CHAPTER 16

TRAFFIC ANALYSIS AND ECONOMIC EVALUATION

CHAPTER 16

TRAFFIC ANALYSIS AND ECONOMIC EVALUATION

16.1 TRAFFIC ANALYSIS

This chapter describes the traffic analysis and economic evaluation for the Ayala Bridge improvement project. The purpose of the traffic analysis is to forecast the future traffic demand on Ayala Bridge as a presumption of the economic analysis and to clarify characteristics of the traffic passing through the Ayala Bridge.

Procedure for Traffic Analysis and Economic Evaluation

The procedure for the traffic analysis and economic analysis illustrated in **Figure 16.1-1** was employed in the Study.

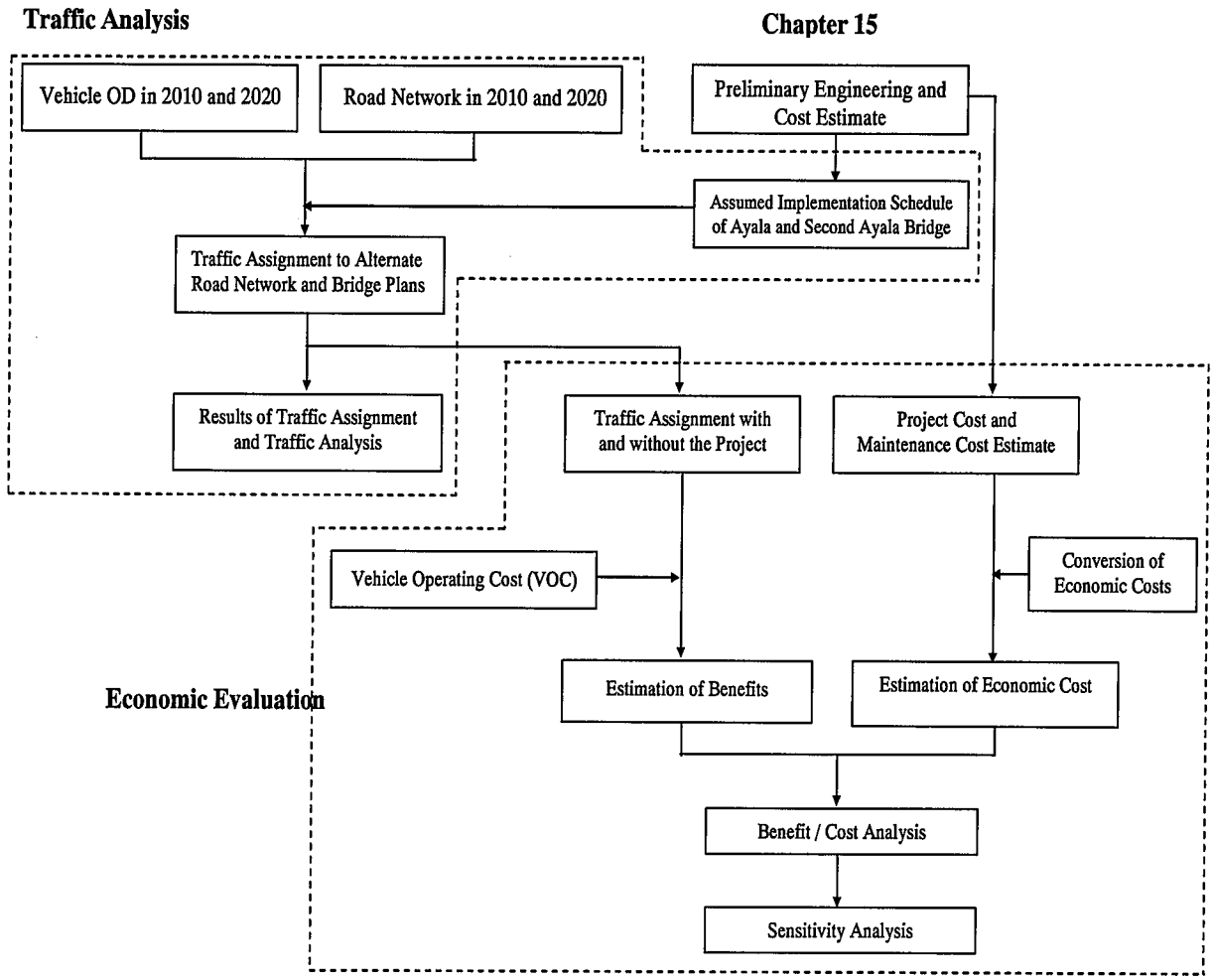


Figure 16.1-1 Procedure for Traffic Analysis and Economic Evaluation

16.1.1 Traffic Assignment

(1) Alternative and Bridge Plans

The present load limit of 5 tons was set at Ayala Bridge several years ago. According to the engineering studies conducted in this Study, it is predicted that all vehicles including heavy vehicles and light vehicles will not be able to pass through the Ayala Bridge at around year 2007. Therefore, it is assumed that after year 2007, full closure to any traffic on the Ayala Bridge.

As mentioned in Chapter 19, the Second Ayala Bridge is scheduled to be completed sometime in the year 2010. Therefore, the following schedule presented in **Figure 16.1.1-1** with regard to the Ayala Bridge, is assumed in this study.

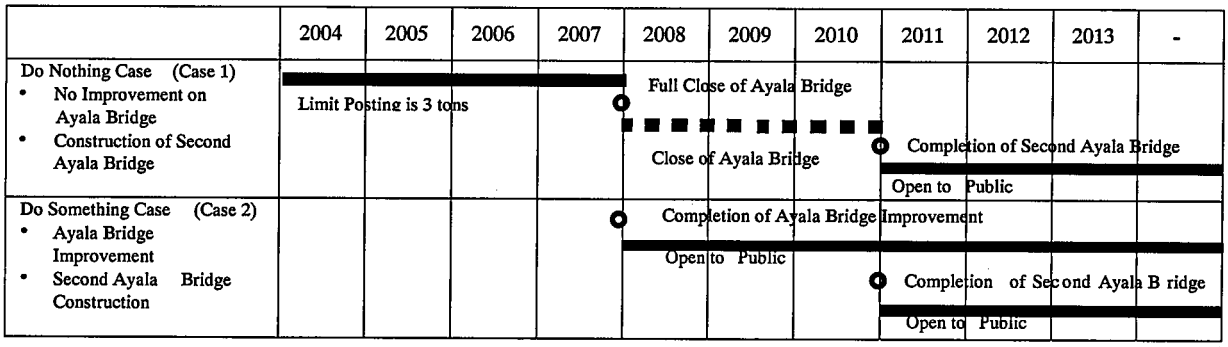


Figure 16.1.1-1 Assumed Implementation of Ayala Bridge and Second Ayala Bridge

(2) Traffic Assignment Method

The traffic assignment to road networks with the Bridge Plans is made using STRADA highway – type assignment model as shown in **Section 5.3** in **Chapter 5**.

16.1.2 Results of Traffic Assignment and Traffic Analysis

(1) Traffic Demand on Bridges

Table 16.1.2-1 shows the traffic demand forecast on bridges related to the Ayala Bridge improvement on Pasig River.

Table 16.1.2-1 Traffic Demand Forecast on the Ayala Bridge in 2010 and 2020

Unit: PCU/Day

No.	Bridge Name	2010		2020	
		Case 1 (Do Nothing)	Case 2 (Do Something	Case 1 (Do Nothing)	Case 2 (Do Something
1	Delpan Bridge	73,600	69,500	88,700	88,300
2	Jones Bridge	66,600	58,600	70,900	64,000
3	McArthur Bridge	61,800	67,300	87,300	74,600
4	Quezon Bridge	84,000	72,900	110,300	86,300
5-1	Ayala Bridge	0	33,000	0	51,000
5-2	Second Ayala Bridge	35,300	22,600	53,800	33,900
Total		321,300	323,900	411,000	398,100

Note: The Second Ayala Bridge was assumed to be constructed in 2010

(2) Traffic Volume of the Ayala Bridge

The traffic volumes on the Ayala Bridge by alternative cases are shown in **Table 16.1.3-1.**

Table 16.1.3-1 Traffic Demand Forecast on Ayala Bridge in 2010 and 2020

Bridge Name	Case 1 (Do Nothing)						Case 2 (Do Something)					
	Ayala Bridge		Second Ayala Bridge		Total		Ayala Bridge		Second Ayala Bridge		Total	
	Traffic Volume (PCU)	Growth Rate (%)	Traffic Volume (PCU)	Growth Rate (%)	Traffic Volume (PCU)	Growth Rate (%)	Traffic Volume (PCU)	Growth Rate (%)	Traffic Volume (PCU)	Growth Rate (%)	Traffic Volume (PCU)	Growth Rate (%)
2010	0	-	35,300	-	35,300	-	33,000	-	22,600	-	55,600	-
2015	0	-	43,580	4.3	43,580	4.3	41,000	4.4	27,700	4.1	68,700	4.3
2020	0	-	58,300	4.3	58,300	4.3	51,000	4.4	33,900	4.1	84,900	4.3

