

Guatemala

Ex-Post Evaluation of Japanese ODA Loan

“Rural and Main Roads Improvement Project”

External Evaluator: Choshin Haneji, Japan Development Service Co., Ltd.

0. Summary

The Project was conducted in Guatemala where civil conflict had come to an end after many years. The main purpose was to improve some major roads of which the upgrading had long been delayed and/or severely damaged so that the improved transportation would vitalize economic activities and facilitate the smooth implementation of the Peace Agreement. The relevance of the Project was high as it was fully consistent with the development policy of the Government of Guatemala which was eager to develop infrastructure to preserve the peace, the development needs of Guatemala and the ODA policy of the Government of Japan. With the completion of the Project, smooth transportation became possible throughout the Project Area except for a section affected by a landslide, halving the transportation time on the improved roads. In this area, the Government of Guatemala had been earnestly constructing departmental and municipal roads linked to the roads targeted by the Project and the vitalization of local agriculture and livestock farming is hoped for. As the improved road should contribute to the socioeconomic development of the area (ZONAPAZ¹) subject to the Peace Agreement² signed in 1996 between the Government of Guatemala and the rebel forces, the Project has contributed to preserving the peace. Meanwhile, both the effectiveness and impact of the Project are judged to be fair as smooth travelling has been hampered at a section due to a landslide. The project cost exceeded the original plan as the civil engineering cost increased due to the unanticipated work of drilling rocks. The project period far exceeded the original plan and the occurrence of an unexpected large-scale landslide was a major contributory factor. Apart from this, the repetition of tender, drilling of rocks of which the presence was not anticipated and additional work, including the work to revise the original design, also contributed to the lengthening of the project period. As such, the efficiency of the Project is judged to be low. Meanwhile, the sustainability of the project effects is judged to be high as no problems are found either with the maintenance system or in the technical and financial aspects. In light of the above, the project is evaluated to be partially satisfactory.

¹ This area (ZONAPAZ) was defined by the Peace Agreement in 1996 and was the area in which the rebel forces had been waging guerrilla warfare since the 1960's (area marked by a red line on the map showing the project locations).

² In December, 1996, the then Arzú Administration signed the Peace Agreement with the URNG (Unidad Revolucionaria Nacional Guatemalteca), the umbrella organization for rebel groups, in exchange for the cessation of anti-government military activities. While the URNG agreed to lay down their arms, the government promised the legalisation of the political activities of the URNG and a reconstruction plan for the area (ZONAPAZ), the development of which had been hampered by the civil conflict.

1. Project Description



Project Locations



Present State of International Road CA-01W

1.1 Background

At the time of appraisal in 1998, 74% of the total road length of 13,238 km (total of international highways, national roads and rural roads) consisted of earth roads, partly because of the prominence of highland and partly because of the slow progress of upgrading work which was badly affected by the civil conflict. The end of this conflict in December, 1996 led to a plan to implement a reconstruction programme in 10 departments composing ZONAPAZ. Road improvement work was given top priority in this programme. The Project formed part of the programme and conducted rehabilitation work for international highway CA-01W (hereinafter referred to as “CA-01W”) which passes through Chimaltenango Department and paving work for national road RN-7W (hereinafter referred to as “RN-7W”) which crosses Alta Verapaz, Quiché and Huehuetenango Departments.

CA-01W is a trunk road linking Guatemala City with San Cristóbal Frontera on the border with El Salvador and La Mesilla on the border with Mexico. Prior to the Project, the road surface was cracking and the shoulders were missing in many parts, making it difficult to drive safely above 50 km/hr. RN-7W is connected to CA-01W and another international highway, CA-14. Apart from the function of providing access to isolated rural areas as part of the circular road network originating from Guatemala City, this road helps residents along its route to have access to San Cristóbal Verapaz and Huehuetenango, the third largest city in Guatemala. It also acts as a community road linking communities along the route. At the time of appraisal, it was unpaved and the possible travelling speed for even four-wheel drive vehicles was less than 20 km/hr.

Following the signing of the Peace Agreement with the rebel forces in December, 1996, the Government of Guatemala promised conscious reconstruction and development efforts in the

subject area of the Peace Agreement which consisted of those departments severely affected by the civil conflict because of their strong association with the rebel forces. RN-7W traversing the said area was a major factor for the slow development of the area as the unpaved road became impassable during the rainy season despite its importance. Most people in the Project Area are indigenous people engaged mainly in agriculture and/or livestock farming. At the time of appraisal, the average poverty ratio of local public bodies along the route was far below the national average.

