Republic of the Philippines

Ex-Post Evaluation of Japanese ODA Loan Project

Second Mandaue -Mactan Bridge (Phase II) and Metro Cebu Road Project

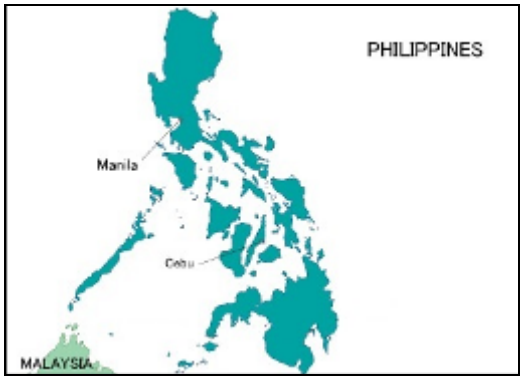
External Evaluator: Yasuhiro Kawabata, Sanshu Engineering Consultant

0. Summary

The objectives of the project were to improve the traffic safety and efficiency in the connecting section between Cebu and Mactan Island by constructing the Second Mactan Bridge connecting between Cebu and Mactan Island and rehabilitating the existing First Mactan Bridge, and to alleviate traffic congestion in central Metro Cebu by constructing the Talisay section of the coastal road, thereby contributing to promotion of the economic development in Metro Cebu. The project has been highly relevant to the development plans and needs of the Philippines, as well as Japan's ODA policies. Regarding improvement of the safety and efficiency of the transport between Cebu and Mactan Island, and alleviation of traffic congestion in the central Metro Cebu, which were both the development objectives, the project has somewhat achieved its objectives. Thus, the effectiveness is fair. Although the project cost was within the plan, the project period was significantly longer than planned. Therefore, efficiency of the project is considered fair. Some problems have been observed in terms of institutional and financial aspects for operation and maintenance, therefore sustainability of the project effect is fair.

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

1. Project Description



Project Location

Second Mactan Bridge

1.1 Background

Philippines's second largest economic city, Metro Cebu has been developing having Mactan Airport and Mactan Export Processing Zones as its nucleus, and leading country's economic growth. Before the project was commenced, the traffic volume of First Mactan Bridge, which

solely connected between Mactan Island and Cebu main island had been rapidly increasing (increased by 15% per annum). However, due to damage of piers caused by the vessel collision accident occurred in 1990 and increase of traffic volume, the durability had been lowered and it had not been able to cope with the traffic demand. Thus, construction of 4-lane Second Mactam Bridge and rehabilitation of First Mactan Bridge had been identified as the highest priority agenda. At the same time, since the traffic congestion in the Cebu city center was serious, construction of a detour road connecting between northern and southern Cebu was also imperative. In addition, there was a plan that an export processing zone was to be developed in the reclaimed land created in the south of Cebu city, and construction of an access road was also imperative. Therefore, expansion of the carriageway of Second Mactan Bridge to 4 lanes was needed in order to cope with the rapidly increasing traffic demand between Mactan Island and Cebu Island, and the safety of First Mactan Bridge needed to be enhanced through rehabilitation of the bridge.

1.2 Project Outline

The objectives of the project were to improve the traffic safety and efficiency in the connecting section between Cebu and Mactan Island by constructing the Second Mactan Bridge connecting between Cebu and Mactan Island and rehabilitating the existing First Mactan Bridge, and to alleviate traffic congestion in central Metro Cebu by constructing the Talisay section of the coastal road, thereby contributing to promotion of the economic development in Metro Cebu.