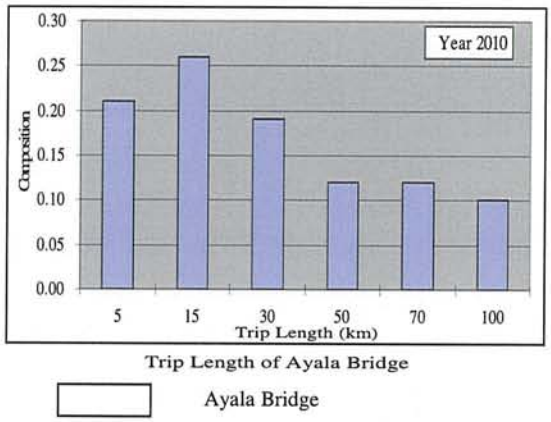
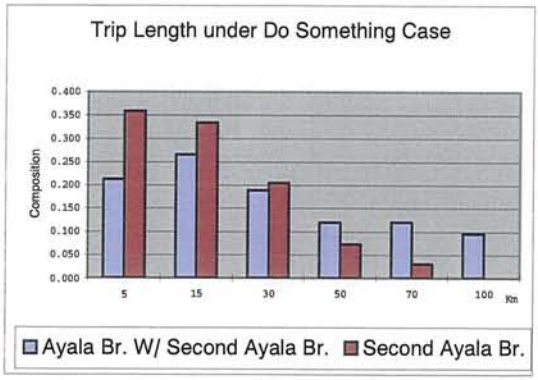
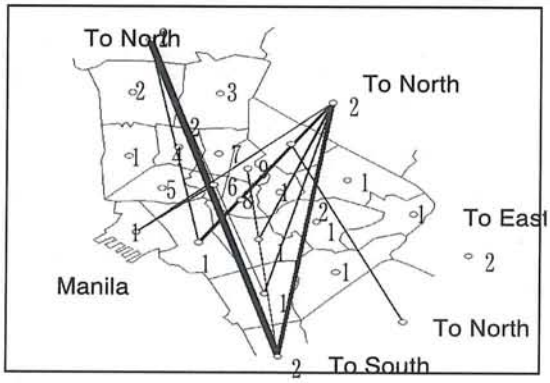
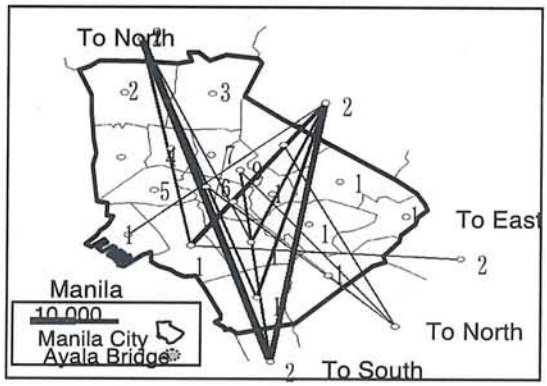
(3) Traffic Characteristics of the Ayala Bridge

For the traffic characteristics of the Ayala Bridge, the trip length distribution and OD pattern of traffic using the Ayala Bridge and the Second Ayala Bridge is illustrated in **Table 16.1.3-2.**

- An average trip length using the Ayala Bridge is about 30.5 km/trip and its distribution pattern is shown in **Table 16.1.3-2.** When the Second Ayala Bridge is constructed, then the average trip length of the Ayala Bridge is expected to increase longer from 30.5km/trip to 34.6 km/trip. This means that longer distance traffic passes through the Ayala Bridge since the road network linking with the Ayala Bridge is defined to be major arterials.

- According to the desired line of the Ayala Bridge as shown in **Table 16.1.3-2**, the Ayala Bridge has a wide influence area because the Ayala Bridge forms part of the major arterial in Metro Manila.

Table 16.1.3-2 Comparative Analysis between With And Without Second Ayala Bridge

Ayala Bridge Improvement and No Second Ayala Construction	Ayala Bridge Improvement and Second Ayala Construction
From Distribution of Trip Length	
 Trip Length of Ayala Bridge Ayala Bridge	 Ayala Bridge Second Ayala Br.
Average Trip Length	
Ayala Bridge 30.48 km/trip	Ayala Bridge 34.58 km/trip Second Ayala Bridge 18.66 km/trip
Influence Area	
 Ayala Bridge Only (Year 2010)	 Ayala Bridge with Second Ayala Bridge (Year 2010)
Main Features	
• Ayala Bridge serves longer trip length while Second Ayala Bridge serves shorter trip length • Ayala Bridge has wider influence area, while the Second Ayala Bridge has narrow influence area.	

16.2 ECONOMIC EVALUATION

16.2.1 Presumptions

(1) Evaluation Period

The evaluation period was assumed to be 30 years from third quarter of 2007 to second quarter of 2037.

(2) Implementation Schedule of the Project

According to the implementation schedule mentioned in the previous sections, the project will be implemented with the following schedule:

- Detailed Engineering : 2006
- Implementation : 2 Years, 2006 and 2007
- Open to Traffic : 2008

(3) Evaluation Method and Economic Indicator

The economic evaluation method principally employed is the benefit cost analysis in which the investment efficiency is evaluated through comparison between benefits and costs derived from the improvement of Ayala Bridge. The benefit – cost stream expression during the evaluation period and the economic indicators used in this study are as follows:

- Net Present Value (NPV)
- Benefit Cost Ratio, (BCR), and
- Economic Internal Rate of Return (EIRR)

(4) Type of Benefit

The most direct transportation cost is the vehicle operating cost (VOC) and the travel time cost (TTC). The VOC can be divided into the following two (2) types:

- Vehicle Running Cost (VRC): Vehicle Running Cost depending upon the running distance
- Vehicle Fixed Cost (VFC): Fixed cost depending upon running hours.

The benefit is estimated through "with and without" comparison of the transportation costs derived from the traffic assignment on the road network. The economic benefit generated by

improvement of the Ayala Bridge project is defined as savings of VRC, VFC and TTC attributable to the Project.

16.2.2 Project Costs

(1) Project Cost

The project cost, which was already calculated in the previous section, is expressed as the financial cost. It is therefore necessary to convert from financial cost to economic cost using the conversion factor shown in **Table 16.2.2-1.**

Table 16.2.2-1 Economic Cost Estimate

1,000 Pesos

Description		Economic Cost	Financial Cost
1	Construction Cost	909,794	1,071,345
1-1	Superstructure	424,131	493,984
1-2	Substructure	381,203	451,430
1-3	Highway	14,921	17,723
1-4	Detour	89,539	108,207
2	Consultancy	128,561	128,561
2-1	Detailed Design	42,854	42,854
2-2	Construction Supervision	85,707	85,707
3	Land Acquisition	56,633	62,925
	Total	1,094,988	1,262,832

(2) Maintenance Cost

According to the maintenance system reviewed under this study, the present maintenance cost for the bridges in the Metro Manila are estimated to be about 1.0% of the construction cost. The maintenance cost of the Ayala Bridge was assumed to be 1.0% of the construction cost accordingly.

16.2.3 Estimation of Benefits

(1) Basic Vehicle Operating Cost

The basic vehicle operating cost (BVOC) is estimated annually by PMO-FS Office in the DPWH. The latest BVOC was estimated in April 2002. In this study, the BVOC with some modification by inflation between April 2002 and April 2003 is utilized. (See **Table 16.2.3-1**).

Table 16.2.3-1 Basic Vehicle Operating Cost (Excluding Tax)

Vehicle Type	Running (P/1000km)	Fixed [P/Min]	Time [P/Min]
Car /Taxi / Jeep	4,441	0.245	0.991
Jeepney	2,991	1.181	1.468
Bus	7,453	1.794	5.561
Truck	9,622	2.107	0
Average	4,167	0.419	1,110

Source: PMO-FS, DPWH
Note: BVOC prepared by PMO-FS is modified with inflation rate.

Table 16.2.3-2 and **16.2.3-3** were used to calculate the average vehicle operating cost.

Table 16.2.3-2 Vehicle Composition on Ayala Bridge

	Composition (%)
Car / Taxi / Jeep	85.9
Jeepneys	2.9
Buses	2.0
Track	3.5
Motor Cycle	5.7
Total	100.0

Source: Traffic count survey, 2003

Table 16.2.3-3 Composition of Trip Purpose

	Composition (%)	For Time Value Calculating (%)
To Work	31.2	15.6
To School	26.3	0
Business	14.8	14.8
Private	27.6	0
Total	100.0	30.4

Source: MMUTIS

(2) Estimation of Vehicle Operating Costs

The saving in vehicle operating costs was quantified on the annual basis by means of the following formula:

$$SVOC = ((VK^{WO} - VK^{W}) \times VRC) + (VH^{WO} - VH^{W}) \times VFC)) \times AF$$

Where:

SVOC: Saving in vehicle operating costs
VK^{WO}: Vehicle traffic on the road network without Ayala Bridge
VK^{W}: Vehicle traffic on the road network with Ayala Bridge
VRC: Vehicle running cost
VH^{WO}: Vehicle hours on the road network without Ayala Bridge
VH^{W}: Vehicle hours on the road network with Ayala Bridge
VFC: Fixed cost
AF: Annualized factor

Table 16.2.3-4 shows total vehicle kilometers with and without the project.

Table 16.2.3-4 Vehicle Kilometers with and without the Project

Year	W/O Project	W/ Project	W/O – W/
2010	2,767,363	2,681,563	85,800
2020	3,553.544	3,436,236	117,308

(3) Estimation of Travel Time Cost

The saving in travel time costs was quantified on the annual basis by means of the following formula:

$$STTC = (VH^{WO} - VH^{W}) \times TC \times AF$$

Where:

STTC:	Saving in travel time costs
VH^{WO}:	Vehicle hours on the project road without project
VH^{W}:	Vehicle hours on the project road with project
TC:	Time Value
AF:	Annualized factor

Table 16.2.3-5 shows total vehicle hours with and without the Project.

