] Sub-rating for Effectiveness is to be put with consideration of Impacts.
[20] Of the 10 sample bridges, 8 bridges were repaired and rebuilt by this project other than 2 bridges rebuilt by other projects.
[21] In this project, a total of 145 bridges were repaired and rebuilt in 36 provinces and 3 cities in 8 regions, and bridges with a length of 70 m or less accounted for over 90% of the total bridges. Also, the location of bridges is a mixture of urban and rural areas.

Table 7: The Details of the Sample Bridges

| Bridge | Road | Region | Province | Bridge length (m) | Location | Repaired and rebuilt |
|---|---|---|---|---|---|---|
| Na Mo | NR3 | North East | Thai Nguyen | 6 | City | Phase (I) |
| Thieu | NR47 | North Central | Thanh Hoa | 21 | City (Suburb) | Phase (I) |
| Tran | NR15 | North Central | Ha Tinh | 18 | Rural | Phase (I) |
| Dak Pri | PR684 | Central Highland | Dak Nong | 33 | Rural | Phase (II) |
| Cai Mit | NR54 | Mekong River Delta | Dong Thap | 66 | Rural | Phase (I) |
| Song Liem | NR24 | South Central | Quang Ngai | 33 | Rural | Phase (I) |
| Dap Ong Choi | NR57 | Mekong River Delta | Ben Tre | 24 | Rural | Phase (II) |
| Tan Loc | NR63 | Mekong River Delta | Ca Mau | 24 | City (suburb) | Phase (II) |
| Though the following two bridges were selected as the sample bridges at the time of appraisal, these two were excluded from the sample bridges since these two were repaired and rebuilt by other projects. | | | | | | |
| Phu An I | NR1 | Mekong River Delta | Vinh Long | NA | City (Suburb) | Another project |
| Coc Pai | PR Bac Quang-Xin Man | North West | Ha Giang | NA | Rural | Another project |
| The following two bridges were newly added to the sample bridges at the time of the ex-post evaluation according to the selection criteria of the sample bridges at the time of appraisal for reference purposes. | | | | | | |
| Phe | NR31 | North East | Bac Giang | 24 | Rural | Phase (II) |
| Binh Minh | NR1 | Mekong River Delta | Vinh Long | 24 | City (Suburb) | Phase (II) |

Source: Documents provided by JICA and the executing agency

As for the selection of the sample bridges, it is considered that the selection criteria of the sample bridges and the bridges that were actually selected as samples were appropriate, considering that the bridges repaired and rebuilt by the project were dispersed nationwide and that most of the bridges were of relatively short length. On the other hand, given the fact that this project was to repair and rebuild 141 bridges across Viet Nam at the time of appraisal, it is difficult to represent the overall effect of the project with 10 bridges in 10 provinces. In addition, since the number of bridges repaired and rebuilt in a province ranged from 1 to 14 bridges, it is thought that the project effect and impact will be different depending on the number of bridges under the project. Therefore, considering the project effects as well as the project impact, for example, it could be considered that, as a case study, the selection of an area targeting a province or district

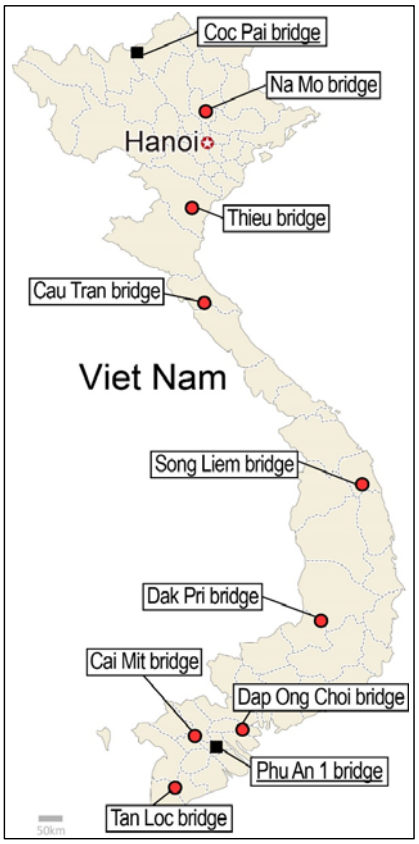


Figure 1: Locations of sample bridges

where multiple bridges under the project are concentrated or a road section of the province/district to monitor the project effects and impacts as sample area may enable the capture of project effects and impacts from a broader perspective.

(2) Operation Indicators: annual average daily traffic volume

Since the location of the traffic volume counting points for the sample bridges at the time of appraisal was not clearly identified, it was difficult to make a strict comparison between the target traffic volume and the actual traffic volume. On the other hand, as shown in Table 8, in the comparison between the actual traffic volume in 2017 (two years after the completion of Phase (II)) that was provided by the executing agency and the target traffic volume, 3 bridges (Tieu bridge, Song Liem bridge, and Dap Ong Choi bridge) out of 8 sample bridges with target traffic volume met the target volume[22]. The results of the 24-hours simple traffic volume survey conducted near the sample bridges at the time of the ex-post evaluation in order to supplement the actual traffic volumes provided by the executing agency showed that the traffic volume on 4 bridges (Tieu bridge, Cai Mit bridge, Song Liem bridge, and Dap Ong Choi bridge) exceeded the target volume.

As a result, 4 bridges out of 8 sample bridges exceeded the target traffic volume in either the actual traffic volume provided by the executing agency or the actual traffic volumes at the 24-hours simple traffic volume surveys. According to the executing agency, the reason that the actual traffic volumes for Tran bridge, Dak Pri bridge, and Tan Loc bridge were significantly lower than the target volume was the dispersed traffic volume due to the development of a new road network around these bridges including the construction of new roads such as by-pass roads after the reconstruction of these bridges. In addition, the differences in the counting points of traffic volume at the time of appraisal, between the executing agency and the 24-hours simple traffic volume survey could be a reason for the actual traffic volume being lower than the target volume. As described above, due to significant improvements in new and existing roads around the sample bridges from the time of appraisal and the possibility of difference in the traffic counting points between the target volume and actual volume provided by the executing agency and 24-hours traffic survey, there should be reservations regarding the results above. Therefore, the traffic volume at each sample bridge should be considered as a proxy indicator[23] in evaluating the project.

[22] In the actual traffic volume data obtained from the executing agency at the time of the ex-post evaluation, there were many cases where the counting points of the traffic volume had been frequently changed and the counting points had a considerable distance from the sample bridges. In addition, it was difficult to reestablish the baseline and target data at the time of the ex-post evaluation due to difficulties in obtaining historical actual data at fixed counting points in the vicinity of the sample bridges.

