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MANILA SOUTH TOLLWAY BOT PROJECT

DRAFT FINAL REPORT

VOLUME I - MAIN REPORT

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MST BOT PROJECT
ORGANIZATION OF REPORT

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LIST OF ACRONYMS

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADB	Asian Development Bank
APD	Areas for Priority Development
ASTM	American Society for Testing Materials
AVI	Automatic Vehicle Identification
BIR	Bureau of Internal Revenue
BLISS	Bagong Lipunan Improvement of Sites and Services (1980's socialized housing)
BOI	Board of Investments
BOT	Build-Operate-Transfer
cv/d	commercial vehicles/day
CB	Central Bank of the Philippines
CBR	California Bearing Ratio
CDCP	Construction Development Corporation of the Philippines
CMP	Community Mortgage Program
CPI	Consumer Price Index
dBA	decibel
DBM	Department of Budget and Management
DBP	Development Bank of the Philippines
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DOBM	Department of Building Maintenance
DOF	Department of Finance
DOH	Department of Health
DOJ	Department of Justice
DOLE	Department of Labor and Employment
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
EMB	Environmental Management Bureau

LIST OF ACRONYMS

FIRR	Financial Internal Rate of Return
HDMF	Housing Development Mortgage Finance
HIGC	Housing Insurance Guaranty Corporation
HLURB	Housing and Land Use Regulatory Board
HUDCC	Housing and Urban Development Coordinating Council
HV	Heavy Vehicles
GDP	Gross Domestic Product
IFC	International Finance Corporation
IPP	Investment Priorities Plan
IRI	International Roughness Index
IRP	Industrial Restructuring Project
JICA	Japan International Corporation Agency
kN	kilo Newton
LGU	Local Government Unit
LIBOR	London Interbank Offering Rate
LLDA	Laguna Lake Development Authority
LRT	Light Rail Transit
LV	Light Vehicles
MIS	Management Information System
MMA	Metro Manila Authority
MMR	Metro Manila Region
MMT	Metro Manila Tollway
MMUTSTRAP	Metropolitan Manila Urban Transportation Strategy Planning Project
MOA	Memorandum of Agreement
MPa	Mega Pascal
MST	Manila South Tollway
NAIA	Ninoy Aquino International Airport
NCR	National Capital Region
NEDA	National Economic and Development Authority
NHA	National Housing Authority
NHMFC	National Home Mortgage and Finance Corporation

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LIST OF ACRONYMS

NIRC	National Internal Revenue Code
NLE	North Luzon Expressway
NSC	National Steel Corporation
NWRC	National Water Resources Council
ODA	Official Development Assistance
PBAC	Prequalification, Bids and Awards Committee
PEA	Public Estates Authority
PCUP	Presidential Commission for the Urban Poor
PNCC	Philippine National Construction Corporation
PNOC	Philippine National Oil Company
PNR	Philippine National Railways
PPA	Philippine Ports Authority
PSIDF	Private Sector Infrastructure Development Fund
RA	Republic Act
RF	Radio Frequency
ROM	Rehabilitate-Operate-Maintain
ROR	Rate of Return
ROW	Right-of-Way
RTRRMS	Response Type Road Roughness Measuring System
SEC	Securities and Exchange Commission
SLE	South Luzon Expressway
SPL	Sound Pressure Level
TEC	Traffic Engineering Center
TOA	Toll Operation Agreement
TRB	Toll Regulatory Board
UHLP	Unified Home Lending Program
UPS	Uninterruptible Power Supply
UPTTC	University of the Philippines Transport Training Center
URPO	Urban Road Projects Office
USEPA	United States Environmental Protection Agency
VAT	Value-added Tax
VOC	Vehicle Operating Cost
WHO	World Health Organization

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

MANILA SOUTH TOLLWAY BOT PROJECT

BACKGROUND

This report on the Manila South Tollway BOT Project has been prepared for the Coordinating Council of the Philippine Assistance Program (CCPAP) under the Philippine Assistance Program Support (PAPS) Project. The project is sponsored by the Department of Public Works and Highways (DPWH) and the National Economic and Development Authority (NEDA). Technical services for this study are funded by the United States Agency for International Development (USAID).

The Terms of Reference call for the preparation of bid/tender documents for the construction and operation of a Manila South Tollway (MST) from President Quirino Avenue in Manila to Alabang, and for the rehabilitation, operation and maintenance of the reverted portion of the South Luzon Expressway from the Magallanes Interchange on EDSA to Alabang. Figure 1 provides a map of the project area.

Metro Manila, also known as the National Capital Region (NCR), is a metropolitan area comprised of four cities and thirteen municipalities. Presently, Metro Manila has a population of slightly over 8 million inhabitants. During the 1980's, its population grew at an annual rate of 3 %. This value also corresponds roughly to the estimated average traffic growth rate on the road network for this region. During the same period very little capacity was added to the highway network within the NCR. The result has been a gradual increase in congestion on the major arterials characterized by very low average speeds during peak hours.

Two existing expressways (the North and South Luzon Expressways) are the primary links connecting Metro Manila to the economically important regions to the north and south. The South Luzon Expressway (SLE) connects to the rapidly expanding suburban areas and emerging industrial areas of the CALABARZON. The economy of the area around the northern expressway has been devastated by the eruption of Mt. Pinatubo in 1991 and the movement of lahar (mud flows) into fertile agricultural areas. Traffic on the South Luzon Expressway is increasing at an average annual rate of around 7%.

The Metro Manila Tollway (MMT) is an expressway which has remained in the proposal stage since 1985. A long term franchise for this tollway was granted to the Philippine National Construction Corporation (PNCC). The purpose of this tollway is to connect the North and South Luzon Expressways and relieve traffic congestion on EDSA. Two problems face this project: 1) the financial position of PNCC is very weak which will not allow it to implement the MMT within the foreseeable future, and 2) because the MMT follows an entirely new alignment, its right-of-way requirements are extensive and costly.

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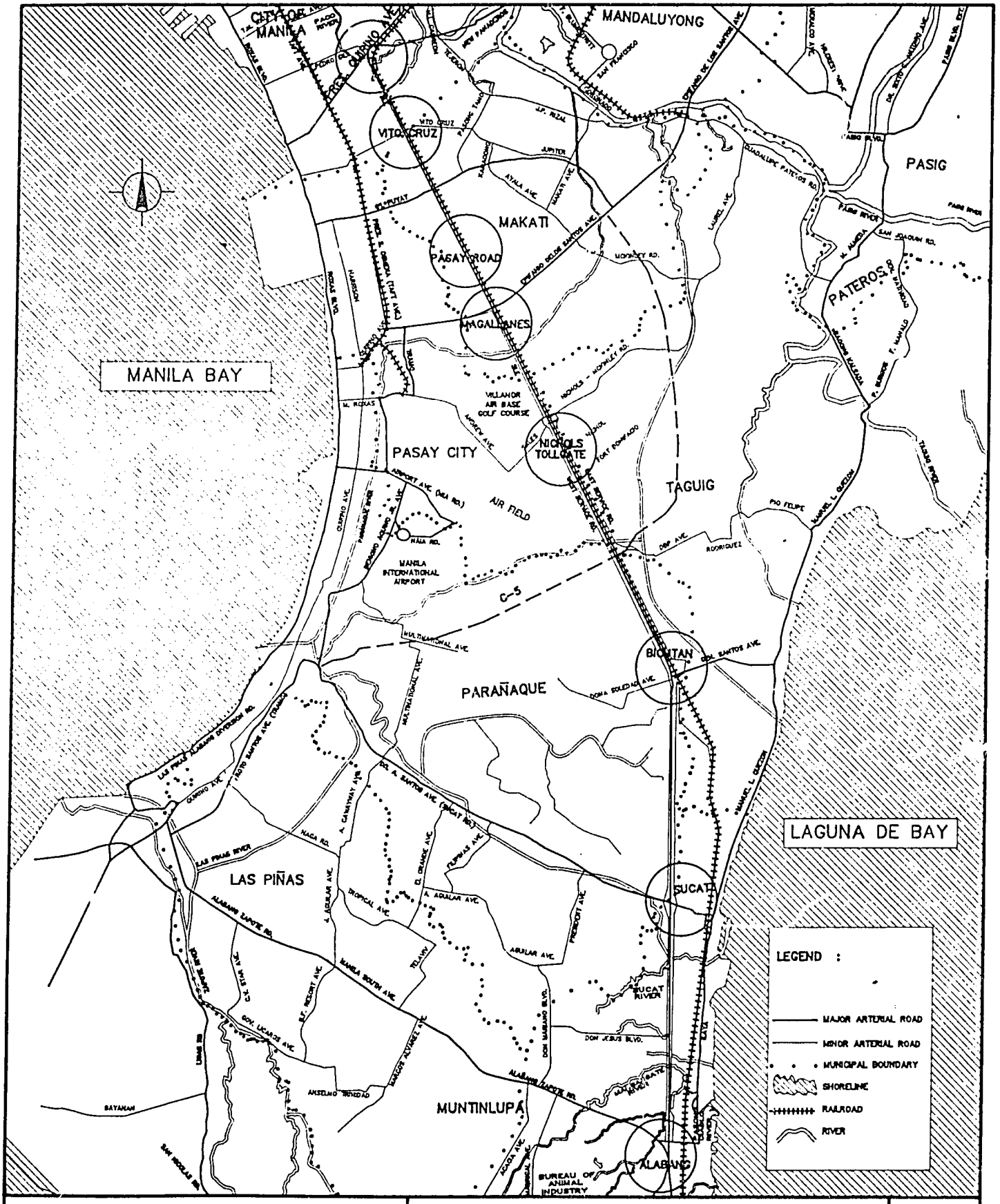

PHILIPPINE ASSISTANCE PROGRAM SUPPORT UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO 492-0452-C-00-0089-00	**MANILA SOUTH TOLLWAY PROJECT**	**FIGURE**
LOUIS BERGER INTERNATIONAL, INC. • LOCKWOOD GREENE INT'L • SIDNEY A. YOUNG INT'L • GLOSTERSOTTING ENG'G. CORP. • TRANS-ASIA SPELL INC. • CONSULTANT MANAGEMENT SERVICES, INC.	**MST PROJECT LOCATION MAP**	**1**

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It is only through the implementation of the MST BOT Project that new capacity in the southern corridor connecting Metro Manila can be built within the next ten years. If the present growth rate continues, traffic will double in 10 years, a prospect that would have considerable adverse effects within the National Capital Region and in the CALABARZON if the transport system does not keep pace with this development.

GENERAL FINDINGS ON BOT HIGHWAY PROJECTS

Present conditions suggest that the implementation of large BOT projects in the highway sector will face a number of difficulties: they include financial and legal issues, land acquisition and the country's past experience with tollroads.

Financial Issues: At this time, there are major constraints in the ability of the Philippine private sector to undertake large BOT projects involving a tollway. The Filipino banking system and capital markets are not structured to commit large amounts of long term funds to infrastructure projects. Local entrepreneurs expect rates of return (ROR) on equity investments of between 20 and 30 percent per annum. The toll rates needed to justify these high ROR will also have to be relatively high; they may be too costly for the public to accept readily.

Without foreign collaboration, the construction and financing of a large BOT project is not now possible. Foreign banks are hesitant to commit themselves to a large portion of the total cost of these projects. They might consider supporting a BOT highway project but would take a secondary role to local banks. They are reluctant to become involved in a project which depends upon the government's veto power over the level of fees or tolls which can be collected from the public. Thus, the concessionaire's ability to repay their loans might be jeopardized. In most countries around the world, increasing toll rates on expressways is very political; the Philippines is no exception. Foreign bankers believe that if the local financial institutions take the larger share then the government is less likely to delay or disapprove the increases. Government action could affect the solvency of local banks. National governments are less inclined to be concerned about the financial condition of foreign banks.

A review of a number of BOT highway projects supports this conclusion. Internationally, most debt financing for tollroads comes from local sources; some examples of BOT projects underway or recently completed are:

- Second Stage Expressway, Bangkok: Over 96 % of the debt is funded locally.
- Don Muang Tollway, Bangkok: About 60 % of the debt is financed by local sources.
- North-South Highway, Malaysia: About 90 % of the debt comes from local financial institutions.

- Mexican BOT Tollway System: By law it is entirely funded domestically.

- M4 Motorway, Sydney: This project is entirely funded by a local bank.

Many of the major international financial markets are presently in a precarious condition. They are not likely to receive the news of a BOT highway project in the Philippines with great enthusiasm. However, lower than historic average interest rates make foreign sourcing of debt attractive at this time.

Funds originating from Official Development Assistance (ODA) might be available to finance BOT projects in the future. The Government of the Philippines and foreign donors are exploring this possibility. ODA support may prove to be indispensable to the funding of Philippine BOT projects.

Legal Issues: Foreign construction contractors are sometimes willing to take large equity positions in BOT projects. However, the ownership of a public utility according to the BOT Law and the Constitution of the Philippines must be at least 60% Filipino. Furthermore, the Constitution limits the involvement of foreigners in the management of a public utility. These restrictions on foreign participation tend to limit the interest of legitimate foreign entrepreneurs in BOT projects which are considered public utilities. Based upon research done by the Consultant, a tollway would be considered a public utility. As such the MST BOT Project would require that the concessionaire be 60% or more Filipino.

Alternately, a BOT tollway project could be structured so it is not truly a BOT project, i.e. similar to a Build-Transfer (BT) project. This places a greater financial burden on government and requires that the Government of the Philippines becomes directly involved in the operation of the project in lieu of the concessionaire.

Officials of the Government of the Philippines are aware of these shortcomings to the BOT Law and are considering legislation to change it. There is some discussion of amending the constitution to make these types of investments more attractive to foreigners.

Land Acquisition: The acquisition for the right-of-way for a BOT project is the responsibility of the government or its sponsoring agency. The degree of interest of the private sector will depend on whether or not the land is available. Without all the necessary land the potential for delays is high which makes the BOT project risky and financially unattractive. To avoid these problems, the Government should begin the land acquisition program for a BOT highway project well in advance of asking for tenders on the project.

Past Experience: The experience in the Philippines with tollways is not good from the point of view of potential BOT investors. Basic toll rates on the North and South Luzon Expressways have not been increased since the early 1980's. On the positive side, there are institutions of the Government of the Philippines in place that could facilitate the implementation of BOT projects such as the Department of Public Works and Highways, the Toll Regulatory Board and the new BOT Project Management Office of the DPWH.

Recommendations: In summary, the Government of the Philippines must continue with the implementation of BOT highway projects in the expectation that international financial markets and Filipino credit will improve and that local financial institutions will become more involved in long term financing. A drop in local interest rates for government securities could persuade local entrepreneurs to accept lower rates of return. ODA funds should be made available to finance BOT highway projects. Debt for equity and debt for debt swaps should also be considered as a method of helping make BOT projects more attractive. Concurrently, the legal basis for attracting foreign investments in this type of infrastructure project can be improved; it would appear that a constitutional amendment would be required to do this unless a Build-Transfer (BT) arrangement is used. Finally, the acquisition of the right-of-way for important projects must commence as early as possible.

FINDINGS AND RECOMMENDATIONS ON MST BOT PROJECT

The Concept Design: This Build-Operate and Transfer (BOT) project consists of two components: 1) the construction of the Manila South Tollway (MST), and 2) the rehabilitation of the South Luzon Expressway (SLE). It is recommended that both components of this project be implemented by a single concessionaire. This will simplify the financing, construction, operation, and maintenance of the MST BOT Project.

The MST is envisioned as a six-lane elevated viaduct structure following the alignment of the existing SLE corridor. It starts at President Quirino Avenue in the North and ends at Alabang in the South. Between President Quirino Avenue and Bicutan, the MST runs as a single elevated roadway structure over the PNR, diverting slightly eastward for about 1 km to the general alignment of the present East Service Road where it drops to ground level to meet the vertical clearance requirements imposed by the runway of the Ninoy Aquino International Airport (NAIA). At Bicutan, the MST no longer follows the alignment of PNR but bifurcates into two separate elevated roadways structures over the median of the SLE and at the edge of the East Service Road. It terminates at Alabang with direct connections to the SLE.

The length between Pres. Quirino Ave. and Alabang is around 19 km. Interchanges and ramp connections have a total length of 15 km. The total width of the cross section is 27.3 m for six lanes. This includes 3.5 m lane width, the 3 m median, the 1.2 m shoulders and New Jersey barriers along the sides of the expressway.

The MST will therefore include the construction of:

- 18 km of a six-lane elevated roadway which is supported by column piers.
- 1 km of six-lane expressway at grade. This is required to meet NAIA clearance requirements and to accommodate C-5 (Circumferential Road 5) whose construction is planned for completion by 1994.

- Interchanges and ramps for seven (7) interchanges:

  (i) President Quirino Avenue
  (ii) Vito Cruz
  (iii) Pasay Road
  (iv) Magallanes (EDSA)
  (v) Bicutan (Doña Soledad Avenue)
  (vi) Sucat (Sucat - Parañaque Road)
  (vii) Alabang (Alabang - Zapote Road)

  Modifications to the existing Magallanes interchange will have to be considered including widening ramps off EDSA and the SLE and the creation of new elevated loop ramps to connect the MST and SLE or to carry through traffic.

- A barrier toll plaza (or toll gate) would be located along the MST at ground level near Nichols toll plaza on the SLE.

The SLE component of the project entails its rehabilitation between Magallanes Interchange and Alabang which is approximately 14.4 km in length. The scope of work for this component includes improvements to drainage, correction of roadway elevation in low areas, repairs to failing and damaged pavement and shoulders, overlay of the entire pavement with asphalt concrete, reinstallation of security fencing, and the provision of new toll collection facilities.

The level of effort of the services provided by the Consultant resulted in the development of conceptual designs for the MST BOT Project, or roughly 10 to 15 % of the resources needed for a complete preliminary design. The preliminary design from which right-of-way drawings will be prepared is the next step in the implementation of this project.

During the conceptual design of the MST BOT Project, several technical issues were identified that will require further analysis. The preliminary design of this project will provide an opportunity to investigate in greater detail:

- improvement of the principal arterial streets and roads serving the MST/SLE corridor to increase their capacity;

- the feasibility of incorporating an elevated PNR and an elevated MST within the SLE/PNR and corridor between Pres. Quirino Avenue and EDSA, possibly using a 3-tier arrangement, to eliminate existing grade crossings;

- the precise location of the MST interchanges based on accurate topographic surveys and based on more accurate traffic forecasts than were possible for the concept designs;

- improvements to the service roads which would complement the development of the MST BOT Project and the areas which they serve. This entails consideration of pedestrian overpasses, jeepney and bus stops and other safety features;

- more thorough engineering analysis of the drainage requirements along the SLE. This might entail area-wide solutions beyond the scope of this project.

Environmental Considerations: The environmental feasibility of the MST project was investigated through consultations with local officials, an on-site survey and field reconnaissance along the proposed alignment. This preliminary examination suggests that the project is environmentally feasible. Land use trends indicate further commercial development and growth in residential subdivisions along the transport corridor, i.e., patterns which are not in conflict with the development effects of the construction of a major expressway.

As the MST uses an existing alignment, it does not have the full range of impacts associated with the construction of a new road alignment. Approximately 35% of the land area required to construct the interchanges is privately owned land and land expropriation costs are estimated to be in the range ₱ 0.7 to 1.5 billion. The significant impacts are at interchanges, in particular at Pres. Quirino Avenue, Vito Cruz and Pasay where several structures, businesses and people will be displaced. However, the decision to construct the Pasay and Vito Cruz interchanges will depend on the volume of traffic expected and whether improvements in arterial/service roads may serve to accommodate this.

The impacts on squatters are less severe than anticipated. As the MST will only use the PNR right-of-way from President Quirino Avenue to Bicutan, 11,215 squatters or 22% of all the squatters from President Quirino Avenue to Alabang would be affected. Relocation of the squatters is required under existing legislation (RA No. 7279). The Government of the Philippines will need to relocate the squatters and assume the costs (approximately ₱ 102 million) as part of guaranteeing, to the private investor, access to the right-of-way.

Project Costs: Several structural systems for the MST were reviewed in order to develop cost estimates for the total project. Four alternatives are analyzed; four and six-lane construction and AASHTO Girder and Box Girder. The AASHTO Girders have to be erected from the ground, the Box Girders can be erected from the ground or from above. Although the AASHTO girder system is 11 % more costly than a box girder, the concessionaire would decide which of a number of possible methods of construction is most cost effective.

The six-lane box girder costs ₱ 10.9 billion in 1992 pesos or US$ 437 million at an exchange rate of 25 ₱ to one US$. The rehabilitation of the reverted portions of the SLE is estimated to cost ₱ 1.1 billion or US$ 42 million. These two components of the MST BOT Project have a total cost of ₱ 11.98 billion or US$ 479 million.

Project preparatory or pre-concession agreement costs which include preliminary design and advisory services, a public relations program, preparation of an Environmental Impact

Statement, relocation of the squatters and the acquisition of right-of-way are ₱ 1.66 billion or US$ 66.4 million. These costs will have to be borne largely by the Government of the Philippines. There is some scope for Official Development Assistance (ODA) funding of some of these costs.

By 1999, the full cost to build and operate the MST BOT is about ₱23.7 billion in current pesos or US$702 million in current dollars. These figures assume completion of the rehabilitated portion of SLE in 1996 (1992 cost of ₱1.1 billion) and of the MST during the three year period 1996-1998 (1992 cost of ₱10.9 billion). The difference in costs between 1992 and 1999 is the result of projected inflation (9% in pesos and 6% in dollars), plus Interest During Construction, Initial Working Capital, and the establishment of a Debt Service Reserve Fund.

Traffic: A traffic network model was used to analyze the consequences of different toll rates and system configurations on Manila South Tollway (MST) and South Luzon Expressway (SLE) traffic volumes. The model considered the entire metropolitan area traffic network and travel demand pattern. The level of traffic volumes on each link in the traffic network resulted from the interaction between travel demand, travel supply (the characteristics and level of congestion of competing routes) and the toll rate

Traffic volume outputs by the model were an essential input to the toll revenue and economic benefit calculations, and also shed light on a number of additional issues such as the relative importance of the different MST interchanges, and the required MST mainline capacity.

Traffic levels on the SLE are already high. In 1992, 105,000 vehicles per day traveled between Magallanes and Bicutan Interchanges. Base year travel demand in the MST/SLE corridor is projected to grow at annual rates ranging from approximately 7% between 1990 and 2000, to approximately 2% over the period from 2020 to 2030.

It appears from the various analyses carried out with the model that traffic volumes and total toll revenues are moderately sensitive to the level of toll rates applied on the system. This is because both C-5 and Roxas Boulevard provide alternative routes to the MST/SLE at high toll levels. The toll rate producing the highest total revenue in 1999 is approximately 1.25 Pesos/km for light vehicles. At that level, a four-lane MST would have excess capacity at opening in 1999, although by 2030 a six-lane facility would be required. Roughly half of the corridor's traffic would be forced by this level of tolls to seek alternative (more congested or more circuitous) routes through the network. The MST Bicutan and Vito Cruz interchanges could be eliminated without adversely affecting the system's toll revenues or traffic levels.

A partial-length MST from Alabang to Magallanes would generate about 8% less revenues than a full-length facility.

A key conclusion of the study is that the toll applied at the MST barrier has a major influence on the required MST configuration. A relatively high toll rate tends to dissuade short-distance trips and reduces or eliminates the need for intermediate interchanges or for future capacity

expansion. At a sufficiently high barrier toll (approximately 20 Pesos), virtually all MST traffic is end-to-end and no intermediate interchanges are needed.

Further traffic modelling and analysis work is required to better explore these issues.

Financial Evaluation: A detailed financial model was developed to investigate alternative cost, financing and revenue assumptions. Even assuming a 40% project subsidy from the Philippine Government, no financially viable project organization or financing package was found.

Economic Evaluation: Based on a comparison of project economic costs and benefits (road user cost savings), the project would exceed the NEDA 15% threshold rate of return if opened in 1999. This conclusion hold whether the project is operated as a tollway or free facility, and whether monetarized user time savings are included or excluded from the benefit calculation.

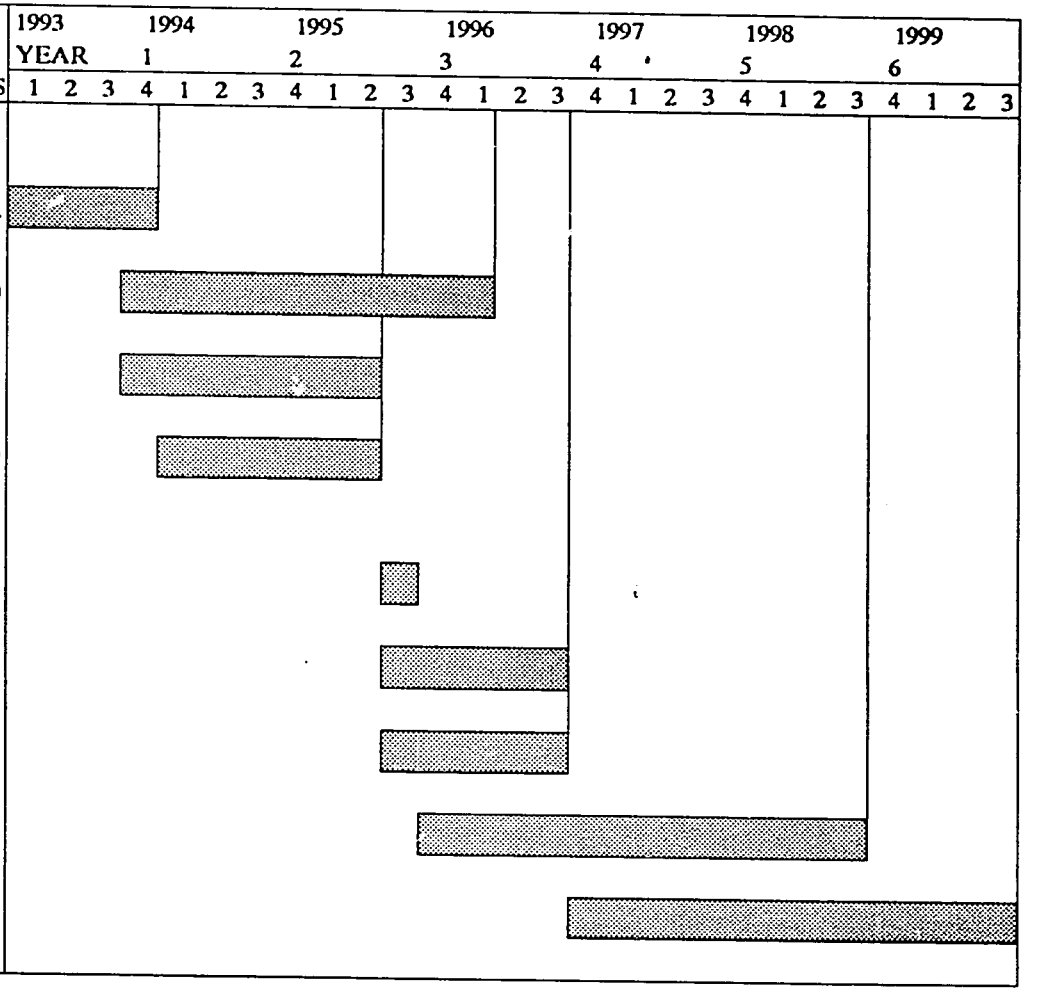
Concession Agreement: Until the preliminary designs and right-of-way drawings are complete, the Consultant does not recommend tendering of the MST BOT Project. The Concession Agreement and Bidding Documents prepared follow closely the requirements of the BOT Law (Republic Act No 6957) and its Implementing Rules and Regulations (IRR). As such, the project is ready to prequalify bidders. However, these documents should be reviewed and modified at the time potential bidders are prequalified. They should reflect changes resulting from the preliminary designs and modifications which might occur to the BOT Law and its IRR.

Implementation Schedule: A detailed implementation schedule has been prepared by the Consultant as shown in Figure 2. If the Government decides to begin with the implementation of this project, the earliest completion date for the MST component of project is late 1998 or early 1999. However, rehabilitation of the SLE could be completed two years earlier after one year of construction. The revenues from the SLE would contribute to the financing of the MST and help to make the project financially viable.

Recommendations: The Consultant recommends that the MST BOT Project be undertaken because it is the only corridor connecting Metro Manila to southern Luzon in which additional transportation capacity can be built before the turn of the century. The rates of return although not that high could attract investors given a sound economic environment. The Government should immediately proceed to the next stages in implementation: preliminary design and legal review.

Figure 2
IMPLEMENTATION SCHEDULE FOR THE MANILA SOUTH TOLLWAY PROJECT

	DESCRIPTION	TIME IN MONTHS
1.0	PRELIMINARY DESIGNS FOR THE MST & SLE AND ROW LOCATION PLANS	12
2.0	RIGHT–OF–WAY (ROW) ACQUISITION	30
3.0	TECHNICAL ASSISTANCE DURING TENDERING	21
4.0	TENDERING, NEGOTIATIONS AND CLOSING	19
5.0	FINALIZE FINANCIAL PLAN AND CONDITIONS PRECEDENT	3
6.0	SQUATTER RELOCATION	15
7.0	FINAL DESIGNS AND APPROVALS	15
8.0	CONSTRUCTION & CERTIFICATION	36
9.0	BEGINNING OF THE OPERATIONAL PHASE	36



Source: Consultant's Estimate as of 20 August 1992.

Chapter 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

This report on the Manila South Tollway BOT Project has been prepared for the Coordinating Council of the Philippine Assistance Program (CCPAP) under the Philippine Assistance Program Support (PAPS) Project. The project is sponsored by the Department of Public Works and Highways (DPWH) and the National Economic and Development Authority (NEDA). Technical services for this study are funded by the United States Agency for International Development (USAID).

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1.1 DESCRIPTION OF THE PROJECT

1.1.1 Overview

The rapid growth of metropolitan Manila in terms of population (3 percent increase per year during the 1980s), and of per capita income (2 percent increase per year) has resulted in projected traffic growth rates of around 3 percent per year. The results of this growth has been the increase in congestion and the need for greater highway capacity. A secondary effect of this growth has been spatial dispersion; commuters now have to travel longer distances to and from work and for leisure and other purposes. In particular, the industrialization and rapid urbanization in the areas south of Manila are straining the capacity of the existing highway network to handle the present traffic and its future growth.

To overcome these capacity constraints, expressways are needed to connect major origins and destinations within the metropolitan area and to by-pass the congestion found at street levels. The National and Metropolitan Governments are aware of these requirements and have prepared a number of transportation plans over the years. The Metro Manila Tollway (MMT), one solution to by-passing urban congestion and to connecting the North and South Expressways, has been in the proposal stage since 1985. A long term franchise to develop this corridor was granted to the Philippine National Construction Corporation (PNCC), holder of the franchises of these two expressways. As part of this program, additional capacity within the South Luzon Expressway (SLE) corridor is needed since this is one of only a few alternatives which provide access to southern Luzon. The Manila South Tollway (MST) is potentially a feasible alternative.

The Manila South Tollway is envisaged as a six-lane highway connecting Pres. Quirino Avenue to Alabang, Muntinlupa. (Appendix A1-2 provides a description of the project's service area.) This project plans to utilize some of the right-of-way of the Philippine National Railways (PNR) and the South Luzon Expressway. Elevated sections are required over most of its length to minimize the right-of-way requirements of the project. At the same time, to provide additional capacity within the corridor, the rehabilitation, operation and maintenance of the South Luzon Expressway are required. The MST and the SLE are best operated as an integrated and complementary system rather than two competing ones.

The long delays associated with the execution of major urban expressway projects are often due to a lack of adequate financing. As the concept of privatization of public infrastructure becomes more popular, Build-Operate-Transfer (BOT) schemes are now being considered as an alternate method of implementing a number of urban transportation projects. To speed this effort along, the Government of the Philippines passed the Build-Operate-Transfer Law (Republic Act No. 6957) in July 1990. Implementing Rules and Regulations for this Act were promulgated in April 1991. To date, no BOT concession agreement for roads has been concluded.

BOT schemes are seen as a relatively cost efficient method of financing large infrastructure projects without burdening the Government with additional debt. When granted the proper incentives, the private sector is better able to complete these projects on time and at lower cost than the Government.

The Manila South Tollway BOT Project presents such an opportunity. Traffic levels in this corridor are high, and are expected to continue to increase rapidly in the future. Revenues generated from charging a toll might be sufficiently high to offset the cost of constructing and operating this facility and provide its investors with an adequate rate of return.

1.1.2 Project Components

This Build-Operate and Transfer (BOT) project consists of two components: the construction of the Manila South Tollway (MST) and the rehabilitation of the South Luzon Expressway (SLE). The combination of both components is referred to as the MST BOT Project.

The MST is envisioned as a six-lane elevated viaduct structure following the alignment of the existing SLE corridor. It starts at President Quirino Avenue in the North and ends at Alabang in the South. Between President Quirino Avenue and Bicutan, the MST runs as a single elevated roadway structure over the PNR, diverting slightly eastward for about 1 km to the general alignment of the present East Service Road where it drops to ground level to meet the vertical clearance requirements imposed by the runway of the Ninoy Aquino International Airport (NAIA). At Bicutan, the MST no longer follows the alignment of PNR but bifurcates into two separate elevated roadway structures over the median of the SLE and at the edge of the East Service Road. It terminates at Alabang with direct connections to the SLE.

The length between Pres. Quirino Ave. to Alabang is around 19 km. Interchanges and ramp connections have a total length of 15 km. The total width of the cross section is 27.3 m for six lanes. This includes 3.5 m lane width, the 3 m median, the 1.2 m shoulders and New Jersey barriers along the sides of the expressway.

The MST will therefore include the construction of:

- 18 km of a six-lane elevated roadway which is supported by column piers.

- 1 km of six-lane expressway at grade. This is required to meet NAIA clearance requirements and to accommodate C-5 (Circumferential Road 5) whose planned construction is to be completed by 1994.

- Interchanges and ramps for seven (7) interchanges:

  (i) President Quirino Avenue
  (ii) Vito Cruz
  (iii) Pasay Road
  (iv) Magallanes (EDSA)
  (v) Bicutan (Doña Soledad Avenue)
  (vi) Sucat (Sucat - Parañaque Road)
  (vii) Alabang (Alabang - Zapote Road)

  Modifications to the existing Magallanes interchange would have to be considered including widening ramps off EDSA and the SLE and the creation of new elevated loop ramps to connect the MST and SLE or to carry through traffic.

- A barrier toll plaza (or toll gate) would be located along the MST at ground level near Nichols toll plaza on the SLE.

The SLE component of the project entails its rehabilitation between Magallanes Interchange and Alabang. Traffic levels on it are high. In 1992, 105,000 vehicles per day travel between Magallanes and Bicutan Interchanges. The traffic on the average is growing at over 7% per annum; the growth of truck traffic is over 11%. The scope of work for this component includes improvements to its drainage, correction of roadway elevation in low areas, repairs to its failing and damaged pavement and shoulders and the overlay of the entire pavement with asphalt concrete, reinstallation of the security fencing, and the provision of new toll collection facilities.

Both components of this project should be implemented by a single concessionaire. This should simplify their financing, construction, operation and maintenance.

1.2 PROGRESS OF THE STUDY

The Terms of Reference for the Preparation of BOT Bid/Tender Documents and Operation of a Manila South Tollway from Alabang to Quirino Avenue and the Rehabilitation, Operation and Maintenance of Reverted Portion of the South Luzon Expressway assumed that these projects would be ready to bid by the end of this year (Appendix A1-1). The Inception Report submitted in June 1992 indicated that this schedule was too optimistic since:

- The concept designs prepared for this study would be too general. The acquisition of the additional right-of-way required for the MST must be based upon more detailed studies of the alignment especially at the interchanges.

- Preliminary designs are needed to define in reasonable detail the right-of-way requirements of the project. The time to prepare these designs and right-of-way drawings is now estimated to be at least a year.

- The SLE and the MST BOT projects would have to be undertaken by the same concessionaire in order to make them attractive to the private sector.

- A portion of the right-of-way would have to be acquired in order to begin the tendering process. No private sector enterprise would be willing to undertake the construction of project without assurances that the required right-of-way at the interchanges would be available in a timely manner.

- The legal issues surrounding the PNCC franchise of the SLE place a danger on the immediate implementation of a BOT project.

Since the Inception Report, the investigation of the Filipino and international financial markets indicate that they are not yet ready to undertake a project as large as the MST. The local capital market has a very limited capacity to fund long term projects.

Because of these reasons, the emphasis placed by the Consultant has been oriented more toward preparing detailed conceptual designs than was originally anticipated. At the same time, preparation of the contract Bid/Tender documents continued in the realization that they might have to be modified as a result of the preliminary design and possible changes in the BOT Law.

The lack of available as-built drawings of the SLE and improvements made to it since its completion in 1968 hampered the progress of the study. As a result, more thorough investigations were required than were originally planned. They included:

- Socio-economic survey of squatters who might be impacted by the project;
- Traffic surveys to update and verify existing data;
- Aerial photography of the corridor;

- Topographic surveys of the MST corridor;
- Geotechnical investigations at major interchanges; and
- Visual inventory of the pavement.

These data collecting activities improved the accuracy of the conceptual designs and will eventually help in the preparation of the preliminary designs.

Throughout the study, the Consultant provided technical assistance to the DPWH in three areas:

- pre-qualification activities for the MST and other potential BOT projects;
- institutional development associated with the creation of a Project Management Office for BOT projects; and
- coordination with other consultants to DPWH undertaking urban highway projects in Metro Manila. In particular, the Consultant assisted the C-5 Consultant in planning for the interchange at C-5 and the MST.

Even with the completion of the draft Report, the Consultant intends to continue advising the DPWH on the MST Project and other BOT projects. This will be done on an ad hoc basis and within the resources available to the Consultant.

1.3 DESCRIPTION OF THE REPORT

This report is organized into three volumes:

- Volume I: Executive Summary and Main Report
- Volume II: Appendices to Main Report
- Volume III: Drawings

The Main Report and Executive Summary has been kept as short as possible. The Appendices present more detailed information including tables, diagrams, technical data such as traffic and geotechnical data as well as outputs from the traffic and financial models. Each chapter in the Main report has corresponding appendices in Volume II with supporting material. Volume III summarizes the results of the conceptual designs prepared for the MST BOT Project.

Chapter 1, Introduction, provides a description of the MST BOT Project and progress of the study.

Chapter 2, Legal Framework, describes the present legal constraints in general terms and their impact upon the MST BOT Project in particular. A review of the recently enacted BOT Law and its Implementing Rules and Regulations (IRR) is made. This includes the corporate structure of the BOT concessionaire, investment privileges, repatriation of foreign currency, and other approvals necessary to be obtained. The ability of the Government of the Philippines to acquire the land required to build these highway projects is evaluated. Finally, the present legal entanglements surrounding the Philippine National Construction Corporation (PNCC) franchise for the reverted portions of the South Luzon Expressway and their impact on the project are discussed.

Chapter 3, Technical Considerations, presents the technical analyses done to prepare the conceptual designs. Alternative designs are considered and evaluated. Data collected on the pavement condition of the SLE, on the geotechnical conditions at the sites of major interchanges, and on the existing alignment of the SLE are reflected in the concept designs and are summarized in the supporting appendices.

In many cases, the choice of methods to be employed in the construction is the prerogative of the concessionaire. However, the construction must follow the approved design criteria and standards, specifications and performance standards which are described in this chapter. Based on the concept designs, cost estimates are prepared reflecting 1992 costs. Detailed construction schedules are prepared.

The Consultant has identified where additional engineering studies are needed. This includes the preliminary engineering designs which will be the basis of preparing the right-of-way drawings. This is the first step in acquiring the additional right-of-way needed at the interchanges.

Chapter 4, Traffic Analysis, explains how the traffic forecasts are prepared using available traffic data obtained from the Department of Public Works and Highways and from the Department of Transportation and Communications. A traffic count program was undertaken to supplement data already available from the two Departments as well as the Metro Manila Traffic Engineering Center. The network model developed by DPWH for the prefeasibility study was adapted for use with the TRANPLAN transportation planning software package. Its calibration replicated the latest available traffic volume on the SLE. Using this calibrated model, the impacts of alternative tolls are evaluated. The Consultant recommends that additional traffic studies be done as part of preparing the preliminary designs.

Chapter 5, Project Financing and Capital Markets, reviews the capacity of Filipino and foreign capital markets to finance large BOT projects in the highway sector. Project funding issues and risk assessment are reflected in the financial covenants attached to loan agreements. The evaluation of the capital markets involved contacting a number of financial institutions in Manila and overseas. A series of recommendations are presented which could help fund these projects.

Chapter 6, Environmental Issues, identifies the major environmental concerns of the project as the relocation of the squatter population along the right-of-way of the Philippine National Railways (PNR), an issue associated with the acquisition of right-of-way at interchanges. Since the largest part of the project is within an existing transport corridor, the project is considered to be environmentally feasible. The size and scope of the project suggests that an Environmental Impact Statement (EIS) will be necessary in order to obtain an Environmental Compliance Certificate from the Department of Environment and Natural Resources (DENR).

Chapter 7, Financial and Economic Evaluation, summarizes the main project parameters which affect its financial viability. They include the project costs, method of financing the project, tolls and traffic, inflation and exchange rate. Alternative techniques of financing the project are also explored including the use of subsidies. These examples provide considerable insight into economic, technical and financial parameters affecting the viability of private participation in the MST BOT Project. The appendices to the chapter give details of the estimates of the operations and maintenance costs and the outputs to the financial model.

Chapter 8, Institutional Arrangements, suggests ways in which various Government agencies can help in the implementation of the project. A BOT Project Management Office is proposed. Supervising the concessionaire and coordination with other government agencies during the construction phase of the project will be its main responsibility. Its manning, training and funding requirements are also described.

Chapter 9, Concession Agreement and Tendering Process, covers the important points which the concession agreement should cover. They include the length of the franchise, toll setting mechanism, approval during design and construction, and penalties and target completion dates. The pre-qualification and bidding procedures and their evaluation are described. The appendices to this chapter include a draft of the concession agreement or contract, pre-qualification forms, evaluation and rating methodology of the pre-qualification documentation, invitation to bid and instructions to bidders, method of evaluating the bids, and the terms of reference of the Independent Design Checker and the Independent Certification Engineer.

Chapter 10, Implementation Schedule, summarizes the activities that need to be done in order to complete the MST BOT Project prior to 1999.

1.4 ACKNOWLEDGEMENTS

The Consultant and the Study Team (Appendix A1-3) would like to acknowledge the cooperation and help they received from persons and organizations in the private and public sectors.

In this connection, special mention is made of the valuable assistance from the following departments/agencies of government:

- In the Coordinating Council of the Philippine Assistance Program, the Executive Director, Rogelio L. Singson, and his staff for providing on many occasions an opportunity to discuss this project in context of BOT projects being considered in other sectors of the economy.

- In the Department of Public Works and Highways, the Honorable Jose P. de Jesus, Secretary; Honorable Teodoro T. Encarnacion, Undersecretary; Director Jose C. Pendoza of the Urban Road Projects Office; Project Manager Godofredo Z. Galano of the BOT Project Management Office; and many other officials and staff of the Department for their support, cooperation and high quality collaboration throughout the conduct of the study.

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- In the Philippine National Railways, the General Manager, Conrado K. Tolentino, and his staff for making available PNR data and drawings on ROW, squatter relocation strategies, and development plans and programs.

- In the Toll Regulatory Board, the Executive Director, Ma. Chona M. Dimayuga, and her staff for making available materials and information on toll operations and regulations.

The private sector gave the Study Team considerable insight into the financing and construction of large projects in the Philippines. In particular, Senen Matoto, Senior Vice-President of the Bank of the Philippine Islands; Gil Buenaventura, Vice-President; and Vaughan Montes, Senior Economist; both of Citibank; and Antonio Sundiang, Senior Vice-President, Philippine National Bank.

Finally, the Acting Mission Director, Richard A. Johnson, allowed the Study Team to brief the USAID staff on the progress of the study. Special thanks is given to Alex Sundermann, Chief, Energy and Special Projects; and Pons Naanep, Project Management Specialist; both of the Office of Capital Projects, USAID, for their continuous support throughout the study.

A list of the meetings conducted over the course of the study is provided in Appendix A1-4.

A bibliography is given in Appendix A1-5.

Chapter 2

LEGAL FRAMEWORK

CHAPTER 2

LEGAL FRAMEWORK

2.1 THE BOT LAW AND ITS IMPLEMENTING RULES AND REGULATIONS

2.1.1 Legislative and Administrative Background

Republic Act (RA) No. 6957, otherwise known as the BOT law, is entitled "An Act Authorizing the Financing, Construction, Operation and Maintenance of Infrastructure Projects by the Private Sector, and for Other Purposes". It was enacted in line with the declared policy of the state to recognize the indispensable role of the private sector as the main engine for national growth and development and to provide the most appropriate favorable incentives to mobilize private resources for the purpose.

The BOT law was sponsored in the House of Representatives as House Bill (HB) No. 19440, and in the Senate as Senate Bill (SB) No. 1285. HB No. 19440 introduced the Build-Operate-and-Transfer (BOT) scheme, while SB No. 1285 introduced the Build-and-Transfer (BT) scheme as well. A conference committee of the House of Representatives and the Senate prepared a consolidated bill which both chambers approved on June 7, 1990. President Corazon C. Aquino approved the BOT Law on July 9, 1990.

A committee, created pursuant to the BOT law, composed of representatives from the Department of Public Works and Highways (DPWH), the Department of Finance (DOF), the Department of Interior and Local Government (DILG), the National Economic and Development Authority (NEDA), and the duly accredited organizations representing the construction industry promulgated, and on April 3, 1991, approved the Implementing Rules and Regulations (IRR) of RA No. 6957.

2.1.2 Requirements in General of the BOT Scheme

2.1.2.1 Statutory Characteristics

The BOT scheme is a contractual arrangement whereby the contractor undertakes the construction, including the financing, of a given infrastructure facility, and the operation and maintenance thereof. For the construction stage, the contractor may obtain financing from foreign and/or domestic sources and/or engage the services of a foreign and/or Filipino constructor. The contractor operates, maintains, and repairs the facility over a fixed term during which it is allowed to charge facility users appropriate tolls, fees, rentals, and charges sufficient

to enable it to recover its operating and maintenance expenses and its investment in the project plus a reasonable rate of return thereon. At the end of the term, which shall not exceed fifty (50) years, the contractor transfers the facility to the government agency concerned.

2.1.2.2 Citizenship Requirement of BOT Operator

Where the operation of the infrastructure facility needs a public utility franchise, the BOT law expressly requires compliance with the Constitution. The BOT contractor must, therefore, be a citizen of the Philippines or a corporation or association organized under the laws of the Philippines at least sixty per centum of whose capital is owned by such citizen. This constitutional requirement with respect to BOT projects is re-stated in the Transitory Negative List prepared by the Board of Investments (BOI) pursuant to Republic Act No. 7042, also known as the Foreign Investments Act of 1991, signed into law by President Aquino on June 13, 1991.

2.1.2.3 Repayment Scheme to the BOT Contractor

For the financing, construction, operation, and maintenance of the BOT facility, the contractor is authorized to charge facility users appropriate tolls, fees, rentals, and charges sufficient to enable it to recover its operating and maintenance expenses and its investment in the project plus a reasonable rate of return thereon. The fairness and equity of the tolls for national highways and public thoroughfares are approved by the Toll Regulatory Board which is under the DPWH. The tolls, fees, rentals and charges may be subsequently adjusted based on a formula related to official government price indices which are mainly those issued by the National Statistics Office and the Central Bank of the Philippines. Another approach or basis of toll setting is discussed in Chapter 9 in relation to the parameters affecting the concession agreement.

2.1.2.4 BOT Franchise

The infrastructure agency concerned, automatically issues the BOT contractor a franchise to operate and maintain the facility, including the collection of tolls, fees, rentals and charges in accordance with the repayment schedule discussed above. The Constitution and the BOT law mandate that the maximum period of the franchise is fifty (50) years. Chapter 9 discusses the critical nature of the franchise period as a variable in the concession agreement.

2.1.2.5 Project Supervision

The BOT contractor constructs, operates and maintains the facility in accordance with the plans, specifications, standards, and cost approved by the infrastructure agency concerned which also exercises technical supervision over the project.

2.1.3 Specific Requirements of the BOT Scheme

2.1.3.1 Authorized Government Contracting Agencies and Eligible Infrastructure Projects

All government infrastructure agencies, including government owned and controlled corporations and local government units, are authorized to enter into BOT contracts. Financially viable infrastructure projects which meet the requirements of the BOT law are eligible to be undertaken under the scheme. The IRR lists the infrastructure agencies and the eligible infrastructure projects.

2.1.3.2 Approval of Proposed BOT Projects

National projects eligible under the BOT are approved by the Congress of the Philippines prior to the call for bids for their implementation. These projects must have been included in the agencies' medium-term infrastructure programs and must have been given the required publicity.

The Senate and the House of Representatives, however, issued Joint Resolution No. 3, which among others, approved the listing of generic infrastructure projects and designated the Investments Coordinating Committee (ICC) of the NEDA as the supervising central and final authority for the approval or disapproval of proposals or direct applications for BOT or similar projects. This Joint Resolution, approved by President Aquino on February 10, 1992, consolidated House Joint Resolution No. 16 and Senate Concurrent Resolution No. 49.

For its part, the ICC issued its guidelines which define the requirements and procedures in the evaluation/approval of BOT proposals.

2.1.3.3 Preparatory Tendering Activities

The infrastructure agency prepares the bidding documents to guide prospective bidders in preparing and submitting their prequalification applications and bid proposals. These documents include project objective and description, prequalification criteria and procedures, instructions to bidders, minimum design and performance standards and specifications, economic parameters, draft contract, and bid evaluation criteria. These documents are discussed in greater detail in the text and appendices of the other chapters of this report.

2.1.3.4 Prequalification, Bidding, and Bid Evaluation Requirements and Procedures

The tendering process is discussed in detail in Chapter 9 and its appendices.

2.1.3.5 Concession Agreement

The parameters affecting the concession agreement are discussed in Chapter 9.

The contract is approved by the head of the infrastructure agency or higher authorities depending upon the contract cost. The NEDA ICC guidelines require the submission to it of the contract for confirmation of any government exposure or commitments within the earlier ICC-approved negotiating parameters. Approvals by other government agencies are discussed in subsequent portions of this chapter.

2.1.3.6 Financing

For the construction stage, the contractor may obtain financing from foreign and/or domestic sources. The financing of a foreign or foreign-controlled contractor from Philippine government financing institutions should not exceed twenty percent (20%) of the total cost of the project. The financing from foreign sources should not require a guarantee by the government or by government-owned or controlled corporations. The financing from domestic sources should not require a guarantee from the national government.

2.1.3.7 Construction

The BOT contractor may engage the services of a foreign and/or Filipino constructor. The foreign constructor must be duly accredited by its government to undertake construction work and must employ or hire Filipino labor in the different phases of the construction where Filipino skills are available. The Filipino constructor must be licensed and accredited by the Philippine Constructor Accreditation Board.

2.1.3.8 Right-of-Way and Other Facilities

This is discussed in various chapters of this report.

2.1.3.9 Audit of Collections

The collection of tolls, fees, rentals, and charges for the use of the facility by the public and for the recovery of its cost plus a reasonable rate of return on the investment is, by law, of public interest. To establish that such amounts are properly collected and recorded, the Commission on Audit (COA), after consultation with the infrastructure agency concerned, audits the pertinent books and records of the contractor in accordance with existing rules and regulations.

2.1.4 Proposed Changes

The BOT law is of relatively recent enactment. It was signed into law only on July 9, 1990. Its IRR was approved only on April 3, 1991. Joint Resolution No. 3 of the Senate and House of Representatives designating the NEDA ICC as the supervising central and final authority for the approval/disapproval of BOT proposals was approved by President Aquino only on February 2, 1992. The Investment Priorities Plan, prepared by the BOI pursuant to Executive Order No. 226 (Omnibus Investments Code of 1987), which included BOT projects as eligible for incentives and privileges, became effective only on May 11, 1992.

Only two (2) projects have so far been acted upon by the ICC under the BOT law: The Manila Grains Terminal Project and the EDSA LRT Project, both of which are still in the ICC evaluation stage. The Hopewell Energy (Philippines) Corporation Project and other National Power Corporation (NPC) BOT projects were passed upon by the ICC under Executive Order (E.O.) No. 215 dated July 10, 1987, not under RA 6957. The BOI recently created a BOT team to hasten the mobilization particularly of foreign investment in the BOT scheme. The team is just too eager to have its hands on the first BOT application which still has to come by.

In January 1992, the U.S. Agency for International Development (A.I.D.) sponsored a symposium on the BOT scheme. The need to consider changes in the BOT law was noted. The NEDA plans to conduct a workshop on the BOT scheme before the end of 1992. A further look will be made on the BOT law and its IRR with the end in view of recommending improvements thereon. This and other chapters of this report will consider proposed improvements in the BOT law.

2.2 RIGHT-OF-WAY ISSUES

The BOT law and its IRR says that the infrastructure agency shall acquire and provide the contractor the required right-of-way free of any third-party rights which will prevent or hamper the implementation and operation of the project. It is only proper that this burden be assumed by the government because it has the resources and facilities for official coordination, and the inherent and coercive clout of eminent domain should the owner of a private property be unwilling to part with it. Besides, title over the resulting public road belongs to it.

The cost of the right-of-way and associated facilities may be partly or wholly financed and/or shouldered by the contractor as part of its bid, i.e., of the project cost to be recovered by it through the BOT repayment scheme.

If the right-of-way is to be funded by the government, as is generally the case, budgetary and fiscal constraints can delay if not derail the project. Even when funds are available and the owners agree to sell, the completion of documentary requirements and the standardized system and procedures of the DPWH under its Ministry Order No. 65 Series of 1983 are tedious, cumbersome, and time-consuming.

Even worse is the situation when funds are not available and the owners contest the government's price offer. While procedures are in place which are used to determined what is just compensation, convening the appraisal committee is encumbered with red tape. If no agreement between the DPWH and the lot owners is reached, it will become necessary for the government to exercise its power of eminent domain.

Expropriation proceedings, like other judicial proceedings, can be time consuming. The DPWH experience on right-of-way acquisition will bear this out. Close coordination with the Office of the Solicitor General is necessary. Arrangements for the deposit with the Philippine National Bank will have to be worked out. In court, owners question the necessity of the exercise of the power, the public use of the property sought to be expropriated, and the determination of just compensation.

Protracted right-or-way acquisition overwhelmingly discourages potential investors.

The BOT law and its IRR attempts to cure the malady. It says that if there is undue delay and/or inadequacy in the right-of-way or other project facilities which are required to be provided by the infrastructure agency, the latter may make appropriate adjustments in the tolls, fees, rentals or charges to compensate for the opportunity costs to the contractor. In the meantime, cost of the delay to the contractor could be grossly disproportionate.

The BOT law and its IRR also says that the infrastructure agency, through no fault of the contractor and by mutual agreement with the contractor, may revoke, cancel, or terminate the contract in case of failure of the agency to provide the right-of-way . In such case, the agency shall compensate the contractor for its actual expenses in the project plus a reasonable rate of return therein as of the date of such revocation, cancellation or termination, provided the right of the government has been properly insured and the insurance cost included in the terms and conditions of the contract. The contractor, therefore receives no more and only subject to the conditions just mentioned.

Chapter 9 of the report provides a deeper insight on the right-of-way acquisition as a parameter affecting the concession agreement.

2.3 BOT OPERATIONS: LEGAL REQUIREMENTS AND APPROVALS

2.3.1 Corporate Structure of BOT Operations

The BOT law says that the ownership structure of the contractor of an infrastructure facility whose operation requires a public utility franchise must be in accordance with the Constitution. The Philippine Constitution provides that a public utility franchise shall be granted only to citizens of the Philippines or to corporations or associations organized under the laws of the Philippines at least 60 per centum of whose capital is owned by such citizens. The Constitution also says that the participation of foreign investors in the governing body of any public utility enterprise shall be limited to their proportionate share in its capital, and that all executive and managing officers of such corporation or association must be citizens of the Philippines.

A legal question, therefore, of interest to foreign investors is whether or not the operation of a tollway such as the proposed Manila South Tollway requires a public utility franchise. If it does, the constitutional requirements must be met.

The BOT law and its IRR makes reference to the Public Service Act in the determination of which contractor must meet the 60 percent minimum Filipino ownership requirement. The Public Service Act, Commonwealth Act No. 146 which became effective on November 7, 1937, does not define a public utility, but it defined by enumeration what are included in the term "public service". While tollways are not among or similar to those enumerated, the preponderance of authority is to the effect that tollways are public utilities the operation of which requires a public utility franchise.

The Toll Regulatory Board, which is mandated by its charter to supervise and regulate toll operation, in its 1989 financial audit of PNCC operations, makes reference to the Supreme Court ruling on the 12% allowable rate of return for public utilities under the Public Service Act. The Toll Operation Agreement between the Public Estates Authority and the TRB also makes reference to the 12% maximum rate of return based on the Public Service Act. In the case of North Negros Sugar Co. vs. Hidalgo, 63 Philippine Reports 664, promulgated on October 31, 1936, the Supreme Court said that when the owner of a land opens a road to the use of the public upon paying toll fees, the road becomes charged with a public interest and accordingly becomes a public utility. The Court further said that the fact that toll roads were not included in the enumeration of public utilities under the then Public utilities Act, Act No. 3108, such omission by the legislature does not remove the public character of the road. An enterprise which is essentially a public utility cannot be made otherwise by legislative fiat of omission.

It can therefore be concluded that the operation of the Manila South Tollway requires a public utility franchise and that the constitutional minimum Filipino ownership requirement for corporations or associations must be met if the MST project is to be undertaken under the BOT scheme.

To remove BOT tollways from the scope of the constitutional requirements, amending the Public Service Acts by expressly removing tollways from the category of a public utility will not be valid since the public character of the tollway remains the same. Instead, the Constitution itself will have to be amended so as to delete the minimum Filipino ownership requirement for operation of public utilities.

It should be noted, however, that the constitutional requirement on the minimum Filipino ownership applies to the operation phase of the public utility. If the MST BOT project is structured similar to a Build-and-Transfer scheme, as in the proposed EDSA LRT Project where the operation of the public utility is leased to the government or to an entity which can meet the constitutional requirement, then constitutional provision will not be violated. In such a case, no limitation is placed on the ownership structure. This arrangement, however, places a greater financial burden on the government which also will have to take greater responsibility and risk in the operation of the tollway.

2.3.2 Law Enforcement on BOT Facilities

Law enforcement is an essential component of the operation phase of the BOT facility. The public interest in the operation of a public utility necessitates the protection of the lives and properties of facility users and the facility itself. Law and order will have to be preserved within the facility. For this purpose, proper coordination between the concessionaire and law enforcement agencies will have to be formalized and institutionalized. Since responsibility over the facility operation belongs to the concessionaire, the latter should be granted jurisdiction, supervision and control all immediate areas of influence of the facility. The concessionaire's personnel should be properly deputized by the appropriate government agency. In the case of the South Luzon Expressway, PNCC's amended charter, Presidential Decree No. 1894, expressly grants the PNCC such jurisdiction, supervision and control. For this purpose, the PNCC entered into a Memorandum of Agreement with law enforcement agencies to formalize security and traffic arrangements in the area. When the PNCC pulled out of portions of the South Luzon Expressway because of pending legal issues before the courts, the Citizens Action for Reliable Expressway (CARE) Foundation entered into an agreement with the DPWH, the DOTC, the Metro Manila Authority, the Traffic Engineering Center, the Land Transportation Office and the Philippine National Police - Highway Patrol Group regarding the need to improve essential services particularly traffic control along the expressway from Magallanes to Alabang. The agreement hopes to ensure smooth traffic mobility and decongestion in all areas of the facility.

2.3.3 Board of Investments Privileges

Executive Order No. 226, otherwise known as the Omnibus Investments Code of 1987, consolidates the incentives and privileges available to foreign and local investors under separate laws, and provides them with alternate incentive schemes. The detailed discussion of these incentives are found in Appendix A7-3.

2.3.4 Securities and Exchange Commission Approvals

A corporation acquires legal personality upon its registration with the Securities and Exchange Commission pursuant to Batas Pambansa Bilang. 68 otherwise known as the Corporation Code of the Philippines. The BOT law IRR also says that the Filipino contractor must be duly registered with the Securities and Exchange Commission for purposes of undertaking component activities of the BOT project. Likewise, SEC registration is required under Republic Act No. 7042 otherwise known as the Foreign Investments Act of 1991.

2.3.5 Central Bank/Monetary Board

The Central Bank had existing regulations on Foreign Exchange and Foreign Currency Deposits. Central Bank Circular 1028 and 1088 govern repatriation of foreign investments and remittance of profits and dividends. Registration under the BOT law will facilitate assistance in these areas.

2.3.6 Environmental Regulations

BOT operation must observe environmental laws and met environmental standards. The details on environmental concerns are discussed in detail in Chapter 6.

2.4 PNCC FRANCHISE

2.4.1 Outstanding Legal Issues

In 1987, the Republic of the Philippines petitioned the Regional Trial Court of Makati to exclude from the PNCC franchise the portion from Villamor Air Base, Pasay City to Alabang, Muntinlupa, among others, on the ground that the PNCC had long fully recovered its investments and expenses in the construction. In due time, the case reached the Supreme Court (G.R. No. 89557) which approved a compromise agreement entered into by the parties. A provision in the compromise agreement stated that should the PNCC fail to comply with its commitments under the said agreement, the Court of Appeals ruling that the questioned portions of the SLE will be excluded from PNCC's franchise will become final and executory. When the case was remanded to the lower court for execution, the claim was made that PNCC indeed failed to comply with the compromise agreement and therefore the questioned portions of the SLE should be excluded from the PNCC franchise. The case is back with the Supreme Court (G.R. No. 104437).

Another case involving the PNCC has recently been decided by the Supreme Court (G.R. No. 101057). The case stems from the debt-to-equity scheme the government financial institutions took and the ratification thereof made by the PNCC Board of Directors and stockholders. The case appears to be part of the on-going claim of ownership over the PNCC by the Rodolfo Cuenca group.

The Rodolfo Cuenca group has a pending case with the Securities and Exchange Commission also involving the issue of ownership of the PNCC.

Petitions for toll rate increase decided by the Toll Regulatory Board have been included in the PNCC cases with the Supreme Court.

The BOT law says that the infrastructure agency shall automatically grant the winning contractor the franchise to operate and maintain the facility, including the collection of tolls, fees, rentals and charges. The collection of tolls, etc. is the repayment scheme through which the BOT investors recover their operating and maintenance expenses and its investments plus a reasonable rate of return thereon. The investors will therefore have to be assured at best full and undivided enjoyment of the franchise.

On the other hand, PNCC claims that it has an existing legislative franchise (Presidential Decree No. 1113 as amended) over the South Luzon Expressway including any and all extensions, linkages, stretches and diversions thereof. PNCC can also raise the claim that its franchise, being legislative in nature, is superior to that issued by an administrative body such as the DPWH and can be repealed only by another legislation.

