

Republic of Guatemala

FY 2020 Ex-Post Evaluation of Japanese ODA Loan Project

“ZONAPAZ Road Improvement Project”

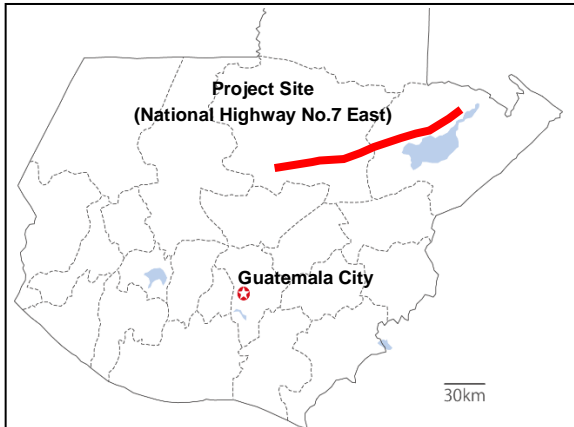
External Evaluator: Hajime Sonoda, Global Group 21 Japan, Inc.

## **0. Summary**

“ZONAPAZ Road Improvement Project” (hereinafter referred to as “the Project”) was implemented for the purpose of ensuring a means of transportation in the ZONAPAZ, an area severely damaged by the civil war in Guatemala, by improving National Highway No.7 East (hereinafter referred to as “RN-7E”) which intersects the area, an access road to the municipality and rural roads in the area, thereby contributing to improvement of the living standard of local residents as well as the establishment of peace and reduction of poverty through revitalization of the local economy. The Project is highly relevant to the development policies and development needs of Guatemala and Japan’s ODA policy. Therefore, the relevance of the Project is high. While the construction on RN-7E has been completed at three of the total four sections, it is still suspended at one remaining section as of March 2021. The access road was completed as planned and rural roads were also completed although the target sections were changed. Both the project cost and project period significantly exceeded the plan. Therefore, the efficiency of the Project is low. Although the pavement of some parts of RN-7E is incomplete, the planned outcomes of the Project, such as an increased traffic volume, shorter travelling time, reduction in the number of road closures due to natural disasters have been achieved, and it is considered to contribute to the socioeconomic development of areas along the route. Therefore, the effectiveness and impacts of the Project are high. As far as the operation and maintenance of the Project are concerned, although there are no problems in the technical aspect, coordination efforts are required in terms of its institutional / organizational and financial aspects regarding transfer of the maintenance responsibility for access roads to the Road Maintenance Executing Unit (hereinafter referred to as “COVIAL”). In the financial aspect, the maintenance of rural roads faces a constraint in terms of the funding sources. As such, the situation of road operation and maintenance is not necessarily good. Therefore, the sustainability of the Project is fair.

In the light of the above, the Project is evaluated as partially satisfactory.

## 1. Project Description



Project Location



National Highway No.7 East (Section 4)

### 1.1 Background

The civil war in Guatemala lasted for 36 years from 1960 to December 1996 when the Government of Guatemala signed the Peace Accords with the anti-government forces. The areas most severely affected by the war as they had been controlled by the anti-government forces were then designated as the ZONAPAZ of which the reconstruction and development were promised by the government.<sup>1</sup> While roads constitute the principal means of transportation in Guatemala, the slow infrastructure development partly affected by the civil war constituted a constraint for socioeconomic development. Most local residents of the Department of Alta Verapaz, part of the ZONAPAZ, and its neighboring Department of Izabal (combined population of approximately 1.67 million in 2016), are indigenous people primarily engaged in agriculture and animal husbandry. The average poverty rate of 70.3% in 2001 was far higher than the national average of 54.3%. RN-7E which intersects both departments was unpaved despite its important status and was frequently impassable during the rainy season, constituting a major factor for the slow development along its route.

Against this background, the Government of Guatemala made a request for an ODA loan project to improve RN-7E and secondary roads to the Government of Japan in 2003 and the loan agreement for the Project was signed in 2006.

### 1.2 Project Outline

The Project aimed at ensuring a means of transportation in the ZONAPAZ by improving RN-7E, an access road to the municipality and rural roads in the area, thereby contributing to improvement of the standard of living of local residents as well as the establishment of peace and reduction of poverty through revitalization of the local economy.

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<sup>1</sup> The ZONAPAZ is a geographical area most affected by the civil war as it had been controlled by anti-government forces. It is made up of eight Departments: Quetzaltenango, Huehuetenango, Quiché, San Marcos, Totonicapán, Solola, Alta Verapaz and Baja Verapaz.

Loan Approved Amount / Disbursed Amount	7,357 million yen / 7,349 million yen
Exchange of Notes Date / Loan Agreement Signing Date	February 2006 / February 2006
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: General untied
Borrower / Executing Agencies	Republic of Guatemala / Direction General of Road (DGC) of Ministry of Communication, Infrastructure and Housing, Institute of Municipal Development (INFOM)
Project Completion	Not yet completed as of March 2021 (disbursement was completed in May 2005)
Target Area	Alta Verapaz Department, Izabal Department (Eastern Guatemala)
Main Contractors	Tokura Corporation (Japan), Biotecnologias Energeticas de Guatemala (Guatemala), Samkye Construction Co., Ltd. (Republic of Korea) (JV), Constructora Nacional, Sociedad Anonima (Guatemala)
Main Consultant	Katahira & Engineers International (Japan)
Related Studies	① Detailed Engineering Design for National Highway Route-7 East (World Bank), December 2000 ② Special Assistance for Project Formulation (SAPROF) for ZONAPAZ Road Improvement Project (JICA): (1) September 2003, (2) September 2004 ③ Supplemental Study for ZONAPAZ Road Improvement Project (JICA), July 2005
Related Projects	Rural and Main Roads Rehabilitation Project (July 2007) ZONAPAZ Road Improvement Project (2) (November 2012)

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan, Inc.)

## 2.2 Duration of Evaluation Study

The ex-post evaluation study for the Project was conducted over the following period.

Duration of the Study: October 2020 –December 2021

Duration of the Field Survey: January – March 2021 (by local consultants)

## 2.3 Constraints During the Evaluation Study

Due to the pandemic of COVID-19, the external evaluator did not travel to Guatemala, and the interviews with the executing agencies, the field inspection of the road sections constructed under the Project, and the interviews with the road users and others were conducted by a local consultant. Using information obtained by the local consultant, the external evaluator conducted the ex-post evaluation of the Project.

## 3. Results of the Evaluation (Overall Rating: C<sup>2</sup>)

### 3.1 Relevance (Rating: ③<sup>3</sup>)

#### 3.1.1 Consistency with the Development Plans of Guatemala

At the time of the planning of the Project (2006), the Berger administration adopted such development themes in its National Development Plan (2004 – 2008) as “solidarity” (social security, education, promotion of social participation), “growth” (development of transportation infrastructure and creation of employment) and “competitiveness” (export promotion, support for small and medium enterprises, support for productivity increase). In the plan, development of the ZONAPAZ based on the peace cooperation in the post-civil war period was given the status of the highest priority and national reconciliation efforts were promoted through various social development programs, and the improvement of roads was prioritized to avoid the ZONAPAZ being left behind the national development. In Guatemala’s Road Development Plan (2000 – 2010), the Project was given a high level of priority as it was considered to make a great contribution to improvement of the standard of living of local residents in less developed areas of the country. RN-7E was designated as a supplementary corridor in the Pueblo to Panama Plan,<sup>4</sup> which was part of the Central American Integration System initiative, and was expected to play an important role as part of an international trunk road running from southern Mexico to Honduras and Belize via Guatemala.

