Republic of Nicaragua

Ex-Post Evaluation of Japanese ODA Grant Aid Project

Project for Reconstruction of Primary Bridges on the National Road No.7

External Evaluator: Jun TOTSUKAWA, Sano Planning Co., Ltd.

0. Summary

The objective of this project is to ensure safe and steady traffic and transport on Route-7 by reconstructing the dilapidated Las Limas Bridge, Oconqua Bridge, Quinama Bridge, and Muhan Bridge and constructing access roads to them in Boaco Department and Chontales Department, thereby contributing to improvement in convenience of local residents. This objective was relevant with Nicaragua's development policies and development needs at the time of planning and is still relevant at the time of ex-post evaluation, and therefore the relevance of the project is high. The bridges subject to this project have been reconstructed as planned and both project cost and project period were within the plan, and therefore the efficiency of the project is high. Further data collected at the ex-post evaluation study show the targets concerning reduction of weight limit of vehicles passing over bridges, increase of traffic, and increase of average drive speed specified at the time of planning have been all achieved, and safety of pedestrian has been ensured. Therefore the effectiveness of the project is high. No major problems have been observed in the operation and maintenance system as well as financial basis of both Ministry of Transport Infrastructure and Road Maintenance Fund (FOMAV), and a certain level of sustainability will be guaranteed in the future. Therefore the sustainability of the project is high.

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

1. Project Description

Project Location

(Route-7 is shown as the bold line stretching laterally in the center.)

Las Limas Bridge

1.1 Background

The Republic of Nicaragua is situated in the center of Central America, facing the Caribbean Sea on the east and the Pacific Ocean on the west, and has a population of 5,630,000 as of 2004. In Nicaragua, road transport accounts for about 90% of the transport of passengers and goods, and is the most important mode of transport. Nevertheless, Nicaragua was apparently lagging behind in building infrastructure such as roads and bridges in the area on the Atlantic Ocean side, which resulted in delay of regional development. Consequently, more people lived in poverty compared to those in the area on the Pacific Ocean side. The economic gap between two areas had become a big social problem in Nicaragua. To solve this problem, the Nicaraguan government identified renovation of the El Rama port and restoration of Route-7 connecting the El Rama port and Managua, the capital of Nicaragua, as key measures, aiming at economic development through trade with the United States based on the El Rama port on the Atlantic Ocean side and promotion of regional development in the area on the Atlantic Ocean side.

Route-7 itself had been improved with the aid of several donors, while dilapidated bridges on Route-7 had not be sufficiently reconstructed, which interfered with the passage of large vehicles. Further once renovation of the El Rama port was completed, the traffic of large and heavy vehicles was expected to increase as more goods were handled at the renovated port. For this reason, bridge reconstruction on Route-7 was given higher priority.

Under such a situation, the Nicaraguan government requested the Japanese government to provide grant aid in July 2003 for reconstructing four bridges on Route-7 that are under unsafe environment and faces the limited weight of passing vehicles due to their structural problems, damages, and narrow road widths.

In reply to this request, the Japanese government dispatched a preliminary study team in November 2004 concerning the relevance of the project to confirm the necessity of urgently reconstructing these four bridges. Then after various subsequent studies, the relevance of the project to be conducted as Japan's grant aid was confirmed through importance of the road network, wide area to gain benefit and urgency, and then implementation of this project was approved.

1.2 Project Outline

The objective of this project is to ensure safe and steady traffic and transport on Route-7 by reconstructing the Las Limas Bridge, Oconqua Bridge, Quinama Bridge, and Muhan Bridge and constructing access roads to them in Boaco Department and Chontales Department, thereby contributing to improvement in convenience of local residents.