An apparent conflict between these two franchises will naturally ensue.

2.4.2 Evaluation of the Legal Issues

The issue of whether or not PNCC violated the terms of the compromise agreement warranting the exclusion of the questioned portions from the PNCC franchise will be passed upon by the Supreme Court in G.R. No. 104437. All parties are confident that their cause will be vindicated.

The Supreme Court resolution in G.R. No. 101057 will have a considerable impact in the pending case before the Securities and Exchange Commission regarding Rodolfo Cuenca's claim of ownership of a major portion of PNCC.

The TRB case No. 83-1, then before the Office of the President, regarding toll rates increase is included in the compromise agreement approved by the Supreme Court in G.R. No. 89557.

There should be no conflict between the two franchises. PNCC's franchise under Presidential Decree No. 1894, covers the South Luzon Expressway from Nichols, Pasay City (Station 10 - 540) to Lucena, Quezon. It is described by specific horizontal stations. The MST, on the other hand covers the elevated roadway from President Quirino Avenue, Manila to Alabang, Muntinlupa. An apparent overlap is located in the area between Nichols and Alabang. But then one is at grade and the other is elevated. And even if an overlap does exist, there should be no legal incompatibility between the PNCC franchise and the franchise to be issued by the DPWH. When the BOT law granted the sponsoring agency, in this case the DPWH, the authority to grant the BOT concessionaire the franchise to operate and maintain the infrastructure facility, Congress was well aware of the legislative franchises it had previously issued. Besides, as the Constitution expressly provides, no franchise for the operation of a public utility shall be exclusive character.

2.4.3 Perception by Bidders of the Legal Problems

Foreign investors will be alarmed at the government position of requesting the courts for exclusion of certain portions from the PNCC franchise. The government which itself issued a 30-year franchise requested partial cancellation thereof even before the expiry of the period of the franchise. If it happened to PNCC, it can happen to the BOT franchise.

Likewise, foreign investors will entertain serious doubts about recovering its investments through the toll system because of TRB's apparent reluctance to approve toll rate increases. The last toll rate increase was in 1983. Foreign investors will not want uncertainties in this area.

Foreign investors will likewise find as threatening the existence of the PNCC along the same corridors as the MST BOT Project.

2.5 REQUIREMENTS FOR THE MST

As discussed above, the right-of-way issue must be addressed by the government to assure the timely prosecution of the project. The draft concession agreement has been drawn to make it very compelling to the government to meet the deadlines for right-of-way acquisition. Penalties for delay have been provided.

The constitutional provision on the minimum Filipino ownership requirement for operation of public utilities will have to be amended.

The franchise of PNCC will have to be dealt with. The Toll Regulatory Board claims that PNCC has violated the terms and conditions of its franchise for which the government is authorized to cancel the same as so provided in Presidential Decree No. 1113, the PNCC

charter. The TRB further claims that the Toll Operation Agreement subsequently entered into between it and the Construction and Development Corporation of the Philippines, PNCC's predecessor-in-interest, expressly granted the TRB the authority to impose the penalty imposed under the PNCC charter, which is, cancellation of the franchise. The TRB therefore claims that it has been expressly delegated by the legislature the authority to cancel or repeal the franchise. This approach will be very contentious and litigious.

The PNCC franchise can be dealt with through the internal corporate processes. The PNCC Board of Directors and stockholders are presently dominated by representative of the government financial institutions. At the present time, the government therefore has control over policy directions of PNCC. The PNCC Board and stockholders may, upon receipt of a minimal fee, voluntarily abdicate its franchise on the ground that it no longer has the financial, technical and other resources to continue providing the public the required standard of service. The PNCC can decide to agree on a revenue sharing arrangement with the BOT concessionaire. Whatever the action will be, it has to be done before the tendering process so that foreign investors are assured of a unified tollway operations.

Chapter 3

TECHNICAL CONSIDERATIONS

CHAPTER 3

TECHNICAL CONSIDERATIONS

3.1 DESIGN STANDARDS

3.1.1 Highway Design Standard

The geometric design standards given in the Pre-Feasibility Study are said to be based on the DPWH Design Guidelines Criteria and Standards. The DPWH Guidelines are largely derived from AASHTO policies.

It is therefore proposed that the highway design standards be based on current AASHTO policies and guidelines for Freeways,[1] with modifications appropriate to the Philippines and additions necessary for toll roads, see Appendix A3-1.

Design of highway drainage, pavements, pavement markings, traffic signs and signals shall also be based on AASHTO procedures or comparable international standards suitably modified for local conditions.

3.1.2 Structural Design Standard

The National Structural Code of the Philippines[2] shall be adopted as the Structural Design Standard, with the specific design criteria and modifications given in Appendix A3-1. Alternatively, any approved equivalent national bridge design code, such as the Ontario, United States, German, British or Australian codes, may be adopted as the Structural Design Standard.

3.1.3 Building Design Standard

The National Structural Code of the Philippines[3] shall be adopted as the Building Design Standard.

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[1] A Policy on Geometric Design of Highways and Streets, 1990, AASHTO. Roadside Design Guide, 1988, AASHTO.

[2] Volume II Bridges, First Edition December 1987, published by the Association of Structural Engineers of the Philippines, which is based on the AASHTO "Standard Specifications for Highways Bridges" 13th Edition 1983 with modifications to suit local conditions.

[3] Volume I, Buildings, Towers and Other Vertical Structures, Third Edition June 1986, published by the Association of Structural Engineers of the Philippines.

3.1.4 Construction Specification

The DPWH Standard Specifications[4] shall be adopted as the Construction Specification, with supply and testing of materials to the relevant AASHTO and ASTM Standards. The Standard Specifications shall be augmented or modified as necessary at the design stage by supplementary specifications.

3.1.5 Miscellaneous Requirements

Requirements for design life and units are given in Appendix A3-1.

All of the above standards and specifications shall be the current editions, including amendments and updates, as at the end of the bidding period.

3.1.6 PNR Clearance Requirements

Clearances to the PNR tracks were indicated in Attachment 3 of the DPWH Pre-Feasibility Study dated November 15, 1991. Clearance envelopes were detailed with a vertical clearance of 5.65 m above rail level and a horizontal clearance of 1.5 m from the centerline of each track.

Clearance diagrams which differ from the above were independently obtained from the PNR Permanent Ways Maintenance Branch. These envelopes are applicable to the section of track between President Quirino Avenue and Alabang and are shown in Appendix A3-1. The minimum vertical clearance from the top of rails is generally 4.83 m but is 5.32 m at Bicutan. The minimum horizontal clearance during construction is 1.82 m from the centerline of each track.

A further PNR preference is that a horizontal clearance of 3.5 m be generally provided from the centerline of each track to facilitate track maintenance. The intermittent infringement of the preferred boundary by bridge piers is acceptable.

As indicated in the Terms of Reference, allowance for an improved mass transit system, such as an LRT, would be advantageous.

Accordingly, clearance requirements have been obtained from the Light Rail Transit Authority and are shown in Appendix A3-1. The minimum vertical clearance from the top of rails is 6.365 m and the minimum horizontal clearance is 1.57 m from the centerline of each track.

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[4] Volume II, Highways Bridges and Airports, published by the Republic of the Philippines, Department of Public Works and Highways.

The drawings have been detailed for the worst of the above requirements based on the advice provided by the PNR Permanent Ways Maintenance Branch and the Light Rail Transit Authority. PNR Permanent Ways Maintenance Branch has confirmed that this envelope would provide sufficient clearance for dealing with emergencies such as a derailed train.

As the railway stations along the route have platforms which are approximately 100 m long, it will be necessary to place at least two piers within each 3 m wide platform. With the column separation detailed, the piers would be located in the back half of each platform leaving a clear width in front of the column of approximately 1.7 m. A larger clearance could be provided by spreading the carriageways further apart at each station, if necessary, while still remaining within the PNR ROW boundary. Any inconvenience to rail commuters of having columns located within the platforms would be more than offset by the protection from the elements afforded by the overhead structures. Pier spacing can be arranged so as not to interfere with station buildings.

3.2 DESIGN CONCEPTS CONSIDERED

3.2.1 Operational Strategies

3.2.1.1 Two Separate Tollway Projects

If the MST-BOT concessionaire and the SLE-ROM concessionaire are two separate and independent organizations, two basic operational strategies are possible:

- Both tollways have similar connections to regional arterial roads and streets between Magallanes and Alabang and compete for traffic over this stretch, as assumed in the Pre-Feasibility Study.

- The MST has no connections to regional roads between Magallanes and Alabang and serves only long distance traffic. The SLE serves all traffic between Magallanes and Sucat. The only traffic for which the two tollways would compete would be from Magallanes to Alabang.

Other combinations of entrance and exit ramps would produce an intermediate operational procedure.

3.2.1.2 One Integrated Tollway

If the MST-BOT concessionaire and the SLE-ROM concessionaire are one and the same, the combined facility would be operated in a manner which would maximize revenues and minimize costs.

In addition to the two basic operational strategies in 3.2.1.1 above, if permitted to do so the concessionaire might choose to serve certain origins and destination with the SLE and others with the MST.

For reasons given elsewhere in the report, it is recommended that the SLE and MST be operated as one integrated tollway. For the purposes of this study, it has been assumed that similar connections to regional arterials would be made for both facilities.

3.2.1.3 Recommended Operation Strategy

The Consultant recommends the Integrated Tollway strategy because it minimizes the costs and the need to have two competing concessionaires. Secondly, having an existing tollway which could be rehabilitated in a reasonably short period of time could facilitate putting together a financial package for the MST by potential BOT bidders.

3.2.2 Barrier or Closed System

3.2.2.1 General

Two alternative systems of toll collection are in use in international practice, the barrier system and the closed or ticket system. All existing toll systems in the Philippines are closed systems. A barrier system has been proposed for the R-1 (Coastal Road) but this has not yet been accepted by the Toll Regulatory Board (TRB).

3.2.2.2 Barrier System

The barrier system of toll collection requires a toll plaza (or toll gate) across the toll road at intervals determined by the spacing of major interchanges. All vehicles of one class pay the same toll at each barrier. No toll tickets are required, but receipts are provided on request.

Barrier systems are commonly used in preference to closed systems in urban areas where land is costly and difficult to acquire. Closed systems require either interchanges which occupy large land areas, such as the trumpet or direct connection types, or, if simpler interchanges such as diamond types are used, numerous small toll plazas which are difficult and costly to operate, administer and secure.

As no tickets are used, the barrier system is less costly and each transaction takes less time, though for longer trips more transactions per vehicle may be required than for closed systems. Since all vehicles of one class passing a barrier pay the same toll, however, the toll rate per kilometer may vary according to actual trip length. In some cases barrier toll plazas are located on entrance and exit ramps in order to make toll charges more equitable or to eliminate toll free movements between interchanges located between mainline barriers.

Based on the traffic projections in the Pre-Feasibility Study for the MST, a barrier located between Nichols and C-5 is estimated to require 28 toll lanes by the year 2011.

3.2.2.3 Closed System

In a closed system, every vehicle entering a tollway is issued with a ticket encoded with the class of vehicle, entry toll plaza, date and time. Upon leaving the tollway the ticket is surrendered and the driver pays the appropriate toll.

Closed ticket systems are usually used in suburban and rural areas where trip lengths are longer. Vehicles are only required to make two stops whatever their length of trip on the tollway. Each class of vehicle pays a more or less constant toll rate per kilometer, related to its length of trip.

As far as possible, closed systems employ interchanges which can funnel all traffic through a single toll plaza serving both entry and exit traffic, such as the trumpet or direct connection types. This is the most cost effective toll collection system for these types as a few large plazas are easier and less costly to operate, administer and secure than a large number of small plazas. The reverted portion of the SLE was a closed system.

Based on the traffic projections given in the Pre-Feasibility Study, Table 3-1 estimates the number of toll lanes required in the year 2011 for a closed system for the MST as follows:

Table 3-1
NUMBER OF TOLL LANES REQUIRED FOR MST CLOSED SYSTEM

INTERCHANGE	NO. OF TOLL LANES REQUIRED	
	ENTRANCE	EXIT
Pres. Quirino Ave.	4	11
Vito Cruz	2	2
Pasay Road	2	5
EDSA	2	5
Bicutan*	6	N.A.
Sucat*	N.A.	6
Alabang	combined	15

*Traffic Projection Data Incomplete

3.2.2.4 Recommended System

It is apparent that the cost of land acquisition to provide toll plazas for a closed system on the MST would be very high indeed. The consultant therefore recommends that the MST uses a barrier toll collection system. A barrier system also has lower capital and operating costs than a closed system, see Section 3.5.

The consultant recommends continuing to operate the SLE with a closed system. Table 3-2 lists the number of existing toll lanes. It appears that if necessary, one more lane could be added to each entrance and exit lane at Alabang, Sucat and Bicutan, without additional ROW.

It should be noted that 12 additional lanes are required on the SLE at Alabang.

Table 3-2
NUMBER OF EXISTING TOLL LANES ON SLE

INTERCHANGE	NORTHBOUND		SOUTHBOUND	
	ENTRANCE	EXIT	ENTRANCE	EXIT
Alabang	2	-	-	4
Sucat	2	2	2	4
Bicutan	2	2	2	3
Nichols	-	9*	9*	-

*Includes 4 Reversible Lanes.

3.2.3 Alignment

3.2.3.1 General

Between President Quirino Avenue and Bicutan the South Luzon Expressway (SLE) and the Philippine National Railway (PNR) occupy a single transportation corridor. Between Bicutan and Alabang the two facilities are located on separate rights-of-way with the SLE up to 800 m west of the PNR.

On the west side of the SLE between Magallanes Interchange and Nichols Interchange there is a two-lane southbound frontage road. From Nichols Interchange to Alabang the West Service Road parallels the SLE, has two lanes and carries two-way traffic. Between Nichols Interchange and Bicutan the East Service Road, with four lanes divided by a median, is located immediately east of the PNR. From Bicutan to Alabang a two-lane frontage road carrying two-way traffic is located immediately east of the SLE.

The east end of the main runway at Ninoy Aquino International Airport (NAIA) is situated immediately west of the SLE about 500 m south of Nichols Toll Plaza. The proposed Circumferential Road 5 (C-5) crosses the SLE about 400 m south of this runway.

For alignment study purposes the project was divided into the following four sections.

- Section 1: President Quirino Avenue to EDSA (Magallanes Interchange)
- Section 2: EDSA to Nichols Interchange
- Section 3: Nichols Interchange to Bicutan
- Section 4: Bicutan to Alabang.

3.2.3.2 Section 1: President Quirino Avenue to EDSA

This section of the SLE is the principal north-south route in Makati and a key link in the urban arterial system of Metro Manila. Located immediately west of the PNR, this arterial street is divided with four lanes in each direction plus two turning lanes at intersections. All intersections are at grade, but at Buendia Avenue a four lane flyover carries through traffic on the SLE. There is no control of access, but the presence of the railway effectively limits access along the east side.

As the proposed Manila South Tollway (MST) would have full control of access, an at grade location would require the provision of two parallel collector - distributor frontage roads. Even if the SLE served at one of these, the extensive right-of-way requirements for the MST and a second frontage road in this densely developed urban area rule out consideration of an at grade alignment.

Studies were therefore made for locating an elevated viaduct structure within the combined SLE/PNR corridor. As given in the DPWH Pre-Feasibility Study, the selected location is over the PNR. There is insufficient median width to accommodate substructure columns for the MST to be over the SLE.

Appendix A3-2 contains the geotechnical data and Appendix A3-3 outlines the structural design studies for the proposed viaduct.

3.2.3.3 Section 2: EDSA to Nichols Interchange

There is a two-lane southbound frontage road on the west side of the SLE, originally separated from the SLE by a fence to give access control. Much of the fence has disappeared and at present there is effectively no control of access on the west side. There are no access points over the PNR on the east side along this section.

Most of this corridor has been intensively developed with industrial/commercial facilities on the east side and commercial/residential to the west. A golf course and golf driving range are located on the west side adjoining Nichols Interchange.

There is insufficient width within the West Frontage Road/SLE/PNR corridor to accommodate the MST roadways at grade. Taking sufficient right-of-way on the west side for an at-grade MST would require elimination of the commercial facilities between the SLE and Magallanes Village and taking many residences.

As in the case of Section 1, the selected location for the MST in Section 2 is therefore elevated over the PNR.

3.2.3.4 Section 3: Nichols Interchange to Bicutan

On the west side of the SLE there is a two-lane, two-way frontage road known as the West Service Road. On the east side of the PNR there is a four-lane, mostly divided frontage road known as the East Service Road. There was originally full control of access to the SLE over this section, but now numerous gaps in the cyclone fence between the SLE and the East Service Road allow access between them. The PNR fences have been breached by squatters.

A barrier toll plaza known as Nichols Toll Gate is located across the SLE about 700 m south of Nichols Interchange. NAIA lies immediately west of the West Service Road, the main runway being about 500 m south of the toll plaza. C-5 will cross the SLE about 400 m south of the runway. Ramps will be provided for southbound SLE traffic to exit westbound on C-5, for eastbound C-5 traffic to enter northbound on SLE, for northbound SLE traffic to exit eastbound on C-5 and for westbound C-5 traffic to enter southbound on SLE.

There is insufficient width within the existing transportation corridor to accommodate the MST at ground level. Vertical clearance requirements for the runway approach zone preclude locating the MST over the railway or the existing highways in the vicinity of NAIA.

The Consultant has considered five alternative schemes for Section 3, see Volume III.

- Scheme A

  In Scheme A the MST would continue elevated over the PNR from Nichols Interchange to Nichols Toll Gate. It would then divert eastward into partly developed residential and commercial areas within the Fort Bonifacio reservation, drop to ground level and continue depressed to pass under the proposed C-5 interchange about 250 m east of the PNR.

  The alignment would then swing back towards the PNR and climb to reach its original elevated location over the PNR at a point close to the Taguig Campus of

the Technological University of the Philippines, then continue over the PNR to Bicutan.

This scheme would displace some residences and businesses, cross the AFP-RSBS development adjoining C-5 in the southeast quadrant and require some re-design of the C-5 interchange to incorporate the MST structure. To provide connecting ramps between the MST and C-5 as well as between the SLE and C-5 would require complete re-design of the C-5 interchange and toll collection facilities.

The existing East Service Road would remain in its present location. There would be no access to it from properties east of the MST between Nichols Toll Gate and the Taguig campus.

A barrier toll plaza could be located within Fort Bonifacio immediately north of C-5, which would displace additional residences and businesses.

- Scheme B

In Scheme B, in the vicinity of the airport the SLE would be depressed in a cut-and-cover tunnel on its present alignment and continue depressed under the proposed C-5. The MST would be built over the depressed SLE at approximately the same elevation as the existing SLE.

The MST alignment would transition from elevated over the PNR to elevated over the SLE and, after passing under the C-5, back to being elevated over the PNR. The SLE tunnel section would be about 1 km long and would require a pumped drainage system, forced ventilation and lighting.

This scheme would require little or no additional right-of-way but would be costly to construct and maintain. The C-5 interchange would require considerable redesign, but in principle the presently proposed ramps could be connected to the MST instead of the SLE. It would certainly be difficult and probably impractical to connect the depressed SLE to C-5 as well.

Maintenance of traffic during construction would be difficult and require construction of temporary diversion roads and structures.

With Scheme B it would not be possible to locate a barrier toll plaza within this section.

- Scheme C

In Scheme C the MST would continue elevated over the PNR from Nichols Interchange to Nichols Toll Gate. It would then divert eastward to the general

alignment of the present East Service Road and drop to ground level. The East Service Road would be moved eastward parallel to the MST.

At C-5 the two eastern spans of the four overpasses over the East Service Road would have to be redesigned to accommodate the MST instead of the East Service Road. An additional span on each overpass would be required to accommodate the diverted East Service Road. The total length of each overpass structure would increase by about 25 m.

South of C-5 the MST would rise again and return to being elevated over the PNR near the Taguig campus.

This scheme would require no geometric adjustments to the C-5 interchange if no ramp connections were made to the MST. Some redesign of and extensions to overpasses, however, would be required as described above.

This scheme would displace businesses on both sides of the present East Service Road and some residences. It would have less impact on the AFP-RSBS development than any other scheme, but would require approximately 25 m of the present forecourt area to accommodate the relocated East Service Road, part of which is already being acquired for C-5.

A barrier toll plaza could be located within Fort Bonifacio immediately north of C-5, with the East Service Road moved to the eastern boundary of the plaza.

Scheme C has been selected as the best available option.

- Scheme D

In Scheme D the MST would continue elevated over the PNR from Nichols Interchange to Nichols Toll Gate. It would then divert eastward and pass through partly developed residential areas within Fort Bonifacio, passing over C-5 about 300 m east of the PNR. The MST would then continue southward through the AFP-RSBS development in the southeast quadrant and a residential subdivision east of the Taguig Campus of the Technological University of the Philippines, then elevated over a street between the Bliss apartment complex and the AFP Veterans Center, to turn slightly eastward over DBP Avenue and FTI Avenue. The MST would then turn southward generally along the municipal boundary between Parañaque and Taguig immediately east of the three United Parañaque subdivisions, then west of the National Science and Technology Authority and elevated over the East Service Road to Bicutan.

This scheme would displace a substantial number of residences and businesses and have a permanent adverse impact on many residences, institutions and businesses. Its only advantage is that the MST could pass over C-5 as presently designed, but it would not be possible to make ramp connections to the C-5/SLE toll plazas.

A barrier toll plaza could be located within Fort Bonifacio immediately north of C-5.

- Scheme E

In Scheme E the MST would continue elevated over the PNR from Nichols Interchange to Nichols Toll Gate. It would then divert eastward and continue through Fort Bonifacio to Laguna de Bay, joining the alignment of the proposed Metro Manila Tollway (MMT) somewhere in the vicinity of Hagonoy and Bicutan. The MST would then proceed southward along the route of the MMT to its proposed terminus with the SLE south of Bicutan. Some residences, businesses and the AFP-RSBS development would be impacted.

The MMT and MST would follow a common route for about 4 km. Scheme E would be about 3 km. longer than any of the other three schemes. Furthermore, an extension of General Santos Avenue eastward to meet the MST would be necessary and most traffic entering and leaving the MST would have to travel through the congested Bicutan Market area.

A barrier toll plaza could be located within Fort Bonifacio immediately north of C-5.

- Recommended Scheme

Table 3-3 rates the five alternative schemes in order of apparent merit, as follows:

Table 3-3
RATINGS OF ALTERNATIVE SCHEMES FOR MST SECTION 3
(Nichols Interchange to Bicutan)

SCHEME	A	B	C	D	E
Relative Cost of each	4	3	5	2	1
Operational Flexibility	3	4	5	2	1
Traffic Management During Construction	4	1	3	2	5
Ease of Construction	5	1	4	2	3
ROW Requirements	3	4	5	1	2
Total Points	19	13	22	9	12

5 = best
1 = worst

On this basis, Scheme C has been selected as the best choice.

3.2.3.5 Section 4: Bicutan to Alabang

There is a two-lane, two-way frontage road on both sides of the SLE through this section. There was originally full control of access to the SLE but now numerous gaps in the cyclone fence between the SLE and frontage roads allow access between them.

At Bicutan the PNR diverts eastward from the SLE corridor and is located up to 800 m from the SLE.

There are several areas of undeveloped land adjoining the SLE and PNR, but none are extensive enough to be usable as a ground level location for the MST. The most feasible locations are elevated within the PNR right-of-way or the SLE corridor.

- Scheme F

  This scheme, elevated over the PNR, was proposed in the Pre-Feasibility Study. Though technically feasible, this alignment has been rejected because of the difficulty of providing proper access ramps to and from the MST on the east side of the congested commercial and residential centers of Bicutan, Sucat and Alabang (see Section 3.2.4). Furthermore, most traffic to and from the MST would have to pass through these busy commercial areas.

- Scheme G

  In Scheme G the MST would divert westward at Bicutan, leaving the alignment of the PNR. It would continue southward on two independent roadway structures elevated over the SLE and the East Service Road. The columns supporting the northbound roadway structure would be located in the central median between the northbound and southbound roadways of the SLE. The columns supporting the southbound roadway structure would be located in the outer separation between the northbound roadway of the SLE and the East Service Road.

  Between Bicutan and Sucat the SLE northbound roadway has been widened to approximately 13.20 m by reducing the outer separation to approximately 0.60 m, which is insufficient to accommodate the 3.00 m wide structure columns. The outer separation will therefore have to be widened for this purpose.

  This can be accomplished in one of two ways. The first would be to relocate the East Service Road approximately 4.50 m eastward by acquiring additional right-of-way. This requires partial demolition of some industrial buildings and relocation of numerous small businesses. If the congested service road is improved in conjunction with the rehabilitation of the SLE, requiring additional right-of-way, this solution could be adopted.

The alternative solution would be to reduce the width of the northbound SLE roadway from 13.20 m (three lanes of 3.40 m plus 3.00 m shoulder) to 10.50 m (three lanes of 3.10 m plus 1.20 m shoulder). The East Service Road would also have to be moved about 2.00 m eastward, reducing the present sidewalk area from a width of about 3.00 m to about 1.00 m.

Lane widths of 3.10 m have been found to operate satisfactorily on British Motorways over short distances. The preferred solution, however, would be to acquire the necessary additional right-of-way and maintain the existing SLE roadway width.

3.2.3.6 PNR Metrotren

A meeting was held with the PNR consultant responsible for preparing plans for the development and future expansion of the PNR Metrotren service, Pacific Consultants International.

It is understood that the Improvement and Modernization of the Commuter Line South Project from Tutuban to San Pedro has been bid and a contract has been awarded. The work includes strengthening and replacement of structures and upgrading the track to serve a fleet of new commuter trains being supplied to PNR with Japanese financial assistance.

On completion of this two-year improvement project, it is expected that the number of commuters using the Metrotren will increase rapidly. Eventually it is anticipated that in peak hours four-car trains will be operating between Tutuban and San Pedro with a ten-minute headway.

At the present time, with trains passing at approximately 30-minute intervals during peak hours, there is considerable congestion and traffic delays at major street grade crossings. These major grade crossings include San Andres, Vito Cruz, Buendia Avenue, Pasay Road and Don Bosco in Makati, as well as General Santos Avenue in Bicutan, Sucat Road in Sucat and Montillano Road in Alabang. Trains at ten-minute intervals would almost certainly create intolerable peak hour congestion on these and other streets crossing the PNR at grade.

There are two potential alternative solutions to separation of rail and road traffic; either the grade crossings are eliminated by providing flyovers for the streets, or the PNR is raised on a viaduct to pass over the streets at ground level.

North of EDSA, flyovers for crossing streets would only accommodate through traffic. Traffic between the SLE and Makati and other districts to the east would still cross the PNR at grade. Two-level interchanges with the SLE would be required to eliminate all traffic at grade. These would be costly and require large ROW takings. If the MST was built above the PNR, such flyovers would be at a third level with some ramps at a fourth level. It is felt that this would be quite impractical for closely-spaced urban interchanges, apart from the high cost and economic and social impacts involved.

If the PNR was elevated on a viaduct to pass over all cross streets north of EDSA, all existing grade crossings south of President Quirino Avenue would be eliminated. However, the PNR-ROW is not wide enough to accommodate both the PNR (with stations) and the MST on viaduct at the same level. It may be feasible to elevate the PNR and locate the MST on a second level above it. This three-tier elevated transport concept has been adopted in Bangkok, Thailand, for the Hopewell Holdings combined mass transit and urban expressway system now under construction. Also in Bangkok the elevated Don Muang Tollway is being built with 14 m clearance over the existing Highway No. 31 so as to clear pedestrian bridges and future elevated road crossings. With a three-tier configuration for the MST the proposed interchanges ramps at Vito Cruz and Pasay Road would have to be eliminated.

Early in this study, the concept of locating the MST over the northbound roadway of the SLE was investigated. This would require a substructure with columns within the PNR-ROW and in the median of the SLE. Much of the median is taken up by left-turn lanes at the many intersections north of EDSA, and there is insufficient width to accommodate columns. The Buendia Avenue flyover would have to be removed. This concept was therefore rejected in favor of the alternative and original concept of constructing the MST over the PNR north of Bicutan.

The concept of elevating the PNR to eliminate grade crossings and to construct an elevated MST within the PNR/SLE corridor appears to merit further study. Such a concept might well prove to be feasible but would probably require modifications to the present roadway layout of the SLE and its expansion into the PNR-ROW between President Quirino Avenue and EDSA. This would require a combined road/rail study far beyond the scope of work envisaged for this project.

3.2.3.7 Summary

In view of the potential cost and the difficulty of obtaining right-of-way in the developed areas outside the SLE/PNR corridor, the alignment of the MST has been confined to the SLE/PNR right-of-way, except for a deviation near the eastern end of the main runway of the Ninoy Aquino International Airport.

An elevated structure is in general required between President Quirino Avenue and Alabang because there is insufficient available width within the SLE/PNR corridor to locate the MST at ground level.

As extensive working areas will be required at ground level during the construction of the elevated viaduct, there are decided advantages in constructing the MST within the PNR right-of-way, thereby avoiding significant disruption to road traffic on the SLE. A viaduct structure straddling the PNR tracks, which can be constructed without disruption to rail traffic, has accordingly been proposed between President Quirino Avenue and Bicutan.

The remaining section of the MST between Bicutan and Alabang has been located over the median and eastern side of the SLE, rather than over the PNR, for the following reasons:

- the principal residential and commercial development at Sucat is on the western side of the SLE, and an interchange over the PNR on the eastern side would force most users of the MST to pass through the congested commercial area of Sucat and the existing SLE interchange; and

- the principal residential and commercial development at Alabang is likewise on the western side of the SLE, and an MST terminus in the Montillano Road area would not adequately serve either the traffic terminating at Alabang or the through traffic attempting to connect with the SLE.

The Bicutan to Alabang section has therefore been located over the SLE and East Service Road with ramps to the SLE south of Alabang and a connection to the Alabang - Zapote Road west of Alabang.

3.2.4 Access To and From the MST

3.2.4.1 Pre-Feasibility Study

The selected alignment at the Pre-Feasibility Study stage was elevated above the PNR for the whole 20 km from Pres. Quirino Avenue to Alabang. Eight interchanges were proposed, seven with existing streets and one with the proposed C-5.

The northern four interchanges were to have southbound entrance and northbound exit ramps. These are:

- Pres, Quirino Avenue
- Vito Cruz
- Pasay Road
- Magallanes Interchange (EDSA)

The southern three interchanges were to have northbound entrance and southbound exit ramps. These are:

- Doña Soledad/Gen. Santos Avenue (Bicutan)
- Parañaque - Sucat Road (Sucat)
- Montillano Road (Alabang)

In addition a northbound exit ramp was proposed at the crossing with C-5. This is not geometrically feasible because if it passes over C-5 the MST cannot comply with the runway

clearance criteria at MAIA. If it passes under C-5, connections between the two expressways are impossible without complete redesign of the C-5/SLE interchange toll plaza locations and layout, which would delay completion of C-5.

Ramps in the southwest quadrant may be feasible but would require a separate toll plaza on a viaduct. This can be studied further at the preliminary design stage if justified by traffic forecasts.

3.2.4.2 Ramps Terminals

Accident data on expressways reveal that areas of merging and diverging traffic have the highest accident rates. Operational and safety experience supports the use of right hand ramps and many highway authorities no longer recognize left hand ramps as an acceptable design alternative.

Merging into traffic on high volume, high speed expressways is one of the most difficult tasks for drivers, requiring accurate judgement of speed and gap distance. Both merging and diverging movements involve speed changes due to the difference between ramp and expressway speeds. The higher the difference the greater is the potential for accidents. Right hand ramps keep the merging and diverging traffic in the slower right hand lane and also minimize weaving a cross the expressway.

Bringing ramps on or off from the left can also disrupt the normal distribution of traffic on a multi-lane expressway. Under normal conditions the highest speeds are in the left lane. Conflicts will occur with slower traffic merging into this lane or with existing traffic in it slowing down prior to a left hand exit. The higher speed through traffic will change lanes to the right creating additional traffic friction and overloading the center traffic lanes. In urban areas during peak hours it is not uncommon to have an exit ramp with traffic backed up onto the through lanes. Such a back-up in the left or fast lane creates a totally unexpected traffic situation which can result in major accidents.

Advance signing is most difficult for a left hand exit, particularly when several destinations are listed together. Without proper advance signing for a left hand exit, last minute cross expressway maneuvers can occur potentially creating serious accidents. Lack of adequate decision sight distance can be particularly hazardous with closely spaced exit ramps.

For these reasons left hand ramp terminals are considered unsuitable for this project.

3.2.4.3 Selected Alignment

The Pre-Feasibility Study and selected alignments are the same for the four northern interchanges. Studies have been made for providing southbound entrance and northbound exit ramps at each.

From Bicutan to Alabang the selected alignment is elevated over the SLE/East Service Road instead of the PNR. Studies have been made for providing northbound entrance and southbound exit ramps at each of the three cross streets selected in the Pre-Feasibility Study. In addition, a study was made of the proposed connection between the Metro Manila Tollway (MMT), the MST and the SLE.

If the MST is to serve long distance traffic it should not terminate at the Alabang - Zapote Road in Alabang. Studies have therefore been made for providing direct connections between the MST and SLE at Alabang.

No studies have been made for interchange ramp connections with streets other than those selected for the Pre-Feasibility Study because insufficient traffic data was available. It may be desirable to investigate other possible interchange locations, see Section 3.2.4.12.

3.2.4.4 Pres. Quirino Avenue

It is not feasible to make ramp connections to and from the MST in the vicinity of the complex and extensive at-grade channelized and signalized intersection forming the terminus of the SLE at Pres. Quirino Avenue. At the preliminary design stage a study of Pres. Quirino Avenue should be made to determine its ability to handle the additional volume of traffic that the MST would discharge, combined with possible increased traffic volumes due to the new link road across the Pasig River.

Two alternative ramp layouts were prepared.

- Scheme 1 is an elevated partial rotary interchange of a type commonly used in European practice in order to minimize ROW requirements.

  Operationally Scheme 1 is superior to Scheme 2, but its successful operation depends upon provision of adequate weaving lengths along the rotary section. If this interchange type is selected for preliminary design, detailed traffic studies are necessary to determine the weaving distances required.

  Scheme 1 has been selected for this study.

- Scheme 2 provides direct connections which would allow northbound traffic from the MST to exit onto Pres. Quirino Avenue in both directions and traffic from both directions to enter the MST southbound.

  It is, however, a type of interchange more appropriate to the terminus of one expressway with another expressway than to the terminus of an expressway with a heavily trafficked principal arterial street. The left exit for northbound MST traffic and left entrance for southbound traffic are substandard. The main merit of this scheme is that it minimizes the amount of ROW necessary for the ramps.

Although this type of interchange is presently operating satisfactorily in other Metro Manila locations, it cannot be recommended for the terminus of a toll road on which traffic is expected to grow rapidly.

3.2.4.5 Vito Cruz

Provision of northbound exit and southbound entrance ramps at Vito Cruz is complicated by the one-way street system in this area. Zobel Roxas Avenue is one-way eastbound where it crosses the SLE. From its intersection with Zobel Roxas Avenue just east of the SLE, W. Pablo Ocampo Street is one-way westbound. At the preliminary design stage a study of this street system should be undertaken to determine its ability to handle the additional volume of traffic to and from the MST.

The proposed northbound exit ramp would be located immediately east of the MST and connect with eastbound Zobel Roxas Avenue through a channelized intersection. This channelization would incorporate a left turn onto W. Pablo Ocampo for westbound exiting traffic.

The southbound entrance ramp would start on the west side of the SLE about 250 m south of the intersection of Zobel Roxas Avenue so as to provide sufficient weaving distance on the SLE for vehicles coming from the east on W. Pablo Ocampo. After passing over both roadways of the SLE the ramp would connect to the elevated MST.

3.2.4.6 Pasay Road

Arnaiz Avenue (Pasay Road) is a two-way street except for one block to the east of the PNR at grade crossing which is one-way westbound. Eastbound traffic turns south on Medina Street, passing anti-clockwise around the block via Don Bosco and Pasong Tamo Streets back to Arnaiz Avenue. This means that the northbound exit ramp would logically be located so as to discharge onto Don Bosco Street.

At the preliminary design stage, a study of this street system should be undertaken to determine its ability to handle the additional volume of traffic to and from the MST.

The heavy volume of turning traffic at the Arnaiz Avenue/SLE intersection would appear to justify construction of a flyover for SLE through traffic. The southbound entrance ramp would therefore start on the west side of the SLE about 600 m south of Arnaiz Avenue so as to provide sufficient weaving distance on the SLE for traffic coming southbound over the flyover. After passing over the roadways of the SLE, the ramp would connect to the elevated MST.

3.2.4.7 Magallanes Interchange (EDSA)

The MST elevated over the PNR will cross EDSA on a fourth level structure. A fifth level is not considered to be structurally feasible. A southbound entrance ramp crossing over the northbound MST roadway is therefore impractical.

The Government is negotiating construction of a Light Rail Transit (LRT) system along EDSA. The impact of the LRT was not investigated but must be considered at the preliminary design stage.

The most practical location for the southbound entrance ramp for traffic from the east (Makati) is to start from the west side of the existing second level SLE southbound roadway, crossing over the SLE to connect to the MST. This location, however, would mean that traffic bound for the MST would have to traverse the existing Magallanes ramps between EDSA and the southbound SLE which are only two lanes wide and inadequate for present traffic.

It is considered that improvements to the Magallanes interchange are essential to the successful operation of the combined MST/SLE tollways. Such improvements are both beyond the scope of this study and outside the responsibility of a potential BOT/ROM concessionaire. However, they should be undertaken as an urgent matter by DPWH.

For the purposes of this study, one possible concept for improving the Magallanes interchange has been assumed:

- A completely new three lane elevated roadway to carry southbound through traffic is constructed to the west of the existing southbound roadway, passing through the next span of the EDSA viaduct. The service road on the westside is relocated on new right-of-way.

- The westbound/southbound ramp off EDSA is widened by at least one lane to a minimum of three lanes.

- The little-used southbound to eastbound elevated loop ramp is closed.

- The widened westbound/southbound ramp bifurcates, a two-lane ramp connecting to the SLE and a two-lane ramp passing over the SLE to connect to the MST.

- The northbound/eastbound ramp off the SLE is widened by at least one lane to a minimum of three lanes.

The MST northbound exit ramp to EDSA eastbound will not directly impact the existing interchange provided that its connection to EDSA is a sufficient distance east of the SLE connection and extra lanes for merging are provided. Factory buildings in the southeast quadrant of the intersection, however, will be severely impacted.

3.2.4.8 Bicutan

Three of the four quadrants at the intersection of Doña Soledad-General Santos Avenue and the SLE/MST are densely developed. The most open area is in the northwest quadrant, south and east of the Marinar II subdivision.

As northbound entrance and southbound exit ramps are the only connections proposed, and as most of the traffic using the MST is believed to have its origin west of the corridor, the northwest quadrant is the logical location for the interchange.

DPWH intends to improve the existing diamond interchange with the SLE at Bicutan. At this time no detailed proposal exists. It is unlikely that the proposed MST-Doña Soledad ramps would conflict with any such improvement project.

Sufficient ROW will be required at Doña Soledad to accommodate a channelized intersection with left turn storage lanes.

3.2.4.9 Connection Between MMT, MST and SLE

The Terms of Reference require the Consultant to study the proper connection between the proposed Metro Manila Tollway (MMT) along the alignment of the C-6 with the proposed Manila South Tollway (MST) and the existing South Luzon Expressway (SLE).

A 1:125,000 scale map dated 01-24-89 showing the corridor of the proposed MMT indicates that the MMT-SLE connection is to be between Sucat and Alabang. The least developed corridor between Laguna de Bay and the SLE is approximately midway between Sucat and Alabang. At the present time this corridor is the logical location for the start of the MMT if this is to be between Sucat and Alabang. Most of the corridor, however, is under development and the number of houses and institutions within the right-of-way required for the MMT may be expected to increase year by year.

It has been noted that the June 1980 feasibility study of the proposed Metro Manila Expressway (now the MMT) shows it beginning at Bicutan. Nine years later, in 1989, it was proposed to move the starting point to midway between Sucat and Alabang. Now three years later, implementation of the MMT appears to be as distant as ever. If and when the franchise holder, PNCC, decides to proceed with implementation of the MMT this corridor may no longer be the logical location.

When implementation of the MMT can be more definitely forecast, further studies should be made to determine the best starting point. This may prove to be further south, perhaps at Alabang or even south of Alabang. However, the Government might consider purchasing the ROW for the MMT now while it is reasonably free of development. This would avoid having to locate the interchange further south.

The least costly connection between the MMT and SLE would be a trumpet interchange with movements in all directions. Although the largest traffic flows between the two toll roads may be expected to be north-south and south-north, provision should be made for all turns. A toll plaza could be provided at any suitable location between Laguna de Bay and the SLE.

If there were no connections between the MMT and MST, the MST could cross the interchange on a third level structure.

If there were no connections between the MMT and SLE, the MMT could be connected to the MST by means of a trumpet interchange with the interchange overpass at the third level.

It would be costly to make connections from the MMT to both the SLE and MST. The most reasonable compromise might be to provide a complete trumpet interchange between the MMT and SLE and directional ramps between the MMT and MST for north-south and south-north movements only. All movements could be served by one properly located toll plaza.

3.2.4.10 Sucat

DPWH has completed the design and intends to construct improvements to the existing SLE interchange.[5] New ramps will be provided for the East and West Service Roads outside the existing diamond ramps.

The southeast quadrant is completely developed. The northeast quadrant is partly open land. However, this is not a suitable location for a single quadrant interchange as all traffic to and from Parañaque Road to the west would be forced to pass through the congested area of Sucat within the double-diamond interchange resulting from the improvement project. It would only be a suitable location for an entrance ramp serving traffic from the area between Laguna de Bay and Sucat.

The most logical location for northbound entrance and southbound exit ramps is in the northwest quadrant. There is some undeveloped land in this area, but a few industrial sites and commercial buildings on the north side of Parañaque Road would be affected. This location is recommended for the Sucat interchange.

An alternative location would be in the southwest quadrant. The ramps would pass through commercial buildings on the south side of Parañaque Road, then a narrow band of generally older, low class housing followed by a squatter development, before turning east and north through a parcel of vacant land owned by the Government of the Philippines. This location would require more structures, be more costly and serve traffic less effectively.

For either interchange sufficient ROW will be required at Parañaque Road to accommodate a channelized intersection with left turn storage lanes.

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[5]Parañaque-Sucat Road widening and Kalayaan Avenue Extension Project.

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3.2.4.11 Alabang

The Pre-Feasibility Study proposed to terminate the MST at Alabang. This would mean that all traffic using the MST with origins and destinations south of Alabang would have to travel over local streets between the terminus of the MST and the SLE. This is not considered feasible for the volume of traffic involved. It was therefore decided that direct connection ramps should be provided between the elevated MST and north end of the SLE Alabang viaduct. They could be located over the existing SLE ramps and toll gates. This should encourage long distance traffic to utilize the MST in preference to the SLE.

West of Alabang and both sides of the Alabang- Zapote road much of the land is occupied by Government owned agricultural institutions. The northwest quadrant is the only feasible location for ramp connections because the whole area east of the SLE viaduct is densely developed A trumpet-type interchange is the ideal solution and it is believed one can be provided without seriously impacting agricultural activities. Scheme 1 is the selected layout with direct connection ramps to the SLE. Scheme 2 is the rejected termination of the MST at Alabang.

3.2.4.12 Additional Interchanges

The scope of traffic investigations in this study was insufficient to identify additional potential interchange sites. This should be investigated at the preliminary design stage.

The Consultant noted that several new residential subdivisions have been established west of the SLE between Sucat and Alabang and that some of the older subdivisions are only about 30 - 50 percent developed. At present the principal outlet from these subdivisions is the grossly overloaded and inadequate West Service Road.

It is possible that further study would justify construction of ramp connections in this vicinity, possibly at Don Jesus Boulevard. If this proves to be the case, these connections should be with the SLE rather than the MST if the selected operational strategy is to have the MST serve long distance traffic and the SLE shorter trip lengths.

3.2.4.13 Bus Stops

Bus stops are usually provided off toll roads on intersecting roads and streets near interchanges. If a toll road crosses an important regional road where no interchange is provided, there may be a need to provide bus stops within the toll road right-of-way near the intersecting road. Access for bus passengers on the toll road is then provided by means of stairways or pedestrian ramps to the cross road.

In the case of the MST/SLE facilities it appears unlikely that bus stops within the toll road right-of-way will be required as interchanges are proposed at frequent intervals. It should be noted,

however, that all the proposed MST interchanges would have limited movements and buses leaving the MST to discharge passengers would not be able to return to it. Only long distance buses would therefore use the MST.

3.2.5 ROM Concepts

3.2.5.1 General

The Terms of Reference require the consultant to determine the economic and financial viability of improving the South Luzon Expressway (SLE) between Magallanes and Alabang as a Rehabilitation-Operation-Maintenance (ROM) project.

Meetings were held with PNCC and DPWH officials to obtain any available information about the construction of this section of the SLE in 1966/67 and the widening in 1984/88. Unfortunately, no as-built plans for either the original construction or the widening were located. Some information was obtained about current maintenance activities and about flooding and drainage deficiencies and ongoing efforts by DPWH to alleviate them.

The Consultant has conducted surveys including a Pavement Condition Survey (Appendix A3-4) to determine the scope of rehabilitation work needed. The results and the Consultant's recommendations are given in Appendix A3-5 and summarized below.

3.2.5.2 Correction of Road Elevation due to Flooding

PNCC records indicate that, in 1989, seven areas of the SLE between Magallanes and Alabang were subject to some degree of flooding in periods of heavy rain. The cause in five of these cases was reported to be due to drainage deficiencies and the proposed solutions involved drainage system improvements.

In two instances, at Km. 15+600 and Km 23 ±, deeper flooding had occurred and the proposed long term solution was to raise the pavement at these low spots.

In the Consultant's opinion none of the proposed solutions to alleviate drainage deficiencies address the root cause, which appears to be an initially inadequate drainage system overwhelmed by 25 years of development along the SLE corridor. To raise low sections of the SLE pavement would merely aggravate conditions on the adjoining service roads and abutting properties.

A complete drainage survey of the SLE corridor, including service roads and abutting properties, should be made and a new piped drainage system serving the whole corridor will probably be found to be required.

3.2.5.3 Repair of Damaged Pavements and Shoulders

The original pavements are 25 or more years old and constructed of unreinforced portland cement concrete. Many areas are showing signs of structural distress and some have failed completely. DPWH has recently replaced many of the worst failures. Additional lanes were added between 1984 and 1988 and the joint between the original and widened pavements is also showing signs of distress. As a form of maintenance intended to preserve the pavement, some of the bad areas have been given a thin asphalt wearing course.

Major rehabilitation of the existing pavement is required to extend its functional life through a concession period of 20 to 35 years. For conceptual design purposes, the rehabilitation method selected is partial reconstruction with a flexible overlay throughout.

A visual pavement condition survey was performed to identify the types, severity and amount of distress present. (See Appendix A3-4.) The results were analyzed to estimate the amount of pavement needing reconstruction and the amount for which an overlay would suffice. (See Appendix A3-5.)

As no construction histories are available and there is insufficient data to make a structural overlay analysis, the following procedure was adopted:

- Reconstruction. All pavement considered to have failed would be broken out and replaced with unreinforced cement concrete slabs 230 mm thick.

- Overlay. The whole roadway pavement would then be given an asphalt overlay with a thickness of 100 mm as the first stage of a 30-year pavement management strategy.

3.2.5.4 Reinstallation of Security Fencing

The access control security fencing is in a dilapidated state. Some has been removed, much has been damaged and there are many openings of all sizes.

All the original fencing should be replaced. It is recommended that the replacement consists of standard concrete safety shape or W-beam steel traffic barrier surmounted by an anti-glare fence approximately 1.00 m high to discourage the common practice of cutting access openings in the fence.

3.2.5.5 Provision of Appropriate Traffic Signs, Signals and Monitoring Systems

Complete redesign traffic signs for the combined SLE/MST corridor will be required to direct vehicles onto their desired routes.

Traffic signals should be updated to the latest solid state technology and programmed for proper management of intersection traffic.

The monitoring system should include a surveillance element to provide traffic information and locate incidents, a control center with operator and various response elements to take appropriate action.

3.2.5.6 Efficient Overall Traffic Management

A comprehensive traffic control plan for the rehabilitation work will be needed. The heavily trafficked Magallanes to Bicutan section should be rehabilitated first.

The Concessionaire will be required to provide and operate a traffic management system for the completed facility.

3.2.5.7 Latest State of the Art in Toll Collection System

All existing toll plazas will have to be completely rehabilitated as they are unsuitable to accommodate a modern toll system, see Section 3.3.2.

With two different concessionaires operating the SLE north and south of Alabang, 12 new toll lanes will be required at Alabang for through traffic. Additional right-of-way will be required within the developed area surrounding the existing entrance and exit toll plazas to accommodate the extra 12 lanes. An alternative solution would be to site an 18 lane plaza for all traffic somewhere between Sucat and Alabang. The existing entrance and exit plazas at Alabang would be abandoned.

The best alternative should be selected at the Preliminary Design Stage.

The conceptual toll system is outlined in Appendix A3-6 and summarized below.

The toll collection system should be composed of integrated, industry standard computers, sub-systems and software, easily expandable to meet changed conditions.

Vehicle counts should be by means of detector loops which record traffic by vehicle classification and toll lane. A closed system should utilize re-usable magnetically encoded toll tickets read at both entry and exit lanes.[6]

[6] The actual method of toll collection is left to the BOT concessionaire. This information is provided as a basis for estimating costs.

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Each plaza should send computer data to a central office for reconciliation of loop counts, tickets and money and preparation of the toll revenue audit reports. The data from these reports could be entered into a computerized Management Information System (MIS) to generate statistical data used by management to measure performance.

Standby generators, uninterruptible power supplies and radio communication systems are required to ensure that toll collection systems function continuously.

3.2.5.8 East and West Service Roads

The Consultant's terms of reference exclude consideration of rehabilitation and/or improvement of the East and West Service Roads. These roads are grossly overloaded now and for the most part inadequate. Pedestrians are poorly served by narrow sidewalks on one side and none on the other, so that jeepney passengers wait, embark and disembark within the travel lanes.

There is no provision for pedestrians to cross the SLE except at existing interchanges. It is possible that provision of pedestrian overpasses, or even tricycle overpasses, between the East and West Service Roads would relieve traffic congestion on these facilities.

It is recommended that improvements to the service roads and the provision of pedestrian and tricycle overpasses be considered at the preliminary design stage of the ROM project.

3.2.6 Right-of-Way Considerations

It is essential that sufficient ROW be acquired to accommodate a facility meeting operational and safety requirements anticipated up to the end of the concession period, likely to be 25 or more years. ROW costs always increase over time. It is false economy to stint on acquiring sufficient ROW initially for ultimate requirements, and this is invariably regretted later.

Unfortunately Metro Manila's transportation facilities show all too well the results of lack of attention to this issue in the recent past. It should be remembered that, no matter how costly it may be now, ROW will never cost less in the future when the social and environmental impacts of acquisition will be even greater.

To determine ROW requirements in a developed urban area, it is necessary to complete detailed surveys and the preliminary design of the project. Surveys should include determination of individual property ownership and title searches, a time-consuming process. Work should be started as soon as possible.

3.3 APPLICATION OF THE DESIGN CONCEPTS

3.3.1 MST - BOT

3.3.1.1 Pavement Design

- Design Method

The subgrade soil parameters available at this stage include strength as characterized by California Bearing Ratio (CBR), see Appendix A3-2. The British Department of Transportation procedures for structural design of new road pavements utilize CBR whereas AASHTO utilizes a more complex procedure requiring calculation of the effective modules of subgrade reaction. For the purpose of this study, the British method was selected[7].

- Pavement Type

The type of expressway pavement generally used in the Metro Manila area is jointed unreinforced concrete. This type was therefore selected for conceptual design purposes. A cement-treated aggregate base course to prevent pavement damage from pumping and a granular sub-base were also selected.

- Design Life

It is generally accepted that a balance between initial maintenance and traffic delay costs is achieved when a 40-year pavement life is attained. The selected method designs a pavement with a serviceable life, with appropriate maintenance, of 40 years to failure condition. The failure condition is the point where the rate of cracking begins to increase rapidly.

- Traffic Assessment

The 24 hour Annual Average Daily Traffic (AADT) of commercial vehicles (cv/d) in the year of opening is the parameter used for design of pavement thickness. Commercial vehicles are defined as those over 15 kN unladen vehicle weight.[8]

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[7] HD 14/87 and HA 35/87, Structural Design of New Road Pavements, Department of Transport, Highways and Traffic, United Kingdom.

[8] Pavement design should be based on axle load surveys of truck traffic. The pervasive problem of overloading can then be considered in the design of the pavement structure.

Traffic projections for this project are given in terms of Light Vehicles (LV) and Heavy Vehicles (HV). As the pavement thickness is not very sensitive to cv/d at the volumes projected it has been assumed that the HV volumes are equivalent to commercial vehicle volumes.

- Thickness for Unreinforced Concrete Pavement

For the assumed opening year of 1997, the projected volume of HV varies between 7,000 and 9,000 per day on the EDSA to C-5 section[9]. This requires a slab design thickness of 330 mm.

- Thickness of Base Course

The required thickness of cement bound aggregate base course is 150 mm.

- Thickness of Granular Sub-base

Below the cement bound base course, a layer of granular sub-base is required with a thickness related to the CBR of the subgrade material:

CBR	THICKNESS (mm)
> 15%	0
5% - 15%	150
2% - 5%	350
< 2%	600

Source: Op. Cit. Structural Design of New Road Pavements.

Based on the CBR test results, a thickness of 350 mm was used for estimating purposes.

- Periodic Friction Course

If routine maintenance is properly performed, the concrete pavement and concrete viaduct deck pavement should be structurally adequate for the duration of the concession. To maintain skid resistance and riding quality a non-structural overlay will be required periodically.

It has been assumed that the initial grooving of the pavement and viaduct deck will provide an acceptable level of skid resistance for 12 years from opening.

[9] Pre-Feasibility Study, Table 4.4-1

After 12 years it has been assumed that an open-graded bituminous friction course 50 mm thick would be required. Every six years thereafter it has been assumed that a bituminous friction course 30 mm thick would be provided.

3.3.1.2 Viaduct Design

Most of the project will be elevated on a viaduct structure. For details of the structural design studies see Appendix A3-3.

3.3.1.3 Toll Collection Facilities

It is assumed that the selection of the toll collection facilities is largely the responsibility of the BOT operator. The trade-off between sophisticated technology and labor intensive methods should be analyzed on the basis of life-cycle costs. Whatever the selected method, however, it is essential that a means be provided for counting vehicles independently of the toll collector in order to ensure accuracy, reliability and security. This precludes use of a completely manual system.

The toll collection facilities should preferably be of a modern state-of-the-art design. Toll plazas and their associated buildings should comply with the design standards outlined in Appendix A3-1. The toll collection system should comply with the requirements given in Appendix A3-6.

3.3.2 SLE - ROM

Complete rehabilitation of the SLE will be required. Drainage facilities are inadequate, the life of the pavement requires extending (see Appendix A3-4), the access control fencing has been breached and the toll collection facilities are antiquated and need to be completely replaced.

Details of the necessary rehabilitation program are given in Appendix A3-5.

3.3.2.1 Toll Collection Facilities

The existing toll lanes, booths and utility buildings are out-dated, dilapidated, vandalized and unsuitable for installation of a modern, computerized toll collection system. They should be demolished and replaced with facilities complying with the design standards given in Appendix A3-1.

It is essential that utility buildings adjoin the toll lanes for efficient toll collection operations. If suitable sites are not available due to ROW acquisition difficulties, consideration should be

given to locating utility buildings over the toll gates. This will require provision of additional facilities such as elevators and closed-circuit television for supervision of toll collectors.

The toll collection system should comply with the requirements given in Appendix A3-6.

3.3.3 Recommendations

The selected alignment for the MST is elevated over the PNR tracks between President Quirino Avenue and the general location of the National Manpower and Youth Council building and the Nichols Toll Plaza on the SLE. Between this point and the crossing with C-5 the MST will divert slightly eastward to pass at ground level through a barrier toll plaza, pass under C-5, and then rise again over the PNR tracks as far as Bicutan. Between Bicutan and Alabang the MST is to be elevated over the northbound roadway of the SLE and the East Service Road.

If shown to be justified by further traffic studies, interchanges between the MST and local roads and streets can be provided at the following seven locations:

- Pre. Quirino Avenue
- Vito Cruz
- Pasay Road
- EDSA (Magallanes)
- Bicutan
- Sucat
- Alabang

It is not geometrically feasible to provide ramps between the MST and the C-5 toll plazas as presently designed. Construction of C-5 cannot be delayed.

It is further recommended that the MST and SLE be operated as one integrated tollway by the same concessionaire, using a barrier toll system on the MST and a closed toll system on the SLE. The MST barrier plaza is to be located where the tollway is at ground level between the National Manpower and Youth Council building and the crossing with C-5.

3.4 STRUCTURAL SYSTEMS CONSIDERED

3.4.1 Alternatives Evaluated

The principal constraint affecting the choice of structural type is the need for the MST viaduct to be economically constructed over the PNR and SLE corridor with minimal disruption to rail and road traffic.

Possible structural forms which satisfy these requirements include precast concrete superstructures and steel superstructures. Comments on various alternatives are as follows:

- Precast Concrete Segmental Box Girder - often used in similar situations where overhead construction is advantageous; choice of BOT consortium currently constructing 31 km long elevated expressway in Bangkok, Thailand.

- Precast Concrete AASHTO I Girders - always an economical form of construction which should be considered in this situation; many bridges in Manila have recently been constructed and are currently being constructed of this form.

- Steel Girders - seldom as competitive in capital cost as precast concrete in this span range, and more expensive to maintain. For these reasons, the steel girder option has not been considered in any further detail.

Conceptual designs based on the use of the two precast concrete alternative forms of elevated structure have been completed. These are detailed in the appended structural drawings and are briefly described below. Whilst the proposed alternatives satisfy the above constraints, they are not necessarily the only suitable structural solutions, and the BOT operator will be free to adopt his choice of structure.

3.4.1.1 Precast Segmental Box Girder

The precast segmental box girder alternative is based on the use of match-cast precast concrete segments. The segments are typically manufactured in an enclosed factory at one end of the job where each segment is cast against the face of the previous segment to ensure an accurate fit after erection. The segments in this instance may conceivably be delivered by road, rail or along the completed spans.

After being positioned using an erection truss, the segments are post-tensioned together. The use of epoxy in the joints is optional, and post-tensioning tendons may be either internal or external to the box section.

Span lengths of 40 m have been detailed, which can typically be erected in a one week cycle. Slightly longer spans are feasible and may prove preferable after further study.

Simply supported spans have been detailed to minimize the effects of seismic forces on the substructure.

Advantages of this alternative include:

- minimal interference to traffic and development at ground level;

- reduced impact of substructure at ground level using 40 m span lengths;
- minimal ground surface area requirements for falsework for slender columns and headstocks;
- reduced construction working areas and interference to traffic because virtually all work can be completed at deck level during the erection of the superstructure; and
- no complexity or change to the method of construction of the high level portions of the viaduct at the interchanges.

Disadvantages include:

- a high level of control required during the casting of segments, although this has been achieved on similar projects elsewhere; and
- a large capital outlay for each erection truss, although the unit rate per square meter of deck on a project of this scale will be relatively small.

3.4.1.2 Precast AASHTO I Girders and Cast-in-Place Deck

The AASHTO girder alternative is based on the use of precast pretensioned Type IV AASHTO I girders with a compositely acting cast-in-place concrete deck.

The girders would normally be delivered by road and would be lifted into position using one or two cranes.

Precast concrete slabs have been detailed as permanent formwork between the girders, and it is envisaged that projecting reinforcement would be overlapped to form the bottom layers of the deck reinforcement.

Precast headstocks (hammerheads) have been shown on the pier columns to minimize working area requirements for falsework and interference to traffic.

Span lengths of 30 m have been detailed. The spans are simply supported to minimize the effects of seismic forces on the substructure.

Advantages of this alternative include:

- economy of structural materials;
- maximized use of precast components;

- availability of girder forms in local casting yards; and
- straightforward construction procedure.

Disadvantages include:

- large working area requirements for erection of girders. Virtually all land beside the PNR tracks between President Quirino Avenue and Bicutan will be required during construction for delivery of the girders and for positioning of the cranes progressively across the PNR right-of-way during the erection of the girders in each span;
- larger proportion of land permanently required for more closely spaced piers;
- significant interference to road traffic between Bicutan and Alabang. Considerable disruption to traffic on SLE during lane closures required for positioning of cranes during erection of girders. Girder erection would consequently be carried out at night, adding to the construction cost; and
- the need for very large cranes for erection of high level girders at interchanges.

3.4.1.3 Lane Configurations

Various lane configurations were considered for each of the two structural forms of superstructure. The pertinent aspects of each configuration are described in Appendix A3-3. It was concluded that the initial provision of a six lane facility is the most cost-effective and practical lane configuration to adopt.

3.4.2 Recommended System

Of the alternatives considered, the recommended system is a six lane structure or structures comprising precast concrete segmental box girders erected using an overhead gantry.

The initial provision of six traffic lanes is the most cost-effective of the lane configurations considered since a 50% increase in capacity over the two lane case adds to the initial capital cost by only 13-14%.

The construction of the superstructure from an overhead gantry will substantially reduce interference to road and rail traffic and to surface activities. The minimization of interference to the existing traffic network is considered to be an essential feature of any system adopted. This can be achieved through the use of a segmental box girder, which is estimated to be 9.29% less costly to build than an equivalent I girder structure.

The six lane segmental box girder option has accordingly been selected for the purposes of estimating costs.

Details of the structural design studies are given in Appendix A3-3.

3.5 COSTS

3.5.1 General

Cost estimates were prepared in three (3) parts:

- Part A: Pre- Concession Agreement or Contract

  These costs are mainly borne by the Government or are partially paid from ODA funds.

- Part B: Manila South Tollway

  Costs were prepared for four (4) different alternatives:

  (i) Superstructure AASHTO Girder 2 lanes, 2 separate carriageways,
  (ii) Superstructure AASHTO Girder 3 lanes, 2 separate carriageways,
  (iii) Superstructure Box Girder 2 lanes, 2 separate carriageways,
  (iv) Superstructure Box Girder 3 lanes, 2 separate carriageways,

- Part C: Rehabilitation of the South Luzon Expressway

Cost summaries were prepared as Parts A + B + C to show the entire cost of the project and Parts B + C to show the costs to be borne by the concessionaire. These are presented in Tables 3-4 and 3-5 respectively.