The National Development Plan approved by the Government of Guatemala in 2014 emphasized the acceleration of inclusive economic growth, elimination of inequality and disparities, and strengthening of social protection policies, identifying poverty alleviation as the biggest challenge. Moreover, the plan called for the improvement of residents’ access to services

<sup>2</sup> A: Highly satisfactory; B: Satisfactory; C: Partially satisfactory; D: Unsatisfactory

<sup>3</sup> ③: High, ②: Fair, ①: Low

<sup>4</sup> The Puebla to Panama Plan is a wide area development plan jointly announced by Central American countries and the Government of Mexico in June 2001.

through road improvement and the facilitation of exchanges among rural areas and also between rural areas and the outer areas as the first steps for integral rural development. The Road Development Plan (final draft as of March 2021) being prepared by the Direction General of Roads (hereinafter referred to as “DGC”) of the Ministry of Communication, Infrastructure and Housing proposes a road improvement program based on the analysis results of the current situation of each section of trunk roads nationwide and the importance of individual roads in terms of the socioeconomic development of Guatemala. As RN-7E is very important from the viewpoints of economic growth, regional integration, reduction of regional disparities, and social development, it has a high priority for improvement. The status of RN-7E as part of the International Network of Mesoamerican Highways which has inherited the Pueblo to Panama Plan remains unchanged at the time of this ex-post evaluation.

Based on the above, the Project has been relevant to the development plan of Guatemala both at the time of planning and ex-post evaluation.

### 3.1.2 Consistency with the Development Needs of Guatemala

As described in “1.1 Background,” development of the road network, including RN-7E, had been slow at the time of project planning in the target area, constituting a constraint to the area’s socioeconomic development.

At the time of this ex-post evaluation, the importance of RN-7E is still high and there has been a massive increase in the traffic volume using this road (see the section on “Effectiveness”), maintaining the necessity for the Project.

Based on the above, the Project has been relevant to the development needs of Guatemala at the time of both its planning and ex-post evaluation.

### 3.1.3 Consistency with Japan’s ODA Policy

In the Implementation Policies for Overseas Economic Cooperation at the time of planning, JICA identified “assistance for poverty reduction” and “infrastructure development for sustainable growth” as priority areas, emphasizing the assistance designed to promote sustainable growth through the development of social and economic infrastructure, including roads. JICA also considers “assistance for peace building” to be an important area. As the Government of Guatemala considered the “consolidation of peace” and “eradication of poverty” to be priority issues for the ZONAPAZ, the necessity and relevance of the Project to assist socioeconomic development in the target area were high.

### 3.1.4 Appropriateness of the Project Plan and Approach

Under the Project, part of the construction contract was cancelled and re-contracted, leaving one section incomplete as detailed in “3.2 Efficiency”. This was due to a significant increase in

the project cost, delayed payment by the executing agency and abandonment of the construction by some contractors.<sup>5</sup>

At the time of planning, the project cost for RN-7E was estimated through the results of JICA studies (Related Studies ② and ③ of “1.2 Project Outline”) based on the results of the Detailed Engineering Design for RN-7E of the World Bank conducted in 2000 (Related Study ①). The report for the last study by JICA (Related Study ③) pointed out that adequate estimates of the work volume and project cost based on the World Bank’s study would not be feasible because the plan based on the latter was likely prepared without a topographical survey and contained many calculation errors. However, this report simply confirmed the necessity for DGC to prepare a detailed design study with new topographical survey, before the tender for the civil works, and was not followed up by an additional study. Consequently, the estimated project cost at the time of signing the loan agreement was not revised. Therefore, it can be pointed out that the insufficient accuracy of the studies which formed the basis for estimating the project cost at the time of project planning was one of the factors for the substantial increase in the project cost, significantly affecting the implementation of the Project. However, it cannot be said that this has affected the relevance of the Project.

Based on the above, the Project has been highly relevant to the Guatemala’s development plan and development needs, as well as Japan’s ODA policy. Therefore, its relevance is high.

### **3.2 Efficiency (Rating: ①)**

#### **3.2.1 Project Outputs**

The planned and actual outputs of the Project are shown in Table 1.

##### **(1) RN-7E and the Access Road (RN-7E to Senahú)**

Under the Project, improvement of RN-7E and the access road was implemented with DGC acting as the executing agency. The consultant conducted the detailed design work for RN-7E and the access road in 2007. As this work found that the actual ground bearing capacity was smaller than assumed, it was necessary to change the specifications for the subgrade, base course and pavement, and more accurate estimation of the work volume led to an increase of the earth work, in particular, for slopes. In addition, rehabilitation-cum-improvement of the five bridges on RN-7E which had been damaged by a hurricane after project appraisal increased the cost. As it became clear that the project cost would substantially increase to 144% of the planned amount because of such situations, JICA agreed in May 2008 to increase the estimated project cost for RN-7E and the access road on the condition that any shortfall would be funded by the Guatemalan side.

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<sup>5</sup> See “3.2 Efficiency” for details on the increase in operating expenses.

Following this decision of JICA, DGC decided that the work for Section 4 would be financed solely by the Guatemalan side without using the ODA loan and JICA agreed on this decision in November 2008. The contracts for the three sections (Sections 1, 2 and 3) of RN-7E and the access road which were covered by the ODA loan and the contract for Section 4 of RN-7E which was not covered by the ODA loan were signed in February – March 2009 and August 2012 respectively.

Table 1 Planned and Actual Outputs of the Project

Section	Planned	Actual	Remarks
Improvement of RN-7E	Asphalt pavement 161 km	Concrete pavement 161 km	
Section 1	51.1 km	49.0 km	67% was completed under the first contract and then fully completed in January 2020 under the second contract.
Section 2	38.2 km	38.0 km	Completed in March 2017.
Section 3	39.6 km	35.6 km (incomplete)	40% was completed by June 2013 when it was suspended. Part (4 km) was improved by the Guatemalan side with the cooperation of a nickel mining company and was outside the scope of the Project.
Section 4	32.1 km	38.3 km	Completed in November 2015. This section was extended eastwards, and this section was not covered by the ODA loan.
Improvement of an access road	Concrete pavement 25 km	Concrete pavement 21.6 km	Completed in October 2014.
Rehabilitation of rural roads	Gravel pavement 162 km	Gravel pavement 111.5 km	Total of 24 sections completed between 2009 and 2014 under five contracts. These were not covered by the ODA loan.

Source: Prepared based on the materials provided by JICA and the Executing Agencies.

For RN-7E, the improvement work was conducted for 161 km as planned, while there was a change in the road location and replacement of a target short section (4 – 5 km). However, the work for Section 3 is still suspended with a progress rate of 40% with some parts being unpaved even though the work on the base course has been completed throughout. As for the pavement, asphalt pavement was originally planned but was changed to concrete pavement after signing of the work contract in consideration of a likely increase in the traffic volume.<sup>6</sup> The access road was

<sup>6</sup> The study in 2003 (Related Study ②) proposed asphalt pavement based on the estimated traffic volume at the time. It subsequently became clear that there were plans to develop a nickel mine and a sugar plant along the route, making an increase of the traffic volume likely, mainly involving large vehicles. The detailed design had adopted asphalt pavement to suppress the project cost. After signing of the work contract, DGC reconsidered such advantages of concrete pavement as a high level of durability and lower maintenance cost and decided to change to concrete pavement on the assumption that the increase of the project cost (equivalent to 15 – 20% of the total project cost) would be shouldered by the Guatemalan side. JICA agreed on this decision.

generally completed as planned, while the total length was shortened due to changes in the road location.

