

Republic of Nicaragua

FY 2017 Ex-Post Evaluation of Japanese Grant Aid Project

“The Project for Construction of the Santa Fe Bridge in the Republic of Nicaragua”

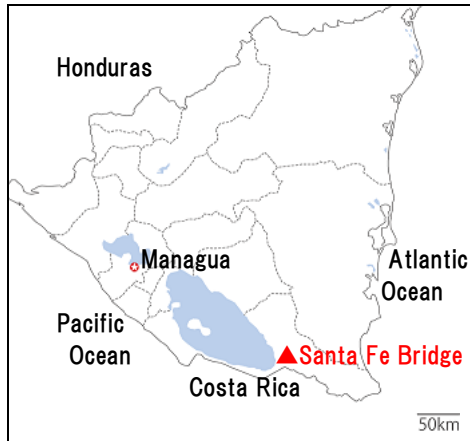
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0. Summary

The Project for Construction of the Santa Fe Bridge in the Republic of Nicaragua (hereinafter referred to as “the Project”) was implemented to construct the Santa Fe Bridge in Nicaragua’s Rio San Juan Department, over San Juan River which runs along the border between Nicaragua and Costa Rica, in order to guarantee the safe and smooth flow of traffic crossing San Juan River, thereby contributing to the vitalization of the international flow of goods, the local economic growth, and the improvement of the living standard of local residents. The Project was sufficiently consistent with the national development plan, transportation sector policies, development needs of Nicaragua at both the time of planning and the time of ex-post evaluation, as well as Japan’s ODA policy at the time of planning. However, even though the Project consisted in the construction of a bridge with the functions of an actual international bridge, the external conditions concerning border opening with Costa Rica were not adequately analyzed at the time of planning. Thus, the relevance of the Project is fair. The Project outputs were generally as planned, and the Project cost was lower than planned, however, because the Project period was longer than planned due to time spent on making design changes and opening the border, the efficiency of the Project is fair. As a result of the Project, targets regarding increase of weight capacity of passing vehicles and reduction of river crossing time were achieved; furthermore, it is recognized that there has been a certain impact in terms of local economic growth and improvement of the living standard of local residents. However, because border facilities on the Costa Rica side are still not complete, the increase in traffic volume, the main indicator of the Project, has not achieved the target; and international cargoes utilizing the Project have been limited, hence vitalization of the international flow of goods has not been realized sufficiently. Therefore, the effectiveness and impacts of the Project are fair. The organizational, technical, financial aspects and current status of the operation and maintenance of the Ministry of Transport and Infrastructure (Ministerio de Transporte e Infraestructura: MTI), the Road Maintenance Fund (Fondo de Mantenimiento Vial: FOMAV), and the Corporation of Regional Construction Companies (Corporación de Empresas Regionales de la Construcción: COERCO), which are responsible for the operation and maintenance of the Project, are generally satisfactory, hence, the sustainability of the Project is high.

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

1. Project Description



Project Location



Santa Fe Bridge

(looking from the national border towards Managua)

1.1 Background

The Acoyapa-San Carlos-Costa Rica international highway (hereafter called the “Acoyapa Highway”), along which the Project is located, is the only arterial road that runs through the agricultural region of Central Nicaragua and reaches the border with Costa Rica (San Pancho-Las Tablillas border¹). Passing by Lake Nicaragua on the east side, it forms part of the “Atlantic Corridor” that leads to neighboring Costa Rica in the south (Figure 1). The Atlantic Corridor is an international arterial road that connects from Tegucigalpa, capital of Honduras in the north, all the way to San Jose, capital of Costa Rica in the south, and it is expected to play a role in complementing and substituting the “Pacific Corridor” which is the main land transportation route between Nicaragua and Costa Rica. However, although the Atlantic Corridor north of Acoyapa had been improved thanks to an assistance from the Danish International Development Agency (DANIDA), the Acoyapa Highway going south from Acoyapa was unpaved and had poor runnability; and roadside areas tended to be excluded from development, hindering socioeconomic development. In view of this situation, in 2006, the Interamerican Development Bank (IDB) decided to provide a loan for the construction and improvement of Acoyapa Highway with the objectives of promoting international traffic with Costa Rica; improving links between roadside areas and domestic markets; and vitalizing the economy through promoting tourism development and so forth in the southern region of Nicaragua. However, since there was no bridge in the point where the Acoyapa Highway intercepted San Juan River, and vehicles needed to use a small ferry to continue their journey along the highway. Because the IDB road construction and improvement project did not include the construction of a bridge at this point, it was necessary to

¹ The border between Nicaragua and Costa Rica on the Atlantic side is called the “San Pancho border” in Nicaragua, and the “Las Tablillas border” in Costa Rica. At the request of the executing agency, the border is referred to as the “San Pancho-Las Tablillas border” in this report.

construct the “Santa Fe Bridge” to carry the highway across San Juan River and thereby enhance the project effect. Against this background, the Government of Nicaragua made a request for a grant aid cooperation to the Government of Japan for the construction of the said bridge.

1.2 Project Outline

The purpose of the Project was to construct a new bridge in Nicaragua’s Rio San Juan Department over San Juan River that runs along the border between Nicaragua and Costa Rica, in order to guarantee the safe and smooth flow of traffic crossing San Juan River, thereby vitalizing the international flow of goods; the local economic growth and improving the living standard of local residents.



Source: JICA “The Project for Construction of the Santa Fe Bridge in the Republic of Nicaragua Preparatory Survey Report”, 2009.

Figure 1 Relation of Santa Fe Bridge to International Corridors in Central America

Grant Limit/Actual Grant Amount	Detailed Design: 76 million yen / 75 million yen Construction: 2,753 million yen / 2,476 million yen
Exchange of Notes Date/ Grant Agreement Signing Date	Detailed Design: December 2009 / December 2009 Construction: May 2010 / May 2010
Executing Agency	Ministry of Transport and Infrastructure
Project Completion	August 2014
Main contractor	Hazama Ando Corporation
Consultant	Central Consultant Inc.

Preparatory Survey	December 2008 to November 2009
Related Projects	<p>[Technical cooperation] “Project for the Study of National Transport Plan in the Republic of Nicaragua” (2012- 2014)</p> <p>[Grant aid] “Project for the Reconstruction of the Bridges in Arterial Highway” (E/N: May 2000); “Project for the Reconstruction of the main Bridges in National Highway 7” (E/N: June 2007); “Project for Reconstruction of Bridges on Managua – El Lama Road” (E/N: June 2011)</p> <p>[Projects by other agencies] “National Highway 7 Improvement Project” (IDB, 2003-2004), “National Highway 25 Acoyapa-San Carlos-Costa Rica Border Highway Integration Program” (IDB, 2006-2015), “Comprehensive Border Program (2017-),” “National Highway 7 (Atlantic Corridor north from Acoyapa) Improvement Project” (DANIDA, 2000-2002)</p>

2. Outline of the Evaluation Study

2.1 External Evaluator

Hiromi Suzuki S. (IC Net Ltd.)

2.2 Duration of the Evaluation Study

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

Duration of the Study: October 2017 to March 2019

Duration of the Field Survey: February 14, 2018 to March 5, 2018

2.3 Constraints during the Evaluation Study

In this ex-post evaluation study, it was intended to implement two field surveys, however, protests against the presentation of a bill to reform the Social Insurance Institute in April 2018 triggered the activation of demonstrations led mainly by students, which originated into clashes with security forces throughout the country². These events forced to the cancelling of the second field survey by the Japanese consultant which was substituted with a partial survey by a local consultant. As a result, confirmation of the latest information and collection of supplementary information that were scheduled in the second field survey were limited.