Table 16.2.3-5 Vehicle Hours with and without the Project

Year	W/O Project	W/ Project	W/O – W/
2010	157,087	145,444	11,643
2020	246,266	223,361	22,905

(4) Benefit Calculation

Saving in vehicle operating costs and travel time cost were estimated and are shown in **Table 16.2.3-6.**

Table 16.2.3-6 Estimation of Benefits

Unit: '000 Pesos/Day

Year	Saving in VOC	Saving in Fixed Cost	Saving in Time Cost	*Total Saving*
2010	138,644.5	102,568.2	271,434.2	512 646.9
2020	189,558.5	201,777.9	533 980.5	925 316.9

16.2.4 Economic Evaluation

(1) Benefit Cost Analysis

Based on the above mentioned benefits and cost estimations, the economic analysis of the Project was made. **Table 16.2.4-1** shows the benefit – cost analysis of the Ayala Bridge Improvement Project during project life period and **Table 16.2.4-2** shows the benefit cost stream. The results of the economic analysis show that Net Present Value (NPV) is ₱1,999 million and BCR is 3.25 over 30 years life of the Bridge using a discount rate of 15% which is designated by the NEDA. The Economic Internal Rate of Return (EIRR) was compiled at 34.3%.

Table 16.2.4-1 Economic Indicators of Benefit Cost Analysis

Net Present Value	1,999,853
BCR	3,249
EIRR	0.343

Table 16.2.4-2 Benefit-Cost Stream of Ayala Bridge Improvement Project

Undiccounted BenefiT Cost Stream

000 Pesos

Sq	Year	Construction Cost	O & M Cost	Cost Total	Benefit	Cost-Benefit
1	2004	42,854.0		42,854.0	0.0	-42854.0
2	2005	310,282.6		310,282.6	0.0	-310282.6
3	2006	503,691.4		503,691.4	0.0	-503691.4
4	2007	238,159.6		238,159.6	0.0	-238159.6
5	2008	0.0	9,097.9	9,097.9	456,898.3	447,800.4
6	2009	0.0	9,097.9	9,097.9	483,906.4	474,808.5
7	2010	0.0	9,097.9	9,097.9	512,646.9	503,548.9
8	2011	0.0	9,097.9	9,097.9	543,235.9	534,138.0
9	2012	0.0	9,097.9	9,097.9	575,797.8	566,699.9
10	2013	0.0	9,097.9	9,097.9	610,465.3	601,367.3
11	2014	0.0	9,097.9	9,097.9	647,380.1	638,282.2
12	2015	0.0	9,097.9	9,097.9	686,694.0	677,596.1
13	2016	0.0	9,097.9	9,097.9	728,569.0	719,471.0
14	2017	0.0	9,097.9	9,097.9	773,178.2	764,080.3
15	2018	0.0	9,097.9	9,097.9	820,706.9	811,609.0
16	2019	0.0	9,097.9	9,097.9	871,352.9	862,255.0
17	2020	0.0	9,097.9	9,097.9	925,316.9	916,219.0
18	2021	0.0	9,097.9	9,097.9	954,082.5	944,984.5
19	2022	0.0	9,097.9	9,097.9	983,797.2	974,699.3
20	2023	0.0	9,097.9	9,097.9	1,014,493.5	1,005,395.6
21	2024	0.0	9,097.9	9,097.9	1,046,204.8	1,037,106.8
22	2025	0.0	9,097.9	9,097.9	1,078,965.5	1,069,867.6
23	2026	0.0	9,097.9	9,097.9	1,112,811.6	1,103,713.7
24	2027	0.0	9,097.9	9,097.9	1,147,780.0	1,138,682.1
25	2028	0.0	9,097.9	9,097.9	1,183,909.1	1,174,811.1
26	2029	0.0	9,097.9	9,097.9	1,221,238.3	1,212,140.4
27	2030	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8
28	2031	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8
29	2032	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8
30	2033	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8
31	2034	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8
32	2035	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8
33	2036	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8
34	2037	0.0	9,097.9	9,097.9	1,259,808.8	1,250,710.8

Diccounted BenefiT Cost Stream

000 Pesos

Sq	Year	Discounted	Construction Cost	O & M Cost	Cost Total	Benefit	Cost-Benefit
1	2004	1.000	42,854.0	0.0	42,854.0	0.0	-42854.0
2	2005	1.150	269,811.0	0.0	269,811.0	0.0	-269811.0
3	2006	1.323	380,863.0	0.0	380,863.0	0.0	-380863.0
4	2007	1.521	156,593.8	0.0	156,593.8	0.0	-156593.8
5	2008	1.749	0.0	5,201.8	5,201.8	261,233.1	256,031.3
6	2009	2.011	0.0	4,523.3	4,523.3	240,587.0	236,063.7
7	2010	2.313	0.0	3,933.3	3,933.3	221,631.4	217,698.1
8	2011	2.660	0.0	3,420.3	3,420.3	204,222.5	200,802.2
9	2012	3.059	0.0	2,974.1	2,974.1	188,229.3	185,255.2
10	2013	3.518	0.0	2,586.2	2,586.2	173,532.3	170,946.1
11	2014	4.046	0.0	2,248.9	2,248.9	160,022.5	157,773.6
12	2015	4.652	0.0	1,955.5	1,955.5	147,600.2	145,644.7
13	2016	5.350	0.0	1,700.5	1,700.5	136,174.7	134,474.2
14	2017	6.153	0.0	1,478.7	1,478.7	125,663.1	124,184.4
15	2018	7.076	0.0	1,285.8	1,285.8	115,989.4	114,703.6
16	2019	8.137	0.0	1,118.1	1,118.1	107,084.5	105,966.4
17	2020	9.358	0.0	972.2	972.2	98,883.8	97,911.6
18	2021	10.761	0.0	845.4	845.4	88,659.0	87,813.6
19	2022	12.375	0.0	735.2	735.2	79,495.9	78,760.7
20	2023	14.232	0.0	639.3	639.3	71,283.7	70,644.4
21	2024	16.367	0.0	555.9	555.9	63,923.4	63,367.5
22	2025	18.822	0.0	483.4	483.4	57,326.2	56,842.8
23	2026	21.645	0.0	420.3	420.3	51,412.6	50,992.3
24	2027	24.891	0.0	365.5	365.5	46,111.4	45,745.9
25	2028	28.625	0.0	317.8	317.8	41,359.0	41,041.2
26	2029	32.919	0.0	276.4	276.4	37,098.3	36,821.9
27	2030	37.857	0.0	240.3	240.3	33,278.3	33,038.0
28	2031	43.535	0.0	209.0	209.0	28,937.6	28,728.6
29	2032	50.066	0.0	181.7	181.7	25,163.2	24,981.5
30	2033	57.575	0.0	158.0	158.0	21,881.0	21,723.0
31	2034	66.212	0.0	137.4	137.4	19,027.0	18,889.6
32	2035	76.144	0.0	119.5	119.5	16,545.2	16,425.7
33	2036	87.565	0.0	103.9	103.9	14,387.1	14,283.2
34	2037	100.700	0.0	90.3	90.3	12,510.5	12,420.2
		Total	850,121.8	39,278.0	889,399.8	2,889,253.2	1,999,853.4

Net Present Value	1,999,853
B/C Ratio	3.249
EIRR	34.3

(2) Sensitivity Analysis

The sensitivity analysis was conducted under a worse case scenario incorporating increase and/or decrease of the estimation of costs and benefits. **Table 16.2.4-3** shows the results of the sensitivity analysis.

Table 16.2.4-3 Sensitivity Analysis regarding Costs and Benefits of Ayala Bridge Improvement Project (EIRR)

Unit: %

		Benefits				
		20% down	10% down	Base Case	10% up	20% up
Costs	20% down	34.3	37.1	39.7	42.3	44.7
	10% down	31.7	34.3	36.8	39.1	41.4
	Base Case	29.5	32.0	34.3	36.5	38.7
	10% up	27.7	30.0	32.2	34.3	36.3
	20% up	26.1	28.3	30.4	32.4	34.3

Note: Project life of the project is assumed to be 30 years

(3) Summary of Economic Analysis

The implementation of the Ayala Bridge improvement project can be justified from view of national economic point since the economic indicators of all cases are more than the cut-off level which can be considered as 15% of EIRR in the Philippines.

CHAPTER 17

ENVIRONMENTAL IMPACT ASSESSMENT

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ENVIRONMENTAL IMPACT ASSESSMENT

17.1 BASIS FOR ASSESSMENT OF ENVIRONMENTAL IMPACT

The assessment of environmental impacts of the proposed project is based on the existing conditions in the study area. The study area is classified into two (2) types of impact areas, namely the **Direct Impact Area (DIA)** and the **Indirect Impact Area (IIA). DIAs** are areas that will be directly affected by the proposed undertaking, and will entail physical displacement of houses and improvements due to the construction of a temporary detour bridge on the east side of Ayala Bridge. These include the (i) property of the Philippine Long Distance Telephone Company (PLDT) Malate Exchange in Brgy. 663 where the repair and maintenance building to be affected is located; (ii) Brgy. 663-A, where three (3) houses will be displaced; and (iii) Brgy. 646, where the Department of Budget and Management's (DBM) basketball court and other improvements will be affected.

On the other hand, **IIAs** refer to those that will be indirectly affected by the possible increase in noise levels, TSP levels and other gaseous pollutants such as SO_X and NO_X due to the operation of various equipment and machinery during the construction phase of the project. These consist of Brgy. 647 Zone 67, and Brgy. 659 Zone 71.

17.1.1 General Geology

The study area where the Ayala Bridge is located is the low-lying flat strip of land between the Manila Bay Zone on its west and the elevated Guadalupe Plateau on its eastern boundary. This is designated as the Coastal Margin zone with an average elevation of less than five (5) meters above mean sea level (amsl). This zone includes the CAMANAVA area (Caloocan, Navotas, Malabon, and Valenzuela), Pasay City, Paranaque City, Las Pinas City, the reclaimed portions of Manila Bay and the City of Manila.