3.5.2 Part A - Pre Concession Agreement or Contract

Cost estimates for the following four activities were based on the Consultant's experience of similar projects in the Philippines and other countries.

- Planning activities, technical investigations, detailed surveys, preliminary designs, right-of-way surveys and title searches, right-of-way plans, traffic and other studies.

Table 3-4
TOTAL PROJECT COST

DESCRIPTION	FOREIGN COMPONENT	LOCAL COMPONENT	TAXES	TOTAL COST
	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)
PART A—PRE-CONCESSION AGREEMENT OR CONTRACT	146,307,720	966,996,660	53,064,360	1,166,368,740
PART B-MANILA SOUTH TOLLWAY				
1. Alternative 1-AASHTO Girder, 4 Lanes	5,329,981,133	3,280,297,797	2,029,880,450	10,640,159,380
2. Alternative 2-AASHTO Girder, 6 Lanes	5,869,736,365	3,586,925,636	2,241,371,131	11,698,033,131
3. Alternative 3-Box Girder, 4 Lanes	4,854,265,249	2,847,537,047	1,819,356,132	9,521,158,428
4. Alternative 4-Box Girder, 6 Lanes	5,578,624,494	3,315,883,730	2,029,798,980	10,924,307,203
PART C-REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	362,354,936	474,358,061	223,090,259	1,059,803,256
TOTAL with PART B, Alternative 1	**5,838,643,789**	**4,721,652,518**	**2,306,035,069**	**12,866,331,376**
TOTAL with PART B, Alternative 2	**6,378,399,021**	**5,028,280,357**	**2,517,525,750**	**13,924,205,128**
TOTAL with PART B, Alternative 3	**5,362,927,905**	**4,288,891,768**	**2,095,510,751**	**11,747,330,424**
TOTAL with PART B, Alternative 4	**6,087,287,150**	**4,757,238,451**	**2,305,953,599**	**13,150,479,199**

Source: The Consultant's Estimates.

Table 3-5
COST TO BE BORNE BY CONCESSIONAIRE

DESCRIPTION	FOREIGN COMPONENT	LOCAL COMPONENT	TAXES	TOTAL COST
	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)
PART B-MANILA SOUTH TOLLWAY				
1. Alternative 1-AASHTO Girder, 4 Lanes	5,329,981,133	3,280,297,797	2,029,880,450	10,640,159,380
2. Alternative 2-AASHTO Girder, 6 Lanes	5,869,736,365	3,586,925,636	2,241,371,131	11,698,033,131
3. Alternative 3-Box Girder, 4 Lanes	4,854,265,249	2,847,537,047	1,819,356,132	9,521,158,428
4. Alternative 4-Box Girder, 6 Lanes	5,578,624,494	3,315,883,730	2,029,798,980	10,924,307,203
PART C-REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	362,354,936	474,358,061	223,090,259	1,059,803,256
TOTAL with PART B, Alternative 1	**5,692,336,069**	**3,754,655,858**	**2,252,970,709**	**11,699,962,636**
TOTAL with PART B, Alternative 2	**6,232,091,301**	**4,061,283,697**	**2,464,461,390**	**12,757,836,388**
TOTAL with PART B, Alternative 3	**5,216,620,185**	**3,321,895,108**	**2,042,446,391**	**10,580,961,684**
TOTAL with PART B, Alternative 4	**5,940,979,430**	**3,790,241,791**	**2,252,889,239**	**11,984,110,459**

Source: The Consultant's Estimates.

- Environmental impact study
- Public involvement and information program
- Technical assistance during tendering and negotiations with bidders.

The estimated cost of right-of-way acquisition was based on current prices obtained from concerned GOP agencies.

The cost of resettlement of squatters was estimated after consultation with concerned GOP agencies and is discussed in detail in Chapter 6.

3.5.3 Manila South Tollway (MST)

3.5.3.1 Unit Cost Development

Unit price analysis for major items of work was made to establish unit costs applicable to the project. This analysis deals with the direct and indirect cost, the two (2) basic components of cost. A summary of unit costs is prepared incorporating the local and foreign components and taxes, the derivation of which were patterned with the latest feasibility studies made by the Consultant and from current DPWH data. The Unit Cost Development and Summary of Unit Cost are presented in Appendix A3-7.

3.5.3.2 Direct Cost

The direct cost, which comprises the expenses incurred directly from the actual construction, have three (3) main elements namely, materials, labor and equipment. Based on each element's production capacities, every major work item is analyzed and costed to derive the total direct cost.

- Materials

  The prices of materials used are the average market prices - canvassed from various establishments in Metro Manila - prevailing during the time of the study. Quarrying or locally producing materials such as aggregates was not considered.

- Labor

  Manpower categories are classified into three (3), namely: foreman, skilled and unskilled labor. Skilled labor constitutes steelmen, carpenters, pipefitters, spotters, riggers, masons, etc.

The rates of wages adapted are the current labor rates prevailing in Metro Manila. They include fringe benefits and social insurance contribution.

- Equipment

  The equipment rental rates used in this study are the rates given by the Association of Construction Equipment Lessors (ACEL) of the Philippines, 1989 edition plus the 1990 increases due to fuel rates increase. It includes cost of maintenance, fuel, lubricants, insurance and the wage of the equipment operator.

3.5.3.3 Indirect Cost

The following are the items included in estimating the total indirect cost based on the recent feasibility studies made by the Consultant and from current DPWH data.

- Overhead Cost - 10% of direct cost
- Profit - 10% of (direct cost + overhead)
- Value Added Tax - 10% of equipment and labor cost
- Bond/Insurance - 1% of total unit cost

3.5.3.4 Project Cost

The project cost was derived by adding the Direct and the Indirect cost plus the following:

• Contingency Cost	-	20%
• General Items Cost	-	5%
• Detailed Design Cost	-	2%
a. Concessionaire Designer	-	1.5%
b. Independent Design Checker (IDC)	-	0.5%
• Project Management and Supervision Cost	-	6%
a. Concessionaire's supervision of his constructors	-	5%

b. Independent Certification Engineer (ICE) 1%

The total project costs are presented in Appendix A3-7 of this report and are designated as:

Table A3-7-1 -	Cost Summary
Table A3-7-2 -	Estimate of Pre-Concession Agreement or Contract Costs (Part A)
Table A3-7-3 -	Cost Estimate of Manila South Tollway (Part B)
Table A3-7-5 -	Cost Estimate of the Rehabilitation of South Luzon Expressway (Part C).

Cost of operation and maintenance of both the MST and SLE were not included in the above mentioned cost tables.

3.5.3.5 Quantities

Quantities used in estimating the total project costs were calculated based on the preliminary design details.

3.5.3.6 Toll Collection System

Lacking a source for costs of a modern, computerized toll collection system in the Philippines, reference was made to a 1991 report prepared by a consultant for the Asian Development Bank and Government of India.[10] Costs taken from this report expressed in 1990 US dollars were increased by 10 percent to allow for inflation and converted to Pesos.

It was assumed that a barrier system would be selected, using a single barrier toll plaza located within the Fort Bonifacio reservation between Nichols and the C-5 crossing.

It was calculated that by year 2011 the projected traffic would require 28 toll lanes. For estimating purposes a 20-lane barrier toll plaza was assumed to be required initially.

The cost of this toll collection system is summarized in Table 3-6.

[10] Expressway System Planning Study, Toll System and Interchange Options and Recommended Organizational Structure, prepared for Asian Development Bank and Government of India by Wilbur Smith Associates.

Table 3-6
COST OF MANILA SOUTH TOLLWAY TOLL COLLECTION SYSTEM
(In Million Pesos)

MST TOLL SUBSYSTEM	COST (Million Pesos)
Toll Plaza Construction	₱ 76.88
Toll Collection System	19.55
Communication System	0.89
Plaza Admin. Building	10.00
Standby Generator	6.25
TOTAL	₱ 113.57

Source: The Consultant's Estimates.

3.5.4 South Luzon Expressway (SLE)

3.5.4.1 Rehabilitation of the Existing Highway

Similar to that of the MST, unit price analyses of major items applicable to rehabilitation works were also prepared. Drainage works, Traffic signs and Pavement markings and Street lighting were calculated on a per kilometer basis using the most recent estimates of the Consultant and the DPWH on expressways.

3.5.4.2 Toll Collection System

The same source of cost data (see Section 3.5.1) was used for the SLE. Costs taken from this report expressed in 1990 US dollars were increased by 10 percent to allow for inflation and converted to Pesos.

It was assumed that a ticket system would be used at the following four reconstructed toll plazas:

Nichols	18 lanes[11]
Bicutan	9 lanes
Sucat	10 lanes
Alabang	6 lanes

12 additional lanes are required at Alabang for through traffic on the SLE.[11]

The cost of the toll collection system is summarized in Table 3-7.

[11] Includes four reversible lanes.

Table 3-7
COST OF SOUTH LUZON EXPRESSWAY TOLL COLLECTION SYSTEM
(In Million Pesos)

SLE TOLL SUBSYSTEM	NICHOLS TOLL GATE	BICUTAN TOLL GATE	SUCAT TOLL GATE	ALABANG TOLL GATE	TOTALS
Toll Plaza Reconstruction	₱ 18.80	₱ 6.95	₱ 7.94	₱ 36.03	₱ 69.72
Toll Collection System	33.93	16.84	18.82	33.93	103.52
Communication System	0.79	0.40	0.44	0.79	2.42
Plaza Admin. Building	10.00	10.00	10.00	10.00	40.00
Standby Generator	1.88	1.88	1.88	1.88	7.52
TOTAL	₱ 65.40	₱ 36.07	₱ 39.08	₱ 82.63	₱ 223.18

Source: The Consultant's Estimates.

3.5.5 Combined Facilities for MST and SLE

3.5.5.1 Central Administration Building

For estimating purposes it has been assumed that one central administration building for both the MST and SLE will be sufficient. A floor area of 3,000 sq. m. has been selected.

The costs of the office administration equipment, including computers and peripherals, and the radio communication system control center have been obtained from the same source as the toll collection estimates, see Section 3.5.3.6.

Table 3-8
COST OF CENTRAL ADMINISTRATION BUILDING
(In Million Pesos)

ADMINISTRATION SUBSYSTEM	COST (In Million Pesos)
Building	30.00
Equipment	18.87
Radio Control Center	8.29
Standby Generator	6.25
TOTAL	63.41

Source: The Consultant's Estimates.

3.5.5.2 Tollway Maintenance Unit

A maintenance organization for routine and general maintenance of both the MST and SLE will be required. For estimating purposes it has been assumed that one maintenance unit is sufficient for both facilities.

Estimated equipment costs have been obtained from the same source as the toll collection estimates, see Section 3.5.3.6.

Table 3-9
COST OF TOLLWAY MAINTENANCE UNIT
(In Million Pesos)

MAINTENANCE SUBSYSTEM	COST (In Million Pesos)
Building	10.00
Equipment	32.07
Standby Generator	6.25
TOTAL	48.32

Source: The Consultant's Estimates.

3.6 DESIGN AND CONSTRUCTION SCHEDULE

3.6.1 Preliminary Design

The Preliminary Design forms part of the bid documents and therefore will have been completed before Final Design is performed by the concessionaire. The horizontal and vertical alignments, and basic interchange layouts will have been determined for the purpose of defining right-of-way requirements.

3.6.2 Final Design

One year has been scheduled for final design. This means that the concessionaire will have to mobilize a substantial team of experienced expressway designers. He is likely to engage the services of one or more international consultants for this purpose.

3.6.3 Construction

The sequence of construction will be the choice of the concessionaire. His first priority is likely to be rehabilitation of the SLE so that tolls can be reimposed as early as possible, providing him with some revenue. The first phase of the rehabilitation will extend from Magallanes interchange to Bicutan, a length of 70 km. In this section, the entire rehabilitation can be completed.

Between Bicutan and Alabang the MST viaduct columns are located in the median of the SLE and the outer separation between the East Service Road and the SLE. To finish the rehabilitation work on this section, prior completion of construction of the MST substructure is necessary. Rehabilitation works such as drainage improvements may be feasible before completion of the MST columns.

Right-of-way acquisition for the MST will probably take longer in the northern section between President Quirino Avenue and Magallanes. The precast yard will almost certainly be located somewhere south of the project because it will occupy a large area of land. For these reasons it is assumed that the concessionaire will first construct the Magallanes to Alabang section and then the President Quirino Avenue to Magallanes section.

3.6.4 Importation of Equipment

Whatever structural system is chosen for the MST viaducts, manufacture of the concrete units will require the construction of a very large precast yard covering an area between 10 and 20 hectares. Special equipment to equip this precast yard will have to be imported at an early stage.

A substantial amount of specialized construction equipment will also have to be imported such as the superstructure erection trusses and their handling gear.

The concessionaire will probably install a fully computerized state-of-the-art toll collection system. If the SLE is to have tolls reimposed at an early stage this equipment is also likely to be imported.

3.6.5 Design and Construction Schedule

Figure 3-1 is a schedule based on the scenario described above. The actual schedule will be the choice of the concessionaire. Acquisition of the right-of-way will be the responsibility of the government and its availability will be the principal constraint on the construction schedule.

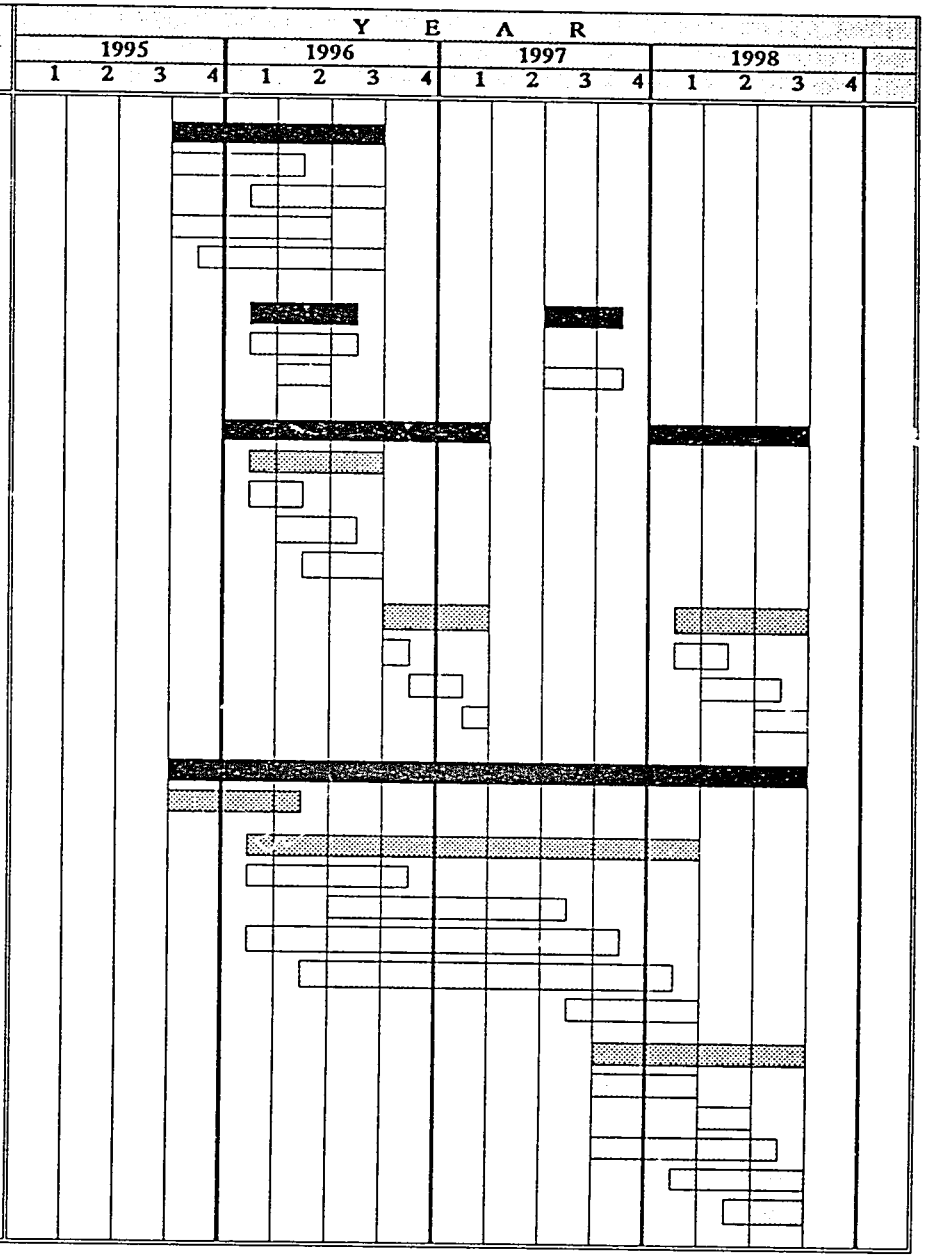
3.7 MAINTENANCE STANDARDS AND REQUIREMENTS

3.7.1 General Requirements

Maintenance is defined as the preservation of the entire roadway, including pavement, shoulders, roadside, drainage, erosion, vegetation, structures, traffic control devices and toll collection facilities, as necessary for the safe and efficient utilization of the tollway.

Figure 3–1
DESIGN AND CONSTRUCTION SCHEDULE

DESCRIPTION	TIME IN MONTH
PREPARATION OF FINAL DESIGNS FOR SLE & MST	12
Rehabilitation of SLE – Phase I – Magallanes to Bicutan	8
Rehabilitation of SLE – Phase II – Bicutan to Alabang	8
MST – Phase I – Magallanes to Alabang	9
MST – Phase II – President Quirino Avenue to Magallanes	10
IMPORTATION OF EQUIPMENT	12
Construction and Precast Plant Equipment	8
Toll Collection Equipment	8
REHABILITATION OF SOUTH LUZON EXPRESSWAY	24
Rehabilitation of SLE – Phase I – Magallanes to Bicutan	9
Earthwork and Drainage	5
Pavement and Structures	4
Toll Facilities, Traffic Signs, Lighting and Miscellaneous	4
Rehabilitation of SLE – Phase II – Bicutan to Alabang	15
Earthwork and Drainage	6
Pavement and Structures	8
Toll Facilities, Traffic Signs, Lighting and Miscellaneous	5
CONSTRUCTION OF MANILA SOUTH TOLLWAY	36
Construction of Precast Yard	8
Construction of MST – Phase I – Magallanes to Alabang	27
Earthwork and Drainage	12
Pavement	14
Substructures	22
Superstructures	21
Toll Collection Facilities, Traffic Signs and Lighting	7
Construction of MST – Phase II – Pres. Quirino Ave. to Magallanes	12
Earthwork and Drainage	6
Pavement	3
Substructures	11
Superstructures	9
Traffic Signs and Lighting	5



Source: The Consultant's Estimates.

Pavement maintenance includes resurfacing to provide improved structural capacity or serviceability, replacing failed concrete slabs, stabilizing pavement by undersealing, restoring skid resistance, sealing joints and cracks, and replacing deteriorated materials.

The pavement roughness shall be measured by means of an approved Response Type Road Roughness Measuring System (RTRRMS) such as the NAASRA Roughness Meter.[12]

The pavement shall initially have an International Roughness Index (IRI) of less than 2.5 m/km when measured over any 200 m continuous lane lengths. The pavement shall be maintained such that the IRI is less than 3.5 m/km over any continuous lane length.

Structure maintenance includes periodic inspection for structural integrity, any necessary structural repairs, maintenance and repair of joints, removal of drainage blockages, repair of decks, curbs and railings, maintenance of skid resistance and provision of a wearing course.

Road and bridge maintenance standards shall be appropriate for a high speed urban road, and shall ensure that the design life requirements in Section 3.1 will be met.

Failure to maintain the operating conditions to the standard set out in these criteria shall be a breach entitling the Government of the Philippines to terminate the Concessionaire's right to operate the Tollway.

Within one year from the MST being opened to traffic, the concessionaire shall develop a maintenance program for approval by DPWH.

All facilities of the MST shall be required to be kept in good order and repair throughout the period of the concession. Two years before the end of the concession DPWH should carry out a detailed inspection of the MST with the concessionaire's maintenance manager. Based on the results of this inspection, DPWH should prepare a schedule of repair and rehabilitation work to be accomplished before the MST reverts to DPWH.

3.7.2 Particular Requirements

- If the NAASRA Roughness Meter is used, the initial pavement roughness shall be at a rate less than 70 counts per km over any 200 m continuous lane length and shall be maintained at a rate below 110 counts per km over any 200 m continuous lane length.[13]

- The pavement shall be constructed and maintained so that there is not any deviation greater than 20 mm from a 3 m straight edge, laid in any direction. Notwithstanding this requirement the surface shall not pond water.

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[12] NAASRA Guide to the Structural Design of Road Pavements, 1987, Australian Roads.

[13] Correlation between IRI and c/km derived from Australian Road Research Board, Research Report, APR164.

- The pavement surface shall be constructed and maintained with surface co-efficient of friction not less than 0.30. Remedial action should be initiated when the skid resistance in any wheel track is lower than 0.35 over a 20 m length, or 15% of any gross wheel track area.

- The pavement surface shall be cleared of any obstacle, debris or spillage which shows a safety hazard without delay. A 24 hour, 7 day a week callout facility shall be provided.

- The full pavement width shall be maintained for each direction except for maintenance and emergencies and any work carried out on the pavement shall have maintenance and protection of traffic provisions to the standard required by DPWH.

- Linemarking, delineation, lighting and signing shall be installed and maintained to provide good visibility under night-time conditions at design operating speeds.

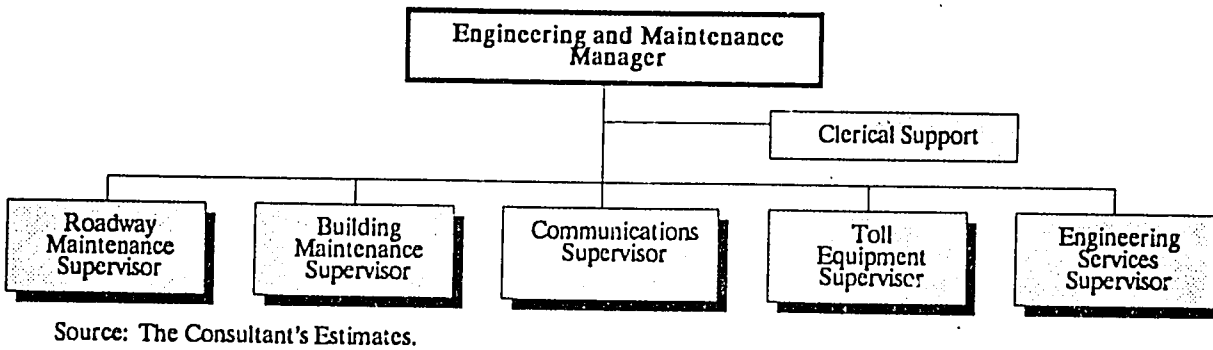
- All bridges, toll plaza structures, drainage structures, guardrail, fencing, traffic signs etc., shall be maintained in good repair from both a structural and visual aspect. Damaged components shall be repaired or replaced as soon as practicable.

3.7.3 Engineering and Maintenance Organization

Tollway maintenance personnel perform routine and preventive maintenance functions. Major maintenance pavement, rehabilitation and structural repairs are performed by contract. Toll and radio communication equipment are usually maintained by contract with specialist firms.

Using this concept, an organization for the Engineering and Maintenance Section would be as shown in Figure 3-2.

Figure 3–2
FUNCTIONAL ORGANIZATION STRUCTURE
ENGINEERING AND MAINTENANCE



Source: The Consultant's Estimates.

The Engineering and Maintenance Manager would be responsible for planning major maintenance operations performed by contract as well as all day-to-day routine maintenance operations. It is estimated that he would require a clerical staff of two.

There would be two Roadway Maintenance Units, each headed by a Roadway Maintenance Supervisor, one for the MST and one for the SLE. Each unit would have about 14 personnel.

It is anticipated that most building repair and maintenance work will be performed by contract. The Building Maintenance Supervisor would be responsible for arranging such contracts. Minor repairs and preventive maintenance would be performed by a staff estimated at 11 to cover seven administrative, utility and maintenance buildings.

The Communications Unit will be responsible for operating the radio communication system round the clock and performing preventive maintenance. It is estimated that the Communication Supervisor would need a staff of four.

The toll equipment will almost certainly be maintained by contract with specialist firms. The Toll Equipment Supervisor would be responsible for arranging such contracts and for keeping the toll collection systems operational. This work would include identification and correction of faults, replacement of faulty units with spares and preventive maintenance. It is estimated that this unit would have a staff of two.

The Engineering Services Unit would be responsible for preparing specifications and contract documents for all items of equipment and maintenance services required. It is estimated that the Engineering Services Supervisor would require a staff of five.

The above staffing of seven supervisors and 52 personnel has been used as the basis of the maintenance cost estimated in Appendix A7-4.

3.8 CONTINUED TECHNICAL REQUIREMENTS OF THE PROJECT

3.8.1 Issues Requiring Further Investigation

This study has identified several issues requiring further investigation, some of which are outside the scope of the proposed BOT/ROM project:

- Improvement of the principal arterial streets and roads serving the MST/SLE corridor to increase their capacity. In particular, the probable need to improve the capacity of Pres. Quirino Avenue, which is not only the northern terminus of both the SLE and MST, but also the main route serving the new link road crossing the Pasig River.

- Improvement of the capacity of Magallanes interchange, already grossly overloaded without the MST (see Section 3.2.4.6)

- The Government is negotiating construction of a Light Rail Transit (LRT) system, known as LRT-III, as a BLT project to be located along EDSA. The impact of LRT-III on Magallanes interchange will need consideration.

- Determination of whether the MST interchanges should be with the same arterial streets and road as the SLE interchanges and whether additional interchanges are needed between C-5 and Alabang.

- The feasibility of incorporating an elevated MST and an elevated PNR within the SLE/PNR corridor between Pres. Quirino Avenue and Magallanes interchange, possibly using a 3-tier arrangement.

- The urgent need to widen and improve the service roads, particularly the West Service Road which serves vast subdivisions under development and is totally inadequate now.

- The need to develop a new integrated drainage system for the whole MST/SLE/Service Roads corridor, taking into account recent and future development within the adjoining drainage area.

- The possible need to acquire the right-of-way for a future connection between the proposed Metro Manila Tollway (MMT) and the MST/SLE corridor between Sucat and Alabang before further development takes place.

3.8.2 Additional Engineering Studies

This conceptual design has been performed utilizing eight-year old 1:10,000 topographic maps augmented by recent 1:10,000 aerial photographs and a limited amount of ground survey work. With the time and resources available, it has only been possible to determine that the project is technically feasible and to develop one possible concept.

With the possible exception of the structures, this study provides insufficient technical information for potential bidders to proceed. In particular, interchanges require much more study and development before definitive designs can be prepared. Additional traffic studies will be needed for this purpose.

It is recommended that DPWH should proceed with survey work as soon as possible, including property surveys and title searches in interchange areas, as this will be a time-consuming operation in urban areas. Additional traffic studies are needed to assist in determining the best operational strategy to adopt and the best location for interchanges and individual ramps. There is a need to improve the traffic capacity of arterial streets feeding the MST/SLE facilities, as identified by but not investigated in detail for this study. The additional studies should also include the collection and analysis of traffic on these streets.

When topographic surveys of potential interchange areas are complete and refinements of the traffic studies have been made, the preliminary design of the project can proceed.

Between President Quirino Avenue and EDSA, the proposed interchanges are closely spaced. Further study is necessary to determine precise interchange requirements. Each interchange may be influenced directly by the preceding or following interchange. All should be integrated into a system, with additional traffic lanes where required to satisfy capacity, weaving and lane balance.

3.8.3 Preliminary Design Requirements

3.8.3.1 Highways

Preliminary design studies are to be made at either 1:1,000 or 1:2,000 scale and will be used to establish preliminary horizontal and vertical alignment, interchange and toll plaza configurations, local road and street treatments, split profiles, median concepts, alternative alignments, right-of-way requirements, preliminary cost estimates, and tentative maintenance and protection of traffic schemes.

Studies are to be shown on reproducible topographic base maps, and are to be accurately drawn in either pencil or ink and of a quality to produce a clear, legible print. The size of the sheets is to be at least A1 but may be up to twice as long. Profiles are to be drawn at a 10:1 ratio with the horizontal scale the same as the plan scale. The profiles may be either pencil or ink on either stable or paper base.

Where required or warranted, alternative studies are to be made. The studies may consist of, but need not to be limited to, horizontal and vertical alignment shifts, channelization alternatives, alternative interchange configurations and right-of-way comparisons. In all alternative studies, the presentation is to be similar and for each alternative a cost estimate and a list of advantages and disadvantages with recommendations will be prepared.

The following information is to be shown:

- Preliminary Plan Sheets:

  (i) Roadway descriptions and roadbed widths
  (ii) Radii with TC, TS, SC, CS, SS, ST & CT locations
  (iii) Stationing at 100 m intervals and kilometers
  (iv) Proposed interchanges and toll plazas
  (v) Proposed ROW takings and existing property lines
  (vi) Slope lines
  (vii) Local road and street names

(viii) Local government boundaries and names
(ix) Horizontal limits of work
(x) Typical cross sections
(xi) Title box
(xii) Structure outline
(xiii) Approximate retaining wall locations
(xiv) Limits of local road and street relocations
(xv) Pedestrian bridge locations
(xvi) Major stream relocations
(xvii) Major utility relocations
(xviii) Major bodies of water

- Preliminary Profile Sheets:

(i) Roadway descriptions
(ii) Existing ground
(iii) Datum, horizontal and vertical scales and stationing
(iv) Gradients to nearest 0.1% (using a solid line)
(v) Structure locations and major waterway openings
(vi) Vertical curve data
(vii) Locations and size of horizontal radii
(viii) Superelevation and transition locations
(ix) Superimposed profiles from adjacent ramps or roadways at noses or concentric areas
(x) Nose locations
(xi) Title box

3.8.3.2 Structures

The structural design of the typical elevated viaduct and ramp structures has already been completed to the preliminary design stage as part of this conceptual study, and no further work in this area is necessary, particularly in view of the likelihood that the Concessionaire will adopt a different structural system.

Additional structural design may be necessary at locations where right-of-way acquisitions need to be implemented prior to the awarding of a BOT Contract, and these would include:

- preliminary abutment and/or retaining wall designs at the terminations of all entrance and exit ramps;

- preliminary retaining wall and tunnel roof designs where the MST deviates below the C-5 adjacent to the Manila International Airport, if applicable; and

- preliminary design of the termination of the MST on the Alabang viaduct, if applicable.

3.8.3.3 Submissions

When the preliminary plans are submitted for approval, the submission shall consist of the following:

- Three sets of prints of the plans and profiles;
- Alternative studies and their costs;
- Project cost estimate;
- A brief report describing the project; any problem areas warranting detailed studies during a subsequent Phase; meetings held with various agencies to resolve problems; brief construction sequence; and construction coordination with adjacent projects;
- Typical sections showing lane dimensions, local roadway widths, grading criteria, median treatment, etc.;
- Proposed utility relocation schemes; and
- Results of any supplementary geotechnical investigations.

A preliminary general plan and elevation drawing shall be submitted for each structure.

The best available substructure information will be used to assess the influence of the foundation conditions on the types of structure proposed and their arrangement. If borings have been taken and soil tests made, copies shall be submitted together with foundation recommendations.

- For bridges, the design notes should contain a brief description of super- and substructure types.
- A typical section view is to be shown, illustrating the deck cross-section and the form of substructure.
- Computed alignment is not required; information obtained from graphic geometry should be given. Clearance may be scaled.
- A preliminary cost estimate, arrived at by estimated current unit prices to approximate quantities of major items, with allowance for items not measured and contingencies shall be indicated on the Plans.

3.9 REDUCED SCOPE OF MST BOT PROJECT

3.9.1 General

Three factors have been identified, but not investigated at this stage, which indicate that a possible reduction in scope of the MST BOT project should be considered during preliminary design:

- Toll levels and financial feasibility
- Traffic volumes
- Right-of-Way acquisition

3.9.2 Toll Levels and Financial Feasibility

It is recommended in Section 3.2.2.4 that the MST is operated with a single toll collection barrier near Nichols. This means that all MST users of each class of vehicle will pay the same toll, whether travelling the longest trip, between Pres. Quirino Avenue and Alabang, or the shortest, between Magallanes and Bicutan.

If the SLE is operated as a closed system users will pay a different toll for each trip. Users will have a choice of tollway between Magallanes and Bicutan, Sucat and Alabang (the section of the SLE between Pres. Quirino Avenue and Magallanes will continue to be free).

If the combined MST and SLE tollways are to operate efficiently with balanced traffic flows, tolls on both need to be perceived by users as being reasonably equitable. This may limit the amounts of toll that can be charged at the MST barrier and affect the financial feasibility of the project.

3.9.3 Traffic Volumes

The traffic analysis tends to indicate that if construction of the MST Phase II - Pres. Quirino Avenue to Magallanes section was omitted or deferred for some years, there would be a relatively small reduction in the volume of traffic using the MST. The total construction cost, however, would be reduced by about 20% and the cost to the concessionaire by more than 18%, as shown in Tables 3-10 and 3-11. The implementation schedule could also be reduced by at least six months if construction of MST Phase II was deferred.

The overall effect on traffic within Makati would need detailed analysis if construction of MST-Phase II was deferred.

Table 3–10
COST COMPARISON OF REDUCED SCOPE OF MST BOT PROJECT

TOTAL PROJECT COST

DESCRIPTION	PRES. QUIRINO TO ALABANG	MAGALLANES TO ALABANG		PRES. QUIRINO TO MAGALLANES	
	AMOUNT	AMOUNT	%	AMOUNT	%
PART A—PRE-CONCESSION AGREEMENT OR CONTRACT	1,166,368,740	736,750,320	63.17	429,618,420	36.83
PART B–MANILA SOUTH TOLLWAY					
1. Alternative 1–AASHTO Girder, 4 Lanes	10,640,159,380	8,461,862,808	79.53	2,178,296,572	20.47
2. Alternative 2–AASHTO Girder, 6 Lanes	11,698,033,131	9,347,362,170	79.91	2,350,670,961	20.09
3. Alternative 3–Box Girder, 4 Lanes	9,521,158,428	7,558,731,484	79.39	1,962,426,944	20.61
4. Alternative 4–Box Girder, 6 Lanes	10,924,307,203	8,740,787,829	80.01	2,183,519,374	19.99
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	1,059,803,256	1,059,803,256		—	—
TOTAL with PART B, Alternative 1	**12,866,331,376**	**10,258,416,384**	**79.73**	**2,607,914,992**	**20.27**
TOTAL with PART B, Alternative 2	**13,924,205,128**	**11,143,915,747**	**80.03**	**2,780,289,381**	**19.97**
TOTAL with PART B, Alternative 3	**11,747,330,424**	**9,355,285,060**	**79.64**	**2,392,045,364**	**20.36**
TOTAL with PART B, Alternative 4	**13,150,479,199**	**10,537,341,405**	**80.13**	**2,613,137,794**	**19.87**

Source: Consultant's Estimates.

Table 3–11
COST TO BE BORNE BY CONCESSIONAIRE

DESCRIPTION	PRES. QUIRINO TO ALABANG	MAGALLANES TO ALABANG		PRES. QUIRINO TO MAGALLANES	
	AMOUNT	AMOUNT	%	AMOUNT	%
PART B–MANILA SOUTH TOLLWAY					
1. Alternative 1–AASHTO Girder, 4 Lanes	10,640,159,380	8,461,862,808	79.53	2,178,296,572	20.47
2. Alternative 2–AASHTO Girder, 6 Lanes	11,698,033,131	9,347,362,170	79.91	2,350,670,961	20.09
3. Alternative 3–Box Girder, 4 Lanes	9,521,158,428	7,558,731,484	79.39	1,962,426,944	20.61
4. Alternative 4–Box Girder, 6 Lanes	10,924,307,203	8,740,787,829	80.01	2,183,519,374	19.99
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	1,059,803,256	1,059,803,256		—	—
TOTAL with PART B, Alternative 1	**11,699,962,636**	**9,521,666,064**	**81.38**	**2,178,296,572**	**18.62**
TOTAL with PART B, Alternative 2	**12,757,836,388**	**10,407,165,427**	**81.57**	**2,350,670,961**	**18.43**
TOTAL with PART B, Alternative 3	**10,580,961,684**	**8,618,534,740**	**81.45**	**1,962,426,944**	**18.55**
TOTAL with PART B, Alternative 4	**11,984,110,459**	**9,800,591,085**	**81.78**	**2,183,519,374**	**18.22**

Source: Consultant's Estimates.

3.9.4 Right-of-Way Acquisition

It is likely that acquisition of all the necessary ROW for the MST-Phase II-Pres. Quirino Avenue to Magallanes section will take more time than acquisition of the ROW for the southern section. The northern section will involve more individual owners in a more densely developed area than the southern section.

It this proves to be the case it would support the concept of reducing the scope of the project to avoid delays in implementation by deferring MST-Phase II.

Chapter 4

TRAFFIC ANALYSIS

CHAPTER 4

TRAFFIC ANALYSIS

4.1 INTRODUCTION

The traffic component of a toll road study is needed to:

- identify future traffic levels and patterns in order to guide the engineering design of the facility;
- explore the effects of different toll levels on toll system traffic volumes and revenues for use in the financial analyses;
- provide input on traffic and congestion levels to the economic analyses.

In the particular case of the proposed SLE/MST toll system, the traffic analyses had to be carried out using a *traffic network model* because of the complex interactions between the two different types (open and closed) of proposed toll facilities, and because of potential competition with the SLE/MST from other routes, both existing and proposed: the service roads, the coast roads, and the proposed C-5 circumferential, among others.

A traffic network model simulates the flow of traffic over a network. Each trip is assumed to take the most favorable path from its point of origin to its point of destination. The most favorable path, however, depends on the amount of congestion on the various links making up the possible paths: as more and more trips use a given path, it may become so congested that trips find advantage in choosing other paths. Thus the trips from an origin to a destination may in fact be spread over a number of parallel paths through the network. In the case of a network with toll roads, the attractiveness of a particular path depends not only on its level of congestion but also on the amount of toll that must be paid on it. A traffic network model attempts to identify a situation of supply-demand equilibrium, where by definition at equilibrium no individual trip can find a more attractive path from origin to destination. Traffic network models are widely considered to be the tool of choice for analyzing situations where highway users are confronted with a variety of paths and service options.

For the SLE/MST traffic analyses, the traffic model network had to represent all the major roads in the Metro Manila road network in order to adequately take account of the alternative paths available to drivers. Similarly, the model had to incorporate trips made throughout the Metro Manila area as well as to or from the provinces north and south of the Capital Region. However, because of the focus of the study on the SLE/MST, the detail and accuracy of the network and demand representation needed to be greatest in the southern corridor.

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This chapter describes the development and application of the traffic network model used for the SLE/MST tollway analyses. The Inception Report identifies and discusses many of the data sources that were reviewed while preparing the network model and should be consulted for such background information; particular sources that were important in the development of the model will be cited and discussed in this chapter as needed.

Section 4.2 below deals with the development and calibration of the traffic network model, while Section 4.3 deals with its application for the various SLE/MST analyses and with the principal results that were obtained. Section 4.4 briefly recapitulates the conclusions and recommendations of the traffic study.

4.2 DEVELOPMENT OF THE TRAFFIC MODEL

4.2.1 Overview of Required Steps

Development of a traffic network model for use in analyzing the proposed SLE/MST project involved a number of steps, as follows:

- preparing a model capable of replicating baseline (mid-1992) traffic conditions; this is known as model calibration;
- developing estimates of future network characteristics and travel demand levels enabling the model to realistically predict future traffic conditions in the future no-build situation (without the SLE/MST project);
- appropriately representing the SLE/MST project in its various possible configurations; this enables the future build situation to be analyzed.

Each of these steps will be discussed in turn.

4.2.2 Baseline Model Calibration

Model calibration required establishing the baseline 1992 traffic levels which the model must be able to replicate; choosing a transportation analysis software package and developing the road network and travel demand data in a format suitable for use by it; and adjusting the various model parameters until the baseline traffic volumes are satisfactorily replicated.

4.2.2 1 Establishment of Baseline Traffic

Establishment of baseline traffic data involved compiling and analyzing existing data from the Metro Manila Traffic Engineering Center (TEC) and the Philippine National Construction Corporation (PNCC), as well as collecting and analyzing new traffic data on the SLE.

- Traffic Data Sources

The TEC provided traffic data from their ongoing comprehensive program of manual traffic counts at signalized intersections in the metropolitan area. Summary AADT and peak hour as well as more detailed hourly count data from 1991, 1990 and selected earlier years were obtained for intersections important to the present study. However, in most cases the TEC counts do not cover the SLE mainline.

Historical toll traffic data was obtained from the PNCC and the Toll Regulatory Board (TRB). The data provides information on AADT by toll class between the various tollway entry and exit locations from the time when the SLE between Alabang and the Nichols interchange was operated by the PNCC as a tollway, and is a useful source of both volume and O-D information.

In principle, the collection of tolls might have affected the SLE historical traffic levels, so volumes from earlier years may not be strictly comparable to current (no toll) volumes. However, given the relatively low tolls that were applied[1], it is unlikely that significant traffic diversions were produced. In any case, the magnitude of such effects is surely small compared to other changes affecting traffic which occurred over the same time period. Thus, the PNCC toll traffic data were pooled with those from other, more recent, sources.

To complete the existing TEC and PNCC traffic data, the present study also carried out a series of new traffic counts. These included 24-hour automatic traffic recorder (ATR) axle and vehicle classification counts on the SLE mainline to establish hourly traffic variations, as well as manual turning movement and vehicle classification counts at SLE interchanges and intersections with the local street system. The ATR counts were carried out separately in the northbound and southbound directions on the Alabang-Sucat, Sucat-Bicutan and Nichols-Magallanes SLE mainline segments. Manual counts were carried out at the Alabang, Sucat, Bicutan and Magallanes SLE interchanges, and at the President Quirino Avenue terminus. All counts were carried out on representative midweek days in late June and early July, 1992. Manual counts were carried out under a

[1] There were no toll increases in the period from 1983 through the cessation of PNCC toll collection on the Nichols-Alabang section in 1991.

contract established with the University of the Philippines Transport Training Center (TTC) while the ATR counts were carried out by the DPWH.

- Traffic Data Processing

The various sources of traffic data were not directly comparable or consistent: counts were taken in different years, some counts were for part of a day while some were for a full 24-hour period, and, in the limited access portions of the SLE, volumes upstream and downstream of an interchange were not consistent with the interchange off- and on-volumes. The objective of the traffic data processing was to reduce these disparate data sources into a consistent set of baseline 24-hour volumes along the SLE between Alabang and President Quirino Avenue.

To this end, partial-day counts (all of which covered the 14-hour period starting at 6:00 and ending at 20:00) were first factored to a 24-hour total using hourly variations determined from the DPWH 24-hour ATR axle counts.

Considerable effort was spent trying to extract meaningful information from the ATR count results, but it was finally concluded that the counters used were not able to successfully cope with the relatively high traffic volumes at most locations on the SLE. For example, the ATRs' classified volumes showed virtually no agreement with the results of manual counts carried out over the same times of day. The raw axle counts, on the other hand, when suitably adjusted to take account of the distribution of vehicle axle configurations, showed reasonably good agreement with the manual counts at low volume levels but again tended to exhibit sizeable discrepancies at higher levels. However, since the ATRs were the only source of 24-hour volume data, it was decided to use their raw axle counts to derive a factor relating the 14- and the 24-hour axle totals and, by extension, the corresponding traffic volumes. Analysis of ATR results in the northbound and southbound directions for the three individual segments as well as of the combined axle counts for the three segments together resulted in ratios of 24-hour axle counts to 14-hour counts ranging from 1.23 to 1.35. It was decided to apply a single conversion factor of 1.3 to factor 14-hour counts to a daily 24-hour total. This factor was applied equally to all vehicle types.[2]

Next, counts carried out in earlier years were projected to the 1992 baseline using annual growth rates established from PNCC historical toll volumes by SLE segment. Historical AADTs for the years 1983, 1985, 1987, 1989 and 1991 were available for the segments Alabang-Sucat, Sucat-Bicutan and Bicutan-Nichols, and

[2] No information was available on monthly or seasonal traffic variations in the metropolitan area. As will be seen, however, baseline traffic volumes were derived by combining counts that were taken at different times of year. This data pooling circumvents to some extent the need to adjust for monthly or seasonal variations.

were broken down by light vehicles and heavy vehicles, with the latter further broken down into buses and trucks. Exponential growth was assumed:

$$V = V_0 \, e^{rt}$$

where	V	is the traffic volume in year t;
	V_0	is the traffic volume in an initial year 0; and
	r	is the annual average growth rate.

The equation was linearized by taking logarithms of both sides, then linear regression was applied to determine the exponential growth rate, r, which best fit the five years of historical volumes. Figures 4-1, 4-2 and 4-3 present the historical light and heavy vehicle AADTs as well as the computed growth rates for the three segments. The figures show clearly that traffic growth was highest in the southern portions of the SLE, and that heavy vehicles (trucks and buses) have experienced higher growth rates than light vehicles (private passenger vehicles and public jeepneys). Despite a stagnation observable in the final two years of data, overall traffic growth in the period 1983-1991 was quite robust.

The total number of vehicle-kilometers (vkm) produced on the SLE between Alabang and Nichols was also computed from the historical AADTs and a similar set of regressions was carried out on the vkm. This is perhaps the best measure of overall traffic growth in the southern corridor. Average annual vkm growth rates over the period considered were 6.7% for light vehicles (cars and jeepneys), 8.9% for heavy vehicles (buses and trucks), 6.3% for buses alone, 11.3% for trucks alone, and 7.1% for all vehicle types combined. These growth rates were applied to bring traffic counts from earlier years up to the 1992 baseline.

In this way, the diverse sources of traffic data for the SLE mainline and on-/off-volumes were brought to a common 1992 24-hour basis. The available raw data and applied adjustments for each movement are presented in Appendix A4-1.

To ensure consistency of mainline and ramp volumes on the limited access portion of the SLE, a maximum likelihood method proposed by R. Hamerslag and M. C. Huisman was applied.[3] By using this method to systematically adjust the factored count data, it could be guaranteed that, for example, the northbound volume on the Sucat-Bicutan mainline segment equalled the northbound volume on the Alabang-Sucat segment minus the northbound off-movements plus the northbound on-movements at the Sucat interchange.

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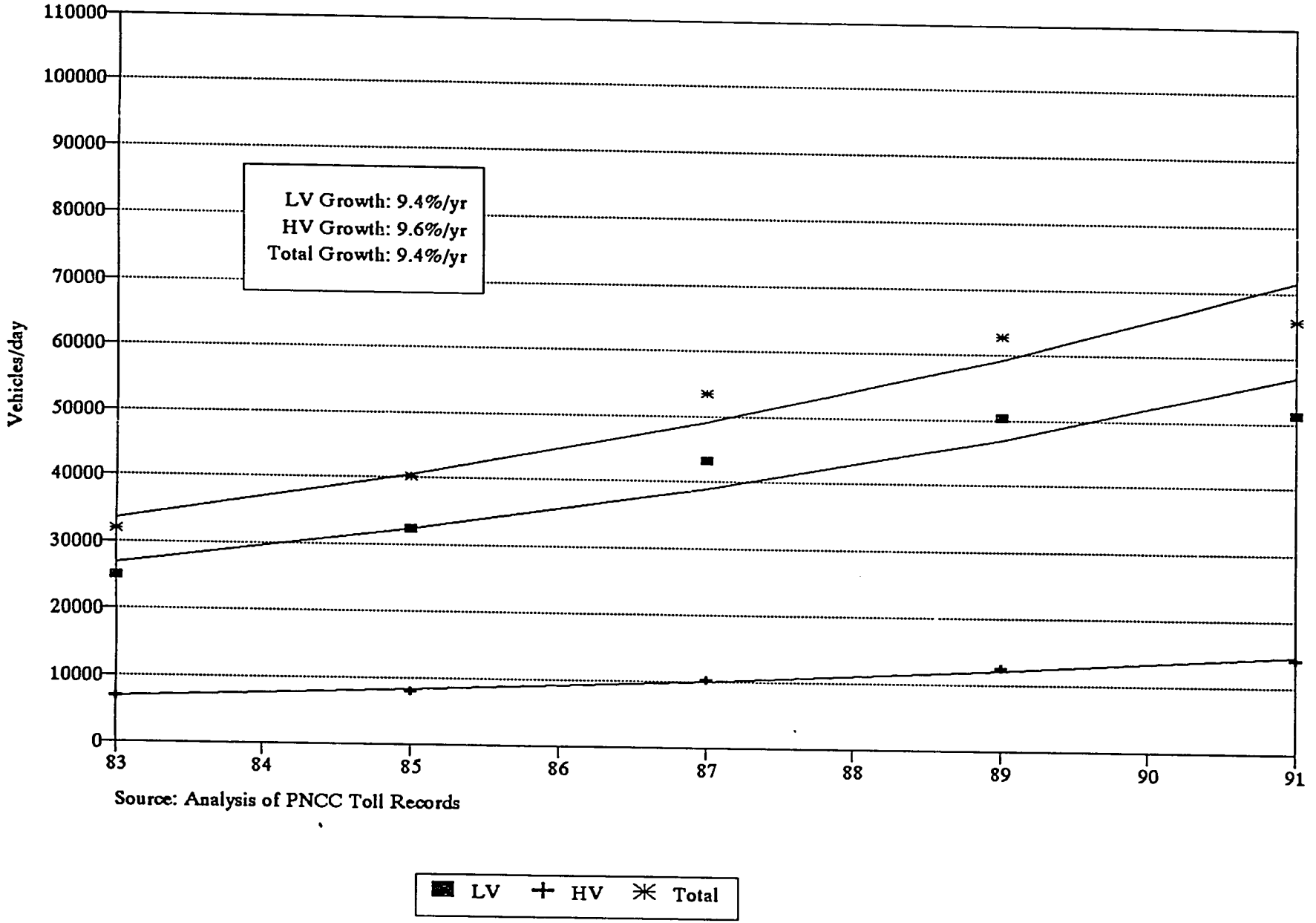
[3] This method was originally proposed in Dutch in an article published in the review *Verkeerskunde* in 1978. It was subsequently described in English in the article The Most Likely Trip Matrix Estimated from Traffic Counts by H.J. Van Zuylen and L.G. Willumsen, published in *Transportation Research*, Vol. 14B, 1980.

Figure 4-1
TWO-WAY AADT: ALABANG-SUCAT



Source: Analysis of PNCC Toll Records

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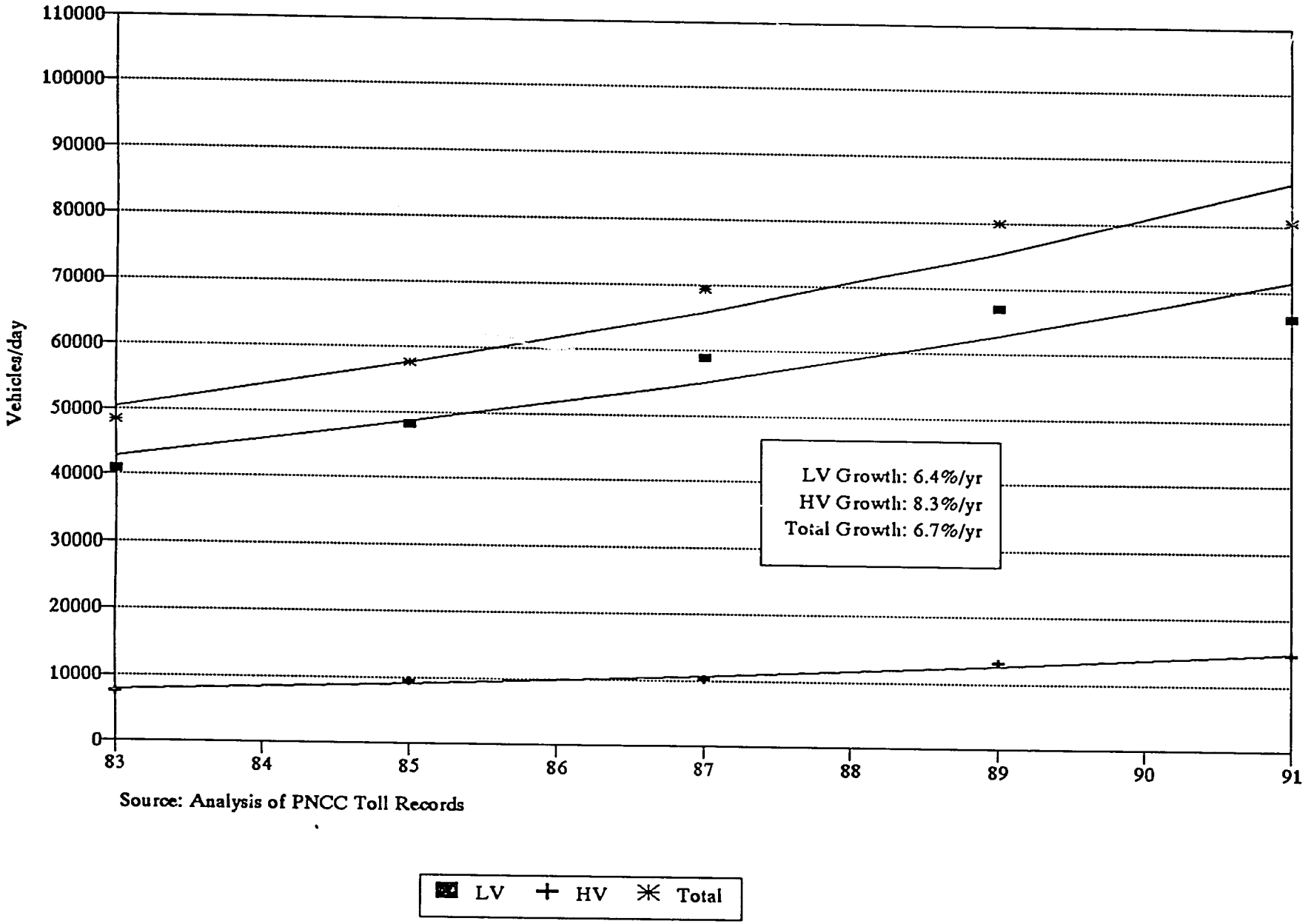
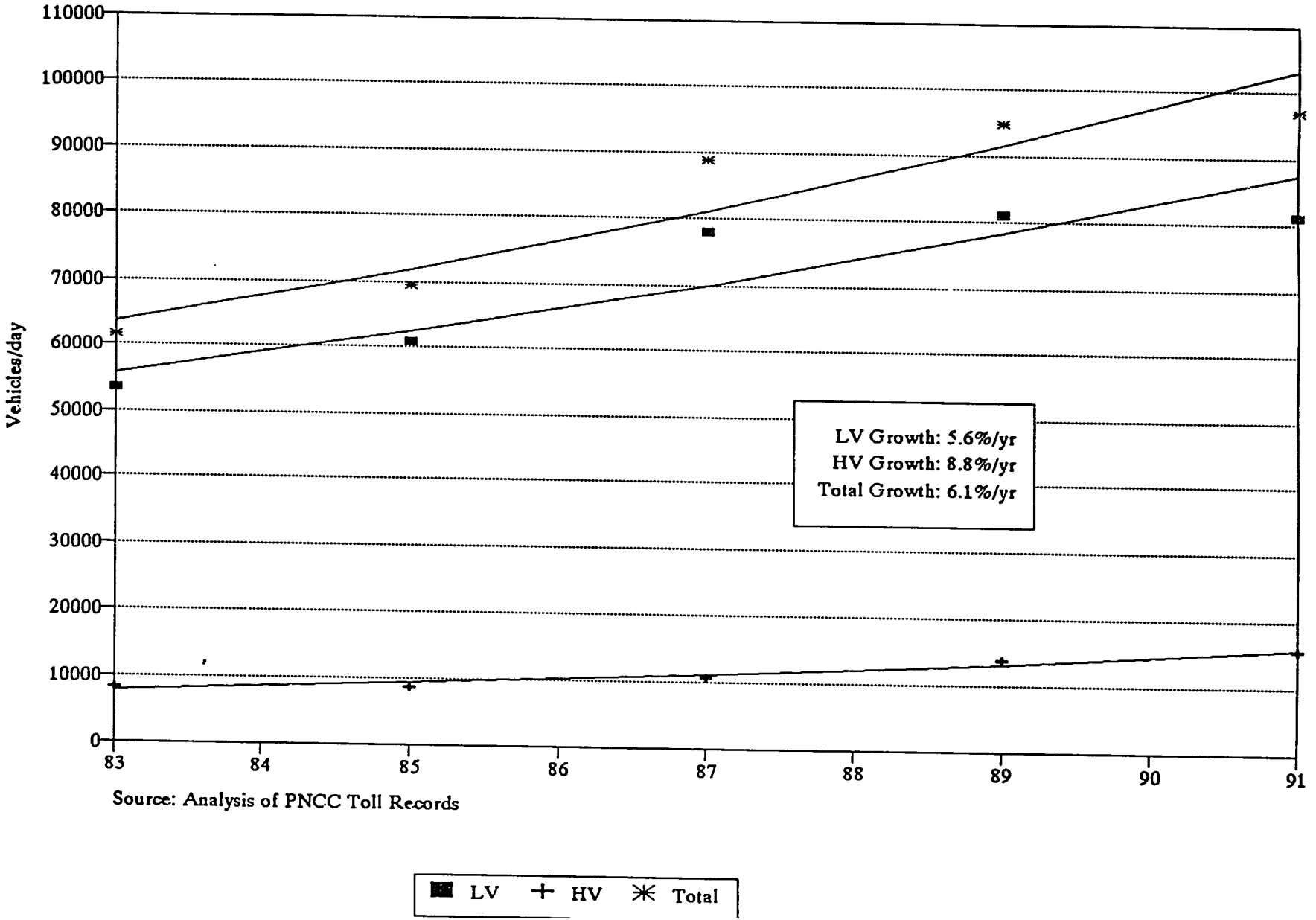
Figure 4-2
TWO-WAY AADT: SUCAT-BICUTAN



Source: Analysis of PNCC Toll Records

Figure 4-3
TWO-WAY AADT: BICUTAN-NICHOLS



Source: Analysis of PNCC Toll Records

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It was also felt that northbound and southbound mainline volumes should be approximately equal over a 24-hour period, although the availability of the service roads as relief routes during periods of high congestion somewhat weakens this expectation. Thus, the application of the Hamerslag-Huisman adjustment procedure also imposed the constraint that 24-hour northbound and southbound volumes on the SLE segment between Nichols and Magallanes be equal, but did not constrain opposite direction volumes at other locations.

Appendix A4-2 describes the method of Hamerslag and Huisman and its application to the present study. The application of the method resulted in a consistent set of 24-hour mainline and on-/off-volumes for the SLE between Alabang and the Magallanes interchange.

Since the SLE north of Magallanes has unlimited access from local streets and adjacent land uses, it would not have been appropriate to balance traffic counts between Magallanes and President Quirino Avenue. Average segment volumes were obtained from the various 1992 volume estimates with minimum additional processing. In some cases, there was no information on SLE mainline at intersections; in such cases, the volumes were approximated by averaging the appropriate upstream and downstream intersection mainline volumes. It is also worth noting that some 1991 counts appeared suspect, perhaps because they were taken during construction of the EDSA interchanges. Questionable count results were rejected.

The calibration of the traffic model also required an estimate of the composition of the daily traffic on each SLE segment in terms of the number of cars, jeepneys, buses and trucks per day. This estimate was performed by manually inspecting the percentage composition determined during the various traffic counts carried out at each location, deriving a representative percentage composition and applying this to the daily segment volume determined as described above.

Table 4-1 presents the baseline traffic volumes that were used for the traffic network calibration.

The relative mix of car and truck traffic was also needed for certain calculations. Examination of the classified count results showed that the car-truck composition on the SLE varies from 90%-10% on the Alabang-Sucat segment to 96%-4% on the segment between Vito Cruz and President Quirino Avenue. A rounded overall 90%-10% car-truck breakdown was used.

Table 4-1
BASELINE VOLUMES ALONG SOUTH LUZON EXPRESSWAY
(vehicles/day)

SECTION	CARS		JEEPNEYS (PUJs)		BUSES (PUBs)		TRUCKS		TOTAL
	veh	%	veh	%	veh	%	veh	%	
Alabang-Sucat	48,710	70%	6,231	9%	8,974	13%	5,360	8%	69,275
NB	24,625	75%	2,261	7%	3,734	11%	2,095	6%	32,715
SB	24,085	66%	3,970	11%	5,240	14%	3,265	9%	36,560
Sucat-Bicutan	69,151	77%	6,304	7%	9,239	10%	5,541	6%	90,235
NB	33,563	79%	2,689	6%	3,691	9%	2,287	5%	42,230
SB	35,588	74%	3,615	8%	5,548	12%	3,254	7%	48,005
Bicutan-Nichols	82,386	78%	7,877	7%	8,997	9%	5,798	6%	105,058
NB	38,505	80%	3,448	7%	3,548	7%	2,456	5%	47,957
SB	43,881	77%	4,429	8%	5,449	10%	3,342	6%	57,101
Nichols-Magallanes	86,650	78%	9,901	9%	8,878	8%	5,447	5%	110,876
NB	43,592	79%	5,472	10%	3,429	6%	2,945	5%	55,438
SB	43,058	78%	4,429	8%	5,449	10%	2,502	5%	55,438
Magallanes-Pasay Road	56,097	89%	198	0%	3,424	5%	3,481	6%	63,200
NB	21,998	87%	16	0%	1,723	7%	1,578	6%	25,315
SB	34,099	90%	182	0%	1,701	4%	1,903	5%	37,885
Pasay Road-Buendia	56,188	89%	220	0%	3,401	5%	3,427	5%	63,236
NB	31,666	90%	220	1%	1,724	5%	1,650	5%	35,260
SB	24,522	88%	0	0%	1,677	6%	1,777	6%	27,976
Buendia-Vito Cruz	57,830	90%	0	0%	3,636	6%	2,933	5%	64,399
NB	22,580	88%	0	0%	1,834	7%	1,196	5%	25,610
SB	35,250	91%	0	0%	1,802	5%	1,737	4%	38,789
Vito Cruz-P. Quirino Ave.	74,777	92%	8	0%	2,961	4%	3,521	4%	81,267
NB	36,118	91%	2	0%	1,814	5%	1,644	4%	39,578
SB	38,659	93%	6	0%	1,147	3%	1,877	5%	41,689

Source: Consultant's processing of available traffic data.

4.2.2.2 Establishment of Network Model and Data

The DPWH prefeasibility study traffic modelling work used a traffic assignment program called ECOVAL that was originally developed during the MMUTSTRAP study and was further elaborated by DPWH thereafter. For the particular needs of the prefeasibility study, DPWH updated ECOVAL's network representation as well as its car and truck trip tables.