[23] Since there is no appropriate data as other indicators, this data is used for the evaluation judgement as a proxy indicator.

Table 8: Planned and Actual Annual Average Daily Traffic Volume

Unit: PCU/Day

| Bridge | Baseline (Note 1) | Target | Actual (Note 2) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (i) 2003 (ii) 2007 | (i) 2010 (ii) 2013 | 2013 | 2014 | 2015 | 2016 | 2017 (2 years after project completion) | At the time of the ex-post evaluation (traffic volume survey) |
| Na Mo (i) (Note 3) | 10,055 | 15,534 | 6,153 | 2,909 | 6,153 | NA | 10,855 | 13,391 |
| Thieu (i) (Note 4) | 2,948 | 5,458 | 9,060 | NA | 9,060 | NA | 12,124 | 12,124 |
| Tran (i) (Note 5) | 4,485 | 8,704 | 1,052 | 1,934 | 851 | NA | 1,192 | 5,675 |
| Dak Pri (ii) (Note 6) | 772 | 1,863 | NA | NA | NA | NA | NA | 547 |
| Cai Mit (i) (Note 7) | 444 | 1,087 | NA | NA | NA | NA | NA | 6,103 |
| Song Liem (ii) (Note 8) | 2,160 | 3,337 | 2,267 | 2,462 | 2,343 | NA | 4,282 | 4,119 |
| Dap Ong Choi (i) (Note 9) | 3,564 | 5,498 | 7,255 | 7,579 | 7,741 | 7,938 | 8,666 | 7,860 |
| Tan Loc (ii) (Note 10) | 4,420 | 6,869 | 4,720 | 3,080 | 4,160 | NA | NA | 5,001 |
| Phe (ii) (Note 11) | NA | NA | NA | 1,943 | 7,710 | 9,698 | 8,031 | 1,068 |
| Binh Minh (ii) (Note 12) | NA | NA | NA | NA | NA | NA | 41,577 | 6,291 |

Source: Documents provided by JICA and the executing agency, traffic volume survey conducted at the time of the ex-post evaluation

Note 1: (i) (ii) represent bridges repaired and rebuilt in Phase (I) or Phase (II). The base year and target year for the bridges repaired and rebuilt in Phase (I) are 2003 and 2010 respectively, and the base year and target year for the bridges repaired and rebuilt in Phase (II) are 2007 and 2013 (two years after the project completion) respectively.

Note 2: NA in the column of baseline, target, and actual means that data was not collected.

Note 3: The distance from Na Mo bridge to the counting point of the actual traffic volume provided by the executing agency was as follows: 35 km in 2013; 88 km in 2014; 37 m in 2015 and 2017.

Note 4: The distance from Thieu bridge to the counting point of the actual traffic volume provided by the executing agency was as follows: 11 km in 2013 and 2015; 0.5 km in 2017. Since the counting point in 2017 was close to the bridge, a traffic volume survey at the time of the ex-post evaluation was not conducted.

Note 5: The distance from Tran bridge to the counting point of the actual traffic volume provided by the executing agency was as follows: 79 km from 2013 to 2015; 16 km in 2017.

Note 6: No actual traffic volumes for Dak Pri bridge were counted since the bridge is on a provincial road, on which traffic volume counting is not required. Though this bridge was scheduled to be rebuilt in Phase (I) at the time of appraisal for Phase (I), the bridge was eventually rebuilt in Phase (II).

Note 7: The traffic volume counting near Cai Mit bridges has not been conducted by the executing agency since 2012.

Note 8: The distance from Song Liem bridge to the counting point of the actual traffic volume provided by the executing agency was 6 km.

Note 9: The distance from Dap Ong Choi bridge to the counting point of the actual traffic volume provided by the executing agency was 7 km. Though this bridge was scheduled to be repaired and rebuilt in Phase (II) at the time of appraisal for Phase (II), the bridge was eventually repaired and rebuilt in Phase (I) eventually.

Note 10: The distance from Tan Loc bridge to the counting point of the actual traffic volume provided by the executing agency was 9 km.

Note 11: The distance from Phe bridge to the counting point of the actual traffic volume provided by the executing agency was as follows: 30 km in 2013, 46 km from 2014 to 2017.

Note 12: The distance from Binh Minh bridge to the counting point of the actual traffic volume provided by the executing agency was 21 km. There was a big gap between actual volume in 2017 and actual volume at the time of the ex-post evaluation. Binh Minh bridge was originally on National Road No.1 extending to the ferry terminal for Can Tho. However, due to the construction of Can Tho bridge and new National Road No.1 connected to Can Tho bridge, Binh Minh bridge currently serves as a bridge on National Road No.54 and the traffic to/from Can Tho no longer passes the Binh Minh bridge.

(3) Effect Indicators: a travel time saving compared with travel time using a (Time for each bridge)

As described in "2.3 Constraints during the Evaluation Study", as with traffic volume, the definition of a detour route including the starting and end points and a detour route at the time of target setting for each sample bridge could not be confirmed at the time of the ex-post evaluation. Therefore, interview surveys were conducted at the time of the on-site field survey to obtain information about current detour routes including the start and end points, and time

savings compared with the travel time using the detour route from multiple information sources such as PDOTs and DPCs where the sample bridges are located, from management and maintenance companies and bridge users near the sample bridges. Also, the time saving effect for some sample bridges were measured at the time of the on-site field survey[24]. The results are shown in Table 9.

Table 9: Planned and Actual Travel Time Saving Compared with Travel Time Using a Detour Route

| Bridge | Target | At the time of ex-post evaluation (Note) |
|---|---|---|
| Na Mo | 2.2 | 3.0 |
| Thieu | 3.2 | 0.5 (0.7) |
| Tran | 3.6 | 3.9 |
| Dak Pri | 5.3 | -0.3 (0.5) |
| Cai Mit | 2.6 | 1.3 |
| Sing Liem | 14.4 | 0.3 |
| Dap Ong Choi | 2.1 | 2.2 |
| Tan Loc | 9.6 | -0.1 (6.1) |
| Phe | NA | 3.3 |
| Binh Minh | NA | 2.3 |

Source: Documents provided JICA, interviews at the time of on-site field survey at the ex-post evaluation
Note: The number in ( ) at the time of ex-post evaluation indicates saved time before the development of new detour routes.