² Based on safety information issued by the Japanese Embassy in Nicaragua. URL: https://www.ni.emb-japan.go.jp/itpr_ja/nicaragua.html/ (accessed on July 10, 2018)

3. Results of Evaluation (Rating: C³)

3.1 Relevance (Rating: ②⁴)

3.1.1 Consistency with the Development Plan of Nicaragua

At the time of planning, in Nicaragua's *National Plan for Human Development* (2008-2012), "improvement of the economic infrastructure base such as roads, bridges, etc." was regarded as an important means of "improving productivity". Based on this, the *National Transportation Plan* (2001-2020) that was formulated by the Ministry of Transport and Infrastructure (Ministerio de Transporte e Infraestructura; hereinafter referred to as "MTI"), mentioned the improvement of Acoyapa Highway where the Project is located, and the construction of Santa Fe Bridge (the Project). Also, the *Mesoamerica Integration and Development Project*, which is a wide regional development project that aims to vitalize distribution of goods in Central America, includes the International Network of Mesoamerican Highways (Red Internacional de Carreteras Mesoamericanas; hereinafter referred to as "RICAM") connecting the region from Mexico to countries in Central America including Nicaragua, Costa Rica, and Panama, and the Project constitutes part of that⁵. In all these plans, emphasis is placed on the development of the "Pacific Corridor" and the "Atlantic Corridor" where the Project is located, from the viewpoint of building a network of arterial road transportation that includes international arterial roads.

At the time of ex-post evaluation, improvement of transport infrastructure was earmarked as one of 12 strategy guidelines in Nicaragua's *National Plan for Human Development* (2012-2016)⁶, and the Project was included as one of 12 top priority undertakings in the transport infrastructure sector. The MTI's *Long-term National Transportation Plan* (2014-2033), viewing roads and bridges as necessary infrastructure for the sustainable growth of the national economy and correction of disparities between eastern and western areas, proposes a strategy of constructing a reliable road network, strengthening the arterial road network and international corridors, bolstering road functions to address vulnerability to disasters, strengthening road maintenance systems and so on. Also, regarding the Atlantic Corridor in which the Project is located, it considers its importance for building an efficient access route to areas on the Atlantic side and vitalizing communications and economic activities between areas in the said region. Concerning the *Mesoamerica Integration and Development Project*, at the time of ex-post evaluation it also

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

⁴ ③: High; ②: Fair; ①: Low

⁵ The *Mesoamerica Integration and Development Project*, which is the successor to the *Puebla-Panama Plan*, was announced in June 2001 by Mexico, six Central American countries, and Belize. This plan for integrated and sustainable regional development stretching from Mexico to Panama, crossing eight Central American countries including Nicaragua and Costa Rica, focuses on eight major issues including roads, electric power, communications, trade, human development, tourism, and environment, among others.

⁶ The *Draft National Plan for Human Development* (2018-2021) was announced in December 2017 as the draft successor to the current *National Plan for Human Development*. The basic policy remains unchanged from the present plan, the main goals being employment creation, mitigation of poverty, correction of income disparities, etc. based on stable economic development. The social infrastructure sector remains a priority area with plans to further develop the road network and border facilities.

intends to vitalize the flow of goods and tourism in Central America, and thus, improvements continue to be made to the Atlantic Corridor, to which the Project belongs, as part of RICAM.

Based on the above, both at the time of planning and the time of ex-post evaluation, all development plans in Nicaragua consider transport infrastructure including bridges as an essential infrastructure for economic growth and improving productivity; hence, consistency of the Project is sustained.

3.1.2 Consistency with the Development Needs of Nicaragua

As was described in “1.1 Background”, the Atlantic Corridor which includes the Project, complements the Pacific Corridor, and it was anticipated that the Project would help relieve congestion at the Peñas Blancas border located on the Pacific Corridor. On the Atlantic Corridor, the IDB had been implementing road improvement and construction, however, the only means to cross San Juan River had been small ferries for small vehicles. Accordingly, in order to carry cargoes across San Juan River, it was necessary to reload goods between trucks and pontoon boats (flat bottom boats) at piers on both sides of the river. Meanwhile passengers and cyclists had to cross using a small boat. Thus, the construction of Santa Fe Bridge was necessary to enhance the effects of the development of Acoyapa Highway.

At the time of ex-post evaluation, the entire Atlantic Corridor in Nicaragua is complete. Work is still in progress on border facilities and the Atlantic Corridor on the Costa Rica side.⁷ Also at the time of ex-post evaluation, the road that bypasses the capital San Jose directly connecting San Pancho-Las Tablillas border to Limon Port on the Atlantic side is being constructed. This road will connect eventually to Moín Port which is scheduled to open in 2019 located right in the north of Limon Port. However, as is described in detail in “Impacts”, because the said border is not entirely opened, the effects of the Project anticipated as part of the Atlantic Corridor have not been fully realized, and congestion at Peñas Blancas border has not been relieved either. Meanwhile, judging from interviews to the freight transportation association, there is a high demand for opening of the San Pancho-Las Tablillas border, so it can be said that the need for the Project remains high at the time of ex-post evaluation.

3.1.3 Consistency with Japan’s ODA Policy

The *Country Assistance Plan* compiled in 2002 through consultations with the Government of Nicaragua earmarked mitigation of poverty and correction of disparities, development of

⁷ At the time of ex-post evaluation, the IDB has signed loan agreements with Central American countries since 2017 towards the implementation of a “border integration program” geared to promoting integration in the region and has either been preparing or has already started the implementation of investment programs. This program includes the development of border facilities between Nicaragua and Costa Rica. Construction of facilities at the San Pancho-Las Tablillas border on the Nicaragua side is scheduled to be implemented with a grant aid by the European Community which is complementing this Program. Thus, concrete initiatives are being advanced for a full-scale realization of the effects of the Atlantic Corridor. (Based on interviews to IDB Nicaragua Office).

socioeconomic infrastructure, support for democratization, and strengthening of disaster prevention capacity as the basic policies, considering that the country was still beset by the impacts of many years of civil war and it has struggled with numerous natural disasters. At the same time, it also took into consideration the consistency with the regional integration initiatives based on the Central American Integration System. The Plan sets six priority sectors including development of road and transport infrastructure; and the Project is highly consistent with it as a road and transport infrastructure development undertaking.

3.1.4 Appropriateness of the Project Plan and Approach

By the time of ex-post evaluation, the Acoyapa Highway in the Nicaragua side including the Santa Fe Bridge has been entirely finished, leading to a major improvement in access from the capital Managua to the border with Costa Rica. Facilities at the San Pancho-Las Tablillas border on the Nicaragua side, including freight truck weighing facilities, parking area, immigration bureau, customs, quarantine station, and national police facilities have been completed. Meanwhile, on the Costa Rica side, temporary facilities for immigration, customs, and police have been installed, however, there are still no quarantine station and customs weighing facilities. Due to this, only limited passenger vehicles and freight vehicles are permitted to pass, significantly hindering the manifestation of the Project impacts (see “Impacts”).

As a factor behind the above, it may be said that analysis of the external conditions (risks) assuming that the Project would function as an international bridge at the time of planning was insufficient. The Project is located in Nicaragua, 8 kilometers from the border, but the space in between the two points is occupied only by the office and orange plantations of Frutales San Juan, S.A., and apart from the company’s workers, the use of the Project as part of the daily lives of the residents is very few. Moreover, passage times over this bridge are limited in line with the open hours of the border facilities which mainly serve to the purpose of controlling illegal immigrants between Nicaragua and Costa Rica and other security control. Accordingly, the Project is that of the construction of a bridge which in real terms has the function of an international bridge, and a complete border opening of both Nicaragua and Costa Rica had an important effect for its effects to be realized. Attention should have been paid at the time of planning to the following points based on a more careful analysis of this fact:

- ✓ Confirmation should have been made concerning plans and policies for development of roads, border facilities and other infrastructure not only for Nicaragua, but also for Costa Rica.
- ✓ Confirmation should have been made concerning the existence of a legal framework or institutions (or plans) for cooperation geared to border installation and coordination and

integration of border traffic management⁸. In particular, because relations between Nicaragua and Costa Rica have historically been constantly tense, it was important to confirm initiatives related to bilateral cooperation to both countries at the time of planning.