E/N Limit /Actual Grant Amount	1,004 million yen (Detailed Design: 43 million yen, Main: 961 million yen) /1,004 million yen

		(Detailed Design: 43 million yen, Main: 961 million yen)
Exchange of Notes Date		Detailed Design: August 2006, Main: June 2007
Implementing Agency		Ministry of Transport Infrastructure, Nicaragua
Project Completion Date		March 2009
Cooperation Agency in Japan	Main contractor	Fujita Corporation
	Consultant	Central Consultant Inc.
Basic Design Study		August 2005 to June 2006
Related Projects (if any)		• Project for Reconstruction of Bridges on Nejapa–Izapa Road (1994–95) • Project for Reconstruction of Bridges on Main Routes (1995–96) • Secondary Project for Reconstruction of Bridges on Main Routes (1998–2000) • Project for Construction of Facilities Associated with the Rio Negro Bridge (2000) • Project for Reconstruction of Bridges on Major Roads (1999–2001) • Project for Reconstruction of the Guasaule Bridge (2000–02)

2. Outline of the Evaluation Study

2.1 External Evaluator

Jun TOTSUKAWA, Sano Planning Co., Ltd.

2.2 Duration of Evaluation Study

The evaluation study was conducted as follows:

Duration of the Study: November 2011 – August 2012

Duration of the Field Study: February 29, 2012 – March 22, 2012, June 9, 2012 – June 28, 2012

2.3 Constraints during the Evaluation Study (if any)

None in particular.

3. Results of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Nicaragua

(At the time of project planning)

In the "National Development Plan (2003)[3]," the Nicaraguan government identified the importance to alleviate the economic gap between the east and west parts of the country through development of the area on the Atlantic Ocean side, and economic development through trade with the United States based on the El Rama port. Then, the plan ranked the renovation of the El Rama port and the restoration of Route-7 connecting the capital city, Managua and El Rama as key measures.

Further, the Ministry of Transport Infrastructure devised the "National Transport Plan (PNT)" in which the 10-year project for constructing access roads starting in 2000 was thought important for promotion of development in the area on the Atlantic Ocean side. Especially, restoration of Route-7 leading to Managua was given priority.

In light of above, this project has been highly relevant with Nicaragua's development policy.

(At the time of ex-post evaluation)

The National Development Plan described above is still Nicaragua's valid primary policy. In the "National Human Development Plan (PNDH: Plan Nacional de Desarrollo Humano, September 2009)" enacted after the planning of this project, the Nicaraguan government also identified development of infrastructure including roads and bridges as key measures for reduction of poverty[4].

Therefore, this project was relevant with Nicaragua's development plan at the time of planning and is still regarded as key measures at the time of ex-post evaluation.

3.1.2 Relevance with the Development Needs of Nicaragua

(1) Development needs at the time of planning

Since Nicaragua has mountains to reach the area on the Atlantic Ocean side, development of roads and bridges had not advanced so considerably compared to the other area, leading to delay of local development. Further, this resulted in a higher ratio of poor people compared to that in the area on the Pacific Ocean side. Consequently, the local development on the Atlantic Ocean side had been regarded as an important nationwide issue.

Route-7 to be improved under this project is a major road connecting the capital city Managua and

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

[2] ③: High, ②: Fair, ①: Low

[3] The National Development Plan is a 25-year plan, and an operation plan was devised to embody the implementation of the plan in 2004.

[4] However, an actual plan determining the target schedule for improvement of the entire Route-7 has not been created so far. Actually, the Ministry of Transport Infrastructure has reconstructed or rehabilitated bridges with higher priorities, considering its available budget and support situation by donors.

the area on the Atlantic Ocean side, and had been restored by several donors since the 2000's. However, middle- to large-scaled bridges were not covered by such donors' aids, and had not been restored or reconstructed for a long time. The Nicaraguan government faced problems to be solved for smooth vehicle traffic and prevention of accidents[5].
Therefore, improving efficiency and safety of traffic and transport through reconstruction of bridges on Route-7 has been relevant with the development needs of both Nicaragua and local community.

(2) Development needs at the time of ex-post evaluation
Through improvement of roads and bridges under this project and others, networking of major roads has been established on Route-7. Though other three bridges additional to this project are currently being reconstructed on Route-7 as Japan's grand aid project at the time of ex-post evaluation, reconstruction of middle to large-scaled bridges on Route-7 will be almost completed by this current project. After the on-going project ends, the major works in charge by the Ministry of Transport and Infrastructure will be shifted towards rehabilitation works on deteriorated roads and small to middle-scaled bridges.

Therefore, this project was important from viewpoints of economic development and safety aspects at the time of planning, and is still relevant with the development needs of Nicaragua at the time of ex-post evaluation.

