

Republic of the Philippines
Metro Manila Interchange Construction Project (IV)¹

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Field Survey: November 2007-June 2008

1. Project Profile and Japan's ODA Loan



Location of Project Site



EDSA/Quezon Interchange
Flyover along EDSA

1.1 Background

According to the Metro Manila Urban Development Master Plans (by JICA in 1973 and by IBRD in 1977), the Philippine Government has made efforts to develop a major highway network in Metro Manila, which consists of six circumferential roads and 10 radial roads. However, the road development has not kept pace with the increase of traffic – an annual growth rate of more than 9% – as a result of the rapid increase in population and economic development. Particularly, Epifanio de Los Santos Avenue (EDSA) and Circumferential Road-5 (C-5) are the most important and most heavily traveled circumferential roads and the level of congestion was becoming a concern. The total average daily traffic volume as of 1995 was approximately 200,000 vehicles per day. Even though the outer circumferential road, C-5 (partly funded by JBIC) was expected to shoulder the traffic along EDSA, C-5 was already congested as well.

Congestion at at-grade intersections was the primary reason for the congestion along circumferential roads. In order to alleviate the congestion on these major highways, the Philippine Government has been implementing projects to grade separate all intersections where EDSA and C-5, and radial roads cross. JBIC has been providing financial assistance to the grade separation projects under the “Metro Manila Urban Road

¹ The ex-post evaluation for this project was jointly conducted with the Philippines' National Economic and Development Authority..

Development Projects: Phases I-III,” the “Engineering Study Package Loan” and other projects. A total of 27 billion yen has been provided. The subject project will further the grade separation efforts.

1.2 Objective

The project objective is to facilitate economic and social development in Metro Manila by alleviating the traffic congestion, which is becoming increasingly serious, improve the living environment through the construction of three interchanges, and undertake detailed designs for four interchanges at major intersections along EDSA and C-5, which are the most important and heavily congested circumferential roads.

The location of the project site is shown in Figure 1.



Figure 1 Location of the project site

1.3 Borrower/Executing Agency

Government of the Republic of the Philippines/Department of Public Works and Highways (DPWH)

1.4 Outline of Loan Agreement

Loan Amount/Disbursed Amount	5,849 million yen/5,096 million yen
Exchange of Notes/Loan Agreement	September 1998/September 1998
Terms and Conditions	
-Interest Rate	2.2%; Consultant: 0.75%
-Repayment Period (Grace Period)	30 years (10 years); Consultant: 40 years (10 years)
-Procurement	Partially Untied
Date of (Disbursement) Completion	January 2005
Main Contractors	Sumitomo Construction (Japan) , China State Construction Engineering (China)
Consultant Services	DCCD Engineering Corporation (Philippines) • Pertconsult.(Philippines) • Dainippon Consultant-JV, Japan Overseas Consultant • TCGI Engineers (Philippines) -JV Proconsult (Philippines) • United Technologies (Philippines) • Katahira and Engineers International-JV Proconsult (Philippines) • Katahira and Engineers International-JV Design Science (Philippines) • RENARDET S.A. (Philippines) • Pacific Consultants International-JV
Feasibility Study	Japan International Cooperation Agency M/P (1973) Japan International Cooperation Agency MMUTIS (1998)

2. Evaluation Results (Rating: B)

2.1 Relevance (Rating: a)

2.1.1 Relevance at the time of appraisal

The basic objective of the Medium-Term Philippines Development Plan 1999-2004 (MTPDP) is to achieve economic growth. In pursuing this goal, six specific objectives were identified. One of the objectives is to accelerate infrastructure development. At the appraisal stage, roads in Metro Manila suffered from chronic congestion due to insufficient transport infrastructure, which could not cope with the increased traffic volume resulting from a rapidly growing population and economic development. The main reason for congestion on main roads was congestion at major at-grade intersections. The Philippine Government has been implementing projects to grade separate all intersections where EDSA and C-5, and radial roads cross in order to alleviate congestion and traffic jams. At the appraisal stage, JICA's "Metro Manila Urban Transport

Improvement Study (MMUTIS)” was being undertaken, and the report concluded that the grade separation of intersections along EDSA and C-5 was essential.