Although consideration was given to applying ECOVAL for the purposes of the present study, it was finally decided to use a commercially available transportation planning software package for the following reasons:

- ECOVAL is relatively inflexible in terms of the processing it carries out; it cannot be changed except by modifying the source code, which was not readily available;

- ECOVAL is basically a traffic assignment and vehicle operating cost (VOC) calculation program; it does not offer the broad range of additional transportation analysis capabilities typically available in commercial software packages. Many such additional capabilities were required for the present study.

The TRANPLAN transportation planning software package was chosen because of its wide use and considerable power and flexibility. (Louis Berger International, Inc. is a registered user of the software.)

It should be realized that, although the TRANPLAN software package was used as the modelling tool, the general DPWH modelling approach implemented in ECOVAL was for the most part followed without major change.

This approach involved assignments of 24-hour car and truck trip tables. The tables are based on a system of 124 zones, of which 118 represent areas of trip production and/or attraction within the Metro Manila area and six represent all or parts of outlying provinces. (To derive these tables, the DPWH updated car and truck trip tables which had originally been prepared from *circa* 1983 survey data.) Daily jeepney and bus volumes were preloaded on individual network links and contributed to network congestion but were not allowed to divert to other links as a result of that congestion. Where required, peak hour values (volumes and capacities) were converted to a daily basis using a peak hour/24-hour conversion factor of 10% applied over the entire network; this factor was derived by MMUTSTRAP based on observed traffic peaking and directional variation characteristics.

Conversion of the ECOVAL traffic model data (the coded network description and the car and truck trip tables) to TRANPLAN format was a fairly straightforward data conversion exercise since most of the transportation data inputs are similar in the two systems. Small BASIC programs were prepared to carry out many of the conversions, and a spreadsheet was used to maintain the individual link data.

The following sections discuss some of the salient differences between the ECOVAL and the TRANPLAN implementations of the DPWH modelling approach.

- Use of the MMUTSTRAP Volume-Delay Curve

  A key component of any assignment procedure is the relationship between the amount of traffic on a link and the time which vehicles take to traverse the link; this relationship, known as the volume-delay curve, gives precise meaning to the word "congestion". The MMUTSTRAP study developed the following volume-delay curve which is applied in ECOVAL:

$$T = \frac{(VCR+1)^6 + 15}{10 \cdot VCR + 16} \cdot T_0$$

where	T	is the travel time over a link at a given level of congestion;
	T_0	is the link's free-flow travel time, as derived from its length and basic operating speed (BOS); and
	VCR	is the link's volume/capacity ratio, a measure of its level of congestion.

Interestingly, this curve penalizes moderate and high volume/capacity (V/C) ratios more severely than do the volume-delay curves that are used in some other countries. However, it was clearly beyond the scope of the present study to assess the applicability of different volume-delay curves to Metro Manila traffic conditions. Thus, the MMUTSTRAP curve was retained. TRANPLAN's ability to approximate any volume-delay curve by a user-specified piecewise linear function was used for this purpose.[4]

- Use of Equilibrium Assignment

The ECOVAL program implements a standard traffic assignment technique known as incremental assignment, in which fixed fractions of a trip table are assigned to the network in successive iterations, and link travel times are updated using the MMUTSTRAP volume-delay curve after each increment is assigned. (ECOVAL uses five iterations of 30%, 20%, 20%, 20% and 10% of the trip table.) The incremental assignment method is relatively popular because it is easy to explain and to program. However, incremental assignment also has a number of drawbacks:

(i) it requires that the user specify *a priori* the number of iterations and the fraction of the trip table to be assigned in each iteration, but there is usually no objective basis for choosing these parameters;

(ii) while it seems a like plausible heuristic for simulating a situation of supply-demand equilibrium over a network, there is in fact no guarantee that at termination an equilibrium situation actually will have been found.

For these reasons and others, the incremental assignment method has been gradually supplanted by newer methods which are mathematically guaranteed to

[4] In fact, the MMUTSTRAP formula contains a slight anomaly in that the predicted travel times for V/C ratios in the range of 0.00 to approximately 0.20 are actually somewhat lower (ie, the travel speeds are higher) than in the free-flow situation. This anomaly was smoothed over by inputting to TRANPLAN the free-flow travel time in this range of V/C ratios.

find equilibrium without requiring the *a priori* specification of the number of iterations or iteration fractions.[5]

TRANPLAN offers a full-featured equilibrium assignment module. As it happens, this module also provides a richer set of capabilities for modelling toll systems than do the TRANPLAN modules which implement other traffic assignment methods such as incremental assignment. Thus, the choice of equilibrium assignment for use in the present study was clear.

- Use of Passenger Car Units

As mentioned, ECOVAL assigns car and truck trip tables while considering jeepney and bus traffic to be undivertible. Each increment of ECOVAL's assignment procedure loads car and truck trips as distinct volume types. Then, for the purpose of quantifying link congestion, it computes the total equivalent link volume in passenger car units (PCUs). PCUs are calculated by counting each truck and (preloaded) bus as equivalent to 2 passenger cars, and each (preloaded) jeepney as equivalent to 1.5 passenger cars.

TRANPLAN proceeds somewhat differently in that it expects the trip table to have already been converted into PCUs before assignment. However, during the assignment of a PCU trip table, it can simultaneously keep track of the separate loading (on the same paths) of additional trip tables. It does this through what is basically an accounting process; trips from the additional tables are accumulated separately on the minimum path's links, but do not take part in the link impedance calculations.

Thus, in the present study the car and truck trip tables were first converted into a single PCU trip table using the ECOVAL car/truck equivalence factor of 2.0. When the PCU trip table was assigned, the original car and truck trip tables were also assigned as additional and separate tables. At the conclusion of the assignments, the link car and truck loadings were retained for use in the financial and economic analyses.

A similar procedure was used to handle preloaded trips. TRANPLAN can incorporate preloaded volumes on network links, but requires these volumes to be expressed in terms of PCUs. On most links the preloaded volumes were those used in the ECOVAL network, although on some key links recent traffic count results were used, where available and appropriate, to update the ECOVAL jeepney and bus volumes. Then, the jeepney and bus link volumes were

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[5] See Equilibrium Trip Assignment: Advantages and Implications for Practice, by R.W Eash, B.N. Janson and D.E. Boyce, presented at the 58th Annual Meeting of the Transportation Research Board, January, 1979, for a fuller description of the equilibrium assignment method and its advantages.

converted into equivalent PCUs using the equivalence factors listed above, and the resulting PCUs were input into the TRANPLAN network definition as the preloaded link volumes. At the conclusion of the assignments, the total loaded link PCUs, which include both the converted preloaded trips as well as the car and truck PCUs resulting from the assignment, are the best overall measure of link occupancy by traffic and so of link congestion.

- Use of Travel Time Equivalents as Impedance

Both ECOVAL and the original MMUTSTRAP program utilize travel time as the impedance variable for determining minimum paths through the network. In order to represent toll effects, the ECOVAL model converted tolls into an equivalent length using the delta-L method.

Travel time was used as the impedance variable in the TRANPLAN model as well. However, as will be seen in section 4.2.4.1 below, the TRANPLAN equilibrium assignment module allows monetary toll values to be directly represented in the coded network. Thus, the monetary toll values were converted into travel time equivalents for use in the assignment procedure. The per vehicle value of time, discussed in section 4.2.4.2 below, was the conversion factor used for this purpose.

- Other Changes to the ECOVAL Data

The model network representation received from DPWH was reviewed in terms of its correspondence to the baseline (current) Metro Manila road network. (The very detailed DOTC network model, which is currently under preparation as part of a larger-scale transportation model development effort, was of considerable help in this review.) A number of proposed future roadway improvements which had already been coded into the network were removed, and a number of already executed roadway improvements which had not been incorporated in the network were coded in. These changes were discussed and agreed on with DPWH personnel.

ECOVAL link capacities and free-flow speeds were derived from more basic road inventory data (e.g., number of lanes, lane width, side friction, etc.) via a set of tables prepared during the MMUTSTRAP study. The MMUTSTRAP tables provide a very detailed breakdown of link capacities and free-flow speeds according to roadway characteristics. Systematically updating these tables was beyond the scope of the present study, so most link capacities and free-flow speeds were left unchanged; the capacities and free-flow speeds of new or upgraded links were also derived using these tables.

However, in a few cases it appeared that unusually low free-flow speeds were being attributed to key links in the study network; some of these links include portions of the SLE and the future C-5, which were attributed free-flow speeds of around 40 kph. To correct this problem, all expressway links (the North Luzon Expressway, the SLE south of the Magallanes interchange, the future C-5 and the future MST) were assigned free-flow speeds of 80 kph in the present study.

4.2.2.3 Baseline Traffic Network Model Calibration

The baseline car and truck trip tables received from DPWH were assigned by TRANPLAN to the updated network (section 4.2.2.2) and the resulting predicted volumes along the SLE were compared to the baseline traffic volumes (section 4.2.2.1). The correspondence between the actual segment volumes and those resulting from this trial assignment varied from good to poor.

To ensure adequate replication of baseline traffic volumes along the SLE, a series of manual adjustments of the baseline trip tables was undertaken. TRANPLAN's selected link analysis capabilities were utilized to identify the O-D pairs which were the heaviest users of each segment of the SLE (the equilibrium assignment module was run with the selected link option, then the selected link trip table module was run to generate tables of link volumes by O-D pair). These O-D volumes were then manually factored to bring the assigned volumes into line with the baseline segment volumes. Care was taken in the factoring process to preserve the symmetry of the 24-hour trip tables. Because of the interdependence of link volumes along the SLE, a number of adjustments had to be carried out before satisfactory replication of baseline volumes was obtained.

Calibration was considered achieved when the bidirectional PCUs loaded on each segment of the SLE were within $\pm 5\%$ of the baseline values. (This criterion is particularly appropriate because the calculation of PCUs mimics the toll revenue calculation in that trucks will pay tolls that are twice those of cars.) Looser tolerances were allowed for the loaded volumes in separate directions and by individual vehicle types.

Table 4-2 presents a comparison of the actual and predicted volumes by SLE segment following the baseline calibration.

Manual adjustments to relatively dated trip tables are clearly no substitute for the development of a new set of area-wide tables that all Metro Manila transportation studies could use. Nonetheless, it is felt that the results of the trip table adjustment are relatively reliable for zones in the southern portions of the study area because most baseline traffic on the SLE south of Magallanes is interzonal in nature.

Table 4–2
BASELINE MODEL CALIBRATION – DIFFERENCE BETWEEN ASSIGNED AND ACTUAL VOLUMES

SEGMENT	NB CARs				NB TRUCKs				NB PCUs				SB CARs				SB TRUCKs				SB PCUs			
	Asg	Act	Diff	%	Asg	Act	Diff	%	Asg	Act	Diff	%	Asg	Act	Diff	%	Asg	Act	Diff	%	Asg	Act	Diff	%
Alabang–Sucat	23,572	24,625	(1,053)	–4%	2,570	2,095	475	23%	28,712	28,815	(103)	–0%	23,731	24,085	(354)	–1%	2,544	3,265	(721)	–22%	28,819	30,615	(1,796)	–6%
Sucat–Bicutan	34,502	33,563	939	3%	2,760	2,287	473	21%	40,022	38,137	1,885	5%	34,752	35,588	(836)	–2%	2,731	3,254	(523)	–16%	40,214	42,096	(1,882)	–4%
Bicutan–Nichols	40,595	38,505	2,090	5%	2,934	2,456	478	19%	46,463	43,417	3,046	7%	40,750	39,820	93[illegible]	2%	2,922	3,342	(420)	–13%	46,594	46,504	90	0%
Nichols–Magallanes	42,859	43,592	(733)	–2%	2,967	2,945	22	1%	48,793	49,482	(689)	–1%	42,976	43,058	(82)	–0%	2,962	2,502	460	18%	48,900	48,062	838	2%
Magallanes–Pasay Road	27,223	21,998	5,225	24%	1,604	1,578	26	2%	30,431	25,154	5,277	21%	27,423	34,099	(6,676)	–20%	1,611	1,903	(292)	–15%	30,645	37,905	(7,260)	–19%
Pasay Road–Buendia	26,822	31,666	(4,844)	–15%	1,874	1,650	224	14%	30,570	34,966	(4,396)	–13%	27,005	24,522	2,483	10%	1,831	1,777	54	3%	30,667	28,076	2,591	9%
Buendia–Vito Cruz	30,760	22,580	8,180	36%	1,878	1,196	682	57%	34,516	24,972	9,544	38%	26,728	35,250	(8,522)	–24%	1,728	1,737	(9)	–1%	30,184	38,724	(8,540)	–22%
Vito Cruz–P. Quirino Ave.	37,124	36,118	1,006	3%	1,758	1,644	114	7%	40,640	39,406	1,234	3%	37,857	38,659	(802)	–2%	1,788	1,877	(89)	–5%	41,433	42,413	(980)	–2%

SEGMENT	Bi–Dir CARs				Bi–Dir TRUCKs				Bi–Dir PCUS			
	Asg	Act	Diff	%	Asg	Act	Diff	%	Asg	Act	Diff	%
Alabang–Sucat	47,303	48,710	(1,407)	–3%	5,114	5,360	(246)	–5%	57,531	59,430	(1,899)	–3%
Sucat–Bicutan	69,254	69,151	103	0%	5,491	5,541	(50)	–1%	80,236	80,233	3	0%
Bicutan–Nichols	81,345	78,325	3,020	4%	5,856	5,798	58	1%	93,057	89,921	3,136	3%
Nichols–Magallanes	85,835	86,650	(815)	–1%	5,929	5,447	482	9%	97,693	97,544	149	0%
Magallanes–Pasay Road	54,646	56,097	(1,451)	–3%	3,215	3,481	(266)	–8%	61,076	63,059	(1,983)	–3%
Pasay Road–Buendia	53,827	56,188	(2,361)	–4%	3,705	3,427	278	8%	61,237	63,042	(1,805)	–3%
Buendia–Vito Cruz	57,488	57,830	(342)	–1%	3,606	2,933	673	23%	64,700	63,696	1,004	2%
Vito Cruz–P. Quirino Ave.	74,981	74,777	204	0%	3,546	3,521	25	1%	82,073	81,819	254	0%

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However, since the northern segments of the SLE do not limit vehicular access, it is impossible to distinguish inter- from intrazonal (ie, short-distance or local) traffic. Some of the larger trip table adjustments to zones in the northern portions of the study area may perhaps result from attempting to replicate not just the interzonal but also part of the local traffic on the northern segments of the SLE. On the other hand, almost all of these adjustments involve northbound trips from zones near the northern extremity of the SLE, so it is very unlikely that they have any significant effect on the conclusions of the present study.

4.2.3 Future No-Build Situations

Traffic forecasts were performed for the years 1999 (the earliest likely MST opening year), 2010, 2020 and 2030. An out year of 2030 was chosen because of the expected length of the concession period. It was decided to carry out intermediate year analyses, rather than interpolate traffic volumes for years between 1999 and 2030, because it was felt that significant increases in traffic congestion in the medium-term future might result in enhanced toll facility attractiveness even at relatively high toll rates, and that a simple interpolation of 1999 and 2030 volumes would not necessarily capture this type of effect.

The no-build situations represent future demand levels and network characteristics. Analysis of these situations is necessary for the economic analysis of the build network (its economic benefits and costs are calculated by reference to the no-build situation). No-build assignments are also useful as a check on traffic conditions predicted for the build situation.

Development of data for the analysis of the future no-build situations involved projecting the baseline trip tables, incorporating committed highway projects and updating the preloaded jeepney and bus volumes. Each of these steps will be discussed in turn.

4.2.3.1 Trip Table Projections

The car and truck trip tables resulting from the baseline calibration were projected to the future analysis years using the Fratar growth factor method. Growth factors were derived from a combination of historical traffic growth rates and official socioeconomic forecasts for the study area. Different growth factors were developed for each decade of the analysis period and for large groupings of zones within the study area. Because trip tables are based on a 24-hour period, no attempt was made to distinguish growth in trip productions and trip attractions.

For the period 1992-1999, the trip table projections were based entirely on historical traffic growth rates. For zones that generate heavy SLE traffic, these were derived from the PNCC time series of toll volumes (section 4.2.2.1 above), while for the remainder of the study area an average rate of 3.0% per year, obtained from the prefeasibility study, was used.

Traffic growth rates applied for later decades were a combination of the historical traffic growth rates and the population growth rates underlying the official population forecasts published in the 1991 Philippine Statistical Yearbook. For the purposes of this calculation, zones 1-118 corresponded to the National Capital Region, zones 119 and 120 corresponded to Region III, and zones 121 through 124 corresponded to Region IV.

The traffic growth rate (in percentage growth per year) for a given decade was computed as the average of the traffic growth in the preceding decade and the forecast population growth rate for the decade in question. Growth rates were computed separately for cars and trucks. Table 4-3 presents the results of these calculations.

Annual growth rates were converted into equivalent growth factors over the appropriate time span (seven years for 1992-1999, eleven years for 1999-2010, ten years for the two other analysis decades) and input to the TRANPLAN Fratar module to carry out the forecasts.

Table 4–3
TRAFFIC GROWTH RATES
(% AADT growth per year)

PERIOD	DISTRICT	CARS	TRUCKS
1992–1999	Southern Corridor	6.70	8.90
	Rest of Metro Manila	3.00	3.00
	Region 3	3.00	3.00
	Region 4	6.70	8.90
1999–2010	Southern Corridor	4.10	5.20
	Rest of Metro Manila	2.25	2.25
	Region 3	2.24	2.24
	Region 4	4.19	5.29
2010–2020	Southern Corridor	2.65	3.20
	Rest of Metro Manila	1.73	1.73
	Region 3	1.66	1.66
	Region 4	2.72	3.27
2020–2030	Southern Corridor	1.65	1.92
	Rest of Metro Manila	1.19	1.19
	Region 3	1.23	1.37
	Region 4	1.99	2.26

Source: Consultant's estimates based on historical traffic growth and official population growth estimates.

4.2.3.2 Incorporation of Committed Highway Projects

Only currently committed highway projects were incorporated in the future year analysis networks. Since it is expected that all currently committed projects will have been constructed by 1999, there were no changes to the structure of the future year networks after 1999.

Chief among the committed improvement projects are the construction of the C-5 circumferential between Roxas Boulevard in Parañaque and Pasig Boulevard in Pasig; construction of the C-5 bridge over the Pasig River; improvement of the Parañaque-Sucat road; and construction of the new Nagtahan-R. Magsaysay Road connector; among others.

Although consideration is currently being given to implementing C-5 as a BOT project, it was included in the future year analysis network as a no-toll expressway. At the time of this study, the design of C-5 included a partial interchange with the SLE which prohibits movements between points south on the SLE and points west on C-5, and between points north on the SLE and points east on C-5. Partial connections to the east and west service roads were also provided, although the connection to the west service road did not allow movements to or from points east on C-5, and the connection to the east service road did not allow movements to or from points west on C-5. It also appeared, because of vertical clearance requirements near the Ninoy Aquino International Airport, that it would not be possible to provide any connection between C-5 and the proposed MST.

In the longer-term future it is likely that projects such as C-6 will also be implemented. However, at the present time very little information is available concerning either the likely technical characteristics of these projects or their implementation schedule.

4.2.3.3 Projection of Preloaded Jeepney and Bus Link Volumes

As stated earlier, the modelling approach used here follows that of the prefeasibility study in that jeepney and bus trips are considered to be undivertible volumes loaded on the network before beginning the assignment of the (divertible) car and truck volumes. Each network link has an estimated daily volume of jeepney and bus traffic associated with it. These volumes were obtained from the ECOVAL network data and updated using the results of the baseline traffic data processing where appropriate.

To grow the preloaded volumes to future analysis years, the basic Metro Manila traffic growth rates were applied. Preloaded jeepney and bus volumes were then converted into equivalent PCUs as required by the TRANPLAN assignment module.

4.2.4 Future Build Situation

The network analysis of the future build situation (ie, with the SLE/MST toll system in place) presented three new modelling aspects: the representation of the proposed open and closed toll systems in the network model; the selection of an appropriate value of time for use in the determination of minimum paths during traffic assignment; and the reassignment of preloaded SLE jeepney and bus traffic. Each of these is discussed below.

4.2.4.1 Representation of the Toll Systems in the Network Model

Recall that the proposed design of the SLE/MST toll system involves the operation of the elevated MST as an open (single barrier) system in parallel with the operation of the at-grade SLE as a closed system. On the SLE a vehicle will be charged a toll which depends on the locations where it enters and exits the tollway, whereas on the MST all vehicles crossing the barrier will pay the same toll regardless of their entry and exit points. The design of the ramp connections to and from the elevated facility is such that all traffic using the MST will have to pass through the toll barrier. This is accomplished by ensuring that south of the barrier, northbound traffic can only enter and southbound traffic can only exit the MST, while north of the barrier, northbound traffic can only exit and southbound traffic can only enter the MST.

The choice of this overall design was dictated by a number of considerations; among others, it avoids the costly and complex ramp-based toll collection facilities that would be required to operate the MST as a closed system, and it makes use of the SLE toll booths left over from the PNCC. However, it is worth mentioning that, to the best of the study team's knowledge, a dual system of this sort (two parallel and closely-spaced toll facilities, one open and one closed, both under the same operator) would be unique in the world.

TRANPLAN's equilibrium assignment module includes facilities for modelling tolls: any link in the network can have a *toll class* (an integer between 1 and 20) attributed to it. At the time of an assignment, the user associates a (monetary) toll value with each toll class. Other parameters supplied by the user enable TRANPLAN to convert a link's toll value and travel time into an equivalent impedance, and path building is on the basis of minimum impedance.[6]

The appropriate representation of tolls within the network model is predicated on the choice of travel time as the impedance measure for path building: monetary tolls must be converted into an equivalent time value. The choice of an appropriate conversion factor, or value of time, is the subject of section 4.2.4.2. However, even given that tolls are to be converted into equivalent time values, a number of modelling issues still must be resolved.

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[6] TRANPLAN also has a rudimentary ability to model the delays incurred in queuing at toll booths or barriers, but these delays were ignored in the present study.

It was decided to apply a constant toll rate per kilometer to the SLE closed system: all automobiles would pay the same basic rate, and all trucks would pay twice the automobile rate. (This toll policy does not necessarily lead to maximum revenues for the concessionaire, but it does have the merit of simplicity; analysis of more elaborate toll policies was not justified given the quality of the basic modelling data.)

To represent this system, each TRANPLAN network link representing an individual segment of the SLE had attributed to it a distinct toll class. The monetary toll value corresponding to the toll class was then calculated as the basic per kilometer toll rate multiplied by the segment's length. (A 90%-10% weighted average of the car and truck toll rates was applied based on the average vehicle mix.) In this way, a vehicle using several SLE network links would be confronted with a total toll equal to the total distance travelled on the SLE times the basic per kilometer toll rate. Conceptually, it is as if a vehicle had to pay a toll each time it went from one SLE segment to the next but in fact, since the system is closed, the only interruptions to a trip would occur at the SLE entry and exit points.

Tolls on the MST open system were handled in a similar way. The TRANPLAN network link representing the MST barrier (corresponding to the MST segment between the Bicutan and Magallanes interchanges) was attributed a distinct toll class. The toll associated with this class was the amount which all crossing vehicles would have to pay regardless of MST entry or exit point. The coding of the TRANPLAN network ensured that only the permitted movements could be made at the MST ramps.

It is important to realize that the lump sum amount of the MST barrier toll can be set completely independently of the per kilometer toll rate applied on the SLE. However, to help conceptualize the relationship of the MST barrier toll amount to the SLE toll rate, the MST barrier toll amount can be expressed *as if* it were the result of applying the basic SLE toll rate over a certain travel distance on the MST. This equivalent length will be referred to in this report as the "notional" MST travel distance. For example, if the SLE toll rate were 1.00 Peso/km and the barrier toll were set at 15.00 Pesos, it might be said that the barrier toll corresponded to a notional MST distance of 15 km. Again, however, the MST barrier toll amount is actually independent of the SLE toll rate. As will be seen in section 4.3, the concept of a notional MST distance is very useful for analyzing MST barrier toll-setting strategies.

4.2.4.2 Value of Time

Link tolls were incorporated into the link impedance calculation by converting them into a travel time equivalent. The conversion factor applied for this purpose is known as the value of time (VOT). Other things being equal, a vehicle having a VOT of, for example, 100 Pesos/hour is likely to be willing to pay up to 50 Pesos to travel on a toll facility that would enable it to save 30 minutes of travel time compared to an alternative free route.

The DPWH's feasibility study office (FSO) maintains an up-to-date estimate of vehicle operating costs. Based on survey data, the FSO has established a series of conversion parameters (the distribution of trips by trip purposes; the ratio of VOT to hourly income by trip purpose; the number of passengers per vehicle; the ratio of driver to passenger income) that enable the average private passenger vehicle VOT to be determined from average family income. The resulting VOT is routinely applied by the FSO in its economic analyses of road projects around the country. The latest listings received from the FSO, dated June 1992, are based on an average salary for a car driver of 48.43 Pesos/hour and an average private passenger vehicle value of time of 30.06 Pesos/hour (all monetary values are expressed in constant 1992 Pesos).

However, because the FSO's data represent national averages, it was felt that they probably understate economic conditions in the NCR. A review of 1988 family income statistics, using a car ownership income threshold of 100,000 Pesos/year, led to a revision of the average salary of a car driver to 70.98 Pesos/hour, and of the per-car value of time to 46.37 Pesos/hour.

Calculation of the truck value of time was based on a somewhat different approach. The FSO's calculations give an average truck vehicle operating cost of 6.634 Pesos/km, all components combined. The TRANPLAN assignment results show that, under a fairly wide range of assumptions about network improvements, average network travel speeds are approximately 26-27 km/hour. Thus, truck time can implicitly be valued at around 179.12 Pesos/hour.

All cars are assumed to have identical values of time, as are all trucks. Based on the standard 90%-10% car-truck composition, the weighted average value of time for cars and trucks together is 59.65 Pesos/hour.[7]

TRANPLAN's equilibrium assignment module allows the user to input a parameter known as the TOLL FACTOR or CTOLL, for the purpose of incorporating tolls into the link impedance calculation. Since in the present study impedance is expressed as a "generalized time", VOT and CTOLL must be inversely related; and since TRANPLAN measures time in units of hundredths of minutes, the CTOLL parameter must be entered in units of hundredths of minutes per Peso. Thus, the relationship between VOT and CTOLL is

$$CTOLL = \frac{1}{VOT} \cdot 60 \div 100$$

The economic development of the Philippines will translate into a long-term real growth in per capita income and hence into an increase in the value of time per vehicle-hour. For the purposes of developing values of time for use in future year trip assignments, a real growth in VOT of 2% per year was assumed. This translates into the future year real values of time and CTOLL values shown in Table 4-4.

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[7] Note that values of time for buses and jeepneys are not needed for the assignment model. Since these vehicle types are preloaded, they have no discretion as to path choice.

Table 4–4
VALUES OF TIME AND TOLL FACTORS USED IN THE NETWORK MODEL

YEAR	VALUE OF TIME (Pesos/hr)	TOLL FACTOR (hundredths of minute/Peso)
1992	59.65	0.0101
1999	68.52	0.0088
2010	85.20	0.0070
2020	103.86	0.0058
2030	126.60	0.0047

Source: Consultant's estimates.

4.2.4.3 Reassignment of Preloaded SLE Jeepney and Bus Trips

It is likely that the MST would attract some of the long-distance buses currently operating on the SLE. Jeepney and local buses, which need to be able to exit and reenter the tollway at all interchanges, probably would not divert to the elevated MST since it provides only on- or only off-movements in a given direction at each interchange.

However, since the relative proportions of long- vs. short-distance bus traffic on the SLE is not known, no reassignment of preloaded bus trips was carried out in the build situation. This simplification is likely to have only minor effects on the detailed assignment results, and to have no effect on the overall study conclusions.

4.3 APPLICATION OF THE TRAFFIC MODEL AND SUMMARY OF RESULTS

This section describes the principal analyses that were carried out using the traffic network model, and summarizes some aspects of the results that were obtained.

Well over 100 separate traffic assignment runs were carried out using the model; it is clearly impossible to present all the outputs resulting from each. Appendix A4-3 summarizes the MST

and SLE car and truck volumes by segment, along with toll revenue forecasts discussed below. PCU volumes and V/C ratios along the SLE and MST are also provided in tables below.

The following sections discuss the future no-build situation analysis; the details of the build situation toll revenue calculations; and the various alternative build analyses including different toll rates, toll system configurations and sensitivity analysis runs.

4.3.1 Future No-Build Situation

Table 4-5 presents the key assignment results of the no-build situation runs as they pertain to the southern corridor. The table indicates the bidirectional traffic loads (in passenger car units) and volume/capacity ratios for each segment of the SLE between Alabang and President Quirino Avenue; results are shown for 1999, 2010, 2020 and 2030. Corresponding numbers from the 1992 baseline calibration run are also included for comparison purposes. (Recall that between 1992 and 1999 the committed highway projects are assumed to have been put into service.)

In 1992 all segments of the SLE south of Magallanes were over capacity, with the Nichols-Magallanes segment at a V/C ratio of 1.36. North of Magallanes the SLE functioned satisfactorily. In 1999 all segments south of Magallanes will be significantly over capacity, while the segments north of Magallanes will be approaching capacity. By 2010 all segments south of Magallanes will be at V/C ratios of 2.0 or more and, of the segments north of Magallanes, only Buendia-Vito Cruz will not be over capacity. Later years are worse.

Recall that in this context the word "capacity" does not designate the absolute or practical short-term capacity used in traffic engineering, but rather an estimate of the volume throughput that is possible over a 24-hour period given a certain pattern of roadway utilization by traffic. This throughput estimate is based on a MMUTSTRAP calculation using hourly and directional traffic variation patterns from the mid-80s. As daily volumes approach the daily capacity on a link, these traffic patterns would change (through a lengthening of the peak periods for example), thus leading to an effective increase in the daily roadway "capacity" without any roadway improvement being undertaken. This is the sense in which reported V/C ratios over 1.0 should be interpreted. The changes in traffic patterns that result from adjusting to such high V/C ratios, however, are not without impacts in terms of economic costs and traffic and social disruption.

The above results clearly indicate the need for immediate capacity improvements on the portions of the SLE south of Magallanes, and for medium-term improvements on the portions of the SLE north of Magallanes.

Table 4–5
SLE TRAFFIC CONDITIONS –NO–BUILD SITUATION
BIDIRECTIONAL PCUs/day AND V/C RATIOS

SECTION	BASELINE		1999		2010		2020		2030	
	PCUs	V/C	PCUs	V/C	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang–Sucat	84,819	1.06	119,148	1.49	171,578	2.14	216,017	2.70	249,994	3.12
Sucat–Bicutan	108,138	1.08	145,040	1.45	208,625	2.09	262,308	2.62	303,616	3.04
Bicutan–C–5	122,768	1.23	163,097	1.63	232,184	2.32	290,303	2.90	335,249	3.35
C–5–Nichols	122,768	1.23	146,282	1.46	204,545	2.05	253,491	2.53	391,777	3.92
Nichols–Magallanes	130,150	1.36	159,613	1.66	222,596	2.32	275,793	2.87	317,817	3.31
Magallanes–Pasay Road	68,109	0.61	93,065	0.83	128,255	1.15	158,167	1.41	182,007	1.63
Pasay Road–Buendia	68,365	0.54	92,228	0.73	127,021	1.01	153,461	1.22	179,610	1.43
Buendia–Vito Cruz	71,996	0.51	96,857	0.68	134,349	0.95	162,607	1.15	185,183	1.31
Vito Cruz–P. Quirino Ave.	97,399	0.69	124,794	0.88	162,605	1.15	194,608	1.37	220,731	1.56

Source: Runs of Consultant's traffic network model.

4.3.2 Calculation of Toll Revenues in the Build Situation Analyses

The build situation analyses involved the calculation of toll revenues generated by the operation of the SLE or SLE/MST with the various considered configurations and toll rates. Toll revenues were used in the financial analysis described in Chapter 7 of this report. The calculation of these revenues is explained here. (Referring to the listings in Appendix A4-3 may be of use in following the explanation.)

Recall that the traffic network model represented the effect of the various tolls on the path choices of users, so that the assigned car and truck volumes reflect the dissuasive effect of tolls on toll link volumes. One-way volumes were added up for the two directions of traffic on each toll link; the volumes shown in the tables in Appendix A4-3 are the results of this addition.

For the closed SLE system, the bidirectional car and truck volumes output by the traffic model for each segment were multiplied by the corresponding segment length and by the basic per kilometer toll rate for cars and for trucks. The revenue resulting from each segment was calculated separately, and the resulting segment values were added together to obtain the total closed system toll revenue.

(Alternatively, the total SLE toll revenue could have been obtained by using TRANPLAN's multiple selected link module to develop a table of car and truck volumes travelling from each SLE entry to each exit point. This table could have been multiplied by the corresponding toll amount for each entry-exit point combination, and the resulting point-to-point revenues could then have been added to obtain the total SLE revenue. The approach utilized in the present study gives an identical result and is considerably easier to implement, but of course is only valid when the same per kilometer toll rate is applied over all segments.)

For the open MST system, the toll calculation was based on the notional MST distance discussed in section 4.2.4.1 above. Bidirectional car and truck volumes crossing the toll barrier were known from the traffic network model outputs, which again reflected a certain level of MST barrier toll. These volumes were multiplied by the basic per kilometer SLE toll rate and by the notional MST trip distance to calculate the MST open system toll revenues. It is important to recognize that the use of the notional MST trip length here is a computational device only; the barrier tolls used in this calculation and in the network model were in all cases identical. (The listings in Appendix A4-3 show volumes on all segments of the MST. However, only the Bicutan-EDSA segment volumes were actually used in the revenue calculation.)

The sum of the open and closed system revenues gives the total toll system revenue. The revenues presented in the Appendix A4-3 listings are expressed in millions of Pesos per year. All monetary values (tolls and toll revenues) are in constant 1992 Pesos.

It will be noticed that jeepney and bus volumes are not considered in the revenue calculation described here. This is because the traffic network model considers these vehicle types to be undivertible; jeepney and bus segment volumes are the same regardless of the toll levels applied

on the SLE and the MST. The revenue they produce can be considered a lump sum addition to the revenues produced by cars and trucks. This lump sum revenue was incorporated in the total system revenues used in the financial calculations described in Chapter 7, but is not shown in the Appendix A4-3 tables.

4.3.3 Analysis of Different Toll Rates - Full Length SLE/MST Tollway

The predicted impacts of a particular toll system — the network-wide traffic volumes and congestion, toll revenues and economic benefits — depend on a number of key toll system design and operations parameters including in particular:

- the SLE toll rate per kilometer;
- the level of MST barrier toll, which can be set independently of the SLE rate;
- the configuration of the toll system (SLE only; SLE with MST from Alabang to President Quirino Avenue; SLE with MST from Alabang to Magallanes); and
- the design of the MST (four or six lanes; interchanges at all locations proposed in the prefeasibility study or at some subset of these).

(Of course, there are other key model parameters, such as the vehicular value of time or the rate of travel demand growth, which also critically influence the predicted impacts, but these are not under the control of the toll system concessionaire.)

It is not possible to isolate the effects of one of the design or operations parameters from those of the other parameters since all are interrelated. However, for presentation purposes it is convenient to define a "standard" tollway system and to determine and analyze the effects of varying its characteristics one at a time. To this end, the "standard" tollway is one which provides the MST with three lanes per direction from Alabang to President Quirino Avenue. The barrier toll is based on a notional MST trip distance of 10 kilometers (e.g., a toll rate of 1.00 Peso/km on the SLE corresponds to a 10.00 Peso toll at the barrier). MST interchanges are provided at Alabang, Sucat, Bicutan, Magallanes, Pasay Road, Vito Cruz and President Quirino Avenue. The SLE and its service roads, but not the MST, connect to C-5 in a partial interchange. This will be referred to as the full-length tollway.

4.3.3.1 Revenues

The effects on revenues of different toll rates were identified by doing traffic assignments using car rates that varied from 0.00 to 2.00 Pesos/km in increments of 0.25 Pesos/km (with double rates for trucks). The resulting car and truck volumes on each SLE and MST segment were

used to determine the corresponding revenues as explained in the preceding section. Assignments and toll revenue calculations were carried out for all four analysis years.

Figure 4-4 presents in graphical form the results of this analysis; the listings in Appendix A4-3 provide the actual car and truck segment volumes and revenues that were obtained.

It can be seen that in 1999, the per kilometer car toll rate which maximizes toll system revenue is around 1.25 Pesos/km. At that level, the toll system revenue from cars and trucks would amount to some 350 million Pesos per year (all monetary amounts are in constant 1992 Pesos). The curve relating toll rate and toll revenues is relatively flat near its maximum, meaning that toll rates somewhat different from the strictly maximizing value would tend to have relatively small effects on the total toll revenue.

In later years the maximizing toll rate would increase as a result of increased congestion on alternative routes as well as of the assumed annual growth of 2% in real value of time. In 2010, the revenue-maximizing rate is around 1.50 Pesos/km, whereas in 2020 and 2030 it is shown as 2.00 Pesos/km but may be even more since higher rates were not tested in the assignments.

4.3.3.2 Traffic Diversions

Another way of considering the effects of different toll rates is in terms of the amount of traffic that would be diverted away from the southern (SLE/MST) corridor and towards other, more circuitous routes as a result of the imposition of tolls. This is of interest to determine if, for example, the relief from traffic congestion produced by the tollway in the southern corridor is obtained by forcing traffic to find other paths through the network and therefore by increasing congestion elsewhere.

Toll-produced traffic diversions can be measured by comparing, at different levels of toll, the total daily bidirectional car and truck volume on a cordon line cutting the SLE C-5-Nichols segment and the MST Bicutan-EDSA segment. After first establishing the potential southern corridor volume from the zero-toll cordon-crossing volume, the traffic diverted away from the corridor by higher toll levels can be calculated by subtraction. Figure 4-5 shows the amount of diverted traffic as a percentage of the potential southern corridor volume.[8]

[8] Toll road studies often apply diversion curves as a means of estimating the traffic diversions that would result from proposed tolls. Most of these curves are either purely theoretical or derive from data collected in situations quite different from those of the intended application. The curves in Figure 4-5, on the other hand, are directly derived from an analysis (via the traffic network model) of supply-demand equilibrium in the Metro Manila road network. The occasional kinks in the curve result from the lumpiness of the supply, which in turn is a consequence of the lack of alternative routes in the southern corridor.

Figure 4-4
TOLL REVENUE vs. TOLL RATE - FULL LENGTH SLE/MST TOLLWAY

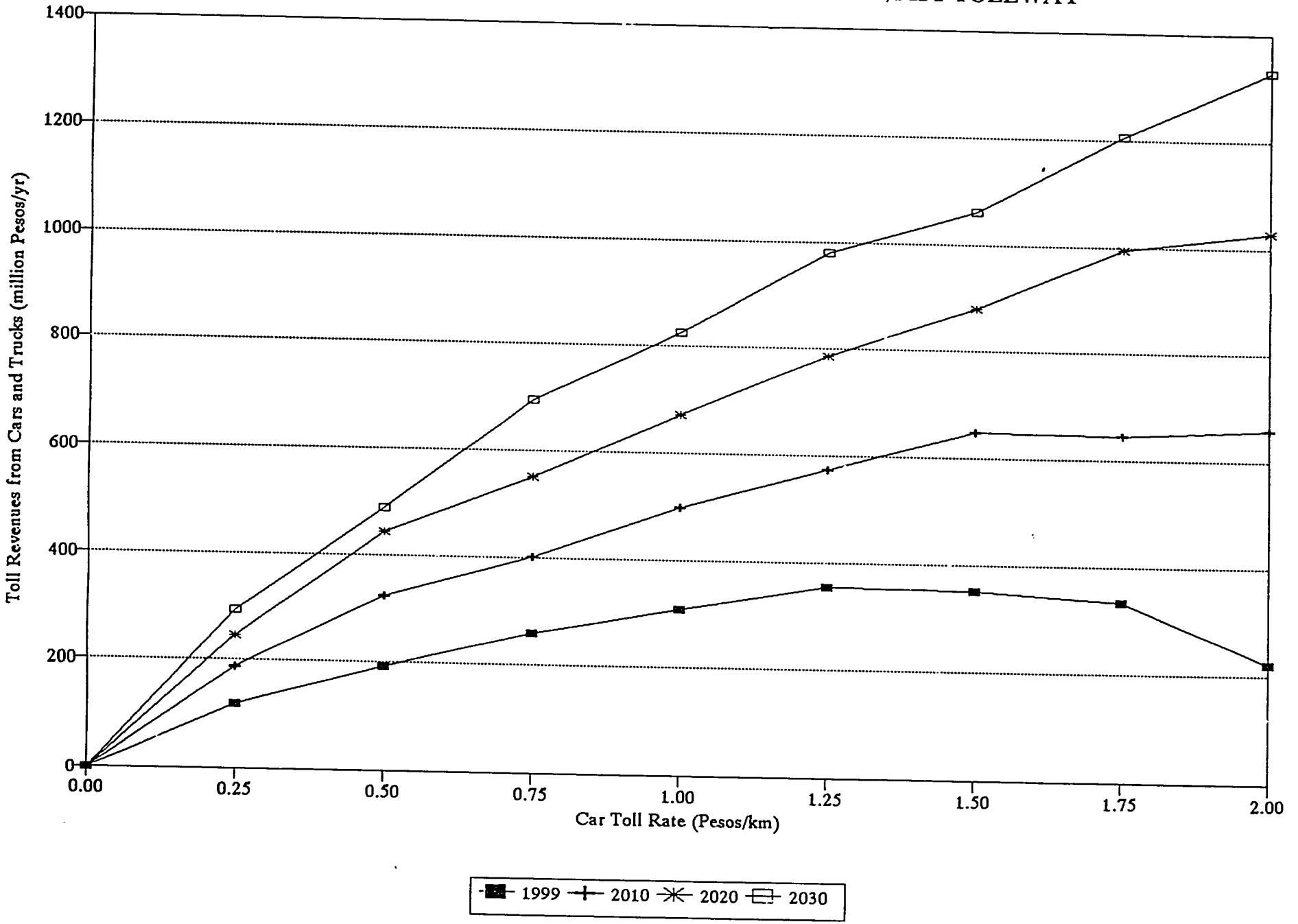
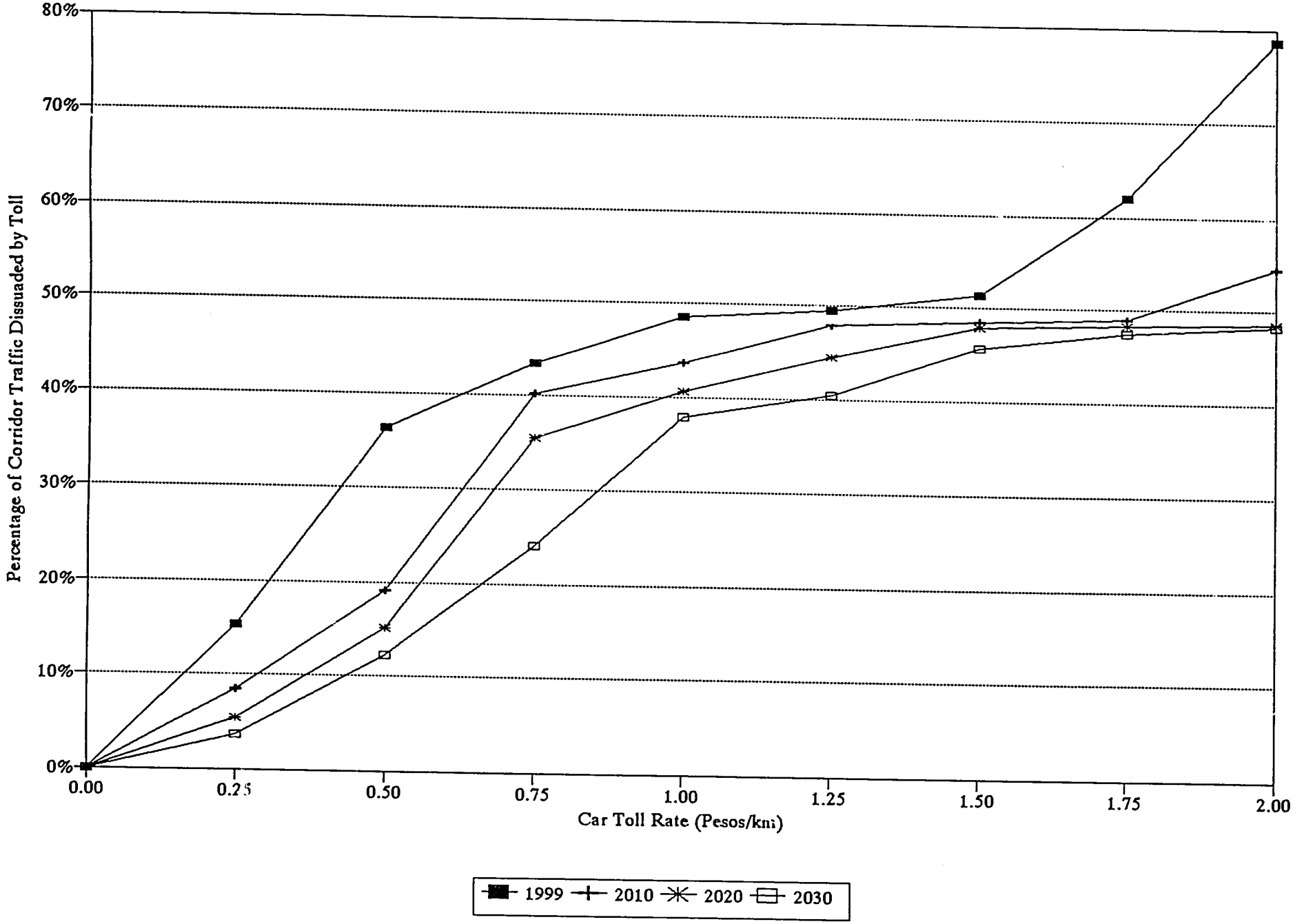


Figure 4-5
TRAFFIC DIVERSION vs. TOLL RATE - FULL LENGTH SLE/MST TOLLWAY



The figure shows that roughly 40% to 50% of the traffic that would use the SLE/MST if it were free would not do so at the revenue-maximizing toll levels being considered. In terms of traffic volumes, the tolls would dissuade roughly 60,000 vehicles/day from using the southern corridor in 1999, a number which would increase to approximately 80,000 in 2010, 105,000 in 2020 and 120,000 in 2030. Most of the dissuaded traffic is by its nature long-distance traffic that would find alternative routes traversing large portions of the metropolitan road network. The dissuaded traffic would prefer the alternative routes because they are toll-free; but the use of these routes would have higher costs to society because they are more congested, and so take more travel time and result in higher vehicle operating costs, not just for traffic diverted from the southern corridor but for all traffic on them.

Given the level of toll-produced traffic diversions, the congestion relief brought to the southern corridor by the tollway only benefits about half of the potential corridor traffic, and the relief is obtained by making traffic conditions worse elsewhere in the network.

4.3.3.3 SLE/MST Traffic Conditions

Since the MST was proposed as a relief to southern corridor traffic congestion, it is interesting to see what its effects would in fact be on the corridor. Table 4-6 presents bidirectional PCUs and V/C ratios on the various SLE/MST segments, in 1999 and in 2010, and at zero-toll and revenue-maximizing toll rates. The pattern of effects is similar in 1999 and 2010.

Operation of the full six-lane MST from Alabang to President Quirino Avenue as a free road would bring considerable traffic relief to the corridor. Table 4-6 shows that most V/C ratios on the SLE would drop by around 50% compared to the no-build situation. Most segments of the MST would be operating at about 50% to 75% capacity, with the exception of Bicutan-EDSA, which would be near capacity.

With the imposition of the revenue-maximizing tolls on the SLE/MST system, traffic volumes on most segments of the SLE actually tend to increase somewhat over the SLE/MST zero-toll situation, although they still remain considerably lower than in the no-build situation. In 1999, the volume increase with respect to the zero-toll situation is 19% on average. MST V/C ratios drop to around 33% or less.

This SLE traffic increase may seem paradoxical in view of the large toll-produced diversions of traffic away from the southern corridor that were discussed in the preceding section. The explanation is that the large diversions out of the corridor come mostly from long-distance traffic that uses the MST in the no-toll situation. Short-distance traffic is less able to divert to different routes in reaction to tolls. However, short-distance traffic that used the MST in the no-toll situation will react to tolls by shifting to the parallel SLE since there it will pay for its exact length of trip whereas on the MST it would have to pay for the equivalent of the notional MST 10 km trip. It is this shifting of short-distance traffic from the MST to the SLE that causes the latter's traffic to increase when tolls are imposed. The heaviest shifts are near the toll barrier

Table 4–6
SLE/MST TRAFFIC CONDITIONS –FULL–LENGTH SLE/MST
BIDIRECTIONAL PCUs/day AND V/C RATIOS

SOUTH LUZON EXPRESSWAY

SECTION	1999				2010			
	Zero Tolls		Max Revenue Tolls		Zero Tolls		Max Revenue Tolls	
	PCUs	V/C	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang–Sucat	66,493	0.83	59,795	0.75	95,370	1.19	88,701	1.11
Sucat–Bicutan	70,232	0.70	59,102	0.59	100,304	1.00	86,986	0.87
Bicutan–C–5	67,397	0.67	82,166	0.82	93,312	0.93	114,609	1.15
C–5–Nichols	52,485	0.52	62,393	0.62	66,502	0.67	84,717	0.85
Nichols–Magallanes	62,390	0.65	104,368	1.09	79,535	0.83	145,188	1.51
Magallanes–Pasay Road	35,627	0.32	57,725	0.52	42,558	0.38	78,035	0.70
Pasay Road–Buendia	42,998	0.34	57,566	0.46	53,174	0.42	77,514	0.62
Buendia–Vito Cruz	63,200	0.45	68,820	0.49	76,738	0.54	95,679	0.68
Vito Cruz–P. Quirino Ave.	108,247	0.76	113,105	0.80	138,626	0.98	145,968	1.03

MANILA SOUTH TOLLWAY

SECTION	1999				2010			
	Zero Tolls		Max Revenue Tolls		Zero Tolls		Max Revenue Tolls	
	PCUs	V/C	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang–Sucat	60,210	0.50	35,696	0.30	87,330	0.73	51,928	0.43
Sucat–Bicutan	84,589	0.70	40,224	0.34	122,711	1.02	58,075	0.48
Bicutan–EDSA	115,252	0.96	40,224	0.34	167,704	1.40	58,075	0.48
EDSA–Pasay Road	100,473	0.84	36,704	0.31	146,103	1.22	53,372	0.44
Pasay Road–Vito Cruz	67,912	0.57	27,856	0.23	98,662	0.82	39,846	0.33
Vito Cruz–P. Quirino Ave.	64,446	0.54	26,994	0.22	93,570	0.78	38,663	0.32

Source: Consultant's traffic network model.

itself: the SLE Nichols-Magallanes and Magallanes-Pasay Road segment volumes nearly double (with respect to the no-toll situation) when tolls are put in place.

The two exceptions to the toll-produced SLE traffic increase occur on the Alabang-Sucat and Sucat-Bicutan segments. Some traffic that would use these segments at zero or low toll rates prefers to use the Alabang-Zapote Road or the (improved) Parañaque-Sucat Road to access Roxas Boulevard or Quirino Avenue as alternative north-south routes at high toll rates.

4.3.3.4 MST Design

The 1999 bidirectional daily volume of cars and trucks on the most heavily loaded section of the MST (between Bicutan and EDSA) is about 40,000 PCUs at the 12.50 Peso revenue-maximizing barrier toll (which is based on the application of the 1.25 Peso/km revenue-maximizing SLE toll rate to a 10 km notional MST distance). Using the MMUTSTRAP directional and peak hour factors which have been re-applied in this study, a six-lane MST would have a total daily capacity of around 120,000 PCUs. Thus, with an opening V/C ratio of about 0.34, a six-lane facility would be considerably under-utilized in 1999. Assuming similar traffic levels, a four-lane MST would have an opening V/C ratio of about 0.50.

By 2030, however, the most heavily travelled section of the MST would be carrying a bidirectional daily volume of cars and trucks amounting to about 87,000 PCUs at the revenue-maximizing barrier toll of 20.00 Pesos. At this volume, a four-lane facility would be over capacity and a six-lane facility would be operating at a V/C ratio of about 0.72. Thus, under the various assumptions which have been stated, a four-lane MST would require widening to six lanes before the end of the 30-year concession period. As will be seen below, however, this conclusion depends closely on the MST toll-setting strategy that is chosen.

The link volumes reported in the tables also give a strong indication that not all intermediate interchanges would be required on the MST. At the 12.50 Peso barrier toll, very little MST traffic would use the Bicutan or the Vito Cruz interchanges. The low usage is in part a consequence of the spatial pattern of travel demand (the trip table), but also results from the fact that short-distance trips will tend to use the SLE and long-distance trips will tend to use the MST.[9] Because their usage is so low, these two interchanges could be eliminated from the MST design, thereby achieving construction and operating cost savings without significantly impacting MST traffic levels or revenues.

4.3.4 Analysis of Different Toll System Configurations

Although the full-length tollway discussed above has been chosen as the standard tollway configuration for the purposes of this study, it is also interesting to examine the effects of alternative configurations, specifically:

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[9] This point will be discussed further in Section 4.3.5.2 below.

- the SLE operated in parallel with the MST constructed only between Alabang and the Magallanes interchange; this will be referred to as the partial-length tollway;

- the SLE operated as a tollway by itself.

4.3.4.1 Partial Length Tollway

Between Magallanes and the President Quirino Avenue terminus, the MST would have to compete with the at-grade SLE, which cannot be tolled because of lack of access control. This is clearly an unfavorable competitive position from the financial point of view. Since elimination of the MST section between Magallanes and President Quirino Avenue would reduce construction costs by approximately 20%, it is worthwhile to see how toll revenues would change if this partial-length configuration were implemented.

To this end, a full series of toll sensitivity traffic assignments was carried out. (In these runs, the MST barrier toll was calculated on the basis of a notional MST travel length of 8.5 km.) Figure 4-6 presents in summary form the results of the toll revenue calculations, while Appendix A4-3 contains the more detailed listings of car and truck volumes and revenues by SLE and MST segment.

The similarity of these results with those obtained for the full-length facility is striking. The revenue-maximizing toll rates for the two configurations are identical in each of the four analysis years considered. At the maximizing toll rates, the total system revenues for the partial configuration are only about 8% less (in all analysis years) than those for the full-length configuration; in 1999, for example, the car and truck revenue produced by the partial-length configuration would be about 325 million Pesos/year vs. 353 million Pesos/year for the full-length configuration.

The explanation of these results is that few MST users would abandon the tollway even if it did not directly serve the areas north of EDSA. Most would still want to use it over the portion between Alabang and Magallanes, and so would pass through the toll barrier and generate revenue for the system.

It would appear, therefore, that the partial length configuration offers the opportunity of cutting construction costs considerably while affecting revenues to a much lesser extent, and thus may be of interest from the financial point of view.

In terms of relieving congestion in the southern corridor, it can be seen from Table 4-7 that the partial-length SLE/MST is a hybrid of the full-length facility and the no-build situation. The segments of the SLE south of Magallanes (which had the highest V/C ratios in the no-build situation) would have their V/C ratios reduced by roughly 50% in 1999 if the partial-length facility were operated with no tolls; on the other hand, the segments north of Magallanes are virtually unaffected by the partial-length facility. Imposition of tolls at the revenue-maximizing

Figure 4-6
TOLL REVENUE vs. TOLL RATE - PARTIAL LENGTH SLE/MST TOLLWAY

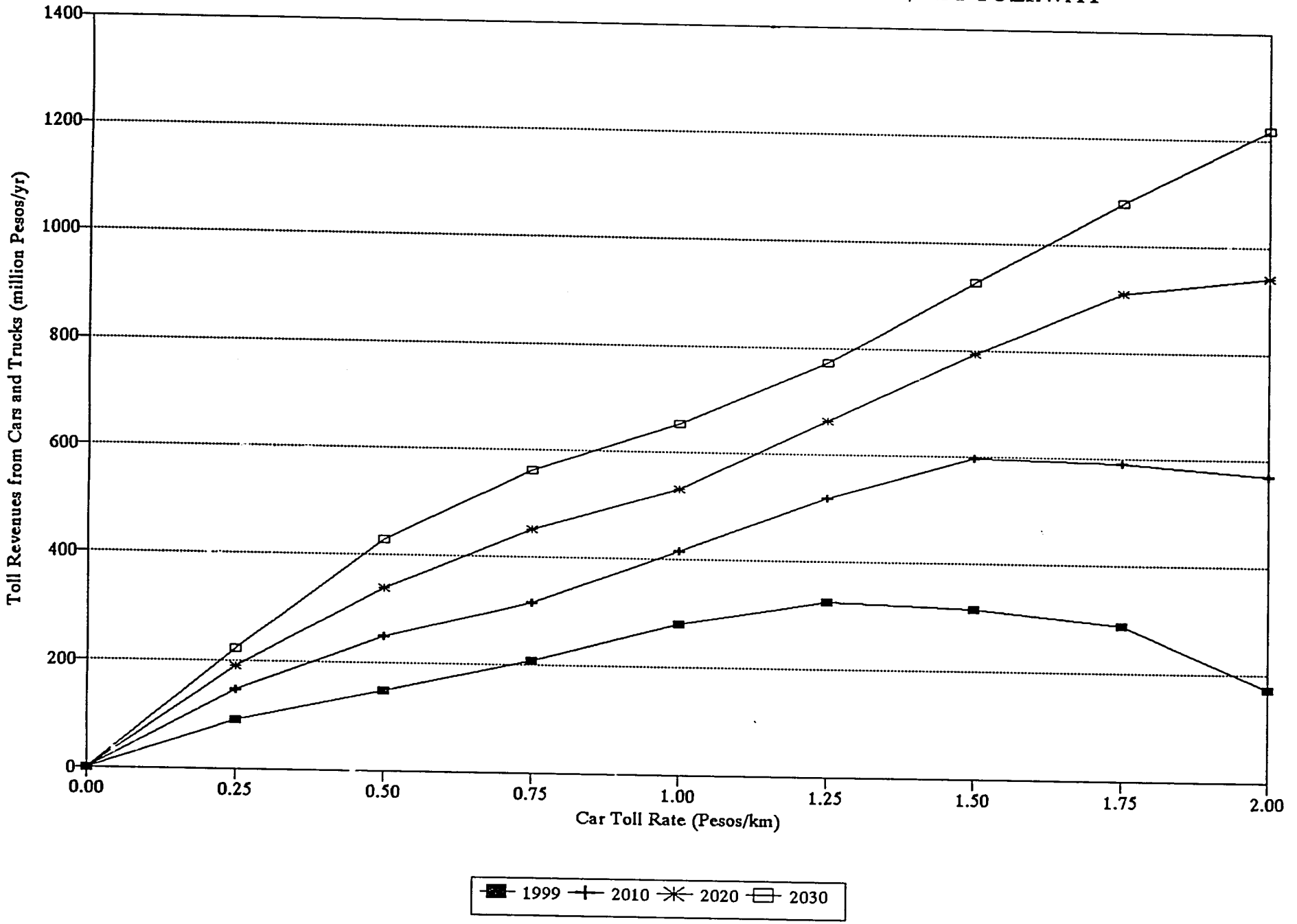

Table 4–7
SLE/MST TRAFFIC CONDITIONS – PARTIAL–LENGTH SLE/MST
BIDIRECTIONAL PCUs/day AND V/C RATIOS

SOUTH LUZON EXPRESSWAY

SECTION	1999				2010			
	Zero Tolls		Max Revenue Tolls		Zero Tolls		Max Revenue Tolls	
	PCUs	V/C	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang–Sucat	67,163	0.84	58,617	0.73	96,304	1.20	85,680	1.07
Sucat–Bicutan	74,945	0.75	57,120	0.57	105,999	1.06	82,762	0.83
Bicutan–C–5	87,117	0.87	80,059	0.80	121,048	1.21	110,359	1.10
C–5–Nichols	71,256	0.71	61,386	0.61	95,493	0.95	83,161	0.83
Nichols–Magallanes	84,540	0.88	103,388	1.08	113,544	1.18	143,360	1.49
Magallanes–Pasay Road	92,770	0.83	84,419	0.75	127,916	1.14	115,858	1.03
Pasay Road–Buendia	91,933	0.73	83,582	0.67	126,682	1.01	114,624	0.91
Buendia–Vito Cruz	96,550	0.68	88,426	0.62	134,010	0.95	122,287	0.86
Vito Cruz–P. Quirino Ave.	124,481	0.88	124,116	0.88	162,265	1.15	161,770	1.14

MANILA SOUTH TOLLWAY

SECTION	1999				2010			
	Zero Tolls		Max Revenue Tolls		Zero Tolls		Max Revenue Tolls	
	PCUs	V/C	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang–Sucat	51,905	0.43	37,152	0.31	75,164	0.63	55,065	0.46
Sucat–Bicutan	70,019	0.58	42,478	0.35	102,517	0.85	62,279	0.52
Bicutan–EDSA	76,000	0.63	42,478	0.35	111,065	0.93	62,279	0.52
EDSA–Pasay Road	0	0.00	0	0.00	0	0.00	0	0.00
Pasay Road–Vito Cruz	0	0.00	0	0.00	0	0.00	0	0.00
Vito Cruz–P. Quirino Ave.	0	0.00	0	0.00	0	0.00	0	0.00

Source: Consultant's traffic network model.

rate causes all SLE segment volumes to drop by a relatively small amount, the one exception being an increase on the Nichols-Magallanes segment for the reasons discussed above. The drop in the SLE sections north of Magallanes can be attributed to the toll-produced diversion of long-distance traffic from the southern corridor to other routes.

Thus, a partial-length SLE/MST, whether operated at zero toll or at the toll-maximizing rate, would provide traffic relief to the SLE between Alabang and Magallanes, but would do very little for the medium-term congestion problems on the SLE sections north of Magallanes.

The other comments that were made above about the full-length configuration remain valid for the partial-length configuration in view of their similar traffic volumes south of Magallanes. In particular, in view of the large traffic diversions, it can be argued that the tollway provides relief to southern corridor traffic problems by worsening congestion elsewhere. At the considered toll rates, the traffic forecasts volumes would not justify a six-lane MST in 1999, although six lanes would be required by 2030. The Bicutan interchange again appears unneeded in view of the very low traffic usage it receives.

4.3.4.2 SLE Only

A concession involving the SLE by itself would be highly lucrative since, as Figure 4-7 shows, the levels of revenue would be comparable to those of the full- and partial-length SLE/MST tollways while the cost to the concessionaire would, of course, be much less. Figure 4-7 results from a full series of runs with the SLE by itself at different toll levels and in different analysis years; more detailed outputs from these runs are included in Appendix A4-3.