3.1.3 Relevance with Japan's ODA policy
At the time of planning, one of the key fields in the assistance plan for Nicaragua was "improvement of road and traffic infrastructure (improvement of economic development basis)". This project was intended to ensure safe and steady traffic and transport by reconstructing dilapidated bridges on Route-7, a main road connecting Managua and the area on the Atlantic Ocean side. Therefore, the project has been consistent with Japan's ODA policy.

In light of above, this project has been highly relevant with the Nicaragua's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness[6] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)
The quantitative effects to be aimed at by this project have been achieved as below.

[5] Since bridges to be improved under this project had a narrower road width than roads before and after them, cars had to temporarily stop before or after them, which prevented smooth traffic.
[6] Sub-rating for Effectiveness is to be put with consideration of Impact.

Table 1 Achievement State of Quantitative Effects

Indicator name (unit)	Figure at planning period (in 2005)	Target (in 2009)	Actual (in 2009)	Ex-post evaluation (in 2011)
Relaxation of weight limit regulation of vehicles passing over bridges (t)	24.5	40.9	40.9	40.9
Increase of traffic (vehicles/day)	Las Limas bridge 2,300 (including 775 large vehicles) Other 3 bridges 700 (including 306 large vehicles)	Increase	Las Limas bridge 3,752 (including 1,255 large vehicles) Other 3 bridges 1,031 (including 391 large vehicles)	Las Limas bridge 4,345 (including 1,668 large vehicles) Other 3 bridges 1,042 (including 370 large vehicles)
Increase of average drive speed (km/h)	30	60	Over 60	Over 60

Source: Data from the Ministry of Transport Infrastructure

All quantitative effects have been achieved. As for “Relaxation of weight limit regulation of vehicles passing over bridges”, the bridges were reconstructed based on the design in consideration of 25% overweight, which is the American Association of State Highway and Transportation Officials (AASHTO) (HS20-44) agreed in Central American Integration System, and the target value 40.9 ton has been achieved.

“Increase of traffic” was found in the bridges reconstructed under this project. Especially the traffic over the Las Limas Bridge has increased more than the other three project bridges because this bridge is located halfway from Managua to Chontales, the capital of Chontales Department as well as to Boaco, the capital of Boaco Department. Further Route-9 connecting Boaco Department and Managua and Route-25 connecting Chontales, Rio San Juan Department and Managua located on the south join Route-7, which with the Santa Fe Bridge construction will become an international route that leads to the new southern border with the neighboring country of Costa Rica . The Las Limas Bridge is located just at the joining point. On the other hand, the increase of traffic over the other three project bridges has been relatively small compared to the Las Limas Bridge because they have no such joining major roads.

The average drive speed is currently 60 km as planned or over 60 km because a line of vehicles waiting in front of a bridge has diminished and smooth traffic has been realized.

3.2.2 Qualitative Effects

As qualitative effects, pedestrians' safety was intended. Compared to the previous condition in which no side walk was provided, the side walk with adequate-width has been provided so that pedestrians can walk in safety. Local residents now realize improved safety[7]. However, there is no house and are actually few people walking near the Oconqua Bridge and Quinama Bridge, though there are some people near the Las Limas Bridge and the Muhan Bridge.

Further, reconstruction of bridges under this project was expected to decrease the number of car accidents. However, its effect cannot be verified because local police has no available data for comparison and the Ministry of Transport Infrastructure has statistics in a generalized manner by department and not necessarily in the specific areas of the bridges. r.

This project has largely achieved its objectives, therefore its effectiveness is high.

3.3 Impact

3.3.1 Intended Impacts

Implementation of this project has caused the following impacts.

(1) Stabilization of distribution and reduction of local residents' poverty in the area depending on Route-7

Implementation of this project has caused the load bearing capacity of the project bridges to increase and safe and steady traffic roads to be secured. Further anxiety that bridges shutdown to traffic due to swollen rivers in rainy season has diminished, leading to increased reliability of transport and traffic in the area concerned.

Steady infrastructure has also contributed to stabilization of distribution in the livestock industry, the key industry in the area. It can be assumed that this indirectly contributes to reduction of poverty among local residents. As an example regarding stabilization of distribution in the livestock industry, the export of cattle (export of living cattle) to the Republic of Venezuela has been increased since 2008. The transport route associated with this export includes project bridges and the El Rama port[8].