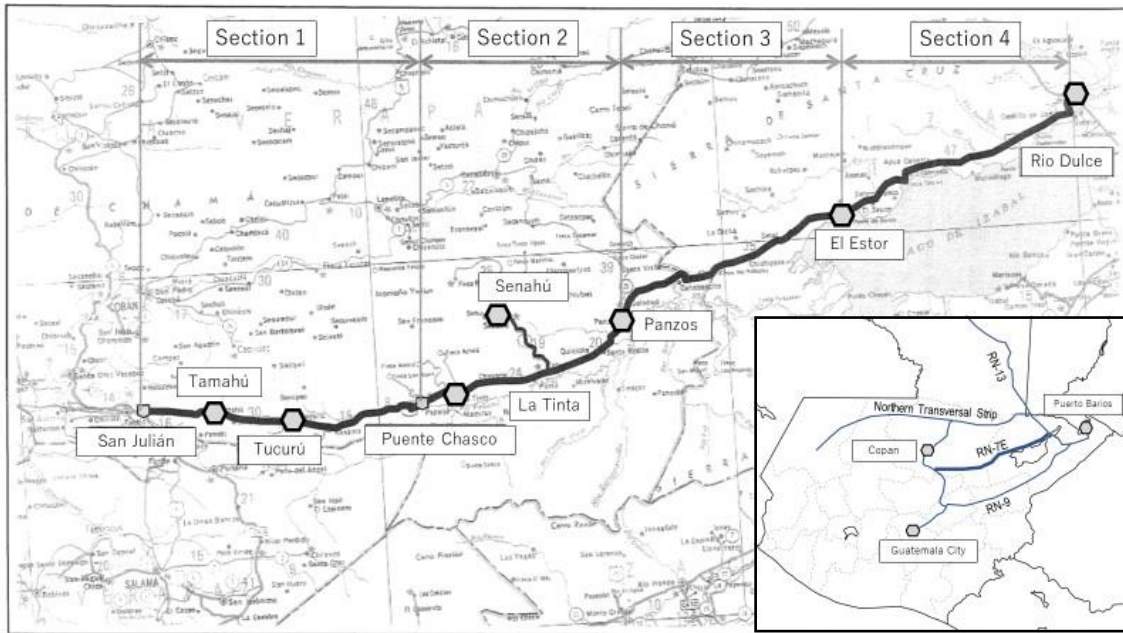
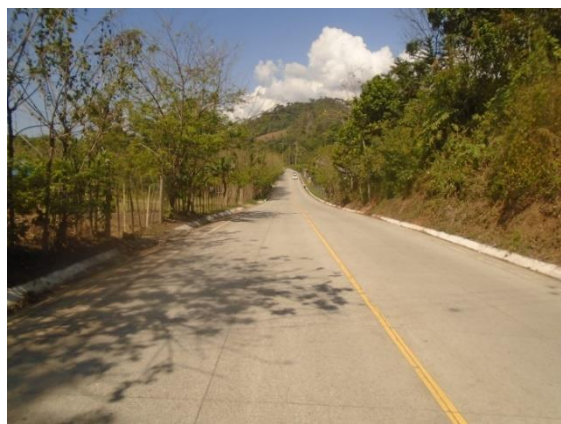


Figure 1 Sections of RN-7E and the Relationships with Other Arterial Roads



Unpaved part of Section 3



The access road to Senahú

At the construction stage for RN-7E, a series of problems occurred as described below.

- Substantial increase in the period and cost of the Project due to design changes (all sections): Hurricane Agatha in May 2010 and Tropical Depression 12E in October 2011 caused collapses, landslides and flooding along the target roads. Along with additional responding works including the repair of collapsed sites and the removal of sediment, a series of design



changes became necessary for rehabilitation and improvement, such as reinforcement of the drainage facilities and slope stabilization at vulnerable sites, strengthening of bridges, etc. Rain and flooding also made it necessary to suspend the works for long periods of time. Moreover, such additional works as bedrock drilling also became necessary because of the existence of a rock layer that was not anticipated during the detailed design, and the pavement was changed from asphalt to concrete pavement as described earlier. Because of these, the contracted amount increased by more than 30% from the originally planned amount, while the work period, except for Section 3 where the work has been suspended (described later), increased by an average of 3.3 times.

- Delayed payment to the contractors and the consultant (all sections): A new system to control government expenditure was introduced in Guatemala in 2010. Although the existing work contracts at that time were to be controlled by the new system, registration and transfer to the new system took a long time. Moreover, the imperfection of the new system frequently caused problems of non-payment and payment with long-time delay. Under such circumstances, payment by DGC to the contractors and the consultants was delayed from 2010 onwards. Due to the general election in 2015 and new budget act in 2017 stipulating stricter payment control, the payments for the unpaid amounts were made in 2018 or later. Meanwhile, JICA repeatedly held tripartite talks involving the DGC and the Ministry of Finance to urge a solution to the problem of delayed payment.
- Cancellation of the original contract and re-contracting for Section 1: In the case of Section 1, the relevant project cost substantially increased because of post-contract design changes as described earlier and a situation arose whereby the work could not be completed within the maximum threshold for expenditure.<sup>7</sup> In June 2013, the contractor involved (Tokura Corporation) requested midway termination of the contract to the Executing Agency and both sides agreed on cancellation of the contract. This was approved by JICA in May 2014. The work progress rate at that time was approximately 70%. Subsequently, after completion of the settlement and cancellation procedures of the contract, DGC signed a new work contract with another enterprise in December 2017 and the work for Section 1 was completed in January 2020.
- Suspension of the work for Section 3: In the case of Section 3, delayed payment by DGC led to suspension of the work by the contractor (Biotecnologias Energeticas de Guatemala / Samkye Construction Co., Ltd.) in June 2013.<sup>8</sup> After the resolution of the non-payment

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<sup>7</sup> Laws of Guatemala authorize an increase of the contracted amount for public works approved by the government up to a maximum of 40%.

<sup>8</sup> The work for Section 3 was hampered by local residents who wanted the purchase of construction materials from them at high prices and the improvement of village facilities. However, such protests could not have been the direct

problem, the contractors did not arrange workers and equipment, withdrew from the work and did not agree on talks with DGC. The work progress rate was approximately 40%. At the time of this ex-post evaluation, DGC is in the process of legal proceedings regarding the completion bond against the contractor. As the next contract cannot proceed unless this completion bond is paid, there is currently no prospect of the recommencement and completion of the work for Section 3. Meanwhile, the entire base course has been completed with some parts unpaved, making it possible for vehicles to travel at some speed. However, Cahaboncito Bridge of Section 3 remains unimproved and has only one lane with weight restriction of 25 tons.