- ✓ Compared to Nicaragua, due to the difference in their political systems⁹, longer time tends to be required to deliberate and approve affairs in the national diet in Costa Rica, as such, a proper assessment of the risks that would limit the realization of the Project's effects should have been conducted, after considering the possibility that the development and legal preparations for the establishment of the San Pancho-Las Tablillas border would drag on past the starting of operations of the Project.

The lack of analysis concerning the above points eventually resulted in the limited manifestation of the Project effects; hence, it is thought that partial issues existed regarding the Project plan and approach.

In light of the above, this project has been highly relevant to Nicaragua's development plan and development needs, as well as Japan's ODA policy, but there have been partial issues regarding the Project plan and approach; hence, the Project relevance is fair.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Outputs of the Project at the time of planning were the bridge (length 362 meters, two-lane roadway plus sidewalks), access roads (total length of 58 meters), revetment (left bank only), incidental works (drainage works, traffic safety facilities, signposts, bridge nameplates), and consulting services. The actual outputs were almost as planned. There were some changes to the type, height, etc. of the bridge piers, however, these were all only minor design changes. The outputs borne by the Nicaragua side were: securing of site land, provision of temporary yards,

⁸ Without such a framework, even if the infrastructure is constructed, the Project effects cannot be effectively exerted. At the time of the ex-ante evaluation, the two countries concerned had no agreements related to border establishment and management of border traffic, and it was not possible to acquire information that could indicate the existence of a plan on whether such an agreement would be adopted. (See "Impacts" concerning the situation at the time of ex-post evaluation).

⁹ Nicaragua is a nation with a republican government like Costa Rica. However, in 2011, the current Ortega administration abolished the law that prohibits consecutive reelection of the president which was prohibited originally in the constitution, and since 2006 government administration authority has continued to be concentrated in the president. Approximately 78% of the unicameral national assembly (seven parties, total of 92 deputies) is occupied by the Sandinista National Liberation Front which is the party in power. On the other hand, consecutive reelection of the president is prohibited in Costa Rica, and there is no political party that accounts for the majority of the unicameral national assembly (eight parties, total of 57 deputies) (White Paper of Japan's Ministry of Foreign Affairs, National Assembly of the Republic of Nicaragua website URL address <http://www.asamblea.gob.ni/> (accessed on July 10, 2018) and the Legislative Assembly of Costa Rica web site URL address <http://www.asamblea.go.cr/> (accessed on July 10, 2018)). These differences in the political system have been affecting the Project's degree of progress and speed as a result. These facts are not limited to this Project, but according to interviews, it was confirmed that it has been affecting IDB projects as well.

preparation of an earth dump, and provision of a waste materials dump. It has been confirmed that all these items were implemented.

Summing up, except for some minor design changes, the Project outputs were generally implemented as planned.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total Project cost at the time of planning was 2,835 million yen. The actual total cost was 2,551 million yen, which was 90% of the planned amount, meaning that the Project cost was lower than planned. (See Table1).

Table 1 Project Cost: Plan and Actual

(Unit: million yen)		
Item	Planned	Actual
[Japanese Portion]		
Detailed design	76	75
Facilities, etc.	2,753	2,330
Implementation design and construction supervision		146
Subtotal	2,829	2,551
[Nicaragua Portion]		
Bank charges	2.9	0.1
Site acquisition cost	2.9	0
Land rental cost	0.1	0.6
Subtotal	5.9	0.7
Total	2,835	2,552

Source: The planned cost of the Japanese portion is the amount stated in the E/N. The planned cost of the Nicaragua portion and the actual cost of the Japanese portion are based on materials provided by JICA. The actual cost of the Nicaragua portion was provided by the executing agency.

Exchange rates: (At the time of planning): February 2009 / 1US\$ = 100.42yen / Cordoba exchange rate: 1US\$ = 19.68 Cordoba (in both cases the average value over the past 6 months from January 31, 2009).

The Project cost of the Japanese portion was less than the planned amount as a result of the competitive tender. The works amount increased as a result of design changes, however, since some of the changes were based on the contractor's proposal, the contractor bore the additional cost and there was no major increase in the Project cost. Concerning the Project cost of the Nicaragua portion, mainly because the two companies that owned the land offered the land free of charge, no land acquisition costs arose among other reasons, the Project cost was less than the planned amount.

3.2.2.2 Project period¹⁰

The Project was scheduled to last from February 2010 to July 2013 (3 years 6 months, 42 months), however, in reality, it lasted longer than planned, from February 2010 to August 2014 (4 years 7 months, 55 months, 131% compared to the planned period). The main reasons for the delay were that in the process between the outline design, detailed design and construction, design changes to improve construction efficiency, omissions, checking procedures of the design and estimation arose, all of which resulted in more time required in the design estimation examination (Project period increased approximately by seven months); and also that it took four months between the completion of works in April 2014 to the starting of service due to a delay in the complete opening of the San Pancho-Las Tablillas border, which had been scheduled by Nicaragua and Costa Rica for May 2014¹¹.

		2010				2011				2012				2013				2014			
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Plan	Detailed design and tender	■	■	■	■	9 months															
	Construction to completion (start of service)					■	■	■	■	■	■	■	■	■	■	■	■				
Actual	Detailed design and tender	■	■	■	■	■	■	■	■												
	Construction to completion (start of service)									■	■	■	■	■	■	■	■	■	■	■	■

Source: Based on materials provided by JICA and interviews to the executing agency and the consultant.

Figure 2 Project Period: Plan and Actual

Summing up, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness and Impacts¹² (Rating: ②)

The objective of the Project is to “guarantee the safe and smooth flow of traffic crossing San Juan River”, while its impacts are intended to be the “vitalization of the international flow of goods; revitalization of the local economy, and improvement of the living standard of local residents”.

The former part is analyzed in 3.3.1 Effectiveness and the latter part is analyzed in 3.3.2 Impacts.

¹⁰ The start of the Project was assumed to be the detailed design, which provides a clear start point both for the planned and the actual work, while the Project completion was assumed to be the start of service on the bridge.

¹¹ The Government of Nicaragua advanced work on the border facilities according to schedule, however, facilities on the Costa Rica side were delayed, leading to a request by the Government of Costa Rica to delay the border opening until the second half of 2014, and the Government of Nicaragua consented to this. It must be noted that during the period following the completion of works until the starting of services, the bridge was not in use. Moreover, the Government of Costa Rica only constructed the minimum necessary facilities for opening the border, and its work on subsequent improvements has continued to be slower compared to those of Nicaragua.

¹² Impacts are also taken into consideration when determining the effectiveness rating.

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effectiveness Indicators)

At the time of planning, the following were indicators were adopted as indicators for the “safe and smooth flow of traffic crossing San Juan River”: (1) Weight capacity on the bridge (total weight of vehicles), (2) Traffic volume, and (3) River crossing time. In the ex-post evaluation, based on other effects that were examined at the time of planning, the following five auxiliary indicators related to the Project objective were added and analysis was attempted from multiple directions: (4) Average time required for persons to cross San Juan River on foot (minutes/person), (5) Average number of hours during which it is possible to cross the San Juan River using the bridge (hours/day) , (6) Average travel speed on the bridge (km/h), (7) Number of times when traffic on the bridge is stopped (times/year), (8) Number of accidents on the bridge (cases/year). Table 2 shows the reference values, target values, and actual values for each indicator.