(Reference)

Since a cause-and-effect relation between stabilized distribution and reduced poverty under this project can only be obtained indirectly and cannot be verified actually, the change of poverty level in the area concerned is shown in Table 2. In Nicaragua, there is no data about gross regional production and poverty index for each department, and thus only comprehensive data showing the

[7] According to the results of the field hearing study by the study team

[8] The export reached about 6,000 cattle in 2011, compared to about 600 cattle in 2008. (Source: Ministry of Transport Infrastructure)

state in a very wide area are available. Nevertheless, the table indicates the percentage of households living in poverty decreased in the “central rural area” including the area concerned at a higher rate than the national average.

Table 2 Ratio of households living on two dollars or less a day (%)

	2005	2009	Decrease rate*
National average	31.6	21.0	10.6
Urban area average	15.9	9.8	6.1
Rural area average	51.4	35.7	15.7
Managua	8.9	6.5	2.4
Urban area on the Pacific Ocean side	18.8	10.8	8
Rural area on the Pacific Ocean side	41.0	26.7	14.3
Central Urban area	24.4	14.0	10.4
Central Rural area	59.2	40.7	18.5
Urban area on the Atlantic Ocean side	20.9	13.6	7.3
Rural area on the Atlantic Ocean side	56.7	41.2	15.5

Note: A decrease rate is a difference between the percentage of households living on two dollars or less in 2005 and that in 2009, and is an item added by the study team.
Source: Living Standard Survey (National Development Agency, May 2011)

(2) Management of the increased amount of freight to be handled due to renovation of the El Rama port

The amounts of both freight handled at the port and traffic of ship sailing in or out have been increased since the construction of a new pier at the El Rama port in October 2005. This project has contributed to stable distribution enough to manage such increase of transport by improving the load bearing capacity of the project bridges.

Judging from the fact that Route-7 is the only major road connecting the El Rama port and Managua, it can be assumed distribution traffic associated with export and import activities at the port passes over project bridges. (Actually, there is a possibility that a route other than Route-7 is used for distribution because the major road joins at a point beyond the Oconqua Bridge, that is, the Las Limas Bridge.)

Table 3 Change of the Amount of Freight Handled at the El Rama Port (in ton)

		2005	2006	2007	2008	2009	2010	2011
El Rama	Import	4,408	8,564	10,716	19,399	11,904	15,553	21,577
	Export	2,283	3,787	8,426	11,077	16,994	16,604	18,262
	Total	6,691	12,351	19,142	30,476	28,898	32,157	39,839
National	Import	2,120,431	2,353,948	2,446,200	2,346,283	2,347,740	2,317,301	2,782,685
	Export	386,623	352,664	492,107	456,319	484,027	691,851	655,066
	Total	2,507,054	2,706,612	2,938,307	2,802,602	2,831,767	3,009,152	3,437,751

Source: Marine General Department, Ministry of Transport Infrastructure

3.3.2 Other Impacts

(1) Impacts on the natural environment

Neither positive nor negative impact on the natural environment has been found. Since this project had been classified as Category B according to JICA's Guidelines for Environmental and Social Considerations, the Initial Environment Examination (IEE) was conducted at the preliminary study to confirm that there was no possibility of causing a problem.

(2) Land acquisition and resettlement

At the start of this project, nine households that illegally occupied land around the Muhan Bridge were resettled. The resettlement was completed by the municipal government before the start of the reconstruction, and no confusion arose with the resettlement. The resettlement place is the land owned by Villa Sandino city which has jurisdiction over the relevant land, and resettlement was conducted after explanation to the residents concerned.

(3) Unintended positive/negative impact

Disassembled bridge parts were not disposed of, but effectively utilized as parts for other bridges through the efforts of the Nicaraguan side. The "I" beams disassembled from the project bridges were utilized to construct one bridge in Boaco Department and three bridges in Chontales Department on the branch road of Route-7. The construction of these bridges is attributed to the effects of the Nicaraguan side, and not connected to direct assistance from the Japanese side, though, from the viewpoint of effective use of resources derived from this project, this should be noted as one of impacts and it constitutes an added value to the effects of the project.