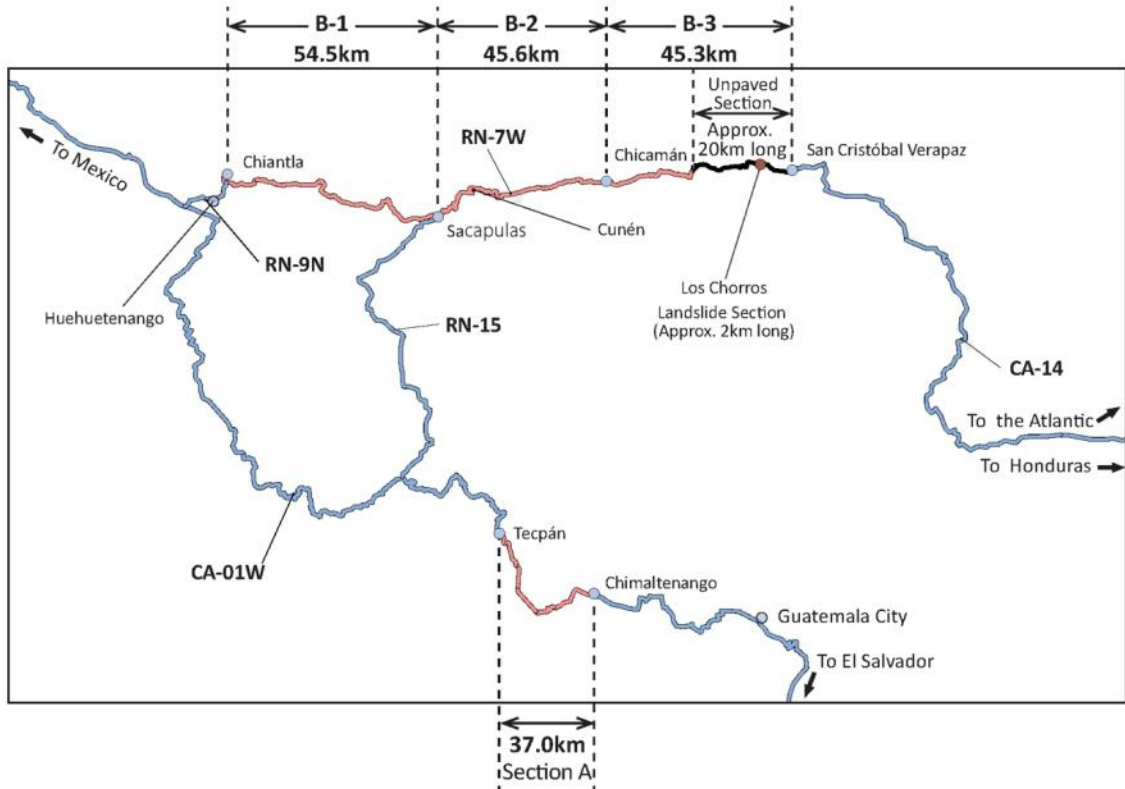
1.2 Project Outline

The objective of this Project is to improve the efficiency of transportation on Guatemala’s road network by means of improving those trunk roads considered to be of crucial importance, thereby contributing to the vitalization of the economic activities of local residents and facilitating the smooth implementation of the Peace Agreement.

The project components were the improvement of CA-01W (hereinafter referred to as “Section A”) and three sections (Section B-1, Section B-2 and Section B-3) of RN-7W as well as the replacement of two bridges. Of these, the work for Sections A, B-1 and B-2 was completed. In the case of Section B-3, a some 2 km long section of the total length of 45.3 km of Section B-3 is impassable because of a massive landslide which occurred during the work period. Moreover, the paving of a some 20.3 km long section, including the above-mentioned 2 km long impassable section, has not been completed because of the prohibition of work in this section by the National Disaster Management Agency (CONRED) after the said landslide even though it is passable on its approximately 18.3 km.

Table 1 Outline of the Project

Item	Road Section		Distance
Road Improvement	Section A	Between Tecpán and Chimaltenango of CA-01W	37.0km
	Section B-1	Between Chiantla and Sacapulas of RN-7W	54.5km
	Section B-2	Between Sacapulas and Chicamán of RN-7W	45.6km
	Section B-3	Between Chicamán and San Cristóbal Verapaz of RN-7W	45.3km
	Total		182.4km
Bridge Replacement	Chixoy Bridge (65 m); Río Branco Bridge (20 m)		



Note

- Red line : subject road sections of the Project
- Blue line : non-subject road sections
- Black line : uncompleted road sections
- Source : Prepared by the author

Fig. 1 Project Sites

Loan Approved Amount / Disbursed Amount	5,781million yen/5,777million yen
Exchange of Notes Date/ Loan Agreement Signing Date	October, 1998/September, 1999
Terms and Conditions	Interest Rate : 2.2% Repayment Period : 30 years (Grace Period: 10 years) Conditions for Procurement: general untied
Borrower/ Executing Agency	Guarantor: Government of Guatemala/ General Directorate (DGC), Ministry of Communications, Infrastructure and Housing (MCIV)
Final Disbursement Date	July, 2007
Main Contractors	(1) Constructora Nacional (Guatemala) (2) Constructora DL (Guatemala)/ Tokura Construction (Japan) (3) Tokura Construction Japan)
Main Consultants	Construction Project Consultants CPC (Japan); Inpla SA (Guatemala)

Feasibility Studies, etc.	<p>(1) The detailed design for CA-01W was already completed using a World Bank loan (year of completion unknown).</p> <p>(2) The pre-F/S for RN-7W (Estudio de Factibilidad Limitada Técnico-Económica-Ambiental de la Ruta Nacional 7W, Tramo: Buenos Aires (Chiantla) – Sacapulas – San Cristóbal Verapaz) was already completed using the PHRD fund of the World Bank (year of completion unknown). The detailed design was also completed using an Inter-American Development Bank loan (year of completion unknown).</p>
Related Projects	<p>(1) World Bank, Secondary and Regional Road Rehabilitation Project: Loan No. 3002GU, L/A in 1993</p> <p>(2) Inter-American Development Bank, Road Rehabilitation and Modernization Program: GU-0017, L/P in 1995</p> <p>(3) JICA, Rural Socioeconomic Infrastructure Development Project (yen loan: ¥2,962 million), Social Investment Fund, GT-P3, L/A in 1995</p> <p>(4) JICA & World Bank, Rural and Main Roads Project, Loan 4260-GU (US\$ 66.7 million), M/D in 1997</p> <p>(5) KfW, Rural Road Construction I (€7.7 million), BMZ 1987 65 927, P/A in 1997</p> <p>(6) JICA, Rural Road Construction and Repair Equipment Improvement Project, Grant Aid: ¥992 million, 1998</p> <p>(7) ZONAPAZ Road Improvement Project (Yen Loan: ¥7,357 million), GT-P5, LA in 2006</p> <p>(8) Central American Bank for Economic Integration, Rehabilitación de la existente y ampliación a cuatro carriles de la ruta CA-2 Occidente (US\$ 119.4 million), Línea 2079, L/A in 2011</p>

2. Outline of the Evaluation Study

2.1 External Evaluator

Choshin Haneji (Japan Development Service Co., Ltd.)