Based on previous studies, the location of Manila, extending south to near Pasay City was found to be within a deltaic plain formed by the Pasig River (Gervacio, 1968). The plain coalesced southward with the beach and lagoon deposits of Parañaque and northward with the dominantly estuarine deposits and beach and/or sand bar deposits of Caloocan City and Malabon. Previous data show that the delta materials' composition are of sand, pebbly gravel, silt, mud and clay of various colors and plasticity; in areas covered by sand, silt and clay

deposits laid down by seasonal floods. The delta deposit is generally stratified to crossbedded. Inter-lobing or intertonguing of various delta material components has also been a common characteristic that was observed. The deposit is over 70 meters thick near the coast and thins out eastward in the Sta. Mesa and Makati areas. Along the eastern border zone, the deposit rests almost conformably on a firm sequence of tuffaceous rocks (Guadalupe Formation) and westward on slightly compacted, intertonguing pebbly gravel, sands and tuffaceous silts.

The geologic structure that have significant effect to the Metropolitan Manila Area is the Marikina Valley Fault System. This system consists of two nearly parallel northeasterly-trending faults with a downthrown block, averaging 4.50 kilometres wide, in between. According to Gervacio (1968), the structural development of the Luzon Central Valley was caused by the Miocene Orogeny uplifting of the Sierra Madre Range; post-orogenic movements brought about the collapse of the Central Valley, now designated as the Central Plain of Luzon, of which the Marikina Valley forms an integral part of its southern extension.

17.1.2 Water Quality and Limnology

Although there have been water quality assessments undertaken along Pasig River in the past (for the Pasig River Rehabilitation Project), the EIA Team conducted recent water sampling for the preparation of the Environmental Impact Assessment for the Improvement of the Ayala Bridge. The sampling was done to establish the present condition on the said waterway that may be possibly affected by the proposed improvement project.

The sampling was performed in the morning of 19 May 2003 (0830-0915 Hours). The site was located just below the docking platform of the Philippine Coast Guard (PCG) Detachment at the Hospicio de San Jose compound, Ayala Bridge, Manila. It is important to note that sampling was done during high tide in Manila Bay wherein the river is flowing on its inland reverse course.

On-site temperature reading and pH measurements were done using a portable digital pH-meter. Water sample was collected from the river and then later brought to the laboratory for analyses. The sample was assessed for water pollution indicators such as levels of Chemical Oxygen Demand (COD), Biological Oxygen Demand, Total Suspended Solids (TSS), Dissolved Oxygen (DO), Oil & Grease, and Fecal and Total Coliform.

Table 17.1.2-1 shows the results of both the laboratory tests and field measurements performed. As provided in the Table, the degree of acidity or alkalinity of the sample is

within the standard based on DENR DAO 34 for Class C waters. Sunlight penetration that sustains biological activities is still sufficient as indicated by the minimal amount of suspended solids found in the sample.

The COD and the oil and grease content of the River are also well within the permissible limit. However, the amount of oxygen required (BOD) to completely oxidize a quantity of organic matter by biological process exceeded the maximum limit suggesting that presence of organic wastes in the River is significantly disproportionate. This also substantiates the very low amount of dissolved oxygen in Pasig River, which is the end result of the discharge of effluent with high BOD levels. The considerable quantity of fecal coliform detected from the water sample is expected, since it is very apparent that sewage lines of the inhabitants in the periphery are directly tapped into the River.

In general, results of the sampling validates that Pasig River has been a recipient, along its course from upstream to downstream, of all sorts of loadings from point and non-point sources among others, residential, commercial, industrial and even agricultural.

Table 17.1.2-1 Physical Properties of the Pasig River, Ayala Bridge Section Manila City

	Sampling Results	DENR Effluent Standard For Class "C" Water (DAO 34)
Sampling Station Location	Below the docking platform of the PCG Detachment at Hospicio de San Jose, approximately 50 meters from Ayala Bridge	
Date and Time of Sampling	0830–0915 HRS 19 May 2003 (HIGH TIDE)	
Parameters		
Temperature C	30	Max. 3 degrees increase
pH	7.9	6.5 - 8.5
DO, mg/L	1.2 mg/L	Min. 4–5 mg/L
COD mg/L	73.0 mg/L	100 mg/L
BOD, mg/L (5 days, 20°C)	12.0 mg/L	10 mg/L
TSS, mg/L	12.0 mg/L	Max. 30 mg/L increase
Oil and Grease, mg/L	0.93 mg/L	5.0 mg/L
Total Coliform, MPN/mL	80,000 MPN/100 mL	10,000 MPN/1000 mL
Fecal Coliform, MPN/mL	80,000 MPN/ 100 mL	

Sediment sampling was also undertaken by the EIA Team to determine the amount of trace metals in Pasig River. River sediments were collected along the bank of the river during the low tide, just outside the Department of Budget Management (DBM) compound across the PCG Detachment (Please refer to **Figure 17.1.2-1**). The results of sediment sampling is tabulated in **Table 17.1.2-2.**

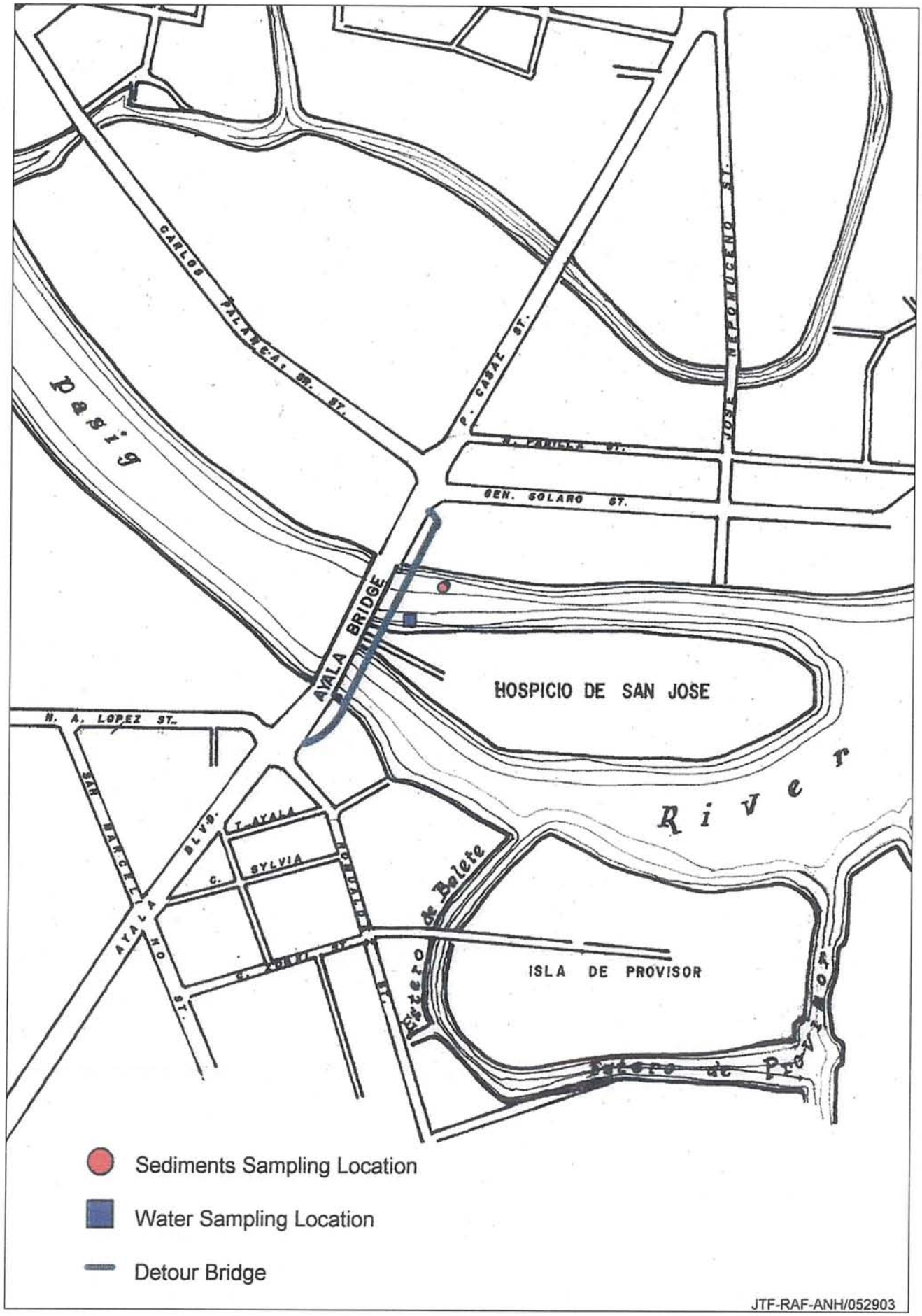

Figure 17.1.2-1 Water Quality and Sediments Sampling Sites

Table 17.1.2-2 Pasig River Sediment Test Data, Ayala Bridge Section Manila City

Trace Metal/Element	Result Value	DENR Standard for Class C Inland Waters
Chromium Hexavalent (Cr+6)	3.30 ppm	0.05 mg/L
Cyanide (CN-)	0.06 ppm	0.05 mg/L
Cadmium (Cd)	1.40 ppm	0.01 mg/L
Lead (Pb)	72.20 ppm	0.05 mg/L
Arsenic (As)	0.40 ppm	0.05 mg/L
Mercury (Hg)	ND	0.002 mg/L
Polychlorinated Biphenyls (AROCLOR 1254)	ND	–

Note: "–" Means the standard of the substance is not considered necessary for the present time, considering the stage of the country's development and DENR capabilities, equipment and resources (DENR Administrative Order No. 34, Series of 1990)
ND - None Detected

17.1.3 Air Quality

Ambient air quality sampling was conducted along Ayala Bridge and its immediate vicinity to determine the present level of Sulfur Dioxide (SO_x), Nitrogen Dioxide (NO_x), Carbon Monoxide (CO), and Total Suspended Particulate (TSP) in the area. The test was done in 19 May 2003.