This project has largely achieved its objectives, therefore its effectiveness and impact are high.

3.4 Efficiency (Rating: ③)

3.4.1 Project Outputs

Under this project, four bridges on Route-7 in Boaco Department and Chontales Department were reconstructed. All of them were reconstructed with the same structure and specifications as their original designs.

Table 4 Outline of the Bridges Reconstructed under this Project

	Las Limas Bridge	Oconqua Bridge	Quinama Bridge	Muhan Bridge
Bridge facility	New construction of a bridge	New construction of a bridge	New construction of a bridge	New construction of a bridge
Bridge length	32m	65m	39m	65m
Total bridge width	9.7m	9.7m	9.7m	9.7m
Superstructure format	PC simple T beam	PC3 span connecting post-tension T beam	PC2 span connecting post-tension T beam	PC3 span connecting post-tension T beam
Access road	Left bank:11.4m Right bank: 11.3m	Left bank: 8.0m Right bank: 14.4m	Left bank: 188m Right bank: 132m	Left bank: 7.8m Right bank: 8.1m

Source: Data from JICA

3.4.2 Project Inputs

3.4.2.1 Project Cost

Given below are the original and actual project costs of this project. The project cost was lower than planned.

Table 5 Original and Actual Project Costs

	Japanese side			Nicaraguan side	Total project cost Borne by Japan and Nicaragua
Original	Detailed design	Main	Total		
	43 million yen	961 million yen	1,004 million yen	18 million yen	1,022 million yen
Actual	43 million yen	961 million yen	1,004 million yen (100% compared to the original)	6 million yen (33.3% compared to the original)	1,010 million yen (98.8% compared to the original

Source: Data from JICA and Ministry of Transport Infrastructure

The Japanese Government side bore the costs of reconstructing or constructing project bridges and new access roads, arranging, importing and transporting construction materials, as well as building and removing temporary facilities (material/equipment yard, office, etc.). The Nicaraguan side, on the other hand, bore the costs of a) environmental consideration (resettlement and land acquisition),

b) moving telephone poles and distribution lines, c) moving water pipelines, d) leveling the temporary facility yard, e) traffic control, and f) removing the existing Quinama Bridge.

【Difference between original and actual project costs】

The actual project cost borne by Nicaragua was largely lower than the planned. This was mainly because the labor cost associated with traffic control, that occupied the large part of the project cost, was lower than the estimated one and moving of water pipelines was unnecessary due to a newly discovered water resource nearby.

Another reason for the reduced project cost in yen at the Nicaraguan side was that the yen exchange rate against the dollar had risen by about 30% in December 2008, compared to that at the time of project cost calculation in December 2005.

3.4.2.2 Project Period

Given below are the original and actual project periods of this project. The project period was as planned. The Nicaraguan side have carried out and completed their works.

Table 6 Original and Actual Project Periods

Item	Original	Actual
Design for execution and aid for bidding	12 months	12 months : 100% compared to the original (October, 2006－September, 2007)
Implementation and implementation management	18 months	18 months : 100% compared to the original (October, 2007－ March, 2009)
Entire project	30 months in total	30 months in total : 100% compared to the original

Source: Manuals from JICA

【Difference between the original and actual project periods】

The project period was as planned. Though works were somewhat delayed due to heavy rains and effects of strikes within Nicaragua in the middle of the project, the entire project was completed as planned thanks to the efforts of the constructor and fewer rainy days in the dry season.

Both project cost and project period were within the plan, therefore the efficiency of the project is high.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

Nicaragua has established the operation and maintenance system for roads and bridges where both

Ministry of Transport Infrastructure and the Road Maintenance Fund (FOMAV: Fondo de Mantenimiento Vial) are supposed to take responsibility. The Ministry of Transport Infrastructure is in charge of middle to large-scaled reconstruction, while FOMAV is in charge of small-scaled reconstruction as well as daily operation and maintenance. Roads and bridges to be reconstructed shall be determined through an Inter-institutional Agreement established as Maintainable Road Network through an Annual Maintenance Plan between Ministry of Transport Infrastructure and FOMAV. A bridge or road with an estimated reconstruction cost exceeding 10% of the construction cost shall be assigned to the Ministry of Transport Infrastructure, and that with an estimated reconstruction cost below 10% shall be assigned to FOMAV.