The traffic volume (in average daily traffic) of three intersections to be improved under the project was as follows: 140,000 veh./day at EDSA/Quezon; 80,000 veh./day at C-5/Boni Serrano; and 90,000 veh./day at C-5/Ortigas. Thus, early commencement of interchange construction was anticipated to alleviate traffic congestion. The traffic volume of the four intersections for which detailed designs were to be undertaken was as follows: 180,000 veh./day at EDSA/Roosevelt; 190,000 veh./day at EDSA/North/West; 130,000 veh./day at C-5/ Kalayaan; and 60,000 veh./day at C-5/ Lanusa/Julia Vargas. It was necessary for the detailed designs to be completed quickly so that interchange construction could begin as required. Once seven interchanges, among which four interchanges would be detailed designed and three interchanges be constructed under the proposed project, were grade separated, almost all the interchanges along EDSA and C-5 would have been grade separated. Thus, the project was highly relevant to national development needs.

2.1.2 Relevance at the time of evaluation

The basic objective of the current Medium-Term Philippines Development Plan 2004-2010 (MTPDP) is to fight poverty, through a particular focus on spurring economic growth and employment creation. In the 2007 State of the Nation Address, President Arroyo reconfirmed the priorities and objectives of the MTPDP, which are as follows: i) increase global competitiveness; ii) provide quality infrastructure; and iii) link the entire country by providing a network of infrastructure. The Government will prioritize strategic infrastructure projects that are critical to stimulating trade and investments among the priority agenda in the transport sector: i) roll-on roll-off (RORO) ports and highways connecting them; ii) road and rail system that will alleviate congestion in Metro Manila; iii) road and airport tourism hubs; and iv) affirmative action projects for Mindanao and other highly impoverished conflict-ridden areas.

Taking the strategic allocation of limited budget into account, DPWH has decided to give priority for the development of road infrastructure in the following order: i) maintenance of the existing assets; ii) rehabilitation of deteriorated sections; iii) improvement and widening of the congested sections; and iv) new construction and elimination of missing links in the road network.

The traffic volume (in average daily traffic) of each intersection as of October 2007 was as follows: 195,000 veh./day at EDSA/Quezon; 80,000 veh./day at C-5/Boni Serrano; and 158,000 veh./day at C-5/Ortigas. Except at C-5/Boni Serrano, the traffic volume has substantially increased over the past 10 years. Thus, the objective of the subject project

fulfills the need to alleviate the traffic congestion which has worsened each year.

The objective of the subject project is consistent with the government development policies at the time of appraisal and at ex-post evaluation and the project is highly relevant to national development needs.

2.2 Efficiency (Rating: b)

2.2.1 Outputs

The project description and output are shown in Table 1. As shown in the table, there were a number of revisions to the scope of works and quantities of the civil work. Due to the number of revisions that were made during implementation, it is extremely difficult to verify the appropriateness and rationale for each change order and revised scope of work, taking into consideration the condition of the project site and situation upon completion of the project. However, since the supervising engineers have approved and verified the revisions and changes, it is considered that these revisions were appropriate and reasonable. Regarding the detailed designs for the four interchanges, the scope of work was also partially revised compared to the original scope. Concept designs included in a feasibility study were used as the basis for the detailed designs. Since the detailed designs are made taking into consideration the field conditions which become clear through field surveys and geotechnical investigations, revisions in quantity and variations in construction scope commonly occur. It is considered appropriate and reasonable since these revisions would have been made based on the results of the detailed field surveys and reconnaissance.