## (2) Rural Roads

INFOM also acted as the executing agency responsible for the rehabilitation of rural roads in the Project. At the time of planning, rehabilitation of 162 km of rural roads out of some 330 km of the rural roads in the target area was intended.<sup>9</sup> In reality, a total of 111.7 km of rural roads in 24 sections was rehabilitated by 2014. The rural road rehabilitation was originally planned to be implemented over three fiscal years from FY 2008 to FY 2010. In FY 2008, the work proceeded as planned and 33.0 km of 14 sections was completed in 2009.<sup>10</sup> In FY 2009, the work was scheduled for six sections and the work for 13.5 km in four sections was completed in 2011. The work for the remaining two sections for 30 km could not start because of the delays in land acquisition and inability of existing bridges to support heavy machinery, resulting in cancellation of the contract with the contractor. In FY 2010, the required budget was not appropriated due to the tight government finance which prioritized rehabilitation of the damages caused by Hurricane Agatha, and no project-related work was undertaken. Subsequently in FY 2013, rehabilitation work was conducted in six sections, including two sections where no work had taken place in FY 2009, for a total length of 65.0 km and this work was completed in 2014.

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reason for suspension of the work because the contractors did not restart the work even after the ending of the opposition by residents.

<sup>9</sup> The target municipalities for the rehabilitation of rural roads were Tamahú, Tukurú, La Tinta, Senahú, Panzós and El Estor along the route of RN-7 East.

<sup>10</sup> Of these 14 sections, three sections with the total length of 6.7 km were rehabilitated again in 2019. Although INFOM implemented the work under the budget of the Project, it is not included in the outputs because of duplication of the targeted sections.



Rural roads rehabilitated by the Project

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The planned total project cost at the time of planning was 9,810 million yen (approved ODA loan amount: 7,357 million yen). The actual project cost up to the time of the ex-post evaluation is 17,045 million yen (174% of the planned amount, ODA loan amount: 7,349 million yen), far exceeding the planned cost (Table 2). When the planned cost of each component is compared to the actual cost taking into consideration price escalation, physical contingency, administrative cost and taxes, the actual costs of the improvement of RN-7E and access roads, rehabilitation of rural roads and consulting service components are 189%, 94% and 188% of the relevant planned costs. In view of the facts that part of the work for RN-7E has not been completed and the actual total length of rehabilitated rural roads is less than planned, the efficiency of the project cost is judged to be low.

The project cost for RN-7E and access roads increased because of the changed road specifications, rehabilitation and improvement of facilities damaged by natural disasters and additional work necessitated by the actual topography and geology of the project area. It is now estimated that an increase of some 2,600 million yen and some 4,200 million yen had taken place up to the time of the detailed design and at the construction stage respectively. In addition, higher-than-expected price inflation is also thought to have contributed to the increase in project costs.<sup>11</sup>

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<sup>11</sup> At the time of planning, it was assumed that prices would rise by about 2.4% per year, but the actual rate of price increase between 2005 and 2020 reached about 4.4%.

Table 2 Planned and Actual Project Costs

(Unit: Million Yen)

	Planned Amount			Actual Amount		
	ODA Loan	Guatemala	Total	ODA Loan	Guatemala	Total
RN-7E and Access Road	5,895	0	5,895	5,968	8,851	14,819
Rural Roads	0	435	435	0	543	543
Consulting Services	894	0	894	1,381	302	1,683
Price Escalation	413	16	429	0	0	0
Physical Contingency	155	157	312	0	0	0
Land Acquisition	0	501	501	0	(unknown)	(unknown)
Tax	0	944	944	0	(included in the above)	0
Administration Cost	0	400	400	0	(unknown)	(unknown)
<b>Total</b>	<b>7,357</b>	<b>2,453</b>	<b>9,810</b>	<b>7,349</b>	<b>9,696</b>	<b>17,045</b>

Source: Prepared based on the materials provided by JICA and the Executing Agencies.

Note: Exchange rates Planned amount: 1 Quetzal = 14.3 Yen

Actual amount: 1 Quetzal = 13.4 Yen (average for 2009 – 2020)

Table 3 Implementation Period of the Project (Actual)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Loan Agreement	▲														
Final Disbursement										▲					
Consulting Services		—	—	—	—	—	—	—	—	—	—				
RN-7E Section 1				—	—	—	—	—	—	—	—	—	—	—	—
RN-7E Section 2				—	—	—	—	—	—	—	—	—	—	—	—
RN-7E Section 3				—	—	—	—	—	—	—	—	—	—	—	—
RN-7E Section 4							—	—	—	—	—	—	—	—	—
Access Road				—	—	—	—	—	—	—	—	—	—	—	—
Rural Roads				—	—	—	—	—	—	—	—	—	—	—	—

Source: Prepared based on the materials provided by JICA and the Executing Agencies.

Note: The solid line indicates the construction implementation period and the dashed line indicates the construction interruption period.

### 3.2.2.2 Project Period

The Project was originally planned to be implemented for 63 months from the loan agreement in October 2005 to the completion of all the civil works in December 2010. In reality, however, the loan agreement was signed in February 2006 and the works was completed in January 2020 except for Section 3 of RN-7E (Table 3). The project period up to April 2021 was 183 months which is 290% of the originally planned period, significantly exceeding the planned period. The deadline for final loan disbursement was extended from June 2012 to May 2015. Although some 40% of the works for Section 3 was completed, the works have been suspended since 2013 without prospect of the timing for its recommencement. As such, the Project has not been

completed yet. The reasons for the substantial increase in the project period and for the incomplete works for Section 3 have already been explained earlier. Based on the above, the efficiency of the project period is judged to be low.

As a result, both the project cost and project period significantly exceeded the plan. Therefore, efficiency of the Project is low.

### 3.3 Effectiveness and Impacts<sup>12</sup> (Rating:③)

#### 3.3.1 Effectiveness

##### 3.3.1.1 National Highway 7 East (RN-7E)

The purpose of the Project was to ensure a means of transportation in the ZONAPAZ by improving RN-7E and access roads to a municipality and rural roads in the area. Three indicators were set for RN-7E regarding an increase in the traffic volume, reduction in the travelling time and reduction in the number of road closures due to natural disasters. The status of the achievement of these indicators is shown in Table 4.

Table 4 Planned and Actual Performance of Operation and Effect Indicators (RN-7E)

	Reference Value	Planned	Actual
Annual average daily traffic (vehicles / day; by sections)	309 – 802 (2004)	1,121 – 2,208 (2021)	821 – 2,598 (2021)
Travelling time (minutes; Sections 1 through 4)	383 (2004)	214 (at project completion)	213 (2021)
Road closure due to natural disasters (hours / year; by sections)	120 – 240 (2004)	12 – 24 (at project completion)	5 – 20 (2019)

Sources: The reference and target values are based on JICA materials and the actual values are based on DGC materials.  
Note: Some of the reference and planned values of the average annual daily traffic volume were modified. See the Note for Table 5.

Further details of the state of achievement of each indicator for RN-7E and the situation of ensuring a means of transportation with access roads and rural roads are analyzed below.

#### (1) Increase of traffic volume

The planned and actual average daily traffic volumes on RN-7E are shown in Table 5. The average traffic volume increased from 538 vehicles/day in 2004 to 1,744 vehicles / day in 2021. The traffic volume in 2010 was below the planned volume, presumably because the work was in progress or not yet started in individual sections. In 2021 when the work has generally been

<sup>12</sup> The effectiveness is rated in consideration of not only the effects but also the impacts.

completed, the traffic volume exceeded the planned volume except in Section 4,<sup>13</sup> producing an achievement ratio of 113% for the planned average traffic volume.