Table 2 Effectiveness: Planned and Actual Operation and Effectiveness Indicators

Indicator	Reference Value (2009)	Target value 2014 (1 year following completion)	Actual	
			2015 (1 year following completion)	
[Main indicators]				Degree of achievement
(1) Weight capacity of the bridge (maximum value, tons)	1.4	Design load: 40.8	Design load: 40.8	100%
(2) Traffic volume* ^{1, 2} (Annual average daily traffic volume: vehicles/day)	480	825 (Target value at 1 year following completion)	2015: 414 2016: 443 2017: 745 2018: 750	50% (1 year following completion)
(3) Time required for vehicles to cross San Juan River* ¹ (minutes)	Minimum 15 minutes by ferry	15 seconds by car	16.3 seconds by car	92%
[Auxiliary indicators]				
(4) Average time required for pedestrians to cross San Juan River (minutes/person) * ¹	Minimum 15 minutes by ferry	10 minutes on foot	Maximum 10 minutes on foot	100%
(5) Hours during which it is possible to cross the San Juan River using the bridge (hours/day)	10 hours (from 08:00 to 18:00)	24 hours	2015: 10 hours 2017: 12 hours	42% (1 year following completion)
(6) Average travel speed on the bridge* (km/h)	—	60-80km/h	2017: 63km/h	100%
(7) Number of times when traffic on the bridge is stopped (times/year)	—	Zero	Zero	Achieved
(8) Number of accidents on the bridge (cases/year)	—	Zero	Zero	Achieved

Source: Main indicators are from the ex-ante evaluation sheet and the Project’s Preparatory Study Report. Concerning Auxiliary indicators (4) to (7), items stated in the Preparatory Survey Report as the Project effects were added. Indicator (8) was added by the evaluator.

*1: In the ex-ante evaluation sheet, “(2) Traffic volume” is stated as the “Increase in the passable traffic volume”, however, because this is the traffic volume based on the traffic volume survey implemented at the time of the Preparatory Survey, the name of the indicator was changed to “Traffic volume”. Similarly, “(3) River crossing time”

was stated as “reduction in required time”, however, “Time required for vehicles to cross San Juan River” was adopted to indicate that it refers to the time required for crossing the river.

*2: The target traffic volume of 825 vehicles/day is the target value at one year following completion of the Project based on the traffic volume forecast at the time of planning. The actual values for 2015 to 2017 are based on measurements made by the executing agency, and the actual value for 2018 is based on the traffic volume survey implemented in the ex-post evaluation study (February 22 to 24, 2018, 12 hours per day on weekdays and weekends) converted to the annual average daily traffic volume (AADT).

(1) Increase in the weight capacity on the bridge (tons)

The target value of 40.8 tons is the design load for this bridge. Since the actual value was as designed, the degree of achievement is 100%. According to MTI, the monthly average weight of trucks being weighted at the Lovago weighing station which is the closest to the Project, was 29.8 tons/month in 2017. However, cases where the design load was exceeded have also been observed¹³; hence it will be necessary to ensure strict observance of the design load from the viewpoints of maintaining the service life of the bridge and preventing accidents.

(2) Traffic volume

Compared to the target value one year following completion of the Project of 825 vehicles/day, the actual average daily traffic volume in 2015 was 414 vehicles, meaning that the degree of achievement was only 50%.

The target value was a projection of the future traffic volume one year following completion of the Project based on the assumption that the San Pancho-Las Tablillas border facilities would be completed on both the Nicaragua and Costa Rica sides, making it possible for all vehicles, cargoes and people to pass 24 hours a day at the moment of Project completion. The breakdown of this traffic was as follows: (1) increase in existing traffic volume (Frutales de San Juan-related vehicles (cargoes), immigrant taxis (private)), (2) developed traffic volume (traffic induced by the road construction between Acoyapa-San Carlos-Costa Rica border and construction of Santa Fe Bridge: mainly international and domestic cargoes of farm produce), (3) diverted traffic volume (traffic volume switching from waterborne border traffic: individual persons using taxis), and switching traffic volume (international, freight and buses) from Peñas Blancas border (Pacific Corridor), and (4) induced traffic volume (inbound tourists travelling overland from Costa Rica: individual persons using minibuses).



Truck transporting wood

However, because the border facilities on the Costa Rica side in 2016 were limited to

¹³ Although the frequency in which it occurs is not clear, during the traffic volume survey conducted in this ex-post evaluation, a succession of 24-ton trailers crossing the bridge was observed.

immigration, customs and police, only one type of farm product (oranges), which was permitted since before the Project, and individuals were permitted to pass the San Pancho-Las Tablillas border. From December 2016, customs clearance and quarantine were permitted for three farm products, i.e. timber, pineapples, and bananas on the Costa Rica side, enabling these products to cross the border and leading to increased traffic volume in 2017 and 2018, however, apart from these products, other freight vehicles are not allowed to cross the border. Moreover, even though individual passenger cars are allowed to cross the border, passenger buses are not. Because of that, passengers travelling on passenger buses have to change to taxis and minibuses at the San Carlos bus terminal before heading to the border. As for passengers, those with Nicaraguan nationality require a visa to enter Costa Rica, however, passengers of Costa Rican nationality are not required to have a visa to enter Nicaragua, and the gentle increase in inbound tourists to Nicaragua is thought to be contributing a little to the increase in traffic volume. From the above, the traffic volume is slowly increasing and, according to the traffic volume survey conducted in the ex-post evaluation study, the annual average daily traffic volume in 2018 was 750 vehicles/day (195 trucks, 555 passenger cars and motorbikes)¹⁴.

(3) Time required for vehicles to cross San Juan River

Before the Project, it took at least 15 minutes to cross San Juan River using a ferry. According to MTI data, time required for vehicles to cross San Juan River has been reduced to 16.3 seconds thanks to the Project. Since the planned target was 15 seconds, the degree of achievement is 92% (15 seconds divided by 16.3 seconds), indicating that the target has been more or less achieved.

(4) Average time required for pedestrians to cross San Juan River (minutes/person)

Before the Project, whereas it took at least 15 minutes to cross San Juan River using a ferry, it became possible to cross the river on foot thanks to the Project. According to MTI data, compared to the target value of 10 minutes, the maximum crossing time is 10 minutes, indicating that the target has been achieved. However, not many local residents walk across Santa Fe Bridge on an everyday basis, and pedestrians are limited to local residents simply walking for recreation purposes¹⁵.

(5) Hours during which it is possible to cross the San Juan River

¹⁴ In the preparatory study, no planned values that can be used for comparison against the actual value at the time of ex-post evaluation (2018) were calculated, however, upon using the rates of increase used in the traffic volume projection in the said study (7.8% per year for freight traffic, 10 to 20% per year for passenger traffic) to make an estimate, the traffic volume in 2018 (planned value) is 691 vehicles/day for freight (assuming a rate of increase of 8%) and 554 vehicles/day for passengers (assuming a rate of increase of 15%), giving a total of 1245 vehicles/day. In comparison, the actual passenger traffic was almost as projected, however, the freight transport was only 28% while the overall traffic volume was 750 vehicles/day or 60% of the forecast.

¹⁵ Based on the interviews conducted to Nicaragua's border police and military, the Mayor of San Carlos, the Ministry of Tourism San Carlos Office, taxi associations, and local residents. Also, the executing agency does not collect information regarding pedestrians, however, according to the traffic volume survey conducted at the time of ex-post evaluation, there were only 22 common pedestrians per day on weekdays and 6 per day on weekends.

Before the Project, it was only possible to cross San Juan River between 08:00 in the morning and 18:00 in the evening, 10 hours a day, when the small boats and pontoon ferries (flat bottom boats) were operating. At the time of ex-post evaluation, the hours in which it is possible to cross the river is a total of 12 hours between 05:00 in the morning and 17:00 in the evening in line with the work hours of the San Pancho-Las Tablillas border facilities¹⁶. The hours in which the bridge, which is inside Nicaragua, can be used is not supposed to be limited by the operating time of border facilities, however, with the main purposes of controlling illegal immigration between Nicaragua and Costa Rica and security control, the Government of Nicaragua limits river crossing to the operating time of border facilities¹⁷.