The two (2) sites selected are areas that will be most likely to be affected during the improvement works along Ayala Bridge as well as during construction of the temporary detour bridge. Sampling **Station 1** was located in the middle of the bridge approximately 50 m from the main entrance of HDSJ in Brgy. 663-A Zone 71. Sampling **Station 2** was situated at the intersection of Ayala Boulevard and Romualdez St. at the southwestern approach of the Ayala Bridge, Brgy. 663 Zone 71. **Figure 17.1.3-1** shows the location of the Air Quality sampling sites.

Sampling Results

Measurements of the TSP and CO in both sampling locations were carried out on a 1-hour basis, while SO_2 and NO_2 were observed within a 30-minute duration. The weather was fair during the time of sampling. Traffic at Sta.1 was moderate. In the afternoon, volume of vehicles increased significantly due to the lifting of truck ban. Traffic at the intersection of Ayala Boulevard and Romualdez St. was moderate to heavy.

The observed levels of the air pollutants monitored in both stations are well within the permissible limits based on the DAO 2000-81. Significant increase in the concentrations of TSP and NO_2 at Sta. 2 however were noted. These were probably due to the emissions from the cargo trucks and other diesel-powered vehicles plying the route at the time of sampling. The rest remain way below the set standards.

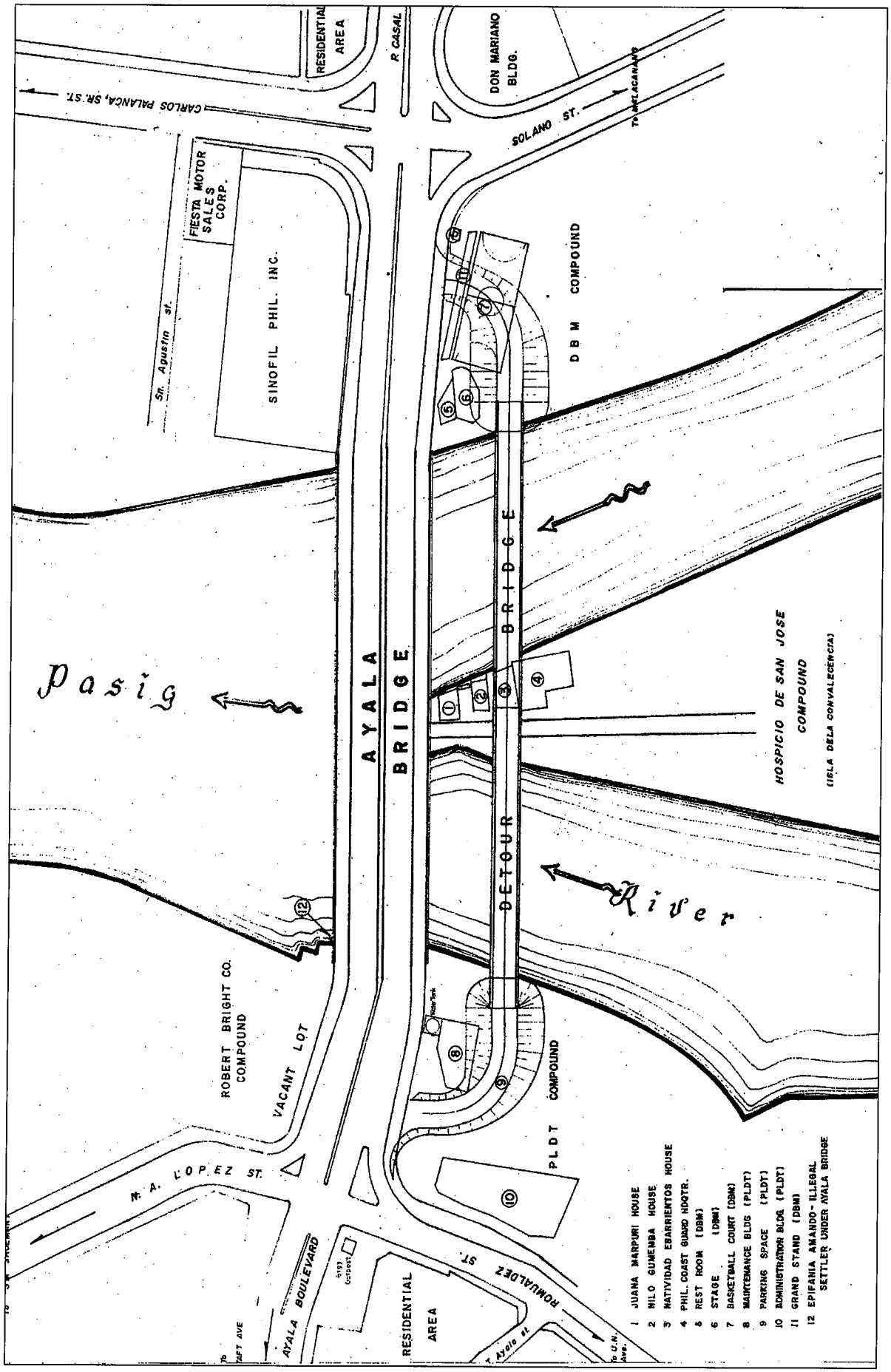

Figure 17.3-1 Air Quality & Noise Level Sampling Sites

Results of the monitoring is presented in **Table 17.1.3-1** shall be the baseline information in assessing the probable impacts of the identified airborne pollutants to the receiving environment. The values obtained will likewise serve as benchmark comparisons for measuring the possible changes in the levels of the said contaminants during the pre-construction, construction and operational phase of the detour bridge.

Table 17.1.3-1 Observed Ambient Air Quality Along Ayala Bridge and Its Vicinity

Parameters	Date & Time of Sampling		Averaging Time	Concentration in µg/Ncm		
				Sampling Results		*DENR Standards*
	Sta. 1	Sta. 2		Sta. 1	Sta. 2	
TSP	19 May 2003 1030–1130 HRS	19 May 2003 1708–1808 HRS	1 hr	54.1	100	*300*
SO_2	19 May 2003 1030–1100 HRS	19 May 2003 1708–1738 HRS	30 min	9.9	8.2	*470*
NO_2	19 May 2003 1030–1130 HRS	19 May 2003 1745–1815 HRS	30 min	38.4	92.6	*375*
CO	19 May 2003 1030–1130 HRS	19 May 2003 1708–1808 HRS	1 hr	0.20	12.0	

17.1.4 Noise Levels

Noise level monitoring was also performed in the project area. The same sampling locations used for air quality was used. The results showed that at the time of sampling, the level of noise along the sites slightly exceeded the standard limit. The recorded noise can be attributed to the instantaneous peaks generated from the vehicles passing by the area during sampling.

The values obtained presented in **Table 17.1.4-1** shall serve as the baseline data in monitoring the changes in noise levels during the pre-construction, construction, and operational phases of the proposed bypass project. These will also be the bases in assessing the likely effects of noise to the receiving environment, especially to people.

Table 17.1.4-1 Observed Noise Levels Along the Ayala Bridge and Its Vicinity

Time	Noise Levels in dB (A)					
	Date & Time of Monitoring		Monitoring Results		*DENR Standards*	
	Sta. 1[AA]	Sta. 2[B]	Sta. 1[AA]	Sta. 2[B]	AA	B
Morning (0500–0900 HRS)	05 June 2003, 0730–0745 HRS	05 June 2003, 0800–0815 HRS	88.15	85.93	50	65
Daytime (0900–1800 HRS)	05 June 2003, 1215–1230 HRS	05 June 2003, 1130–1145 HRS	83.24	89.24	55	70
Evening (1800–2200 HRS)	05 June 2003, 1910-1925 HRS	05 June 2003, 1930-1945 HRS	92.44	92.34	50	65
Nighttime (2200–0500 HRS)	05 June 2003, 2235-2250 HRS	05 June 2003, 2300-2215 HRS	89.54	84.66	45	60

SOURCE: Rules and Regulations of the National Pollution Control Commission (NPCC), 1978
NOTE: AA a section or contiguous area which requires quietness, such as an area within 100 meters from school sites, nursery schools, hospitals, and special homes for the aged;
B a section or contiguous area which is primarily a commercial area

Sampling Stations:

Sta. 1 Along Ayala Bridge approximately 50 meters from the main entrance of Hospicio de San Jose, Brgy. 663-A Zone 71

Sta. 2 Intersection of Ayala Blvd. and Romualdez St. at the southwest approach of Ayala Bridge, Brgy. 663 Zone 71

17.2 IDENTIFIED IMPACTS AND MITIGATING MEASURES

17.2.1 Predicted Impacts and Mitigating Measures

The predicted impacts and recommended mitigating measures for each impact apply to the pre-construction and construction stages of the temporary detour bridge and the actual improvement of the Ayala Bridge.

(1) Pre-Construction and Construction Phases

(a) Physico-Chemical Environment

Impact: Temporary Disturbance of Land

Temporary disturbance of urban land utilized for residential commercial and institutional purposes. The detour bridge that will be constructed on the east side of Ayala Bridge will temporarily affect the land within the PLDT Malate Exchange Compound on the southeast side of Ayala Bridge, the residential areas within Hospicio de San Jose (HSDJ) compound, and the basketball court inside the DBM compound on the northeast approach of the Bridge.

Mitigation:

This impact is unavoidable but temporary in nature. The detour bridge and all other temporary structures will be dismantled as soon as the improvement works at the Ayala Bridge are completed. It is also important to note here that Ayala Bridge is the only access road that serves HDSJ. The site of the detour bridge was selected to ensure continuous access to HDSJ.