Table 5 Planned and Actual Average Annual Daily Traffic

(Unit: vehicles / day)

Section	Baseline (2004)	Planned (2010)	Actual (2010)	Planned (2021)	Actual (2021)	Planned / Actual Ratio
Section 1	802	1,502	837	2,208	2,598	118%
Section 2	637	1,185	1,000	1,723	2,030	118%
Section 3	309	768	385	1,121	1,528	136%
Section 4	402*	764*	484	1,145*	821	72%
Average**	562	1,099	694	1,614	1,846	114%

Sources: The actual volume in 2010 is based on data provided by DGC. The actual volume in 2021 is established by converting the results of a 12-hour traffic volume survey conducted at the time of ex-post evaluation to the average daily traffic volume using information provided by DGC.

Notes: (\*) The reference values and planned values for 2010 and 2021 are based on the estimated traffic volumes in the Supplementary Study in 2005. However, as the reference value for the traffic volume referred to at the time of planning for Section 4 was extremely high compared to that for other sections, there is a possibility that measurement was conducted in an urban area. As this data could not be used as it is for comparison with actual data, a compensated value using the traffic data for other sections and the actual traffic volume data at standard measuring locations of DGC is listed here as a value for reference purposes. (\*\*) A weighted average based on the extension of each section at the time of planning.

For the period from 2004 to 2010, the traffic volume increased at an annual rate of approximately 3.6%. The annual rate of increase subsequently increased to 9% up to 2021. Based on these figures, it is inferred that induced traffic (traffic which has increased above the expected increase of the existing traffic volume induced by the development along the road in response to the road improvement) of more than 80% of the existing traffic has been generated by the Project, suggesting a major economic impact of the Project.<sup>14</sup> Based on the above, the achievement level regarding the traffic is judged to be “high”.

<sup>13</sup> According to the results of interviews with officials and residents of municipalities along the route of RN-7 East, the reasons for the smaller traffic volume increase in Section 4 compared to the other sections would be (i) some 6 km stretch from the end of Section 4 to RN-13 (outside the scope of the Project) is unpaved, (ii) road closure by residents wanting to express their displeasure with the government frequently occurs in areas through which Section 4 passes and (iii) local community organizations establish check points and charge a toll.

<sup>14</sup> At the time of planning, the induced traffic was estimated to be around 50% of the existing traffic.

Table 6 Trends of Traffic Volume by Vehicle Type  
(Annual Average Daily Traffic: vehicles / day)

	All Vehicles	Traffic Volume / Composition by Vehicle Type (Average for Sections 1 through 4)				
		Passenger Vehicles	Pick-Up Trucks	Medium Size Trucks	Large Trucks	Buses and Mini-Buses
2003	403 (100%)	50 (12.4%)	166 (41.1%)	151 (37.5%)	3 (0.8%)	34 (8.2%)
2010	694 (100%)	82 (11.8%)	261 (37.6%)	282 (40.5%)	11 (1.7%)	58 (8.4%)
2021	1,846 (100%)	706 (38.2%)	564 (30.6%)	289 (15.6%)	25 (1.4%)	261 (14.1%)

Sources: The actual volume in 2010 is based on data provided by DGC. The actual volume in 2021 is established by converting the results of a 12-hour traffic volume survey conducted at the time of ex-post evaluation to the average daily traffic volume using information provided by DGC.

Note: A pick-up truck means a 4WD cargo bed, a medium-size truck means a truck with up to four axles and a large truck means a truck with five or more axles. A weighted average based on the extension of each section at the time of planning.

The composition of vehicles in 2010 was similar to that in 2003 (Table 6). Since 2010, however, the ratio of passenger vehicles has considerably increased with their number growing by more than eight times. Meanwhile, the traffic of medium size trucks has not increased much and their ratio has significantly dropped. While the traffic of buses and mini-buses has recorded a large increase, the increase in the number of mini-buses is the dominant factor. In short, the scale of increase in large vehicles (trucks and buses) has been small while that in smaller vehicles, such as passenger vehicles, pick-up trucks and mini-buses, has been large, presumably because the improved road surface has made it easier for small vehicles (especially passenger cars) to use RN-7E of which the previous poor surface made its use by small vehicles difficult.

## (2) Reduction of travelling time

According to DGC, the travelling time between San Julian and Río Dulce (approximately 161 km) on RN-7E is 213 minutes (measured in January 2021), achieving the target value of 214 minutes. The average travelling speed is calculated to be approximately 45 km / hour. These findings largely coincide with the results of interviews with stakeholders. Although there are unpaved sections in Section 3, the road surface conditions are not bad due to the completion of the base course, allowing vehicles to travel at some speed. Therefore, the achievement level regarding the travelling time is high.

## (3) Reduction of road closures due to natural disasters

Section 1 of RN-7E passes through a mountainous area and has been subject to frequent road closures due to landslides and flooding caused by rain. According to DGC, Section 1 experienced

road closure lasting 5 – 20 hours due to a natural disaster in 2019 which was less than one-tenth of the pre-project level in 2004. In 2020, no road closure due to a natural disaster occurred.<sup>15</sup> This improvement is believed to be the result of the installation of such appropriate facilities as slope protection and road surface drainage for RN-7E under the Project and also an improved disaster-resistance performance through rehabilitation and improvement responding to the recent disaster damages to RN-7E. Therefore, the achievement level of the reduction of road closures due to disasters is high.

### 3.3.1.2 Access Road and Rural Roads

According to the results of interviews with the planning section of the City of Senahú which has an access road to RN-7E, the travelling time from the municipal office to RN-7E has been halved from one hour to 30 minutes due to the implementation of the Project.

Meanwhile, the residents of villages where rural roads were rehabilitated under the Project (hereinafter referred to as “target villages”) say that the travelling time from the village to RN-7E or municipal offices has been shortened. There are reports from the villages far from RN-7E or in mountainous areas that vehicles can now enter the village more easily and they can cover a distance, which used to take several hours on foot, now in less than one hour by vehicle. Although the field survey found that some of the 24 sections of rural roads rehabilitated under the Project are not necessarily well maintained (refer “3.4 Sustainability”), they are passable by motorcycles, moto-taxis (small three-wheel taxis), passenger vehicles, pick-up trucks, mini-buses, and small / medium size trucks throughout the year, substantially increasing the traffic volume. However, one section appears to be not used often as the road conditions have badly deteriorated since the completion of the Project.<sup>16</sup>

Based on the above, the purpose of the Project to “ensure a means of transportation in the target area” is judged to have been achieved.

## 3.3.2 Impacts

### 3.3.2.1 Intended Impacts

By securing a means of transportation, the Project was expected to contribute to the establishment of peace and reduction of poverty through improvement of the living standard of residents and revitalization of economy in the local area. The social and economic impacts of the Project are analyzed below based on the findings of the qualitative survey taking the changes in

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<sup>15</sup> Residents along the route of RN-7E sometimes close the road to express their opposition to government policy (no direct relation to the Project). In 2019, road closure up to 85 hours a year occurred depending on section but such closure is not included in assessment of the performance of the relevant indicator.