(6) Average travel speed

Since the maximum speed limit in Nicaragua is 80 km/h, the design speed target value was set at 60-80 km/h. Since a checkpoint was established immediately after crossing the bridge in the direction toward the border, at the time of ex-post evaluation, it is necessary for vehicles to slow down on the bridge. Because of this among other factors, according to MTI data, the actual average speed is 63 km/h, which is within the target range¹⁸.

(7) Number of times when traffic on the bridge is stopped

According to interviews to residents, before the Project was implemented, ferry services were sometimes suspended, and traffic was stopped when the river became flooded and so on. Following the Project, traffic has not been stopped; hence, the target has been achieved.

(8) Absolute number of traffic accidents per year

The target value was zero and the actual value is also zero; hence, the target has been achieved. A major factor in this is the checkpoint close to the Santa Fe Bridge, which has encouraged drivers and pedestrians to generally follow traffic rules¹⁹. Incidentally, as indicated above, crossing of San Juan River has been suspended due to flooding in the past, but there have been no reports of fatal accidents.

Summing up the above points, out of the three main indicators, traffic volume one year following

¹⁶ "Hours during which it is possible to cross the San Juan River" refers to the hours in which the users (beneficiaries) can actually use the road. Although it is possible to physically cross the river 24 hours a day thanks to the Project, at the time of the ex-post Evaluation it is limited to 12 hours. Incidentally, the Peñas Blancas border also operates for 18 hours a day from 06:00 in the morning to 12:00 at night.

¹⁷ Based on interviews to police and military personnel at the San Pancho border facilities on the Nicaragua side. At the time of ex-post evaluation, the checkpoint was installed at the end of the access road after crossing the bridge in the direction towards the border, and the police was stationed during open hours and the military the rest of the times. In addition, through to the group interviews conducted to local residents in this ex-post Evaluation, it became clear that in the future, "enabling 24-hour use of the bridge" was the most desired improvement area (details on the group interviews to local residents please refer to footnote 25)

¹⁸ However, because a maximum speed of 86 km/h was recorded in 2017 according to MTI, it is desirable to strengthen speed control in order to prevent accidents.

¹⁹ However, as was mentioned previously, since there have been cases of speeding and overloading by vehicles crossing the bridge, there are risks related to traffic safety.

completion of the Project was only around half of the target value. The main factor behind this was that the San Pancho-Las Tablillas border was not fully opened, making it difficult for the traffic to switch from the Peñas Blancas border. Meanwhile, the targets regarding increase in maximum weight capacity on the bridge and river crossing time have been achieved.

3.3.1.2 Qualitative Effects (Other Effects)

At the time of planning, it was envisaged that “completing the Atlantic Corridor that has the function of augmenting and providing an alternative to the Pacific Corridor would boost freight vehicle traffic volume and freight transportation quantities over the international transportation corridor connecting the three countries of Honduras-Nicaragua-Costa Rica, and contribute towards maintaining and developing the flow of goods and economic relations between not just the said three countries, but all Central American countries”. In addition, it was envisaged that, “full opening of the Acoyapa Highway together with the Project would lead to the securing of a stable passenger and freight transportation route throughout the year, thereby boosting the economy in roadside areas and vitalizing social and economic activities in Nicaragua”. All these points were analyzed as the Project impacts.

3.3.2 Impacts

3.3.2.1 Intended Impacts

The Project impacts are “the vitalization of the international flow of goods; local economic growth and improvement in the living standard of local residents”. These are analyzed from the three aspects described below.

(1) Vitalization of the international flow of goods

At the time of planning, completing the Atlantic Corridor that has the function of augmenting and providing an alternative to the Pacific Corridor²⁰ would boost freight vehicle traffic volume and freight transportation quantities over the international transportation corridor connecting the three countries of Honduras-Nicaragua-Costa Rica.

²⁰ As indicated in “Effectiveness”, to augment and provide an alternative to the Pacific Corridor, specifically was supposed to be the diverted freight and passenger traffic from the Peñas Blancas border. As for the diverted freight traffic, it was thought that the majority of the freight that goes from Peñas Blancas to Limon Port was going to be diverted to the San Pancho-Las Tablillas border. As for the passenger traffic it was thought that private cars and passenger buses from Peñas Blancas would be diverted. In addition, the traffic volume (mostly agricultural production freight) induced thanks to the construction of the Acoyapa Highway which includes the Project was also included (based on the Preparatory Survey Report). The targets of these to be achieved one year after project completion were set under “Effectiveness”, however, there were no specific targets set for impact, their upward trends since project completion was taken as an evaluation criterion.

According to MTI data, the annual average daily traffic volume on the Acoyapa Highway increased by approximately 60% from 4,438 vehicles/day in 2013, to 7,063 vehicles/day in 2015 (Table 3). Although it has been flat since then, the annual average daily traffic volume of the San Carlos San Pancho-Las Tablillas section of the Acoyapa Highway which includes the Project, has increased by approximately 30% from 2,655 vehicles/day in 2015 to 3,443 vehicles/day in 2017.



Tractor heads (without containers) from Limon Port waiting in line in the Santa Fe Bridge checkpoint

Meanwhile, the quantity of freight passing through the San Pancho-Las Tablillas border increased greatly from 3,746 tons in 2015 to 65,053 tons in 2017. The freight is mostly limited to four commodities: oranges, timber, pineapples and bananas, which are shipped from the area nearby the San Pancho-Las Tablillas border on the Acoyapa Highway. In addition, as is shown in Table 3, almost all the trade that used the San Pancho-Las Tablillas border in 2017 were exports from Nicaragua to Costa Rica, and no freight passing through this border intended for export through Limon Port could be seen.

Table 3 Impact (1): Increase in Freight Vehicles and Freight Transportation Quantity on the Atlantic Corridor

	2015	2016	2017
Acoyapa Highway Annual Average Daily Traffic (vehicles/day)	7,063	No	7,058
Out of the above, San Carlos - San Pancho-Las Tablillas border (vehicles/day)*	2,655	information	3,443
Atlantic Corridor:			
Transported cargoes through San Pancho-Las Tablillas border (tons/year)	3,746	64,483	90,851
Out of the above, exports from Nicaragua to Costa Rica (tons/year)	2,060	63,193	87,217
imports from Costa Rica to Nicaragua (tons/year)	1,686	1,290	3,634
Pacific Corridor:			
Total transported cargoes through Peñas Blancas border (tons/year)	968,686	925,732	961,799
Out of the above, cargo from Peñas Blancas border to Limon Port (tons/year) *	131,759	70,682	92,640

Source: MTI, Nicaragua Immigration Bureau and Customs

*: Quantity of freight transportation that is forecasted to immediately switch to the Atlantic Corridor in case San Pancho-Las Tablillas is fully opened.

According to the traffic survey conducted at the time of ex-post evaluation²¹, 26% of the traffic

²¹ The traffic survey was implemented from February 22 to 24 (Thursday, Friday, Saturday) 2018, and it entailed measuring traffic volume for 12 hours per day, conducting an origin-destination survey, and implementing a survey of driver awareness. In the origin-destination survey and driver awareness survey, 112 persons, selected randomly choosing vehicles crossing the bridge, were surveyed (98% male, 2% female, 81% in the 30s-50s age group, 19% aged 60 or over). Traffic going from Nicaragua to Costa Rica accounted for 66% of traffic volume. 73% of drivers said they had never crossed San Juan River before the Project, from which 26% said they had previously used the Pacific Corridor.

using the Project bridge comprised freight vehicles, and trucks heading for Costa Rica mainly carried oranges and timber, however, most of the trucks entering Nicaragua were empty, especially the trailers did not have containers loaded, or were moving empty containers. It was expected that the Atlantic Corridor would help realize an increase in trade between Nicaragua and the United States and Europe via Limon Port, however, at the time of ex-post evaluation, it was found that there were no vehicles going to Limon Port from Nicaragua and all the freight passing over the Project bridge was intended for processing as raw materials inside Costa Rica. In addition, some vehicles (mainly trucks and trailers) originating out of Limon Port were observed entering Nicaragua, however, such vehicles enter Costa Rica from the Peñas Blancas border on the Pacific Corridor, unload at Limon Port, and return home with no cargo via the San Pancho-Las Tablillas border, where waiting time is shorter. Accordingly, at the time of ex-post evaluation, although the Atlantic Corridor including the Project bridge contributes to the bilateral trade of limited commodities with Costa Rica, its role in supplementing the Pacific Corridor is limited.