At the time of ex-post evaluation, the Ministry of Transport Infrastructure has 61 members at the road and bridge maintenance department, of which 39 members are engineers. On the other hand, FOMAV has currently 50 members, of which 15 members are engineers. Judging from the fact that the number of FOMAV staff has been increased to 50 compared to 15 at the time of planning of this project, FOMAV has almost reached a solid organization enable to manage their duties as a planning and coordinating agency. The Ministry of Transport Infrastructure has almost same number of staff at the maintenance-related department as at the time of planning of this project, though it is difficult to make a strict comparison between these two times because of the changed organizational structure.

Both organizations are mainly engaged in plan and coordination, and subcontract all actual operation and maintenance works to private companies. Therefore, it can be said that they have sufficient number of staff and organizational structure as planning and coordinating agencies.

3.5.2 Technical Aspects of Operation and Maintenance

As for “planning” operation and maintenance, a certain level of technical capability has been acquired. The Ministry of Transport Infrastructure has an established sequence of steps for a road or bridge of which reconstruction or improvement is requested by each department, including document screening within the ministry, field survey by engineers, creation of an inventory, ordering based on the construction method and estimation, and application for budget.

As for “doing” regular operation and maintenance, actual works have been subcontracted to private companies and local residents’ cooperative unions through discussion between the Ministry of Transport Infrastructure and FOMAV, as described above.

One of the main daily operation and maintenance works is sweeping gutters, which requires no special technique. Further the project bridges do not require rust proofing treatment or re-painting of railings because they are made of concrete, which also requires no special technique in operation and maintenance. Access roads are to be re-paved at regular intervals, but the private company having considerable experience in construction in Nicaragua can undertake this job.

In light of above, sustainability of the project is high from the technical aspects of operation and maintenance.

3.5.3 Financial Aspects of Operation and Maintenance

The budget for running FOMAV that is responsible for operation and maintenance in this project is based on gasoline tax, and therefore its stability is very high. Now, 16 cents (USD) per gallon of gasoline tax are allocated to FOMAV, and an application for further allocation to FOMAV is being filed this year. The allocation of gasoline tax to FOMAV was originally set to six cents in 2006, and has been gradually increased to 16 cents since then (therefore, FOMAV revenue has been also increased until now)[9].

The FOMAV Establishment Law stipulates that the management cost (such as labor cost and study cost) should be within 4% of the total expenditure. The remaining of the expenditure shall be allocated to actual operation and maintenance works.

Table 7 Actual Revenue and Expenditure of FOMAV (Unit: 1000 Cordoba)

		2009	2010	2011
Revenue		634,755	1,116,659	886,357
Expenditure	Management cost	18,491	26,341	31,861
	Project cost	405,628	1,238,609	716,221
	Others	15	11	1,221
	Total	424,133	1,264,961	749,304

Note: The year 2010 is different from normal years because of loan provided.
Source: Data from FOMAV

The Ministry of Transport Infrastructure, which is in charge of large-scaled reconstruction, is not expected to be involved in this project for the meantime because they are constructed very recently. However, as reference, the budget of the Ministry of Transport Infrastructure is shown below. As shown in Table 8, the budget of the Ministry of Transport Infrastructure has been also increased in recent years.

[9] Now, an application for increase to 20 cents/gallon is being filed (according to the interview with the Planning Technical Department of the Road Maintenance Fund - FOMAV).

Table 8 Budget of the Ministry of Transport Infrastructure (Unit: million Cordoba)

	2010	2011	2012
Ministry of Transport Infrastructure	2,622	2,893	2,905
Road& Bridge Maintenance Department	303	389	581
Share of the total ministry budget	11.6%	13.4%	20.0%

Source: Data from the Ministry of Transport Infrastructure

3.5.4 Current Status of Operation and Maintenance

At present, all of the four project bridges are effectively utilized and no major problems have been observed in the operation and maintenance system.

Actual operation and maintenance works have been conducted by FOMAV according to the work schedule proposed by the Japanese side, as shown below. No repair work has been conducted on revetment or bed protection because of no damage detected.