Comparing the times required for using the detour routes that were confirmed at the time of the ex-post evaluation with the target value, it was found that the time saving effect was similar to the target value for 3 bridges. The reasons for this are that (i) due to significant improvement of the road network around all the sample bridges since the time of appraisal of Phase (I), the detour routes have improved, including the improvement of traveling speed and the construction of new detour routes, compared to the situation at the time of appraisal, and (ii) the start and end points of detour routes and detour routes themselves that could be confirmed at the time of the ex-post evaluation are not necessarily the same as those at the time of setting the target value. It is difficult to judge the degree of achievement of the project effect from a comparison between the actual value and the target value set 15 years or more ago since the preconditions are different even if the time savings are measured on the same detour routes. On the other hand, while road conditions around the sample bridges were significantly improved at the time of the ex-post evaluation, it has been confirmed that additional travel times are still required when using detour routes for all sample bridges[25]. Therefore, it can be judged that the target value in the time saving by developing bridges has been achieved only for 10 sample bridges. However, from the viewpoint of the measurement of the quantitative effect by a comparison between the target value and the actual value based on quantitative data, it can be said that the comparison between the two values is not necessarily an appropriate measurement of quantitative effect since the overall conditions and the comparison objects are different. Therefore, the travel time savings compared with travel

[24] Based on the results of the interview survey, actual measurements by the evaluation team were conducted on three bridges (Thieu bridge, Cai Mit bridge, and Dak Pri bridge (a part of the detour route)) during daytime other than morning and evening commuting time at the time of the on-site field survey.
[25] Negative time saving was identified for two sample bridges due to the new development of detour routes around the bridges and the increase in the traveling speed of the road. The positive time saving was confirmed in comparison with the old detour routes.

times using the detour routes when bridges are damaged should be considered as a proxy indicator in the ex-post evaluation of this project.

#### 3.3.1.2 Qualitative Effects (Other Effects)[26]

While the results are not necessarily representative of all the bridges, in almost all the qualitative surveys[27], by widening bridges and increasing load capacity through the project, the following qualitative effects were identified: improvement of bridge traffic safety, and ensuring smooth road transport, including increases in transportation volume, shortening of transport time, transport cost reduction, and increase of traffic volume. In addition, by being able to use heavy trucks and buses due to no bridge closures at the time of heavy rains, improvement in access to schools, hospitals, workplaces, etc. was confirmed. While these quantitative effects refer to overall road network improvement including the development of the surrounding road networks in addition to the bridge repair and replacement under this project, considering that many old bridges were bottlenecks, this project is considered to have contributed to the realization of the quantitative effects to some degree. The specific quantitative effects identified are as follows:

(1) Improving bridge traffic safety

It was confirmed that traffic safety on the bridges was improved for most of the bridges where interview surveys were conducted. Specifically, the following were identified: (i) the expansion of bridge width making the traffic of vehicles, cars, pedestrians, and night traffic safer; (ii) while the old bridges had slopes when entering and exiting, which caused the risk of slips during rainfall, the new bridges were flat and the risk of slip was eliminated, and (iii) the locations of the old bridges were close to the river surface, which caused flooding on bridges and problems with traffic safety, but the new bridges were installed high from the river surface so that the bridge would not be flooded. On the other hand, there were opinions that it was necessary to pay more attention to traffic since the speed of vehicles has increased compared to before the project due to the improvement of bridges by this project and nearby roads.

[26] At the time of appraisal, "improvement of safety" and "promotion of the development of the regional economy by securing smooth road transport" were listed as quantitative effects, however, in the ex-post evaluation, "promotion of the development of the regional economy" was included as the project impact.

[27] In order to identify the qualitative effect and impact of this project, key informant interviews were carried out in 15 provinces and 2 cities which were visited at the time of ex-post evaluation (please see Note 2). The interviewees included 7 of Sub-Regional Management Bureaus (thereinafter "Sub-RMBs") that conduct the maintenance and management of the bridges repaired and rebuilt by the project, 14 PDOTs, 14 maintenance and management companies, 10 DPCs where bridges repaired and rebuilt by the project are located in, 22 companies around the bridges (including service industries such as small shops), 6 local transporters, and 29 local residents living around the bridges.

(2) Ensuring smooth road transport

For all the bridges where interview survey was conducted, the answer that smooth road transport was secured after bridge were repaired and rebuilt was confirmed. Specifically, the following was identified: (i) bridge widening and increased load capacity have enabled the efficient transport of goods by increasing traffic speed and the ability to use large trucks[28]; (ii) due to no bridge closures even during heavy rainfall, smooth road transport in terms of transport time reduction, transport cost reduction, traffic volume increase, etc. is ensured and (iii) in the Mekong River Delta region, shifting the means of transport from small-scale inland water transport to large-scale land transport using large vehicles has materialized, which ensures efficient road transport in terms of lower transport costs, transport volume increase, etc. As for bridge width and load capacity, while the widths of old bridges for the sample bridges ranged from 3.5 m to 9.8 m, the widths of the new bridges are from 9 m to 14.5 m. All of the new sample bridges have more than one lane on one side. Also, for load capacity, although the standard load capacity in the old sample bridges ranged from 4 tons to 18 tons, the actual vehicle weight limitation on these bridges was lower than the standard limitation due to the deterioration of the bridges. Therefore, large trucks could not use the most of the old sample bridges[29]. All the new sample bridges allow large trucks to pass, and along with the bridge width expansion, it is now possible for large trucks to pass each other on the bridges.

(3) Improving access

The interview survey also revealed that with the installation of new bridges: (i) access to public services such as schools and hospitals, access to workplaces, and markets is always secured, and (ii) easy access to nearby regional towns and big cities by public and private bus is available, which enable the expansion of commuting and shopping areas for local residents as well as product purchasing and sales areas for local farmers and retailers.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

The expected impact of this project was “socio-economic development in urban and rural areas.” Interview surveys at the time of the on-site field survey revealed that the project has partly contributed to socio-economic development in urban and rural areas, and that there has been a consequent improvement of local residents’ life such as the creation of job opportunities and the improvement of life convenience for local residents.

[28] Under the Road Traffic Act of Japan, the standard for large trucks is a vehicle with a gross vehicle weight of 11 tons or more.

[29] According to interviews in the on-site field survey, the standard load capacities of old Dak Pri bridge, Song Liem bridge, and Dap Ong Choi bridges were 13 tons, 18 tons, and 4 tons respectively. However, the actual load capacity were 10 tons, 4 tons, and 2.5 – 3 tons. Thus, it was difficult for heavy trucks to pass.

(1) Socio-economic development in urban and rural areas

It was confirmed in the on-site field survey that ensuring smooth road transport by the new bridges has enabled businesses and agricultural activities in the project area to be more active through positive effects on existing/ new businesses and farmers around the bridges. The local economy is developing accordingly. The specific impacts are as follows.