Table 4-8 shows that imposition of tolls on the SLE at the revenue-maximizing rate would cause SLE traffic to decrease by an average of 23% in 1999 and 19% in 2010. Of course, the traffic diverted from the SLE is simply using other routes and increasing congestion in other parts of the network.

The main advantage of operating the SLE by itself as a tollway is that its rehabilitation and maintenance could be ensured under the terms of the concession agreement. Otherwise, this arrangement provides no additional capacity and no relief to the traffic congestion in the southern corridor. For this reason it has not been considered further here.

4.3.5 Sensitivity Analyses

Since the traffic assignment results depend closely on a number of key assumptions, it was felt desirable to investigate how some of the study conclusions might change if alternative assumptions were adopted. Study time constraints limited the number of such sensitivity analyses to two:

Figure 4-7
TOLL REVENUE vs. TOLL RATE - SLE TOLLWAY ONLY

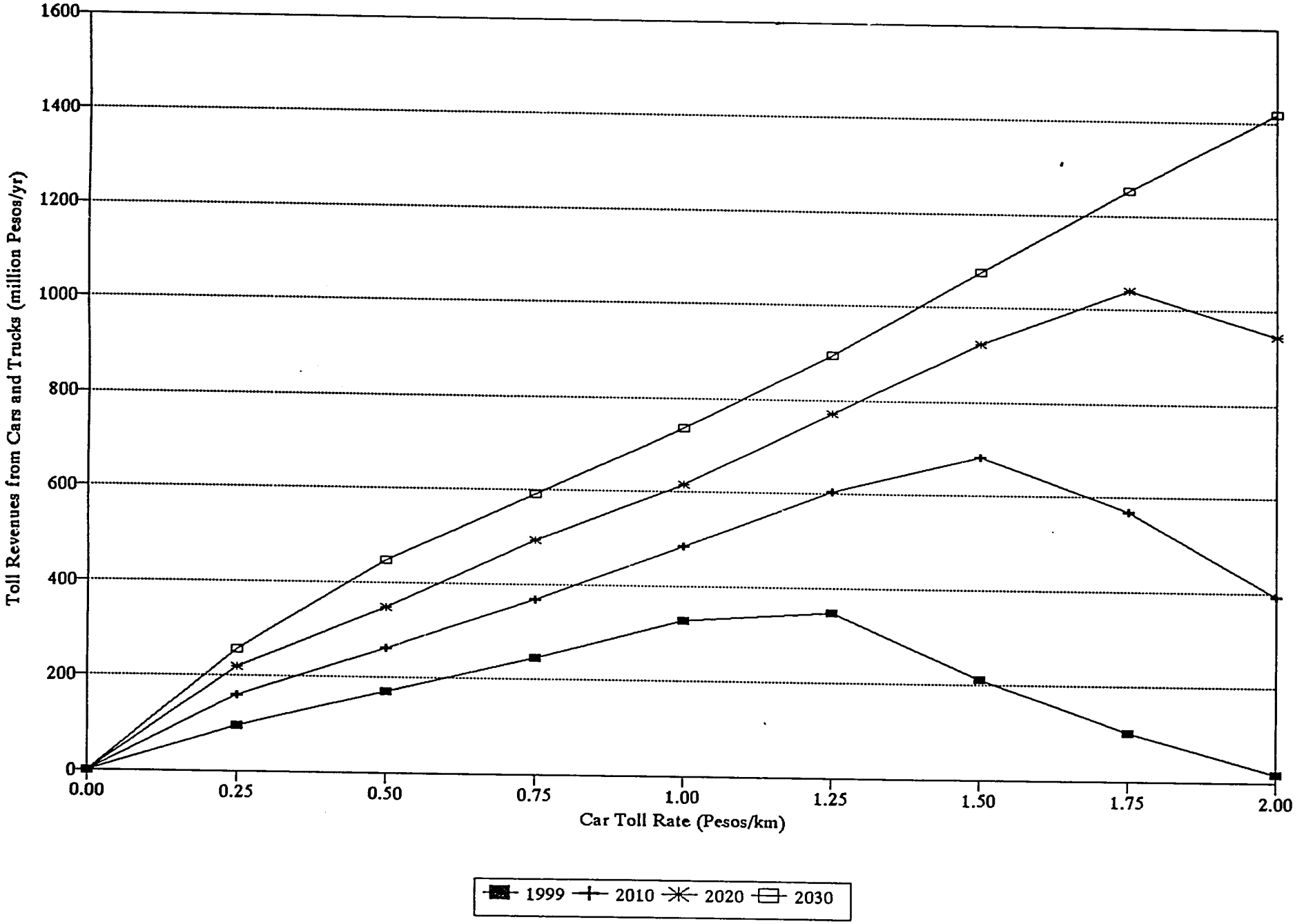

Table 4-8
SLE TRAFFIC CONDITIONS -SLE TOLLWAY ONLY
BIDIRECTIONAL PCUs/day AND V/C RATIOS

SOUTH LUZON EXPRESSWAY

SECTION	1999				2010			
	Zero Tolls		Max Revenue Tolls		Zero Tolls		Max Revenue Tolls	
	PCUs	V/C	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang-Sucat	119148	1.49	90310	1.13	171578	2.14	137653	1.72
Sucat-Bicutan	145040	1.45	91634	0.92	208625	2.09	141903	1.42
Bicutan-C-5	163097	1.63	114572	1.15	232184	2.32	169500	1.70
C-5-Nichols	146282	1.46	93251	0.93	204545	2.05	137024	1.37
Nichols-Magallanes	159613	1.66	135221	1.41	222596	2.32	197224	2.05
Magallanes-Pasay Road	93065	0.83	76823	0.69	128255	1.15	112827	1.01
Pasay Road-Buendia	92228	0.73	76039	0.61	127021	1.01	111664	0.89
Buendia-Vito Cruz	96857	0.68	87336	0.62	134349	0.95	122365	0.86
Vito Cruz-P. Quirino Ave.	124794	0.88	124185	0.88	162605	1.15	161848	1.14

Source: Consultant's traffic network model.

- the influence of the value of time (VOT) assumption on 1999 results;
- the influence of the level of MST barrier toll on 1999 study results; this leads into the question of toll-setting strategies for the MST.

4.3.5.1 Value of Time

As was explained above, the value of time was derived using the methodology applied by the DPWH Feasibility Study Office (FSO) to develop a value for use in rural road project feasibility analyses. Consequently, the FSO value of time is based on values for input parameters; such as average family income, that reflect typical national conditions rather than those of the National Capital Region. An attempt was made to derive a VOT more closely related to the economic conditions prevailing in the NCR through an estimate of the average family income of local automobile owners, but the resulting value intuitively still appears to be low as compared, for example, to typical costs of purchasing and owning an automobile.

For this reason, a series of assignments was carried out using a value of time some 30% higher than the base estimate. (This means that travellers would be willing to pay 30% higher tolls in order to save a unit of time.) Runs were made using the standard full-length SLE/MST configuration with the MST barrier toll based on a notional MST toll distance of 10 km.

Detailed results of the toll revenue analyses, including the car and truck volumes by segment, are provided in Appendix A4-3. Briefly, the higher VOT pushed the revenue-maximizing toll rate to 1.75 Pesos/km and increased the toll revenue corresponding to the maximum rate by 34% to some 468 million Pesos/year in the 1999 opening year.

Under these conditions, the traffic volumes using the MST would be very close to those found for the base assumptions with a 1.25 Peso/km toll rate. The conclusions presented in section 4.3.3 above concerning the tollway's (in)efficiency in solving traffic problems and its suggested cross-section and interchange needs remain unchanged.

On the other hand, of course, if a lower value of time (such as the one calculated by the DPWH Feasibility Study Office) should prove more appropriate, then the revenue-maximizing toll rate and the generated toll revenues would have to be revised correspondingly downward.

4.3.5.2 MST Toll-Setting Strategy

The preceding analyses of a full-length facility have been based on an MST barrier toll based on a notional MST distance of 10 km; for example, if the car toll rate on the SLE were set at 1.00 Peso/km, the MST barrier toll would be equal to 10.00 Pesos. The choice of a 10 km notional distance is essentially arbitrary. It is not equal to the true average distance which vehicles travel on the MST (this can be determined by using TRANPLAN to analyze multiple selected links; for a 10.00 Peso barrier toll, the average travel distance on the MST is close to 16 km); nor is it in any particular relation to the MST's true length. In fact, it is an operational parameter which can be set by the concessionaire in accordance with his own criteria.

To identify the consequences of basing the barrier toll on a longer notional MST distance, a sensitivity run was carried out using a notional distance of 17 km (close to the actual MST total length) for the full-length tollway in 1999. The results of the run are listed in Appendix A4-3.

The revenue-maximizing toll rate is again 1.25 Pesos/km, but the revenue produced at this rate is approximately 14% higher than with the 10 km notional distance. Furthermore, all the traffic using the MST is end-to-end (between Alabang and President Quirino Avenue); there is no traffic to or from intermediate interchanges. Finally, the traffic level on the MST is between one-half and one-third, depending on the segment, of the corresponding MST volume in the standard (10 km notional distance) run. The assigned bidirectional car and truck volume of 15,000 PCUs/day is approximately 12% of the capacity of a six-lane facility and approximately 19% of the capacity of a four-lane facility.

These results can be understood by realizing that, as has been mentioned before, the parallel closed-open SLE/MST tollway tends to draw short-distance traffic to the SLE and long-distance traffic to the MST. To see why this is so, suppose that the MST barrier toll is based on a notional distance of 10 km. Vehicles passing the barrier have to pay an amount corresponding to 10 km, regardless of the true distance they actually travel on the MST. If, in fact, a vehicle travels less than 10 km on the MST, it will pay more than it would have had to on the SLE (where the toll is based on the exact distance travelled). Some vehicles might be willing to pay a bit extra to travel on the MST (because of less congestion, for example), but only up to a point. Conversely, a vehicle travelling more than 10 km on the MST will get a "free ride" for its distance over 10 km since it will pay less than it would have had to on the SLE. It follows that those trips whose travel distance over the tollway is less than the notional MST distance will tend to use the SLE, while those whose distance is greater than the notional MST distance will tend to use the MST, thus resulting in a separation of tollway trip lengths between the two facilities. It should be noted that this effect is separate from that produced by the MST ramp design which, by only accommodating cross-barrier traffic, also tends to favor longer trips.

Since a high barrier toll eliminates short-distance trips from the MST, there is no need to provide the intermediate MST interchanges that would otherwise be required to serve these. Since fewer trips are being served, the required MST capacity is reduced and the need for future capacity expansion is postponed. By setting the barrier toll appropriately, the threshold distance where trips are forced off the MST towards the SLE or alternative routes can be controlled. As was seen above, with a barrier toll based on a 10 km notional distance, the Bicutan and Vito Cruz interchanges are unnecessary; while for a toll based on 17 km, no intermediate interchanges are necessary at all. Although a 2030 run was not made because of study time constraints, it would appear from traffic growth rates that, with a barrier toll based on a 17 km notional distance, a four-lane MST would still be adequate to handle its traffic in 2030.

As was mentioned above, any MST traffic travelling more than the notional distance is getting a "free ride". This represents lost revenue for the concessionaire. Therefore, even without the cost savings which result from reducing interchange and capacity requirements, the concessionaire would want to increase the notional distance in order to minimize revenue losses on the MST. Traffic pushed off the MST by the high barrier toll will use the SLE, where it will generate the amount of revenue appropriate for its true travel distance; or if the SLE is too congested the traffic will be pushed out of the tollway system entirely, and lead to a revenue loss. The results of the sensitivity run show that, in 1999 at least, the additional revenues gained by eliminating the "free ride" on the MST more than offset the loss of revenues from the roughly 4200 vehicles/day pushed completely out of the SLE/MST system. By this logic, then, the maximum toll system revenues would result from setting the MST notional distance close to the true MST length; in effect, all vehicles are then being correctly charged for the actual distance they travel on either the SLE or the MST.[10]

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[10] This conclusion may be somewhat modified at high levels of SLE congestion if leakage becomes significant.

Of course, the effectiveness of a system operated in this way as a solution to southern corridor traffic problems would be even lower than that of the standard tollway configuration discussed above. Table 4-9 shows that, because of the relatively low traffic levels resulting from its service for end-to-end traffic only, the MST would provide near free-flow traffic conditions while the parallel SLE would have congestion levels that would be even higher than in the standard configuration. As a result of the higher congestion on the SLE, even more traffic would be dissuaded altogether from using the southern corridor and would add to congestion elsewhere in the network.

4.4 CONCLUSIONS OF THE TRAFFIC STUDY

The major conclusions of the traffic study can be briefly summarized as follows:

- there is a need to provide additional roadway capacity in the southern corridor; the need is immediate in the southern portions of the corridor between EDSA and Alabang; the need is medium-term in the northern portions of the corridor between EDSA and President Quirino Avenue;

- the construction of the MST as a six-lane facility would provide approximately 120,000 PCU/day of additional capacity and, if operated without tolls, would reduce 1999 V/C ratios on the more congested southern portion of the SLE by up to 50% on some segments.

If the SLE/MST is tolled, with the SLE operated as a closed system and the MST as an open single barrier system, the MST barrier toll amount can be set independently of the SLE toll rate per kilometer. The following conclusions are based on an MST toll amount equivalent to 10 km at the SLE toll rate:

- the revenue-maximizing toll rate would be 1.25 Pesos/km for cars on opening in 1999 (trucks would pay twice the car amount); this rate would increase over time as congestion on alternative routes and users' real value of time both go up;

- operation of the SLE/MST at revenue-maximizing toll rates would cause roughly half of the southern corridor traffic, or about 60,000 vehicles/day in 1999, to seek alternative (more circuitous or more congested) routes through the network;

- under these circumstances, the capacity increase provided by the MST would only benefit about half of the corridor's traffic, and the toll-produced diversions would cause traffic conditions elsewhere in the network to deteriorate;

Table 4–9
SLE/MST TRAFFIC CONDITIONS – FULL–LENGTH SLE/MST
WITH HIGH MST BARRIER TOLL
BIDIRECTIONAL PCUs/day AND V/C RATIOS – 1999 ONLY

SOUTH LUZON EXPRESSWAY

SECTION	ZERO TOLLS		MAX REVENUE TOLL RATES			
			Stand. MST Toll		High MST Toll	
	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang–Sucat	66,493	0.83	59,795	0.75	78,472	0.98
Sucat–Bicutan	70,232	0.70	59,102	0.59	81,871	0.82
Bicutan–C–5	67,397	0.67	82,166	0.82	104,557	1.05
C–5–Nichols	52,485	0.52	62,393	0.62	83,236	0.83
Nichols–Magallanes	62,390	0.65	104,368	1.09	125,238	1.30
Magallanes–Pasay Road	35,627	0.32	57,725	0.52	66,910	0.60
Pasay Road–Buendia	42,998	0.34	57,566	0.46	66,126	0.53
Buendia–Vito Cruz	63,200	0.45	68,820	0.49	77,557	0.55
Vito Cruz–P. Quirino Ave.	108,247	0.76	113,105	0.80	117,793	0.83

MANILA SOUTH TOLLWAY

SECTION	ZERO TOLLS		MAX REVENUE TOLL RATES			
			Stand. MST Toll		High MST Toll	
	PCUs	V/C	PCUs	V/C	PCUs	V/C
Alabang–Sucat	60,210	0.50	35,696	0.30	14,912	0.12
Sucat–Bicutan	84,589	0.70	40,224	0.34	14,912	0.12
Bicutan–EDSA	115,252	0.96	40,224	0.34	14,912	0.12
EDSA–Pasay Road	100,473	0.84	36,704	0.31	14,912	0.12
Pasay Road–Vito Cruz	67,912	0.57	27,856	0.23	14,912	0.12
Vito Cruz–P. Quirino Ave.	64,446	0.54	26,994	0.22	14,912	0.12

Source: Consultant's traffic network model.

- from the point of view of traffic capacity, a four-lane MST would be sufficient to handle projected 1999 opening traffic volumes; however, six lanes would be required before 2030;

- the originally-proposed MST Bicutan and Vito Cruz interchanges could be eliminated without adversely affecting the system's toll revenue or traffic levels;

- a partial-length MST from Alabang to Magallanes would generate about 8% less revenues than a full-length facility.

Another set of conclusions concerns the strategies for setting the MST barrier toll:

- the MST barrier toll can be set independently of the SLE toll rate; it can be set in a way which results in the MST being used by only those trips which travel a certain distance or more on the tollway; trips below this length would tend to choose the SLE;

- consequently, by setting the MST barrier toll appropriately, the need for some or all intermediate interchanges can be eliminated, and the need for future expansion from four to six lanes can be postponed;

- the revenue-maximizing MST barrier toll would be such that the MST served end-to-end trips only, and would require other trips to shift to the SLE or to divert out of the corridor.

It can be seen that there are complex interactions between the MST design, the SLE toll rate and the MST barrier toll level. Because of study time limitations, the present analysis has only been able to identify the major relationships between these aspects of toll system. Furthermore, these issues have major implications on both toll system revenues and the economic costs and benefits produced by the SLE/MST in terms of congestion in the southern corridor and elsewhere on the network. Further work is needed to better understand the issues and to decide on a final system design and operational strategy.

Chapter 5

PROJECT FINANCING AND CAPITAL MARKETS

CHAPTER 5

PROJECT FINANCING AND CAPITAL MARKETS

5.1 INTRODUCTION

The traffic analysis has shown that increasing the road capacity in the Alabang to President Quirino Avenue corridor is required to handle existing and projected traffic. The heavy daily traffic congestion along this section of the South Luzon Expressway causes economic and financial losses for the country in terms of man-hour losses and higher vehicle-operating costs. The construction, therefore, of an elevated expressway from President Quirino Avenue to Alabang will improve the flow of traffic through Metro Manila and to southern Luzon.

It is anticipated that the Manila South Tollway Project will be implemented as a BOT scheme in which the private sector will finance, construct, operate and maintain this project. The BOT concept appeals to the Government of the Philippines because it presently lacks the fiscal means of building most of the infrastructure projects that the country needs.

The main constraint which confronts the national government's ability to finance, build and maintain large infrastructure projects at this time is its ability to finance these projects and to manage their implementation. The BOT schemes present the following advantages:

- The private sector can be a better project manager than government because of its greater flexibility. It has more autonomy in terms of decision making and the fact that it need not contend with bureaucratic delays and time-consuming disbursing/purchasing procedures.

- The BOT scheme is seen as a method of financing infrastructure projects without burdening the government with additional debt.

- Given proper incentives, the private sector is better able to complete projects on time and at lower cost.

Since the BOT scheme for the Manila South Tollway will require considerable financial resources, financing the project will be complex and time consuming. This chapter will address the financial issues associated with putting a large BOT project together. They include the following:

- Assess internal and external funding sources,
- Examine the various project funding issues,
- Evaluate and analyze sources of project risks, and
- Define the ingredients for an acceptable financing package.

5.2 FINANCIAL MARKETS OVERVIEW

To be able to define the kind of financing that can be mobilized for projects of this nature, a brief review of the Philippine financial markets and assessment of the various internal and external sources available for project financing are presented here. A more detailed discussion of the various components of the Philippine financial system is found in Appendix A5-1.

It is necessary to stress here that toll roads, provided the traffic and the toll rates are sufficiently high, can be self-liquidating projects. These facilities have identifiable users who derive "calculable benefits" from whom specific revenues can be derived.

The debts incurred for the construction can be amortized in installments over a period of years, and the payments are obtained from user fees or tolls.

5.2.1 Financial Markets and BOT Projects

The Philippine financial markets are characterized by the dominance of the money market. While the country has a well-developed market for short-term funds usually with maturities of one-year or less, the capital market or the market for long-term funds is small and undeveloped. There is very limited financing available from internal sources to support projects with gestation periods of 7 years and over.

The paper on "Financing of BOT Projects For the Philippines"[1] concludes that:

> "The scope for local financing of BOT projects is limited by the current state of capital markets in the Philippines. In general, it is difficult to arrange term financing of more than five years or less than the usual time profile for a BOT project, which is 10 to 15 years and often longer."

The short term duration of debt investments reflects the country's unstable macroeconomic conditions. Over the last few years, the rate of growth of the economy has been erratic. Years of high growth have been followed by years of low or no growth. In the Philippines, interest rates have been very volatile, with both nominal and real interest rates on an upward trend over the last few years. This is due to the public sector's increasing claim on the economy's financial resources. High interest rates also reflect premiums to offset increased risks, the expectations of inflation and depreciation in the foreign exchange rate. With a more favorable macroeconomic setting, the development of longer term local financing will be greatly facilitated.

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[1] M. McLindon, "Financing BOT Projects for the Philippines," September 14, 1991, Page 1. This paper was prepared for the Coordinating Council for the Philippine Assistance Program (CCPAP).

Those Philippine companies who do not have an established track record of profitable operations find it difficult to raise funds via equity issuance and/or bond flotation. Among the reasons given for the present level of development of the capital market are as follows:

- Low investor confidence in the capital market and preference for short-term investments;

- Absence of a viable secondary market for corporate equity and bonds. The secondary market is considered an essential ingredient that must be in place if capital market instruments are to be saleable;

- The easy access of most companies to the traditional sources of finance, i.e. bank loans, money market funds and sometimes "cheap" foreign credit and limited incentives to open the companies to public scrutiny by going public;

- Raising funds via the capital market involves high cost of financing because of the present tax structure and cumbersome listing and disclosure requirements; and

- The Philippines is still considered to have a lower savings rate (19.8% of GDP) compared to such countries as Korea (33.2%), Singapore (47.2%) Malaysia (31.1%) and Indonesia (32.2%).[2]

In a limited number of cases, some Philippine companies have been able to successfully raise long-term financing from local and foreign sources. This is indicative of the possibility of selling and placing shares for a Philippine company, as a sponsor/developer, to raise equity and/or long-term financing for projects in the near term. The financing of a BOT project depends on the financial and economic environment or setting of the project - that is the financial and economic condition of the country where the project is located and the financial viability of the project itself.

The ability of the Philippines to raise financing for BOT projects and other similar schemes depends on the following factors:

- The attractiveness of projects which are being promoted;

- The state of the Philippine economy and the degree of political stability;

- The level of creativity and the ease of application of the government's BOT program and the process and skill of overcoming the usual bureaucratic impediments; and

[2] 1991 Philippine Statistical Yearbook

- The amount of official development assistance (ODA) funds available to support BOT projects.

On a project specific basis, the factors that affect its viability are its financial conditions and the basic feasibility of the project itself. They include:

- Stability of the revenue from the project and its ability to generate foreign exchange for off-shore investors;
- Reputation of the sponsors, promoters and/or project managers;
- Presence of government guarantees and subsidies; and
- Financial conditions such as the other terms of any possible long-term financing.

Only in the case where both the assessments of the country and of the project's viability are positive will the financing of the project succeed.

5.2.2 Money Market or The Short-Term Funds Market

The money market is a network of institutions and facilities through which the need for short-term funds are met. The established financial institutions in the country including commercial banks, thrift banks, investment houses, finance companies, etc. are active participants in this market. The instruments which are used are generally short-term with maturities of one-year or less.

Borrowers go to the money market to source funds for working capital purposes or for adjusting their liquidity positions. As has been stated, this component of the Philippine financial market is very well-developed with total transaction volume in 1990 reaching ₱ 1,289.49 billion. Over the 1980-1990 period , the total volume of money market transactions has been growing at a high compound annual rate of 15.6%. Table 5-1 shows the 1990 volume of money market transactions by type of instrument.

Table 5-1
1990 MONEY MARKET TRANSACTIONS BY TYPE OF INSTRUMENT
(VOLUME IN MILLION PESOS)

TYPE	VOLUME	% DIST.
Interbank call loans	₱ 730,742	56.7
Deposit substitutes	67,629	5.2
Commercial papers	26,340	2.0
Government securities	464,780	36.0
TOTAL	₱1,289,491	99.90

Source: Central Bank Statistical Bulletin, 1990.

Table 5-2 shows the average interest rates for such instruments from 1980 to 1990. Except for the turbulent years of 1984 and 1985, the weighted average interest rate falls within the range 11% to 18% with an average of 14.6%. The four sub-markets of the money market are the interbank market, the market for deposit substitutes, and the sub-markets for commercial papers and government securities. A detailed discussion of these sub-markets is given in Appendix A5-1.

Table 5-2
AVERAGE INTEREST RATES ON MONEY MARKET TRANSACTIONS
BY TYPE OF INSTRUMENT[3]
(In Percent)

YEAR	COMMERCIAL PAPERS[a]	INTERBANK CALL LOANS	GOVERNMENT SECURITIES[b]	DEPOSIT SUBSTITUTES[c]	WEIGHTED AVERAGE[d]
1980	16.7%	11.9%	11.7%	15.0%	13.2%
1981	17.3	14.9	12.7	16.0	15.7
1982	16.4	12.2	13.2	15.0	14.2
1983	16.0	16.7	11.9	15.2	16.8
1984	20.6	28.1	25.9	30.0	27.2
1985	21.0	20.0	21.0	18.8	20.6
1986	11.8	12.6	15.3	15.2	13.4
1987	11.8	12.2	11.9	11.3	11.1
1988	13.0	14.6	12.0	14.6	13.4
1989	17.0	15.3	15.9	20.0	15.7
1990	21.2	15.8	18.0	18.3	18.0

[a]Financial and non-financial papers issued by corporations
[b]Treasury bills, CBCI's, DBP bonds, others
[c]Pro-notes, repurchase agreements, certificates of assignments/participation
[d]Weighted average of all instruments

Source: CB Statistical Bulletin, 1990

5.2.3 The Capital Market

The capital market is the market for the mobilization of medium to long-term funds through the use of such instruments as corporate equity (common and preferred stocks), bonds, debentures and other certificates of long-term indebtedness. The entire capital market is regarded as thin with an estimated 1992 volume of ₱ 100 billion considered optimistic.[4] This is only about 7% of the size of the money market. Some financial institutions, notably commercial banks give out medium to long-term loans with funds sourced from their regular deposits.

[3]The interest rates for government securities and deposit substitutes are arithmetic averages.

[4]See paper written by Dr. Aurora Sanchez, "Survey of the Regulatory and Institutional Framework-Financial" June 20, 1992 for the Local Development Assistance Program.

Deals in long-term credit are structured either as securities or non-securities. The entire market lacks depth (in volume terms) as compared to the size of the money market. The funds that are sourced from this market are used for acquiring and/or building fixed assets.

The securities segment of this market provides medium and long-term financing through negotiable equity and debt instruments issued by companies needing these types of financial resources. Usually they source their funding requirements through financial intermediaries, i.e. investment/merchant banks, universal banks and securities brokers/dealers. The financial institutions tap a broad range of investors (individuals, corporate, institutional) to supply the funds. Investors take possession of securities which can be bought and sold (traded) through the secondary markets such as the stock exchanges or over-the-counter.

Based on the volume of securities that have been underwritten by investment houses and security brokers and dealers in recent years, the Philippine capital market cannot be considered as a reliable source of funds for project financing. The debt capital (bonds) securities market is small and dominated by government securities. Private bond issues are few.

The non-securities segment of the capital markets provide debt funds in the form of non-negotiable medium and long-term instruments. These funds are provided by financial institutions such as by commercial banks, savings banks and development finance institutions to the private and public sectors. Commercial banks are a major source of this kind of financing.

Aside from the reasons given in section 5.2.1 as responsible for the present level of development of the Philippine capital market, the following reasons can be added:

- There is a general lack of sophistication of the Filipino investing public to appreciate investments in capital market instruments.
- Most Philippine corporations are either close-family or foreign-owned and controlled corporations which have no desire or incentive to open-up their operations to outsiders, risk equity dilution or the danger of losing control of their company.
- There is a lack of clear cut policy directions (including incentives) for the development of the capital market.

5.2.4 Sources of Long-Term Financing

It is estimated that potential financing that could be raised from both local and external sources for BOT financing in the country could reach only about US$ 2.295 billion (₱ 58.52 billion at ₱ 25.50 per US Dollar) per year. Local sources (local debt and equity) has the potential to contribute only $ 385 million or 16.8% of this amount, the bulk would have to come from external sources notably the IFC, ADB, foreign commercial banks and official development assistance (ODA). (See Table 5-3).

Table 5-3
POTENTIAL SOURCES OF BOT FINANCING

SOURCE	TERMS	INTERESTS	POSSIBLE ANNUAL AMOUNTS AVAILABLE (US$ Million)
LOCAL DEBT			
Commercial Banks	3-5 years	Floating Rate	$ 100
Trust Funds	3-5 years	Floating/Fixed	25
Insurance Companies	3-5 years	Floating/Fixed	25
IRP	Up to 10	Fixed	20
Commercial Paper	3-5 years	Floating	10
Special Instruments	Unknown	Floating/Fixed	5
Sub-Total			$ 185
LOCAL EQUITY			
Share sale	Infinite	none	$ 100
Private Placement	Infinite	none	100
Sub-Total			$ 200
FOREIGN DEBT			
IFC	10 years+	LIBOR+	$ 500
ADB	10 years+	LIBOR+	500
Commercial Banks (ADB Linked)	7 years	LIBOR+	300
ODA (Other than IFC & ADB)	10 years+	LIBOR-	300
Sub-Total			$ 1,600
FOREIGN EQUITY			
IFC/ADB	Infinite	none	$ 10
Direct Foreign Investment	Infinite	none	200
Portfolio Investment			100
Sub-Total			$ 310
GRAND TOTAL			$ 2,295

NOTES: IFC = International Finance Corporation
ADB = Asian Development Bank
ODA = Official Development Assistance
IRP = Industrial Restructuring Project

Source: "Financing BOT Projects in the Philippines", Dr. Michael P. McLindon, Sept. 14, 1991, page 3.

5.2.5 Local Sources of Long-Term Financing

5.2.5.1 Commercial Banks

The commercial banking system is the largest sector of the Philippine financial system in terms of resources and is a very important source of term financing. Considering the short-term orientation of commercial bank funding sources, their loans are also mostly short-term with terms averaging 3 to 5 years. Grace periods of 1 to 2 years are possible. For loans that exceed 5 years, escalating amortization periods and balloon payments in years 5 to 7 are arranged.

Even with the advent of universal banking in 1981 which greatly expanded the functions of commercial banks, their merchant banking operations, underwriting, and public offering activities have not really increased.

5.2.5.2 Insurance and Trust Funds

Insurance premiums and trust funds are by their nature considered long-term savings. A look at the investment portfolios of insurance companies and retirement funds, however, reveals that the substantial majority of their funds are either in the money market or in blue-chip investments in the stock market. Floating and fixed rate financing for 3 to 5 years (sometimes longer) is possible from these funds. However, the insurance companies generally require commercial bank guarantees, a mortgage, or a government guarantee.

5.2.5.3 Issuance of Long-Term Commercial Papers

A few large and established industrial and/or commercial and utility companies have successfully floated long-term commercial paper of 3 to 5 years. These companies are considered blue chips and have been established for a number of years. The rates are floating and are set at 1 to 1.5 percent over T-bill rates.

5.2.5.4 Private Sector Infrastructure Development Fund (PSIDF)

In order to support the BOT program, the Philippine Government decided to provide the private sector with access to new sources of financing. The government will be making available funds under the PSIDF through the Development Bank of the Philippines (DBP). Financing for the PSIDF is at present being negotiated by the Philippine Government with multilateral lenders such as the World Bank (WB) and the Asian Development Bank (ADB) which had expressed interest in the program. The World Bank has indicated its willingness to provide US$ 300 million as its initial funding for the PSIDF.

Scheduled to begin operations in 1993, the terms and conditions of the PSIDF are expected to be similar to the other programs of the DBP which are financed by the World Bank i.e. a repayment period of 3 to 13 years with a grace period of 3 to 5 years, interest rates between 17% to 23%, and debt to equity ratio of 4:1.

5.2.5.5 Industrial Restructuring Project (IRP)

The Industrial Restructuring Project funded by the World Bank is available with the Development Bank of the Philippines and other participating financial institutions. Conceived as a lending facility for relending to investment enterprises at fixed rates of up to 10 years, it is designed to finance long term requirements for modernization and expansion of existing as well as of new facilities, permanent working capital, equity and quasi-equity investments (common and preferred, convertible debentures and subordinated debt) and lease contracts. It is available both in local and foreign currency. The interest rates under this facility are as follows:

TERMS	RATES
Variable rate (regardless of term)	13.7%
Fixed rate of up to 5 years	14.7%
Over 5 year	15.2%
Over 8 years	15.7%

Inquiries with the DBP revealed that this facility finances only equipment acquisition, working capital, buildings and not infrastructure projects like tollroads. The funds under this facility have been fully availed and the DBP is in the process of arranging for a second tranche with the World Bank.

5.2.6 External Funding Sources

Given the limited amount of funds that could be raised from local sources for financing of BOT projects, the private sector promoter of a BOT scheme has to turn to external sources for most of its needs. Its ability to tap foreign funds would, however, depend on several factors including the country's credit rating, its present capability to service existing debts and the bankability of the projects for which the funds are being raised.

The exuberant days of project financing of the 1980's are over. The financial difficulties and recession in Europe, North America and Japan make packaging a BOT scheme for highway projects difficult. Even commercial banks have slowed down on their overseas lending activities.

5.2.6.1 Foreign Commercial Debt

This is considered a very important possible source of BOT financing with potential estimated at about $ 300 million. Within the next few years, however, the scope for private foreign debt financing for BOT projects could be severely influenced by the country's existing commercial debt problems. Discussions with local bank executives including representative offices of foreign banks revealed the continued reluctance of foreign commercial banks to make new project loans to the Philippines.

In the Hopewell Gas Turbine Project, commercial co-financing for a currency specific loan of $10.0 million in US Dollars was arranged. The participating banks were Osterreichische Landerbank AG ($4.0 million), IndoSuez Asia Limited ($2.0 million), Credit Lyonnauis ($2.0 million) and Girozentrale Bank ($2.0 million). The term of the loan is seven years including a one-year grace period. The interest is 1 3/4% above three-months LIBOR for US Dollars. The loan also carries a commitment fee of 1/2% per annum on undrawn commitments until the end of the availability period accruing from the date of loan signing, and a front-end fee of 3/4%.

5.2.6.2 Direct Foreign and Portfolio Investment

The Hopewell Energy Corporation's 200 megawatt gas turbine plant in Navotas, Metro Manila has been interpreted as a demonstration that foreign equity in the form of direct investment can be attracted, depending on the particular project. Appendix A5-2 describes the financing of two major recent BOT projects in the Philippines and Thailand. The success of the First Philippine Fund and other funds set up in Hong Kong and Europe, and the recent successful sale of Ayala Land shares have likewise been used to gauge interest among foreign portfolio investors for share ownership in Philippine companies.

5.2.6.3 IFC and ADB

The International Finance Corporation (IFC) and the Asian Development Bank (ADB) are potentially important sources of funds for financing of BOT projects especially as sources for equity participation. This has been clearly demonstrated by the Hopewell energy project. There is current strong interest within the IFC to work with successful BOT bidders to finance their projects.

In the Hopewell Navotas gas turbine project, the ADB contributed equity and provided a currency specific loan. The bank made an equity investment of ₱ 23.76 million ($1.1 million equivalent), by subscribing at par to 237,600 common shares of Hopewell Philippines.

In addition, the ADB provided a loan of $10 million in US Dollars from its ordinary capital resources. The term of the loan is 10 years inclusive of a grace period of one year. The interest rate is fixed at 10.75% per annum for 10 years. A commitment fee of 1% per annum on 50% of the loan amount less any disbursements during the first year, and 1% per annum on the loan amount less any disbursements thereafter will be charged. A front-end fee of ½% flat was also charged to cover the bank's processing expenses.

5.2.6.4 Official Development Assistance (ODA)

There is current interest within the Central Bank of the Philippines to direct ODA funds for infrastructure projects into BOT types of funding mechanisms, especially for World Bank and ADB official development assistance.

One proposal being worked out is the establishment of a BOT fund from ODA. From discussions with World Bank and the ADB, there is reported to be strong interest in the concept. An issue to be resolved with respect to this proposal is whether the concessionality embodied in ODA could be passed on to what would be a private sector led project.

5.2.6.5 The Debt To Equity Conversion Program

A possible mechanism for bringing in equity investments, for BOT projects in general and the MST in particular, is an expanded application of the existing program for the conversion of Philippine external debt into equity investments. As embodied under Central Bank Circular No. 1267 (Series of 1990), the program has the following objectives:

- To stimulate long-term equity investments in Philippine enterprises by both foreign investors and Filipinos.
- To encourage the repatriation to the Philippines of foreign currency holdings of Philippine residents held abroad for the purpose of capitalizing equity investments in this country.
- To provide additional incentives for investment in designated sectors of the Philippine economy that require prompt revitalization.
- To reduce the external debt burden of the Philippines.

It has come to the attention of the Philippine Government that Philippine external obligations, owed to commercial banks or financial institutions, are being traded in the secondary market at substantial discounts. If an investor purchases an interest in such an obligation and the obligor is able to redeem the debt for pesos, this permits the investor to obtain pesos. The Philippine government decided to adopt the opportunities presented by these schemes through a program that would involve the auction of $ 900 million of eligible Central Bank debts over a three year period. The auctioned debts are redeemed by the Central Bank in pesos, the proceeds of which can be invested in preferred areas of investments such as export-oriented producing or processing activities, agriculture or energy-related projects.

Under the auction mechanics, prospective investors with prequalified applications are required to submit sealed bids stating the redemption price as a percentage of the face value of the Central Bank Convertible Debt that they are willing to accept from the Central Bank. The right to use the Central Bank Convertible Debt is awarded to the lowest bidder, then to the next lowest bidder and so on until the auction amount has been covered.

This program can be modified and/or expanded to cover essential infrastructure projects such as tollroads. From the point of view of a foreign equity investor, a tollroad project such as the MST can become more financially attractive if the investments are allowed to come in under this arrangement.

5.2.7 Limits To BOT Financing

There are limits to the size and number of BOT schemes that can be financed in any given year based upon locally available financing for equity and debt. In Table 5-3 (Potential Sources of BOT Financing), the major limiting factors to the size of BOT projects in the Philippines were shown. Local long-term debt financing is estimated at only US$ 185 million. This value rather than equity sets the maximum size of a BOT project that can be financed. Local commercial banks and the other local sources i.e., trust funds, insurance companies, and the long-term commercial paper market cannot provide sufficient funds to finance larger BOT projects.

Given the limited amounts of local debt and local equity that can be raised from local resources (estimated at US$ 185 million, and US$ 200 million respectively), the maximum fundable BOT projects calculated at the 3:1 and 4:1 debt-to-equity ratios are shown in Table 5-4. As can be gleaned from Table 5-4, the maximum fundable BOT projects varies with respect to the extent of local equity and local debt contributions.

Table 5-4
MAXIMUM SIZE OF BOT PROJECTS
WITH ALTERNATIVE FINANCIAL ARRANGEMENTS
(In Million US$)

LOCAL FINANCING CONTRIBUTION	DEBT-TO-EQUITY RATIO	
FOR EQUITY	3:1	4:1
60%	$ 1,333	$ 1,665
40%	2,000	2,500
FOR DEBT		
60%	411	385
50%	493	462
40%	$ 616	$ 578

Source: The Consultant's Estimates based on Table 5-3.

5.3 PROJECT FUNDING ISSUES

5.3.1 Project Background

Perhaps the most important factor that will determine whether financing could be raised for a BOT project is the project itself. Given the critical role of the financial package to the success of a toll road project, it is essential to highlight the components of the tollroad study that would attract investor interests.

Potential investors as well as creditors are likely to pay particular attention to such factors as the accuracy of the traffic forecast to ensure that a demand and revenue stream exists for the project, the engineering cost estimates and the financial feasibility. Other considerations include organizational and management issues, the legal and regulatory environments and other conditions that are essential to insure project success.

5.3.2 Traffic Demand Accuracy

An investor's evaluation of the creditworthiness of a toll facility begins with the demand analysis. The existence of a strong market demand for the Manila South Tollway project is essential to the estimation of future revenues.

The traffic study has to highlight the historical as well as the future growth of traffic on the project corridor including the impact of population growth, urban sprawl, traffic mix (by type of vehicle and nature of trips, competing facilities), and the economic growth, trends and plans for the geographic zones within the influence area of the project. A growing population and economy is likely to require more road trips and will thus add to toll revenue.

It should be noted that the MST is designed as a reliever facility to the SLE which is the main road artery to the provinces and cities south of Metro Manila. From a spatial standpoint, the municipalities of Parañaque, Alabang, Mandaluyong and several Laguna towns are within the immediate service coverage of the MST. As Metro Manila grows, they are becoming the sites of new housing and industrial projects by accommodating the burgeoning demand for residential and industrial space. Within the next few years and with the Calabarzon project, it is expected that the provinces of Laguna, Cavite and Batangas will become increasingly industrialized. All these developments translate into the rapid growth of vehicular traffic using this facility.

Prospective BOT investors and creditors are expected to review and evaluate the assumptions and methodologies made by the government or its consultants to arrive at their own estimation of potential future revenue. While creditors are not expected to agree with the government or its consultant, their evaluation of the project usually plays an important role in arriving at investment decisions.

It is likewise essential to highlight the nature and the composition of the traffic forecast and its vulnerability to such elements as:

- business fluctuations;
- competition from other modes of transportation (i.e. rail) and other roads; and
- fuel price adjustments (or shortages).

Most successful toll roads have a good balance between commercial and private vehicle traffic. Commercial traffic is generally considered less sensitive to toll fee increases because they can readily pass on the additional cost to customers. Likewise, during periods of fuel price adjustments, commercial traffic is better able to absorb the incremental costs. Thus, the effect on traffic curtailment is less severe. The level of commercial traffic is also sensitive to the general condition of the economy.

It is useful also to have a breakdown between business (non-discretionary) and recreational (discretionary) trips. Business-related trips, while sensitive to levels of economic activity, tend to be less so than recreational travel. A toll facility serving an area with an economy heavily reliant on tourism could be severely affected by an economic recession. As a general rule, a diverse traffic mix will cushion the impact of a decline in any one segment.

5.3.3 Engineering and Financial Feasibility

In considering possible financial investment, investors will certainly assess the project's technical and financial feasibility specially as determined by an independent consulting firm.

The important technical issues that have to be resolved with respect to the MST are those concerning feasible alignments, right-of-way requirements and the implications of these two factors on cost estimates. Even with the use of the right-of-way of the PNR and SLE, the requirements for additional land remain large due to the large number of interchanges. The acquisition of land for the project will have impacts on costs, the schedule of the project and on the structure of the concession agreement. Any delay in acquiring the right-of-way will affect the project schedule and could increase project costs. However, the ROW risks are relatively low since they affect only the on and off ramps.

With respect to financial feasibility, the most crucial concern of investors is whether the project will generate sufficient revenue to pay for project cost, repay financial obligations and earn a reasonable return on invested capital. It is expected that the financial viability of the project will improve significantly if the MST and the SLE are combined as a single system and tolls are charged on both. It is also essential that in the analysis of project viability, the impact on project cost and construction schedule of such factors as price increases, construction delays, etc. are taken into account.

The toll road operator's ability and willingness to raise toll rates, when needed, is likewise an essential factor to consider. A toll facility with lower ratios of debt coverage in the early years of operation, but with considerable flexibility for increasing tolls, could be perceived as having a low financial risk compared to a system with higher debt coverage ratios in early years but limited capability for raising tolls.

5.3.4 Organizational and Management Issues

In addition to assessing management's overall ability to coordinate the diverse range of activities encompassed in the financing, construction and operation of a toll road facility, investors evaluate management in terms of the quality of planning involved in the budget-making processes for its initial construction, and for its operations, maintenance and capital improvements.

The degree of autonomy enjoyed by the operator of a toll facility obviously has an important bearing on the operator's ability to manage. The operator's ability and willingness to increase tolls as needed will be of particular importance. It is considered a strength if rate-making decisions are shielded from normal political processes.

Toll road operators, with their own engineering staffs capable of conducting frequent inspections, are perceived to be in a better position to plan and budget for repairs and to perform preventive maintenance than toll operators who rely entirely on outside engineering firms for less frequent inspections. The traffic using the facility--provides a good indication of the relative need for resurfacing and repair. Clearly, a facility that allows access to the heaviest of motor vehicles will take a greater pounding and require a larger maintenance budget than a system with a comparable level of traffic limited to lighter-weight vehicles. Those systems that are unable to budget satisfactory funds for maintenance from operating revenues, therefore deferring repair programs, clearly will be perceived as in a weaker position and may not be able to acquire financing.

5.3.5 Legal Issues

Chapter 2 provides a detailed discussion of the BOT Law and all the legal and approval requirements necessary for BOT operation. A review of the existing franchise of the Philippine National Construction Corporation (PNCC) and all the outstanding legal issues affecting this franchise is also to be made.

A very important legal issue facing the project is whether or not it will be possible to charge a toll on the reverted portion of the SLE. The evaluation of this issue indicates that it is possible to collect tolls on the SLE. Even so, the project could be adversely affected since it is still possible, though not probable, that the collection of tolls might not be allowed. This would adversely affect the commercial viability of the project as a strictly BOT project.

5.3.6 Other Preconditions

If project financing for toll road projects in general is to succeed in the Philippines, the Government must insure the following:

- that adequate funds to complete each road will be available when the project is initiated;
- construction and financing costs can be distributed and repaid over the useful life of the project; and
- user fees (tolls) and other dedicated revenues (including government subsidies) are capable of supporting the project.

The other funding issues that have to be resolved relate to the following:

- The composition of the enterprise which will construct and operate the tollroad. The BOT company can be organized as a consortium of local companies with or

without foreign equity participation. From the perspective of being able to attract more qualified investors, it is preferable to allow foreign equity investors without limit on the nationality of ownership. This requirement, however, might not be sufficient to attract large foreign investors.

- There must be a proper definition of the relative role of debt and equity. To the extent that attempts are made to secure private sector investors for the project, private sector debt placement is less expensive than private equity. Equity investment, on the other hand, will be more attractive to investors seeking higher returns as compensation for higher level of risk taken.

- The appropriate balance between investments and funding from within (the Philippines) and investment and funding from external sources. The BOT company that will be given the concession should define the appropriate mix of the project funding depending on such factors as funding availability, costs, terms and assessment of the country's economic and foreign exchange risks. The amount of co-financing from one or more of the international financial institutions (e.g. World Bank, IFC, ADB) that could be tapped to supplement local and foreign funding will also be very relevant to this issue.

5.4 COUNTRY AND PROJECT RISK ASSESSMENT

Tollroad projects which are covered by concession agreements that span many years are exposed to a variety of risks which may be internally or externally generated. As protection against such risks, investors, lenders, borrowers and operators normally require government guarantees. Likewise, there are risks to the government that may occur at various stages of the proposed project i.e. design, construction, maintenance, operation and management of the system to be operated.

Some of the risk elements that may be relevant to the MST project are discussed below.

5.4.1 External Debt

The present condition and extent of Philippine external indebtedness is indicative of the possibility of generating additional financing from various international capital markets for the tollways project. Given the present difficulties being faced by the country in servicing its external debts, and against the backdrop of continuing fiscal deficits and recent calamities, the Philippine sovereign debt can be classified as less than investment grade. The estimated debt service ratio (debt service as % of GDP) is placed at 24.6% down from 27.8% in 1991. This is a positive development.

It is reported that most of the forthcoming borrowings from official creditors (ODA) would go to finance the debt-reduction package reached with commercial banks. Some sectors have expressed concern over the so called "crowding out effect" as a result of the debt reduction package. The crowding out effect means that inflow of loans for productive undertakings would diminish as the country borrows money to finance the debt reduction program. The country is estimated to need an estimated $ one (1) billion in concessional loans to finance the debt reduction component of the program.

5.4.2 Inflation

Infrastructure projects, such as toll roads, are very vulnerable to sharp upward movement in prices which may bring cost overruns (specially during construction) or stiff increases in project operating and maintenance costs. The investors, lenders, borrowers and operators may insist on some kind of protection against the risk of inflationary changes, and usually, arrangements have to be included in the related agreements. Over the last three years, (1989 - 1991), the Philippines has had an average inflation rate of 13.9%. This is only slightly lower than the 10 year average of 15.0%. During the period 1980 to 1991, the only years in which the country experienced single-digit inflation were from 1986 to 1988. As shown in Table 5-5, the other years were years of double digit inflation. Inflation is slightly higher in Metro Manila than for the nation as a whole.

Table 5-5
CONSUMER PRICE INDEX (CPI) FOR THE PHILIPPINES AND METRO MANILA

YEAR	PHILIPPINES		METRO MANILA	
	CPI	INFLATION RATE	CPI	INFLATION RATE
1980	138.9	18.2	141.5	18.6
1981	157.1	13.1	158.7	12.2
1982	173.2	10.2	176.2	11.0
1983	190.5	10.0	195.3	10.8
1984	286.4	50.3	291.5	49.3
1985	352.6	23.1	351.9	20.7
1986	355.3	0.8	370.5	5.3
1987	368.7	3.8	395.5	6.8
1988	401.0	8.8	935.3	10.1
1989	443.5	10.6	477.2	9.6
1990	499.7	12.7	548.4	14.9
1991 (July)	592.5	18.4	651.7	17.1
Average	(1980-1990)	15.0		15.5

Source: Central Bank of the Philippines.

5.4.3 Foreign Exchange Risk

For projects of such magnitude as the MST, the financial requirements are so substantial that it is inevitable that long-term foreign funding will be tapped. Depending on the actual extent of the foreign funding component, the project is very vulnerable to exchange rate fluctuations. A devaluation penalizes a BOT concessionaire by making the debt servicing of the firm's foreign obligations more burdensome in peso terms. The other component of this risk is whether foreign exchange is available when needed for the BOT company to make a transfer, i.e. to settle an obligation or to remit profits.

During the decade of the 1980's, the Philippines did not exactly have an enviable record in exchange rate stability. The country experienced sharp exchange rate deterioration especially in the aftermath of the economic and foreign exchange crisis after 1983. From January 1989 to December 1990, the peso - dollar rate deteriorated to the extent of 31.15% (from ₱ 21.35 to ₱ 28.00). Between 1980 to July 1992, the exchange rate deteriorated to the extent of 229% (from ₱ 7.60 to US$ 1 to an average of ₱ 25.00).

In view of the risk of constantly fluctuating exchange rates, complex protective arrangements have to be built into the transaction in order to protect the various foreign creditors and investors against losses caused by exchange fluctuations. Included in this category are the risks associated with exchange convertability, particularly if government policy changes regarding restrictions on convertability and/or transfer into hard currency.

5.4.4 Political Risks

The willingness of foreign investors or lenders to participate in the tollroad project will be greatly influenced by their perception of political stability (or the lack of it) in the country. While the peaceful transition from the Aquino to the Ramos administration in June of 1992 has substantially improved the country's political climate, threats though no longer significant, continue to be posed by Communist insurgents and disgruntled former members of the military establishment. The other aspects of political risks aside from revolution and/or coup d'etat are risks from expropriation and nationalization of enterprises. Nationalization of enterprises, however, is no longer a significant risk element in the Philippines. The government in fact is privatizing a number of government owned enterprises.

5.4.5 Demand Forecast Errors

This risk is overestimation of the future traffic and the resulting drop in anticipated revenues. Investors, lenders, borrowers and operators may want some form of "revenue supplement" guarantee in order to protect them against unanticipated losses. It is expected that with the MST and the reverted portion of the SLE packaged as a single project, the traffic would be substantial enough to make the entire project commercially feasible.

5.4.6 Risks of Poor or Delinquent Performance

For the BOT investors, lenders and the Government, there is the risk of poor performance by the various parties at any stage of the project implementation process. Poor or delinquent performance could have serious financial consequences for the project, which may eventually lead to losses and even project failures. The related project agreements must thus include measures that will provide protection against such risks. These could include provision of penalties to various parties (notably constructors), subsidies or guaranties from the government to protect the investors and, to protect the government, access to key data or information for better monitoring of the project. Penalties can be assessed against those who do not meet deadlines or project milestones.

5.4.7 Divergence of Public and Private Objectives

The government has social or equity goals which may constrain the flexibility of a BOT company to continually adjust toll rates in response to changing cost conditions. For a tollroad facility, the operations of which affect thousands of commuters, the adjustment of toll rates is always a difficult task to perform. Adjustments of transport fares and toll rates have always been sensitive social and political issues in the Philippines. The tollroad operator usually has to contend with various social and political pressure groups. To the extent that government social goals result in lower revenues or higher costs, there will be a need for some form of protection to be built into the various agreements. Also, if some flexibility is to be provided in order to allow the government to respond to changing priorities, some protection will be needed to the extent that these changes could result in potential losses.

5.4.8 Other Risks

Other aspects of risks which could have significant impact on the project during the concession period are risks from force majeure, e.g. a major earthquake, and risks of obstructive legal proceedings which could substantially change the project operating conditions.

5.5 FINANCIAL COVENANTS

The kind of protection afforded to creditors through the legal documentation process, e.g. in the bond purchase agreement and related trust indenture, is critical to their investment decision and to the extent of financial support that they are willing to commit to a tollroad project. The following discusses some of the salient financial covenants which creditors would want to see included in the contractual arrangements.

5.5.1 Protection Against Construction and Completion Risks

Investors usually cannot bear the risks associated with the construction of the facility, including cost overruns and/or the risk of non-completion and resultant lack of use. The financial undertakings will need to include insurance, contractor and/or governmental guarantees with respect to the financial consequences of such risks.

5.5.2 Pledge of Revenues

In the case of the MST or any tollroad project for that matter, the debts (bonds or long-term papers) that will be sold to investors (or creditors) are to be payable from a defined set of revenues. Defined revenues consist of the following:

- All tolls together with rentals, and charges payable by concession holders pursuant to defined agreements for the purpose of providing funds for the payment of:

  i. the principal, premium, if any, and interest on debt;

  ii. all sinking and other reserve fund payments required by the legal documents;

  iii. all amounts required pursuant to the rate covenant;

  iv. all amounts required for subordinated debt; and

  v. all administrative and operating expenses of the financial facilities as they are incurred.

- Investment earnings.

- Any other amounts deposited from insurance proceeds, if any, and by the government as supplemental revenues.

In order to secure the payment of the principal, premium, and interest on all debts outstanding from time to time, a pledge has to be made of the defined revenues and all moneys on deposit in the funds and accounts established under the indentures or other form of legal agreement (the "indenture") creating a trust or equivalent (the "trust estate"). These agreements are generally between the BOT project promoter and the creditor banks.

5.5.3 Limited Obligation

The debts to be purchased by investors shall be considered limited obligations of the issuer to be payable solely from the defined revenues and certain other moneys and securities held by the trustee under the indentures.

5.5.4 Rate Covenant

The debt issuer which is the BOT company has to commit to establish and assess (and to revise from time to time as necessary) tolls, rentals, fees and charges under the concession agreement which will produce revenues in each calendar year in which the debt is outstanding that will be sufficient to fund operations and cover all debt service requirements.

5.5.5 Debt Service Reserve Fund

To serve as emergency reserve to protect debt holders from events which may affect the timely payment of debt service, the debt issuer is required to establish a debt service reserve fund which is equal to at least one year debt service. The debt service reserve fund can initially be derived from the financing proceeds.

5.5.6 Other Reserve Funds

The BOT company (or the debt issuer) will most likely be required to establish other revenue funds, e.g. a maintenance reserve fund to be applied to the cost of major resurfacing, replacement, repair, renewals or reconstruction of any part of the facility. A General reserve fund can also be established to be used to make up deficiencies in any of the reserve funds which the debt issuer will be required to establish and maintain from a combination of financing proceeds and annual net revenues.

5.5.7 Additional Debt

The issuance of additional debt is normally subject to a number of conditions, including a covenant that, at the time of issuance of such additional debt, no event of default shall have occurred and remains continuing under the indentures. The issuer may also issue subordinated obligations. Revenues may be transferred each month to pay subordinated debt service only after all required transfers to pay principal, and premium, and interest on the priority debt--and for both administrative and operating expenses--have been completed.

5.6 CONCLUSIONS AND RECOMMENDATIONS

The Philippine capital market has many limitations on its ability to fund highway BOT projects. This is compounded by the present unfavorable external credit rating of the country. It is not certain whether project financing could be raised for the Manila South Tollway project under this environment. Much depends on how the project is ultimately packaged, who its sponsors and developers will be, the actual magnitude of the financing required, and the kind of support, incentives and guarantees which the Government of the Philippines will provide.

5.6.1 Comparison between Power and Tollroad Projects

While the Philippines has been able to raise foreign equity and debt financing for its recent power projects, tapping the same source does not appear to be presently feasible for tollroad projects. There are some clear differences between BOT schemes for power projects and highways. The factors that affect BOT power projects favorably are as follows:

- Power projects have up to 75% of their costs in foreign exchange. Suppliers and export/import bank credits and guarantees facilitate their financing. Foreign commercial banks readily finance these projects when they are guaranteed. This reduces the need for local financing.

- Philippine power projects have only one client. This is the National Power Corporation (NAPOCOR) which guarantees the quantity and price of the electricity sold. The project promoters reduce their project risks with this type of agreement. Since the NAPOCOR is a government owned and controlled corporation, a contract with it is the equivalent of a sovereign guarantee on the revenues that the promoters will receive.

- Foreign exchange repatriation is allowed, and the pricing formula is based in foreign currency. The foreign exchange risks are not large.

- The duration of these projects are relatively short. In the case of Navotas I, the concession period is for 12 years. This reduces the exposure of the creditors.

In contrast to the above advantages, BOT schemes for highways are faced with the following disadvantages when compared with power projects:

- The direct foreign currency costs of elevated tollways falls between 5 and 10% of total project costs. This limits the amount of export/import bank financing and suppliers credit and places a greater demand on local currency.

- A tollroad project has hundreds of thousands of clients where each pays a toll. Any increase in toll rates becomes highly political. The tolls on the existing South Luzon Expressway were last increased in 1983. In September, 1990 there was a reduction in the tolls.[5] The most recent request for toll adjustment filed by Philippine National Construction Corporation (PNCC) was recently turned down by the Toll Regulatory Board (TRB). Due to these constraints, the project revenues are not assured.

- Although the repatriation of foreign exchange will be allowed, the foreign exchange risks of the project are not covered. The external debt service component will be particularly vulnerable to exchange rate fluctuations.

- The cost recovery period is too long for the kind of commercial long-term financing available.

5.6.2 Consultation with Financial Institutions and Contractors

Meetings and consultations were held with senior officials of the country's biggest commercial and foreign banks and other financial institutions as well as with local contractors to gauge their interest and explore the availability of funding for the Manila South Tollway project. The highlights of these meetings are as follows:

5.6.2.1 Local Financial Institutions

- The MST has to compete in terms of priorities with other major projects of the government. In terms of competing uses for funds, the MST may not rank very high in order of priority compared to such projects as the Subic Base conversion and the privatization of government-owned and controlled corporations, i.e., the Philippine National Oil Company (PNOC) and the National Steel Corporation (NSC).

- Local private banks may be reluctant to provide financing for projects of this nature. The lending orientation of private banks is short-term and they are more inclined to support commercial and industrial enterprises which can provide them with more collateral businesses.

[5] Adjustments in the toll rates since the opening of the North and South Luzon Expressway in 1968 are summarized below: 1972 - 33%, 1974 - 26%, 1980 - 50%, 1983 - 31%. Sept. 1990 - decrease 30- 50%. Source: PNCC.

- There have been efforts to organize financing syndicates for the Metropolitan Waterworks and Sewerage System (MWSS) and the National Power Corporation (NPC). These, however, did not attract much lending interest from private banks. These projects carried sovereign guarantees.

- Philippine commercial banks have not participated in any major road financing projects. Their reluctance to finance such projects is also influenced by the long-term orientation of such projects and the unfavorable experience (notably the legal complications) that faced the North and South Luzon Expressways.

- When private bankers look at projects, they are more interested in knowing who the proponents are (they would like to see reputable names) and the potential growth of the sector or industry. Only after these elements are found to be favorable do they begin to examine the project's cash flow.

- In general, financing within the Philippine banking system is tight. This is exacerbated by heavy government borrowings from the banking system. This situation is expected to prevail through 1993. The MST will have to compete with the rest of the economy and the government sector for the limited amount of funds which are available. To do so, the project sponsors have to offer competitive rates (commensurate to the project risks) of about 23/24%. These rates are definitely not suitable for tollroad projects with 20 or 30 year concession periods.

- Philippine commercial banks have extended financing to some recent big property development projects in Metro Manila, i.e. Shoemart Megamall and Shangrila. The financing (provided by a consortium of local banks) came after the physical structures were basically completed. The loan (take-out financing) was secured by a mortgage on the land and the improvements. The interim or construction financing was reported to have been sourced from Taiwan and Hong Kong.

5.6.2.2 Foreign Financial Institutions

- As far as obtaining foreign commercial banking interest in financing projects in the Philippines, there would be great reluctance at this time because of the following:

  i. Country risks in general,
  ii. Political uncertainty,
  iii. Large country debt, and
  iv. Attractiveness of similar investments in neighboring countries.

Before offshore commercial banks would be interested in the MST, they would like to see a large part of the debt being financed by the IFC and ADB. Power projects are easier to finance because export/import banks give concessional loans on the equipment needed to build the power generating facilities. Equipment financed through Exim banks can be as much as 50% of the costs of a power project.

- Since 1986, there has not been any significant new money tapped from foreign commercial banks for the Philippines. This trend is likely to continue for sometime and will not change until there is a dramatic turnaround in the country's economic performance. In the case of Citibank, it has not brought in any new money from external sources since 1986. The loans made by the Philippine branch have come from domestic sources. Its equity contribution to the Hopewell Navotas 200 MW gas turbine power project was arranged under the debt-to-equity program of the Central Bank. From Citibank's point of view, there was no new money infusion into the country for this project.

5.6.2.3 Local Construction Contractors

- Almost all construction companies in the Philippines operate with limited financing. They cannot afford to tie-up a large portion of their financial resources in long-term equity investments in projects such as the MST. To do so would greatly impair their contracting capability.

- There are smaller, less risky and more commercially viable projects in the economy that the MST will have to compete with. Power projects appear to be more attractive at this time.

5.6.3 Other Constraints

In addition to the limitations imposed by the present level of development of the Philippine capital market, there are other elements which tend to dampen the interest of investors and financiers in the project. These include:

- The present unfavorable external credit rating of the country. This stems from the country's poor economic performance and its heavy debt burden. These factors are responsible for the present reluctance of foreign commercial banks to provide additional lending to the country. (A discussion of a country's debt rating system is given in Appendix A5-3.)

- The risks emanating from the unclear legal environment in which the project is to operate increases the risks for investors. These risks are:

i. The present constitutional requirement that companies wishing to be franchised to operate as public utilities should have 60% Filipino equity ownership. This is an important legal limitation because it prevents a major foreign firm from taking a senior investor role (or be the driving force) for the project;

ii. There is the unsettled legal question with respect to the Philippine National Construction Corporation (PNCC) franchise over the reverted portion of the South Luzon Expressway from Magallanes interchange to Alabang; and

iii. The question as to whether the concessionaire will be given the flexibility to make toll fee adjustments during the concession period to fully recover construction/maintenance and debt-servicing costs especially during periods of high inflation and exchange rate adjustments.