Table 9 Operation and Maintenance Work Schedule for the Project Bridges

Item / Year	2009		2010		2011	
	Plan	Actual	Plan	Actual	Plan	Actual
Operation and maintenance of gutters	Yes	Yes	Yes	Yes	Yes	Yes
Operation and maintenance of road safety facilities	No	No	Yes	Yes	No	No
Operation and maintenance of access roads	Yes	Yes	Yes	Yes	Yes	Yes
Inspection and repair of revetment and bed protection facilities	No	No	Yes	Yes	No	No

Source: Basic Design Report of this project as well as Data from the Ministry of Transport Infrastructure and FOMAV

Currently, daily operation and maintenance works including sweeping of gutters are subcontracted by FOMAV to two private companies (one company for the Las Limas Bridge and one for the other three bridges). The subcontract with each of these private companies amounts to 1.06 million Cordoba (equal to 3.70 million yen) annually, and they cover 67 km (corresponding to the Las Limas Bridge) and 50 km (corresponding to the remaining three bridges) respectively. Actually, the ex-post evaluation study team saw a team of uniformed workers weeding and clearing on and around the roads on several occasions and judged their working state to be almost favorable.

One of the actual reconstruction works conducted is the repair of the asphalt pavement of the access road to the Las Limas Bridge. This work was conducted by FOMAV's subcontracting private company (at a cost of about 8,000 Cordoba = about 28,000 yen, estimated value by FOMAV)).

No major problems have been observed in the operation and maintenance system, therefore, the

sustainability of the project effects is high.

4. Conclusion, lessons Learned and Recommendations

4.1 Conclusion

The objective of this project is to ensure safe and steady traffic and transport on Route-7 by reconstructing the dilapidated Las Limas Bridge, Oconqua Bridge, Quinama Bridge, and Muhan Bridge and constructing access roads to them in Boaco Department and Chontales Department, thereby contributing to improvement in convenience of local residents. This objective was relevant with Nicaragua's development policies and development needs at the time of planning and is still relevant at the time of ex-post evaluation, and therefore the relevance of the project is high. The bridges subject to this project have been reconstructed as planned and both project cost and project period were within the plan, and therefore the efficiency of the project is high. Further data collected at the ex-post evaluation study show the targets concerning reduction of weight limit of vehicles passing over bridges, increase of traffic, and increase of average drive speed specified at the time of planning have been all achieved, and safety of pedestrian has been ensured. Therefore the effectiveness of the project is high. No major problems have been observed in the operation and maintenance system as well as financial basis of both Ministry of Transport Infrastructure and Road Maintenance Fund (FOMAV), and a certain level of sustainability will be guaranteed in the future. Therefore the sustainability of the project is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

At present, the Ministry of Transport Infrastructure and FOMAV cooperate to implement the operation and maintenance system of roads and bridges effectively and efficiently, and no major problems have been observed so far. In Nicaragua, however, there are still some bridges and roads to be improved on major roads. Thus both Ministry of Transport Infrastructure and FOMAV are expected to continue their efforts. In this respect, it is recommended that they should more clearly recognize the state of each major road and devise a comprehensive mid- to long-term reconstruction plan that represents when and where reconstruction is to be conducted. Such a plan can be expected to help both organizations conduct reconstruction works efficiently as well as to play a role as guidepost for promotion of common understanding when the Nicaraguan government receives support from an external financial organizations.

4.2.2 Recommendations to JICA

None in particular.

4.3 Lessons Learned

The existence of FOMAV with gasoline tax set as financial resources is a great driving force in guaranteeing financial sustainability of this project. That is, a situation in which budget can be secured constantly allows for implementation of a workable operation and maintenance plan.

In establishment of FOMAV, the FOMAV Establishment Law was enacted to clearly formulate a rule that FOMAV should allocate most of the expenditure to operation and maintenance of roads and bridges, which is the major mission of FOMAV. This law proved effective in clarifying an organization policy of FOMAV and preventing expansion of the organization through the appropriate number of staff in accordance with the policy (the Establishment Law defines the labor cost should be within 4% of the total expenditure). Though similar organizations are found in other Central American countries, FOMAV is worth proposing as an effective approach for guaranteeing sustainability to countries eligible for Japan's grant aid in other continents or areas.