2.2 Duration of Evaluation Study

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

Duration of the Study : Study Period (September, 2011 to December, 2012)

Duration of the Field Study : Field Survey (4th to 17th March and 19th to 28th August, 2012)

2.3 Constraints during the Evaluation Study

From the time of appraisal to the present ex-post evaluation, the government changed three

times and the resulting reshuffling of personnel means that none of the present staff members of the executing agency have knowledge of the implementation situation of the Project. In addition, some of the documents relating to the actual construction work have been disposed of, making it necessary to rely on interview surveys to gather essential information for the evaluation of various aspects of the Project.

3. Results of the Evaluation (Overall Rating: C³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance with the Development Plan of Guatemala

Following the Peace Agreement with the rebel forces, the Government of Guatemala promised to award indigenous people in the ZONAPAZ the right to form political parties and to provide assistance for the socioeconomic development of the area. This promise made the development of agriculture and stock raising in the area an important target and road improvement was identified as the priority means of achieving such target. The government plan (Plan de Gobierno) for 1996 – 2000 stressed the crucial importance of road improvement for the reconstruction of the ZONAPAZ.

The MCIV has prepared the Nationwide Road Development Plan for the 10 year period from 1008 to 2017 and has been proceeding with the repair of major roads, paving of rural roads, construction of access roads to major cities and construction of bridges.⁵ At present, the ZONAPAZ is included in the poor and extremely poor area where development is the priority. The present government plan (2012 – 2016) lists road improvement as an important task to facilitate the socioeconomic development of poor areas, including the ZONAPAZ.

3.1.2 Relevance with the Development Needs of Guatemala

CA-01W is the trunk road linking Guatemala City with El Salvador and Mexico. At the time of appraisal, it was conspicuously suffering from surface cracks and missing shoulders and travelling above 50 km/hr was quite difficult for safety reasons. The importance of this road as a trunk road remains unchanged today as it functions as a major industrial road for many large buses and trucks. It also functions as an artery for people to travel long distances. Meanwhile, RN-7W is connected to CA-01W and CA-14, another international road, and comprises part of the circular road network stretching from Guatemala City. It provides access points for isolated rural areas and also functions as a community road for residents

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

⁴ ③: High; ②: Fair; ①: Low

⁵ At the time of appraisal, there was no sector policy governing roads although road improvement work was in progress under the World Bank's Rural and Main Roads Project.

along its route. At the time of appraisal, this road was unpaved and even four-wheel drive vehicles can only travel at less than 20 km/hr. To make matters worse, part of the road becomes impassable during the rainy season, hampering the development of areas along the route. Today, RN-7W has grown to become a much more important road for the transportation of goods due to population increase and vitalized agriculture along the route. The population of the departments in the Project Area has increased by 178% – 277% in the period from appraisal to the present ex-post evaluation, subsequently increasing the transport demand along the route.

In December, 1996, the Government of Guatemala signed a Peace Agreement with the rebel forces and designated the area severely affected by the civil conflict because of its close association with the rebel forces as the ZONAPAZ (see Map of Project Locations in p.2) as the target area for the promised reconstruction and development efforts. Most of the residents of the ZONAPAZ are indigenous people principally engaged in agriculture and the average poverty ratio of local public bodies along the roads targeted by the Project was far higher than the national average.

The Project was compatible with the development needs of Guatemala as its purpose was to improve the major roads in the ZONAPAZ to increase the efficiency of transportation, thereby facilitating the peace.

3.1.3 Relevance with Japan's ODA Policy

Following the signing of the Peace Accord in December, 1996, Japan conducted a policy consultation in June, 1997, identifying five areas, including infrastructure development and security, as priority areas for Japanese assistance to rectify the various gaps between urban and rural areas. The Implementation Policy for Overseas Economic Cooperation Projects in Latin America at the time (1999) emphasized Japanese assistance for the development of basic infrastructure to rectify income and regional gaps as there are many areas suffering from low income and the lack of development in this region.

Based on this observation, this Project has been highly relevant with the Guatemala's development policy as well as development needs and also with the Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness⁶ (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

Two indicators to measure the quantitative effects of the Project were established. These were “improvement of the transportation efficiency” and “improvement of the International Roughness Index (IRI)”. However, no actual quantitative target was set for the former. The latter was subsequently achieved as planned. The situation regarding these two indicators is described below.

3.2.1.1 Improvement of the Transportation Efficiency

(1) Average Velocity Increase

Section A (CA-01W)

While transporting safely at high speeds was not possible before the Project, it is now possible to transport safely at an average speed of 70 km/hr, halving the transportation time (based on the results of interviews with officials of the DGC and local public bodies along the route⁷).

Section B (RN-7W)

The suspension of the road rehabilitation work due to a landslide means that a some 2 km long (equivalent to 1.1% of the planned road improvement length under the Project) section at Los Chorros in Section B-3 is still buried, making a detour (existing farm road) necessary. The paving of some 20.3 km (equivalent to 11.1% of the planned road improvement length under the Project) has not been completed, including that of the above-mentioned 2 km long section. However, ballast⁸ has been laid to make travelling at a speed of approximately 40 km/hr all the way possible.