- The magnitude of the project financing required (about ₱ 12 Billion) casts some doubts whether this extent of financing could be raised from local and foreign sources at this time.

5.6.4 Recommendations

For the MST to attract the interest of investors and bankers, it must have elements that would make it an acceptable package. These are as follows:

- The project must be commercially viable. Commercial viability implies that the project must yield an after debt-service return to equity of 20 to 25%. These are also the rates at which banks will be encouraged to lend to the project.

- The legal preconditions must be in place. The legal framework in which the BOT company is to operate must be clearly defined and stipulated.

- The MST and the rehabilitation, operation and maintenance of the reverted portion of the SLE should be integrated. This is to ensure that the project captures sufficient traffic to make it financially viable.

- If necessary, the government (DPWH) should be willing to subsidize a major portion of the project costs. The financial analysis indicates that the project becomes financially viable if it is subsidized.

- In order for the MST to attract local and offshore financing, the following are suggested:

i. The principal project proponent should be a recognized/reputable firm with the capability to provide the necessary leadership role and marshal resources required for the project;

ii. Groups or corporations that are developing properties near the project area should be encouraged to support the project; and

iii. A viable foreign group should spearhead the project and provide the necessary leadership and interim financing.

- The Central Bank should expand the coverage of the Debt to Equity Program to allow foreign firms to bring in equity under this program for tollroads and related infrastructure projects. From the point of view of a foreign equity investor, the MST's financial attractiveness increases. This can reduce the foreign cost of providing the exchange by 8% to 15%.

- The roles of relevant government agencies (DPWH, TRB, Central bank, etc.) under the concession agreement must be clearly specified. A harmonious working relationship with these agencies over the life of the agreement is clearly necessary to ensure the success of the project.

- Local commercial banks should be encouraged to participate actively in the project by way of providing a substantial proportion of the debt financing. It is uncertain how the government might do this. Local banks are in a much better position to justify the need for future toll rate adjustments in response to changing cost conditions than are foreign banks. If foreign banks see that local banks are taking a strong position in the project, then they would be encouraged to take part in the project.

- The Government should provide a number of "sweeteners" which will make the BOT highway project more attractive. These include:

  i. A Central Bank guarantee on the availability of foreign exchange for the servicing of the project's external debts.

  ii. A fair and rapid method of adjusting toll charges to be included in the concession agreement leaving little to the discretion of the Government.

  iii. Government assistance by way of shouldering the cost of right-of-way acquisitions.

iv. Multi-year tax incentives to the BOT concessionaire, i.e. exemption from customs duties in the importation of capital equipment, accelerated depreciation, net operating loss carry-over and other incentives. These privileges should cover a period whose duration is longer than what is allowed under the Board of Investments (BOI).

v. In the long-term, the Government should consider allowing the BOT concessionaire to issue tax-exempt bonds for long-term project financing purposes.

vi. There should be protective arrangements for setting disputes arising from risks undertaken by the concessionaire.

Chapter 6

ENVIRONMENTAL ISSUES

CHAPTER 6

ENVIRONMENTAL ISSUES

6.1 INTRODUCTION

The feasibility of improving transport and highway networks must also be considered in the context of their environmental impacts and costs. As a locus of activity for the transport of goods, materials and people, the impacts which these networks and systems have may extend beyond their immediate transport corridors.

Impacts of improved access are not likely to be confined to the immediate areas served by the Manila South Tollway and benefits may relate both to economic and social factors. Road improvements may even guide development by expanding residential subdivisions into new areas, thus spreading population growth and opening up new locations of business and industry. Such improvements however, must also be evaluated in relation to environmental issues and create opportunities for integrating environmental protection measures into overall infrastructure development.

Chapter 6 therefore identifies the major impacts of the MST project and considers the costs for mitigating measures. This has been prepared in compliance with both Philippine Government and USAID environmental regulations.[1]

Under Philippine legislation (PD No. 2146), the MST, as an infrastructure project, is considered 'environmentally critical'. One of the tasks of this environmental examination is to clarify the 'critical' nature of this project especially as the alignment that will be used for the expressway is not new but already existing.

For totally new alignments of highways and fresh road cuts, the full range of environmental impacts may be expected such as possible soil and water contamination during construction, alterations to road beds and hydrological impacts. As the proposed Manila South Tollway will use both the existing alignment of the existing South Luzon Expressway, and the right-of-way of the PNR, the full range of impacts may not be expected.

Anticipated environmental impacts of the rehabilitation of the existing Southern Luzon Highway from Nichols to Alabang would also tend to be secondary. Most likely they would not involve major problems such as disruption of surface hydrology, excessive erosion and silt runoff especially as the improvements will not involve any adjustment in alignment but are essentially maintenance activities. Impacts include noise, fugitive dust, disruption of local traffic, disturbance of nearby residences and commercial establishments and are limited to the duration of the construction period.

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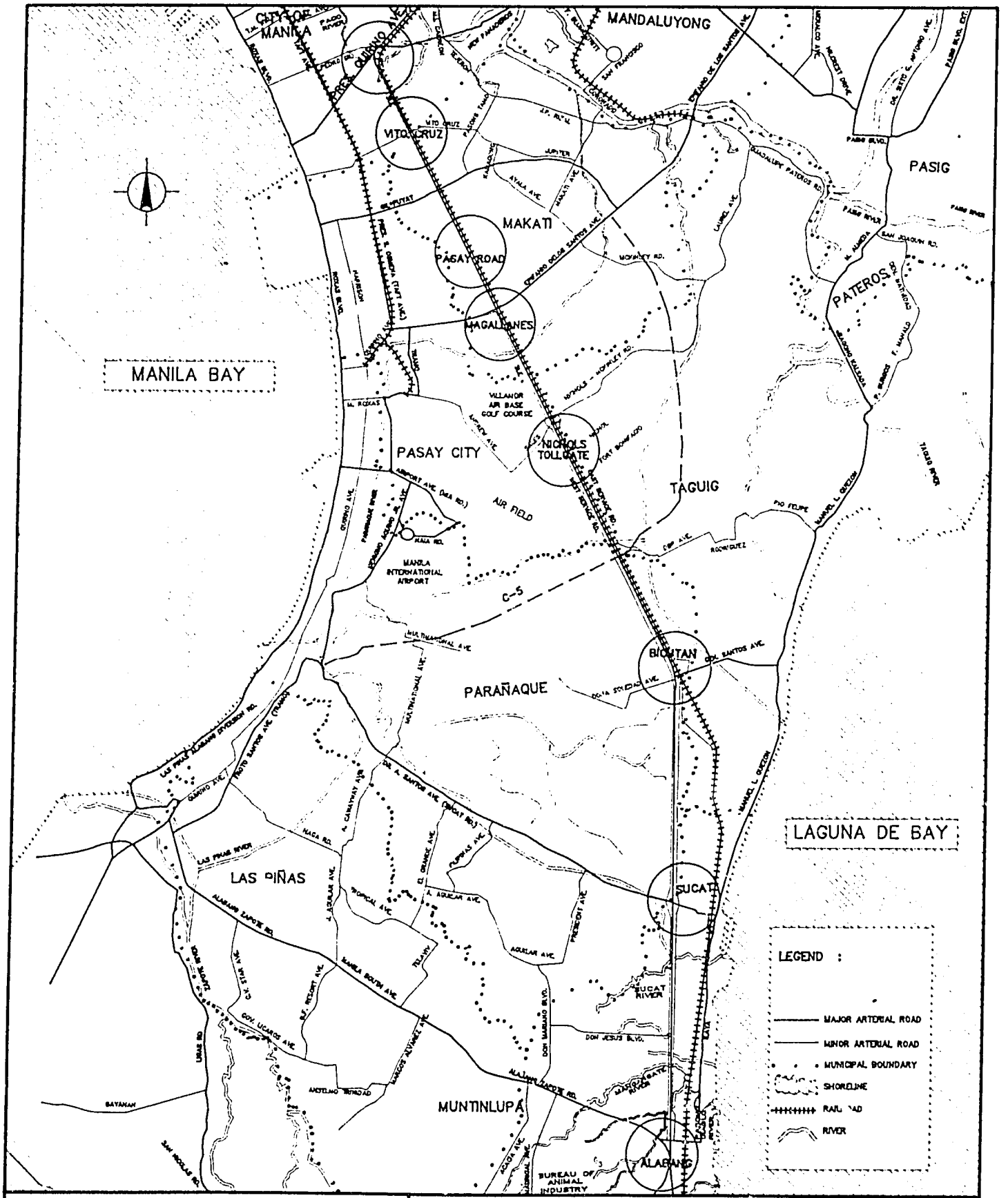
[1] In particular, the completion of this environmental study was prepared in accordance with USAID Regulation 22 CFR 216.



PHILIPPINE ASSISTANCE PROGRAM SUPPORT UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO 492-0452-C-00-0089-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE
LOUIS BERGER INTERNATIONAL, INC. • LOCKWOOD GREENE INT'L • SIBBET & YOUNG INT'L • GLOBETROTTERS ENG'G. CORP. • TRANS-ASIA ENG'G. INC. • CONSULTANT MANAGEMENT SERVICES, INC.	MST PROJECT LOCATION MAP	6 - 1

In conducting this initial examination, the environmental evaluation was coordinated with the proposed design and alignments options. The environmental analysis determined those alternatives with the least environmental impacts or those whose impacts could be mitigated to acceptable levels.

6.2 THE PHYSICAL ENVIRONMENT

The hydrology and physiography of the proposed area are important to consider in relation to drainage conditions. Four rivers cross the project area -- the Pasong Diablo and the Mangangate rivers north of Montillano, the Sucat River and the Estero Tripa de Gallina. The Macariban Creek crosses at Magallanes. A number of other streams also intersect the project corridor (Figure 6-1). These most likely serve as drainage channels for the area but appear to be silt laden or clogged with garbage.

The project is located in three different physiographic zones - the Coastal Margin, the Guadalupe Plateau and the Laguna Lowland. The Alabang to Sucat section of the project lies within the Laguna Lake watershed.

Manila, Pasay and Parañaque lie on the Coastal Margin which is a nearly level coastal lowland flanking Manila Bay. Southward, it extends to include the lagoonal sediments of Parañaque and Las Piñas (and northward the estuarine deposits and beach sand bar deposits of Caloocan, Malabon, and Valenzuela). Due to its low elevation and poor drainage, the area is subject to constant flooding which has been aggravated by high density urban development.

The Margin is formed by deep coastal and river delta deposits of sand, silt, mud, gravel and clay. The main urban area has an elevation range of 1.8 to 10 m above mean sea level and a slope ranging from 0 to 1 percent. It is drained by streams and rivers originating in the uplands to the east, the most notable of which is Pasig River.

Makati mostly sits on the Guadalupe Plateau, a low ridge of land that extends over the full length of the NCR and constitutes the spine of Metro Manila. It covers an area of 395 sq km or about sixty-two percent of the Metro Manila Region. Along the west, it rises from 10 m, where it meets the Coastal Margin, to 40 m at the southern end, 50 m at the center and 140 m elevation to the northeast near the Novaliches reservoir.

The Plateau is rated as highly suitable for urbanization and development based on the following factors: good foundations, good surface drainage, non-vulnerability to flooding, plentiful groundwater and gentle topography. It is composed of lithified volcanic material (volcanic tuff) which is locally known as adobe, considered a suitable bedrock foundation. The soil that overlies the adobe is mostly waterlaid sediments. In the Plateau, groundwater is generally abundant and can be found from 15 to 60 m below ground level.

Taguig and Muntinlupa are located in the Laguna lowlands which is a marginal strip of land south of the Marikina Valley and along the west shore of the Laguna de Bay. It has an alluvial

landscape like that of the Marikina Valley and the coastal margin with similar conditions of terrain, soils, flooding and drainage. With an area of about 21 sq km (equivalent to around 3.3 percent of the total MMR area). The Laguna Lowland is nearly flat, although it rises from the normal level of Laguna de Bay which is 0.5 m to about a maximum of 5 m. It includes the low-lying areas of Muntinlupa and Taguig found along the coast of Laguna de Bay.

Laguna de Bay is a large shallow freshwater lake with a surface area of 900 sq km and a shoreline of some 200 km. It has a catchment area of 4,500 sq km southeast and east of Manila.

6.3 THE URBAN ENVIRONMENT

6.3.1 Metro Manila

The proposed expressway which has an approximate length of 19 km will utilize the right-of-way of the Philippine National Railway and/or the South Luzon Expressway from Alabang, Muntinlupa to Pres. Quirino Avenue in the city of Manila. It will traverse from North to South the cities of Manila and Pasay and the municipalities of Makati, Taguig, Parañaque and Muntinlupa.

These are located in the National Capital Region (NCR), also referred to as the Metro Manila Region (MMR). This region has a total area of 636 sq km and comprises four cities and 13 municipalities. The population in 1990 was 7.8 million persons. Population density in 1990 was estimated at 12,314.5 persons per sq km. Thus, the entire population of Metro Manila is classified as urban.

Slums and squatter settlement areas constitute a major socio-economic and environmental problem in Metro Manila. The Presidential Commission on the Urban Poor has estimated the urban poor population of NCR to have reached more than three million persons (415,000 families) in 1987. The majority of the urban poor live in squatter settlements.

The Metro Manila Region Environmental Improvement Study (1990) has ranked the region's environmental problems in the following order according to their degree of severity. Starting with the most severe, the problems are: solid waste problem, flooding and slum areas, water pollution, air pollution, hazardous/toxic wastes, natural resources degradation and noise pollution.

6.3.2 Population Trends

Population trends show the increasing movement of the population from the congested urban core to the outlying suburbs. Based on observed growth trends, the towns of Parañaque, Taguig, Muntinlupa and Las Piñas have registered annual population growth rates of about 4% to 11% from 1960 to 1990. These rates are among the highest within Metro Manila which is growing at an average of only 3% per year.

On the other hand, Manila and Pasay, the two most congested cities of Metro Manila and Makati have registered declining growth rates. Manila posted a negative 0.19% growth rate for the period 1980 to 1990. Table 6-1 shows the annual average growth of these localities.

Table 6-1
ANNUAL POPULATION GROWTH RATES
SELECTED CITIES AND MUNICIPALITIES OF METRO MANILA

MUNICIPALITIES	1960-1970 (% p.a.)	1970-1980 (% p.a.)	1980-1990 (% p.a.)	1990 Population Density (persons/sq km)
Manila	1.56	2.03	-0.19	41,749.3
Pasay City	4.38	3.35	2.41	26,402.9
Makati	8.35	3.42	1.94	15,150.5
Taguig	9.16	8.91	6.86	7,893.2
Parañaque	4.48	7.68	3.87	8,041.8
Muntinlupa	10.83	7.46	7.04	5,931.5
Las Piñas	10.56	10.91	7.73	7,156.6

Source: Metro Manila Urban Transport Development Plan (1990-2000), DOTC, and 1991 Philippine Statistical Yearbook.

Old commercial areas in Manila have given way to new shopping centers in Quezon City and Makati. Industrial land use grew slightly from 5% to 5.2% within the same period. Industrial land use in Metro Manila is characterized mainly by strong concentrations of factories in certain districts such as at Pandacan, Punta, Paco, Mandaluyong, Pasig and the Port Area. Other industrial agglomerations are located along McArthur Highway and Tandang Sora in the north and along Pasong Tamo and the South Luzon Expressway in the South. Recent industrial development has occurred towards Laguna and Cavite in the South as part of the CALABARZON development initiatives for the region.[2]

[2]The CALABARZON region is a part of the Southern Tagalog region (Region IV) which has been designated by the Philippine government for focused planning and development. It consists of five provinces, namely Cavite, Laguna, Batangas, Rizal and Quezon.

6.3.3 Land Use Trends

Land use trends in Metro Manila reflect the rapid growth and hence, dominance of residential land uses. Residential land use can be characterized in terms of housing quality as seen in :

- high-density, poorer housing areas,
- better quality housing areas and
- squatter housing areas.

The cities of Manila and Pasay are among the most congested cities in the country and characterized by high density, generally poorer housing areas. Makati has emerged to be the country's prime commercial district. Better quality housing areas are found in Makati, and in Parañaque, Muntinlupa and Taguig in the form of subdivisions of low-density dwelling units or high-density, high-rise condominium or townhouses. Slums and squatter settlements are usually located along waterways and in government owned lands.

Based on the Metro Manila Urban Transport Development Plan (1990-2020) conducted by DOTC in 1991, residential land use in Metro Manila increased from 37% of its total land area in 1980 to about 45% of its total land use area in 1990. The composition of land use is given in Table 6-2.

Table 6-2
LAND USE COMPOSITION IN METRO MANILA

LAND USE	1980		1990	
	AREA (ha)	%	AREA (ha)	%
Residential	22,731	37.3	27,441	44.8
Commercial	2,065	3.4	2,086	3.4
Industrial	3,041	5.0	3,193	5.2
Institutional	3,131	5.1	3,288	5.4
Utilities	858	1.4	901	1.5
Open space	29,154	47.8	24,381	39.8
TOTAL	60,980	100	61,290	100

Source: Metro Manila Urban Transport Development Plan (1990-2020), 1991 by DOTC.

6.4 OVERVIEW OF PROJECT IMPACTS

The most significant impacts of the MST are:

- land use impacts at interchanges and
- displacement of the squatter population along the PNR right-of-way from Quirino to Bicutan.

The screening of the expressway along a set of environmental parameters such as geology, soils, slope stability, hydrology, air quality, noise and population affected assisted in identifying these primary impacts. Appendix A6-1 provides details on the screening. Secondary[3], i.e. less significant impacts related to hydrology, air quality and noise levels were also identified and are discussed in Appendix A6-1.

6.4.1 Metro Manila Region

Overall land use impacts can be assessed along two zones of influence of the MST project namely, 1) the immediate corridor and 2) the outlying area. The immediate corridor will be defined as that which covers 500 m from each side of the proposed alignment. The outlying area of influence will cover large zones of varying land uses that connect to the transport spine provided by the SLE. This may cover whole municipalities or large sections thereof.

The expressway is not likely to alter the proposed land uses which are based on the current zoning guidelines[4] for Metro Manila. On the whole, the MST will impact the planned land use for the area in a beneficial way. Under the Medium Term National Capital Region Development Plan, 1987- 1992, the overall objective of the physical growth strategy for the region is to achieve a more efficient land use pattern for Metro Manila which includes among others:

- minimizing distances between home and employment and
- minimizing distances and travel times for finished products and raw materials.

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[3] One of these impacts relates to the Sucat to Alabang section of the expressway which lies within the Laguna Lake watershed. The MST would produce no major alteration of hydrological regimes of the watershed especially as it would be built above the existing SLE alignment. However, silt run-off during project construction operations particularly at the Alabang interchange near the Pasong Diablo River could result in impairment of water quality in the river and eventually in Lake Laguna. Siltation control measures such as gabions will be needed to stabilize road cuts.

[4] The zoning guidelines are based on the 1981 zoning ordinance taken from previous land use survey and therefore do not reflect changing/proposed land uses. Assessing the project's impact on planned land uses is therefore subject to these limitations. The zoning ordinance while providing the spatial allocation for various urban activities (residential, commercial, industrial, etc.) does not specify clear regulatory standards on the intensity of various development activities, i.e. limit in the degree of concentration of activities in a particular area. The Metro Manila Authority is presently tasked with coordinating planning and development efforts in the region.

The strategy also divides the Metro Manila Region into three types of areas:

- preservation areas where change should be resisted,
- stable areas, and
- areas of rapid change.

The south periphery which the proposed expressway aims to serve is considered under the NCR Development Plan as an area of rapid change. Thus, medium-term regional development initiatives and public sector investment are geared towards supporting and encouraging the private led urban growth in the area. This includes improving transportation links to and from the localities in the south.

As an enhancement of the urban transport system, the MST would provide an alternative route to the SLE and improve road services to the fast growing areas of Parañaque, Taguig, Las Piñas and Muntinlupa. To increase the functional and positive impacts of the MST, improvements in arterial feeder roads would become important.

Major road construction improvement projects are being implemented in Metro Manila to decongest and improve traffic along major thoroughfares. Examples of these projects are the flyovers on EDSA and Roxas Boulevard, the R-1 and R-10 and Circumferential Road 5 (C-5). C-5 will divert significant amount of traffic from SLE towards the north and EDSA towards the east. However, long-term planning needs to anticipate and address future problems of land use compatibilities and intensities, infrastructure efficiency and the like.

6.4.2 President Quirino Avenue to Bicutan

An elevated expressway over the PNR right-of-way from President Quirino Avenue to Bicutan is considered the most feasible routing. This distance is approximately 11.48 km.

This section is characterized by heavy industrial development particularly on the eastern side towards the south and high density commercial and residential development towards the north except in the section between EDSA and the proposed C-5 interchange where the surrounding land use consists of the vast military reservations of Viliamor Air Base and Fort Bonifacio.

The PNR maintains two tracks within a 30-m width right-of-way in this section. Construction of the MST over the PNR will not cause displacement of adjoining land uses. In case, though, that the project needs additional right-of-way, the impact will likely be on the residential areas east of the railroad tracks. These are also sections where residential areas are close to the present right-of-way such as at San Andres, south of Quirino which will be affected by noise and vibration nuisances during construction.

About one to three meters from the PNR tracks, the land which is government-owned is occupied by squatter houses and structures. The type of houses based on materials used vary

from makeshift (barong-barong) to mixed concrete and wood. The population of squatters found along the PNR right-of-way from President Quirino Avenue to Bicutan is estimated at 11,215 comprising 2,483 families (estimates provided by barangays).

The most serious, immediate impact of the proposed MST over the PNR will be the removal, temporary or permanent, of squatters' residences. PNR's estimate of the number of squatter structures in this section is 1,076. This comprises half of the total 2,146 structures from Alabang to Pio del Pilar. The impact on squatters and mitigating measures necessary to address the problem are discussed in the section on squatters.

6.4.3 Bicutan to Alabang

The Bicutan to Alabang section of the MST covers a distance of 7.59 km and would be built above the existing South Luzon Expressway. It will include interchanges with entry/exit ramps in Bicutan, Sucat and Alabang - Zapote road. The Alabang - Zapote road will serve as the south terminus.

The MST will have no direct negative impact on the adjoining corridor land uses if the structure will be built atop the existing SLE as the immediate corridor provides ample space for this construction. At present, the land uses along the Bicutan-Alabang corridor are predominantly industrial interspersed with idle grasslands, residential subdivisions and commercial areas. (See Appendix A6-2 for maps of existing land use.) The SLE corridor is a favored location of industrial firms due to available low-cost land, accessibility via the SLE and its industrial zoning.

The effect of the MST on the existing land uses of the outlying area, however, would be more significant. The MST is designed to improve traffic between the suburban, residential areas in the southern part of Manila and the urban, heavy commercial areas in the central and northern parts of the city.

To maximize traffic efficiency though, the MST must be accompanied by the improvement of traffic among the arterial roads that feed into the interchanges. This is necessary to avoid potential bottlenecks in the intersections and interchanges like the ones already occurring in places like Ayala and Guadalupe along EDSA. This is also necessary as land use trends in Metro Manila reflect rapid growth and dominance of residential land uses.

These trends show the increasing movement of the population from the congested urban core to the outlying suburbs. The southward population push favors the conversion of more open lands in the southern fringes to residential land uses. The MST would thus sustain and possibly accelerate the growth of population and residential land uses in the southern suburbs of Parañaque, Taguig, Las Piñas and Muntinlupa and to some extent the adjoining towns of Laguna. The MST may also favor the continued growth of industries along the SLE by providing better transport and accessibility.

The SLE corridor which is predominantly zoned light to heavy industrial is already mostly occupied by large industrial establishments such as Kawasaki and Firestone. More than 50 percent of the SLE corridor between Bicutan and Alabang has existing land uses that are heavy industrial.

Non-conforming uses include the conversion of large tracts of adjoining areas that are zoned agricultural into industrial land uses. This transformation reflects the tolerant and permissive character of the currently used zoning ordinance. These factors plus the relatively low cost of land along the corridor (industrial ₱ 2,500 - 6,500 per sq m, based on seller's asking prices in 1992) would contribute towards the eventual transformation of the immediate corridor into greater industrial land uses.

6.5 LAND USE IMPACTS AT INTERCHANGES

Major impacts on local land use are expected to result from the acquisition of additional right-of-way for the construction of ramp connections and the necessary improvement of access arterial roads. Appendix A6-2 discusses these impacts in greater detail.

Since the proposed interchanges will occur in densely built-up areas, the project will have significant impacts on the existing land uses. Requirement for additional right-of-way will cause dislocation of around 75,055 sq m privately-owned lands, and demolition of residential and commercial structures occupying those lands. Likewise, constructing the MST at grade section between Nichols and C-5 would deny access to a great number of businesses and houses presently located on PNR land. The cost of mitigating these impacts is expected to be high.

6.5.1 Commercial Development

Historically, another major consequence of constructing interchanges is the increase of economic activities around these interchanges and access points. This is continually manifested in the commercial development of the Sucat Interchange area, the Bicutan Interchange area and the Alabang Interchange area which saw the emergence of supermarkets, department stores, groceries, banks and restaurants in addition to small, mobile and temporary stall operators. The Bank of Commerce has been established at the Bicutan intersection since 1986 and more recently in 1991, the Solid Bank has also opened up a branch on the southwest corner near the Bicutan market.

Further development of those interchanges as part of the MST will sustain the pace of commercial development and consequently the increase of land values around the interchanges.

6.5.2 Land and Properties Affected

Table 6-3 summarizes the main land use impacts, the land area and number and type of structures affected in acquiring the additional right-of-way for the interchanges. For two interchanges (Pres. Quirino Ave. and Sucat) and the at grade section between Nichols and C-5, two alternatives are considered. Alternative 1, regarded here as the more technically viable alternative would affect a greater number of bigger and better-quality structures than Alternative 2.

Thirty-five percent (35%) of the total land area of 214,455 sq m required for the interchanges is privately-owned land with approximately 487 structures affected based on the choice of Alternative 1 as the preferred alternative. This has major implications for negotiation procedures with property owners and jurisprudence concerning public lands affected. The process of acquiring and expropriating lands will require time and costs and 'just' values could become critical decision points. This is discussed in greater detail in Section 6.7.

Table 6-3
LAND AND PROPERTIES AFFECTED AT PROPOSED MST INTERCHANGES

INTERCHANGE AND DIVERSION	APPROXIMATE LAND AREA AFFECTED (sq m)	APPROXIMATE NUMBER AND TYPE OF STRUCTURES AFFECTED							REMARKS
		HOUSES/ APART-MENTS	CONDO-MINIUM/ APART-MENT[5]	COMMER-CIAL STRUC-TURE	INDUS-TRIAL BUILDINGS	OTHER BUIL-DINGS[6]	SHANTIES BARONG-BARONG[7]	TOTAL NUMBER OF STRUC-TURES	
1. Pres. Quirino Alternative 1	29,725 (22,040)	95	9	14	–	6	160	284	Most severe impact will be the displacement of a large number of houses and apart-ments along the loop's circular path. These include a 16-unit BLISS apartment and a few big buildings.
Alternative 2	24,640 (2,525)	22	–	4	1	–	150	177	Impacts will be confined to the southern portion of the inter-change: 1) Barangay 734, 2) 15-unit commercial building, 3) frontage of structures along Quirino Ave. eastbound lane.
2. Vito Cruz	8,860 (7,270)	40	4	30	–	–		74	Displacement of several houses and businesses along Mayapis and SLE southbound lane.

( ) Land area figure in brackets refers to the amount of privately owned land affected.

[5]More than 2 storeys.

[6]Includes government and church buildings.

[7]Refer to small, dilapidated houses within blighted housing areas where the urban poor live.

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Tr 3 (continued)
LAND AND PROPERTIES AFFECTED AT PROPOSED MST INTERCHANGES

INTERCHANGE AND DIVERSION	APPROXIMATE LAND AREA AFFECTED (sq m)	APPROXIMATE NUMBER AND TYPE OF STRUCTURES AFFECTED							REMARKS
		HOUSES/ APART-MENTS	CONDO-MINIUM/ APART-MENT	COMMER-CIAL STRUC-TURE	INDUS-TRIAL BUILDINGS	OTHER BUIL-DINGS	SHANTIES BARONG-BARONG	TOTAL NUMBER OF STRUC-TURES	
3. Pasay Road (Along SLE)	6,730 (4,975)	–	2	5	5	–		12	Displacement of a 14-storey condominium along SLE.
4. Magallanes	32,670 (16,930)	–	1	4	–	–		5	Would affect frontage of Magallanes commercial center and commercial establishments along SLE's southbound lane near intersection.
5. Between Nichols and C-5									
Alternative 1	76,500 (0)	23	–	63	–	1		87	Would deny access to a large number of businesses which are leasing PNR land beside the tracks. Would also directly displace structures on the Fort Bonifacio side of the service road.
Alternative 2	44,160 (0)	10	–	–	4	–		14	Would encroach by about 250 m into Libingan ng mga Bayani Military Shrine.
6. Bicutan	12,165 (7,460)	–	–	–	–	–		none	Interchange and ramps will be built on idle private land.
7. Sucat									
Alternative 1	11,425 (8,030)	–	–	2	2	–		4	Would mostly affect open or idle lands.
Alternative 2	12,250 (2,300)	–	–	3	–	–	1,000	1,003	Impact is focused on a slum area with a population of about 10,000 which is being upgraded by the government under the Community Mortgage Program (CMP)
8. Alabang	36,380 (8,350)	9	–	–	9	3		21	Would dissect the BAI compound and isolate portions of it. Affected built-up portion is comprised of factory buildings, offices and houses.
TOTAL									
With Alt. 1[8] only	214,455	167	16	118	16	10	160	487	
With Alt. 2 only	177,855	81	7	46	19	3	1,150	1,306	

Source: The Consultant's Estimate.

[8]Alternative 1 is the preferred alternative.

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6.6 THE SQUATTER POPULATION ALONG THE PNR RIGHT-OF-WAY

6.6.1 Implications For the MST

Development projects be they agriculture, industry or infrastructure have both direct and indirect impacts on people. Some of these impacts are beneficial, intended and directed at selected project beneficiaries while others may not necessarily be immediately positive.

Current views on economic and industrial development are placed in a global context of concerns for how development impacts on people and the environment. Among the increasing concerns are those regarding poverty alleviation, the urban poor and quality of the social environment. Sensitive social issues arise especially in polarized socio-economic environments or when vulnerable sectors of the population are affected.

In social terms, the squatter population is regarded as vulnerable to development projects especially as they occupy, nevertheless illegally, areas that may be required for development, expansion, road networks, real estate and other projects. The situation is one of unintended impact and must be assessed in relation to proposed mitigating measures such as relocation or housing resettlement which aim to minimize impacts.

In Metro Manila, around 2.5 million people are reported to be living in squatter and slum areas representing 31% of the total 8 million people residing in Metro Manila.[9] Appendix A6-3 provides more detailed information on the squatter population in Metro Manila including the legal definition of squatter and those eligible for relocation under R.A. No. 7279.

One of the social risks in the case of the MST is that of "backlash" by vested interests and monopolization of the social issues to represent political concerns. These risks will require special attention and therefore relocation and resettlement will be important mitigating measures.

There are also other risks involved and these concern risks to the project itself. Guaranteeing access to the right-of-way is crucial for the MST project. As a BOT project, the private investor will need to be assured of right-of-way clearance, free of entanglements or other encumbrances including social risks and costs. Resolution of these issues, particularly for such an urban infrastructure project with legalities surrounding right-of-way matters, provides some certainty to the investor of the feasibility and assuredness of his investment.

Therefore, while the social soundness analysis must consider the impact of the project in terms of squatter dislocation and eventual effect on incomes and livelihood, this situation also poses problems for the project in terms of its marketability and commitment of a potential investor. Generating private sector interest in the project will rely on the ability of the project proponent to provide clearance of the right-of-way, without engendering conflicts and pressures that get in the way of the contractor's operations.

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[9] NCR-DSWD Planning and Monitoring Division based on Presidential Commission the Urban Poor 1987 data.

6.6.2 Profile of Squatter Population

The major subpopulation that would be directly affected by the proposed project are the squatters residing along the PNR railway tracks. A field survey of the squatters was conducted by the Consultant in June/July 1992 to obtain socio-economic data and other information on living conditions.[10] (Detailed Survey results are given in Appendix A6-4).

The total number of squatters along the PNR right-of-way from President Quirino Avenue to Alabang is estimated at 51,215 (Table 6-4). The Quirino to Bicutan section has 11,215 or 22% of the total.

Table 6-4
ESTIMATED SIZE OF THE SQUATTER POPULATION
ALONG THE PNR RIGHT OF WAY
(President Quirino Avenue to Alabang)

MST ROAD SECTIONS	POPULATION OF BARANGAYS[11]	NUMBER OF SQUATTERS ALONG PNR RIGHT OF WAY		
		NUMBER OF PERSONS	PERCENTAGE[12] OF SQUATTERS IN BARANGAYS	NUMBER OF FAMILIES
Quirino-Vito Cruz (5 Barangays)	16,000	1,200	7.5%	240
Vito Cruz-Nichols (4 Barangays)	147,000	9,215	6.27%	2,043
Nichols-Bicutan (1 Barangay)	30,000	800	2.67%	200
Bicutan-Sucat (1 Barangay)	266,080	4,000	1.50%	800
Sucat-Alabang (3 Barangays)	270,000	36,000	13.33%	7,200
TOTAL	729,080	51,215 squatters	7.02%	10,483 families

Source: Estimates provided by the Barangay Chairmen of the Barangays crossed by the PNR tracks from Alabang to Quirino.

[10] The survey involved field interviews with squatters. Meetings with Barangay Chairpersons were also conducted to inform them of the field survey and to gather population data on squatters.

[11] Barangays are those which the PNR track crosses from President Quirino Avenue to Alabang.

[12] Refers to percentage of squatters in a certain section of the PNR right-of-way. Base = total population of a group of barangays.

According to NHA and barangay captains who were interviewed, the population along the PNR right-of-way is, in comparison to other squatter populations in Metro Manila, relatively low density and also more permanent. The Consultant's field survey indicates that 29% of the respondents along the Quirino to Bicutan stretch have been there for four to six years, 27% for 10 years and more, and 19% for seven to nine years. More than a majority, 65%, came from squatter areas (usually within the same city/municipality they are presently residing in e.g., Paco and Batangas Line in Manila and other areas in Parañaque, Taguig and Makati) before settling along the tracks. The main reasons given for leaving were: (1) they were fire victims; (2) they were evicted due to road construction or land was sold; 3) they got married and moved to where husbands reside; or (4) they could no longer afford to rent.

The growth of the squatter population along the tracks, as in other prohibited areas is affected by the enforcement of the law by local government officials. The Quirino to Bicutan PNR stretch has been cleared of squatters before.[13] However, Makati and Parañaque/Taguig respondents indicated that their areas have become increasingly congested over the past years. In Makati, for example, around 10 families were added to their population every year since 1990 in spite of threats of eviction by the city government while in Manila, entry of new settlers has been more controlled.

The majority of the squatters 89% have not previously received government assistance in the form of housing. Presently, 67% own their shelters while the remainder rent from others along the tracks.

The PNR squatters do not have basic services, such as water supply and electricity in their homes. They buy water from the barangay public faucet at 30-75 centavos for five gallons of water. 89% do not have direct electric connection but have indirect or tapped lines, i.e., through connections with another household's electric meter. There is a barangay health center which provides free services such as immunization, pre-natal and maternal check-ups. Most of the children go to schools within the barangay which are 5 to less than 15 minutes away from their houses.

Forty-one percent (41%) of the squatters are over 15 years old. The income-earners are in service jobs -- security guard, jeepney/side car/jeepney driver, conductor, painter, carpenter, or in manual jobs such as janitor, messenger or laborer. Working women wash clothes, housekeep, or are beauticians. Average household income ranges from ₱ 1,000 to 3,000 a month for a household of four to five persons.

For the very few households who own a business, their small businesses are either small sari-sari stores just by their house, a carinderia just a few meters away, or they are vendors of plants or vegetables and fish.

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[13] This information is based on the Consultant's field survey. The reports of the NHA also indicate that the tracks were cleared of squatters in the mid 1980's.

6.6.3 Extent of Impact on Squatters

The impacts of the MST on the squatter communities along the right-of-way are expected to be significant especially as these communities are relatively permanent by squatter standards. However, there are also several factors reducing the extent of the project's impact on the squatter families. These are:

- Attitudes towards relocation indicate that even though the squatters like living along the tracks, 81% are "willing" to be relocated and resettle in other areas (Consultant's survey). Preferred conditions of resettlement are proximity to possible places of employment and other services i.e. schools, health centers.

- Seventy-four of the 130 squatters interviewed (57%) have had experiences with eviction before. For the Manila respondents, 27 out of the 30 or 90% have had problems with eviction. The Quirino-Vito Cruz PNR squatters have been evicted three times: 1986, 1987 and 1991. However, within a month after every eviction, the same families returned to the tracks and rebuilt their shacks.

- Only 22% of all the squatters from Quirino to Alabang will be affected, (with Makati having the largest proportion to be affected) since the most feasible route is to use the PNR right-of-way only from Quirino to Bicutan.

- Certain portions of the PNR right-of-way may be cleared before the MST is constructed due to PNR's track and bridge rehabilitation program which includes plans to relocate squatters residing along the tracks.

  The PNR track and rehabilitation plans for the South Commuter Line is projected to start in 1993 in the Paco to Tutuban Section. The PNR plans to relocate the squatters in this section or construct housing[14] at existing squatter sites along the PNR right-of-way between Paco and Tutuban. Housing would be constructed within a five meter clearance from the tracks, the back walls of the houses essentially forming a divider fence. However, this will only be possible where space permits and where there is a suitable road paralleling the tracks thus forming a frontage for the houses. Although the Paco to Tutuban section is outside the MST project area, it is possible that other squatters along the tracks might attempt to get housing.[15]

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[14] It should be noted that under Philippines government legislation (Republic Act No. 7279, Sec. 29) railroad tracks are considered danger areas subject to relocation and resettlement. Further Sec. 30 prohibits the construction of structures in these areas.

[15] The memorandum of Agreement Between PNR and Municipality of Makati (1990) may also have implications. This Memorandum was signed on March 9, 1990 between the Philippine National Railway and the Municipality of Makati. It concerns the provision of housing for low income urban families in the municipality and therefore it could include but not be restricted to families along the PNR right-of-way. The parcel of land owned by PNR and located in Zobel Roxas Street to Magallanes in Makati would be used for this purpose. At the present time, however, the site cannot be approved as DPWH has indicated that drainage canals at the site would be affected.

6.6.4 Government Regulations

Relocation and resettlement as social mitigation measures for the MST are supported by government legislation. Under RA No. 7279 railway tracks are considered danger areas and therefore a priority for relocation. Further, eviction and demolition in slum and blighted areas is allowed when government infrastructure project will be implemented and on-site resettlement development is not feasible.

The legislation outlines certain procedures for relocation with LGUs charged with the implementation of RA No. 7279 in their respective localities. Appendix A6-5 provides a copy of RA No. 7279 with the rules and regulations concerning relocation. The relevant points are briefly described below.

Republic Act No. 7279 which was passed on March 24, 1992 is also known as the Urban Development and Housing Act of 1992. It provides for socialized housing for the underprivileged and homeless including the rehabilitation and development of blighted and slum areas and the resettlement of occupants of blighted lands and slum areas.

Eligible Beneficiaries (Article V) are those whose income or combined household income falls below the poverty threshold defined by NEDA as ₱ 5,821 in 1991 for a household of six persons. They also must not have received previous relocation/resettlement assistance or own any real property in urban or rural areas.

Resettlement Sites should be identified and prepared prior to beginning the actual transfer of the relocatees. Basic services - water, power and electricity, sewerage facilities, waste disposal system should be provided at the site. **The provision of housing is not required under RA 7279.**

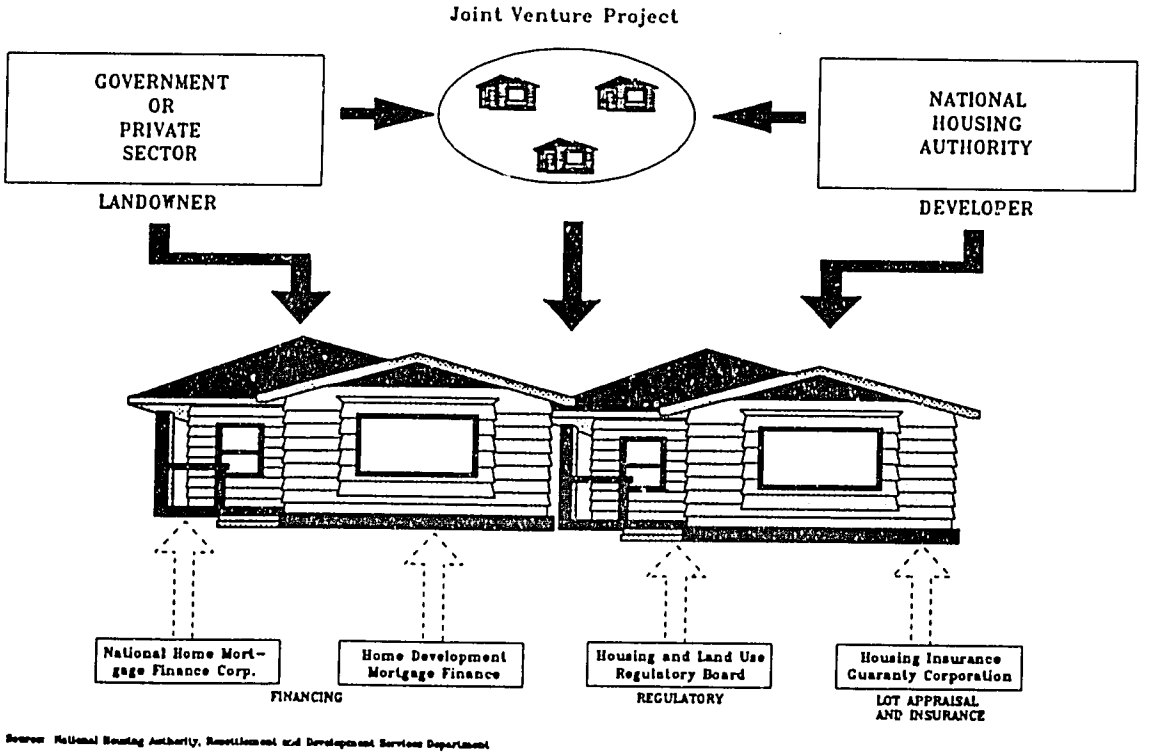
Cash Compensation is identified for cases of a court order for eviction and demolition in a blighted and slum area where on-site development is not feasible. Article VII Section 28 (8) states that "should relocation not be possible within the said period (i.e., 45 days of notice of demolition), financial assistance in the amount equivalent to the prevailing minimum daily wage multiplied by 60 days shall be extended to the affected families by the local government unit concerned.

A Memorandum of Agreement (1992) was signed on July 26, 1992 between the Department of Interior and Local Government, National Housing Authority, DPWH, Housing and Urban Development Coordinating Council, Commission on Human Rights, Presidential Commission for the Urban Poor and various municipalities including Makati, Parañaque and Muntinlupa. Although the Agreement calls for a moratorium (suspension) on the "ejectment of poor dwellers, the demolition of their dwellings and their transfer to adequate relocation sites, there are certain exemptions. These include structures in public areas and danger zones or those "standing in the way of important infrastructure projects". Guidelines to cover demolitions of these structures are also given in the Memorandum.

6.6.5 Review of Relocation Schemes

A review of NHA's[16] relocation strategy, projects and costs was undertaken in order to offer insight into a relocation plan for the MST project. The NHA uses a joint venture strategy designed to maximize capability to undertake housing production (Figure 6-2). Compared to NHA's earlier "traditional" resettlement schemes,[17] projects along the joint venture approach are characterized by one or a combination of the following features: (1) in-city resettlement, (2) joint venture especially where funding is concerned, and (3) land sharing.

Figure 6-2
NHA RELOCATION PROGRAM STRATEGY (1992)



Source: National Housing Authority, Resettlement and Development Services Department

[16] The National Housing Authority is the government agency at the national level responsible for relocation and resettlement of underprivileged and homeless citizens and therefore their responsibilities include displaced squatter families.

[17] In the early projects (1960 to 1982), NHA was solely responsible for the whole resettlement process including site selection and development and provision of housing. The sites were in areas far from the urban core and the provision of housing was a given component of any resettlement scheme (Appendix A6-3).

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Table 6-5 describes recent experimental projects based on a resource/expertise sharing scheme with the private sector (landowners, developers, NGOs), local government units (LGU) and other government agencies. Under the Community Mortgage Program (CMP) squatter communities can purchase the land they occupy or land where they can resettle. The loan to a maximum of ₱80,000, amortized over twenty-five years at a monthly of ₱515.00, can be used for both purchase of land and construction of housing.

Table 6-5
NHA RELOCATION AND RESETTLEMENT PROJECTS (1992)

PROJECT	RELOCATION STRATEGIES	BENEFICIARIES	PARTICIPATING AGENCIES AND THEIR RESPONSIBILITIES		TIME FRAME	COSTS	
						TO BENEFICIARY	TO FINANCING AGENCY
Public Estates Authority (PEA)-NHA (Las Piñas)	PEA bought land in Las Piñas from private land OWNERS. NHA developed the land under their Sites and Services Program as a modest-type subdivision with basic infrastructure (i.e., major roads, foot-paths, water and electricity)	1,527 squatter families occu-pying reclaimed land owned by PEA	PEA NHA PCUP LGU DSWD HUDCC	Acquisition of private land. Subdivision of lots. Accreditation of squatters. Approval of construction and provide other services i.e., hospital, community centers. Provision of social services Overall policy making	1988-Feasibility 1989-Infrastruc-ture dev. and intitial relocation 1990-Completed	P 250-300.00/ monthly amortization	Land: 36 sq.m. home-lots at P200-P250/sq.m.
Philippine Ports Authority (PPA)-NHA Vitas Housing Project (Tondo, Manila)	NHA had in-city property (Tondo) near the original site. PPA provided NHA funds to develop property. Low-cost medium rise housing (4-storey walk ups) was constructed under Community Mortgage Program. Groundfloor open for rental to commercial establishments.	501 families relocated from PPA land intended for international port	PPA NHA PCUP LGU DSWD HUDCC	Acquisition of land and construction of medium rise. Accreditation of squatters Approval of construction Provision of social services Overall policy-making	Construction completed in '91 and occupancy is ongoing	₱ 250-515.44 monthly amortization	Land and site development plus housing: ₱ 250 million

PCUP = Presidential Commission for the Urban Poor.
DSWD = Department of Social Welfare and Development.
HUDCC = Housing and Urban Development Coordinating Council.

Source: NHA Resettlement and Development Services Department

It must be noted that both the NHA schemes described here, are beyond the means of the squatters whose household income averages ₱ 1,000-₱ 3,000 per month.

It has also been pointed out by NHA that providing housing only becomes viable if part of the building can be rented out for commercial purposes.

The DPWH itself has also been involved in a relocation and resettlement scheme for the Mangahan Flood Plain Project over 1975-1980 through its Resettlement Program Unit. (See

Appendix A6-3). A more recent scheme being explored for the C-5 DPWH project in Pasig is being coordinated by the Housing and Urban Development Coordinating Council (HUDCC). A trust fund agreement has been set up through the Housing Insurance Guaranty Corporation (HIGC) with a revolving fund of ₱ 60 million targeted for relocation of people affected by a number of upcoming DPWH projects. (See Appendix A6-3.)

6.6.6 Squatter Relocation Strategies for the MST

The relocation of the affected squatters is required in order to acquire the necessary right-of-way and clear the proposed alignment. Although no guidelines exist as such, the underlying social principle for dealing with these matters is that at project completion, the affected population should not be worse off. The situation should be at least as good as or better than before the project was implemented.

From the MST project's perspective, the main objective in relocating the squatters is to ensure access to the right-of-way at minimum monetary and social costs. There are however, several constraints which are identified in Figure 6-3 with the major constraints being:

- The large numbers for relocation, 2,483 families or 11,215 persons. If one considers only the eligible families -- 2,210, the numbers remain high.
- Relocation costs are high, approximately ₱ 102 million (Consultant's estimates) and the tendency of squatters to leave resettlement sites and return to squatting would add to the long-term burden of costs.
- There are several problems in finding a resettlement site as many government sites are used up and private land will cost more.
- LGUs at receiving sites are not receptive to the establishment of resettlement sites in their locales as it may decrease real estate values.

The constraints can be addressed by a number of strategies identified in Figure 6-3 as follows:

- Promote voluntary relocation and resettlement as 81% of the squatters interviewed indicate they are willing to be relocated and 88% have not received previous assistance of this kind.
- Select more than one resettlement site to average out the costs. Several sites are also possible as the squatters' social/community affiliations are based on barangay boundaries so that separating 'communities' by barangays would be patterned after the existing 'sense of community' along the tracks.
- PNR to share the costs of relocation as the right-of-way is a 'danger area' under RA No. 7279 and should be cleared.

Figure 6–3
SQUATTER RELOCATION STRATEGIES FOR THE MST

OBJECTIVE

Ensure access to right–of– way clear of 11,215 squatters at minimum monetary and social costs.

CONSTRAINTS	STRATEGIES
Squatters • 2,483 families in total from Quirino to Bicutan. • 7 – 10 year established communities. 80% like living on tracks. • Political backlash/ resistance especially at Quirino to Vito Cruz (total – 240 families) experienced previous evictions. • Squatters can mobilize quickly for return to site. Members claiming eligibility increase.	• Promote voluntary re–settlement. 80% are willing to relocate. • Makati likely to opt for voluntary resettlement • Use stringent rules of eligibility under RA No. 7279 (Appendix A6–5). (2,210 families out of 2,483 eligible.)
RA No. 7279 and Resettlement Site • Requires provision of resettlement site and site development (basic infrastructure. • Finding resettlement site difficult – government sites used up – squatters want site near jobs. At least 2 members per family are working now.	• Start site search now. • Private land outside the urban core may cost only ₱ 6 to ₱ 9 million[17] more than a government site, i.e., 6 – 9% of total relocation costs. (Con–sultant's estimate) • Employ squatters in MST construction work. • 26% of those presently employed work in construction.

[18] Estimates based on cost of government site at ₱ 100 – 200 per sq m and private land at ₱ 150 – 500 per sq m and site size of 2,483 families x 36 sq m = 89,388 sq m (See Appendix A6–5).

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Figure 6–3 (continued)
SQUATTER RELOCATION STRATEGIES FOR THE MST

CONSTRAINTS	*STRATEGIES*
Costs • High costs of reloation (at least ₱ 102 million for 2,483 families.) • High cost of private land up to ₱ 500 per sq m • Tendency of squatters to leave resettlement site and return to squatting adds to long–term costs. • Cases of re–sale/transfer of resettlement lot by beneficiaries adds to burden of costs.	• Select more than one site to average out cost. • PNR to share costs. • Restrict re–sale or transfer of resettlement lot. • Alternative strategy to relocation. Cash compensation at ₱ 5,000 per family = ₱ 12.4 million.
LGUs • LGUs at receiving areas: a) not receptive, entry of squatters affects real estate values. b) may charge per family to cover cost of 'services' to the new community.	• Trade–offs – Give LGUs tax incentives. – Provide funding to LGUs for housing construction.
Operational • Legislation require inter–agency coordination and special procedures. (Appendix A6–5) • Difficult to mobilize several dump trucks in truck area.	• Transfer immediately prior to start of MST construction to mitigate against new/former squatters returning. • Carry out transfer by barangay 'community'. • Aim to complete transfer of 2,483 families within 2 to 6 months.

Source: Consultant's estimates based on consultations and field survey.

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- Negotiate trade-offs with the receiving site, such as tax incentives to a private developer, or to the LGUs for providing 'services' to the new population.

- Alleviate the burden of future costs by stipulating stringent conditions concerning lots 'sold' to the squatters to prevent re-sale or transfer to other parties.

Given budget and site constraints, an alternative measure, such as cash compensation of ₱ 5,000 per family might be considered. This is not necessarily the best alternative and would not meet the intended objectives of RA No. 7279.

6.7 COSTS OF MITIGATING IMPACTS

Environmental costs of major urban road projects, in particular, mostly deal with the issue of severance. Social severance is viewed as impairment of relationships between people, relationships between people and institutions or relationships between people and places.[19] Costs associated with severance can be categorized into: 1) Losses imposed on urban residents by displacement itself; 2) Losses imposed upon urban residents by uncertainties and delays; and 3) Losses imposed upon residents not directly displaced but located in surrounding areas.

Specific costs such as removal costs, costs of seeking alternative housing, disruption costs, changed operating costs can be further determined within these broad cost categories.

Since monetary valuation of the environmental costs of this project is expected to be difficult and incomplete, cost determination would have to be limited to the major, immediate and quantifiable ones such as:

- the cost of acquiring land needed for ROW; and

- the cost of relocating and resettling the squatters along the PNR ROW (Quirino to Alabang).

6.7.1 Land Acquisition Cost

Table 6-6 summarizes the estimated land acquisition costs for the proposed MST Interchanges. Costs were calculated based on: 1) zonal valuations, i.e. the municipal and city assessment for real estate tax purposes and 2) current (1992) asking prices for lots at/or near interchanges. (See Appendix A6-2).

The land area used in the calculations in Table 6-6 represents the approximate amount of privately owned land affected at the interchanges. (Appendix A6-2 provides details on each interchange.)

[19] Pearce, David. (1978). The Valuation of Social Cost.

A total of 75,055 sq m of privately owned land would be affected in the case of the Alignment with Alternative 1. In the case of the Alignment with Alternative 2, a total of 49,810 sq m would be affected. Privately owned land represents only 35% or 28% respectively of the total land area affected.

Table 6-5
ESTIMATED COSTS TO ACQUIRE PRIVATELY OWNED LAND FOR ROW AT MST INTERCHANGES

	LAND AFFECTED			PRIVATELY OWNED LAND ACQUISITION COSTS (In Million Pesos)*	
	Total Land Area Affected (sq m)	Government Owned Land (sq m)	Privately Owned Land (sq m)	Based on Zonal Valuation	Based on Seller Asking Prices
Alignment with Alt 1	214,455	139,400 (65%)	75,055 (35%)	₱ 551.62	₱ 1,230.13
Contingency (20%)				110.32	246.03
Total				₱ 661.94	₱ 1,476.16
Alignment with Alt 2	177,855	128,045 (72%)	49,810 (28%)	₱ 367.96	₱ 802.58
Contingency (20%)				73.59	160.52
Total				₱ 441.55	₱ 963.00

*Costs refer to the costs to acquire privately owned land only. Zonal valuation refers to value given by city and municipal governments for real estate tax purposes.

Source: Consultant's estimates (See Appendix A6-2)

Using zonal valuations will result in a cost of ₱ 662 million for land acquisition. At market prices the cost could be ₱ 1.5 billion.

6.7.2 Squatter Relocation Costs

Table 6-7 provides cost estimates for relocating the 2,483 squatter/families (11,215 persons) in the Quirino to Bicutan section of the PNR right-of-way. As relocation and resettlement comprises three phases: 1) Pre-relocation; 2) transfer; and 3) re-settlement, costs are presented for each phase.

Table 6-7
ESTIMATED COSTS TO RELOCATE SQUATTERS
RESIDING IN PNR RIGHT-OF-WAY

RELOCATION ITEMS	UNIT COST	SQUATTERS IN PNR RIGHT-OF-WAY	
		BASIS OF COST CALCULATIONS	TOTAL COST (Million Pesos)
1. Pre-Relocation Census, groundwork in the community (food and transportation), manpower requirements	₱ 150/family	2,483 families[20] x ₱ 150	₱ 0.37
2. Transfer Operations Manpower: 13-person demolition team completing demolition of 15 structures per day and loading items onto truck for transport to relocation site.	₱ 300/structure at a rate of 15 structures/day	1,076 structures[21] x ₱ 300.00	₱ 0.32
Trucking (outside Metro Manila)	₱ 2,000/trip/ structure	a) 1,076 structures transported x ₱ 2,000	₱ 2.15
3. Resettlement Site (Covers land acquisition and land development including basic infrastructure costs, outside Metro Manila) Minimum lot size: a) Metro Manila 36 sq. m.; b) Outside Metro Manila 60-75 sq. m.	₱ 28,000/lot	2,483 families x ₱ 28,000	₱69.52
4. Administrative overhead (includes, vehicles, operations staff, physical facilities, materials and etc.)	₱ 5,000/family	2,483 families x ₱ 5,000	₱12.42
Subtotal			₱84.78
5. Contingency (includes emergencies, overtime pay, security)	assume 20%		₱16.96
TOTAL			₱ 101.74

Source: Consultant's estimates based on cost information provided by NHA Resettlement and Development Services Department. These estimates approximate to ₱ 42,000 per family and are considered low estimates for relocation schemes which have been costed at ₱ 50,000 per family in the Philippines by other consultants.

[20] Estimated number of families from Quirino Avenue to Bicutan based on Barangay estimates.

[21] Estimated number of structures from Quirino Avenue to Bicutan based on PNR field survey. (A structure may have more than one family.)

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The total cost of relocation and resettlement is estimated at ₱ 102 million.[22] This cost covers land acquisition and the provision of basic infrastructure (main road, water lines, electricity) at the resettlement site.

Provision of housing at the resettlement site is not required under R.A. No. 7279. If housing is provided, this would double or triple the costs as shown in Table 6-8.

Table 6-8
SQUATTER RELOCATION COSTS INCLUDING HOUSING

HOUSING	UNIT COST	HOUSING COST FOR 2,483 FAMILIES (In Million Pesos)	TOTAL RELOCATION COSTS WITH HOUSING (In Million Pesos)
Row house 2 walls, roof, floor, slabs	₱ 25,000	₱ 62.08	₱ 434.13
Rooms 10 sq. m. concrete load bearing, toilet	₱ 40,000	₱ 99.32	₱ 218.34
House 4-wall cement house, wash basin, urinal	₱ 122,400 (₱ 3,400 per sq m)	₱ 303.92	₱ 463.86

Source: Consultant's estimates based on unit cost estimates provided by National Housing Authority and Housing and Urban Development Coordinating Council.

The provision of housing can contribute to 'successful' resettlement given other conditions, e.g. good site location near to jobs/schools/market places. However, housing alone will not create permanency at the new site. In addition, the squatters may not be able to sustain payment of the monthly amortization if it is more than ₱ 200.

6.7.3 Total Costs

The Consultant therefore estimates the range of total costs as ₱ 0.7 - to ₱ 2.0 billion covering only land acquisition and relocation and resettlement of squatters as shown in Table 6-9.

[22] This estimate (derived from NHA figures) is comparable to the recent (1978-1980) DPWH Mangahan relocation project with 3,000 families costing ₱ 49 million (land) + ₱ 20-30 million (site improvements) = ₱ 78 million in 1980 = ₱ 26,000 per family.

Table 6-9
TOTAL COST OF MITIGATING IMPACTS

COST ITEM	TOTAL COST (In Million Pesos)
Land Acquisition	
♦ Based on Zonal Valuation, 1992	₱ 662
♦ Based on sellers' asking prices, July 1992	1,476
Squatter Relocation and Resettlement	
♦ Without Housing (meets R.A. No. 7279 requirements)	102
♦ With Housing (client option)	464
Total Minimum Cost	₱ 764
Total Maximum Cost	₱ 1,940

Source: The Consultant's Estimates.

The cost of compensating loss of buildings and improvements is not included in the present analysis and would have to be dealt with in greater detail in the ensuing EIS.

Monetary compensation for loss of land, buildings and improvements as a result of ROW acquisition comprises the bulk of the costs. Lands along SLE and at interchanges command relatively high prices. There will be displacement of a large number of houses, apartments and condominiums thereby raising the total compensation costs even higher aside from eliciting adverse reaction from homeowners.

Higher land acquisition costs are expected for the proposed interchanges at Pres. Quirino Avenue, Pasay Road, Vito Cruz and Magallanes. At Pres. Quirino Avenue, the presence of several old houses creates opportunities for negotiations with property owners while at Vito Cruz and Pasay Road, land acquisition procedures may suffer delays due to the presence of costly structures such as condominiums, factory buildings and profitable businesses. At Magallanes, the issue is the large ROW required coupled with high land values.

The interchanges at Bicutan, Sucat and Alabang are potentially feasible with environmental consequences placing fewer structures in jeopardy of displacement. Nevertheless, increasing land values along the SLE corridor and towards Alabang may raise land acquisition costs. The Nichols-C-5 diversion road could also be costly in terms of removal of left frontage of the AFP Veterans Center building.

6.7.4 Cost Reduction Strategies

It is therefore logical to aim for reducing the monetary and social costs of the projects. For example, in highly built-up areas, alignments should stay as close as possible to the roads and railroads tracks. Another possible measure is not to construct interchanges at Vito Cruz and Pasay Road and instead concentrate the turning traffic to Magallanes and Pres. Quirino Ave. The latter should be accompanied by improvement of arterial roads servicing the Makati area where the volume of incoming and outgoing traffic is high.

A mitigation plan for the MST will therefore be critical in acquiring additional ROW and in proceeding with the construction and operation of the expressway.

Appendix A6-6 identifies the main features of such a plan which will inevitably center on compensation measures, and public scoping sessions and public relations campaigns. There will be several legal issues to resolve and expropriation costs for lands and buildings will be determined to a large extent by the legalities surrounding just compensation and eligibility for compensation.

The relocation of the Quirino to Bicutan squatters requires special planning. Appendix A6-6 therefore identifies procedures for relocation taking into consideration costs and other matters that will influence each step or procedure.

In attempting to reduce the costs of squatter relocation, these are seven strategies. These aim to reduce the numbers for relocation and/or reduce the size of the resettlement site needed. Table 6-10 lists the strategies which are discussed below.

A Provide a cash compensation to each family.

A cash compensation of ₱ 7,080 per family (based on a minimum daily wage of ₱ 117 x 60 days) would reduce costs by 83% to ₱ 17.6 million. However, Strategy A, would be contrary to RA No. 7279 which requires that relocation - either temporary or permanent be provided.

B Prioritize 670 families for relocation. The NHA uses a 10 year-stay at the site to be vacated as the criteria.

Although Strategy A reduces costs by 73%, it is not recommended as it in fact gives preferential treatment to squatting and sets up a precedence for squatting.

C Relocate the total 2,483 families and provide a lot with infrastructure to each household only. (In the case of the Quirino to Bicutan squatters, a household is composed of 2 - 3 families living as an economic and social unit in one structure. There are 1076 households.)

Strategy C would reduce the total relocation costs from ₱ 102 million to ₱ 54.47 million, a reduction of 47%.