(i) Impact on existing and new businesses around the bridges

- For retailers near bridges, sales volumes and incomes have increased as more diversified goods are sold, the sales prices have been declined and the number of customers increased. These resulted from the increase in the amount and variety of goods available in shops, the shortening of time required to purchase stocks of goods, and the decrease in the purchase prices of stocks due to volume discounts and the reduction of shipping charges. These have been made possible by the use of large trucks for the delivery of goods, and the elimination of bridge closures. In addition, most of the transporters have increased the number of trucks. For many transporters, this was thanks to an increase in the number of their customers and the expansion of their business area resulting from the improvements in transport efficiency, such as mass transport by heavy trucks, and the reduction in transit times, resulting in a reduction in transport costs.

- Interviews with DPCs and companies around the bridges revealed that in industries such as the wood processing industry, the sand mining industry, the cement industry, the manufacturing industry, the tourism industry, etc. in which efficient transports can be achieved by using large trucks and buses, favorable effects such as increased production and sales, product diversification, and increased income have been observed. In addition, in the Mekong River Delta region, there were opinions from companies near the bridges and others that industries that require large-scale transport such as horticulture and agro-processing have become active thanks to the shift to large-scale road transport.

- According to companies and residents near bridges as well as to DPCs that were interviewed in the on-site field survey at the time of the ex-post evaluation, there has been new entry of industries which need large vehicles for their business, such as private buses, transporters, intermediaries of agriculture products, tourist companies, etc. Services industries such as hotels, retailers, and food services have been newly established with the increase in the traffic of people in the target area.

(ii) Impact on farmers

In rural areas, the following impacts were identified through the interviews with local farmers, residents and retailers: (i) improved productivity of local farmers and in the aquaculture industry resulting from product diversification by local agricultural products dealers handling seeds and fertilizers; (ii) increased farmers' income through the increase in the sales prices of their products to intermediaries of agricultural products resulting from the new entry of multiple intermediaries, and (iii) a decrease in agricultural waste disposal led by achieving constant access to the market.

As for the quantitative impact on the socio-economic development, it is thought that it is difficult to identify the degree of correlation of this project with quantitative data related to socio-economic development including GDP, the number of companies, and the number of employments in each province. This is due to the big difference in the number of bridges that were repaired and rebuilt under this project in each province, significant development of the road network around the bridges, and other government initiatives taken to develop the socio-economic situation other than the development of the road network.

(2) Improvement in the living standards of local residents

Although this is not an impact of this project alone, improvements in the living standards of the local residents through the securing of a safe, smooth, and reliable road network was confirmed through interviews conducted in the on-site field survey at the time of the ex-post evaluation. Specifically, many people said in the interviews that the living standards for local residents have been improved through: (i) an increase in job opportunities and income earning opportunities for local residents resulting from revitalization of the local economy including the expansion of existing businesses and the entry of new businesses together with an increase in farmers' income through the improvement of their productivity and the improvement of efficient transport for agricultural products, as mentioned previously and (ii) an improvement in the convenience of life, led by declines in the sales prices of goods and the increased diversification of goods available in local retailers through the ensuring of smooth road transport, the increase in availability of diversified services resulting from the entry of new businesses, and the improvement of access to local cities by bus.

(3) Impact on natural disaster risk reduction

Interviews conducted in the on-site field survey at the time of the ex-post evaluation revealed that new bridges have had positive impact on the reduction of risks from natural disasters. The installation of new bridges at a higher position above the river surface allows the elimination of the floods that occurred around the old bridges at the time of heavy rain and so on. This has

contributed to a reduction on inundation damage to fields around the brides. In addition, the new bridges become evacuation sites when there is heavy rain.

As seen above, in the area targeted for the interviews, it can be said that the bridges repaired and rebuilt under this project have made a certain contribution to the socio-economic development of the project area, the improvement of local residents' living standards, and the reduction of risks from natural disaster.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

This project was categorized as Category FI[30] under the "JBIC Guidelines for Confirmation of Environmental and Social Considerations (April 2002)". According to the executing agency, there was no single bridge for which it was necessary to produce an Environmental Impact Assessment (EIA) report (sub-projects categorized as Category A). The environmental monitoring at the project sites during project implementation was conducted by the construction contractors and the supervisory consultants (though it was out of the TOR), and they reported any environmental issues to the executing agency. However, there was no comprehensive and detailed monitoring arrangements for environmental monitoring by the executing agency. The environmental monitoring after project completion has been conducted by maintenance and management companies which are responsible for the O&M of the bridges repaired and rebuilt under the project through daily visual inspection of the bridges. If a problem related to the environment is identified, it will be reported to Sub-RMBs or PDOTs.

Although specific implementation records concerning the environmental monitoring during project implementation were not obtained, according to the executing agencies, questionnaire responses from PDOTs, and the interview survey on local residents near the bridges conducted at the time of the on-site field survey, no negative impact on the environment was observed during and after the implementation of this project. In addition, according to the executing agency and PDOTs, no complaints were received during construction.

As for concrete environment monitoring arrangements during project implementation, it is difficult in practical terms for an executing agency alone to directly monitor the impact on the natural environment for all sub-projects in the case of a nationwide dispersed project like this project. Thus, it would be desirable for JICA and the executing agency to clearly agree on a specific arrangement and method for environmental monitoring during project implementation at the time of appraisal. This would include the establishment of a monitoring arrangement by the executing agency in which it could conduct the environmental monitoring through periodic

[30] If subprojects cannot be identified before loan approval and are expected to have an environmental impact, they are classified into Category FI.

reports from supervision consultants or third-party environmental monitoring specialists to be hired by the time the project starts.

(2) Resettlement and Land Acquisition

In this project, land acquisition and resettlement were implemented by the provinces and district compensation committees according to Viet Nam's domestic laws and regulations, and land acquisition plans and resettlement basic plans formulated by provinces. According to the executing agency, land acquisitions occurred for most of the bridges repaired and rebuilt by the project, but the total area of acquired lands for the project and the details of resettlement were not identified at the time of the ex-post evaluation since detailed information of land acquisition and resettlement was not collected by the executing agency[31]. Even in the questionnaire responses to each PDOT, the details could not be confirmed because the district compensation committees had already been dissolved. Interviews with PDOTs and DPCs in the on-site field survey revealed that while there was small scale land acquisition and resettlement, these were properly implemented according to the domestic laws and regulations and no complaints from the people affected were identified. In addition, in the interviews with people affected by land acquisition, it was confirmed that in most cases, acquired land were vacant or partially occupied, and buildings on the sold land were relocated to another room within the same land. Although the negotiation of compensation for some land acquisition for bridges took time to negotiate with residents, problems were solved after explaining the benefit of the new bridges to landowners, and no particular problems were observed after that.