C-5/Boni Serrano Interchange



C-5/Ortigas Interchange

Table 1: Project Description and Output

Item	Planned	Actual	Reason for Changes
1-1. Civil Work			
EDSA/ Quezon Boulevard:	<ul style="list-style-type: none"> • Two (2) 545-meter, 3-lane second-level flyovers along EDSA (Northbound and Southbound) • 581-meter, 4-lane underpass along Quezon Avenue • Service lanes: Northbound and Southbound of EDSA and Eastbound and Westbound of Quezon Avenue 	<ul style="list-style-type: none"> • Two (2) 548-meter, 3-lane flyovers along EDSA beside the existing MRT (Northbound and Southbound): as planned • 4-lane underpass along Quezon Avenue at EDSA and Agham (300m added resulting in 890m) • Service lanes: 2-5 lanes along EDSA, and 3-5 lanes along Quezon: as planned • Provision of a permanent pumping station (additional work) 	<p>Reason for extension: Per request of local community, the contacting point of an underpass at the ground level was extended to the next intersection - Pragmatic.</p> <p>Reason for addition: Due to expansion of an underpass, the rain catch area was enlarged to prevent recurrence of floods due to continuous rain.</p>
C-5/Boni Serrano	<ul style="list-style-type: none"> • 230-meter, 6-lane flyover along C-5 connecting E. Rodriguez Avenue to Boni Serrano Avenue • 650-meter, 4-lane underpass along Katipunan • At-grade 6-lane deck girder bridge at Boni Avenue 	<ul style="list-style-type: none"> • 475-meter, 4-lane flyover along C-5 connecting with E.Rodriguez and Boni Serrano (quantity and scope revised) • 203-meter, 4-lane tunnel including approach roads toward Boni Serrano and Katipunan (shortened) • Service roads along Boni Serrano (North & Southbound): as planned • Eastbound and Westbound service roads along E. Rodriguez and Katipunan (additional work) 	<p>Priority was given to the traffic flow to C-5.</p> <p>Reason for addition: Since a tunnel was constructed to connect Boni Serrano and Katipunan, service roads needed to be constructed for traffic at ground level.</p>
C-5/Ortigas Avenue	<ul style="list-style-type: none"> • 694-meter, 4-lane flyover along C-5 • 365-meter, 2-lane left-turn flyover • 427-meter, 2-lane flyover along Ortigas • Steel pedestrian overpass along Ortigas 	<ul style="list-style-type: none"> • 694-meter, 4-lane, 3-level flyover along C-5 separated by 1.5-meter median: as planned • 232-meter, 2-lane left-turn flyover from Cainta side to Barangay Ugong (quantity revised) • Excluded from this project • Excluded from this project 	<p>DPWH deferred the construction of the 2-lane flyover and the pedestrian bridge components.</p>
1-2. Consultant Services (Assistance in procurement activities and supervision)	<p>International 112M/M Local 1,037M/M Supervision of three interchanges</p>	<p>International 176.72M/M Local 1,961.47M/M Contents of services are as planned</p>	
2-1. Detailed Designs			
EDSA/Roosevelt Avenue:	<ul style="list-style-type: none"> • 400-meter, 6-lane flyover along EDSA 	<ul style="list-style-type: none"> • 729-meter, 6-lane flyover along EDSA (quantity revised) 	•
EDSA/North/West Avenue:	<ul style="list-style-type: none"> • 500-meter, 6-lane flyover along EDSA • 4-lane underpass along North • 4-lane underpass along West 	<ul style="list-style-type: none"> • 853-meter, 3-lane second level flyover along EDSA, Northbound • 569-meter, 3-lane second level flyover along EDSA, Southbound • 980-meter, 3-lane third level flyover from West Avenue to North Avenue • 1,229-meter, 3-lane third level flyover from EDSA to North 	

		Avenue • 306-meter, 2-lane left-turn flyover to Mindanao Avenue (revision of quantity and scope, additional designs)	
C-5/Kalayaan Avenue:	• 650-meter, 6-lane flyover along C-5	• 750-meter, 6-lane underpass along C-5	
C-5/Lanusa/Julia Vargas Street:	• 500-meter, 2-lane flyover to C-5 Lanuza Street • 500-meter, 2-lane flyover to C-5 from Julia Vargas	• 326-meter, 2-lane flyover along C-5 at Lanuza Street (southbound) • 276-meter, 2-lane flyover along C-5 at from Julia Vargas (quantity revised) (southbound)	
2-2. Consultant Services (Detailed designs)	International 60M/M Local 559M/M	International 76.5M/M Local 710.5M/M	

2.2.2 Project period

The planned project period at time of appraisal was from September 1998 (L/A signed month) to December 2000 (civil work completion date) with a total period of two years and four months. The actual period was from September 1998 to February 2005 (civil work completion date) with a total period of six years and six months, resulting in about a four-year delay; at 279% compared with the planned period. The main reasons for delay are as follows:

- (1) It took about two and a half years to select contractors due to the long clearance process at each stage of procurement.
- (2) The planned construction period at time of appraisal was 17 months. However, the actual construction period needed for each interchange was 30, 36 and 27 months and effectively doubled the planned period.
- (3) Commencement of land acquisition activities including resettlement was delayed² and the originally planned period of one-and-a-half to two-and-a-half years for land acquisition was extended. Land acquisition required six years and 10 months for C-5/Boni Serrano Interchange and three years and seven months for C-5/Ortigas Interchange.
- (4) Design changes were made to adjust the design to reflect field conditions and resulted in extension to the construction period.