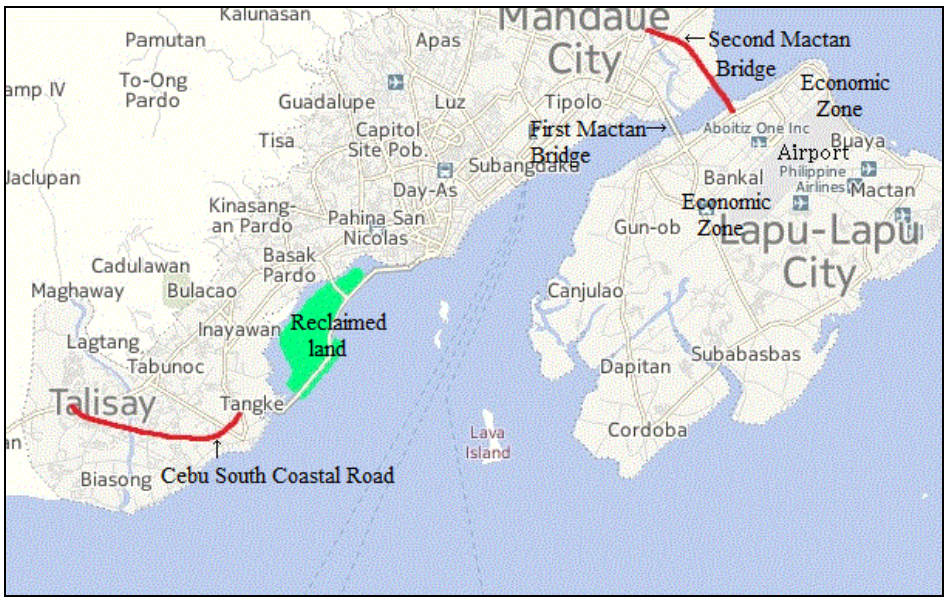


Figure 1: Location of Project Site

Loan Approved Amount/ Disbursed Amount	6,593 million yen/6,340 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 1997/March 1997
Terms and Conditions	Civil Work: Interest Rate: 2.70%, Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General untied Consulting Services: Interest Rate: 2.30% Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General untied
Borrower / Executing Agency(ies)	The Government of the Republic of the Philippines /Department of Public Works and Highways (DPWH)
Final Disbursement Date	June 2004
Main Contractor	Kajima Corporation/Sumitomo Const Co. J.V. Kajima Corporation
Main Consultant	Katahira and Engineers International, The Katahira & Engineers. Inc.
Feasibility Studies, etc.	Feasibility Study (for Second Mactan Bridge Construction Project), prepared by DPWH (December 1990), SAPROF (for Central Visayas Urban Development Plan) prepared by JICA (July 1988), Feasibility Study (for Metro Cebu Development (III)), prepared by DPWH (November 1989)
Related Projects	Japanese ODA Loan: Metro Cebu Development (I) (L/A signed in May 1989), Metro Cebu Development (II) (L/A signed in February 1990), Engineering Services for Metro Cebu Development (III) (L/A signed in June 1991), Second Mactan Bridge Construction Project (L/A signed in August 1993), Metro Cebu Development (III) Reclamation/Coastal Road (L/A signed in August 1995) Grant Aid: Supply of Materials and Construction of Rural Road Bridges (5 times since 1989)

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

Duration of the Study: October 2012 –September 2013

Duration of the Field Study: January 24 – February 13, 2013, April 14 – 27, 2013

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

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Philippines

Under the Mid-Term Development Plan 1993-1998, the following strategies were established: 1) attraction of foreign capital and investment through development of infrastructure and investment related system; 2) alleviation of poverty; 3) enhancement of people's quality of life; 4) promotion of decentralization based on the new Local Autonomy Act (1990); 5) strengthening of rural development by establishing President Office-run regional offices in Visayas, focusing on Cebu island and in Mindanao; and 6) reform of financial system. Objectives of the project matched with two strategies including 1) and 5) among above mentioned 6 strategies.

Under the current Philippine Mid-Term Development Plan 2011-2016, in order to achieve the inclusive growth, the government would address the following agendas: enhancement of governance, attraction of investment, infrastructure development by the PPP scheme, reforms of social security, strengthening of tax collection, and peace building/stable national security. With respect to the transport sector, improvement of quality of existing transport infrastructure, and development of transport networks and logistics are considered to be issues and challenges, and the following strategies are employed: provision of access to major tourism destinations and strategic production areas, identification and development of strategic logistics corridors, improvement of the road RORO[3] transport system, reinforcement of ASEAN connectivity through RORO and others.

3.1.2 Relevance with the Development Needs of Philippines

At the appraisal stage, increase of highway capacity (by construction of 4-lane Second Mactan Bridge)[4] connecting between Cebu main island and Mactan island, where an international airport and export processing zones are located, and enhancement of safety of First Mactan Bridge by rehabilitation were considered to most urgent issues to be tackled. In addition, construction of a detour road (Talisay section) connecting between the northern and southern Cebu regions was also urgent to alleviate traffic congestion in the central Cebu city.

Even now, First and Second Mactan Bridges, which both connect between Cebu main island and Mactan Island, where an international airport, export processing zones and resort areas in

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

2 ③: High, ② Fair, ① Low

3 Roll-on/roll-off ships are vessels designed to carry wheeled cargo such as automobiles, and large trucks, that are driven on and off the ship on their own wheels.

4 Under the original Second Mactan Bridge Construction Project (PH-P131), for which the loan agreement was signed in August 1993, the bridge was planned to be a 2-lane road. However, after the project commenced, the specification was changed to a 4-lane road.

the east coast are located, are key routes for the development of the Metro Cebu regional economy. Traffic passing the seriously damaged and deteriorated First Mactan Bridge (completed in 1973) is still limited to vehicles with less than 6 wheels. Although the bridge was to be rehabilitated under the project, the work was deleted from the project. The Second Mactan Bridge completed under the project is only the bridge which large vehicles can pass, and it is currently an extremely important link.