<sup>16</sup> Villagers now primarily use a different route.



use of the target roads of the Project into consideration.<sup>17</sup>

(1) Changes in road use

As mentioned earlier, the traffic volume of RN-7E has substantially increased, especially the number of small vehicles. The origin and destination survey (OD survey) conducted by the SAPROF Study in 2004 found that local traffic along the route accounted for approximately 40% of the total traffic. Cobán, which is the capital of the Department of Alta Verapaz and a trading center for agricultural products, Guatemala City, the capital of Guatemala, and Puerto Barrios, a municipality with a container port (see Fig. 1), accounted for some 30%, 20% and 10% of the origin and destination respectively of the traffic on RN-7E. Although an OD survey was not conducted as part of this ex-post evaluation, the qualitative survey results suggest the following changes in the use of RN-7E.

- Based on the findings that; the increase in the number of small vehicles was larger than that in large vehicles; a number of target villages reported that some residents had newly purchased motorcycles or moto-taxis to start their transportation services; and many villagers reported that they went to town (the location of the municipal office) more often, it is believed that the traffic within the area along the route has increased significantly.
- An interview with the Puerto Barrios Customs found that 90% of the cargo traffic for import and export using the port as the origin or destination is to and from the capital via RN-9, while remaining 10% is for other areas. Transportation between Puerto Barrios and the Department of Alta Verapaz almost exclusively uses RN-13 and Northern Transit Strip, instead of RN-7E. This suggests that the traffic volume of RN-7E to and from Puerto Barrios has not much increased. However, cooperatives of producers exporting organic coffee, cacao, honey, etc. along the route of RN-7E have expressed the opinion that they welcome the improvement of RN-7E in the direction of Puerto Barrios.

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<sup>17</sup> As a qualitative survey, interviews were made with those stakeholders listed below by the local consultant on behalf of the external evaluator.

- MANPOLIZA (Association of Municipalities of Polochic and Izabal: further explanation is given below)
  - Municipalities along the RN-7 East: Tamahú, Tukurú, La Tinta, Senahú, Panzós and El Estor (mayor, deputy mayor, head of planning, etc.) of each municipality
  - Target villages: Community leaders (members of the community development committee, educational / health extension workers, members of women's association, members of water committee, etc.) of the 19 villages using the rural roads included in the Project
  - NGOs: FUNDEA (Entrepreneurship and Agricultural Development Association); APODIP (Association of Organic Producers for Integral Development of Polochic); ADRI (Association for Integral Rural Development)
  - Transportation industry: GRETEXPOL (Union of Interurban Hauliers of Polochic); Monja Blanca (bus operator); Carlo Gonzales (a haulier)
  - Others: PNC (Police); Puerto Barrios Customs; Guatemala Chamber of Commerce and Industry
- MANPOLIZA was originally established for the main purpose of facilitating road improvement under the Project as an association of local municipalities, but has widened the scope of its activities by the time of ex-post evaluation to include social development (education, medical care, housing improvement, food and nutrition security, road improvement, etc.), agricultural and forestry development and environmental education.

- Factors found through the qualitative survey affecting the less obvious increase in the traffic of large vehicles often used for long distance transportation are; (i) there remains a single lane bridge which has not been rehabilitated in Section 3, (ii) the road width of those sections passing through urban areas is narrow, making large vehicles spend more time to navigate (especially in Tamahú, Tukurú and Panzós), and (iii) there are sections where local residents have set up a check point or charge a toll fee and where road robberies frequently take place.

The traffic on rural roads of the target villages has significantly increased with the greater use of motorcycles, passenger vehicles, pick-up trucks and moto-taxis. Some residents have newly purchased a motorcycle or moto-taxi to start their own transport services. The number of visits by local residents to a nearby town or visits to villages by middlemen for agricultural products have substantially increased. No concrete information has been obtained on the change of use of the access road by Senahú residents.

## (2) Economic impacts

In the qualitative survey, many of the respondents expressed the opinion that the improvement of RN-7E, access roads and rural roads under the Project has significantly contributed to the revitalization of economic activities along RN-7E. More specific reports are listed below.

- Many nationwide chains of pharmacies, stores selling daily necessities, restaurants have opened branches in cities along RN-7E. There are also new hardware stores, stores selling building materials and machine repair shops.
- A major bus company has opened six depots along RN-7E to provide courier services in towns.
- Many middlemen for agricultural products now visit the target villages. In the past, villagers carried their products themselves to the market in a nearby town, used the vehicle of a hauler or saw only one middleman. Since the completion of the Project, it has been unnecessary to carry products, and now visit multiple middlemen. This new situation has led to a reduction of the transportation cost (lowered transportation fees for less vehicle damage and shorter travelling time, and less damages on product due to the improved road conditions), increased selling prices due to competition, expansion of the potential markets (shipment to the market in other municipalities) and increased production and diversification of cash crops, such as coffee, spice (cardamom), vegetables (broccoli and tomatoes), etc. The purchase of fertilizer, agrochemicals from a middleman or hauler has also increased.
- New shops have opened in the target villages. Some villages now have such shops as a puncture repair shop, mobile phone shop, flour mill and welding shop. Peddlers and goods delivery trucks began to enter the villages, expanding the range of goods that could be

purchased in the villages.

- The volume of tree felling and hauling has increased as the roads can now be used by trailers. A new quarry has opened.
- Ore from a newly opened nickel mine along the route of RN-7E is transported to a smelting works in El Estor and the refined nickel is transported to Puerto Barrios via Rio Dulce.

### (3) Social impacts

The following positive social impacts of the Project have been reported.

- It has become easier to travel from the target villages to town, making it more convenient to conduct administrative procedures at the municipal office, visit to a bank, shopping, etc.
- More residents now travel a long distance to work or for temporary migration to another city or the capital for labor.
- As ambulances now have access to the target villages, the prompt transportation of patients to health centers in town or the hospital in Cobán has become possible.
- The target villages are now frequently visited by the police. Although there are no special security problems in areas along RN-7E, the possibility of a quick police response at the time of an emergency has contributed to improving the overall public security.
- According to the local police, road robberies occur less because of the increased speed of vehicles. There are not many traffic accidents. Meanwhile, it has been pointed out in some target villages that traffic accidents involving speeding motorcycles do occur on RN-7E.

The qualitative survey did not produce any concrete information regarding the contribution of the Project to peace building. According to one NGO (FUNDEA) operating in the target area, there had been chronic poverty in the area since the 1980's with limited access to medical and educational services and technology due to its isolated status. However, the situation has been gradually improving with the efforts of NGOs, cooperatives, banks and educational / medical institutions. Local residents made no reference to a problem of public security and the crime rate in the area is lower than the national average. The return of displaced persons to the area is steadily progressing,<sup>18</sup> suggesting that peace has been firmly established as 15 years have passed since the signing of the Peace Accords. Judging from the reality of the social and economic impacts

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<sup>18</sup> According to statistics of the National Police of Guatemala, both the number of extortions / robberies and the number of homicides per population in the six municipalities along RN-7E in 2020 are lower than the national average. Data supplied by the International Organization for Migration puts the number of returnees to the area from the US at 35 in 2016, 36 in 2017, 216 in 2018 and 412 in 2019, indicating a trend of increase.

described above, there is no question that the Project has facilitated socioeconomic interchanges and integration between areas along RN-7E and other areas. Therefore, the Project is considered to have indirectly contributed to the consolidation or preservation of peace.