According to interviews to logistics operators²², respondents said that, when exporting from areas along the Acoyapa Highway either to Costa Rica, or to Europe or the United States of America via Limon Port, if the number of commodities handled at the San Pancho-Las Tablillas border were increased and it became possible to freely use that border, it would be possible to conduct transportation more efficiently via the Atlantic Corridor, which offers better roads and bridges, cheaper transportation costs and shorter travel times, compared to using the Pacific Corridor which entails longer border passing time, longer distances and travel over badly deteriorated roads²³. Also, according to interviews to Nicaragua customs, the immigration bureau and MTI, when the San Pancho-Las Tablillas border is fully opened, there is a forecast that approximately 40% of freight from Nicaragua that currently utilizes the Peñas Blancas border on the Pacific Corridor will switch to the San Pancho-Las Tablillas border. Meanwhile, international

²² In the ex-post evaluation study, interviews were conducted to 10 companies introduced by the Nicaragua Logistics Association. These comprise three companies that use the Santa Fe Bridge, and seven that do not. The three companies that use the Project bridge export oranges and timber from areas around the bridge to Costa Rica, saying that it is better to use the San Pancho-Las Tablillas border in terms of travel time and transportation cost, and that they intend to continue increasing freight volume. The companies that do not use the bridge use the Pacific Corridor to export goods to Costa Rica and American and European markets because they currently cannot pass through the San Pancho-Las Tablillas border. However, if conditions are relaxed, and it becomes possible to freely use the San Pancho-Las Tablillas border, they would be able to save fuel by approximately 15-20%, a total cost savings of approximately 25-30%, and reduce average travel time (currently one-week roundtrip) by roughly three days, so they wish to use the Atlantic Corridor. They cited sugar, palm oil, fruits, cereals, among others as possible goods for switching to the San Pancho-Las Tablillas border.

²³ According to the Nicaragua Customs Department, the total number of freight vehicles using the Peñas Blancas border in 2017 was 200,000 vehicles, of which 3,882 vehicles (2%) either started or finished their journeys at Limon Port in Costa Rica. According to an interview to Peñas Blancas customs, it takes 6 to 12 hours to pass through the border, and travel time to Limon Port is approximately 3 hours longer compared to passing through the San Pancho-Las Tablillas border. If the San Pancho-Las Tablillas border is fully opened, there is a high possibility that such vehicles will switch to the Atlantic Corridor.

passenger transport operators²⁴ said that, unless passage of large buses into Costa Rica is permitted and tourism is developed in San Juan Department, there is little merit in using the Acoyapa Highway.

Summing up, at the time of ex-post evaluation, although the Atlantic Corridor has been completed due to the implementation of the Project, it has not been able to completely augment and provide an alternative to the Pacific Corridor as intended at the time of planning due to the limited operation of the San Pancho-Las Tablillas border among other factors; hence the Project's impact in terms of vitalizing the international flow of goods has been limited. However, since logistics operators hold high expectations with respect to the Atlantic Corridor, if the San Pancho-Las Tablillas border is fully opened, it is possible that the freight traffic volume will increase and the originally intended impacts will be realized.

(2) Boosting of the economy in roadside areas

The mayor of San Carlos, the city located closest to the Project site, says that promotion of the local economy due to Acoyapa Highway including the Project is currently limited because the border has not yet been fully opened, however, he anticipates economic growth when it does so. At the time of ex-post evaluation, the services sector (hotels, restaurants, taxi services) is growing relatively quickly in this city. According to the city's hotel and restaurant association and taxi cooperative, more and more hotels for truck drivers are being opened close to the San Carlos municipal bus terminal and alongside Acoyapa Highway. According to data from the San Carlos branch office of the Ministry of Tourism, the number of accommodation facilities has increased from 77 in 2014, when the Project was completed, to 91 in 2017, while the number of restaurants has increased from 68 to 95 over the same period.

Summing up, impacts on the economic promotion thanks to the development of Acoyapa Highway have been confirmed only in limited sectors, however, it is thought that these will further increase when the border is opened and traffic volume increases.



A truck picking up
Frutales de San Juan workers

²⁴ In the ex-post evaluation study, interviews were conducted to seven Nicaraguan international passenger bus companies that offer services covering from Panama to Mexico. The companies operate an average of 38 vehicles/day. On average approximately 18,300 people use such buses to travel within the Central America region every month. At the time of ex-post evaluation, passenger buses are not permitted to pass through the San Pancho-Las Tablillas border. On ascertaining the feasibility of conducting business via the Atlantic Corridor to Costa Rica from now on, when the main destination of the international passenger buses is Costa Rica, since most of their final destination is the capital city of San Jose, there is little merit in switching from the Pacific Corridor to the Atlantic Corridor. However, if tourism develops in areas along the Atlantic Corridor from now on, the companies said that they would also consider an Atlantic route connecting to Costa Rica using the Atlantic Corridor.

(3) Improvement in the living standard of residents living in the nearby area of Sant Fe Bridge

According to residents who live in the area around Santa Fe Bridge²⁵, for workers of Frutales de San Juan, who use the bridge every day (workers who cross San Juan River on company buses and work in plantations in the border region), impacts of the Project are shorter hours, greater convenience and greater safety. For other local residents, since they do not frequently use the bridge, there are no major impacts that could be generalized, however, their satisfaction level was high in terms of shorter travel time, lower cost, and greater convenience and safety whenever they do use the bridge²⁶.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the natural environment

The Environmental Impact Assessment (EIA) for the Project was approved on October 26, 2007 by the Ministry of the Environment and Natural Resources San Carlos Branch. However, because there was a delay in the starting of the Project, when the condition was to start the Project within 18 months from the above approval date, the EIA was approved again on November 3, 2011. In the Project's environmental management plan and monitoring plan an environmental management plan which included measures to address construction waste, noise, vibration, water pollution and air pollution, as well as afforestation was formulated, which were implemented as planned. In addition, the status of implementation was reported on a monthly basis and an appropriate monitoring was conducted. Interviews to local residents, to Frutales de San Juan, and Santa Fe de Melchora also confirmed that the Project had not caused any major impacts on the environment.

(2) Resettlement and land acquisition

In the Project, land had to be acquired for the access roads, however, there was no need to resettle residents. The land in question was owned by two private companies, however, in both cases, the land was donated smoothly to the state free of charge following consultations between the executing agency and landowners based on the corresponding law.

(3) Other impacts:

A number of post-tensioned T-girder bridge frames and hydraulic jacks used in the Project works were donated to MTI and COERCO, and these are used in bridge construction and repair works

²⁵ Group interview was conducted with 45 residents (24 women and 21 men) of five communities (La Melchorita, La Argentina, Laureles, Los Chiles, and La Azucena) in the vicinity of the Project.

²⁶ There are a lot of families with members living on both sides of the border between Nicaragua and Costa Rica (90% of the residents who participated in the group interviews said they have family or relatives living in Costa Rica). Although they do not use the bridge frequently, many of them said that, previously, it was necessary to use boats and travel over difficult routes, but now it is possible to safely cross the river and due to a shortened travel time, it is possible to travel back and forth in the same day.

at the time of ex-post evaluation. Moreover, some engineers who belong to the executing agency voiced their opinion that they acquired a lot of new knowledge by frequently listening to explanations on construction methods by the Japanese contractor and consultant when they visited the Project works site.