Travel at an average speed of 60 km/hr is possible in the case of the remaining some 25 km of Section B-3, Section B-1 (54.5 km) and Section B-2 (45.6 km), cutting the travelling time in half. It has been reported that the shorter transportation time has cut the transportation cost by more than 50% (results of interviews with officials of the DGC and local public bodies

⁶ For rating of the effectiveness, the impacts are taken into consideration.

⁷ The author interviewed various offices of seven local public bodies along the routes. These were the Planning Bureau of Chimaltenango Departmental Government for CA-01W (between Chimaltenango and Tecpán), the Planning Division of the Santa Cruz Verapaz Municipal Authority for the eastern end of RN-07W, the Planning Division of the San Cristóbal Verapaz Municipal Authority for RN-07W (between San Cristóbal Verapaz and Chicamán), the Planning Division of the Chicamán Municipal Authority and the mayor as well as Planning Office of the Uspantán Town Council for RN-07W (between Chicamán and Sacapulas) and the Planning Division of the Sacapulas Municipal Authority and councillors as well as the Planning Office of the Aquacatán Town Council for RN-07W (between Sacapulas and Chiantla).

⁸ This is a type of simple surface treatment to make RN-7W, which was an earth road, more passable by laying a gravel layer on top of the earth surface.

along the route).

(2) Traffic Volume

Compared to the time of appraisal, the currently daily traffic volume has increased by 61% for Section A (8,479 vehicles to 13,623 vehicles, 70% for Section B-1 (255 vehicles to 383 vehicles), 213% for Section B-2 (92 vehicles to 288 vehicles) and 89% for Section B-3 with some unpaved sections (128 vehicles to 242 vehicles).⁹ In every section, the current traffic volume far exceeds the forecast increase of the traffic demand at the time of appraisal (increase of 47% in 14 years). The completion of the Project has made it possible to use RN-7W even during the rainy season. Prior to the Project, Sections B-1, B-2 and B-3 were all unpaved and became impassable during the rainy season (usually from late May to early October). Since the completion of the Project, the entire route except for the landslide section of some 2 km has been passable all year round.

3.2.1.2 Improvement of the IRI

The IRI¹⁰ indicating the unevenness of the road surface of CA-01W improved from 1.05 to 1.63 in 2006 which was better than the target range of 2.0 to 3.0.¹¹ In regard to RN-7W, a DGC official stated that an average IRI of 2.8 was achieved between Chiantla and Chicamán (covering Sections B-1 and B-2) immediately after the completion of the work (2005 for Section B-1 and 2007 for Section B-12).¹² This value was much better than the target value of 3.5.

3.2.2 Qualitative Effects

3.2.2.1 Improvement of Road Safety

The current road surface conditions are generally good for both roads and safe travel is possible except for a limited section. According to data provided by the National Statistical Office of Guatemala, the number of traffic accidents has fallen throughout the Project Area between the pre-project (2001) and post-project (2010) years (62% in Chimaltenango

⁹ This data was originally provided by the DGC. The Project estimated an annual traffic volume increase of 3% for the two roads. This rate can be translated to 47% in 14 years. (Source: JICA)

¹⁰ The IRI (International Roughness Index) was developed by the World Bank to evaluate road surface roughness. According to the World Bank Technical Paper No. 46 (Guidelines for Conducting and Calibrating Road Roughness Measurements), a perfectly smooth road surface has an IRI value of 0 and rough unpaved road surfaces have an IRI value of 8 or higher. The recommended IRI value is up to 2 for airport runways and highways and 1.5 to 3.5 for paved roads. There is no official IRI standard for road surfaces in Guatemala.

¹¹ The source was data provided by Construction Project Consultants, Inc. in 2006 based on continuous measurement using Dynatest's road surface profiler model 5051 Mark III L5.2+ for the period from January through February, 2006.

¹² No current IRI measurements are available.

Department, 20% in Alta Verapaz Department, 47% in Quiché Department and 64% in Huehuetenango Department). The interview survey with local public bodies along RN-7W found that the decline of the number of accidents was a result of the safer transporting conditions, in turn caused by a free vehicle check and traffic safety campaign organized by the General Directorate of Road Protection and Safety (PROVIAL) of the MCIV and also by the improved road surface. All of these results indicate the positive contribution of the Project to improved road safety.

This project has somewhat achieved its objectives, therefore its effectiveness is fair.

3.3 Impacts

3.3.1 Intended Impacts

3.3.1.1 Stabilization of the ZONAPAZ

Road improvement was one of the highest priority issues identified by the Peace Agreement and the actual progress of the work had a big impact on the preservation of security in the ZONAPAZ. All four of the departments involved in the Project comprise part of the ZONAPAZ and the implementation of the Project as a priority component of the Peace Programme was publicly promised by Presidential Decree No. 28-99. The URNG has been continuously monitoring the progress of the Peace Agreement. Since the promulgation of the above-mentioned Presidential Decree and confirmation of the road improvement projects in progress, the URNG has not been involved in any armed activity. According to the Peace Secretariat (SEPAZ), the improvement of CA-01W and RN-7W has made these roads the foundation for local development as they have facilitated the construction of departmental roads and rural roads connected to these trunk roads. It is, therefore, safe to conclude that the Project has contributed to the stabilization of the ZONAPAZ.