### 3.3.2.2 Other Positive and Negative Impacts

#### (1) Environmental impacts

The civil work contracts for the Project included environmental engineering specifications and the contractors conducted environmental management by posting environmental officers familiar with environmental evaluation and environmental management measures. The actual measures included the greening of spoil banks, greening using local species, slope protection and ground conservation utilizing hedges and tree planting. No serious impact of the project-related work on the environment has been reported.

The qualitative survey found some concern by local municipalities regarding environmental destruction as better access made possible by the Project has led to increased felling and collection of firewood. In regard to rural roads (without pavement) and the unpaved sections of RN-7E, a lot of dust is produced by passing vehicles and some concern was expressed by the residents along the route about the need for frequent cleaning and washing as well as for health issues. At the section of RN-7E used by the mining company, water sprinkling is conducted by the company to suppress dust. While RN-7E used to experience frequent landslides during the rainy season, the employment of adequate slope protection works under the Project has reduced both the frequency and scale of landslides. It can be said that the Project has contributed to strengthening the resilience and adaptability of the transportation network to natural disasters.

#### (2) Social impacts

The work for RN-7E and access roads did not involve any resettlement of residents. No problems have been reported regarding land acquisition.<sup>19</sup>

Some of the target sections of rural roads were changed because of difficulty involved in land acquisition (refer “3.2 Efficiency”). At rehabilitated sections, no specific environmental or social problems have been reported apart from complaints about dust.

The consultant for the Project conducted training on the prevention of infectious diseases, including HIV, for employees of the contractors, and also provided environmental education (tree planting) as well as traffic safety education in the form of lectures held in local municipalities along RN-7E. Even though no concrete information was obtained regarding the results of such training and education, the MANPOLIZA has stated that the traffic safety education has been useful for the prevention of traffic accidents.

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<sup>19</sup> Information on the area of land acquired, amount of compensation paid, etc. could not be obtained from DGC, the executing agency.

To summarize effectiveness and impacts based on the above, although some sections of RN-7E have not yet been paved, it is still possible for vehicles to travel at some speed in these sections. The Project has achieved the expected positive effects, such as an increased traffic volume, reduction of the travelling time and road closures due to natural disasters and is believed to have contributed to social and economic development in areas along the route. Therefore, the effectiveness and impacts of the Project are high.

### **3.4 Sustainability (Rating: ②)**

#### **3.4.1 Institutional / Organizational Aspects of Operation and Maintenance**

##### **(1) RN-7E and access road**

While DGC used to have direct responsibility for road maintenance in Guatemala, COVIAL was established in 1997 under the direct control of the Ministry of Communication, Infrastructure and Housing. Using the fuel tax as the earmarked revenue source, COVIAL now entrusts the maintenance of national roads, departmental roads and some rural / municipal roads to the private sector. The original plan was for DGC to conduct the improvement work for RN-7E and access roads (departmental road) among the roads targeted by the Project and to transfer the responsibility for their maintenance to COVIAL on completion of the work.

COVIAL has 93 staff members (as of March 1, 2021), including 15 management staff and 18 technical staff. The organizational system is compact because the actual maintenance work is entrusted to the private sector. Regular maintenance works include patching of cracks on the road surface, improvement of rainwater drainage, and construction of side ditches and retaining walls to stabilize slopes. Obstacles are removed from the road surface, road shoulders and side ditches. Vegetation control and cleaning of road signs and metal barriers are made. All structural components of bridges are inspected. When physical damage which compromises the safety of the structural components is found, either repair work or replacement work is carried out. The maintenance works conducted by private contractors are supervised in technical and administrative aspects by the engineers employed under a separate contract.

Of the work sections of RN-7E under the Project, Sections 2 and 4 have been transferred to COVIAL which maintains these sections by outsourcing.<sup>20</sup> The maintenance responsibility for Section 1, for which the improvement works were completed in January 2021, is scheduled to be transferred to COVIAL but the relevant procedure has not yet been completed as of March 2021. However, the field survey in March 2021 found that COVIAL is conducting emergency works to deal with landslides in this section. The civil works in Section 3 are not completed and the maintenance responsibility for this section is scheduled to be transferred to COVIAL upon

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<sup>20</sup> For Sections 2 and 4, road pavement reshaping, securement of road drainage, cleaning and supervisory work are entrusted to the private sector.

completion. In some parts of Section 3, the mining company conducts maintenance work, including water sprinkling, free of charge.

The civil works for access roads under the Project were completed in 2013 and DGC had started the procedure to transfer their maintenance responsibility to COVIAL. However, COVIAL declined this transfer because the road conditions at some sections were poor due to landslides. No new transfer efforts have since been made. DGC replied to the questionnaire for the ex-post evaluation that this transfer had been completed but this understanding differs from that of COVIAL, making it unclear where the maintenance responsibility for access roads lies.

## (2) Rural Roads

Each municipal government together with the community development council prepares a rural road maintenance plan and conducts improvement such as pavement, repair and other types of works depending on the available budget primarily before and after the rainy season. Because of budgetary restrictions, not all rural roads are subject to municipal maintenance work every year. Municipal governments make requests for the assistance of the departmental government or central government (army) to secure the use of the necessary heavy machinery. Meanwhile, INFOM has formulated a rural road rehabilitation program (2021 – 2025) which is similar to the Project and which covers the target area of the Project but no actual budget has been appropriated at the time of the ex-post evaluation. Because of the limitations of the maintenance by the municipal governments, communities along rural roads conduct simple repair works when necessary and they are almost entirely conducted by hand.

Based on the above, while no special problems exist with RN-7E and rural roads as far as the institutional / organizational aspect of operation and maintenance is concerned, coordination efforts between DGC and COVIAL are required regarding transfer of the maintenance responsibility for the access road.

### 3.4.2 Technical Aspects of Operation and Maintenance

Since its establishment in 1996, COVIAL has conducted maintenance of national and departmental roads (total length of approximately 4,900 km in FY 2018) and possesses a structure to manage various technical standards for road maintenance and many maintenance plans. While some parts of RN-7E and the access road improved under the Project are in mountainous areas and experience frequent landslides, no special technologies are required for their repair and maintenance. As such, it is believed that no special issues exist regarding the technical aspect of operation and maintenance.

After the completion of the rural road rehabilitation, INFOM conducted training on road maintenance, taking the opportunity of handing over the rural roads to the relevant municipalities. According to INFOM, these municipalities have not necessarily been implementing adequate

maintenance. In interviews with municipal officials, no technical issues were reported, while it was pointed out that the main problem for road maintenance was the financial constraint. In short, there appear to be no major technical constraints for the maintenance of rural roads even though the technical capability of municipal governments is not necessarily strong.

Based on the above, there are no major problems regarding the technical aspect of operation and maintenance.

### 3.4.3 Financial Aspects of Operation and Maintenance

The average annual budget of COVIAL in 2015 through 2018 was 984 million quetzal (approximately 14.8 billion yen based on 1 quetzal = 15 yen). The budget execution ratio was approximately 58%. As the revenue source is the fuel tax, the revenue is stable.<sup>21</sup> In 2020, the total budget of COVIAL was 1,344 million quetzal (approximately 20.2 billion yen). No special financial issues are found regarding the road maintenance work conducted by COVIAL.