Table 6-10
COST REDUCTION STRATEGIES FOR THE RELOCATION OF SQUATTERS

COST REDUCTION STRATEGIES	PROVISION OF LOT AND INFRASTRUCTURE	TOTAL RELOCATION COST (In Million Pesos)	PERCENTAGE DIFFERENCE IN COST OF ₱ 102 Million
A. Cash compensation only to all families (2,483 @ ₱ 7,080)	None	₱ 17.6	- 83%
B. Resettlement of only families living 10 years plus on tracks (670)	Lot with Infrastructure	₱ 27.44	- 73%
C. Resettlement of all families (1076 households)	Lot with Infrastructure each household	₱ 54.47	- 47%
D. Resettlement of only 'eligible' families (2,210)	Lot only	₱ 59.63	- 42%
E. Resettlement of all families (2,483)	Lot only	₱ 66.97	- 34%
F. Resettlement of only 'eligible' families (2,210)	Lot with Infrastructure	₱ 90.56	- 11%
G. Resettlement of all families (2,483)	Lot with Infrastructure plus housing	₱173.65	+70%

Source: The Consultant's Estimates

However, it is likely that this strategy would meet with resistance as 47% of the squatter families prioritize owing a house or lot as a result of relocation. (Consultant's survey). In addition, problems in the future could be created regarding ownership and title to the lot.

D Relocate families based on eligibility criteria defined in RA No. 7279 and provide lots only with no infrastructure. This means that only 2,210 families would be eligible as the Consultant's survey indicates 11% have previously received resettlement assistance.

Strategy D would reduce the total relocation costs to ₱ 59.63 million, a reduction of 42%. However, the strategy is not recommended as it may in fact encourage squatters to relinquish their lots. It could work if the lots were in proximity to

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basic services which they presently have (legally or illegally) along the tracks such as access to water, electricity, health centers and schools.

E Relocate the total 2,483 families and provide lots only without infrastructure.

Strategy E reduces costs by 34%. However, it is not recommended as it includes assistance to families who have previously received resettlement assistance in other circumstances and would therefore be encouraging squatting to continue.

F Resettle only "eligible' families as defined under RA No. 7279 -- 2,210 families in this case, providing lots with infrastructure to each family.

Strategy F reduces costs by 11% only to ₱ 90.56 million. This strategy would satisfy legislative requirements concerning relocation and resettlement. However, it is not recommended because for the expenditure, it does not guarantee that the squatters will use the site since housing and services are not provided.

G Resettle all 2,483 families providing lots, infrastructure and housing to each family.

Strategy G almost doubles the costs of relocation and is not recommended. Further, providing housing does not guarantee that the squatters will move into the houses on a permanent basis.

The recommended strategy is a combination of A and D for the 2,210 eligible families comprising

• Relocation with a lot for each family	₱ 59.63
• Cash compensation of ₱ 5,000 per family	₱ 11.05
	₱ 70.68 million

The cash compensation, however, is to be provided to the receiving LGU not to the family. In addition, it is provided only on condition that the LGU establishes the basic services - water, electricity, sewerage and waste disposal, access to primary roads at the resettlement site.

This would reduce the monetary costs of relocation by 31%, meet legislative requirements and also reduce the social costs of relocation through providing lot ownership as well as cash compensation. However, it offers no guarantees against the risk of squatters leaving the resettlement site to return to squatting.

6.8 ENVIRONMENTAL REQUIREMENTS FOR MST PROJECT

6.8.1 Regulatory Classification

Based on Philippine environmental legislation (Proclamation No. 2146), the proposed Manila South Tollway project falls within the scope of environmentally critical projects which include major roads and bridges that will traverse any highly developed urban areas, and which could affect the hydrology of traversed areas and also could substantially increase or impede traffic flow.

As a 'critical' project, the environmental procedures require the submission of an Environmental Impact Statement (EIS) to be submitted to the Environmental Management Bureau (EMB).[23] Essentially, the EIS should aim to: 1) Provide a brief description of the physical and social environment and identify the significant environmental issues; 2) Identify and recommend mitigating measures which are feasible and achievable, and which balance project benefits with environmental considerations. After review and approval by the EMB, an Environmental Compliance Certificate (ECC) would be issued clearing the project for implementation.

6.8.2 Specific Characteristics of MST

The regulatory classification of the MST as an 'environmentally critical' project must be footnoted with the actual site characteristics that modify its 'critical' nature as follows:

- Land use development and patterns in the corridor and outlying areas of the proposed alignment of the expressway show continuing urbanization trends, with growth in residential subdivisions towards Alabang accompanied by growth in service and commercial establishments. Over 50% of the SLE corridor between Bicutan and Alabang is industrial and there is high density commercial development north of EDSA.

  Industrial and commercial development will therefore, most likely continue to occur along the SLE corridor even without the construction of the MST. New industries are locating along the corridor such as around Sucat due to lower-priced accessible lands.

- Assuming growth continues, any idle lands will eventually be used up. Land prices have already been showing steady increase in the Alabang area. At interchanges, commercial land development has accelerated with banks established there indicating continuing and anticipated business in the area.

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[23] The Sucat to Alabang section falls within the Laguna Lake watershed area, which is under the jurisdiction of the Laguna Lake Development Authority (LLDA). In environmental management, the LLDA focuses on solid waste management, noise and odor control, air and water quality and therefore it is unlikely that the MST project would require a separate clearance from the LLDA. If a document is required, the EIS would serve this purpose. (Consultant's meeting with LLDA).

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- Squatters will continue to spring up where space is available on fringes of idle lands, along roadsides and near industries as possible places of employment. Density is greatest in the Bicutan to Alabang section on the PNR right-of-way.

  While the PNR squatters have shown fairly 'stable' numbers over the past six years (with Makati a main area of growth - 10 families a year), it is their long-term 'permanency' at this location that could present a problem in the future.

  Legislation (RA No. 7279) supports the resettlement of squatters from railway tracks which are defined as danger areas. Further, the project may serve to 'limit' growth in these communities along the tracks.

Since significant impacts will also not extend along the whole transport corridor, an alternative to a full scale EIS that is usually required for infrastructure projects is needed. An assessment that is tailored to the specific characteristics of the MST would be more effective as the analysis could focus on the critical issues such as losses arising from displacement of people and properties.

Further, as the Manila South Tollway is a BOT project and therefore dependent on private sector investment, a strategy that will facilitate compliance with environmental requirements and not hold up the project or impose cumbersome regulations is important. Experience in other BOT projects in France, Italy, US and Japan has shown that because of long term payback periods and relatively low rates of return, government must provide a range of incentives to attract the private sector. One of the incentives could be the granting of the Environmental Compliance Certificate (ECC). A key component of success relates to minimizing the risks and in the case of transport projects, guaranteeing acquisition of the right-of-way would include guaranteeing that all environmental requirements are met.

6.8.3 Recommended Requirements

Environmental requirements relate not only to legislation but also to the specific characteristics of a project. In the case of the MST, these requirements need early clarification especially as a high degree of uncertainty acts to discourage the private sector from participating in the project. The project is therefore dependent on a bidder who perceives it as 'attractive' at all levels. One of these levels is the environmental. In light of this, it is recommended that the environmental procedures:

- Reflect overall policy and legislation while tailoring the EIS to focus on the critical issues. This can be done in an EIS by identifying:

  (i) land expropriation costs at interchanges
  (ii) value of buildings/houses which will be affected
  (iii) value of business/industries displaced

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(iv) numbers of employees/people displaced
(v) any obligations of the project vis a vis these matters
(vi) full costs of relocating squatters
(vii) funding sources for relocation of squatters
(viii) actual relocation plan

- Use existing institutional channels in the environmental assessment process and not create new committees or agencies;

- Facilitate the BOT process through requiring:

  (i) The implementing agency to apply for and get the environmental clearance.

  (ii) The squatter relocation plan to be drawn up and implemented prior to the start of construction by the implementing agency.

6.9 SUMMARY AND RECOMMENDATIONS

The construction of the MST poses both technical and environmental challenges, given spatial limitations in traversing a highly built-up urban and commercial area, and rapid land conversion, densification and mixed land use development in the south. To the extent that the MST succeeds in addressing the growing transport needs inherent in metropolitan development, is the measure of its long-term benefit.

Construction of the MST would, however, be premature without an assessment of its environmental impacts. In the absence of this, such a project cannot be said to demonstrate full feasibility.

According to the Terms of Reference, the initial environmental examination was to identify impacts on the physical and social environments, assess them for their significance, and make recommendations on measures to mitigate any adverse social impacts on squatter families. This was done through 1) screening and analysis of impacts using a set of physical and social environmental criteria, 2) site survey of interchanges and squatter locations, and field verification on foot, 3) analysis of land use patterns and trends, and other data such as population trends, hydrology, noise, air quality.

It was found that although the MST (under Philippine legislation) is typically considered 'environmentally critical', by virtue of being an infrastructure project, its particular characteristics modify this classification:

- The MST uses an existing alignment and therefore does not have the full range of impacts associated with the construction of a new road. For instance, there will not be a need for large cut or fill sections. Further, it crosses an urban area that is still growing in terms of population and industrial and commercial development.

- The MST is not contrary to land use patterns within the corridor but supports the ongoing trends towards residential, commercial, and industrial development most especially in the Bicutan to Alabang section.

- The significant impacts occur at interchanges. At the Quirino, Vito Cruz and Pasay interchanges, several structures, businesses and people could be displaced. However, the decision to construct the Pasay and Vito Cruz interchanges will be dependent on the volume of traffic expected and improvements in arterial/service roads may serve to accomodate this.

- The impacts on squatters are less severe than anticipated. The project potentially impacts on 11,215 squatters i.e. 22% of all the squatters from Quirino to Alabang. The PNR rehabilitation plans which include resettlement components for the Paco to Tutuban section may have 'spill-over' effects for other squatters. Further, the squatter population particularly in the municipalities of Manila and Makati, have been evicted several times before from the PNR right-of-way and have returned to the tracks.

- The Consultant's field survey indicates that the squatters along the PNR right-of-way are willing to be relocated. Further, legislation (RA No. 7279) supports relocation as the railway tracks are considered 'danger areas'.

The existing spatial limitations along the alignment and the ongoing presence and social continuity of squatter communities present a number of environmental challenges.

The project as a whole, independent of particular alternatives selected, raises concerns with respect to acquisition of additional right-of-way. Compensation of land taken at interchanges for the MST could be between 0.7 - 1.5 billion pesos. This only covers land and does not include buildings and other improvements.

Higher land acquisition costs are expected for the proposed interchanges at President Quirino Avenue, Pasay Road, Vito Cruz and Magallanes. At President Quirino Avenue, the presence of several old houses creates opportunities for negotiations with owners while at Vito Cruz and Pasay Road, land acquisition procedures may suffer delays due to the presence of costly structures such as condominiums, factory buildings and profitable businesses. At Magallanes, the issue is the large ROW required coupled with high land values. The interchanges at Bicutan, Sucat and Alabang are potentially feasible with environmental consequences placing fewer structures in jeopardy of displacement. Nevertheless, increasing land values along the SLE

corridor and towards Alabang may raise land acquisition costs. The Nichols C-5 at grade section could also be costly in terms of removal of the left frontage of RSBS structures.

Relocation of squatters becomes necessary also to clear the right-of-way guaranteeing access to the BOT contractor. These costs are estimated at ₱ 102 million and ₱ 464 million if housing is provided at the resettlement site.

The total cost estimates for land acquisition and relocation and resettlement of squatters may range from ₱ 0.7 - ₱ 2.0 billion.

The implications for public relations and consultative contacts with property owners are evident. The social implications of resettling squatters and providing housing are profound. Regarding squatters, while the PNR, is in fact, the agency responsible for managing and clearing its own right-of-way, the project proponent may use this as an opportunity to demonstrate environmental commitment and ability to manage such issues fairly, within legislation, and with conscience.

On the basis of environmental concerns, certain project alternatives, such as the northwest alignment at the Sucat interchange was identified as more feasible since it reduced the level of adverse impacts. It would cut across privately owned idle land and potentially displace a fast food establishment. However, the southwest alignment would impact on the MASAY resettlement site and as well a large industrial company and other smaller establishments.

As the final design will be dependent on the proposal of the successful BOT bidder, other alternatives should be considered at interchanges namely at Quirino, Vito Cruz, and Pasay Road. The displacement of several buildings in these areas including a 14 storey condominium building, (481 apartments) constructed in 1986, several houses and businesses and a BLISS housing project respectively could potentially meet resistance, be costly in financial terms as well as in terms of 'public image' of the project.

Since the MST is a BOT project which, by their nature are complex projects both legally and financially, the environmental procedures should be streamlined with one channel for decision-making, and a target date for obtaining the Environmental Compliance Certificate (ECC). The initial environmental examination presented here in Chapter 6 should serve as part of the process towards obtaining the ECC so that procedural matters are not permitted to take up unnecessary time.

Based on this and the examination conducted, the recommendations associated with environmental concerns are:

- The level of content provided in the initial environmental examination should serve as a draft of the Environmental Impact Statement (EIS). The final draft of the EIS should therefore be a focused assessment of the significant impacts as identified in the initial environmental examination and should provide greater details on costs, identify the buildings and businesses to be displaced and make recommendations on the type of compensation that should be provided.

- The Environmental Compliance Certificate (ECC) should outline guidelines that will assist the BOT contractor towards an environmentally well-managed project. The DPWH should be responsible for acquiring the ECC which may be contracted out to a private consulting company familiar with the procedures and process. This would reduce the need for the private sector to get involved in the assessment and reduce the number of conditions under which the bidder must comply. Accountability would be established by allowing the proponent agency to determine and set the time frame for environmental requirements thus avoiding delay in project processing.

- In the final proposed design, alternative alignments should be evaluated for the Quirino, Vito Cruz, and Pasay interchanges.

- DPWH should conduct public scoping sessions with the different municipalities, residential subdivisions and communities to provide briefings on the proposed project as part of ongoing promotion and public relations.

- DPWH should act as the lead agency in carrying out the actual transfer of squatters as it has experience in resettlement schemes, with projects seen as part of the public need. It is also equipped to carry out relocation operations without a network of complicated coordination procedures between several agencies.

  It should work in close coordination with the NHA for determining eligible beneficiaries, with HUDCC in arranging financing and purchase of the site, with the LGUs for development of services at the receiving sites, and with organizations such as the Presidential Commission for the Urban Poor.

- A cost reduction strategy may be considered for relocating the squatters. This strategy would relocate only the 2,210 families eligible under RA No. 7279, i.e. families who have not previously received any relocation assistance, and provide:

  (i) A lot per family at the resettlement site
  (ii) Cash compensation of ₱ 5,000 per family to be paid to the LGU(s) of the receiving site(s) on condition that the LGU provides basic services at the site, i.e. water, electricity, sewerage and waste disposal, access to transport.

  This strategy reduces relocation costs by 31% while providing a mechanism to meet legislative requirements and also offer incentives to LGUs.

In compliance with USAID regulations, a list of the principal investigators for the environmental study is provided: Mabini E. Arevalo, Masters in Urban and Regional Planning, University of the Philippines. Project leader, Philippine Environmental Project, and member of environmental assessment team for various infrastructure projects.

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Chapter 7

FINANCIAL AND ECONOMIC EVALUATION

CHAPTER 7
FINANCIAL AND ECONOMIC EVALUATION

7.1 INTRODUCTION

This Chapter presents the highlights of the financial and economic evaluation of the Manila South Tollway (MST) from Alabang to President Quirino Avenue and the rehabilitation of the South Luzon Expressway (SLE) segment from Alabang to Magallanes. The objective of the financial analysis is to determine an appropriate rate of return for the potential BOT investors in the expressway project under realistic market conditions. The objective of the economic evaluation is to assess the MST BOT Project in terms of its contribution to the national economy.

7.1.1 Financial Evaluation

The primary objective of the financial evaluation is to assess the feasibility of the Manila South Tollway BOT Project under different financial, operating, and traffic assumptions from the perspective of the private investors in the project as well as to the Philippine Government. Financial projections are determined from the underlying project data and assumptions, including the present and projected traffic volume, construction and operating costs, and national and international macroeconomic and capital market conditions.

Financial feasibility is measured by the attractiveness of the Financial Internal Rate of Return (FIRR) vis-a-vis alternative investments with varying degrees of risk. The FIRR is the discount rate at which the net present value of the funds flows equals to zero. As a BOT Project, the private investors would be interested in the return on their equity investment, that is FIRR on equity. This is calculated based on the net cash flows to the investor after debt service and income tax payment. The private sector expectations from a BOT Project may be significantly higher for long term projects where perceived risks are high and difficult to quantify. The FIRR on equity assumes that the interest rate and debt service package is sufficient to satisfy the separate requirements of financial institutions and other holders of the short and long term debt.

There is no simple formula to determine a range of acceptable rates of return on invested capital. An investment banking approach is necessary similar to that set forth in Chapter Five, **Project Financing and Capital Markets**. Consideration is given to the investment climate, the business cycle, prevailing market rates of return on comparable debt and equity issues in the local capital markets, if any, and the alternative investment opportunities available to potential investors. Peso-denominated treasury bills provide a benchmark of the minimum expected financial return. For example, if treasury bills yield 17% and inflation is estimated at 7%, the hurdle rate for alternative investments is at least 10% in constant pesos. With foreign participation international

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capital markets must also be evaluated. Risk Assessment, interest rates, and expected FIRRs are discussed in Section 7.2.6.

The FIRR on the Project is also calculated based on the net cash flows from the Project before debt service and income tax payment. The National Economic and Development Authority (NEDA) guidelines for Government sponsored projects provide another measure of financial viability. NEDA guidelines require, at a minimum, that proposed projects are able to meet all financial obligations and that the financial internal rate of return should not be less than the weighted cost of capital (WCC). The WCC will differ with each project depending on the proposed mix of equity and debt, and local and foreign short- and long-term borrowing.

7.1.2 Economic Evaluation

Economic feasibility is measured by comparing the Economic Internal Rate of Return (EIRR) with NEDA guidelines, which stipulate a minimum EIRR of 15% for infrastructure projects. For BOT projects, the economic rates of return are generally higher than the financial rates of return because the concessionaire cannot capture all the benefits. In effect, the users share their "consumer surplus" with the concessionaire in some equitable fashion. There are two generally recognized direct economic benefits from highway investments:

- Reduction in vehicle operating costs (VOCs); and
- Reduction in travel time.

A third important benefit is the improved productivity resulting from reductions in transport costs and travel time. This development benefit is indirect and not usually quantified.

7.2 FINANCIAL EVALUATION

7.2.1 The Manila South Tollway Financial Model

The Manilla South Tollway Financial Model is an industry-specific financial planning model which projects the key financial statements of a corporate concessionaire -- the income statements, cash flow statements, and balance sheets -- over the useful life of a hypothetical concession. The model is written in generic "spreadsheet" language (Lotus 123, Version 3.1) and can be readily applied to any long- or short-term corporate planning exercise. A change in one or more assumptions or data inputs triggers a new set of fully integrated financial projections. Response time is instantaneous and the possibilities of testing a large number of different assumptions are virtually unlimited. The following sections describe the design of the financial model, its key inputs, and how it is used to simulate the financial performance of the

MST BOT Project under different assumptions. Figure 7-1 presents the flow chart of the data inputs, analytical procedures used to evaluate the MST BOT Project and the outputs. The figure also indicates where the data and procedures are described in greater detail in this report

7.2.1.1 Model Design

The financial planning model generates inter-related and integrated corporate financial statements (income statement, funds flow statements, and balance sheets), and their supporting schedules, over the life of the project. Each vertical column of the spreadsheet represents one calendar year, labelled to correspond to the expected project cycle. The model projects a three year period for planning and land acquisition (1993 to 1995), a three year construction phase (1996 to 1998) and an operating phase of 20 to 35 years (1996 through years 2015 to 2030). This periodicity and other parameters of the model are easily modified to fit different assumptions.

The supporting schedules generate the data which drives the model. Data inputs are based on the results of the separate studies on traffic, toll, and cost conducted by the engineers, economists, and traffic analysts. The principal supporting schedules are:

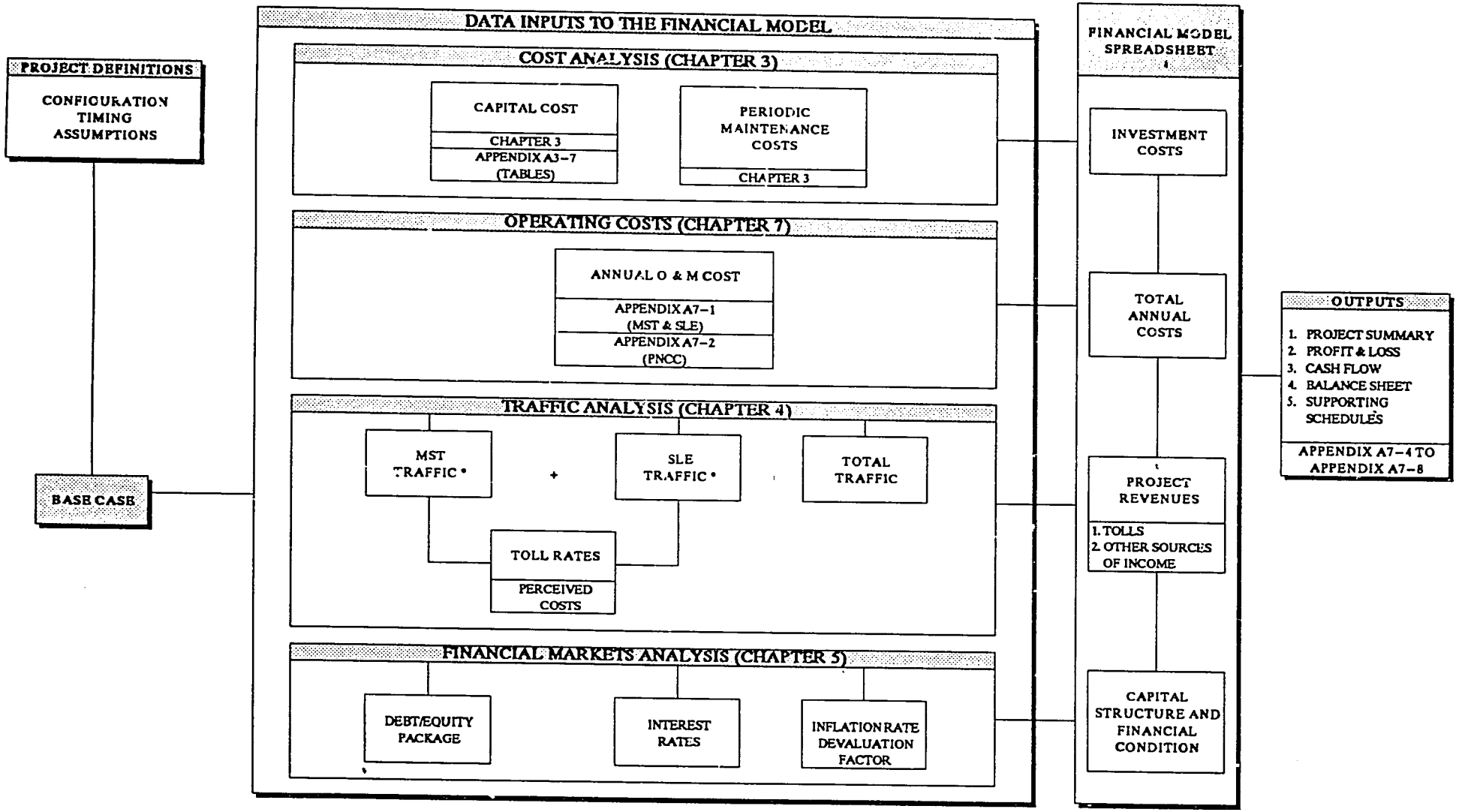
- Schedule of Annual Toll Revenues
- Schedule of Total Costs - Construction & Start-Up
- Schedule of Initial Capital Contributions (Private and Government)
- Initial Capitalization of the Concessionaire
- Schedule of Depreciation of Construction Costs/Capital Expenditures
- Amortization Schedule of Long Term Debt
- Schedule of Excess Cash and Short Term Loan Availments

Other supporting schedules, not needed in the project feasibility phase, can be added at any time depending on the degree of detail, clarity, and refinement desired. Line items that might receive detailed treatment in separate schedules are: Construction Costs, Fixed Assets, Net Working Capital, Dividends, Reserves, Taxes, etc.

7.2.1.2 Structure of the Financial Model

Data is introduced into the MST Financial Model as simple sets of numbers, or relations of numbers, e.g. assumed interest rates or derived traffic growth rates. It follows that the quality of the financial projections is directly related to the quality of inputs (Quality In, Quality Out). The Financial Model shows explicitly the data and assumptions used to generate the financial projections. Assumptions are grouped in four categories on each spreadsheet run: Physical, Financial, Traffic, and Toll Rates.

Figure 7–1
FLOW CHART FOR THE MANILA SOUTH TOLLWAY BOT FINANCIAL MODEL



* Note: Estimate of MST and SLE traffic are derived from a traffic network model which considers travel time and tolls on all competing paths in the Metro Manila road network.

Source: Consultant's Estimates

The financial model considers the Construction Phase as its point of departure. The pre-concession agreement costs which are assumed to be incurred by Government, including feasibility studies, design costs, and land acquisition were excluded. Cost data during the construction phase is based on the physical quantities, unit costs, and schedule of implementation described in Chapter 3. The financial model annualizes these costs, applies the assumed inflation rate, and capitalizes the interests incurred during construction based on an assumed construction loan drawdowns. All costs incurred during the construction phase, plus the mandatory Reserve Fund are then summarized in the Schedule of Total Investment Costs. These are then allocated to the private concessionaire and the Government of the Philippines based on the assumptions of the model run.

The Cash Flow Statements summarize the changes in financial condition and reconciles changes in the Balance Sheets from year to year. Capital contributions are brought through the Funds Flow Statement (as Sources of Funds) to pay off the construction loan plus capitalized interest and to fund the remaining capital costs (Uses of Funds). A long term debt and equity contributions are assumed at a ratio of 3:1.

Toll revenues for years 1999, 2010, 2020 and 2030 are based on the optimum toll revenues expected to be generated from the MST and the SLE at varying traffic projections and toll rates (See Chapter 4). Other key assumptions relate to financial market conditions and the economic environment analyzed in Chapter 5, including interest rates for short and long term debt, assumed annual rate of inflation and devaluation, and the ability of local and international capital markets to finance long term infrastructure investment projects in the Philippines with and without Government guarantees.

7.2.1.3 Project Configuration

The following project configurations considering two options each (box girder and AASHTO girders) are presented in Chapter 3.

- Six lane MST expressway (full length from Alabang to President Quirino Avenue, 19 kms.)
- Four lane MST expressway (full length from Alabang to President Quirino Avenue, 19 kms.)
- Six lane MST expressway (partial length from Alabang to Magallanes, 14.5 kms.)
- Four lane MST expressway (partial length from Alabang to Magallanes, 14.5 kms.)

The difference in these alternative configurations as far as the financial model is concerned represents a classic tradeoff in design alternatives: higher initial capital cost of the six lane expressway permit higher revenues in later years vis-a-vis lower initial costs and lower revenue generating capacity of the four lane alternative. The financial model is well suited to help decision makers choose between these alternatives by providing comparative rates of returns under different assumptions.

Considering the traffic projections on the corridor for a six lane expressway, the financial evaluation was done in detailed only for Alternative 4 - Box girder, 6 lanes for the following configuration:

- Six lane MST expressway, full length from Alabang to President Quirino Avenue, 19 kilometers (See Table 3-5); and

- Six lane MST expressway, partial length from Alabang to Magallanes, 14.5 kilometers, (See Table A3-7-8).

In addition, the rehabilitation of the South Luzon Expressway segment from Alabang to Magallanes (14.5 kilometers) is assumed in each case.

7.2.1.4 Government Subsidy and The Base Case

Initial runs of the financial model looked at the viability of the project without Government subsidy. It soon became apparent from the low rates of return that a substantial subsidy would be required to make the project financially feasible. For this reason, the Base Case and the alternatives considered provide a government subsidy equivalent to 40% of the construction cost in the form of an interest-free advance to the concessionaire. This subsidy is similar to that assumed in the Pre-Feasibility Study.

7.2.2 Total Investment Costs

The total investment cost amounted to ₱27.7 billion for the full length and ₱23.8 billion for partial length. Total investment includes capitalized interest during construction, initial working capital, and loss and debt reserves. (See Table 7-1)

Table 7-1
TOTAL INVESTMENT COST
(In Current Millon Pesos)

	FULL LENGTH (ALABANG TO PRES. QUIRINO)	PARTIAL LENGTH (ALABANG TO MAGALLANES)
Construction Cost	₱ 18,493	₱ 15,096
Capitalized Interest	3,163	2,624
Working Capital	89	82
Reserve Fund - Debt Service	2,000	2,000
Reserve Fund - Operating Losses	4,000	4,000
Total	₱ 27,745	₱ 23,802

Source: Consultant's Estimates

7.2.2.1 Pre-Concession Costs

As stated earlier, pre-concession agreement or contract costs are not considered in the MST financial model. The cost of feasibility studies, preliminary and final design, and land acquisition are assumed to be borne by Government. The pre-concession costs is estimated at ₱1.17 billion for the full length MST and ₱0.74 billion for the partial length MST. The costs are described in detail in Chapter 3.

7.2.2.2 Construction Costs

Construction costs are estimated for the Manila South Tollway and for rehabilitation of the reverted portion of the South Luzon Expressway based on prevailing peso prices as of July 1992 (See Chapter 3 for details). The MST Financial Model converts the 1992 Peso values to current Pesos by adding an allowance for inflation. The total investment cost includes interest during construction (IDC), allowances for initial working capital, and loss and debt reserves.

7.2.2.3 Capitalized Interest

Generally accepted accounting principles require that all cost incurred to bring the project to the point of use or service be added to the investment cost. Thus, interest charges attributable to construction in progress are capitalized; interest charges attributable to the completed project and current operations are expenses.

7.2.2.4 Price Changes and Exchange Rate

Inflation is a major cost of doing business in the future. Initial cost estimates are stated in prices prevailing in mid-1992 levels. However, construction costs will be incurred in money of 1996 to 1998 value. The difference in Philippine price levels between the present and the future costs must be estimated to avoid future shortfalls. Likewise, dollar-based costs are converted to pesos at the exchange rate of US$1.00 to ₱25 prevailing in July 1992. Annual long term inflation is estimated at 9% and annual devaluation is estimated at 6% over the life of the project. The difference of 3% is the consultant's estimated allowance for U.S. inflation. The financial model described below can readily adjust costs and revenues for other estimates of inflation and devaluation.

7.2.2.5 Working Capital

A minimum cash level of approximately of one-half year's cash operating requirements for the succeeding year is assumed. Any cash shortfall will be financed by short-term credits; any excess cash will be retained on hand. The excess cash maybe invested in temporary insecurities or used to pay dividends to common stockholders. However, no earnings will be assumed on any temporary placements, nor will dividends be paid to the common stockholders. The minimum cash balance and the reserve funds are invested in short term treasury bills and the interest income, net of the 20% final withholding tax, is added to annual operating income.

7.2.2.6 Loss and Debt Service Reserves

In accordance with international banking practice, provision is made for a Loss Reserve, if necessary, to cover operating losses during initial years of operations. In addition, a Debt Service Reserve approximately equal to one year's debt service is also established. These Reserves are funded with cash and held in escrow to satisfy the covenants of lending institutions. Interest income from these reserves is an important additional source of income and is added to operating profits as described in the preceding paragraph.

7.2.3 Capital Structure and Financial Conditions

The review of local and international capital markets in Chapter 5, **Project Financing and Capital Markets**, sets the parameters for the kind of financial package which might be put together to fund the proposed tollway project. Key financial assumptions, such as debt:equity ratio, and the availability, term and cost of short and long term borrowing, are discussed in this chapter. The project will be financed by funds obtained from foreign and local shareholders, banks, and long term lending institutions. A debt:equity ratio of 3:1 is assumed during the construction phase, at startup of operations, and over the life of the project. A summary of project capitalization for the base case (full-end partial length) during construction and startup is shown in Table 7-2.

Table 7-2
PROJECT CAPITALIZATION
(In Current Million Pesos)

	FULL LENGTH (ALABANG TO PRES. QUIRINO)	PARTIAL LENGTH (ALABANG TO MAGALLANES)
Stockholders' Equity	₱ 4,499	₱ 3,853
Long Term Borrowings		
Foreign(ADB/World Bank/Exim Bank Loans)	6,105	5,330
Foreign Commercial Loans	6,867	5,995
Development/Local Commercial Loans	2,289	1,998
Cash from Operations	588	588
Government Advances/Subsidy	7,397	6,038
Total	₱ 27,745	₱ 23,802

Source: Consultant's Estimate

7.2.4 Key Assumptions

7.2.4.1 Toll Revenues

- Traffic - The forecasts of corridor traffic are estimated in Chapter 4, **Traffic Analysis.** Traffic forecasts are stated in terms of vehicle/kilometers for the MST and relevant portions of the SLE.

- Toll Rates - The interaction between toll rates, traffic volume, and project revenues for cars and trucks is discussed in Chapter 4, where a range of toll rates is analyzed and discussed. The annual toll revenue is estimated based on the assumed toll rates and projected traffic levels. For 1999, the estimated annual toll revenue is maximized at a toll rate of ₱1.25 per km for cars and jeepneys and ₱2.50 per km for trucks and buses. For the MST which is assumed to be using the barrier system of collection, a fixed toll of ₱12.50 per entry for cars and ₱25 per entry for trucks are assumed.

7.2.4.2 Concession Income

Concession revenues from gas stations, restaurants, parking, etc. constitute a significant source of income for some tollroad authorities, especially interurban expressways or expressways involving new alignments. In the United States, for example, concession income of tollway

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authorities averages about 6% of toll revenues. In the case of the Manila South Tollway, no income from concessions is considered because needed alignments are substantially in place and fully utilized.

7.2.4.3 Operations and Maintenance (O&M) Costs

Operating costs include staff and payroll costs associated with collecting tolls and other costs of operating the concession. Annual routing maintenance cost includes maintenance of pavement and toll facilities, collection of litter, traffic management (policing), landscaping, grass cutting, etc. Operating and maintenance costs are partially based upon PNCC experience. However, the operating and maintenance costs for the project are somewhat higher than PNCC costs reflecting the more intensive maintenance requirements of an elevated structure. The assumptions used for estimating the operating and maintenance expenses for the MST and SLE are discussed in Appendix A7-1 while Appendix A7-2 describes the historical PNCC operating and maintenance costs. General and administrative cost is estimated at ₱9.0 million in 1992 prices.

7.2.4.4 Depreciation

It is common practice to depreciate private sector tollroad investments using the straight line method of depreciation over the estimated useful life of the asset or the franchise period whichever is shorter. Property, plant and equipment are assumed to be depreciated on a straight line method of depreciation using an accelerated useful life assumption of 20 years.

7.2.4.5 Income Tax

Income tax liability is assumed at the standard corporate rate of 35% of annual net income.

7.2.4.6 Tax Holiday

A tax holiday of six years is assumed in accordance with government incentives for preferential new investment projects.

7.2.4.7 Periodic Maintenance Costs

Periodic maintenance includes the cost of major maintenance to the pavement such as resealing and overlaying after completion of construction. The periodic maintenance requirements and the estimated costs are described in Chapter 3. Periodic maintenance costs are funded by a Reserve Fund. Capital expenditures are capitalized and depreciated over their assumed useful life, approximately six years in the case of pavement overlay.

7.2.5 Risk Assessment

Expected rates of return are affected by many risks. Inflation is perhaps the most obvious and pervasive risk. Knowledgeable investors will require a return on investment greater than the expected rate of inflation. During periods of very high inflation they will prefer to hold foreign assets, real estate, precious metals, speculative investments, or high yielding short term debt instruments. Even Government securities, otherwise risk-free, are not immune to the risks of inflation. If inflation exceeds interest rates, fixed interest government securities can result in real losses to the investor. In the Philippines, relatively high rates of inflation, political uncertainty, and a stagnating economy have created severe capital shortages and high interest rates which, together, make long term borrowing, an essential facility for infrastructure projects, problematic at best. These factors are discussed in Chapter Five, **Project Financing and Capital Markets.** The interest rate structures assumed in the study are summarized in Table 7-3.

Table 7-3
INTEREST RATES AND EXPECTED RATES OF RETURN
(Percentage Points Assigned)

	ITEM	SHORT TERM		LONG TERM		FINANCIAL MODEL
		(MIN)	(MAX)	(MIN)	(MAX)	
1	Real Interest Rate	5	5	5	5	5
2	Quality of Borrower	1	5	1	5	3
3	Inflation factor	10	12	8	10	9
4	Project Risk	2	5	4	5	5
5	Bank Interest Rate	18	27	18	25	22
6	Construction Loan	-	-	-	-	18
7	Long Term Debt					
	- 5 year term	-	-	-	-	18
	- Rollover 5 years	-	-	-	-	18
8	Entrepreneur's Premium	2	3	2	3	2
9	FIRR (Current)	20	30	20	28	24
10	FIRR (Constant)	10	18	12	18	15
1	Treasury Bills (One Year)	16	22	n.a.	n.a.	14
2	LIBOR	3.6	5.6	5	10	7½

Notes:(Min) = Minimum(Max) = Maximum
Source: Consultant's Estimates

Expressways, like other infrastructure projects, are complex and entail a number of risks which may adversely affect cash flow and profitability. Some of the risks identified below are project specific; other risks are more general affecting the economy as a whole:

Project Specific Risks

- Completing the project on time;
- Completing the project within cost;
- Risk of obstructive legal proceedings;
- Force Majeure, e.g., a major earthquake or flood;
- Traffic growth risk;
- Toll rate risk;

Environmental Risks

- Inflation risk;
- Political risk, (expropriation, nationalization, etc.);
- Risk of war, revolution, or insurrection;
- Foreign exchange risks (availability, convertibility);
- Interest rate risks;
- Risk of higher income tax rates.

Some risks such as the foreign exchange rate and convertibility are of greater concern to international investors than to local investors. Based on international experience, project risks for a tollway project require about 4 to 5 percentage points of incremental return in order to attract serious investor interest. From the point of view of financial institutions (banks), the market interest rate is also affected by the creditworthiness of the investor. Governments are generally considered to have the best credit rating, followed by blue chip companies. A new start-up company, such as a tollway concession, will necessarily pay higher rates until it has established a record of profitability, performance, and timely debt service. Banks will also consider the term of the investment and assign a higher rate to long term investments. Finally, the interest rate of treasury bills may be taken as a minimum lending rate. In the Philippines, the high interest rates paid by the treasury bills reflect the high cost of money of the financial system as a whole.

7.2.6 The Manila South Tollway Financial Simulations

During the course of the study, a large number of financial simulations have been run on the model assuming a variety of hypotheses. Five simulations have been reproduced in final form testing alternative financing plans. The computer printouts, seven pages in each alternative, are in the Volume of Appendices, Appendix A7-4 through A7-8. A one page **Project Summary** for each alternative is reproduced as Tables 7-4 through 7-8. For each computer simulation, the **Project Summary** lists the physical and financial parameters, assumed toll rates, summaries of

construction costs, capitalization of the concessionaire, subsidy assumptions, if any, terms of the long term debt, and the Financial Internal Rates of Return (FIRRs) on the Project as a whole and on Equity, both in current and constant dollars terms, for a range of possible concession lengths.

- The Base Case. The Base Case assumes the large financing requirement of the project is met by a 3:1 Debt to Equity Ratio. The long term loans are sourced 85% from foreign financial institutions and 15% from local banks. The composition of the debt package is as follows: Foreign Development Loans (45%), Foreign Commercial Loans (40%) and Local Development Bank and Commercial Bank Loans (15%).

- Corporate Bond. This alternative assumes a Debt Equity Ratio of 70:30, and no foreign borrowing. Sixty percent of the total financing requirements are met from the proceeds of a 15 year tax-exempt corporate bond, bearing interest at 17%.

- The Base Case (Partial). This alternative assumes reduced length construction of the elevated expressway, a total of 14.5 kilometers, from Alabang to Magallanes with only a slight reduction in the annual toll revenues. Significant savings are realized in right-of-way acquisition, the number of interchanges, and total construction costs from Magallanes to President Quirino Avenue.

- Corporate Bond (Partial). Idem.

- Tollway Authority. This alternative assumes a public sector initiative, without private participation. Project is assumed to be funded by Overseas Development Assistance (ODA) loans and local tax-exempt revenue bonds.

7.2.6.1 The Base Case

The major assumptions and findings of the Base Case are set forth in the **Project Summary**, Table 7-4. This covers the full-length six lane elevated MST (19 kilometers) plus corresponding 14.5 kilometers of the rehabilitated segment of the SLE from Alabang to Pres. Quirino Ave. Construction is scheduled for years 1996 to 1998. The rehabilitated portion of the SLE is assumed to generate toll revenues starting 1997, thus reducing the required initial equity of the concessionaire. The full concession is expected to be operational from beginning of 1999.

Tolls are set at the revenue-maximizing rates furnished by the traffic model (See Appendix A4-3). Tolls are increased in real terms over the life of the concession to reflect rising incomes and affordability. Tolls for cars and jeepneys in 1992 Pesos range from ₱1.25 per km in year 1999 to ₱2.00 per km in year 2030. Truck and bus tolls are assumed twice the car and jeepney toll rates.

A fundamental assumption of the Pre-Feasibility Study is the need for some Government subsidy. The consultant's findings confirm the need for substantial subsidy. For ease of comparison with the Pre-Feasibility Study, the Government subsidy equivalent to 40% of the construction cost is assumed. In addition, the Government is assumed to shoulder 100% of Pre-Concession Contract Costs.

The financing package reflects the consultant's estimates of long-term funds availability (85% of the debt is assumed borrowed internationally), and an initial Debt to Equity Ratio of 3:1, a maximum which may be allowed by financial institutions.

Total project costs are increased substantially by the capitalized interest, initial working capital of the concessionaire, and the reserve funds for debt service and operating losses required by financial institutions. Thus, the total investment cost is estimated at ₱27.7 billion in current pesos ($815 million in current dollars). Construction costs alone are about ₱18.5 billion in current pesos ($551 million), or about 68% of total costs.

The financial internal returns on Stockholders are well below the minimum standards set in Table 7.3. The FIRR on equity over a 35 year concession is 14.3% in current Pesos and 8.1% in constant dollar. At the same time, financial indicators of liquidity and profitability are unacceptably low. For the same concession period, the FIRR on the Project is 15.2%, higher than the WCC of 11.4%.

The concession sustains net losses until Year 2008, eroding equity. Likewise, net cash deficits forces the concessionaire either to infuse additional equity or, as the model assumes, to incur short term borrowing to maintain solvency.

7.2.6.2 Corporate Bond

This alternative does little to improve the overall liquidity and profitability of the concessionaire. Despite the assumption of a 15 year balloon payment on the corporate bond representing 60% of the concessionaire's capitalization, the higher annual interest payments equivalent to 17% per annum more than offset the costs of devaluation in the base case. The 17% interest is payable each year on the total corporate bond floated whereas the devaluation component of the foreign debt in the base case is incurred only on the annual repayment of principal and interest. This alternative has a higher cost of financing of 17% compared to the weighted cost of capital in the base case of 11.4%. The FIRR on equity is 12.6%, slightly lower than the base case. The FIRR on project is 15.2%, lower than the WCC for this alternative of 18%.

7.2.6.3 The Base Case (Partial)

Under this alternative, total investment cost is estimated at ₱23.8 billion, a reduction of ₱3.9 billion due to the lower construction cost of the MST. Although the FIRR on equity slightly

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improved to 15.8% for the 35 year concession period, this is still way below the acceptable rate of return to a private investor of 24%. Based on the FIRR on the project, the BOT project is feasible with an FIRR of 16.4%, higher than the 11.4% WCC assumed for the project. Profitability and liquidity indicators slightly improved but are still unacceptably low.

7.2.6.4 Corporate Bond (Partial)

Under this alternative, the overall liquidity and profitability of the concessionaire did not improve substantially. This alternative has a higher cost of financing of 17% compared to the WCC in the base case of 11.4%. The FIRR on equity is 13.9%, 1.8 percentage points lower than the base case (partial). The project is not viable under this alternative. The FIRR on the project is 16.4%, lower than the WCC of 18%.

7.2.6.5 Tollway Authority

This alternative assumes that the 40% of the total investment cost will be advanced by the Government in the form a government equity in the Tollways Authority. The other 40% of the investment cost is assumed to be sourced from the Asian Development Bank and the World Bank while the rest from the local capital markets. The FIRR on equity is 15.2% while the FIRR on Project is 15.7% for the 35 year concession period. The WCC under this alternative is 10.56%, lower than the FIRR on the project (16.4%).

7.2.7 Financial Feasibility Analysis

In view of tne low financial returns resulting from each of the detailed simulations described above, it is useful to take a more synoptic view of the project's overall financial situation so as to determine what might be required for it to meet minimum acceptable rates of return. The first year benefit/cost ratio (FYBCR) can be a useful tool for this purpose. If project costs and revenues satisfy a number of conditions, the FYBCR identifies the opening year which maximizes a project's net present value; this is called the optimum opening year. The calculation of and logic behind the use of the FYBCR method is described in Appendix A7-9.

While the FYBCR method can be used to analyze an arbitrarily complex project in full detail, one of its advantages is that it can also be quickly applied to a simplified project description to give an approximate indication about the project's optimum timing. Such a "quick and dirty" calculation is of course no substitute for a detailed financial analysis, yet by abstracting away many of the details of a project's financial situation a clearer image of its overall financial viability can be formed. If optimistic — even wildly optimistic — simplifying assumptions are made and yet the FYBCR calculation shows that the project's optimum opening year is very far removed, then it is reasonable to conclude that no relatively small change in the project's basic parameters (costs including financing arrangements, revenues) will render the project financially worthwhile in the near term.

Table 7-4
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers		SLE	14.5
		MST	19.0
Number of Lanes Constructed		MST	6
Construction (Months)			36
Opening Year:		SLE	1997
		MST	1999
Length of Concession (Years)			20 to 35
Average Cost/Kilometer(P million)	Rehabilitation	SLE	73
(Pesos Million)	New Construction	MST	575
(Dollars Million)			$23
Pre-concession or contract cost(Pesos million)			1,166
Operating expenses(Pesos million)			50
Maintenance (Pesos million)			38
General and administrative expenses			9
Periodic Maintenance (Resurfacing)	Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs +	Every 6 Yrs	MST	910
Land Cost & Access Roads			NA
Revenue Sharing & Concession Income			–

FINANCIAL

Initial Debt: Equity Ratio	3:1	75%	25%
Exchange Rate -- Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate – See Schedule below			
Repayment period – See Schedule below			
Front End Fee			0.5%
Interest Rate – Cash & Reserves			14.0%
Interest Rate – Short Term Investments			–
Interest Rate – Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy			40.0%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	19.0 Kms @ MPesos 575/km	MST	3,277	3,277	4,370	10,924		
(Constant Pesos July 1992 Value)		SLE	1,060	–	–	1,060		
	Plus Inflation		1,785	1,765	2,959	6,509		
Total	Current Pesos		6,122	5,043	7,328	18,493	$551	100%
Government Share	40%		2,449	2,017	2,931	7,397	$221	40%
Private Share	60%		3,673	3,026	4,397	11,096	$331	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	18,493	$551
Interest During Construction	3,163	$92
Initial Working Capital	89	$3
Reserve Fund – Debt Service	2,000	$56
Reserve Fund – Operating Losses	4,000	$113
Total	27,745	$815

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		7,397	$221	26.7%
Long-Term Debt		15,261	$446	55.0%
Equity – Construction	2,774			
Equity – Startup	1,725			
Cash from Operations	588	5,087	$149	18.3%
Total		27,745	$815	100.0%

LONG TERM DEBT – TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	6,104	40.00%	10.75%	10 years, inclusive of 1 year grace period
Foreign Commercial Banks	6,867	45.00%	9.50%	10 years, inclusive of 2 year grace period
Development/Local Commercial Banks	2,289	15.00%	18.70%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity

	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	0.0%	9.4%	12.6%	14.3%
Constant Dollar	-5.3%	3.6%	6.6%	8.1%

FIRR/Project

	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	9.4%	12.5%	14.2%	15.2%
Constant Dollar	4.5%	7.2%	8.7%	9.6%

Table 7-5
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers	SLE	14.5
	MST	19.0
Number of Lanes Constructed	MST	6
Construction (Months)		36
Opening Year:	SLE	1997
	MST	1999
Length of Concession (Years)		20 to 35
Average Cost/Kilometer(P million) Rehabilitation	SLE	73
(Pesos Million) New Construction	MST	575
(Dollars Million)		$23
Pre-concession or contract cost(Pesos million)		1,166
Operating expenses(Pesos million)		50
Maintenance (Pesos million)		38
General and Administrative Expenses(Pesos million)		9
Periodic Maintenance (Resurfacing) Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs + Every 6 Yrs	MST	910
Land Cost & Access Roads		NA
Revenue Sharing & Concession Income		–

FINANCIAL

Initial Debt: Equity Ratio	2.33:1	70%	30%
Exchange Rate – Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate – See Schedule below			
Repayment period – See Schedule below			
Front End Fee			0.5%
Interest Rate – Cash & Reserves			14.0%
Interest Rate – Short Term Investments			–
Interest Rate – Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy			40.0%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	19.0 Kms @ MPesos 575/km.	MST	3,277	3,277	4,370	10,924		
(Constant Pesos July 1992 Value)		SLE	1,060	–	–	1,060		
	Plus Inflation		1,785	1,765	2,959	6,509		
Total	Current Pesos		6,122	5,043	7,328	18,493	$551	100%
Government Share	40%		2,449	2,017	2,931	7,397	$221	40%
Private Share	60%		3,673	3,026	4,397	11,096	$331	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	18,493	$551
Interest During Construction	3,163	$92
Initial Working Capital	89	$3
Reserve Fund – Debt Service	2,000	$56
Reserve Fund – Operating Losses	4,000	$113
Total	27,745	$815

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		7,397	$221	26.7%
Long-Term Debt		14,244	$416	51.3%
Equity – Construction	3,329			
Equity – Startup	2,188			
Cash from Operations	588	6,104	$178	22.0%
Total		27,745	$815	100.0%

LONG TERM DEBT – TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	–	–	–	–
Corporate Bonds	12,209	60.00%	17.00%	15 years, inclusive of 15 year grace period
Development/Local Commercial Banks	2,035	10.00%	24.00%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	–15.9%	6.4%	10.5%	12.6%
Constant Dollar	–20.5%	0.7%	4.6%	6.6%

FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	9.4%	12.5%	14.2%	15.2%
Constant Dollar	4.5%	7.2%	8.7%	9.6%

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Table 7-6
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers	SLE	14.5
	MST	14.5
Number of Lanes Constructed	MST	6
Construction (Months)		36
Opening Year:	SLE	1997
	MST	1999
Length of Concession (Years)		20 to 35
Average Cost/Kilometer(P million) Rehabil	SLE	73
(Pesos Million) New Construction	MST	603
(Dollars Million)		$24
Pre-concession or contract cost(Pesos million)		737
Operating expenses(Pesos million)		47
Maintenance (Pesos million)		34
General and Administrative Expenses(Pesos million)		9
Periodic Maintenance (Resurfacin Every 6 Y	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs + Every 6 Y	MST	910
Land Cost & Access Roads		NA
Revenue Sharing & Concession Income		–

FINANCIAL

Initial Debt: Equity Ratio	3:1	75%	25%
Exchange Rate – Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate – See Schedule below			
Repayment period – See Schedule below			
Front End Fee			0.5%
Interest Rate – Cash & Reserves			14.0%
Interest Rate – Short Term Investments			–
Interest Rate – Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy			40%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	14.5 Kms @ MPesos 603/km	MST	2,622	2,622	3,496	8,741		
(Constant Pesos July 1992 Value)		SLE	1,060	–	–	1,060		
	Plus Inflation		1,515	1,412	2,367	5,295		
Total	Current Pesos		5,197	4,035	5,864	15,096	$451	100%
Government Share	40%		2,079	1,614	2,345	6,038	$180	40%
Private Share	60%		3,118	2,421	3,518	9,057	$270	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	15,096	$451
Interest During Construction	2,624	$76
Initial Working Capital	82	$2
Reserve Fund – Debt Service	2,000	$56
Reserve Fund – Operating Losses	4,000	$113
Total	23,802	$699

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		6,038	$180	25.4%
Long-Term Debt		13,323	$389	56.0%
Equity – Construction	2,264			
Equity – Startup	1,589			
Cash from Operations	588	4,441	$130	18.7%
Total		23,802	$699	100.0%

LONG TERM DEBT – TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	5,329	40.00%	10.75%	10 years, inclusive of 1 year grace period
Foreign Commercial Banks	5,995	45.00%	9.50%	10 years, inclusive of 2 year grace period
Development/Local Commercial Banks	1,998	15.00%	18.70%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	4.6%	11.8%	14.4%	15.8%
Constant Dollar	-0.9%	5.9%	8.4%	9.7%

FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	11.0%	13.9%	15.5%	16.4%
Constant Dollar	6.1%	8.6%	10.0%	10.8%

Table 7-7
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND. PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers		SLE	14.5
		MST	14.5
Number of Lanes Constructed		MST	6
Construction (Months)			36
Opening Year:		SLE	1997
		MST	1999
Length of Concession (Years)			20 to 35
Average Cost/Kilometer(P million)	Rehabilit	SLE	73
(Pesos Million)	New Construction	MST	603
(Dollars Million)			$24
Pre-concession or contract cost(Pesos million)			737
Operating expenses(Pesos million)			47
Maintenance (Pesos million)			34
General and administrative expenses(Pesos million)			9
Maintenance (Resurfacing)	Every 6 Yr	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs +	Every 6 Yr	MST	910
Land Cost & Access Roads			NA
Revenue Sharing & Concession Income			–

FINANCIAL

Initial Debt: Equity Ratio	2.33:1	70%	30%
Exchange Rate–Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate–See Schedule below			
Repayment period–See Schedule below			
Front End Fee			0.5%
Interest Rate–Cash & Reserves			14.0%
Interest Rate–Short Term Investments			–
Interest Rate–Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy			40.0%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	14.5 Kms @ MPesos 603/km	MST	2,622	2,622	3,496	8,741		
(Constant Pesos July 1992 Value)		SLE	1,060	–	–	1,060		
	Plus Inflation		1,515	1,412	2,367	5,295		
Total	Current Pesos		5,197	4,035	5,864	15,096	$451	100%
Government Share	40%		2,079	1,614	2,345	6,038	$180	40%
Private Share	60%		3,118	2,421	3,518	9,057	$270	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	15,096	$451
Interest During Construction	2,624	$76
Initial Working Capital	82	$2
Reserve Fund–Debt Service	2,000	$56
Reserve Fund–Operating Losses	4,000	$113
Total	23,802	$699

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		6,038	$180	25.4%
Long-Term Debt		12,435	$363	52.2%
Equity–Construction	2,717			
Equity–Startup	2,024			
Cash from Operation	588	5,329	$155	22.4%
Total		23,802	$699	100.0%

LONG TERM DEBT–TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	–	–	–	–
Corporate Bonds	10,658	60.00%	17.00%	15 years, inclusive of 15 year grace period
Development/Local Commercial Banks	1,776	10.00%	24.00%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	-3.5%	8.6%	12.1%	13.9%
Constant Dollar	-8.6%	2.9%	6.2%	7.8%

FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	11.0%	13.9%	15.5%	16.4%
Constant Dollar	6.1%	8.6%	10.0%	10.8%

Table 7–8
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers		SLE	14.5
		MST	19.0
Number of Lanes Constructed		MST	6
Construction (Months)			36
Opening Year:		SLE	1997
		MST	1999
Length of Concession (Years)			20 to 35
Average Cost/Kilometer(P million)	Rehabilitation	SLE	73
(Pesos Million)	New Construction	MST	575
(Dollars Million)			$23
Pre–concession or contract cost(Pesos million)			1,166
Operating expenses(Pesos million)			50
Maintenance (Pesos million)			38
Maintenance (Resurfacing)	Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs +	Every 6 Yrs	MST	910
Land Cost & Access Roads			NA
Revenue Sharing & Concession Income			–

FINANCIAL

Initial Debt: Equity Ratio	3:1	100%	–
Exchange Rate – Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			10.5%
Long–term Debt			
Interest Rate – See Schedule below			
Repayment period – See Schedule below			
Front End Fee			0.5%
Interest Rate – Cash & Reserves			14.0%
Interest Rate – Short Term Investments			–
Interest Rate – Short Term Borrowing			22.0%
Corporate Income Tax Rate			–
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy(% of construction cost)			40%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	19.0 Kms @ MPesos 575/km	MST	3,277	3,277	4,370	10,924		
(Constant Pesos July 1992 Value)		SLE	1,060	–	–	1,060		
	Plus Inflation		1,785	1,765	2,959	6,509		
Total	Current Pesos		6,122	5,043	7,328	18,493	$551	100%
Government Share	40%		2,449	2,017	2,931	7,397	$221	40%
Private Share	60%		3,673	3,026	4,397	11,096	$331	60%

CAPITALIZATION OF TOLLWAY AUTHORITY (Current Millions)

Assets	Pesos	Dollars	Liabilities/Equity	Pesos	Dollars	Percent
Construction Costs	18,493	$551	Government Advance/Equity	10,541	$222	40.0%
Interest During Construction	1,771	$52	Long–Term Debt	15,812	$554	60.0%
Initial Working Capital	89	$3				
Reserve Fund – Debt Service	2,000	$56				
Reserve Fund – Operating Losses	4,000	$113				
Total	26,353	$775	Total	26,353	$776	100.0%

LONG TERM DEBT – TERMS

	Amount	Percent	Interest	Repayment Period
Asian Development Bank	2,635	16.67%	6.50%	25 years, inclusive of 5 years grace period
World Bank	7,906	50.00%	7.65%	30 years, inclusive of 5 years grace period
Local Financial Markets(Bonds)	5,271	33.33%	17.00%	10 year bond, tax free

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs	FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	4.9%	10.5%	13.2%	14.7%	Current Pesos	9.4%	12.5%	14.2%	15.2%
Constant Dollar	–0.4%	4.9%	7.4%	8.7%	Constant Dollar	4.5%	7.2%	8.7%	9.6%

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Briefly, the FYBCR method identifies a project's optimum opening year as the first year in which the ratio of annual net revenues to capital costs (discounted to the year before opening) exceeds a threshold discount rate. For the SLE/MST analysis, the threshold long-term constant Peso discount rate is 15% . The principal conditions that must be met for the method to be valid are that project costs and project revenues in each year of operation be independent of the year of opening. In the case of the SLE/MST project, these conditions can be approximately met by expressing all costs and revenues in constant Pesos and assuming that inflation affects costs and revenues equally.

The project's basic construction costs are estimated to be around 12.0 billion pesos (BP) in constant 1992 values; of this, it is assumed that the government will subsidize 40%, leaving 7.2 BP for the private investor. Construction will be phased over three years, as follows:

one year before opening	37% of construction cost
two years before opening	27% of construction cost
three years before opening	36% of construction cost

The investor is assumed to pay 18% interest on the construction loan. Payments of interest during construction (IDC) increase the project costs to the investor by some 30% or approximately 2.2 BP in constant pesos, to a total of 9.4 BP. Based on the above construction phasing, the interest payments would occur as follows:

one year before opening	57% of IDC
two years before opening	32% of IDC
three years before opening	11% of IDC

To bring costs up to their present value in the year before opening, as required by the FYBCR method, factors of 1.15 and 1.32 are applied to costs incurred two and three years, respectively, before opening. This adjustment has the effect of raising the project's present costs to the private investor in the year before opening to 10.7 BP. These project costs can be considered to be independent of the year of opening, as required by the FYBCR method.

Now consider the project revenues in 2030, the last year for which traffic forecasts were carried out. The traffic model was run with a variety of toll rates to test the influence of toll rate on SLE/MST traffic and toll revenues. In 2030, the maximum toll revenue occurred at the highest toll rate tested (2.00 P/km for light vehicles). At this rate, the annual gross toll revenues in 2030 are approximately 1.3 BP in constant 1992 values. Operations and maintenance costs average around 12% of gross revenues, bringing the annual net revenues in 2030 down to around 1.1 BP. The traffic model is such that forecast volumes on the SLE/MST in 2030 are the same whether the project opens in 2030 or in some earlier year, so the levels of 2030 toll revenues are independent of the project opening year, as required by the FYBCR calculation.

It follows that the FYBCR for implementation of the SLE/MST in 2030 is 1.1/10.7 or approximately 10%, well below the study's constant peso long term discount rate of 15% .

What this says is that the financially optimum year for implementing the SLE/MST project is some time after 2030. The poor rates of return resulting from the more detailed and accurate financial simulations of project opening in 1999 simply confirm this general conclusion about the project's near-term financial non-viability.

7.3 ECONOMIC EVALUATION

7.3.1 Introduction

The economic analysis of the proposed SLE/MST project is based on a determination of the project's benefits and costs to society. Unlike the financial analysis, which only considered costs and revenues affecting the concessionaire, the scope of the economic analysis extends equally to all agents involved in the construction, operation and use of the project. Economic costs and benefits are calculated on an annual basis for each year of the proposed concession agreement. Measures such as the economic internal rate of return (EIRR) and economic net present value (NPV) are used to summarize the time stream of annual economic costs and benefits into a succinct indication of the overall economic worth of the project.

Economic benefits produced by the proposed SLE/MST project are measured by the savings in total annual Metro Manila road user costs between the no-build and the build situations. Traffic volumes and conditions output from the TRANPLAN traffic network model of the Metro Manila area are used with DPWH vehicle operating cost calculation procedures to determine total road user costs. The use of road user cost savings as a measure of the project's economic benefits is justified by the fact that the project has been assumed throughout the present study to result in no induced traffic or land use changes. A more general transportation demand and economic analysis framework would require the calculation of the consumer surplus changes brought about by the project. In the absence of such effects, the more general framework reduces to the simpler comparison of total road user costs carried out here.

Economic costs of the project are the pre-concession, construction, maintenance and operating costs resulting from its implementation. Construction costs include the engineering costs of building the MST and of rehabilitating the SLE. Maintenance costs are the incremental costs of routine and periodic maintenance incurred as a result of the implementation of the MST; maintenance costs on the SLE are not counted since they would (or should) be incurred whether the SLE/MST project is implemented or not. Operating and general and administrative (G&A) costs are assumed to be incurred only with the SLE/MST tollway in operation. All costs are expressed in constant 1992 Pesos, net of taxes.

7.3.2 Economic Benefits

Annual road user costs in the no-build and build situations were determined using the vehicle operating cost (VOC) calculation methodology of the DPWH Feasibility Studies Office (FSO), as described in Appendix 1 of the MMUTSTRAP Part B2 report (June 1985) and later documents. The FSO's VOC calculation procedure is known as the delta-L (ΔL) method. It expresses the cost of operating a vehicle over one kilometer of a particular road in terms of the basic running, fixed and time costs which the vehicle would incur if operating on one kilometer of ideal road (level, tangent, well-maintained, uncongested, without side friction, etc.) plus the excess costs arising from the road's non-ideal characteristics (slope, curvature, surface condition, vehicle interactions, roadside friction, etc.)