Impact: Temporary Disturbance of Subsurface Soil

Foundation works such as bored/sheet/concrete pile driving for the detour bridge will cause the alteration and temporary disturbance of subsurface soils, the underlying rock strata, and riverbed configuration

Mitigation:

These impacts are unavoidable but temporary in nature. Configurations of the riverbed and the subsurface soils and the underlying rock strata are expected to return to their normal conditions after restoration works are undertaken

(b) Hydrology and Water Quality

Impact: Increase in Turbidity

Bored piling at riverbed and riverbank of Pasig River for the substructure of the detour bridge and rehabilitation works at the substructure of Ayala Bridge may cause possible increase in turbidity along the River.

Mitigation:

This impact is unavoidable but temporary in nature. Condition of the waterway is expected to return to normal about a year or two after the construction works are completed.

Impact: Increase in Bacteriological Content

Possible increase in the bacteriological content of Pasig River due, particularly fecal coliform, to domestic wastes generated by construction personnel.

Mitigation:

Temporary sanitation facilities such as portable toilets and garbage bins will be provided by the Contractors to ensure that domestic wastes generated by the construction personnel are properly handled and are not thrown into the waterway to prevent further pollution of the Pasig River

Impact: Increase in Oil and Grease

Possible increase in the level of oil and grease and other water contaminants in the River.

Mitigation:

Contractors will be required to conduct daily routine check up of heavy equipment and machinery to ensure these are in good working condition to avoid spillage of oil and grease into the River. Contractors will be prohibited from washing the construction equipment along the River to prevent further contamination of the waterway.

(c) Air Quality

Impact: Increase in Dust Particulates

Possible increase in the generation of dust particulates along construction sites. Dozing, stripping, earthmoving, and other related activities involved during the pre-construction and construction of the detour bridge and rehabilitation works along Ayala Bridge may possibly increase the present level of suspended particulate matters within the construction and adjacent areas.

Mitigation:

Exposed and cleared construction areas will be regularly sprayed with water. Excavated materials will be regularly hauled and disposed at DENR-approved disposal site; and temporary stockpiles of excavated materials will be covered with tarpaulin, canvass or sack materials to prevent re-suspension of particulate matters

Impact: Increase in Exhaust Emission

Possible increase in exhaust gas emission levels. Exhaust gas emissions such as SO_X, NO_X, CO, and other hydrocarbons emitted by different heavy equipment may possibly increase the existing level of air pollutants in the area

Mitigation:

Contractors will be required to conduct daily routine equipment and machinery check-ups to ensure that these are in the optimum working conditions; and Regular tune-up and maintenance of construction equipment and machinery will be complied with to minimize exhaust gas emissions

(d) Noise Level

Impact: Increase in Noise

Possible increase in existing noise level along Ayala Bridge and its immediate vicinity. Noise generated by the various heavy equipment and machinery during the pre-construction and construction of the detour bridge and actual improvement works at Ayala Bridge may increase the present level of noise along Ayala Bridge and its immediate vicinity. In addition, noise coming from vehicles, particularly trucks, buses, and other diesel powered vehicles using the detour bridge will add to the present level of noise in the area. Hospicio de San Jose, which requires quietness at all times is approximately 30 meters from the proposed detour bridge.

Mitigation:

This impact is unavoidable but temporary in nature. Noise suppressors, such as mufflers will be installed whenever deemed necessary to maintain the noise generated by various heavy equipment and other construction machinery to permissible limits.

High noise generating pre-construction and construction activities, and improvement works will be scheduled during daytime to minimize disturbance to surrounding areas, especially Hospicio De San Jose, which requires quietness at all times.

(e) Biological Environment

Impact: Loss of Vegetation

Minimal loss of vegetation cover along the detour bridge alignment.

Mitigation:

The impact of the construction of the detour bridge to the vegetation cover in the project area is negligible, since the areas required to accommodate the foundation works are very limited. In addition, the vegetation cover in the project area is considered minimal.

(f) Socio-Economic Environment

Impact: Displacement of Residential Houses

Construction of the temporary detour bridge will entail permanent displacement of three (3) residential houses within HDSJ (Long-term, negative)

Mitigation:

Just compensation will be accorded to the affected families prior to the construction of the detour bridge

Impact: Displacement of Building

Construction of the detour bridge will entail displacement of the heavy equipment and service vehicles maintenance building inside the PLDT Malate Exchange Compound and the stage and the basketball within the DBM compound (Short-term, negative)

Mitigation:

All affected structures such as the heavy equipment and service vehicles maintenance building inside the PLDT Malate Exchange Compound and the stage within the DBM compound will be restored as soon as the rehabilitation works along the Ayala Bridge are completed. Just compensations/reconstruction of demolished structures will be accorded to the affected parties

Impact: Interruption of Water Service

Possible interruption of water service in HDSJ due to construction works at the bottom structure of Ayala Bridge.

Mitigation:

Water service interruption will be properly scheduled and HDSJ administration will be notified accordingly to enable them to prepare and undertake the necessary measures. Water service interruption will be limited to the least number of days to avoid further disturbance to the affected area;

Impact: Traffic Congestion

Possible decrease in the earnings of public transport drivers due to traffic congestion

Mitigation:

This impact is unavoidable but temporary in nature. A detour bridge will be constructed on the east side of Ayala Bridge to ensure unhampered flow of vehicular traffic along the Bridge. A sound traffic management schemes and re-routing plans duly approved by the MMDA will be implemented. A two-way two-lane traffic management scheme will maintained to avoid traffic congestion within the construction site

Impact: Temporary Employment

Temporary employment for qualified laborers within the affected areas during the construction of the detour bridge will be generated.

Enhancement: Temporary Employment

Qualified workers and laborers from the affected barangays will be given priority in hiring during the construction stage of the project

(2) Operational Phase

(a) Socio-Economic Environment

Impact: Traffic Safety

Improvement of safety of motorists will be expected using the Ayala Bridge and river vessels navigating underneath.

Enhancement:

Inspection and maintenance of the newly rehabilitated Ayala Bridge will be done on a regular basis to ensure optimum level service to road users

17.2.2 Perceived Impacts of the Project

All the directly-affected (PAFs) and indirectly-affected (users of Ayala Bridge and Pasig River) stakeholders were asked about what they perceive as the positive and negative impacts of the proposed improvement works along Ayala Bridge during its construction and operational phases. The responses are shown in **Table 17.2.2-1** for the positive and negative impacts during the construction period, and the impacts during the operational phase in **Table 17.2.2-2.**

Table 17.2.2-1 Perceived Impacts During the Rehabilitation/Construction Period

Type of Respondent	Positive Impacts	Negative Impacts
PAFs	Increase in job opportunities; looking forward to new home	Worsen traffic congestion; displacement of affected families
PUJ Driver	Increase in job opportunities	Worsen traffic congestion; displacement of affected families
PUB Driver	No significant positive impact	Worsen traffic congestion
PV Driver	Increase in job opportunities	Worsen traffic congestion; displacement of affected families
Truck Driver	Increase in job opportunities	Worsen traffic congestion
PUJ/PUB Passenger	Increase in job opportunities	Worsen traffic congestion; displacement of affected families; air and noise pollution
Passersby	Increase in job opportunities	Worsen traffic congestion; displacement of affected families; air and noise pollution
Barge/Boat Navigator	Increase in job opportunities	Worsen traffic congestion; displacement of affected families; air and noise pollution

As shown in the above table, the most common perceived positive impact is the increase in job opportunities during the rehabilitation/construction period. Apparently this refers to the job requirements in terms of local labor during the construction works. Aside from this, small enterprises such as eateries and *sari-sari* stores who can cater to the construction workers would also benefit from the said construction activities.

In terms of perceived negative impacts, the top answers are, "worsen traffic congestion, "displacement of affected families", and "air and noise pollution". As in any other construction activities, these adverse impacts are inevitable, but are short term and can be mitigated. For example, traffic congestion can be abated by efficient traffic management, better discipline among drivers as well as commuters, and provision of sufficient alternate route, such as the detour bridge and other diversion routes.

Displacement of affected families (four only) can be mitigated by according them just and prompt compensation so that they can resettle in another place. Air pollution can be minimized by the proper and regular maintenance of construction equipment and vehicles.

Nuisance due to high noise-level activities can be scheduled during the day time to avoid disturbance.

Table 17.2.2-2 Perceived Impacts During the Operational Period

Type of Respondent	Positive Impacts	Negative Impacts
PAFs	Will enhance traffic flow and improve safety of motorists	Increase in air and noise pollution
PUJ Driver	Will improve safety of motorists	Worsen traffic congestion; increase in air and noise pollution
PUB Driver	Will improve safety of motorists	Increase in air and noise pollution and worsen traffic congestion
PV Driver	Will improve safety of motorists and enhance traffic flow	Increase in air and noise pollution and worsen traffic congestion
Truck Driver	Will improve safety of motorists	Increase in air and noise pollution
PUJ/PUB Passenger	Will improve safety of motorists and enhance traffic flow	Increase in air and noise pollution and worsen traffic congestion
Passersby	Will improve safety of motorists and enhance traffic flow	Increase in air and noise pollution and worsen traffic congestion
Barge/Boat Navigator	Will improve safety of motorists	Increase in air and noise pollution

It can be discerned from the **Table 17.2.2-2** that the main positive impacts that are perceived by the stakeholders are the improvement of the safety of the motorists and the enhancement of traffic flow along the Ayala Bridge and immediate vicinities. However there seems to be a conflict because they also cited as a negative impact the "worsening of traffic congestion in these areas". When asked to explain why, the respondents replied that although they expect enhancement in the traffic flow after the construction period, it can also worsen congestion since more vehicles, including trucks and other heavy vehicles would then be encouraged to use the bridge since the improvement works would have also enhanced its structural integrity, and thus make it safer to use. The increase in air and noise pollution would be more of as a result of the said expected increase in volume of vehicles that would pass through Ayala Bridge.