Most municipalities targeted by the Project believe that financial constraint is the biggest problem for the maintenance of the rural roads. Each municipality plans and implements road maintenance work each year based on its usable budget and the necessity for such work for individual roads. Many of the rural roads targeted by the Project undergo municipal maintenance every two to three years but some rural roads have had no maintenance since the completion of their rehabilitation. Meanwhile, INFOM has a rural road rehabilitation program up to 2025 for the area targeted by the Project but this program has no concrete fund at the time of the ex-post evaluation.

Based on the above, there is some concern regarding rural roads in the financial aspect of operation and maintenance.

### 3.4.4 Status of Operation and Maintenance

#### (1) RN-7E and access road

In Section 1 and Section 2 where RN-7E runs through much mountainous and hilly terrain, some sites remain damaged by minor landslides or river erosion remain. The damages were originally caused by Hurricane Eta in November 2020 and other causes. COVIAL is conducting rehabilitation at some of these sites. In general, the conditions of the road surface and road signs of RN-7E are good and maintenance works by COVIAL were seen in Section 2. Section 3 where the improvement has not been completed has many unpaved sections and sections where only one side of the road is paved. The sprinkling of water to suppress dust by a mining company was seen. In Section 4, although the road surface conditions are good, there are sections where the road surface markings are not properly maintained. The access road to Senahú has unrepaired surface

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<sup>21</sup> 1 quetzal per 1 gallon (3.8 litres) of gasoline is earmarked as the revenue for COVIAL.

cracks and minor landslides in some sections, but the overall road surface conditions are good.

Through the site inspection, the road conditions are judged to be “good” for 68% of the total length of RN-7E and access roads improved by the Project, “fair” for 22% and “poor” for 10%. Those judged to be “poor” correspond to the damaged sections in Section 1, unpaved sections in Section 3 and unpaved or unrepaired sections of access roads.

## (2) Rural Roads

Through the field visits, the conditions of the entire rural road sections rehabilitated by the Project were assessed and found that the conditions are “good” for 56% of the total length of these roads, “fair” for 15% and “poor” for 29%. Those judged to be “poor” are sections where landslides or collapse of the shoulders has not been repaired at slope area and sections where the road surface has become bumpy because the poor drainage made the road surface muddy.

Based on the above, the maintenance situation of the target roads of the Project is judged to be “generally good” for RN-7E and access roads, and “not very good” for rural roads.

In summary, while no problems have been observed in the technical aspect of the operation and maintenance of the Project, coordination is required in terms of the institutional aspect regarding the transfer of road maintenance responsibility of the access road to COVIAL. For the financial aspect, there is a constraint regarding the financial sources for the maintenance of rural roads. The overall maintenance situation of the target roads is not necessarily good. Therefore, the sustainability of the project effects is fair.

## **4. Conclusions, Lessons Learned and Recommendations**

### **4.1 Conclusion**

The Project was implemented for the purpose of ensuring a means of transportation in the ZONAPAZ, an area severely damaged by the civil war in Guatemala, by improving RN-7E which intersects the area, an access road to the municipality and rural roads in the area, thereby contributing to improvement of the living standard of local residents as well as the establishment of peace and reduction of poverty through revitalization of the local economy. The Project is highly relevant to the development policies and development needs of Guatemala and Japan’s ODA policy. Therefore, the relevance of the Project is high. While the construction on RN-7E has been completed at three of the total four sections, it is still suspended at one remaining section as of March 2021. The access road was completed as planned and rural roads were also completed although the target sections were changed. Both the project cost and project period significantly exceeded the plan. Therefore, the efficiency of the Project is low. Although the pavement of some



parts of RN-7E is incomplete, the planned outcomes of the Project, such as an increased traffic volume, shorter travelling time, reduction in the number of road closures due to natural disasters have been achieved, and it is considered to contribute to the socioeconomic development of areas along the route. Therefore, the effectiveness and impacts of the Project are high. As far as the operation and maintenance of the Project are concerned, although there are no problems in the technical aspect, coordination efforts are required in terms of its institutional / organizational and financial aspects regarding transfer of the maintenance responsibility for access roads to COVIAL. In the financial aspect, the maintenance of rural roads faces a constraint in terms of the funding sources. As such, the situation of road operation and maintenance is not necessarily good. Therefore, the sustainability of the Project is fair.

In the light of the above, the Project is evaluated as partially satisfactory.

## **4.2 Recommendations**

### **4.2.1 Recommendations for Implementation Agency**

- DGC should re-contract the civil works for Section 3 of RN-7E so that the improvement can be completed as soon as possible. On completion of these works, DGC should promptly transfer the maintenance responsibility of Section 3 to COVIAL.
- DGC should complete the transfer of the maintenance responsibility of Section 1 of RN-7E and the access road to Senahú to COVIAL as soon as possible upon coordination with COVIAL.
- INFOM should secure the budget for the rural road rehabilitation program and conduct the necessary rehabilitation.

### **4.2.2 Recommendations to JICA**

JICA should encourage DGC to implement the above recommendations and should monitor their implementation.

## **4.3 Lessons Learned**

### **Proper estimation of the project cost**

The substantial increase in the project cost over the planned cost escalated the financial burden on the recipient side, constituting one of the factors for the significant delay of the work implementation. Although the accuracy of the survey on which the project cost estimate was based was questionable at the time of planning, it had been decided that a study, including topographical survey to improve accuracy, would be conducted during the detailed design after the loan agreement. The road specifications and work volume were revised in the detailed design to reflect

the actual ground bearing capacity and topographical features. The project cost was increased because of such revision as well as the rehabilitation and improvement of bridges damaged by a hurricane. After the commencement of the works, project cost further increased by the change of the pavement from asphalt to concrete based on a judgement made by the executing agency, increased work volume due to the existence of an unexpected bedrock formation, suspension of the works due to natural disasters and works to restore and improve damaged infrastructure. On the other hand, some construction contracts were cancelled because payments from the executing agency to the contractors were delayed due to the changes in the government expenditure management system, and because there was a cap on the increase in the amount of public works contracts under the regulations of the recipient country.

In view of the above, it is important to properly plan the project cost prior to the loan agreement at the time of planning. Necessary additional surveys should be conducted based on the accuracy of the information used as the basis for calculating the project cost. In those areas prone to natural disasters, the possibility of an increase due to damage should be considered. In addition, if there are institutional restrictions on the increase in the contract amount of public works projects, it is necessary to further improve the accuracy of project cost estimates at the time of contracting to ensure that no increase over the limit occurs.

**Comparison between plan / actual**

Items	Plan	Actual
1. Output	<National Road: RN-7E> Asphalt pavement, 161 km  <Access Road> Concrete pavement, 25 km  <Rural Road> Gravel pavement, 162 km	<National Road: RN-7E> Asphalt pavement, 161 km (Partially incomplete as of March 2021)  <Access Road> Concrete pavement, 21.6 km  <Rural Road> Gravel pavement, 111.5 km (Some target sections were replaced.)
2. Project Period	October 2005 – December 2010 (63 months)	February 2006 – Partially incomplete as of March 2021 (183 months, 290% of the planned period)
3. Project Cost		
ODA Loan	7,357 million yen	7,349 million yen
Fund by Guatemala	2,453 million yen	9,696 million yen
Total	9,810 million yen	17,045 million yen
Exchange rates	1 quetzal = 14.3 yen (July 2005)	1 quetzal = 13.4 yen (Average for 2009 – 2020)
4. Final Disbursement	May 2015	