Resettlement occurred for 7 bridges repaired and rebuilt under this project. The biggest of these was for the reconstruction of Ngam bridge in Nam Dinh province. In the resettlement for Ngam bridge, a total of 20 households were affected, and 13 households were relocated to lands that the province prepared (200 m from the original lands). The remaining 7 households were relocated to other locations with monetary compensation. According to interviews with the households relocated to the land prepared by the province, the households were satisfied with the resettlement procedures and the current living conditions on the new land which faces the roads since they are able to start retail businesses there. Households for all other bridges where resettlement occurred were dealt with using monetary compensation. According to the executing agency and questionnaire responses from provinces, no complaints from households affected were filled for these bridges.

[31] The executing agency grasps the details of land acquisition and resettlement by checking progress through cost claims and the attached documents submitted by each province and district compensation committee. Depending on provinces and districts, there are some cases where costs are not claimed. Due to such reasons, accurate information related to land acquisition and resettlement such as the scale of land acquisition, the number of affected households, and the land acquisition area were not confirmed at the time of the ex-post evaluation. It was a total of 2,651 million yen for the land acquisition and resettlement costs for which payment applications were made from the district compensation committees.

In interviews with the executing agency, PDOTs, PDCs, and households affected, no issues in the procedures and compensation for land acquisition and resettlement nor negative impact on social aspects through the project were observed. On the other hand, no concrete system was established in the executing agency to monitor and collect information about the status of land acquisition and resettlement for each bridge in a timely manner. Considering the fact that delays in land acquisition and resettlement were one factor in project delay, it would be desirable to establish a specific system for monitoring the progress of land acquisition and resettlement, such as the holding of regular meetings between related agencies, and the regular collection of information by construction supervision consultants.

From the above, while it is difficult to strictly compare the target values with the actual values of the operation and effective indicators due to the unclear definition of the indicators, the target values was largely achieved with the exception of some bridges, and the contribution of the project to the expected outcome was confirmed by the qualitative information. Therefore, it can be seen that this project has largely achieved the objective. The effectiveness and impacts of the project are high.

### 3.4 Sustainability (Rating: ③)

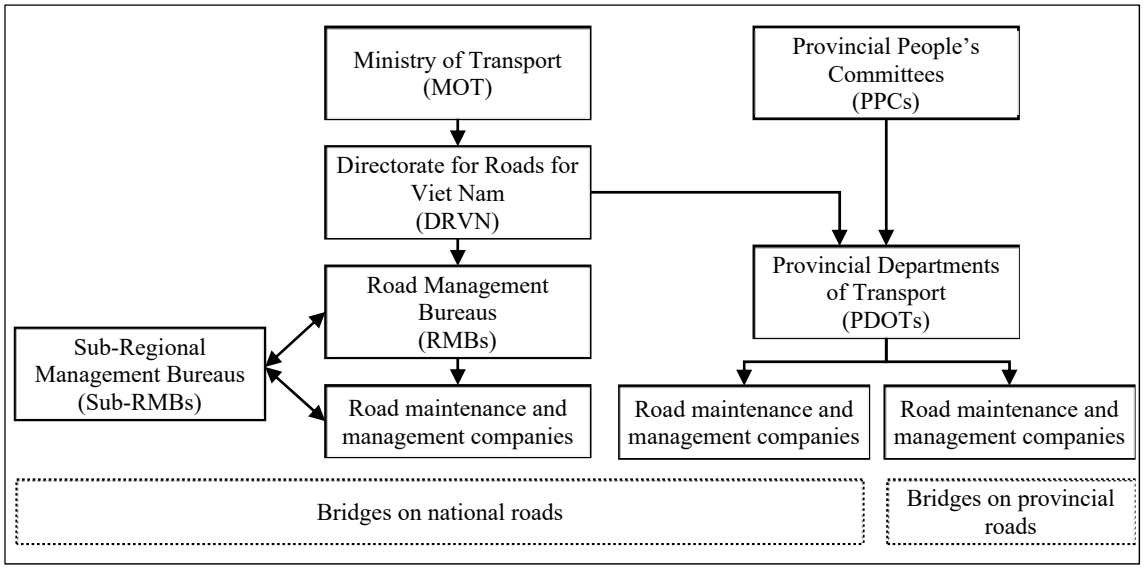
#### 3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

The Directorate of Roads for Viet Nam (hereinafter "DRVN"), Road Management Bureaus (hereinafter, "RMBs"), and PDOTs which are authorized to conduct the O&M activities by DRVN are responsible for the bridges repaired and rebuilt under this project on national roads. Each PDOT is responsible for the O&M of the bridges on provincial roads. The practices of the O&M of the bridges on national roads are conducted by RMBs (I, II, III, IV) which divides the whole country into four divisions, and road maintenance and management companies committed by RMBs[32]. Sub-RMBs which are branch offices of RMBs are in charge of supervising the activities of the road maintenance and management companies. Similarly, the O&M of the bridges which PDOTs manage the O&M of the bridges on national roads and provincial roads are conducted by road maintenance and management companies commissioned by PDOTs, and PDOTs supervise the status of O&M activities conducted by the road maintenance and management companies (Figure 2). Every week, staff in charge of the O&M in Sub-RMBs or PDOTs visit the maintenance companies and the sites to inspect the O&M condition of bridges conducted by the road maintenance and management companies. Any problems identified in bridges are immediately reported to Sub-RMBs or PDOTs by the road operation and

[32] Road maintenance and management companies were state-owned companies till 2010, and they have been corporatized since then.

management companies. As such, a system in which RMBs or PDOTs can properly supervise the O&M activities of the road maintenance and management companies has been put in place.

From interviews with RMBs/Sub-RMBs, PDOTs, and road maintenance and management companies, and questionnaire responses, it is clear that a sufficient number of staff for O&M activities has been provided and no issues affecting O&M activities caused by a lack of staff have been observed[33, 34]. It was found that the organization framework for the O&M as well as the demarcation of responsibilities and roles among the sections concerned are clear. Also, no technical issues with staff who are responsible for the O&M activities were found. Therefore, no particular problem has been observed in the institutional aspect of the O&M activities for the bridges repaired and rebuilt under this project.