It is considered that at the appraisal stage, the period needed for procurement was underestimated. At the appraisal stage, the period needed for civil work was estimated to be 17 months based on the proposal in the feasibility study, which was prepared by foreign experts. However, it is considered that two-and-a-half to three years were needed

² Land acquisition activities continued even after civil work commenced.

taking into account the scope of work. The construction period was also underestimated. Furthermore, consultant selection for the detailed designs took longer than expected. However, since designs were completed in six months against the original plan of 12 months, this activity did not affect the implementation progress of the project.

Table 2: Project Period (Planned and Actual)

Item	Planned		Actual	
	Start	Completion	Start	Completion
Civil Work				
EDSA/Quezon				
LA ³ • Resettlement	04/1997	08/1999	06/2000	06/2001
Consultant selection	12/1997	12/1998	03/1998	04/1999
Tendering for works	05/1998	08/1999	07/1998	12/2000
Construction period	08/1999	12/2000	01/2001	06/2003
C-5/Boni Serrano				
LA • Resettlement	04/1997	08/1998	01/1998	10/2004
Consultant selection	12/1997	12/1998	03/1998	05/1999
Tendering for works	05/1998	08/1999	10/1999	03/2002
Construction period	08/1999	12/2000	03/2002	02/2005
C-5/Ortigas				
LA • Resettlement	04/1997	08/1999	06/1999	12/2002
Consultant selection	12/1997	12/1998	03/1998	10/1999
Tendering for works	05/1998	08/1999	10/1999	01/2002
Construction period	08/1999	12/2000	01/2002	03/2004
Detailed Designs				
EDSA/North/West; EDSA/Roosevelt				
Consultant selection	01/1998	12/1998	02/1998	10/1999
Detailed designs	01/1999	12/1999	06/2001	11/2001
C-5/Lanus; C-5/ Kalayaan				
Consultant selection	01/1998	12/1998	02/1998	10/1999
Detailed designs	01/1999	12/1999	11/2001	04/2002

Note: LA: Land Acquisition

2.2.3 Project cost

The estimated total project cost at appraisal was 10,171 million yen and the total loan amount was 5,849 million. The actual total project cost was 9,920 million yen and the loan amount disbursed was 5,096 million. The total project cost was reduced by 3%, and the loan amount spent was reduced by 13%. The amount of the loan spent was reduced because the loan covered only the amount disbursed by the loan closing date (January 7, 2005) and the remaining balance was locally financed by the Philippine Government.

³ Land acquisition activities continued even after project commencement.

Table 3: Project Cost (Planned and Actual)

(million pesos)

Item	Planned	Actual
Civil work	1,464 (5,123 million yen)	1,575 (5,511 million yen)
Contingencies	162 (566 million yen)	
Consultant services	261 (915 million yen)	261 (915 million yen)
Land acquisition	978 (3,423 million yen)	890 (3,116 million yen)
Administrative expenses	41 (144 million yen)	103 (360 million yen)
Total	2,906 (10,171million yen)	2,829 (9,902million yen)

Note: Exchange rate used at appraisal was 1 peso = 3.5 yen and the same rate was used at completion (suggested by executing agency)

The project cost was within the estimated cost, but the project period substantially exceeded the planned period. Thus, the efficiency is considered to be moderate.

2.3 Effectiveness (Rating: a)

2.3.1 Time needed for turning and travel speed

The average time needed for turning at the EDSA/Quezon Interchange at the time of appraisal (1998) was 10 minutes. The target values (running speed) and the actual values upon completion (2006) at each interchange are as follows. The time needed for turning was reduced to less than one minute and congestion was eliminated.

Table 4: Travel Speed of Turning Vehicles

Interchange		Target	Actual
EDSA/Quezon	Average speed	37km/hr	42km/hr
	Speed at peak hour	17	20
C-5/Boni Serrano	Average speed	20	50
	Speed at peak hour	N.A.	N.A.
C-5/Ortigas	Average speed	31	31
	Speed at peak hour	13	16

2.3.2 Average speed on the main highway

Table 5 shows the average running speed on main highways. Even though no significant change of speed was observed along C-5, the actual average running speed along EDSA in 2006 and 2007 was increased, partly because the grade separation works for intersections along EDSA are nearly complete.