Construction of South Coastal Road (Talisay section) would contribute to alleviate traffic congestion in the central Cebu city through diverting some traffic on the seriously congested Cebu South Road to Cebu South Coastal Road constructed under the project. The project meets the development needs of Cebu City.

3.1.3 Relevance with Japan's ODA Policy

At the appraisal time, under the Country Assistance Policy for the Philippines for fiscal year 1997, the following agendas were listed as the priority agenda: 1) strengthening of economic infrastructure, 2) restructuring of industrial sector and agricultural development, 3) poverty alleviation and improvement of fundamental living environment, and 4) environmental protection. Among these agendas, regarding strengthening of the economic infrastructure, development of economic infrastructure including the transport sector was considered to be a high priority agenda.

Accordingly, the project has been highly relevant with the Philippine development plans and needs, as well as Japan's ODA policies. Its relevance is therefore considered high.

3.2 Effectiveness[5] (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Average Daily Traffic

1) Second and First Mactan Bridges

Average Daily Traffic on Second and First Mactan Bridges is shown in Table 1.

[5] Sub-rating for Effectiveness is to be put with consideration of Impact.

Table 1: Annual Average Daily Traffic on Second and First Mactan Bridges

Annual Average Daily Traffic (vehicles/day)	Actual Volume					
	2007	2008	2009	2010	2011	2012
Second Mactan Bridge						11,400 (16,000)
First Mactan Bridge	19,600 (25,900)	23,400 (33,200)	23,942 (33,700)	22,600 (32,000)	no counting data	no counting data

Source: Planning Division of DPWH Regional Office VII
Note 1: Opening date of Second Mactan Bridge is October 1999.
Note 2: Traffic volume is in absolute number (vehicles/day).
Note 3: Numbers in ( ) are traffic volume including motorcycles.
Note 4: Vehicles with less than 6 wheels are allowed to pass First Mactan Bridge.
Note 5: Daily traffic volume on the Second Mactan Bridge was estimated assuming that the actual day-time traffic volume counted from 6:00 to 7:00 on Wednesday, January 4, 2012 was 60% of the daily traffic.

The total traffic volume (all vehicles) in 2010 of First and Second Mactan Bridges was estimated at 71,200 vehicles per day, among which the traffic volume of the Second Mactan Bridge was estimated at about 40,000 vehicles/day under the lowest scenario case at the appraisal stage. Traffic counting has not been regularly undertaken for the Second Mactan Bridge since opening to traffic in October 1999. Before rehabilitation of expansion joints[6], traffic counting was undertaken during the day time (6:00 - 17:00) for one week in January 2012. According to the counting results, the traffic volume of the approach road at the Cebu city side was 11,400 vehicles/day (16,000 vehicles/day if motorcycles are included), which is about 40% of the projected volume. The reason for low actual traffic volume is that the approach section of First Mactan Bridge is closer to the city center at both the Cebu city side and Lapu Lapu city in Mactan Island. Even though the highway capacity of the bridge section (divided 4-lane) was expanded by the project, a bottleneck due to lack of highway capacity at the connecting road sections (particularly UN Avenue) is considered to be another reason.

The traffic volume of the First Mactan Bridge for the past three years during 2008 - 2010 was 23,000 - 24,000 vehicles/day (32,000 - 34,000 vehicles/day if motorcycles are included). Thus, it has likely reached the highway capacity for a two-lane highway and serious congestion has occurred during peak hours (106% of the projected volume).

2) Cebu South Coastal Road (Talisay section)

Annual Average Daily Traffic of South Coastal Road (Talisay section) is shown in Table 2.

[6] joints which prevents transferring force, separating structures with different natures.

Table 2: Annual Average Daily Traffic of South Coastal Road (Talisay section)

Unit: vehicles/day

	2010	2011
Annual Average Daily Traffic	20,300 (29,100)	21,300 (30,400)

Source: Planning Division of DPWH Regional Office VII
Note 1: A counting station is between Rafael Rabaya and Road San Roque Road along Talisay section
Note 2: Numbers in ( ) are traffic volume including motorcycles.

The traffic volume of the Talisay section in 2011 was 21,300 vehicles /day. Considering that it is a four-lane undivided highway, traffic congestion likely occurs during peak hours. The traffic volume of the parallel existing Cebu South Road for the past three years is shown in Table 3.

Table 3: Annual Average Daily Traffic of Cebu South Road

Unit: vehicles/day

	2010	2011	2012
Annual Average Daily Traffic	38,552	38,340	40,412

Source: DPWH
Note 1: A counting station is around Lawaan I
Note 2: Traffic volume includes motorcycles.

Considering that South Cebu Road is also a four-lane undivided highway, traffic congestion likely occurs during peak hours in some sections.