Source: Prepared by evaluator

Figure 2: Organizational Arrangement of O&M for Bridges on National and Provincial Roads

### 3.4.2 Technical Aspect of Operation and Maintenance

Staff in charge of O&M activities of DRVN, RMBs/Sub-RMBs, and PDOTs hold at least a college degree and an appropriate technical level is maintained. The O&M manual includes the manuals for daily maintenance and for periodic maintenance. In addition, an O&M manual for large bridges is formulated for each bridge. The O&M of the bridges repaired and rebuilt under the project is carried out according to these manuals[35]. According to the interviews with the RMBs and PDOTs, the technical capability of road maintenance and management companies

[33] The number of total staff and engineers in each RMB is as follows: RMBI: 98 staff including 90 engineers; RMBII: 87 staff including 79 engineers, RMBIII: 67 staff including 57 engineers, RMBIV: 76 staff including 68 engineers.
[34] The Binh bridge O&M office in Hai Phong Bridge PMU in Hai Phong city is in charge of the O&M of Binh bridge that was rehabilitated in Phase (II). According to the interview survey with Binh bridge O&M office, there was no problem with lack of personnel.
[35] The O&M of Binh bridge is conducted according to O&M manual for Binh bridge.

has been improved, as they face intense competition with companies other than the former state-owned enterprises since the corporatization of the road maintenance and management companies.

DRVN conducts technical training once a year which includes (i) training on laws and regulations and procedures related to roads and bridges, and (ii) technical training for O&M methods for road and bridges and training for the supervision of road maintenance and management companies. Several staff members from RMBs, Sub-RMBs, and PDOTs participate in the training. Furthermore, the staff that participated in the training provide similar training for staff inside RMBs and PDOTs, and to Sub-RMBs and road maintenance and management companies. According to the interviews with Sub-RMBs and road maintenance and management companies, they are satisfied with the content of the training.

The status of the O&M for bridges on national roads is managed and monitored in the VBMS that was developed with the consulting service of this project as well as a subsequent Japan ODA Loan project (Second Transport Sector Loan for National Road Network Improvement)[36]. In interviews with staff in RMBs and PDOTs, there were many comments that it was easy to identify the appropriate timing of O&M activities for each bridge in the VBMS since the current condition and O&M situation for each bridge could be grasped in a timely and accurate manner in the VBMS, and this was useful in prioritizing O&M activities and developing O&M plans. Regarding the training related to the use of the VBMS, which was conducted by the project, interview surveys at the time of the ex-post evaluation revealed that a sharing mechanism for training in which the staff who participated in the training regularly carried out training within the organizations was established.

While it was assumed that the VBMS would eventually be utilized to formulate a mid to long-term bridge maintenance and management plan, at the time of the ex-post evaluation, this has not yet been utilized in the formulation since detailed inspections for all bridges has been underway and the current VBMS does not contain an aging deterioration analysis model[37]. At the time of the ex-post evaluation, detailed inspections and VBMS upgrading were being conducted, and an early completion is desired[38]. Further, a road data base (Viet Nam Road Asset Management System, hereinafter "VRMS") is under construction with the support of the World

[36] This system stores data on each bridge's specifications (construction year, bridge length and width, etc.), inspection results, and repair history, etc., and the data is updated regularly and at the time of repair. The data in the system is utilized to formulate an annual bridge maintenance and management plan.

[37] The consulting services for this project and subsequent Japan ODA Loan project did not include the utilization of the VBMS in the formulation of a mid to long-term bridge maintenance and management plan.

[38] As of April 2019, a detailed inspection on 4,835 bridges out of approximately 6,500 bridges on national roads has been completed, and the detailed inspection of the remaining bridges was underway in the World Bank supported project (Road Asset Management Project). It is planned that the inspection of all bridges in will be completed by 2020. In addition, The application of the long-term plan model used in the road pavement management system (Pavement Management System, hereinafter "PMS") developed by the JICA Technical Cooperation "The Project for Capacity Enhancement in Road Maintenance Phase 1 and 2" into the VBMS has been carried out.

Bank. The establishment of a comprehensive maintenance and management database in which VRMS, PMS, and VBMS are connected each other is scheduled[39].

It can be said that there are no particular problems in the technical aspects of the O&M.

### 3.4.3 Financial Aspect of Operation and Maintenance

As for O&M costs for national roads including bridges, the Road Maintenance Fund (hereinafter, "RMF") was established in 2012 for the purpose of securing a stable budget for the O&M of national and provincial roads[40, 41]. The fund size of RMF at the time of establishment was about 6.9 trillion VND, and this increased to 10.4 trillion VND in 2017. As a result, the budget allocation amount for the O&M of national roads increased at an annual average of 15.5 % from 2013 to 2017 and the budget allocation for O&M of provincial roads increased by 7.2 % on an annual average over the same period. According to DRVN, only about 20 % to 30 % of the amount necessary for O&M of national roads was allocated before RMF was established, but after RMF was established, it received about 35 % to 55 % of the necessary amounts. As such, the budget allocation situation has been improved. According to the Ministry of Transport and RMF, the same budget growth rate is expected in the future. In order to improve the O&M of national roads, DRVN submitted the *"Proposed Plan: Improvement of Management and Maintenance of National Highways for the period 2019-2030"* to the Ministry of Transport in February 2019 [42].

With regard to the O&M budget for the provincial roads, the situation differs depending on the province since there is a budget allocation from the Provincial People's Committee in addition to the budget allocation from the RMF. In the provinces where interviews were conducted at the time of the on-site field survey, roughly 20-30 % of the amounts necessary were being allocated. However, in the Mekong River Delta region, many provinces in the on-site field survey said that they received around 50% of the amount necessary for O&M because road damages were more severe than in other province due to ground with low self-sustainability.

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[39] According to Hanoi office of the World Bank, it is planned to be competed in 2020.

[40] The main financial source of the RMF is vehicle registration fees, and 65 % of the registration fee is allocated to the O&M of national roads and 35 % to the O&M of provincial roads. In addition to this, a government budget was allocated to the fund for national roads. A total of 10.4 trillion VND (about 7.9 trillion VND for national roads and about 2.5 trillion VND for provincial roads) was allocated from the RMF.

[41] Because of changes in the law in 2017 which requires all fees to be turned over once to the government's treasury, vehicle registration fees cannot be directly entered into the RMF. According to the RMF, while a new mechanism is currently under consideration, it is planned that the budget for vehicle registration fees and government subsidies will be allocated as before. It is expected that the RMF will receive the same level of funds. Furthermore, collecting road rents which are not currently collected is being considered to secure financial resources.

[42] In Proposed Plan: Improvement of Management and Maintenance of National Highways for the period 2019 - 2030, it is estimated that the budget shortage from 2019 to 2025 will reach to a minimum 0.5 trillion VND and maximum 7 trillion VND per year, according to the predicted amounts of budget allocation based on the required budget amounts of O&M for national roads and the current O&M budget amounts (vehicle registration fees and the government subsidies) from 2019 to 2030. On the other hand, it is estimated that the budgets will be filled after 2025. Therefore, the plan proposes inflation adjustment for vehicle registration fees, diversification of RMF funding sources (e.g., rents for road infrastructures), and increased subsides from government budgets.