Table 5: Average Speed on the Main Highway

(km/hr)

Interchange	Direction	2003	2004	2005	2006	2007
EDSA	Northbound	24	20	21	29	34
	Southbound	22	20	21	31	28
Quezon	Northbound	25			25	31
	Southbound	22			26	31
C-5	Northbound			37	38	29
	Southbound			30	29	41
E. Rodriguez	Northbound		39	40	38	
	Southbound		29	37	29	
Katipunan	Northbound		15	41		
	Southbound		29	37		

Note: EDS/Quezon was completed in June 2003, C-5/Boni Serrano in February 2005, and C-5/Ortigas in March 2004.

2.3.3 Internal rate of return

The economic internal rate of return (EIRR) at the appraisal stage was estimated using construction and maintenance costs, savings in vehicle operating costs, and travel time as quantitative benefits. EIRRs at appraisal and recalculated EIRRs upon completion based on the same assumptions applied at appraisal are shown as follows.

Table 6: Internal Rate of Return (%)

	At appraisal	At ex-post evaluation
EDSA/Quezon	53.7%	63.75%
C-5/Boni Serrano	34.5%	23.1%
C-5/Ortigas	39.9%	36.6%

The EIRR for EDSA/Quezon at completion showed a higher rate. The traffic volume was increased more than expected as the interchanges along EDSA were improved and thus the highway capacity was also enhanced, which led to the higher rate. To the contrary, EIRRs for the two interchanges along C-5 were lower than expected. The improvements to the interchanges along C-5 have not progressed according to plan, resulting in the lower rate.

The congestion around the project area was eliminated and the project highly contributed to the local communities, particularly in the enhancement of the regional economy. Thus, it is considered that the investment was appropriate and the project satisfactorily achieved its original development objectives.

2.3.4 Qualitative impact

Through interviews with the executing agency, the following qualitative impacts were confirmed: improvement of social service sectors such as water supply and sewage disposal and drainage lines at EDSA/Quezon Avenue; expansion of employment opportunities through improved access and reduced atmospheric pollution caused by traffic congestion around these projects at C-5/Ortigas; expansion of investments from local governments, property price increases around these projects; and increase in tax revenue and development of the local area around these projects at C-5/Bomni.

2.4 Impact

2.4.1 Benefits to the people in the project affected area

Under the ex-post evaluation, the beneficiary surveys were undertaken by interviews with 600 respondents within the vicinity of three interchanges. According to the classification of respondents by sex, 35% were female and 65% male. The classification of respondents by occupation is shown in Table 7. Among 600 respondents, 27% (162 persons) were car owners. Fifty-three (53) percent of respondents considered that the project contributed to the promotion of local economic activities and 69% to the enhancement of business opportunities. Thus, the project achieved its original development objectives. Regarding the alleviation of traffic congestion, 91% of respondents considered that traffic congestion was eliminated, among which 18% considered the reduction “substantial,” 66% “quite,” and 6% “a little.” Regarding the increase in household income, 30% perceived a positive impact and 69% no impact. Among the respondents who perceived a positive impact, 62% reported an increase by 10%, and 20% reported an increase by 20%.

Table 7: Respondents by Occupation

Occupation	Number of persons	Share (%)
Businessman	73	12
Private employee	317	53
Government employee	39	7
No income/dependent	36	6
Student	51	8
Housewife	28	5
Others	56	9
Total	600	100



EDS/Quezon Interchange
Underpass along Quezon Avenue

Moreover, a majority of respondents perceived improvements in accessibility and mobility. Eighty-nine (89) percent reported improved access and mobility to markets, 50% to schools, 43% to hospitals, 22% to social services and 68% to work. Regarding reduction in travel time (per interchange), 6% reported a reduction by more than 30 minutes, 13% by 21-30 minutes, 40% by 11-20 minutes, 28% by 6-10 minutes and 14% by less than 6 minutes compared to travel time prior to project completion.

In respect to reduction of transport costs, 58% perceived some impact. Of the responses for specific items which resulted in reduction, 43% reported a reduction in vehicle maintenance costs, 52% in fuel, and 52% in fares. Seventy-seven (77) percent perceived enhanced road safety.

In addition, the following comments were noted: i) reductions in travel time led to increased employment opportunities for housewives; and ii) improvements in mobility enabled long-distance commutes, which led to increased employment opportunities.