3.3.1.2 Vitalization of Economic Activities

Although the latest national data on agriculture and stock farming is unavailable because of the on-going compilation of such data, an interviewee at the Ministry of Agriculture (MAGA) informed that agriculture and stock farming have been on the increased in areas served by the improved roads following the Peace Agreement. In his opinion, the decline of the transportation cost is a factor for such an increase.

In Guatemala, there is no GDP or other data by department, making it impossible to quantitatively determine the vitalization of the local economy by the Project. However, the long-term development plan (Plan de Desarrollo Departamental 2011 – 2013) for the four target departments of the Project contains a plan for the construction, expansion and repair of departmental and municipal roads branching from CA-01W in Chimaltenango Department.

A similar plan exists for Alta Verapaz, Quiché and Huehuetenango Departments through which RN-7W traverses. The eventual construction of such roads will boost the impact of road development on the vitalization of the national and local economy.

3.3.1.3 Improved Access to Health Services

Local public bodies along the routes of the two improved roads have confirmed that access to the nearest hospital has much improved, making emergency transportation possible. In Chimaltenango Department, the general hospital in Chimaltenango City is the only general hospital administered by the Ministry of Public Health and Social Assistance and CA-01W provides the only transport route from a cluster of cities and towns around Chimaltenango City. The improved RN-7W has shortened the access time to a nearby hospital, making such access possible all year round. The substantial improvement of the access of residents to medical services is the result of the assured passability of the road throughout the year and the shorter transporting time of a nearby hospital. One example is the shortening of the transporting time from some three hours to one hour in the dry season from the furthest Cunén Town to Huehuetenango General Hospital.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

No significant impact on the environment has been recorded as a result of the Project. The problem of the illegal dumping of waste wood along the route which was raised at the time of appraisal has not occurred due to improvement of the waste collection service and the introduction of final disposal sites by local public bodies.

3.3.2.2 Land Acquisition and Resettlement

The Project did not require the resettlement of residents. The rehabilitation and/or paving work for the existing CA-01W and RN-7W under the Project took place at state-owned land where no houses or other structures existed even though the road width was widened in some places. Site acquisition was, therefore, unnecessary.

In short, the transport time on the subject roads was halved as smooth travel became possible throughout except for the section blocked by a landslide. Meanwhile, the Government of Guatemala has been proceeding with the construction of departmental and municipal roads branching from the two subject roads of the Project and the further vitalization of agriculture and stock farming is hoped for. No anti-government activities have taken place as the road construction work which will contribute to socioeconomic development has been conducted in areas subject to the Peace Agreement. As such, the Project is said to have contributed to the preservation of the peace. However, the prohibition of road work which is still being

enforced at the section affected by a landslide means that the paving work is not fully completed. In turn, this means that improvement of the transportation efficiency has not been fully achieved, making the effectiveness and impact of the Project to be fair.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs (See Fig. 1)

The target roads of the Project were classified into the following four sections. The work was completed as planned as shown in Table 2 except for a section between San Cristóbal Verapaz and Chicamán on RN-7W.

Table 2 Outputs

Item	Road Section		Distance	Achievement Ratio
Road Improvement	Section A	(CA-01W: Between Tecpán and Chimaltenango)	37.0 km	100%
	Section B-1	(RN-7W: Between Chiantla and Sacapulas)	54.5 km	100%
	Section B-2	(RN-7W: Between Sacapulas and Chicamán)	45.6 km	100%
	Section B-3	(RN-7W: Between Chicamán and San Cristóbal Verapaz)	45.3 km	55%
	Total		182.4 km	88.9%
Bridge Replacement	Chixoy Bridge		Replacement was found to be impossible as both bridges are designated as cultural assets. Only the reinforcement work was done.	
	Río Branco Bridge			

Source: DGC

3.4.1.1 Section A (CA-01W: Between Tecpán and Chimaltenango)

The rehabilitation work for this 37 km long section was completed as planned and the present conditions of the road surface are generally good. Repair work or widening work is being conducted in some places.

3.4.1.2 Section B-1 (RN-7W: Between Chiantla and Sacapulas)

The paving work for this 54.5 km long section was completed as planned and the present conditions of the road surface are generally good. The road surface was damaged at four sites by minor landslides which occurred after the completion of the work. These sites are passable as the collapsed sediment has been removed by repair work supervised by the DGC. Although subsidence (by 2 – 3 cm) is observed for a length of some 50 m at another site, it has not affected the surface of the road which is still passable. The DGC is currently supervising the work to repair an area where the road has collapsed to the width of half a lane for a length of some 20 m.

3.4.1.3 Section B-2 (RN-7W: Between Sacapulas and Chicamán)

The paving work for this 45.6 km long section was completed and the present conditions of the road surface are generally good. One site was slightly damaged by a minor landslide after the completion of the work but the removal of the collapsed sediment by repair work supervised by the DGC has made this part passable.

3.4.1.4 Section B-3 (RN-7W: Between Chicamán and San Cristóbal Verapaz)

Of the planned 45.3 km, some 25 km has been paved and the present conditions of the road surface are generally good. The remaining some 20.3 km has been given ballast treatment as mentioned earlier and an average travelling speed of 40 km/hr is achievable for a length of some 18.3 km.

The major landslide mentioned earlier occurred at Los Chorros during the construction work (January, 2009), using local funds after the loan completion of the Japanese ODA loan disbursement, and some 2 km of the road was buried. The National Committee for Disaster Mitigation (consisting of the Minister of Defense, representatives of local residents and the Director General of the National Institute for Seismology, Vulcanology, Meteorology and Hydrology) promptly prohibited any construction work at this stretch of the road. Since the occurrence of the landslide, the CONRED has been conducting a ground survey at the site every three months. As landslides or subsidence takes place from time to time at this site, there is no firm prospect at present that the prohibition of construction work will be cancelled.