RMBs and PDOTs, which are responsible for practical O&M place emphasis on daily O&M activities, especially prioritizing (i) ensuring smooth pavement surface, (ii) securing road safety (repair of traffic lights and signs), and (iii) drainage facilities. Thus, although the O&M budget is not yet sufficient, under the tight fiscal condition of the Vietnamese government, securing a certain funding source for O&M activities for roads by the establishment of RMF can be seen as significant progress made for the financial aspect of O&M for roads. In addition, the O&M agencies put their emphasis on daily O&M activities under limited budget conditions, taking measures to prevent large-scale repairs that require large budgets as much as possible, and conduct daily O&M activities prioritizing safety and smooth traffic. It is considered that they take appropriate measures under limited budget constraints.

Table 10: Budget Allocation for the O&M for National Roads

Unit: billion VND

| Fiscal year | Total allocation | Increase (%) | Annual required amounts | Budget allocation ratio to annual required amounts |
|---|---|---|---|---|
| 2012 | 2,804 | NA | NA | NA |
| 2013 | 4,668 | 66.5 | 4,100 | 100% |
| 2014 | 5,784 | 23.9 | 13,047 | 44.3% |
| 2015 | 6,792 | 17.4 | 12,308 | 55.2% |
| 2016 | 7,603 | 11.9 | 16,308 | 46.6% |
| 2017 | 7,878 | 3.6 | 16,427 | 48.0% |
| 2018 | 8,317 | 5.6 | 23,891 | 34.8% |
| 2019 | 9,454 | 13.6 | 20,849 | 46.1% |

Source: Documents provided by the executing agency

### 3.4.4 Status of Operation and Maintenance

The conditions of the bridges visited have been generally good except for some minor damage, and no major problems were observed in the O&M conditions[43]. According to the questionnaire responses from the executing agency and the interview surveys, the following O&M activities are conducted according to the O&M plan created on the basis of the actual O&M budget allocation and O&M manuals: (i) daily maintenance (daily visual checks of bridges, cleaning, mowing and simple repairs of surfaces, under and around bridges); (ii) periodic maintenance (painting of lanes, balustrades, sidewalks, medium/large scale repairs); and (iii) emergency/special maintenance (repairs in case of traffic accident or natural disaster). All information related to activities of daily and periodic maintenance and bridge repair for each bridge is managed and monitored in the VBMS. The damaged parts identified in the daily maintenance are input through mobile terminals at the field level, and the maintenance status

[43] At the time of the on-site field survey, minor damages such as damage of the asphalt surrounding rubber parts covering bridge joints due to the damage of the rubber parts which protect bridge joints at multiple bridges was confirmed, and some bridges have already been repaired or marked for repairs. It is thought that this is caused by the increase in overall traffic volumes as well as by overloaded trucks. In addition, in the case of bridges in the Mekong River Delta region, repair of cracks on the pavement due to ground subsidence caused by fragile ground was confirmed, but no significant damage that would seriously affect bridge operation has occurred.

can be monitored in the VBMS. Every year, priorities for bridge repairs are determined based on information about the bridge conditions and repair history of all bridges derived from the VBMS, which has contributed to proper O&M activities to ensure the soundness of bridges. Currently, the introduction of a bridge aging analysis model to the VBMS is being carried out. After the completion of the upgrading VBMS, it is expected that a mid to long-term bridge O&M plan will be formulated, and that better bridge repair prioritization will be made based on quantitative analysis.

As such, no major problems were observed in the institutional, technical, financial aspects and the status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

The objective of this project was to develop a safe, smooth, and reliable road network by repairing and rebuilding weak bridges on Viet Nam's national and provincial roads, thereby contributing to the socio-economic development of Viet Nam's urban and rural areas. This objective was consistent with the development policy of Viet Nam, its development needs, and with Japan's ODA policy, and thus its relevance is high. The definition of the operation and effective indicators, which were annual average daily traffic volume and a travel time saving compared with travel time using a detour route when a bridge was damaged in 10 sample bridges for monitoring, was not clear at the time of appraisal. Therefore, it was difficult to confirm the degree to which the target values of these indicators were achieved. However, the qualitative effects of this project including improvement of traffic safety on the bridges, the securement of smooth road transport and the improvement of access were identified through key-informant interviews and so on in the on-site field survey. In addition, the project has positively contributed to socio-economic development in the project target area including the promotion of existing/ new businesses and the increase in productivity and income levels of local farmers around the bridges, and an improvement in the living standards of local residents. Furthermore, a positive impact on the reduction of the risk of natural disasters by the project has been also identified. There was no negative impact on the natural environment, and the land acquisition and resettlement for the project were properly executed according to the related laws and regulations in Viet Nam. Thus, its effectiveness and impact are high. While the project cost was lower than planned, the project period was significantly longer than planned. Thus, the efficiency of the project is fair. Lastly, the current status of the operation and maintenance of the project in terms of the institutional, technical, and financial aspects has no problem. Therefore, the sustainability of the project is high.

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

## 4.2 Recommendations

### 4.2.1 Recommendations to the Executing Agency

At the ex-post evaluation, the VBMS was utilized to identify bridge conditions in a timely manner and to formulate an annual bridge maintenance plan. On the other hand, as for the formulation of a mid to long-term maintenance plan utilizing the VBMS, which was the purpose of introducing the VBMS, detailed inspection of some bridges has been underway and the work of introducing the long-term planning model to the VBMS has been conducted. Therefore, the VBMS has not been utilized to formulate the mid to long-term maintenance plan yet. In order to utilize the VBMS for strengthening the bridge maintenance capacity of DRVN through the formulation of the mid to long-term bridge maintenance plan, and formulating a comprehensive long-term maintenance plan which is currently being developed, it is desirable that detailed inspection for all bridges for VBMS and also the upgrade of the VBMS to formulate the mid-long-term maintenance plan by utilizing the VBMS are completed as soon as possible.

### 4.2.2 Recommendations to JICA

None

## 4.3 Lessons Learned

(1) Development of an institutional arrangement for the smooth implementation of land acquisition and resettlement in decentralized projects

In this project, the province and district compensation committee where each bridge was located was in charge of land acquisition and resettlement. However, smooth coordination among the people affected and the related organizations was impeded by the limited practical experience in the procedures of land acquisition and resettlement on some of the district compensation committees. A lack of a system to monitor the progress in a timely manner also resulted in delays in the procedures of land acquisition and resettlement for multiple bridges. As a result, delays in land acquisition and resettlement was one of the main causes of the project delays.