2.4.2 Environmental and social impact

The Environment Compliance Certificate was obtained for all the interchanges by January 1999. Despite the decline in air quality during construction of the interchanges, vehicle exhaust emissions were reduced as a result of the shortened travel time upon project completion. However, the vehicle ownership ratio and the number of registered vehicles rapidly increased, and no significant improvement has been observed. To address the air quality issue, the Philippine Government will implement the following items: compliance with vehicle emissions standards, implementation of inspection and maintenance systems, introduction of alternative fuels such as LPG and CNG, transition to high-occupancy mass transport systems, reduction in travel time through congestion alleviation measures, and increase in vehicle load factor by promoting larger capacity vehicles.

In respect to improvement of the environment, 34% perceived an improvement in air quality, 28% in traffic noise, and 20% in water quality. Congestion was eliminated. However, the total traffic volume was increased. Environmental improvement may not be achievable solely by the construction of certain roads, but by addressing the urban issue as a whole. Considering that improvement of the environment in urban areas is hardly observed by implementation of a single project, the numbers reported seem to be high.

Other countermeasures taken include cleaning and de-clogging existing drainage lines and the construction of additional drainage lines. Such preventive measures have effectively reduced the recurrence of flooding along Mother Ignacia Street. Landscaping was performed on the quadrants, sidewalks, and center islands of Quezon Avenue.

During the detailed design work, the public hearing on the nature of the project and

land acquisition and resettlement issues in relation to the project were implemented, and land/business owners were properly informed about the extent of the project. However, it took more time than expected to reach agreement on land acquisition. The land area acquired for each interchange was 725m² for EDSA/Quezon; 8,902m² for C-5/Boni Serrano; and 6,938m² for C-5/Ortigas with a total area of about 1.7hectares. The planned land area to be acquired at the time of appraisal was 2,400m², 23,400m², and 13,895m², respectively with a total area of 4hectares. The number of relocated households was 31 for EDSA/Quezon; 508 (including 232 squatters) for C-5/Boni Serrano; and 42 for C-5/Ortigas with a total of 581households. The planned number of relocated households at the appraisal stage was 81 for C-5/Boni Serrano and 26 for C-5/Ortigas with a total of 107 households including 30 squatters. The number of relocated households substantially increased to 508 at C-5/Boni due to a fire which occurred in 2000, where houses on the project site were burned down. Many residents, including illegal settlers, built temporary houses on the site and these houses were compensated.

Regarding the land acquisition and resettlement, DPWH through the Infrastructure ROW-PMO was responsible for negotiation, acquisition and payment. The land acquisition and resettlement was implemented in accordance with national law and practices in the Philippines.

Therefore, this project has largely achieved its objectives, and effectiveness is highly satisfactory.

2.5 Sustainability (Rating: b)

2.5.1 Executing agency (Department of Public Works and Highways: DPWH)

DPWH through the Urban Roads Project Office (URPO) - PMO was the implementing agency. The DPWH's National Capital Regional Office (NCR) is responsible for operation and maintenance of the project under the supervision of DPWH.

2.5.1.1 Operation and maintenance system

Under the current Philippines Highway Management/Maintenance System, maintenance work is divided into two categories: i) Maintenance Work by Administration (MBA); and ii) Maintenance Work by Contract (MBC). The routine maintenance work for the main carriageway at the three interchanges is undertaken by maintenance crews of the District Engineer's Office under MBA, while periodic maintenance work is contracted out to private contractors. Contractors are selected through competitive bidding and maintenance work items are scheduled on a tri-monthly basis.

In 2002, the responsibility for maintenance work was transferred to the Metro Manila Development Authority (MMDA). After the transfer, DPWH's responsibility was

limited to the maintenance of the carriageway of the facilities. All other routine maintenance activities such as maintenance of traffic signals, drainage clearing, and painting of sidewalls are undertaken by MMDA. Likewise, periodic maintenance falls under the jurisdiction of MMDA. The Bureau of Maintenance (BOM) of DPWH provides technical assistance and guidelines for the efficient and economical implementation of maintenance functions. The BOM conducts a semi-annual road condition inventory of national roads and interchanges, and the information is updated every year.

2.5.1.2 Technical capacity

DPWH employees/staff are encouraged to participate in training courses or attend seminars on different aspects and modules of roads/bridges (such as planning, investigation, designs, buildings, maintenance and repairs) depending on the needs of the currently assigned posts. They are also expected to share what they have learned with their colleagues and to apply the skills in their current job assignments. Highly-qualified staff or employees eligible for higher benefits are also encouraged to apply for higher positions. DPWH is making efforts to retain highly-qualified and well-trained workers. The currently available operational manuals include the following documents:

- Highway Maintenance Management Manual (the 4th IBRD Highway Loan in 1983)
- Pavement Management System (PMS) • Bridge Management System (BMS) and Bridge Inspection Manual (ADB Loan 2002)
- Highway Planning Manual (HPM)

2.5.1.3 Financial status

The DPWH budget allocated for maintenance of national roads for the past 9 years (1999-2007) is shown in Table 8.