RN-7W lies on the Chixoy-Polochic Fault and it was known prior to the Project that the road work would take place on fragile ground. Accordingly, it was expected that the road work would experience minor landslides and subsidence, necessitating regular repair work as part of the subsequent road maintenance work. The problem of vulnerable ground was not confined to RN-7W but extended to the ZONAPAZ in general. The major landslide at Los Chorros was, however, reported by the CONRED to be an unprecedented natural disaster because of its massive scale as well as timing during the dry season in which landslides do not usually occur.

At the buried section of some 2 km in length, a narrow earth private road which runs in the south of this section is used as a detour. Even though this road is just wide enough to allow single vehicle traffic in some places, the detour is used by large trucks as well as buses.

A minor landslide occurred at three sites on the 25 km long completed part of Section B-3. Small-scale subsidence (in a circular shape of some 5 m in diameter) is observed at one of these sites. The road widening work supervised by the DGC has kept the area of subsidence

under control, making vehicle traffic possible without much reduction of the speed.
(See 3.5.4.2 for the plan for the hitherto uncompleted section.)

The photograph below shows the state of the landslide at Los Chorros (taken in March, 2012 during the field reconnaissance).



Fig. 2 Current State of the Major Landslide Site at Los Chorros on RN-7W

3.4.1.5 Bridge Replacement

Under the Project, the replacement of Chixoy Bridge and Rio Branco Bridge was originally planned. However, because of their designation as cultural assets, permission to rebuild the bridges could not be granted. As a result, only reinforcement work was carried out. According to the DGC, the service life of these bridges was prolonged by some 15 years by the work.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The overall project cost was higher than the planned cost (143%) despite the incompleteness of the work at part of Section B-3 and the change of the plan from rebuilding to reinforcement of two bridges. As shown in Table 3, the cost of the civil engineering work increased by 40% and the cost of the consultant increased by 66%. The increase of the civil engineering work cost was attributable to the drilling of rocks of which the presence in the planned road work sections was not anticipated and also to additional work, including the revision of the original design. This led to significantly increased funding (314%) by the Guatemalan side. Meanwhile, the principal cause of the increased consultant cost was the lengthening of the project period, in turn caused by the replacement of Constructora DL, which was responsible for the paving work for the entire RN-7W, by Tokura Construction because of the bankruptcy of the former during the Project period.

Table 3 Planned and Actual Project Costs

Item	Amount (¥ million)		Differences	
	Planned (With Tax)	Actual (With Tax)	Amount (¥ million)	Difference (%)
Civil Engineering Work	5,957	8,330	+2,373	+40%
CA-01W	1,473	2,091	+618	+42%
RN-7W	4,484	6,239	+1,755	+39%
Consultant	733	1,214	+481	+66%
Total	6,690	9,544	+2,854	+43%
JICA Portion	5,781	5,777	-4	0%
Guatemala Portion	909	3,767	+2,858	+314%

Source: DGC

3.4.2.2 Project Period

The actual project period was significantly longer (more than 206%) than the originally planned. The commencement of the work under the Project was delayed by some 5 – 6 years in each section. The main reasons were (i) repetition of the tender, (ii) extra drilling work because of the presence of unanticipated rocks, (iii) need to carry out design revisions and other additional work and (iv) fairly lengthy procedure of transferring the contractor contract because of the bankruptcy of the original contractor. In terms of the duration of the work, the performance at all sections except Section B-2 was almost as planned. The significant extension of the work duration at Section B-2 (by 20 months) was caused by the extra drilling work to deal with unanticipated rocks, additional work and the procedure of transferring the contractor contract as mentioned above. The incomplete work at part (some 20.3 km) of Section B-3 has already been mentioned in 3.4.1.4. Table 4 below shows the planned and actual project periods.

Table 4 Planned and Actual Project Periods

Item	Planned		Actual	
	Period	Duration	Period	Duration
Section A (CA-01W)	1997-2000	30 months	August, 2003-April, 2006	33 months
Section B (RN-7W)	1998-2001	30 months	January, 2003-January, 2009 (work suspended)	73 months
• Section B-1			January, 2003-May, 2005	29 months
• Section B-2			February, 2003-April, 2007	50 months
• Section B-3			February, 2003-January 2009 (work suspended)	72 months
Work Supervision CA-01W	1997-2000	30 months	August, 2003-April, 2006	33 months
Work Supervision RN-7W	1998-2001	30 months	September, 2000-January 2009 (work suspended)	101 months

Source: DGC

3.4.3 Internal Rate of Return (For Reference Purposes Only)

Economic Internal Rate of Return (EIRR)

- ① CA-01W (Section A): 38%
- ② RN-7W (Section B1 + Section B2 + Section B3): 7%
- ③ RN-7W (Section B-1): 12%
- ④ RN-7W (Section B-2): 6%
- ⑤ RN-7W (Section B-3): 3%

The EIRR is high for CA-01W where the completed work in entire Section A has considerably boosted the traffic volume. In the case of RN-7W, the EIRR decreases from the western part where the work is completed towards the eastern part where the work is incomplete.¹³ Both project cost and project period were significantly exceeded the plan, therefore efficiency of the project is low.