Different executing bodies from a project's executing agency are likely to be in charge of the land acquisition/resettlement of subprojects in decentralized projects like this project. However, these bodies are not necessarily equipped with adequate experience of the procedures. Thus, in order to ensure smooth land acquisition and resettlement procedures, it is desirable for JICA to establish a system to mitigate project delay risks related to land acquisition and resettlement by strengthening the practical skills of those staff involved in the procedures at the time of appraisal. This may include: (i) examining the knowledge and practical experience pertaining to the procedures for land acquisition and resettlement of the staff of the executing bodies and (ii)

including training programs related to the procedures of land acquisition and resettlement in the project as necessary. Furthermore, at the time appraisal stage, it is desirable that a coordination system is established among the agencies concerned including the executing agency and executing bodies for resettlement and land acquisition in each subproject, and others, for the smooth implementation of land acquisition and resettlement. This should include the holding of regular coordination meetings pertaining to land acquisition and resettlement among the agencies concerned in order to identify issues through regular progress monitoring and to grasp the necessities for additional budgets, etc.

(2) Project implementation considering the capacity of construction contractors

A lack of capacity of the construction contractors caused a significant delay in some of the construction works in the project. This mainly resulted from contracting a large number of contractors since the repair and rebuild of 141 bridges in 38 provinces over 5 years was originally planned. It is likely that contractor quality deteriorates as the number of contractors increases. In addition, if geographical conditions are different at project sites, construction methods may be also different. In the case of projects where sub-projects are dispersed throughout the country and the hiring of many construction contractors is required like in this project, it is likely that the possibility of project delays caused by contractors is higher. Therefore, at the time of appraisal stage, it is desirable that JICA considers measures to avoid project delay risks caused by construction contractors. These may include more strict examination of the technical aspects of contractors (including a check of the quality of field managers and main engineers) as well as the financial aspects (including the cash flow situation). Also, the division of a project into phases according to areas where the weather and geographical conditions are similar if necessary, considering past contractors' performance, etc. in the same types of projects.

(3) Development of a monitoring system for the impact on the natural environment and impact pertaining to land acquisition and resettlement during project implementation in decentralized projects

A monitoring system for the impact on the natural environment and impact pertaining to land acquisition/resettlement during the project implementation was not sufficiently established in this project. Thus, it was difficult for the executing agency to grasp the impact on natural environment and local residents affected with land acquisition on a regular basis. In the case of decentralized projects such as this project, it is considered to be practically difficult for the executing agency to identify all impacts related to the project by itself. Therefore, in order to appropriately monitor these impacts during project implementation in such decentralized projects, it is desirable that a concrete and feasible monitoring mechanism is established at the time of appraisal, utilizing construction supervision consultants, allocating a dedicated person in charge of monitoring

impacts within the executing agency, and utilizing local governments where sub-projects were located.

(4) Setting up operation and effect indicators and the monitoring system

While the traffic volumes at the sample bridges and travel time savings compared travel times using detour routes when bridges are damaged were set as the operation and effect indicators of this project, the definition of these indicators such as the counting points of the traffic volume and the detour routes could not be identified at the time of the ex-post evaluation. In addition, the agreement between the executing agency and JICA regarding the continuous measuring of the traffic volumes at the same counting points in order to monitor the operation and effective indicators during project implementation was not been confirmed a. As a result, monitoring of the indicators was not conducted during project implementation and a comparison of project effects before and after the project was difficult at the time of the ex-post evaluation.

Therefore, it is desirable for JICA: (i) to clearly agree and record the definition and calculation basis of indicators between JICA and an executing agency at the time of appraisal; (ii) to record the definition of the indicators in the project appraisal report and/or ex-ante evaluation paper and (iii) to prompt the establishment of a method and system to collect the indicators, including the location information around target roads/bridges, and changes in the situation of surrounding environment, and the implementation of the periodic monitoring. This would enable JICA to conduct proper project monitoring activities as well as enable to conduct the ex-post evaluation smoothly.

(5) Method of setting operation and effect indicators for decentralized bridge development project

In this project, 10 bridges were selected as sample bridges to monitor project effects. However, considering such issues as the reconstruction being that of relatively small-scale bridges, and these bridges being dispersed across Viet Nam, it is considered that it is quite difficult to identify the overall project effects just from these 10 bridges. Therefore, in order to grasp the project impact and the supplementary effects in addition to the monitoring of project effects, it is desirable that a sample area is set up, for example, a province, city, or road section where multiple bridges are concentrated as monitoring targets for the operation and effect indicators of projects separately at the time of appraisal. This may enable the capture of project effects and impacts from a broader perspective as a case study.

End

Comparison of the Original and Actual Scope of the Project

| Item | Plan | Actual |
|---|---|---|
| 1. Project Output<br>(1) Bridge repairing and rebuilding | 141 bridges (At the time of appraisal for Phase (I))<br><br>154 bridges (At the time of appraisal for Phase (II)) | 145 bridges |
| (2) Consulting Services (Construction Supervision) | Review of detailed design, assistance for bidding, construction supervision, in-county and overseas training | As planned |
| (3) Consulting Services (Capacity building for O&M) | Development of database necessary to formulate a long-term O&M plan<br>Capacity building for O&M (renewal of bridge inspection standard, in-country and overseas training, support for the development of a long-term O&M plan, etc.) | Almost as planned |
| (4) Consulting Services (Others) | NA | • Review of detailed design and construction methods of Can Tho bridge<br>• Inspection on pavement status and a feasibility study for Thanh Long bridge pavement rehabilitation<br>• Detailed design, bidding assistance, and construction supervision for the rehabilitation of Binh bridge |
| 2. Project Period | March 2004 – February 2009 (60 months) (At the time of appraisal for Phase (I))<br><br>March 2004 – January 2012 (95 months) (At the time of appraisal for Phase (II)) | March 2004 – June 2015 (136 months) |
| 3. Project Cost<br>Amount Paid in Foreign Currency | 17,701 million yen | 2,421 million yen |
| Amount paid in Local Currency | 32,299 million yen (4,255,468 million VND) | 33,168 million yen (5,872,629 million VND) |
| Total | 49,930 million yen | 35,590 million yen |
| ODA Loan Portion | 27,452 million yen | 25,456 million yen |
| Exchange Rate | 1 VND = 0.00759 yen (As of October 2007) | 1 VND = 0.00565 yen (Average between March 2004 and June 2015 (Source: IMF International Financial Statistics)) |
| 4. Final Disbursement | July 2016 | |