Table 8: DPWH Maintenance Budget

(1,000 pesos)

Year	Allocation	Funding Source
1999	3,786,652	GAA
2000	4,093,667	GAA
2001	4,093,667	GAA
2002	4,080,371	GAA
2003	4,846,710	MVUC+GAA
2004	4,846,710	MVUC
2005	5,741,208	MVUC
2006	5,960,592	MVUC
2007	6,219,000	MVUC

Note: MVUC: Motor Vehicle User's Charge
 GAA: General Approved Allocations (General Fund)

The total length of national roads under the management of DPWH is about 30,000km. Since 2003, when the Road Fund was established, DPWH's total budget allocated for maintenance has been increased from about 4 billion pesos. However, DPWH's budget for maintenance is not sufficient: the required cost for maintenance is 100,000 pesos/km/year (as of 2007), however, the actual disbursed amount was only 32,713 pesos/km/year.

The DPWH budget allocated for maintenance of national roads in Metro Manila for the past nine years (1999-2007) is shown in Table 9.

Table 9: Maintenance Budget for Highways in Metro Manila

(1,000 pesos)

Year	Budget	Financial Source
1999	164,787	DPWH Infra Program
2000	179,936	DPWH Infra Program
2001	179,412	DPWH Infra Program
2002	183,961	DPWH Infra Program
2003	227,989	DPWH Infra Program
2004	227,799	Allocations (MVUC)
2005	418,193	Allocations (MVUC)
2006	111,106	Allocations (MVUC)
2007	93,734	Allocations (MVUC)

Among DPWH's total budget for maintenance, about 2% (in 2006) was allocated to the maintenance of national roads in Metro Manila. The budget allocated for maintenance

of national roads in Metro Manila has been declining for the past two years. It is considered that 8.6 million pesos per year is needed to properly maintain the three interchanges funded by JBIC. The total budget of DPWH-NCR allocated for maintenance of the 1,011km of national roads under their jurisdiction is 94 million pesos (in 2007). Needless to say, this amount is insufficient. Furthermore, no budget has been allocated for the three recently-completed interchanges.

2.5.2 Operation and Maintenance status

In the three to four years following the completion of the three interchanges, no major structural failures have been observed. From the field visual inspection, it was confirmed that the pavement surface condition was satisfactory. However, as the need for major rehabilitation works arises in the future, there is a possibility that the financial resources will be insufficient. As such, the financing plan and implementation schedule for major rehabilitation works should be formulated well in advance.

No major problems have been observed in terms of the technical capacity or the organizational setup of the executing agency, thus sustainability is considered to be moderate. However, since the budget for maintenance has not been properly allocated, there is some concern regarding the operation and maintenance of the project.

3. Feedback

3.1 Conclusion

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

3.2 Lessons learned

As lessons learned through this project, it is recommended that the following needs be taken into account:

- More detailed engineering investigation and designs should be undertaken in order to avoid any variations/change orders and supplemental agreements during the implementation, which quite often result in a delay of implementation and cost overruns.
- In order to minimize the delay of project implementation due to land acquisition and resettlement, the executing agency should organize a project coordination committee, which may consist of DPWH, local government units, and other stakeholders (private

and public) and establish a coordination body to enhance dialogue and contact with the neighboring residents.

- According to the implementation schedule shown in the appraisal document, the period from the loan signing date to the completion date of the three interchanges is planned for two years and four months, and the construction period is estimated at one year and four months. The planned schedule seems to be underestimated. In planning the implementation schedule, pragmatic scheduling, taking into consideration the time needed for land acquisition, tendering process, and more realistic construction period should be made. The JBIC appraisal team should engage in thorough discussions with the borrower at the appraisal stage so that more realistic and pragmatic scheduling can be achieved.

3.3 Recommendations

N.A.