17.3 SOCIAL ACCEPTABILITY

The information discussed here are results of field investigation and interview surveys conducted in the study area. Based on site inspection, there are only **four (4)** Project-Affected-Families (PAFs) that will be displaced as a result of improvement works. Aside from these PAFs other stakeholders were identified. These consist of users of the bridge, which include the (i) drivers and passengers of public and private vehicles, and (ii) "passersby", or people who walk through the sidewalks of the bridge, and users of river vessels navigating the Pasig River. As such, two (2) sets of questionnaires were prepared, one for the PAFs and the other for vehicular motorists, passersby, and users of navigational vessels. A total of **120** respondents were interviewed. The interviews were conducted from 22-27 May, 2003.

Based on the interview surveys, a very high **100%** of the PAFs and **95.8%** of the other stakeholders expressed full support to the proposed improvement of the Ayala Bridge. Only **4.2%** expressed disapproval over the proposed undertaking as shown in **Table 17.3-1.**

Table 17.3-1 Project Awareness and Social Acceptability

Type of Respondent	Project Awareness	Source	Acceptability			
			YES	%	NO	%
PAFs	YES (100%)	Consultation Meeting w/ ECOSYS Corporation	4	100.0	0	0.0
Other Stakeholders						
PUJ Driver	n/a	n/a	14	87.5	2	12.5
PUB Driver	n/a	n/a	19	100.0	0	0.0
PV Driver	n/a	n/a	17	94.4	1	5.6
Truck Driver	n/a	n/a	5	100.0	0	0.0
PUJ/PUB Passenger	n/a	n/a	19	95.0	1	5.0
Passersby	n/a	n/a	30	96.8	1	3.2
Barge/Boat Navigator	n/a	n/a	11	100.0	0	0.0
TOTAL			**115**	**95.8**	**5**	**4.2**

When asked why they are in-favor of the Project, the top **two (2)** answers are because (i) it is for the safety of the motorists (**51.8%**), and (ii) it will enhance traffic flow (**12.5%**). The results are very encouraging because even the PAFs who will actually be displaced to give way to the construction of the detour bridge, are in full support to the improvement works on the Bridge.

17.4 RESETTLEMENT PLAN FOR AFFECTED PEOPLE

17.4.1 Project Affected People

(1) Legal Occupants

There are three types of Project-Affected-People (PAPs) that would be affected by the proposed project. These are the, (i) legal occupants; (ii) tenants on private land and (iii) informal settlers. The **legal occupants** consist of **two (2)** institutions namely the Department of Budget and Management (DBM) and the Philippine Long Distance Telephone (PLDT) Company. These institutions would be affected in terms of the demolition of structures within their compound, such as the heavy equipment and light vehicles repair and maintenance building of the PLDT and the basketball court and grand stand inside the DBM compound.

(2) Tenants on Private Land

Tenants on private land refer to the **three (3)** Project-Affected-Families (PAFs) that will be displaced as a result of the construction of the detour bridge and rehabilitation works within Ayala Bridge. These families reside within the property of Hospicio de San Jose (HDSJ) at *Isla Convalecencia*. However based on interviews, these tenants occupy the lots of HDSJ free of charge.

(3) Informal Settlers on Public Land

There is only **one (1) informal settler** that will be displaced by the Project. The said family lives under the Ayala Bridge, near its south approach. Based on the survey conducted, the family expressed willingness to be relocated but requested that the relocation be done within the City of Manila.

17.4.2 Socio-Economic Profile of Affected People

(1) Household Size, Income, and Expenditures of PAFs

Information on the PAFs including household size, annual household income, and total annual expenditures are shown in **Table 17.4.2-1.**

Table 17.4.2-1 Household Size, Income and Expenditures of PAFs

Name of Respondent	Household (HH) Size	Source of Income	Annual HH Income	Annual HH Expenditures
1. Ebarrientos, Natividad B.	8	Skilled Labor	102,000.00	124,600.00
2. Gumemba, Nilo T.	6	Prof. Employment	188,400.00	171,800.00
3. Marpuri, Juana C.	12	Business Enterprise	420,000.00	238,000.00
4. Amando, Efipania D.	6	Unskilled Labor	42,000.00	44,200.00

From the Table it can be discerned that out of the four PAFs, only **one (1)** has an annual household income that falls below the annual per capita poverty threshold of P85,794/annum for a family of six (NSCB, 2000 Philippine Statistical Yearbook). This is understandable considering that the family's sole source of income is from unskilled labor. In terms of household expenditures, main expenses of the households interviewed, in descending order are: food, education, medical, and utilities.

(2) Residency, Type of Dwelling, and Land Tenure

Among the three residents at the HDSJ compound, two have been staying there for the last 50 to 60 years, and one for more than 10 years. The informal settler dwelling under the Ayala Bridge has been there for about 13 years. **Table 17.4.2-2** shows the residency, type of dwelling, and land tenure of the PAFs.

Table 17.4.2-2 Residency, Type of Dwelling and Tenure of PAFs

Name of Respondent	History of Residency	Type of House/Dwelling	Building Materials Used	Estimated Value	Land Tenure	Landowner
1. Ebarrientos, Natividad B.	8	Single detached	Wood/concrete	316,500.00	Free Occupation with permit	Hospicio de San Jose
2. Gumemba, Nilo T.	6	Single detached	Wood/concrete	218,900.00	Free Occupation with permit	Hospicio de San Jose
3. Marpuri, Juana C.	12	Single detached	Wood/concrete	336,250.00	Free Occupation with permit	Hospicio de San Jose
4. Amando, Efipania D.	6	Shanty	Light materials	5,000.00	Free Occupation w/o permit	R-O-W

(3) Availability of Basic Social Services

In terms of basic social services, **Table 17.4.2-3** shows that all the PAFs have access to electricity. However, unlike the three families residing inside the HDSJ compound, the informal settler under the bridge stated that they get power from an illegal connection.

Table 17.4.2-3 Availability of Basic Social Services

Name of Respondent	Source of Drinking Water	Source of Lighting/ Electricity	Toilet Facility	Health Facility	Educatio-nal Facility	Solid Waste Disposal
1.Ebarrientos,Natividad B.	Manila Water (piped)	MERALCO	Semi-flush	Health Center	All levels	City Garbage Collector
2. Gumemba, Nilo T.	Manila Water (piped)	MERALCO	Semi-flush	Health Center & Clinic	All levels	City Garbage Collector
3. Marpuri, Juana C.	Manila Water (piped)	MERALCO	Semi-flush	Hospital	All levels	City Garbage Collector
4. Amando, Efipania D.	Igib/ Purchased	Illegal connection	Open pit	Health Center & Clinic	All levels	Pasig River

Note: MERALCO – Manila Electric Company

It can be noted from the Table that all PAFs have access to sufficient health and educational facilities. In terms of solid waste disposal, it is very upsetting that the informal settler still dumps their wastes into the river despite the regular garbage collection service provided by the City of Manila.

17.4.3 Other Stakeholders of the Ayala Bridge

As previously mentioned, there are other stakeholders of the proposed project namely the users of the Ayala Bridge--- drivers and passengers of public and private vehicles, and passersby, and the users of Pasig River for navigation purposes. Interviews were carried out in bus and jeepney terminals, and in nearby offices and institutions, such as the Hospicio de San Jose, Department of Budget and Management (DBM), and Shoe Mart (SM) Manila. This was done to minimize disturbance to the respondents who are most of the time in a hurry. **Table 17.4.3-1** presents the profile of respondent users of the Ayala Bridge.

Table 17.4.3-1 Profile of Respondent Users of Ayala Bridge

Type of Respondent	Number	Place of Origin	Place of Destination
Public Utility Jeep (PUJ) Driver	16	Shoe Mart (SM) Manila	San Miguel, Quiapo, Pandacan
Public Utility Bus (PUB) Driver	19	Carlos Palanca St., Manila	Pandacan, Sta. Cruz
		Taytay, Rizal	Quiapo, Manila
Private Vehicle (PV) Driver	18	Makati; Quezon City; Parañaque; San Juan; Marikina; Antipolo; Cavite; Bulacan	Manila
Truck Driver	5	Pandacan Oil Depot	Batangas, Laguna
		North and South Harbor	Batangas, Laguna
PUJ/PUB Passenger	20	Sta. Cruz, Quiapo, HDSJ, Sta. Mesa, and Binondo, Manila; Quezon City; Cavite	Manila
Passerby	31	Not applicable	Not applicable
Barge/Boat Navigator	11	BASECO (North Harbor)	Pasig River inter island; Pandacan; Laguna; Pasig-Ugong
		Pandacan	PETRON Ugong; Bataan
TOTAL	**120**		

The Table shows that users of Ayala Bridge and the waterway below it (Pasig River) come from as near as the neighboring districts of San Miguel (Quiapo, Binondo, Sta. Cruz, and Pandacan) to as far to the north as Bulacan, Antipolo, and Quezon City, south to Parañaque, Cavite, Laguna and Batangas, east to Taytay Rizal, and west to Bataan.

(1) Traffic Congestion

When asked about the traffic situation along Ayala Boulevard, including the Bridge, the respondents cited various causes of congestion. The top seven answers are shown in **Table 17.4-3-2.**

Table 17.4.3-2 Causes of Traffic Congestion at Ayala Bridge Based on Interview

Type of Respondent	Vehicular Accident	Bridge Repair	Protest Actions	High Volume of Vehicles	Poor Traffic Management	Road Intersections	When Truck Ban is Not in Effect
PUJ Driver	8	9	7	10	5	2	1
PUB Driver	1	0	11	16	6	3	3
PV Driver	13	7	10	14	1	0	1
Truck Driver	3	1	3	4	2	1	1
PUJ/PUB Passenger	10	3	10	9	4	1	0
TOTAL	**35**	**20**	**41**	**53**	**18**	**7**	**6**

From the responses, it shows that based on the users' opinion, the "high volume of vehicles" is the top leading cause of traffic congestion along the Ayala Blvd., including Ayala Bridge. This is followed by stalled vehicles as a result of vehicular accidents. It is interesting to note that protest actions or rallies are cited as one of the main reasons for traffic congestion in the area. This is because whenever these rallies are held at Mendiola Avenue, a portion of this road, particularly the access to Malacañang Compound is closed to traffic. As a result, most vehicles divert to Ayala Boulevard.