Table 2 shows that the traffic volume of South Coastal Road (Talisay section) reaches almost the highway capacity, and Table 3 shows that South Road (existing national road) has the traffic volume, which also reaches the highway capacity. From two tables, it is considered that all day South Road have been heavily congested if South Coastal Road (Talisay section) had not been constructed. It is clear that South Coastal Road (Talisay section) has contributed to alleviation of traffic congestion in the central Metro Cebu by diverging the traffic heading Cebu city center or coming out from the city center.

(2) Travel Time: Cebu South Coastal Road (Talisay Section)

The travel time by passing the old road, and by South Coastal Road (the project road) was compared in the section between Lawaan I (intersection with Talisay Road) in the south along Cebu South Road and Carreta Cemetery in Cebu city. The result indicates that the travel time of the route passing South Coastal Road (project road) is shorter by 14 minutes.

Table 4: Travel Time

Road	Distance	Operational Speed	Travel time (min)
South Cebu	11.3km	30km/hr	23
South Coastal	8.6km	60km/hr	9

Source: Responses to the Questionnaire
Note: Travel time between Lawaan I (intersection with Talisay Road) and Carreta Cemetery in Cebu

3.2.2 Qualitative Effects

As qualitative effects, the followings are recognized.

1) Since only the vehicles with less than 6 wheels are allowed to pass the First Mactan Bridge, large vehicles pass Second Mactan Bridge only. This results in segregation of passable route by type of vehicle, and it has contributed to enhancement of logistics efficiency between Cebu city and Mactan Island because of increase of efficiency (however, only during the period when the total traffic volume of both bridges is much less than the highway capacity).
2) Since the highway capacity was increased because of completion of Second Mactan Bridge and Cebu South Coastal Road, the project contributes to improvement of traffic condition in the central urban area of Cebu.
3) The access from the Cebu southern district (Naga) to Mactan Island (Mactan International Airport, Economic Zones I and II, and resort areas in the east coast are located) was improved by diverting the central Cebu city and passing First and Second Mactan bridges, the travel time was shortened (by about 15 minutes in average).

3.3 Impact

3.3.1 Intended Impacts

Since data on economic indicators by city in Metro Cebu including Mandaue, Cebu, Talisay, and Lapu Lapu in Mactan Island are not available, it is not possible to examine the impact on economic development and activation in quantitative terms. However, the executing agency testifies that the project has greatly contributed to the economic development and activation in the Metro Cebu region because of the following reasons. Since only the vehicles with less than 6 wheels are allowed to pass the First Mactan Bridge, upon completion of the project, merchandise produced in the Mactan Economic Zones to Cebu port, tourists arriving at Mactan Airport to Cebu city, air cargo to Cebu city, and foods/supplies to luxurious resort hotels in the Mactan east coast, which are fundamental to the economic development in the Metro Cebu region, are all transported by large vehicles (trucks and buses).

3.3.2 Other Impacts

(1) Impacts on the natural environment

According to the Project Completion Report, during the project implementation for the Second Mactan Bridge, watering, speed control, installation of traffic signs, provision of detour roads, and enforcement of traffic regulations were done in order to cope with issues regarding dust, noise, vibration and traffic management. With respect to South Coastal Road (Talisay section), planting was undertaken along the roadside and consideration has been given to the landscaping aspects. According to the implementing agency, no adverse impact to the natural environment by the project has been noted during the project implementation stage and after the project completion.

(2) Land Acquisition and Resettlement

Under the Second Mactan Bridge Project, land acquisition and resettlement have occurred. There were some cases in which land owners and residents could not reach an agreement about the amount for compensation, and some cases were left to the court for arbitration on the amount to be paid. However, since time has passed after the project implementation (14 - 15 years), details are unknown. Compensation for resettlement was paid to about 350 households in the Talisay section of the Coastal Road.

(3) Other Positive and Negative Impacts

Cebu City is a tourist city, which has beach resorts in Mactan Island off the coast of Cebu, and some remnants from the colony era in the city. The extradosed cable-stayed[7] bridge constructed under the project is a new landmark for tourism for the city.

Since rehabilitation of First Mactan Bridge was cancelled from the scope of the work under the project, the project has not contributed to enhancement of safety at First Mactan Bridge. The traffic volume of the Second Mactan Bridge, which was constructed under the project, and is only the bridge trucks can pass, was lower than the planned volume, and thus, the project somewhat achieved its objectives in terms of improvement of safety and efficiency of transport between Cebu Island and Mactan Island. Since Coastal Road (Talisay section) has been well used so that traffic congestion likely occurs during peak hours, the project has largely achieved its objectives. Combining two projects, the project has somewhat achieved its objectives, and therefore, the effectiveness is fair.

[7] Bridge structure, in which the main deck is supported by main tower and diagonal cables.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The original and actual output of the project is shown in Table 5.