3.5 Sustainability (Rating:③)

3.5.1 Structural Aspects of Operation and Maintenance

At the time of appraisal, the DGC was the competent agency for road maintenance with some maintenance work being contracted out. At present, the DGC and the Road Maintenance Execution Unit (COVIAL)¹⁴ are responsible for road maintenance with the entire actual maintenance work being contracted out. The DGC is responsible for the construction and repair of roads as well as large-scale maintenance work while the COVIAL is responsible for small-scale maintenance work. A smooth operation and maintenance system is well established. The organization of the DGC consists of the Technical Department and the General Affairs Department under the General Director. The Technical Department has the Planning and Survey Division (7 staff members), Work Division (4 staff members), Maintenance Division (5 staff members) and Project Accounting Division (1 staff member). The General Affairs Department has the Finance Division (7 staff members) and Administration Division (7 staff members). The total staff strength is 37, including the General Director, two Deputy General Directors, secretary, internal auditors and legal advisor. The COVIAL consists of the Technical Committee (11 staff members), Technical Guidance Division (1 staff member), Operation Management Division (3 staff members),

¹³ The estimated EIRR takes the decrease of the road maintenance cost and the opportunity cost for road users (i.e. benefits for road users due to the lower vehicle maintenance cost and shorter transporting time) into consideration. The EIRR at the time of appraisal was estimated to be 20.6% for CA-01W and 12% for RN-7W. Because the detailed basis for this estimation is unknown, it is difficult to compare these figures with the recalculated EIRR figures for the present ex-post evaluation.

¹⁴ The COVIAL is placed under the MCIV but is independent from the DGC. It is responsible for the maintenance of roads and bridges although expensive repair work is conducted by the DGC.

Planning Division (8 staff members), Finance Division (1 staff member) and Accounting Division (10 staff members). The total staff strength is 35, including the General Director. Repair as well as extension work for CA-01W and RN-7W has steadily been conducted as both the DGC and COVIAL have the necessary manpower.

3.5.2 Technical Aspect of Operation and Maintenance

In view of the smooth implementation of the roads improvement activities, the DGC has prepared (i) a unit price catalogue for road improvement and repair projects (Catálogo de Precios Unitarios de Referencia de Proyectos de Mejoramiento y Mantenimiento de Carreteras) which forms the basis for the selection of possible bidders for tenders and (ii) a manual for the compilation of an operation and accounting management report for each type of work. The DGC has introduced a set of rules for the use of such catalogue and manuals for the control of contractors to ensure the quality of road construction, repair and maintenance work. As mentioned earlier, small-scale road maintenance work is principally the responsibility of the COVIAL and the actual work is conducted by private contractors who have selected by the bidding process. The COVIAL manages the tenders and supervises the maintenance work of successful bidders. The participation in tenders is restricted to prequalified private companies which have registered with the COVIAL based on their clearance of the technical and financial registration criteria. The COVIAL strictly enforces the application of the catalogue and manuals prepared by the DGC to ensure the quality of road maintenance work.

3.5.3 Financial Aspect of Operation and Maintenance

The necessary long-term construction and maintenance expenses for the road sections improved by the Project have been planned. As far as the maintenance of the subject roads of the Project is concerned, the COVIAL is currently responsible only for the tender for and supervision of the maintenance of those roads sections of the Project for which the said work has been transferred to the COVIAL from the DGC. The maintenance of RN-7W is managed by the DGC as repair work, including work to improve the stability of slopes, is currently in progress. The repair and maintenance plans for 2012 and 2013 include work to partially widen CA-01W to four lanes and work to repair the damage caused by post-project subsidence and landslides to RN-7W. It is planned that the COVIAL will be responsible for all maintenance work from 2014 onwards. Table 5 shows the planned road maintenance budget.

Table 5 Actual and Planned Budgets for Improvement and Repair of Roads

Managed by the DGC (Unit: million USD)

Section	CA-01W (widening, repair)	RN-7W (slopes stabilization, repair)		
	Section A	Section B-3	Section B-2	Section B-3
2008~2011 Average *	1.675	1.396	1.406	1.691
2012	7.744	11.644	9.077	8.392
2013	7.744	11.645	9.078	8.394

* The figures for 2008 through 2011 are estimates by the DGC.

Source: GDC

Table 6 Planned Budget for Repair of Roads

Managed by the COVIAL (Unit: million USD)

Section	CA-01W	RN-7W		
	Section A	Section B-1	Section B-2	Section B-3
2014	1.640	0.408	0.410	0.598
2015	1.640	0.408	0.410	0.598

Source: GDC

The maintenance cost of CA-01W did not change much after the Project as shown in Table 5 and Table 6 because it was already paved before the Project. In contrast, the maintenance cost of RN-7W is expected to fall from 2014 onwards due to the change from an earth road with a high repair and maintenance cost to a paved road which is easy to maintain. At present, the repair and maintenance budget for CA-01W and RN-7W is included in the MCIV's Nationwide Road Development Plan for 2008 – 2017 and the budget up to 2015 has so far been secured. The unit prices are to be reviewed to reflect the actual market prices and are shown in the catalogue mentioned earlier.¹⁵ The planned budget for 2014 when the large-scale repair work will be completed and thereafter is believed to be highly executable especially for RN-7W as the planned figures are well below the average figure for 2008-2011 because of the reasons described above.

Although general financial information concerning the DGC and COVIAL has not been obtained, the on-going extension of the nationwide road network¹⁶ suggests continual progress of the above plan. The unit prices in the catalogue mentioned earlier are set to be revised by the COVIAL and General Accounting Office of Guatemala (CGC) based on the

¹⁵ The unit price is revised by the COVIAL and the General Accounting Office (CGC) of Guatemala as required.