For the past decades, Mendiola Avenue, being one of the roads leading to Malacañang, has been the venue for protest actions. As such, the National Historical Institute is in the process of including a portion of Mendiola Avenue, which is named "Freedom Park", as a historical site.

When asked about the time of the day when they experience traffic congestion along the Ayala Bridge, the respondents gave the following answers (Please refer to **Table 17.4.3-3**).

Table 17.4.3-3 Time of the Day When Traffic Congestion Occur at Ayala Bridge

Type of Respondent	8:00 a.m to 5:00 p.m.	11:30 a.m. and 4:30 p.m.	11:30 a.m.	12:00 noon	1:00 p.m.	5:00 p.m.
PUJ Driver	2	5	2	1	1	3
PUB Driver	6	9	0	0	2	0
PV Driver	0	4	0	0	1	11
Truck Driver	0	4	0	0	0	1
PUJ/PUB Passenger	0	8	0	0	0	6
TOTAL	**8**	**30**	**2**	**1**	**4**	**21**

Although the respondents ranked the "when the truck ban is not in effect" as last in the list of causes of traffic congestion, **Table 17.4.3-3** strongly indicates that the times when traffic congestion are at its peak are when the truck ban is not in effect, which are at 11:30 a.m. and 4:30 p.m., and at 5:00 p.m. This may be due to the fact that the long queue of vehicles, mostly consisting of container vans, oil tankers, and other heavy trucks originate and huddle along Romualdez St., but does not reach Ayala Bridge, since these heavy vehicles are prohibited from using the said Bridge.

It is interesting to note that although container vans, oil tankers, and other trucks are barred from using Ayala Bridge, these types of vehicle can still be observed during night time (9:00 p.m. to 5:00 a.m.). In fact, a number of these were noted during the noise level sampling activity undertaken.

(2) Condition of the Ayala Bridge Based on Stakeholders' Perception

The respondent stakeholders were also asked to cite their observations and perception about the existing condition of the Ayala Bridge. Their answers are presented in **Table 17.4.3-4.**

Table 17.4.3-4 Condition of the Ayala Bridge Based on Stakeholders' Perception

Type of Respondent	Strong Vibration	Old and Highly Deteriorated	Insufficient Traffic Capacity	Too Many Snatchers	No Traffic/Police Enforcer
PUJ Driver	10	11	10	2	3
PUB Driver	9	10	14	0	0
PV Driver	17	15	11	1	1
Truck Driver	3	2	6	0	1
PUJ/PUB Passenger	15	13	7	9	6
TOTAL	**54**	**51**	**48**	**12**	**11**

As seen from this Table, the deteriorating condition of the Ayala Bridge is evidently acknowledged by the users of the Bridge as indicated by their top answers to what they perceive as its existing condition, which include "strong vibration" as the top answer, followed by "old and highly deteriorated" as second, and "insufficient traffic capacity" as third.

One of the noteworthy observations is the "insufficient lighting", which may partly explain why there are "too many snatchers" in the area. During the rehabilitation of the Bridge, it is strongly suggested that proper and sufficient lighting be provided so as to dissuade life-threatening outlaws like snatchers and hold uppers from victimizing both passengers and passersby along Ayala Bridge.

17.4.4 Social Development Program

(1) Relocation

Due to the nature of the improvement works to be done, adverse social impacts are expected to be minimal. As mentioned in the previous sections, the only activity that would entail the displacement of people would be the construction of the temporary detour bridge on the eastern side of the Ayala Bridge. The said displacement would involve only **four (4)** families, three of which are staying inside the Hospicio de San Jose Compound, and the other one under the west portion of the bridge near its approach.

Based on the socio-economic survey conducted from 22-27 May, 2003, results show that none of the four families that would be displaced are eligible for socialized housing projects of the government. **Table 17.4.4-1** below shows the list of PAFs and their corresponding income, residency, and land tenure, based on information gathered during the interview survey. Highlighted items indicate PAF's statuses which make them ineligible for government socialized housing programs.

Table 17.4-4-1 Annual Income, Years of Stay and Land Tenure of the PAFs'

Name of Respondent	Annual HH Income	Years of Stay	Land Tenure
1. Ebarrientos, Natividad B.	102,000.00	8	Free Occupation With Permit from HSDJ
2. Gumemba, Nilo T.	188,400.00	6	Free Occupation With Permit from HSDJ
3. Marpuri, Juana C.	420,000.00	12	Free Occupation With Permit from HSDJ
4. Amando, Efipania D.	42,000.00	6	Informal Settler

The highlighted portions show that the three (3) families occupying the property owned by Hospicio de San Jose have annual incomes that are above the annual per capita poverty threshold for NCR which is P85,794.00/annum for a family of six. The informal settler on the other hand has been staying under the bridge for only six (6) years, which means that they occupied the area after 1992.

In accordance with Philippine Laws, particularly Section 16 of Republic Act (RA) 7279, also known as the Housing and Urban Development Act of 1992, the following are the criteria for a beneficiary to qualify for socialized housing projects:

- Must be a Filipino;
- Must be an underprivileged and homeless citizen (*refers to individuals or families residing in urban and urbanizable areas whose income or combined household income falls within the poverty threshold as defined by the National Economic*

Development Authority and who do not own housing facilities. This shall include those who live in makeshift dwelling units who do not enjoy security of tenure)

- Must not own any real property whether in the urban or rural areas;
- Must not be a professional squatter or a member of squatting syndicates

Section 28 of RA 7279 on the other hand states that eviction or demolition may be allowed when:

- Persons or entities occupy danger areas such as esteros, railroad tracks, garbage dumps, riverbanks, shorelines, waterways, and other public places such as sidewalks, roads, parks, and playgrounds;
- When government infrastructure projects with available funding are about to be implemented; or
- When there is court order for eviction or demolition

In the execution of such eviction and demolition, persons who are "underprivileged and homeless" must be adequately relocated. However, the Implementing Rules and Regulations of Section 28 states that relocation and resettlement shall not apply to squatters who constructed their structures after March 28, 1992, which is the effectivity date of RA 7279.

Based on these premises, it is apparent that the four (4) PAFs would not be eligible for relocation or resettlement for the following reasons:

- The three (3) PAFs residing inside the property owned by Hospicio de San Jose have annual incomes above the poverty threshold and they own the structures they occupy; thus do not fall into the classification of "underprivileged and homeless citizens"
- The informal settler meets the criteria for being "underprivileged and homeless", but occupied the area under the bridge after the cut-off date stated in the IRR of Section 28, i.e.,, March 28, 1992

However, this does not mean that these PAFs will not be properly and humanely accorded just compensation for the damage and anguish that will be brought about by involuntary resettlement. Although they are not eligible for socialized housing programs, other forms of assistance must be provided by the government to ensure that they are not worsened off by the implementation of the Project. The next section discusses the types of disturbance compensation that can be provided to them.

(2) Disturbance Compensation

Adverse socio-economic impacts is expected to be very minimal since there are only four (4) PAFs. In addition, only **one (1)** of these three (3) belongs to the poor population as defined in

the 2000 Philippine Statistical Yearbook. Nevertheless, appropriate compensation and entitlements must be provided to these families to ensure that they are not worsened off as a result of project implementation.

(a) Payment to Structure Owners

In accordance with Republic Act (RA) 8974 and its Implementing Rules and Regulations (IRR), payment to structures shall be based on the **replacement cost method**. In the said IRR, the replacement cost of the improvements/structures is defined as "*the amount necessary to replace the improvements/structures based on the current market prices for materials, equipment, labor, contractor's profit and overhead, and all other attendant costs associated with the acquisition and installation in place of the affected improvements/structures*".

In January 2003, this provision was even enhanced by DPWH Department Order (D.O.) No. 5, also known as the "Creation of the Infrastructure Right-of-Way and Resettlement Project Management Office (PMO) and the Implementation of the Improved IROW Process. This D.O. states that there shall be **no salvage value** in computing for the replacement cost for improvements.

Based on the foregoing principles and guidelines, the three (3) PAFs who are occupying the property of Hospicio de San Jose shall be compensated for their structures based on replacement cost and without salvage value.

(b) Resettlement for the Informal Settler

The remaining PAF is considered an informal settler since they are occupying government property. In terms of annual income, they can be classified as underprivileged and homeless since their annual household income is below the per capita poverty threshold, and they do not own any other property whether in the urban or rural areas, as described in Section 17.4.4 of this report.

However, their structure was constructed after 1992, which is the cut-off date for informal settlers' entitlement to relocation. That is, in accordance with the Implementing Rules and Regulations of Section 28 of RA 7279, the IRR "shall not apply to those squatters who constructed their structures after March 28, 1992, which is the effectivity date of RA 7279. This means that under the said IRR, the informal settler under the west approach of the Ayala Bridge is not entitled to relocation.

As such, other options must be considered. For example, there is the *balik-probinsiya* (back-to-the-province) option, which enables informal settlers to go back their provinces instead of staying in Metro Manila as squatters. Using this scheme, the DPWH can either transport the family together with their belongings back to their province where they originated, or give them transportation allowance to do so. Another option is for the DPWH to request the City of Manila to resettle the said PAF, since they are mandated by Section 29 of RA 7279 to do so.