Summing up the above, the Project has resulted in greater weight capacity on the bridge and shorter river crossing time as planned. However, due to the slow development of facilities on the Costa Rica side and failure to fully open the San Pancho-Las Tablillas border, the traffic volume is less than planned, and the role of the Project as an international arterial road supplementing the Pacific Corridor has been limited. Accordingly, contributions in terms of vitalizing the international flow of goods; local economic growth and improving the living standard of local residents have not been that large. This project has achieved its objectives to some extent. Therefore, effectiveness and impacts of the project are fair.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional Aspects of Operation and Maintenance

Periodic maintenance work for the Project is implemented by contractors outsourced by FOMAV under the supervision of MTI. Large-scale repairs and emergency measures in response to natural disasters and so on are implemented by COERCO, which is a state-owned company controlled by MTI.

The Road Maintenance Unit of the MTI Road Department has 284 employees (at the time of ex-post evaluation), and four members are in charge of maintenance planning and monitoring of the Project. The responsible employees of the Road Maintenance Unit check the monthly reports submitted by FOMAV and conduct on-site visual checks and monitoring every three months.

Based on an annual agreement signed with MTI, FOMAV implements routine inspections and periodic maintenance work (early repair of sidewalks, cleaning of side ditches, repair of paving, transfer and installation of road and traffic signs and bus stops, among others) of roads and bridges in relatively good state, classified as being in either “good” or “ordinary” condition, by outsourcing these tasks to micro-enterprises. FOMAV has approximately 54 employees, 12 of whom place orders for maintenance work related to the Project and conduct supervision and monitoring of these micro-enterprises. FOMAV consigns monitoring of the status of maintenance of roads divided into sections and subcontracted to micro-enterprises to private consultants. FOMAV also directly conducts monitoring as well.

At the time of ex-post evaluation, maintenance of the road section that includes the Santa Fe Bridge is consigned to “Las Tablillas Micro-Enterprise”. This company has 18 employees in total and conducts periodic maintenance work. Judging from the state of maintenance in site inspections and interviews to employees of the contractor at the time of ex-post evaluation, the

contractor was confirmed to have an adequate organization for conducting maintenance work. Since the road and bridge maintained by the micro-enterprise also happens to be the local road and bridge of the area where the company's employees live, it is possible to say that they have a relatively high sense of ownership.

COERCO has four business offices, i one per each region of the country. It has approximately 1,200 employees and approximately 300 units of maintenance equipment. The Managua Department Southeast Office, which has jurisdiction over the Project, has approximately 400 employees, of whom one engineer and nine workers are directly involved with the Project.

Based on the above, it was confirmed that with respect to the maintenance structure of the Project, the organization, command lines, division of roles, etc. of the three entities, that is the MTI, the state-owned company under MTI's control COERCO, and the independent administrative corporation FOMAV, are clearly specified, and a comprehensive structure that secures the implementation of maintenance is in place. Thus, no issues in particular are observed regarding the institutional aspects of Project operation and maintenance.

3.4.2 Technical Aspects of Operation and Maintenance

The personnel of MTI, FOMAV and COERCO in charge of maintaining this bridge are all engineers who have graduated university or postgraduate school, and they all have long work experience. Since appropriate maintenance work is conducted and the facilities are in good condition (as described later), these entities are deemed to possess appropriate technical competence. Supervisors in the micro-enterprises subcontracted by FOMAV are either university, high school or technical college



Cleaning work done in the side ditches by FOMAV

graduates, which are appropriate education levels for supervising cleaning, weeding and inspection. As with the majority of government agencies in Nicaragua, MTI does not have a systematic and formal human resources development scheme, however, isolated training programs are implemented irregularly based on donor contributions as well as its own budget²⁷.

MTI hopes to boost its technology as well as its materials and equipment for conducting the maintenance work that needs to be done over the coming five and 10 years, however, according to the Japanese consultant of the Project²⁸, the maintenance required in the medium to long term

²⁷ Examples of training implemented in 2017 are as follows: "Bridge design, construction, and maintenance", "Responding to climate change and reducing risks (postgraduate)", "Measures for strengthening infrastructure in order to reduce vulnerability of road networks to climate change (masters)". These programs last from 8 to 16 months; lectures are conducted twice a week; and participants are selected from MTI, FOMAV, and COERCO.

²⁸ As part of the ex-post evaluation study, interviews were conducted to the Japanese consultant. The said consultant also implemented JICA's "Information collection and confirmation study on the introduction of high-quality

can fully be conducted with the materials and equipment that COERCO has, and the technical level of the human resources that currently belong to COERCO. In sum, no issues in particular are observed regarding sustainability in terms of technical aspects.

3.4.3 Financial Aspects of Operation and Maintenance

FOMAV, which mainly obtains funds from the fuel tax (0.16US\$/gallon, as of 2018) that is imposed on gasoline and light oil, has operated in the black for the past three years (Table 4). Maintenance costs of the Project are approximately 0.4 million Cordoba and considering that this represents less than or equal to 0.1% of FOMAV's total revenue in 2016, with respect to the Project, there are no concerns regarding the financial capacity of FOMAV.

Table 4 FOMAV Revenue and Expenditure Balance

(Unit: million Cordoba)

		2014	2015	2016
Revenue	Fuel tax	1,028	1,207	1,211
	IDB, World Bank	18	26	25
	Other	221	170	213
	Subtotal	1,267	1,403	1,449
Expenditure	Administration and personnel	18	12	13
	Clerical and finance department	16	15	13
	Procurement department	4	3	3
	Technical department (maintenance)	19	17	17
	Subtotal	57	47	46
Operating profit		1,210	1,356	1,403
Other expenditure and project expenses		962	1,189	773
Profit		246	167	630

Source: MTI, FOMAV. 2016 values are up to November.

Meanwhile, COERCO receives an annual budget from MTI based on each fiscal year's road and bridge maintenance plan, so there are no major financial issues. MTI's budget increased from 3,883 million Cordoba in 2014 to 6,023 million Cordoba in 2016. Its large-scale maintenance budget decreased from approximately 350 million Cordoba in 2014 to approximately 180 million Cordoba in 2016, however, no major limitations are expected to arise because the need for large-scale repair works is receding as the nationwide road network (including bridges) expands and there is also a system for MTI to make special budget requests to the Ministry of Finance in emergencies.

From the above, it can be said that there are no issues in particular regarding the financial aspects of Project operation and maintenance.

3.4.4 Current Status of Operation and Maintenance

infrastructure in Central America (2017)" after the Project, in which it obtained new information concerning MTI's technical, materials and equipment capacity.

At the time of planning, it was envisaged that bridge maintenance would comprise: “inspection and maintenance required every year”, “maintenance implemented over multiple years”, and “emergency inspections at times of flooding. Judging from the maintenance records (monthly reports) submitted by FOMAV to MTI, site inspections, and interviews to employees of Las Tablillas Micro-Enterprise, it has been confirmed that “inspection and maintenance required every



Access road and the Bridge

year” continues to be implemented every week following the Project completion up to the time of ex-post evaluation. Concerning maintenance implemented over multiple years, based on the road and bridge assessment implemented by MTI every year, it is scheduled to decide the work contents as required and incorporate such contents into COERCO’s maintenance plans for implementation. Concerning emergency inspections at times of flooding, none have been implemented between Project completion and the time of ex-post evaluation because there have been no natural disasters including floods, however, it was confirmed that organization and procedures for responding to emergencies are in place.

Checking the status of maintenance of the Project through site inspections, also because it is still only three years since completion, no problems that require emergency measures were observed, and maintenance status is good (Table5).