¹⁶ The total length of the nationwide road network increased from 14,436 km in 2005 to 15,700 km in 2009 (a 9% increase). Paved international and national roads increased from 6,044 km to 6,920 km (a 14% increase), unpaved international and national roads from 5,365 km to 4,679 km (a 13% decrease) and rural roads from 3,028 km to 4,101 km (a 35% increase). (Source: National Statistical Office)

actual performance. As the planned budget is settled based on set unit prices, it is highly executable.

3.5.4 Current Status of Operation and Maintenance

3.5.4.1 Status of Operation and Maintenance of the Completed Sections

The field reconnaissance by the author found that the road surface conditions are generally good. Widening work supervised by the DGC and maintenance work supervised by the COVIAL are in progress for CA-01W. In the case of RN-7W, widening or repair work supervised by the DGC is in progress in several places. At sites of a minor landslide or subsidence on RN-7W, repair work supervised by the DGC is currently in progress as part of the routine maintenance work, making the entire route passable except for a some 2 km long section at Los Chorros.

3.5.4.2 Planning for the Uncompleted Section

The DGC plans to deal with the some 20.3 km long incomplete section by dividing it into two sections: (i) some 2 km long section at Los Chorros where the road is buried by collapsed sediment and (ii) the remaining some 18.3 km long section. The DGC is ready to start paving and repair work for the latter as soon as the work prohibition order is lifted. In the case of the former, the DGC is currently examining three options: (i) work on site, including stabilization of the ground and the slope, (ii) construction of a detour running in the north of Los Chorros and (iii) improvement of the current provisional detour running in the south of Los Chorros (the purchase of private land is required). Because of an existing pipeline which runs parallel to the current route of RN-7W to convey water to a nearby hydroelectric power station, the CONRED is examining possible measures to stabilize the slope at Los Chorros while preserving the road and pipeline.

At both sections, the work will start when it is considered to be safe by the CONRED by its three monthly ground survey.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project was conducted in Guatemala where civil conflict had come to an end after many years. The main purpose was to improve some major roads of which the upgrading had long been delayed and/or severely damaged so that the improved transportation would vitalize

economic activities and facilitate the smooth implementation of the Peace Agreement. The relevance of the Project was high as it was fully consistent with the development policy of the Government of Guatemala which was eager to develop infrastructure to preserve the peace, the development needs of Guatemala and the ODA policy of the Government of Japan. With the completion of the Project, smooth transportation became possible throughout the Project Area except for a section affected by a landslide, halving the transportation time on the improved roads. In this area, the Government of Guatemala had been earnestly constructing departmental and municipal roads linked to the roads targeted by the Project and the vitalization of local agriculture and livestock farming is hoped for. As the improved road should contribute to the socioeconomic development of the area (ZONAPAZ) subject to the Peace Agreement signed in 1996 between the Government of Guatemala and the rebel forces, the Project has contributed to preserving the peace. Meanwhile, both the effectiveness and impact of the Project are judged to be fair as smooth travelling has been hampered at a section due to a landslide. The project cost exceeded the original plan as the civil engineering cost increased due to the unanticipated work of drilling rocks. The project period far exceeded the original plan and the occurrence of an unexpected large-scale landslide was a major contributory factor. Apart from this, the repetition of tender, drilling of rocks of which the presence was not anticipated and additional work, including the work to revise the original design, also contributed to the lengthening of the project period. As such, the efficiency of the Project is judged to be low. Meanwhile, the sustainability of the project effects is judged to be high as no problems are found either with the maintenance system or in the technical and financial aspects. In light of the above, the project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The National Committee for Disaster Mitigation established prohibition to conduct construction activities in Los Chorros and its influence areas until verification of stability of the ground affected by massive landslide. Due to this, pavement activities of unconcluded portion of RN-7W (between San Cristóbal Verapaz and Chicamán) cannot be continued. The DGC should commence paving work at the unpaved section of RN-7W except for the Los Chorros section as soon as the prohibition of road work is lifted. It should also finalize the plan to deal with the currently blocked Los Chorros section as soon as possible and should try to implement the plan.

4.2.2 Recommendations to the JICA

There is no specific recommendation to the JICA in connection with the ex-post evaluation of the Local Roads Improvement Project in Guatemala.

4.3 Lessons Learned

There is a high risk of landslides in the mountainous areas; thus, road construction or improvement plan in these areas must fully take this risk into proper consideration. For road construction in mountainous areas, even if the planned work is to improve an existing road, a careful ground survey should be conducted in advance especially when the high risk is already known so that the need for slope stabilization work is properly assessed.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Project Outputs	CA-01W: Between Chimaltenango and Tecpán: Repair Work RN-7W: Between San Cristóbal Verapaz and Chicamán: Paving Work RN-7W: Between Chicamán and Sacapulas: Paving Work RN-7W: Between Sacapulas and Chiantla: Paving Work Work Supervision: CA-01W Work Supervision: RN-7W	CA-01W: Between Chimaltenango and Tecpán: As Planned RN-7W: Between San Cristóbal Verapaz and Chicamán: Paving Work (Incomplete) RN-7W: Between Chicamán and Sacapulas: As Planned RN-7W: Between Sacapulas and Chiantla: As Planned Work Supervision: CA-01W Work Supervision: RN-7W
② Project Period	1997 – 2001 (Approx. 30 months)	January, 2003 – July, 2007 (55 months)
③ Project Cost Amount paid in Foreign currency Amount paid in Local currency Total (Japanese ODA loan portion) Exchange Rate	0 million yen 6,690 million yen 546.12 million Q 6,690 million yen 5,781 million yen 1Q = 12.25 yen (as of 1999)	0 million yen 0 million yen 593.86 million Q 9,544 million yen 5,777 million yen 1Q = 9.73 yen (Average for 2000 through 2007)