Table 5: Output (original and actual)

	Scope of Work at appraisal for Second Mactan Bridge Project	Scope of Work at appraisal for Second Mactan Bridge Project (II)	Scope of Work at project completion for Second Mactan Bridge Project (II)
Second Mandaue - Mactan Bridge			
Civil Work :	・ Second Mactan Bridge (bridge length: 998m, 2 lanes) ・ Approach Road (length: 1.2km viaduct, 2 lanes)	・ Second Mactan Bridge (main bridge length: 410m, 4 lanes) ・ Approach Road (total length: 2,948m: (viaduct 600m, approach road 2,348m) 4 lanes) ・ Rehabilitation of First Mactan Bridge (length: 860m)	・ Second Mactan Bridge (main bridge length: 410m, 4 lanes) : as planned ・ Approach Road (total length: 3,292m: viaduct 635m 、 approach road 2,657m) ・ Flyover for left turn traffic 192m: (additional work) ・ Rehabilitation of First Mactan Bridge (860 m) :cancelled
Consulting Services :	1) Geotechnical investigation /review of bridge type 2) Detail designs (No. of lanes for super-structures to be determined after completion) 3) Assistance in bidding activities 4) Construction supervision	1) Toll road study 2) Detail designs for First Mactan Bridge rehabilitation 3) Construction supervision Foreign : 31 + 83 = 114 M/M Local : 91 + 100 = 191 M/M Local Office Staff : 214 + 277 = 491 M/M	Scope of work was as planned.
Cebu South Coastal Road			
Civil Work :		・ Construction of Talisay section (length: 4.3km,4 lanes)	・ Construction of Talisay section (length: 4.5km,4 lanes)
Consulting Services :		1) Review of detail designs 2) Assistance in tendering activities 3) Construction supervision Foreign: 24 M/M Local: 123 M/M Local Staff: 197 M/M Total: 344M/M	Scope of work was as planned. Foreign: 41 M/M Local: 136 M/M Local Staff: 215 M/M Total: 392M/ M

Source: JICA appraisal documents, Project Completion Report, Final reports prepared by the consultants

Major changes made on the Scope of Work are as follows:

1. It was foreseen that the originally planned 2-lane bridge would reach the highway capacity in 3 to 5 years after commissioning the project based on the traffic volume analysis conducted in 1995. Thus, the carriageway was expanded to 4 lanes under the project.
2. The approach viaduct/roads were extended in order to apply gentler slope.

3. The left-turn flyover was constructed at the Mactan side in order to introduce the smoother traffic flow.
4. A connecting point with the existing road was moved to more city center side at the Mandaue side.
5. Rehabilitation of the First Mactan Bridge (860m) was cancelled from the project by request of the local government. (the estimated construction cost at appraisal was about 210 million Japanese yen.)
6. The originally planned toll collection facilities to be needed to operate as a toll road were cancelled from the project, since it was changed to a toll free road. (the estimated construction cost at appraisal was about 160 million Japanese yen.)

Left-turn Ramp at Mactan side
Second Mactan Bridge

Coastal Road (Talisay section)

3.4.2 Project Inputs

3.4.2.1 Project Cost

The originally estimated project cost including both phases (this project and the preceding project) at appraisal was 18,602 million yen, of which the total Japanese ODA loan was 13,465 million yen. The actual project cost at completion was 15,647 million yen, which is equivalent to 84% of the planned cost and the Japanese ODA loan disbursed was 13,060 million yen. However, if the exchange rates at appraisal (1 peso = 4.5 yen) and at implementation (1 peso = 3.31 yen) are taken into consideration, the actual project cost in local currency is equivalent to about 114% of the planned cost since Japanese yen appreciated by 25%.

Table 6: Comparison of Project Cost (Planned and Actual)

unit: million yen

Item	Planned					Actual				
	Foreign ODA loan	Local		Total		Foreign ODA loan	Local		Total	
		Own fund	ODA loan	Total	ODA loan		Own fund	ODA loan	Total	ODA loan
Second Mactan Bridge (Preceding project)										
1) Civil Work	4,336			5,751		3,469	256	2,254	5,979	5,723
2) Consulting Services	598			828		943	28		971	943
3) Price escalation	434			574		0	0		0	0
4) Physical contingency						0	0			
5) Land acquisition / compensation	0			615		0	720		720	0
6) Taxes	0					0	0		0	0
Total	5,368			7,768	6,872	4,412	1,004	2,254	7,670	6,666
Second Mactan Bridge (II) : (this project)										
1) Civil Work	2,490			5,623					3,981	3,838
2) Consulting services	634			692					400	360
3) Price escalation	511			1,003						
4) Physical contingency										
5) Land acquisition / compensation	0			1,125			1,312		1,312	
Total	3,635			8,443	5,286				5,693	4,198
Total of two phases	**9,003**			**16,211**	**12,158**				13,353	10,864
Cebu South Coastal Road: this project										
1) Civil work	689			1,145		1,903	138	27	2,068	1,930
2) Consulting services	61			169		130	4	82	216	212
3) Price escalation	40			68						
4) Physical escalation	73			121						
5) Land acquisition / Compensation	0			888			Included in PH-P158			
Total	863			2,391	1,307				2,284	2,142
Total of this project	4,498			10,834	6,593				7,977	6,340
Total of this project and the preceding project	9,866			18,602	13,465				15,647	13,006