Table 5 Santa Fe Bridge Status of Maintenance

Item	Time of Ex-post Evaluation
Bridge superstructure	There are no major deformations, etc. in the main structural components such as main girders, floor slabs, and cross girders. All sections of the bridge remain in the good condition as when it was completed.
Bridge surface	No problems have arisen in the bridge surface paving, expansion devices, drainage facilities, among others, and they are in good condition. A number of cracks can be seen in the sidewalks on both left and right sides, however, since the sidewalks do not contain reinforcing bars, there is no risk of corrosion even if water infiltrates from the cracks, and there is no need for any particular measures.
Bridge substructure	No particular problems are observed over the scope that can be checked visually.
Access roads	There are some graffities on the guard rails, however, the asphalt paving, banking slopes, and drainage facilities are in good condition.
Revetment	There are no deformations and damages. No problems were observed.
Gate signposts on abutments	There has been no theft, vandalism or breakage, and they are in good condition.
Other	Since there are no lights on the bridge and the roads before and after the bridge, it is necessary to secure safety especially at night and early morning (installation of lights or lane lights, etc.)

Source: The status of maintenance was visually confirmed. Parts of the explanations are based on materials provided by JICA and interviews conducted to the Project consultant.

In addition, in the Project defect inspection report, it was indicated that, to ensure the effective utilization of the Project, there is a need to construct a heated asphalt mixture manufacturing plant in the local area in readiness for future repairs, overlaying, re-laying, etc. of the asphalt paving on roads leading up to the bridge²⁹, however, no such plant has been constructed yet.

From the above, no major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

4 Conclusions, Recommendations and Lessons Learned

4.1 Conclusions

The Project for Construction of the Santa Fe Bridge in the Republic of Nicaragua (hereinafter referred to as “the Project”) was implemented to construct the Santa Fe Bridge in Nicaragua’s Rio San Juan Department over San Juan River which runs along the border between Nicaragua and Costa Rica, in order to guarantee the safe and smooth flow of traffic crossing San Juan River, thereby contributing to the vitalization of the international flow of goods, the local economic growth, and the improvement of the living standard of local residents. The Project was sufficiently consistent with the national development plan, transportation sector policies, development needs of Nicaragua at both the time of planning and the time of ex-post evaluation, as well as Japan’s ODA policy at the time of planning. However, even though the Project consisted in the construction of a bridge with the functions of an actual international bridge, the external conditions concerning border opening with Costa Rica were not adequately analyzed at the time of planning. Thus, the relevance of the Project is fair. The Project outputs were generally as planned, and the Project cost was lower than planned, however, because the Project period was longer than planned due to time spent on making design changes and opening the border, the efficiency of the Project is fair. As a result of the Project, targets regarding increase of weight capacity of passing vehicles and reduction of river crossing time were achieved; furthermore, it is recognized that there has been a certain impact in terms of local economic growth and improvement of the living standard of local residents. However, because border facilities on the Costa Rica side are still not complete, the increase in traffic volume, the main indicator of the Project, has not achieved the target; and international cargoes utilizing the Project have been limited, hence vitalization of the international flow of goods has not been realized sufficiently. Therefore, the effectiveness and impacts of the Project are fair. The organizational, technical, financial aspects and current status of the operation and maintenance of MTI, FOMAV, and COERCO, which are responsible for the operation and

²⁹ In the defect inspection report, it was recommended that an asphalt plant be newly constructed immediately, because of the large transport distance and time from the existing plant, which results in a decline in the temperature of the heated asphalt mixture while being carried to the worksite.

maintenance of the Project, are generally satisfactory, hence, the sustainability of the Project is high. In light of the above, this Project is evaluated as partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- (1) Thorough implementation of routine maintenance: If routine inspection can be thoroughly implemented, excluding times of flooding and other natural disasters, it is possible to keep the medium-term and long-term maintenance to a minimum. In the Project, it is necessary to frequently implement routine inspections that include removing sand and debris accumulated in the drainage such as pipes, intercepting drains and side ditches, among others, and removing grass and weeds from road shoulders and slopes, and so on. Therefore, it will be important for FOMAV to continue implementing thoroughly such routine inspections, and for MTI to conduct periodical monitoring. The executing agency expressed concerns about detailed methods, equipment and materials concerning the maintenance required over the coming five and 10 years, however, according to the Japanese consultant of the Project, the equipment and materials that were acknowledged during the “Information collection and confirmation study on introduction of high-quality infrastructure in Central America” were deemed sufficient to implement inspections and maintenance. The results of this study have already been shared with MTI, and it is desirable that they also share them with FOMAV and COERCO.
- (2) Control of overloaded vehicles: In the traffic volume survey conducted at the time of ex-post evaluation, trucks were seen carrying loads over the maximum capacity. To maintain the service life of Santa Fe Bridge from now on, it will be necessary to take measures to thoroughly prohibit overloading. At the time of ex-post evaluation, all trucks undergo weighing at the Lovago weighing station for the purpose of preventing overloading, however, this weighing station is located approximately 110 kilometers from the Project site closer to Managua, and there are no weighing stations located any closer than this to the bridge. There is a weighing station at the San Pancho border facilities, however, it is currently not in use. Therefore, in the future, it is desirable to make effective use of the weighing station at the San Pancho border facilities simultaneously as to the complete opening of the said border; and especially according to how much the freight volume that is transported from Nicaragua to Costa Rica increases, it will be desirable to consider the installation of a new weighing station on the Acoyapa Highway halfway between the current Lovago weighing station and the Project’s bridge.
- (3) Readiness for medium to long-term maintenance: The recommendation made in the defect

inspection report pointed to the need to construct a heated asphalt mixture plant close to the Project site, and the need for such a facility was also confirmed at the time of the ex-post evaluation study. Considering that repairs will also be needed on Acoyapa Highway, this recommendation is thought to be relevant. It is desirable to consider this heading towards periodic maintenance allowing enough time and incorporating it in the budget.

4.2.2 Recommendations to JICA

It is desirable for JICA to monitor the status regarding the opening of the San Pancho-Las Tablillas border between Nicaragua and Costa Rica and continue to exchange information regarding developments on regional integration with the IDB and other donors, and appeal to the governments of Nicaragua and Costa Rica to ensure effective utilization of the Atlantic Corridor.

4.3 Lessons Learned

Confirmation of relevance, risk assessment and measures in cases where the opening of a border is a precondition for the realization of the Project effects

Although the Project was a domestic undertaking in Nicaragua, the Santa Fe Bridge is part of the Atlantic Corridor, which is an international arterial route, and it was anticipated that the target bridge, being located so close to the border with Costa Rica, would essentially function as an international bridge. Therefore, at the time of Project formulation and planning, in order to secure the realization of the Project effects, it was necessary to confirm the consistency of the Project with the national development policies and sector policies of not only Nicaragua but also of Costa Rica. In addition, it was necessary to verify the existence of important conditions for the realization of the Project effects such as both countries' border policies, border cooperation agreements, and any possibility of diplomatic issues arising between both countries, and the probability and risks surrounding the conditions for the manifestation of the Project effects should have been analyzed carefully.

For similar projects in the future, it will be necessary to not only confirm the cooperation with neighboring countries and legal frameworks as well as the level of maturity of such frameworks (existence of political will and infrastructure in each of the allied nations) at the time of the project planning, but also consider with even greater caution the risks such as the status of the international arterial road in both countries' national and sector policies, and the status of the relations between both countries, in particular the existence of a border cooperation agreement or initiatives geared to the signing of such an agreement. After these considerations it is necessary to check the project relevance and points requiring caution and measures towards the realization of the project effects. In addition, in the event where territorial issues occur or worsen, it is desirable to ascertain the impacts at that precise moment, closely share information with related parties including other donors, and examine the points that need caution as well as measures

necessary towards the manifestation of the project effects.

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