Comparison of the Main Issues at Planned/Actual

Item	Planned	Actual
(1) Output		
1-1. Civil Work		
EDSA/Quezon Boulevard	<ul style="list-style-type: none"> • Two (2) 545-meter, 3-lane, second-level flyovers along EDSA (Northbound and Southbound) • 581-meter, 4-lane underpass along Quezon Avenue • Service lanes; Northbound and Southbound of EDSA and Eastbound and Westbound of Quezon Avenue 	<ul style="list-style-type: none"> • Two (2) 548-meter, 3-lane flyovers along EDSA beside the existing MRT (Northbound and Southbound): as planned • 4-lane underpass along Quezon Avenue at EDSA and Agham (300m added resulting in 890m) • Service lanes: 2-5 lanes along EDSA, and 3-5 lanes along Quezon: as planned • Provision of a permanent pumping station (additional work)
C-5/Boni Serrano	<ul style="list-style-type: none"> • 230-meter, 6-lane flyover along C-5 connecting E. Rodriguez Avenue to Boni Serrano Avenue) • 650-meter, 4-lane underpass along Katipunan • At-grade 6-lane deck girder bridge at Boni avenue 	<ul style="list-style-type: none"> • 475-meter, 4-lane flyover along C-5 connecting with E. Rodriguez and Boni Serrano (quantity and scope revised) • 203-meter, 4-lane tunnel including approach roads toward Boni Serrano and Katipunan (shortened) • Service roads along Boni Serrano (North & Southbound): as planned • Eastbound and Westbound service roads along E. Rodriguez and Katipunan (additional work)
C-5/Ortigas Avenue	<ul style="list-style-type: none"> • 694-meter, 4-lane flyover along C-5 • 365-meter, 2-lane left-turn flyover • 427-meter, 2-lane flyover along Ortigas • Steel pedestrian overpass along Ortigas 	<ul style="list-style-type: none"> • 694-meter, 4-lane, 3-level flyover along C-5 separated by 1.5-meter median: as planned • 232-meter, 2-lane left-turn flyover from Cainta side to Barangay Ugong (quantity revised) • Excluded from this project • Excluded from this project
1-2. Consultant Services (Assistance in procurement activities and supervision)	International 112M/M Local 1,037M/M Supervision of three interchanges	International 176.72M/M Local 1,961.4M/M Contents of service: as planned
2-1. Detailed Designs		
EDSA/Roosevelt Avenue	<ul style="list-style-type: none"> • 400-meter, 6-lane flyover along EDSA 	<ul style="list-style-type: none"> • 729-meter, 6-lane flyover along EDSA (quantity revised)
EDSA/North/West Avenue	<ul style="list-style-type: none"> • 500-meter, 6-lane flyover along EDSA • 4-lane underpass along North • 4-lane underpass along West 	<ul style="list-style-type: none"> • 853-meter, 3-lane second-level flyover along EDSA, Northbound • 569-meter, 3-lane second-level flyover along EDSA, Southbound • 980-meter, 3-lane third-level flyover from West Avenue to North Avenue • 1,229-meter, 3-lane third-level flyover from EDSA to North Avenue • 306-meter, 2-lane left-turn flyover to Mindanao Avenue (revision of quantity and scope, additional designs)
C-5/Kalayaan Avenue	<ul style="list-style-type: none"> • 650-meter, 6-lane flyover along C-5 	<ul style="list-style-type: none"> • 750-meter, 6-lane underpass along C-5
C-5/Lanusa/Julia Vargas Street	<ul style="list-style-type: none"> • 500-meter, 2-lane flyover to C-5 Lanuza Street 	<ul style="list-style-type: none"> • 326-meter, 2-lane flyover along C-5 at Lanuza Street (southbound)

	• 500-meter, 2-lane flyover to C-5 from Julia Vargas	• 276-meter, 2-lane flyover along C-5 at Julia Vargas (quantity revised) (southbound)
2-2. Consultant Services (Detailed designs)	International 60M/M Local 559M/M	International 76.5M/M Local 710.5M/M
(2) Project Period	September 1998 - December 2000 (2 years, 4 months: 26 months)	September 1998 - February 2005 (6 years, 6 months: 78 months)
(3) Project Costs		
Foreign Currency:	4.147 billion yen	5.096 billion yen
Local Currency:	6.024 billion yen (1.721 billion pesos)	4.860 billion yen (1.373 billion pesos)
Total	10.171 billion yen	9.920 billion yen
ODA Loan Portion	5.849 billion yen	5.096 billion yen
Exchange Rate	1 peso = 3.5 yen (as of September 1998)	1 peso = 3.5 yen (same rate used at appraisal)