Source: Appraisal documents, Ex-Post Evaluation Report for Second Mactan Bridge, Final Reports prepared by supervision consultants

Foreign exchange rates:

at appraisal for the original project 1 US$ = 124 yen, 1 Peso = 5 yen (July 1994); at appraisal for the subject project (PH-P175) 1 US$ = 106 yen, 1 Peso = 4 yen (March 1997): rate during the project implementation (1996.10 - 1999.10) 1 Peso = 2.62 yen; rate used by consultants for the Talisay Road section 1 Peso = 1.9 yen (information provided by the consultants.)

Note 1: The original scope of work included construction of a two-lane Second Mactan Bridge connecting between Cebu and Mactan Island, construction of a two-lane approach road, and consulting services.

Note 2: This project (Second Mactan Bridge (II)) includes expansion of roadway at the Second Mactan Bridge and its approach road sections from 2 lanes to 4 lanes, rehabilitation of the First Mactan Bridge (cancelled from the project) and consulting services.

Main reasons for increase and decrease of the project cost are as follows:

1. Rehabilitation of the First Mactan Bridge (860m) was cancelled. (the estimated construction cost at appraisal was about 210 million Japanese yen.)
2. The originally planned toll collection facilities to be needed to operate as a toll road was cancelled, since it was changed to a toll free road. (the estimated construction cost at appraisal was about 160 million Japanese yen.)
3. Change of foreign exchange rate (1 peso = 4.5 yen at appraisal and 1 peso = 3.31 yen at implementation). The actual project cost in Japanese yen is lower than the planned cost by about 16% due to yen appreciation.
4. Addition of a left-turn flyover (about 168 million peso or about 524 million yen)
5. Installation of vibration damper for stay cables and others (about 85 million peso or about 265 million yen)

3.4.2.2 Project Period

The original project period planned for Second Mactan Bridge at appraisal was from March 1997 (signing of the Loan Agreement) to August 1999 (planned opening date) with a total period of 30 months. The actual project period was also from March 1997 to August 1999 (official opening to traffic) with a total period of 30 months, which is exactly as planned. The original project period planned for South Coastal Road (Talisay section) was from March 1997 (signing of the Loan Agreement) to April 2000 (civil work completion) with a total period of 38 months. The actual project period was from March 1997 to May 2004 (civil work completion) with a total period of 87 months, which is equivalent to 228% of the plan. Thus, the project period significantly exceeded the planned period.

Second Mactan Bridge was open to traffic in August 1999 as planned. However, commencement of the work for South Coastal Road (Talisay section) was delayed since the subject section was included as a segment under the previous coastal road project (Metro Cebu Development (III)) and thus contractors were to be procured by contract package (segment). Conclusion of a contract with a consultant was delayed, and succeeding design reviews and selection of contractors were also delayed resulting in about three and half years delay at the stage of civil work commencement. Moreover, since some problems regarding land acquisition occurred during the project implementation, the project was further delayed by half a year resulting in four years delay in total.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

(1) Financial Internal Rate of Return (FIRR)

Although the Second Mactan Bridge was planned to be a toll road at the appraisal stage,

FIRR was not calculated. During the project implementation, the bridge was changed to a toll-free road.

(2) Economic Internal Rate of Return (EIRR)

EIRR at ex-post evaluation, which was recalculated using the same condition and assumption made for calculation of the EIRR at the original appraisal time, is shown in Table 7. (Recalculation was made by the implementing agency.)

Table 7: EIRR (at planning/at post evaluation)

	at planning	at post evaluation
Second Mactan Bridge (II)	17.4%	Not possible
Cebu South Coastal Road	19.1%	17.4 (recalculated by DPWH)

Source: Numbers at the planning stage were from JICA appraisal documents.
Cost: construction cost, operation and maintenance costs
Benefits: Vehicle Operating Costs (VOC) saving and time saving

EIRR for the Second Mactan Bridge at the post evaluation stage was not recalculated since the data and information on each benefit item to calculate benefits was not available.

Regarding outputs, the scope of work was partly revised including cancellation of rehabilitation of the First Mactan Bridge. Although the project cost was within the plan, the project period significantly exceeded the plan. Therefore, efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

DPWH Regional Office VII was originally to be responsible for maintenance of the Second Mactan Bridge upon completion. However, the management of the road section including the bridge section was not transferred and thus, not classified as a national road until February 2013. (The bridge section was included in the national road network on February 14, 2013.) Thus, Cebu 6 District Engineering Office of Regional Office VII had been undertaking the minimum routine and periodic maintenance work. The District Engineering Office has about 40 regular staffs, and among those 8 staffs are responsible for maintenance work, with additional about 17 roadside maintenance workers. Cebu 2 District Engineering Office of DPWH Regional Office VII (with 230 regular staffs) has been responsible for maintenance of the Talisay section of the Coastal Road upon completion of the work. The District Engineering Office has about 55 regular staffs, and among those 9 staffs are responsible for maintenance work, with additional about 35 roadside maintenance workers. In addition, the Office employs about a few dozen

temporary staffs. A maintenance worker is assigned every 3.5km for routine maintenance work of roads.

3.5.2 Technical Aspects of Operation and Maintenance

DPWH has developed and posses various manuals including those for road repair/maintenance, road maintenance activity, and road safety. For a newly employed staff, training is undertaken using DPWH's manuals and he/she is assigned to the field work. The routine maintenance work has been undertaken by force account, and technicians and workers have sufficient technical skills. The periodic maintenance work (such as replacement of expansion joints) and major rehabilitation (such as overlay), which require special equipment and skills are undertaken by contractors, who were selected through the competitive bidding process.

Coastal Road (Talisay Section)

Second Mactan Bridge (Mandaue Side)

3.5.3 Financial Aspects of Operation and Maintenance

As mentioned above, since the Mactan Bridge section had not been officially classified as a national road, the normal maintenance budget has not been allocated to the section. In the original plan, the bridge section was designed as a toll road, and the collected revenue was to be used for maintenance. However, since the Cebu Provincial government has objected to the original proposal and toll collection has not been realized.

Since completion of the bridge in October 1999, Cebu 6 District Engineering Office has allocated budget to the maintenance work for the bridge section by diverting some from the maintenance budget allocated to roads under the District Engineering Office. However, it has received additional budget for major urgently needed rehabilitation and improvement work separately from DPWH Headquarters. From 2012 to 2013, replacement of expansion joints was made by spending 20 million peso, and currently (2013) overlay has been undertaken with the budget of 30 million peso. The budget for routine maintenance work for the Second Mactan Bridge section will be soon allocated.

The maintenance budget for routine maintenance of national roads including roads constructed under the project is provided directly to a District Engineering Office following the DPWH's standard norm and formula. Concerning the 2013 budget, 67,387 peso/km/year from the DPWH general budget, and additional 24,745 peso /km/year from the vehicle user charges, totaling about 92,000 peso/km/year is to be allocated to the roadway section. Budget of 30,700 peso/km/year is allocated to the bridge/viaduct section (e.g. for old bridges). The maintenance cost spent by Cebu 2 District Engineering Office for the Talisay section under the project for the past five years is shown in Table 8.

Table 8: Maintenance Costs (Cebu 2 District Engineering Office)

Unit: peso

	Maintenance costs	Maintenance work
2008	1,891,153	Reconstruction/improvement, marking, planting
2009	509,000	Installation of traffic signs, planting
2010	185,956,496	Road safety improvement, traffic signs, planting
2011	96,727,456	Road safety improvement, traffic signs
2012	57,088,259	Repaving, overlay, road markings

Source: Responses to the Questionnaire

3.5.4 Current Status of Operation and Maintenance

Since Second Mactan Bridge was open to traffic in October 1999, Cebu 6 District Engineering Office has been undertaking routine maintenance for the bridge section by diverting some from the maintenance budget allocated to roads under the District Engineering Office. Replacement of expansion joints conducted from last year has been completed and overlay is currently being implemented. From the ocular inspection during the field study, no particular major damage or distress was observed. However, although 13 years have passed since the bridge was open to traffic, major rehabilitation and improvement has not been undertaken. Thus, major rehabilitation and improvement work needs to be done in the near future. Before rehabilitation and improvement to be made, firstly thorough inspection of structures and members should be conducted. As mentioned above, on February 14, 2013 the Second Mactan Bridge section was officially included in the national road network, and Cebu 6 District Engineering Office can request for a budget for maintenance directly to DPWH Headquarters. Thus, it will be much easier to plan and make strategies not only for the routine maintenance work, but also periodic maintenance work and major rehabilitation/improvement work. Moreover, since the Second Mactan Bridge is the first extradozed bridge in the Philippines, the training program on maintenance methodology for special bridges is now being planned by JICA. A special bridge inspection vehicle will be also provided by JICA, and the inspection and review/planning of repair methods could be easily made.

During the field inspection of the Talisay section of Coastal Road, it was observed that

overlay has been partly implemented. However, rehabilitation of bridge joints has not been undertaken. Moreover, along the roadway, planting has been made, and consideration has been given to the aesthetic aspects. No major damages and distress were observed, and thus it seemed that maintenance has been properly undertaken.

The management of the Second Mactan Bridge was officially transferred to DPWH in February 2013, which is more than ten years after opening of the bridge in 1999. Until now, the minimum maintenance work has been undertaken. The maintenance for special bridges, which are new to the Philippines, has just commenced. Thus, it is difficult to judge at this moment whether or not a proper maintenance system (institutionally, technically, financially) would be established. Since provision of special equipment and training on the maintenance technology is planned by JICA, improvement on maintenance is expected. A thorough and detailed inspection, which has not be done yet, should be first conducted. At this moment, it is uncertain whether or not a proper maintenance work would be implemented, even taking into account possible effects of JICA technical assistance. Thus, some problems in terms of management, financial and technical aspects have been observed, therefore sustainability of the project effect is considered fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objectives of the project were to improve the traffic safety and efficiency in the connecting section between Cebu and Mactan Island by constructing the Second Mactan Bridge connecting between Cebu and Mactan Island and rehabilitating the existing First Mactan Bridge, and to alleviate traffic congestion in central Metro Cebu by constructing the Talisay section of the coastal road, thereby contributing to promotion of the economic development in Metro Cebu. The project has been highly relevant to the development plans and needs of the Philippines, as well as Japan’s ODA policies. Regarding improvement of the safety and efficiency of the transport between Cebu and Mactan Island, and alleviation of traffic congestion in the central Metro Cebu, which were both the development objectives, the project has somewhat achieved its objectives. Thus, the effectiveness is fair. Although the project cost was within the plan, the project period was significantly longer than planned. Therefore, efficiency of the project is considered fair. Some problems have been observed in terms of institutional and financial aspects for operation and maintenance, therefore sustainability of the project effect is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

It is recommended to regularly conduct traffic counting at the same location and same time of the year. The traffic volume is a fundamental data in planning and programming its yearly and future maintenance and management work, and for preparation of future road development plans. The Maintenance Division could be an appropriate unit responsible for collecting data on traffic count, and analyzing and storing the data.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

From the planning stage, consideration needs to be fully given to balance of highway capacity at the bridge section and of connecting/crossing roads (e.g. planning of a grade separation at the intersection where a connecting road and a crossing road intersect), and to the highway network in the city[8].

[8] The above mentioned “lessons learned” was introduced at the DPWH Regional Office during the second field visit. DPWH staff agreed with the proposal and informed that they were now planning to make the some section along UN Avenue an excavated structure (underpass) and to construct a left-turn ramp for traffic from Mactan Island to the Cebu city center at the intersection connecting with Plaridel Street.)

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Output		
Second Mandaue - Mactan Bridge: Civil Work	・ Second Mactan Bridge (main bridge length: 410m, 4 lanes)	・ Second Mactan Bridge (main bridge length: 410m, 4 lanes) : as planned
	・ Approach Road (total length: 2,348m: viaduct 600m, approach road 2,448m 4 lanes)	・ Approach Road (total length: 3,292m: viaduct 635m, approach road 2,657m)
		・ Flyover for left turn traffic 192m: (additional work)
	・ Rehabilitation of First Mactan Bridge (length: 860m)	・ Rehabilitation of First Mactan Bridge (860 m) :cancelled
Consulting services	1) Toll road study 2) Detail designs for First Mactan Bridge rehabilitation 3) Construction supervision	as planned
Cebu South Coastal Road: Civil Work	・ Construction of Talisay section (length: 4.3km,4 lanes)	almost as planned
Consulting services	1) Review of detail designs 2) Assistance in tendering activities 3) Construction supervision	as planned
	Foreign : 24 M/M Local : 123 M/M Local Staff : 197 M/M Total : 344M/M	Foreign : 41 M/M Local : 136 M/M Local Staff : 215 M/M Total : 392M/ M
2. Project Period	Second Mactan Bridge: March 1997 -August 1999 (30 months) Coastal Road: March 1997 - April 2000 (38 months)	Second Mactan Bridge : March 1997 -August 1999 (30 months: as planned) Coastal Road: March 1997 - May 2004 (87 months)
3. Project Cost		
Amount paid in Foreign currency	9,866 million yen	Unknown
Amount paid in Local currency	8,736 million yen	Unknown
Total	18,602 million yen	15,647 million yen
Japanese ODA loan portion	13,465 million yen	13,006 million yen
Exchange rate	1 Peso = 5 yen Second Mactan Bridge 1 Peso = 4 yen Second Mactan Bridge (II)	1 Peso = 2.62 yen (average between October 1996 and October 1999) 1 Peso = 1.9 Yen (consulting services for the Talisay section