For the running cost component of vehicle operations, these excess costs are expressed in terms of an equivalent length, or ΔL, of operations on an ideal road. For example, if the running costs of a vehicle on an ideal road were 1 Peso/km, and non-ideal conditions added an additional 10 cents/km to the running cost, then the ΔL resulting from the non-ideal conditions would be 0.1 km. The running cost on the one kilometer section would be calculated by applying the basic (ideal) running cost to a length of $L+\Delta L$ or 1.1 km of ideal road.

For the fixed and time cost components, the excess cost is calculated by applying the basic component cost (expressed in Pesos/minute) to the additional time taken by a vehicle to traverse a link as a result of the link's non-ideal conditions.[1]

7.3.2.1 Basic Vehicle Operating Costs

The FSO maintains an up-to-date listing of basic running, fixed and time costs for a variety of vehicle types. FSO economic running costs (in Pesos/km) and fixed costs (in Pesos/minute) for cars, jeepneys, buses and trucks were applied without change in the present study. FSO documentation should be consulted for background on the VOC data and calculation methods.

In section 4.2.4.2 of this report, the question of the applicability of the FSO's time cost estimates to the National Capital Region was brought up. It was argued that since the estimates are based on national averages of a number of key economic parameters, they tend to understate values of time in the NCR. As explained in that section, an updated estimate of the value of time for cars was developed and was applied for the impedance calculations in the traffic network model.

This updated car value of time was retained for the economic calculation. Corresponding values for jeepneys and buses were developed by proportional adjustments to the FSO value of time estimates for the corresponding vehicle types. Table 7-9 presents the basic running, fixed and time used for the different types of vehicles considered in this study.

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[1] Thus the term *ΔL method* actually only describes a portion of the VOC calculation procedure, but it persists as a convenient name for the overall procedure nonetheless.

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Table 7-9
BASIC VEHICLE OPERATING COSTS
(Economic Costs in Constant 1992 Pesos)

VEHICLE TYPE	RUNNING COST (₱/km)	FIXED COST (₱/min)	TIME COST (₱/min)
Car	2.34	0.119	0.773
Jeepney	1.50	0.591	1.134
Bus	3.37	0.810	4.081
Truck	4.30	0.870	--

Source: DPWH FSO for running and fixed costs.
Consultant's estimates for time costs.

7.3.2.2 Excess Costs

Since the object of the benefit calculation is to determine the changes in road user costs between the build and the no-build situations, there is no point in calculating ΔLs for road conditions that will not change as a result of the SLE/MST project implementation. Thus, the calculation of ΔLs focussed on effects due to congestion (which incorporates the effects of roadside friction) and to road surface conditions.

- Congestion and Roadside Friction ΔLs

  The FSO calculates congestion and roadside friction ΔLs using the following formulas:

$$\Delta L(\text{RFRIC},\text{VCR}) = 0.02\ (\text{RFRIC} + 20)\ \text{VCR}^2 + \frac{\text{RFRIC}^2}{1000}, \text{ cars, jeepneys}$$

$$\Delta L(\text{RFRIC},\text{VCR}) = 0.015\ (\text{RFRIC} + 30)\ \text{VCR}^2 + \frac{\text{RFRIC}^2}{500}, \text{ buses, trucks}$$

where VCR is the volume/capacity ratio calculated from the TRANPLAN PCU assignment outputs;

RFRIC is a measure of the amount of roadside friction affecting traffic flow; RFRIC takes on values of 0, 5, 7, or 9 according as side friction is nonexistent, light, medium or heavy.

Road inventory data obtained from the DPWH was used to quantify the amount of roadside friction on each link of the TRANPLAN network. (New expressway links such as the MST and C-5 were given an RFRIC of 0.)

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Road Surface Condition ΔLs

Road surface condition ΔLs can be calculated using the following formula:

$$\Delta L(\text{SCON}) = 0.0026\ \text{SCON} - \frac{0.2\ \text{SCON}}{\text{SCON} + 80} - 0.1, \text{ all vehicles}$$

where SCON is a measure of road surface condition; a concrete pavement has an SCON of 100 when in good condition and 200 when in bad condition.

This formula could be used to calculate the road user benefits resulting from the rehabilitation (and subsequent good maintenance) of the SLE. However, incorporation of road surface condition effects in what is basically an analysis of a new construction project is somewhat questionable for both methodological and practical reasons. Concerning the former, it imputes to the project a set of benefits that would not be present had good maintenance been carried out in the past. Concerning the latter, it supposes that no-build and build road surface conditions are known over the 30-year analysis period, not only on the SLE and the MST, but in fact on every link of the network (since, as has been seen, the SLE/MST tolls produce considerable traffic diversions throughout the network.) The costs of providing the corresponding maintenance levels would also have to be estimated on a network-wide basis. It was clearly beyond the scope of the present study to undertake an extensive analysis of the metropolitan network's maintenance problems and possible solutions.

For these reasons, it was decided not to include in the economic benefits calculation the road user cost savings resulting from changes in road surface conditions.

Other Excess Costs

The effects of the SLE/MST project on vehicle fixed and time cost components are captured through the link travel times output from the TRANPLAN trip assignments to the alternative networks.

Tolls

SLE and MST tolls were not included in the calculation of road user costs since these are basically transfer payments.

7.3.2.3 Calculation of Total Road User Costs

A BASIC program was prepared to calculate the total network road user costs from TRANPLAN assignment outputs.

The program first reads a file of data containing, for each link in the TRANPLAN network, the link identifier, the amount of roadside friction and the volume of preloaded trips by vehicle type. (Unfortunately, TRANPLAN cannot readily store such data together with the data required for network analyses, so such data has to be kept in separate files.)

The program then accesses the TRANPLAN output file containing the equilibrium assignment results. For each link in the network file (except centroid connectors), it reads the link identifier, link length, capacity, and congested travel time, along with the assigned PCUs, cars and trucks. The volume/capacity ratio is computed; then the roadside friction value RFRIC and preloaded trip data for the link is combined with the TRANPLAN data. With all required information available, the program then proceeds to apply the ΔL method to compute the daily per kilometer running, fixed and time costs by vehicle type over the link. Per kilometer costs are finally multiplied by the link length and by the daily traffic volume by vehicle type to determine the total link road user costs. Each link's results are accumulated to the network level and the network totals are printed out when all links have been processed.

Total road user costs were calculated for three different situations in each assignment year: the no-build situation; the build situation assuming that the full-length SLE/MST will be operated without tolls; and the build situation assuming that the full-length SLE/MST will be operated at the toll rate that maximizes revenues in the particular year under consideration. Table 7-10 presents the results of these calculations on a daily and annual basis, and also computes the economic benefits (total annual road user cost savings) of the two build situations as compared to the no-build situation.

It is particularly interesting to compare the road user cost savings produced by the SLE/MST when operated with and without tolls. Fixed cost and user time savings resulting from the tollway are in all cases small and in some cases even negative as the traffic diverted from the southern corridor takes circuitous and congested alternative routes through the network. However, the running cost savings resulting from a reduction in severely congested conditions on the SLE/MST compensate for the small or negative fixed and user time savings to produce a substantial savings in user cost. Nonetheless, the net economic costs to road users of operating the SLE/MST as a tollway rather than as a free facility can be seen from Table 7-10 to be around 380 million Pesos/year (in 1992 Pesos) in 1999, a figure which reaches 1 billion Pesos/year (again in 1992 Pesos) before 2020.

7.3.3 Economic Project Costs

Economic project costs consist of the one-time pre-concession costs, MST construction costs, the SLE rehabilitation costs; as well as the recurrent net routine and periodic maintenance costs and operating and general and administration (G&A) costs of the tollway.

Pre-concession and construction costs were derived from Chapter 3. They correspond to the Alternative 4, six-lane box girder MST design.

A portion of the pre-concession and construction costs could be avoided if the SLE/MST were operated as a free facility rather than as a tollway. The pre-concession costs include a public involvement program which could be avoided to a large extent if the facility were free, and also include the costs of preparing, negotiating and executing the concession agreement. It is estimated that 25% of the pre-concession costs are attributable to the operation of the project as a tollway; the remaining 75% (engineering design, right-of-way, etc.) would be incurred regardless of the mode of operation.

Similarly, some 223.2 MP (financial cost in 1992 Pesos) of the SLE rehabilitation cost corresponds in fact to rehabilitation and/or replacement of the toll collection facilities; the corresponding figure for the MST is 113.6 million Pesos. Administrative buildings and equipment for the tollway would cost 63.4 million Pesos, a figure which has been allocated equally to the SLE and the MST.

Maintenance, operations and G&A costs were derived from information presented earlier in this chapter. Note that the costs of routine and periodic maintenance of the SLE are not counted as part of the project costs since they would normally be incurred by society whether the project was built or not. Operating and G&A costs for both the SLE and the MST are included, however, since these costs are associated with the project as a tollway. Maintenance, operations and G&A costs were derived from information presented earlier in this chapter.

All costs are economic costs, net of taxes. The economic component of the MST construction and SLE rehabilitation were provided in Chapter 3. The economic component of all other costs was estimated at 80% of their financial cost.

Table 7-11 summarizes the cost data and assumptions that were applied in the economic analysis.

7.3.4 Calculation of Economic Criteria and Results

The calculated economic benefits and costs were combined to form a time series covering the pre-concession period beginning in 1994 through the expected termination of the concession agreement in 2030. Road user cost savings calculated for 1999, 2010, 2020 and 2030 were interpolated for intermediate years. Time series were prepared for both the no-toll situation and the maximum revenue toll situation, and both including and excluding user time savings in the benefit calculation.

Table 7–10a
TOTAL ROAD USER COSTS
(Economic Costs in Millions of Constant 1992 Pesos)

YEAR	ANALYSIS SITUATION		DAILY ROAD USER COSTS (MP / day)					ANNUAL ROAD USER COSTS (MP / year)				
			Running	Fixed	R+F	Time	R+F+T	Running	Fixed	R+F	Time	R+F+T
1999	No–Build	Car	63.2	3.0	66.2	19.5	85.7	23,071.7	1,095.0	24,166.7	7,102.9	31,269.6
		Jeepney	12.2	5.3	17.4	10.1	27.6	4,434.8	1,927.2	6,362.0	3,697.5	10,059.4
		Bus	5.2	1.3	6.4	6.3	12.7	1,894.4	456.3	2,350.6	2,288.6	4,639.2
		Truck	25.4	4.9	30.3		30.3	9,274.7	1,784.9	11,059.5		11,059.5
		Total	**106.0**	**14.4**	**120.4**	**35.9**	**156.2**	**38,675.4**	**5,263.3**	**43,938.7**	**13,088.9**	**57,027.6**
1999	Build – No Toll	Car	60.1	3.0	63.1	19.2	82.3	21,940.2	1,076.8	23,016.9	7,004.4	30,021.3
		Jeepney	11.9	5.3	17.2	10.1	27.3	4,347.2	1,927.2	6,274.4	3,693.8	9,968.2
		Bus	4.6	1.2	5.9	6.3	12.1	1,682.7	452.6	2,135.3	2,288.6	4,423.8
		Truck	24.9	4.9	29.8		29.8	9,084.9	1,777.6	10,862.4		10,862.4
		Total	**101.5**	**14.3**	**115.9**	**35.6**	**151.4**	**37,054.8**	**5,234.1**	**42,288.9**	**12,986.7**	**55,275.6**
1999	Build – Max Rev Toll	Car	60.5	3.0	63.5	19.5	83.0	22,075.2	1,095.0	23,170.2	7,110.2	30,280.4
		Jeepney	12.1	5.3	17.3	10.1	27.5	4,398.3	1,927.2	6,325.5	3,697.5	10,022.9
		Bus	4.7	1.2	6.0	6.3	12.2	1,719.2	452.6	2,171.8	2,288.6	4,460.3
		Truck	24.9	4.9	29.8		29.8	9,103.1	1,788.5	10,891.6		10,891.6
		Total	**102.2**	**14.4**	**116.6**	**35.9**	**152.5**	**37,295.7**	**5,263.3**	**42,559.0**	**13,096.2**	**55,655.2**
		Annual road user cost savings from project – no toll						1,620.6	29.2	1,649.8	102.2	1,752.0
		Annual road user cost savings from project – toll						1,379.7	0.0	1,379.7	(7.3)	1,372.4
		Annual economic cost of toll to road users						240.9	29.2	270.1	109.5	379.6

Table 7–10b
TOTAL ROAD USER COSTS
(Economic Costs in Millions of Constant 1992 Pesos)

YEAR	ANALYSIS SITUATION		DAILY ROAD USER COSTS (MP / day)					ANNUAL ROAD USER COSTS (MP / year)				
			Running	Fixed	R+F	Time	R+F+T	Running	Fixed	R+F	Time	R+F+T
2010	No–Build	Car	112.7	4.0	116.7	25.7	142.3	41,139.2	1,441.8	42,580.9	9,362.3	51,943.2
		Jeepney	20.5	6.8	27.2	13.0	40.2	7,464.3	2,463.8	9,928.0	4,730.4	14,658.4
		Bus	8.8	1.6	10.4	8.0	18.4	3,223.0	580.4	3,803.3	2,927.3	6,730.6
		Truck	44.3	6.4	50.7		50.7	16,162.2	2,339.7	18,501.9		18,501.9
		Total	**186.3**	**18.7**	**205.0**	**46.6**	**251.6**	**67,988.6**	**6,825.5**	**74,814.1**	**17,020.0**	**91,834.0**
2010	Build – No Toll	Car	104.7	3.9	108.6	25.3	134.0	38,230.1	1,423.5	39,653.6	9,238.2	48,891.8
		Jeepney	19.8	6.8	26.6	13.0	39.5	7,227.0	2,463.8	9,690.8	4,726.8	14,417.5
		Bus	7.3	1.6	8.9	8.0	16.9	2,660.9	580.4	3,241.2	2,923.7	6,164.9
		Truck	42.8	6.4	49.2		49.2	15,611.1	2,328.7	17,939.8		17,939.8
		Total	**174.6**	**18.6**	**193.2**	**46.3**	**239.5**	**63,729.0**	**6,796.3**	**70,525.3**	**16,888.6**	**87,413.9**
2010	Build – Max Rev Toll	Car	105.6	4.0	109.6	25.7	135.2	38,558.6	1,441.8	40,000.4	9,362.3	49,362.6
		Jeepney	20.2	6.8	26.9	13.0	39.9	7,369.4	2,463.8	9,833.1	4,730.4	14,563.5
		Bus	7.6	1.6	9.2	8.0	17.2	2,759.4	580.4	3,339.8	2,927.3	6,267.1
		Truck	42.9	6.4	49.3		49.3	15,643.9	2,339.7	17,983.6		17,983.6
		Total	**176.3**	**18.7**	**195.0**	**46.6**	**241.6**	**64,331.3**	**6,825.5**	**71,156.8**	**17,020.0**	**88,176.7**
		Annual road user cost savings from project – no toll						4,259.6	29.2	4,288.8	131.4	4,420.2
		Annual road user cost savings from project – toll						3,657.3	0.0	3,657.3	0.0	3,657.3
		Annual economic cost of toll to road users						602.3	29.2	631.5	131.4	762.9

Table 7–10c
TOTAL ROAD USER COSTS
(Economic Costs in Millions of Constant 1992 Pesos)

YEAR	ANALYSIS SITUATION		DAILY ROAD USER COSTS (MP / day)					ANNUAL ROAD USER COSTS (MP / year)				
			Running	Fixed	R+F	Time	R+F+T	Running	Fixed	R+F	Time	R+F+T
2020	No–Build	Car	174.9	4.8	179.6	31.0	210.6	63,823.9	1,741.1	65,565.0	11,296.8	76,861.7
		Jeepney	30.9	8.1	38.9	15.5	54.4	11,271.2	2,938.3	14,209.5	5,639.3	19,848.7
		Bus	13.4	1.9	15.3	9.6	24.8	4,887.4	693.5	5,580.9	3,485.8	9,066.6
		Truck	67.7	7.7	75.5		75.5	24,721.5	2,817.8	27,539.3		27,539.3
		Total	286.9	22.4	309.3	56.0	365.3	104,703.9	8,190.6	112,894.5	20,421.8	133,316.3
2020	Build – No Toll	Car	160.2	4.7	164.9	30.5	195.4	58,476.7	1,715.5	60,192.2	11,143.5	71,335.6
		Jeepney	29.7	8.1	37.8	15.5	53.2	10,851.5	2,938.3	13,789.7	5,639.3	19,429.0
		Bus	10.5	1.9	12.4	9.6	22.0	3,843.5	693.5	4,537.0	3,485.8	8,022.7
		Truck	64.9	7.7	72.6		72.6	23,681.2	2,803.2	26,484.4		26,484.4
		Total	265.4	22.3	287.7	55.5	343.2	96,852.8	8,150.5	105,003.2	20,268.5	125,271.7
2020	Build – Max Rev Toll	Car	161.6	4.8	166.4	31.0	197.4	58,998.6	1,744.7	60,743.3	11,322.3	72,065.6
		Jeepney	30.5	8.1	38.5	15.5	54.0	11,125.2	2,938.3	14,063.5	5,639.3	19,702.7
		Bus	11.0	1.9	12.9	9.6	22.4	4,000.4	693.5	4,693.9	3,485.8	8,179.7
		Truck	65.0	7.7	72.8		72.8	23,732.3	2,821.5	26,553.8		26,553.8
		Total	268.1	22.5	290.6	56.0	346.6	97,856.5	8,197.9	106,054.4	20,447.3	126,501.7
		Annual road user cost savings from project – no toll						7,351.2	40.1	7,891.3	153.3	8,044.6
		Annual road user cost savings from project – toll						6,847.4	(7.3)	6,840.1	(25.6)	6,814.6
		Annual economic cost of toll to road users						1,003.8	47.4	1,051.2	178.9	1,230.0

Table 7 – 10d

TOTAL ROAD USER COSTS

(Economic Costs in Millions of Constant 1992 Pesos)

YEAR	ANALYSIS SITUATION		DAILY ROAD USER COSTS (MP / day)					ANNUAL ROAD USER COSTS (MP / year)				
			Running	Fixed	R+F	Time	R+F+T	Running	Fixed	R+F	Time	R+F+T
2030	No–Build	Car	241.0	5.4	246.4	35.2	281.6	87,950.4	1,978.3	89,928.7	12,862.6	102,791.3
		Jeepney	41.9	9.1	51.0	17.5	68.5	15,282.6	3,328.8	18,611.4	6,383.9	24,995.2
		Bus	18.2	2.2	20.4	10.8	31.2	6,646.7	784.8	7,431.4	3,945.7	11,377.1
		Truck	92.5	8.8	101.3		101.3	33,777.1	3,201.1	36,978.2		36,978.2
		Total	393.6	25.5	419.0	63.5	482.6	143,656.7	9,292.9	152,949.6	23,192.1	176,141.7
2030	Build – No Toll	Car	217.8	5.4	223.1	34.8	257.9	79,486.1	1,952.8	81,438.8	12,687.4	94,126.2
		Jeepney	39.8	9.1	49.0	17.5	66.4	14,538.0	3,328.8	17,866.8	6,383.9	24,250.6
		Bus	13.8	2.2	16.0	10.8	26.8	5,051.6	784.8	5,836.4	3,945.7	9,782.0
		Truck	87.5	8.7	96.2		96.2	31,922.9	3,182.8	35,105.7		35,105.7
		Total	358.9	25.3	384.2	63.1	447.3	130,998.5	9,249.1	140,247.6	23,016.9	163,264.5
2030	Build – Max Rev Toll	Car	220.3	5.4	225.7	35.2	260.9	80,416.8	1,978.3	82,395.1	12,840.7	95,235.8
		Jeepney	41.1	9.1	50.2	17.5	67.7	15,001.5	3,328.8	18,330.3	6,383.9	24,714.2
		Bus	14.7	2.2	16.8	10.8	27.6	5,347.3	784.8	6,132.0	3,945.7	10,077.7
		Truck	88.0	8.8	96.8		96.8	32,134.6	3,197.4	35,332.0		35,332.0
		Total	364.1	25.5	389.6	63.5	453.0	132,900.2	9,289.3	142,189.4	23,170.2	165,359.6
		Annual road user cost savings from project – no toll						12,658.2	43.8	12,702.0	175.2	12,877.2
		Annual road user cost savings from project – toll						10,756.5	3.7	10,760.2	21.9	10,782.1
		Annual economic cost of toll to road users						1,901.7	40.2	1,941.8	153.3	2,095.1

Table 7–11
ECONOMIC PROJECT COSTS AND RELATED PARAMETERS
(Economic Costs in Millions of Constant 1992 Pesos)

ONE–TIME COSTS		
Item	Tollway	Free Facility
Pre–concession costs	1,113.3	835.0
Construction Cost		
MST Construction	8,894.5	8,778.3
SLE Rehabilitation	836.7	632.8
Total	9,731.2	9,411.1

SCHEDULE OF ONE–TIME COSTS			
	Percentage of Expenditure in Year		
	Pre–concession	SLE	MST
1994	50%		
1995	50%		
1996		100%	30%
1997			30%
1998			40%

RECURRENT COSTS		
Item	Periodicity	Total
Operating Costs (tollway only)	annual	39.8
G & A Costs (tollway only)	annual	7.2
Routine Maintenance of MST	annual	17.3
Periodic Maintenance of MST	every six years beginning in 2011	83.0

Source: Consultant's estimates.
Recurrent costs based on assumed 20% tax rate.

Tables 7-12a and b show the resulting series along with the calculated economic internal rate of return, net present value based on a 1992 reference year and a 15% discount rate, and economic first year benefit/cost ratio (FYBCR). (See Appendix A7-9 for a description of the application of this method to the calculation of the financially optimum project opening year. The logic is in all respects identical when the method is applied to determine the economically optimum opening year.) Table 7-12a corresponds to the proposed facility being operated at revenue-maximizing toll rates, while Table 7-12b corresponds to its operation as a free facility. In both cases, the calculation of road user savings incorporates the value of user time.

It can be seen that in both cases the proposed project exceeds the NEDA 15% target discount rate, although the economic evaluation indicators are more favorable for the free facility than for the tollway. The tollway shows an EIRR of approximately 18% and an NPV (at a 15% discount rate and with respect to a 1992 base year) of approximately 1.7 BP. However, the FYBCR shows that, if the facility were operated as a tollway, the economically optimum opening year would be some time after 1999. The free facility has an EIRR of approximately 21% and an NPV of almost 4.0 BP. Thus, the NPV of the economic benefits resulting from the operation of the facility as a free facility rather than a tollway can be estimated at around 2.3 BP over the analysis period. Furthermore, the free facility's FYBCR indicates that its economically optimum opening year is 1999 or 2000, exactly as assumed in the analysis.

Tables 7-13a and b carry out the same calculation but exclude road user time savings from the benefit calculation. The general results are quite similar in the two cases. Both projects remain economically worthwhile, but the economically optimum opening year for the free facility would be pushed slightly after 2000. The slight increase in the tollway's NPV when evaluated in this way results from the fact that, as seen above, the traffic diversions it produces actually result in slightly negative user time savings with respect to the no-build situation.

In summary, the project is economically feasible for opening in 1999 whether operated with or without tolls. The economically optimum opening year for the no-toll facility would be around 2000, while that for the tollway would be some time later.

Table 7–12a
ECONOMIC ANALYSIS OF SLE/MST PROJECT INCLUDING USER TIME SAVINGS
(All Values are Economic Costs in Millions of Constant 1992 Pesos)

Pre–Concession Cost:	1,113.3
SLE Rehabilitation Cost:	836.7
MST Construction Cost:	8,894.5

OPERATION OF SLE/MST AT REVENUE–MAXIMIZING TOLL RATES

YEAR	PRE–CONCESS. + CONSTRUC.	MAINTENANCE		OPERATING + G & A	ROAD USER SAVINGS	NET BENEFIT
		Routine	Periodic			
1994	556.7					(556.7)
1995	556.7					(556.7)
1996	3,505.1					(3,505.1)
1997	2,668.4					(2,668.4)
1998	3,557.8					(3,557.8)
1999		17.3		47.0	1,372.4	1,308.1
2000		17.3		47.0	1,500.3	1,436.0
2001		17.3		47.0	1,640.1	1,575.8
2002		17.3		47.0	1,793.0	1,728.7
2003		17.3		47.0	1,960.1	1,895.8
2004		17.3		47.0	2,142.8	2,078.5
2005		17.3		47.0	2,342.4	2,278.1
2006		17.3		47.0	2,560.8	2,496.5
2007		17.3		47.0	2,799.4	2,735.1
2008		17.3		47.0	3,060.3	2,996.0
2009		17.3		47.0	3,345.5	3,281.2
2010		17.3		47.0	3,657.3	3,593.0
2011		17.3	83.0	47.0	3,892.1	3,744.8
2012		17.3		47.0	4,142.1	4,077.8
2013		17.3		47.0	4,408.0	4,343.7
2014		17.3		47.0	4,691.1	4,626.8
2015		17.3		47.0	4,992.3	4,928.0
2016		17.3		47.0	5,312.9	5,248.6
2017		17.3	83.0	47.0	5,654.0	5,506.7
2018		17.3		47.0	6,017.1	5,952.8
2019		17.3		47.0	6,403.4	6,339.1
2020		17.3		47.0	6,814.6	6,750.3
2021		17.3		47.0	7,134.6	7,070.3
2022		17.3		47.0	7,469.5	7,405.2
2023		17.3	83.0	47.0	7,820.2	7,672.9
2024		17.3		47.0	8,187.4	8,123.1
2025		17.3		47.0	8,571.8	8,507.5
2026		17.3		47.0	8,974.2	8,909.9
2027		17.3		47.0	9,395.6	9,331.3
2028		17.3		47.0	9,836.7	9,772.4
2029		17.3	83.0	47.0	10,298.6	10,151.3
2030		17.3		47.0	10,782.1	10,717.8

EIRR	17.6%
NPV @ 15%; 1992 base	1,728.5
FYBCR of 1999 opening	10.0%

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Table 7–12b
ECONOMIC ANALYSIS OF SLE/MST PROJECT INCLUDING USER TIME SAVINGS
(All Values are Economic Costs in Millions of Constant 1992 Pesos)

Pre–Concession Cost:	835.0
SLE Rehabilitation Cost:	632.8
MST Construction Cost:	8,778.3

OPERATION OF SLE/MST AS A FREE ROADWAY

YEAR	PRE–CONCESS. + CONSTRUC.	MAINTENANCE		OPERATING + G & A	ROAD USER SAVINGS	NET BENEFIT
		Routine	Periodic			
1994	417.5					(417.5)
1995	417.5					(417.5)
1996	3,266.3					(3,266.3)
1997	2,633.5					(2,633.5)
1998	3,511.3					(3,511.3)
1999		17.3		0.0	1,752.0	1,734.7
2000		17.3		0.0	1,905.8	1,888.5
2001		17.3		0.0	2,073.0	2,055.7
2002		17.3		0.0	2,255.0	2,237.7
2003		17.3		0.0	2,452.9	2,435.6
2004		17.3		0.0	2,668.2	2,650.9
2005		17.3		0.0	2,902.4	2,885.1
2006		17.3		0.0	3,157.1	3,139.8
2007		17.3		0.0	3,434.2	3,416.9
2008		17.3		0.0	3,735.7	3,718.4
2009		17.3		0.0	4,063.5	4,046.2
2010		17.3		0.0	4,420.2	4,402.9
2011		17.3	83.0	0.0	4,693.0	4,592.7
2012		17.3		0.0	4,982.6	4,965.3
2013		17.3		0.0	5,290.1	5,272.8
2014		17.3		0.0	5,616.5	5,599.2
2015		17.3		0.0	5,963.1	5,945.8
2016		17.3		0.0	6,331.1	6,313.8
2017		17.3	83.0	0.0	6,721.8	6,621.5
2018		17.3		0.0	7,136.6	7,119.3
2019		17.3		0.0	7,577.0	7,559.7
2020		17.3		0.0	8,044.6	8,027.3
2021		17.3		0.0	8,432.1	8,414.8
2022		17.3		0.0	8,838.3	8,821.0
2023		17.3	83.0	0.0	9,264.0	9,163.7
2024		17.3		0.0	9,710.3	9,693.0
2025		17.3		0.0	10,178.0	10,160.7
2026		17.3		0.0	10,668.3	10,651.0
2027		17.3		0.0	11,182.2	11,164.9
2028		17.3		0.0	11,720.8	11,703.5
2029		17.3	83.0	0.0	12,285.4	12,185.1
2030		17.3		0.0	12,877.2	12,859.9

EIRR	21.1%
NPV @ 15%; 1992 base	3,946.4
FYBCR of 1999 opening	14.2%

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Table 7–13a
ECONOMIC ANALYSIS OF SLE/MST PROJECT WITHOUT USER TIME SAVINGS
(All Values are Economic Costs in Millions of Constant 1992 Pesos)

Pre–Concession Cost:	1,113.3
SLE Rehabilitation Cost:	836.7
MST Construction Cost:	8,894.5

OPERATION OF SLE/MST AT REVENUE–MAXIMIZING TOLL RATES

YEAR	PRE–CONCESS. + CONSTRUC.	MAINTENANCE		OPERATING + G & A	ROAD USER SAVINGS	NET BENEFIT
		Routine	Periodic			
1994	556.7					(556.7)
1995	556.7					(556.7)
1996	3,505.1					(3,505.1)
1997	2,668.4					(2,668.4)
1998	3,557.8					(3,557.8)
1999		17.3		47.0	1,379.7	1,315.4
2000		17.3		47.0	1,507.6	1,443.3
2001		17.3		47.0	1,647.3	1,583.0
2002		17.3		47.0	1,799.9	1,735.6
2003		17.3		47.0	1,966.7	1,902.4
2004		17.3		47.0	2,149.0	2,084.7
2005		17.3		47.0	2,348.1	2,283.8
2006		17.3		47.0	2,565.7	2,501.4
2007		17.3		47.0	2,803.5	2,739.2
2008		17.3		47.0	3,063.3	2,999.0
2009		17.3		47.0	3,347.1	3,282.8
2010		17.3		47.0	3,657.3	3,593.0
2011		17.3	83.0	47.0	3,893.6	3,746.3
2012		17.3		47.0	4,145.2	4,080.9
2013		17.3		47.0	4,413.0	4,348.7
2014		17.3		47.0	4,698.1	4,633.8
2015		17.3		47.0	5,001.6	4,937.3
2016		17.3		47.0	5,324.8	5,260.5
2017		17.3	83.0	47.0	5,668.8	5,521.5
2018		17.3		47.0	6,035.1	5,970.8
2019		17.3		47.0	6,425.0	6,360.7
2020		17.3		47.0	6,840.1	6,775.8
2021		17.3		47.0	7,157.1	7,092.8
2022		17.3		47.0	7,488.8	7,424.5
2023		17.3	83.0	47.0	7,835.9	7,688.6
2024		17.3		47.0	8,199.1	8,134.8
2025		17.3		47.0	8,579.1	8,514.8
2026		17.3		47.0	8,976.7	8,912.4
2027		17.3		47.0	9,392.8	9,328.5
2028		17.3		47.0	9,828.1	9,763.8
2029		17.3	83.0	47.0	10,283.6	10,136.3
2030		17.3		47.0	10,760.2	10,695.9

EIRR	17.6%
NPV @ 15%; 1992 base	1,746.9
FYBCR of 1999 opening	10.1%

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Table 7–13b
ECONOMIC ANALYSIS OF SLE/MST PROJECT WITHOUT USER TIME SAVINGS
(All Values are Economic Costs in Millions of Constant 1992 Pesos)

Pre–Concession Cost:	835.0
SLE Rehabilitation Cost:	632.8
MST Construction Cost:	8,778.3

OPERATION OF SLE/MST AS A FREE ROADWAY

YEAR	PRE–CONCESS. + CONSTRUC.	MAINTENANCE		OPERATING + G & A	ROAD USER SAVINGS	NET BENEFIT
		Routine	Periodic			
1994	417.5					(417.5)
1995	417.5					(417.5)
1996	3,266.3					(3,266.3)
1997	2,633.5					(2,633.5)
1998	3,511.3					(3,511.3)
1999		17.3		0.0	1,649.8	1,632.5
2000		17.3		0.0	1,799.5	1,782.2
2001		17.3		0.0	1,962.8	1,945.5
2002		17.3		0.0	2,140.9	2,123.6
2003		17.3		0.0	2,335.1	2,317.8
2004		17.3		0.0	2,547.0	2,529.7
2005		17.3		0.0	2,778.1	2,760.8
2006		17.3		0.0	3,030.1	3,012.8
2007		17.3		0.0	3,305.1	3,287.8
2008		17.3		0.0	3,604.9	3,587.6
2009		17.3		0.0	3,932.0	3,914.7
2010		17.3		0.0	4,288.8	4,271.5
2011		17.3	83.0	0.0	4,558.4	4,458.1
2012		17.3		0.0	4,845.1	4,827.8
2013		17.3		0.0	5,149.7	5,132.4
2014		17.3		0.0	5,473.4	5,456.1
2015		17.3		0.0	5,817.6	5,800.3
2016		17.3		0.0	6,183.3	6,166.0
2017		17.3	83.0	0.0	6,572.1	6,471.8
2018		17.3		0.0	6,985.3	6,968.0
2019		17.3		0.0	7,424.5	7,407.2
2020		17.3		0.0	7,891.3	7,874.0
2021		17.3		0.0	8,276.0	8,258.7
2022		17.3		0.0	8,679.5	8,662.2
2023		17.3	83.0	0.0	9,102.6	9,002.3
2024		17.3		0.0	9,546.4	9,529.1
2025		17.3		0.0	10,011.8	9,994.5
2026		17.3		0.0	10,499.8	10,482.5
2027		17.3		0.0	11,011.7	10,994.4
2028		17.3		0.0	11,548.5	11,531.2
2029		17.3	83.0	0.0	12,111.6	12,011.3
2030		17.3		0.0	12,702.0	12,684.7

EIRR	20.5%
NPV @ 15%; 1992 base	3,600.4
FYBCR of 1999 opening	13.4%

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Chapter 8

INSTITUTIONAL ARRANGEMENTS

CHAPTER 8

INSTITUTIONAL ARRANGEMENTS

8.1 GENERAL OVERVIEW

The BOT schemes for tollways are planned, bids prepared and evaluated and a contractor selected to negotiate and sign a concession agreement. During the construction of the tollway, the concessionaire is supervised and the quality of his work certified. Throughout the operational phase, the concessionaire's performance is monitored. On occasion, the tolls charged by the concessionaire are changed to reflect increases in his costs.

During the life of a BOT scheme, the Government of the Philippines (GOP) will be represented in many of the decisions needed to implement a BOT project. In the case of the Manila South Tollway, who will represent the GOP? The BOT Law is quite specific in providing an answer to this question; it is the project's sponsor. For the Manila South Tollway, it is the Department of Public Works and Highways. How this Department is organized to handle these types of projects is critical to their success. Since the Department has, as of yet, no experience in the implementation of a BOT project, the development of a viable institutional structure must proceed in parallel with the implementation of its first BOT schemes.

8.2 STAGES IN THE IMPLEMENTATION OF BOT SCHEMES

The Department's involvement in a BOT scheme varies over the life of the project. It is also in partnership with the private sector in the project's implementation and in its operation. The life of a BOT scheme goes through five functional stages:

- Planning Stage,
- Pre-Contract or Pre-Concession Stage,
- Construction Stage,
- Operational Stage, and
- Transfer and Final Stage.

The differentiation between stages is not always clear cut. In the case of the first three stages, the end of each is marked by a major milestone.

- Planning Stage: Selection of BOT Projects for consideration and the determination whether or not the project is viable as a BOT scheme.

- Pre-Contract or Concession Stage: Signing a contract or concession agreement between the GOP and the successful bidder or concessionaire.

- Construction Stage: Certification of completion of the construction of the BOT project.

A brief description of each of the five stages of a BOT project is given below.

8.2.1 Planning Stage

The main objective of the Planning Stage is the determination of the project's feasibility as a BOT scheme. The initial selection of candidate BOT projects is normally done by the Department in consultation with the NEDA. Once the initial selection is made, pre-feasibility studies of the most viable projects are undertaken.

Components of the pre-feasibility study include the technical, economic, legal, financial and environmental evaluation of the project. Based upon this study, a decision is made as to whether or not the project should be implemented as a BOT scheme. Not all highway projects lend themselves to this method of financing, construction and operation.

These initial technical or pre-feasibility studies are conceptual in nature and attempt to define the alignment of the road and the location of the interchanges within a transport corridor. Traffic studies using available data and models give an indication of the future traffic demand. The financial analysis determines if the project can produce a rate of return which would be sufficiently high to interest the private sector. If not, subsidies could be suggested as a means of making the project more attractive. Environmental issues are evaluated to determine if the project will have any potential adverse impacts.

If the pre-feasibility study indicates that a BOT scheme would be able to attract private participation then the Government of the Philippines should proceed to the next stage. If the project proves not to be feasible as a BOT scheme, it may be economically feasible and still merit being built. In this case, it would be constructed through normal contracting procedures.

The pre-feasibility study could be done with the Departments's own resources or with the services of a consultant.

The pre-feasibility study is probably not accurate enough to entice the private sector to make a large investment in a major urban tollway. Additional studies are needed. The areas of major concern to the private sector are the traffic forecasts and various technical aspects of the project such as the location and final alignment of the interchanges. These concerns require more detailed analysis of the project including the preparation of the preliminary designs. The main purpose of the preliminary designs is to identify the right-of-way requirements of the project. Additional technical, environmental and traffic studies which may be needed are undertaken before proceeding to the next stage. Once the preliminary designs are near completion, the bid documents are then prepared reflecting the specific requirements of the project. These activities would normally be done through the services of consultants.

When the right-of-way (ROW) requirements are known, a land acquisition program can begin. This program can take several years to complete depending upon the particular needs of the project. For urban tollway projects, this ROW acquisition comes at considerable cost in time, effort and funds.

It is impossible to expect that the concessionaire will "up front" the ROW costs. The concessionaire might agree to reimburse the Government for these costs as a rental or lease payment. Thus, obtaining the ROW is a prime governmental responsibility, and its funding has to come from an appropriation in the budget.

8.2.2 Pre-Contract or Pre-Concession Stage

Once the ROW acquisition program is underway, prequalifications of potential bidders can begin. The bidding documents can be completed as the bidders are prequalified. Then requests for detailed proposals are solicited from pre-qualified bidders. All the bids are evaluated, and the bidders are ranked according to a predetermined procedure. The one with the best proposal is selected to negotiate with the Government.

During these first two stages, the Government will need to select a number of consultants:

- to complete the additional technical and environmental studies,
- to assist in preparing the bid documents, evaluating the bids and negotiating the concession agreement, and
- to review the designs submitted by the concessionaire once the concession agreement has been signed.

Only upon the signing of a concession agreement does the next stage begin.

8.2.3 Construction Stage

This stage actually begins when the Government and the concessionaire fulfill the conditions precedent of the concession agreement. On the Government's part, this might entail certifying that a certain amount of the right-of-way is free of all encumbrances. For the concessionaire, this might mean obtaining the performance bonds and the appropriate insurance required by the concession agreement. Approval of the environmental requirements of the project is also necessary. This might be a precondition of notice to proceed.

The Construction Stage includes preparation of the final designs and drawings by the concessionaire and their approval by the Government. These tasks are often done by separate consultants. Upon the acceptance of the designs, the Government oversees the construction of the project. Again this can be done through a consulting engineering firm. The degree of supervision by the Government is generally less rigorous than what is found on most construction contracts since the Government is not making progress payments on the work completed. Its main concern is the quality of the work (whether or not the finished work meets the specifications, performance criteria and approved designs for the project) and whether or not the concessionaire is on schedule. The BOT concessionaire is responsible for the selection of the construction contractor(s). The Government will qualify them when it reviews the pre-qualification documents submitted by the bidder. For an urban tollway, the BOT concessionaire and his constructors have to work closely with the Department and other government agencies and public utility companies in the relocation of utilities (water, power, sewerage, PLDT, etc...).

As already indicated, it might be necessary to complete the right-of-way acquisition during this stage. Undertaking the BOT project without having all the ROW available represents a large risk for the concessionaire. Any delay in the acquisition of the right-of-way can postpone the completion of the project. Adverse financial consequences to the concessionaire can result. If the bulk of this activity is left to this stage, the concession agreement would have to be structured differently than if the land is available at the beginning of this stage.

Once each section of the project is certified complete, the operational stage begins.

8.2.4 Operational Stage

During this stage the Government's role is threefold. First, it monitors the operation of the concession to ascertain that tollway facilities are properly maintained by the concessionaire. Second, it approves any increases in the tolls. Finally, it approves any proposal to upgrade and expand the facilities. At the technical level, the Government wants to be assured that the concessionaire is providing the proper level of maintenance and is operating the facilities in accordance with the concession agreement. Likewise, the Government reviews any changes to the facilities to accommodate increases in traffic that might be needed over the life of the concession, for instance, the construction of additional lanes or an interchange. This might require amending the basic agreement between the concessionaire and the Government.

The concession agreement also indicates the method and frequency for changing the tolls charged for use of the facilities by the motorists. The Government approves these changes.

As part of these activities, the Government wants to be informed of the financial condition of the concessionaire and whether or not it can meet its financial and other obligations under the concession agreement.

8.2.5 Transfer and Final Stage

At the end of the contract or concession period, the tollway facilities are turned over to the Government. The transfer of all the facilities and equipment must be done in an orderly fashion so that there is no interruption in service.

8.2.6 Summary

Government involvement in the BOT schemes extends over their entire life. In effect, the operation of a BOT project represents a partnership between the Government and the concessionaire. The adversarial relationship that often develops between the Government and a construction contractor is not an appropriate model to follow and must be avoided. The concession agreement should provide methods which would help to resolve these differences quickly and equitable. In BOT projects, there is a sharing of responsibility and accountability. This contractual arrangement requires a high degree of trust and cooperation between the Government and the concessionaire if the scheme is to work.

Besides being able to work with the concessionaire in a cooperative spirit, the type of skills needed to manage these complex projects from the Government's perspective varies considerably. In the first stage, it is highly technical. The Pre-Contract or Concession (Second) Stage relies on legal and financial expertise. During the Construction Stage, it is highly technical again, and the Government depends heavily upon human resources found outside of its institutions. The Operational Stage requires management skills in finance and contract management although technical considerations are important over the life of the concession agreement.

8.3 SPECIFIC REQUIREMENTS FOR IMPLEMENTATION OF BOT PROJECTS

8.3.1 Work Load

At present, there are no BOT projects which have reached the Pre-Contract or Pre-Concession Stage under the sponsorship of the Department of Public Works and Highways. However, a number of tollways are being considered as possible candidates for private participation and are listed below in Figure 8-1. Most BOT projects are therefore at the Planning Stage or about to begin Stage Two, Pre-Contract or Pre-Concession Stage.

Figure 8-1
POTENTIAL BOT TOLLWAY PROJECTS OF THE DPWH

1. Manila South Tollway Project and the Rehabilitation, Operation and Maintenance of the Luzon South Expressway.
2. Manila-Bataan Coastal Road: This road might extend as far as Subic Bay.
3. Manila-Cavite Expressway.
4. South Luzon Expressway Extension.
5. San Mateo-Batasan Road: This road is likely to be the first highway BOT project.
6. New Luzon North Expressway.
7. Metro Manila Expressway System: There are three components to this project.
8. C-2/C-3 Expressway
9. Second Mactan Bridge.

Source: Department of Public Works and Highways

In order to handle the projected work load, the Department is in the process of creating a Project Management Office to oversee the implementation of BOT schemes. In addition, there is the Toll Regulatory Board (TRB) which was recently transferred (1990) from the Department of Transportation and Communications (DOTC) to the Department of Public Works and Highways (DPWH). Historically, its responsibility was to oversee the South and North Super

Highways operated under a franchise by the Philippine National Construction Corporation (PNCC). More recently, it has been given the responsibility of overseeing the toll roads of the Public Estates Authority (PEA). In both cases, the prime concern of the Board is the regulation of tolls charged for use of the highways managed by the PNCC and the PEA.

The workload indicated by this table would be substantial if all the projects are implemented as BOT projects. A certain number of them will not receive support from the private sector because their rates of return are too low. In the Philippines, businessmen would presently expect rates of return (ROR) on their investments in excess of 20 %. Discussions with several local investors indicate that they are expecting to receive 25 % ROR on BOT power projects. These high rates of return can only be sustained with high toll rates; these rates are probably too high for public acceptance. Would the public be willing to pay an average of 3 to 5 Pesos per kilometer?

Likewise, Filipino and international financial markets presently have limited funds available to finance large highway BOT projects in the Philippines. These conditions suggest that only one or two large projects (+/- US$ 100 or more million) could be presently undertaken. However, local and international conditions are volatile. If there are substantial improvements in the Philippine economy and in international financial markets, funds for these larger projects could increase substantially. These conditions are likely to occur in four to five years.

For larger BOT projects, the activities of the BOT-PMO in the first few years will center around project planning rather than project implementation. Time and effort are required to prepare these large projects for tendering. This process is no easier for a BOT scheme than it is for those projects implemented through normal bidding procedures. It is often mentioned that the time needed to bring the BOT to the Pre-Contract or Pre-Concession Stage is less that if ordinary contracting procedures are followed. There is some truth to this since a detailed final design is not needed for these projects. However, the preliminary designs must be quite rigorous since they define the right-of-way requirements of the project in sufficient detail so that the land can be acquired. The time required for tendering is much longer for BOT projects than for normal construction projects. Two reasons exist for this: 1) for the bidders, they prepare their own designs for the project and find project financing and 2) for the Government, the bid documents are more difficult to evaluate. For large BOT Projects, the savings in time during the Planning Stage is offset by the greater time needed for tendering.

8.3.2 Toll Regulatory Board

In March 1977, Presidential Decree No. 1112 created the Toll Regulatory Board. As stated in this Decree, the primary function of the Board is to "grant authority to operate a toll facility and to issue ... the Toll Operation Certificate ...", to "issue, modify and promulgate from time to time the rates of toll that will be charged the direct users of toll facilities ..." and "to enter into contracts... for the construction and operation and maintenance of toll facilities such as but not limited to national highways, roads bridges, and public thoroughfares." Initially, the TRB

operated under the National Economic Development Authority (NEDA). The costs of operating the Board was to be defrayed from the tolls set aside by the operators. In the Letter of Instructions (LOI) No. 579 dated July 1977, the then Department of Public Highways must approve all plans and specifications for any proposed extension of the Manila North and/or Manila South Expressways prior to approval of the Board. From this LOI, it is clear that the Government intended to have this Department provide the technical expertise and assistance which the TRB would occasionally need to fulfill its mandate.

Executive Order No. 708 transferred the TRB to the administrative supervision of the Ministry of Transportation and Communications. Even under this arrangement, the Department of Public Works and Highway continued to provide the Board with the technical guidance it needed. With the passage of the BOT Law, Republic Act 6957 in 1989, the TRB is now attached to the Department of Public Works and Highways with the Secretary of Public Works and Highways as its Chairman. Under this arrangement, the technical inputs the Board often needs to make its decisions could readily be made available through the Secretary of Public Works and Highways.

Historically, the main responsibility of the Board has been the regulation and supervision of the Philippine National Construction Corporation's franchise for the Manila North and Manila South Expressways. In 1990, the Public Estates Authority applied for approval of the upgrading of the Manila-Cavite Coastal Road into a toll facility. The TRB has been given the responsibility for regulating this project.

The TRB has a staff of 26 persons, and an annual budget of about Pesos 3.5 million. Of the staff, approximately 62% or 16 persons are professional. The administration of BOT tollways will require an increase in it staffing levels of the TRB. Since the completion of the first one is several years off, it is not critical at this point to determine the additional resources which the TRB will need. The staffing requirements are also a function of the structure of the concession agreement and the method used to compute changes in the toll rates. A complex method of toll regulation would require that there be a sizeable increase in the staff of the TRB. A simpler method would reduce these requirements.

8.3.3 Build-Operate-Transfer Project Management Office (BOT-PMO)

The DPWH is in the process of setting up a BOT-PMO within the Department. A full description of its responsibilities and functions are not yet available. From the approved position and functional charts (given in Appendix 8-1), its functions can be discerned. They are to identify potential BOT projects, prepare feasibility studies and bidding documents, assist in the acquisition of land for the right-of-way, approve designs, oversee the construction of the tollway and its operation and "recommend for approval the fairness and equity of the tolls, rentals and charges except in the case of tolls for national highways, roads, bridges and public thoroughfares which shall be approved by the TRB."

8.3.3.1 Organizational Development of BOT-PMO

The BOT-PMO will be headed by the Director of BOT Projects who will be initially under the Director of Urban Road Projects (URPO). As the PMO matures and its work load increases, it is proposed that the PMO will come directly under the supervision of the Undersecretary for Field Operations. Based upon the work levels discussed earlier, the staffing levels of the BOT-PMO should be skewed toward planning activities in its first years. Most of these activities would be done by a combination of its staff and outside consultants. For larger projects all the technical analysis would be contracted through consulting firms. These services would include technical investigations (topographic mapping, soils and geotechnical investigations, traffic survey, etc..), preliminary designs, technical and financial feasibility analysis, title research and preparation of the right-of-way drawings. To support these activities, there will be a Planning Section responsible for the technical evaluation of the BOT projects. A Contracting Section will oversee the management of the consulting contracts of the BOT-PMO and prepare the contract documents for each BOT project.

Once the right-of-way drawing are completed, the BOT-PMO through the DPWH's legal department will have to begin condemnation proceedings. The BOT-PMO will have to rely on the resources of this department to acquire the land for each BOT project. This task will consume a considerable amount of time of the staff of the BOT-PMO. Initially, this activity will be overseen by the Planning Section.

Once projects reach the construction stage, the staffing levels will have to increase substantially since the DPWH will be required to provide extensive liaison with the concessionaire, other national and local government agencies and the public utilities. For each BOT project, a senior engineer should be assigned to it on a full time basis as its Project Officer. The Project Officer would report directly to the Director of the BOT-PMO or its Deputy Director. Initially, the Project Officer would receive support in the execution of the contract through the Project Contract Administrator.

During construction of the tollway, a public information program will be jointly managed by the Department and the concessionaire. This program will inform the public about the project and its impact on the movement of traffic around the construction sites. In addition, the BOT-PMO will have to supervise the Independent Design Checker and the Independent Certification Engineer. The contracting of these services would be done through the Contracting Section of the BOT-PMO. Depending on the size of the project, the Project Officer will be supported by a technical staff of engineers, contract administrators and financial analysts. Some of these specialists would be assigned to the project on a full-time basis; others would provide temporary assistance on an "as needed" basis.

The BOT-PMO will have an Administrative Section which will provide administrative support. These services include personnel management, accounting and budgetary assistance, computer support functions, maintenance of the PMO's data bank, assistance in the public involvement program and clerical, janitorial, messengerial and transportation services.

8.3.3.2 Staffing Levels

The proposed organizational chart of the BOT-PMO given in Figure 8-2 also gives some indication of the staffing requirements of the BOT-PMO needed by the second and third years of operation.

In the initial years, the Office of the Director would consist of the Director himself and his secretary. Initially, the Legal Counsel to the BOT-PMO would come from the Department's permanent staff. Eventually, a full-time senior Legal Officer would be placed in this position. The Legal Officer would assist in the preparation all contracts, prequalification and bidding documents. If he would not be directly involved, he would review them.

The Planning Section would comprise 5 professionals covering four different areas of specialization. This section would be responsible for taking the project through the Planning Stage. The Contracting Section has two professionals and one clerk. The Administrative Section which would provide various support functions has a staff of five professionals and 8 support personnel.

A BOT project section would be created to handle every BOT project once it is ready for bidding. Once construction of the project is completed, its staff would be reassigned to another project or be transferred back to the Department.

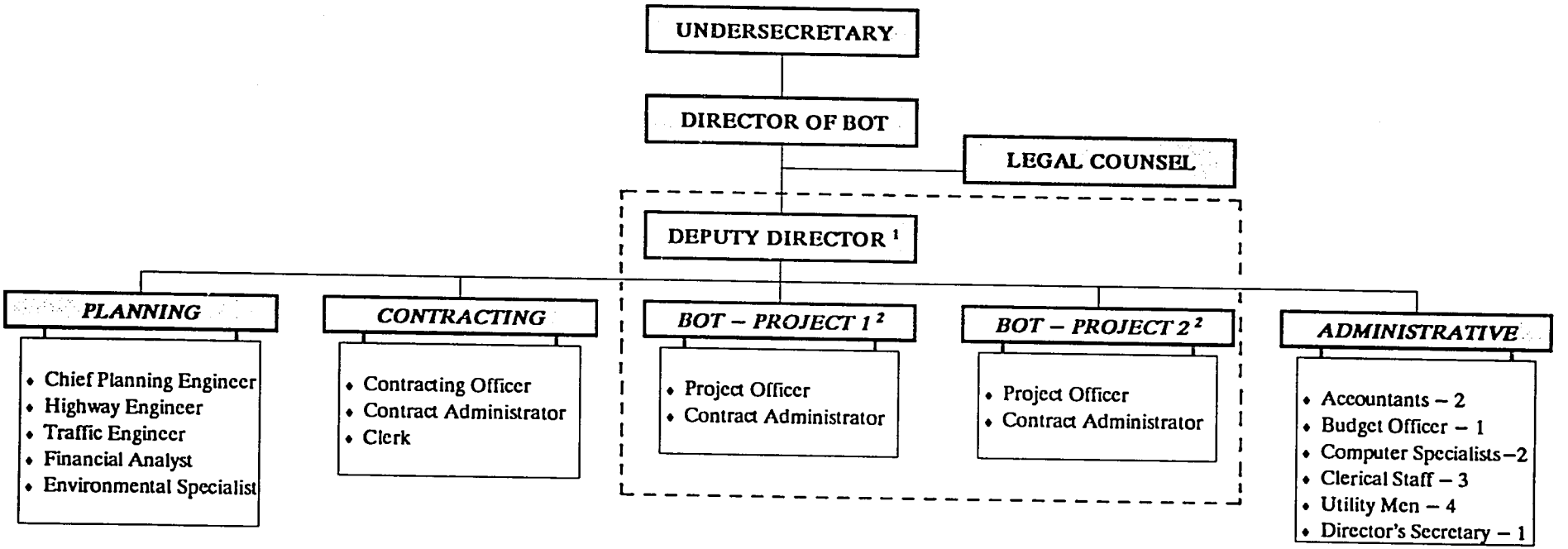
For large projects, the staffing levels would be considerably higher than the two persons and this is indicated in Figure 8-2.

During the middle of the Construction Stage, an additional 5 or 6 persons might be assigned to monitor progress of the project, to oversee the contracts of the IDC, the ICE and the concessionaire and to coordinate with national and local agencies. In the case of the MST project, there would be a need for 3 Senior Engineers to monitor the design and construction activities. Two or more ROW Legal Officers would follow the progress of the ROW acquisition; these persons would be seconded from the Legal Section of the Department. A larger number might be needed if progress is slow. The Contracting Officer would also need additional assistance to oversee the various contracts managed by the BOT-PMO.

8.3.3.3 Budgetary Levels

After its first year of operation, it is suggested that the BOT-PMO have its own office separate from the main headquarters complex of the Department. This provides the BOT-PMO a certain status and independence and is similar to the arrangement which the TRB has. The budgetary requirements would include an office area of 250 to 300 square meters with furnishings for a staff of about 25 persons. Two conference rooms are suggested to accommodate simultaneous meetings. The cost of establishing the Project Management Office is estimated in Table 8-1.

Figure 8–2
ORGANIZATIONAL CHART OF THE BOT–PMO AFTER THE FIRST YEAR



Notes:
1 Deputy Director to be added after 2nd BOT–Project.
2 For each successful BOT Project, a Project Officer and a Contract Adminstrator will be assigned to it on a full time basis during the Pre–contractor, Pre–Concession and Construction Stages.
|--|
|--| Not initially part of the BOT–PMO.

Source: The Consultant's Estimate.

Table 8-1
ESTIMATE ON OFFICE AND STAFFING
BUDGETARY LEVELS FOR THE BOT-PMO

ITEMS		TOTAL (Million Pesos)
OFFICE		
Furnishings which includes air conditioning, partitions, furniture, painting file cabinets, etc...		₱ 1.0
Equipment which includes computers, copiers, printers, typewriters, etc....		₱ 1.0
Office supplies		₱ 0.10
Service Vehicle		₱ 0.65
TOTAL		₱ 2.75
STAFFING LEVELS		
Year 1	15 persons @ Pesos 130,000/person	₱ 1.95
Year 2	25 persons @ Pesos 150,000/person	₱ 3.75

Source: The Consultant's Estimates.

The budgetary costs per person are based on those of the TRB, ₱ 136,000 per person. The first year shows slightly lower costs. The recruitment of personnel for support positions will be easier than it will be for the professional positions. The budget estimate for the second year reflects the higher average cost of these personnel.

8.3.3.4 Training Requirements

The recommended training program consists of two components. The first aims at familiarizing the BOT-PMO senior staff with the BOT concept, in general, and its specific application to highway projects. The second component concerns improving the basic skills of the staff. The need for highly trained managers on the staff of the BOT-PMO is important. They will be meeting with private sector companies and therefore must be able to negotiate complex contracts and understand how the concession agreements are structured. These skills are generally not part of the academic education of most engineers and senior personnel of the Department and training will therefore be important.

To familiarize senior staff members with the BOT concept, two approaches are recommended; 1) participation in international seminars or meetings and 2) participation in a tour of BOT projects in Asia which are in progress.

- International Seminars and Meetings on BOT Projects: It is recommended that all senior members (eight positions) of the BOT-PMO attend within their first two years of employment one international seminar or meeting on BOT projects. This will allow the BOT-PMO to keep abreast of international developments in this field and also help to generate international interest in the program in the Philippines. Upon returning to Manila, each participant would be expected to prepare a short summary of what was learnt (to be circulated to other agencies involved in or interested in BOT projects) and a list of contacts made at the seminar. A one hour briefing presentation should also be made by the group who attended the seminar to other colleagues.

- Asian BOT Projects: In addition, two study tours, one each year, should be scheduled to visit BOT projects in other Asian countries. These visits would familiarize the BOT-PMO staff with the implementation of various BOT projects in the transport sector in different Asian countries. These trips should include a short stay in Hong Kong to visit BOT projects there. The estimated duration of each trip would be 3 weeks. They should include other members of the Department (10 persons) who will be involved in BOT projects.

To develop the managerial skills of the staff of the BOT-PMO, it is recommended that they attend short courses in project financing, contract administration, human resource management, data management and information systems, seminars aimed at improving negotiating or inter-personnel skills, and other similar programs of short duration. This training should be done in the Philippines and overseas. In addition, improving basic skills or cross training could be encouraged; this training could be done in the Philippines.

- Short-Term Courses Overseas: Emphasis should be on making use of institutions in nearby countries where the language of instruction is in English such as at the Asian Institute of Technology in Thailand, or in Singapore or Hong Kong. Other courses might be offered through private institutions for instance, specialized courses or seminars in finance. Recently (March 1992), a "Symposium on Innovative Strategies for the Financing of Major Infrastructure Projects" was offered in Hong Kong. These types of specialized courses are often given in Hong Kong and Singapore, the regional financial centers. Short-term courses in Europe or the United States might also be considered. These courses should be attended by each of the five senior managers.

- Short-Term Courses and Skills Training in the Philippines: Cross training, for instance training a highway engineer in environmental assessment is important in a multidisciplinary staff situation. Productivity improves when one better

understands what his or her colleagues' professional concerns are. Similarly, improving the basic skills of the staff such as in the use of computers or of a particular type of software will make the staff more productive. These types of skills training could be done entirely within the Philippines.

The estimated cost of the first two years of training and upgrading of skills of the staff of the BOT-PMO is given in Table 8-2:

Table 8-2
ESTIMATED COSTS OF TRAINING IN THE FIRST TWO YEARS

TYPE OF COURSE	COST (US $)
• BOT Familiarization	
International Seminars (8 @ $10,000 each)	$ 80,000
Asian BOT Projects (18 @ $ 6,000 each)	108,000
• Skills Training	
Short-Term Courses Overseas (5 @ $ 8,000 each)	40,000
Skills Training Locally (8 @ $ 1,000 each)	8,000
Total	$ 236,000

Source: The Consultant's Estimates.

A large portion of the costs of the training program could be borne by multilateral or bilateral donors interested in supporting the BOT scheme of project implementation.

8.4 INTERACTION BETWEEN THE TRB AND THE BOT-PMO

From the available documentation, it appears that the two organizations, the Toll Regulatory Board (TRB) and the BOT-PMO, will complement each other. In the past, the TRB relied on the technical expertise of the Department to fulfil its responsibilities and will continue to do so.

As the BOT projects go through their project cycle, the interaction between them has yet to be defined. From the available data, the BOT-PMO will have the overall responsibility for the implementation of BOT schemes during its Planning, Pre-Contract or Pre-Concession and Construction Stages.

Once certification of the construction has occurred, the responsibility for overseeing the concessionaire's operation is transferred to the TRB. The role of the BOT would then be to provide technical assistance to the TRB on the quality of the concessionaire's maintenance program or on other technical issues of an operational nature. If there is a need to expand the capacity of the tollway, the BOT-PMO would assist in the technical evaluation of any proposals put forth by either the TRB and/or the concessionaire.

The TRB's main responsibility will be to review the rates charged for use of these facilities. To prepare for this eventuality, it will have limited involvement in the Planning Stage. In the Pre-Contract or Pre-Concession Stage, it will have to approve the proposed toll rates negotiated between the concessionaire and the Government and the method of periodically updating them.

During the Operational Stage, its involvement would be to approve all increases in the toll. Depending on the nature of the toll setting arrangement, the BOT-PMO's involvement would vary considerably. Where tolls are set on the basis of a reasonable rate of return, the BOT-PMO would be consulted by the TRB on the reasonableness of certain types of expenditures. For instance, are the costs acceptable given the quality, of the repairs and the standards set in the contract? Where the tolls are determined on the basis of a fixed formula, the BOT-PMO's involvement in toll setting discussions between the TRB and the concessionaire would be less. It would be concentrating directly on overseeing the quality of the maintenance of the tollway and its facilities.

These comments can be summarized schematically in Table 8-3 which follows.

Table 8-3
ORGANIZATIONAL ANALYSIS OF RESPONSIBILITY FOR THE IMPLEMENTATION OF BOT PROJECTS

STAGE	PRIME RESPONSIBILITY	SUPPORTING ROLE
Planning	BOT-PMO	TRB
Pre-Contract or Pre-Concession	BOT-PMO	TRB
Construction	BOT-PMO	TRB
Operation and Maintenance	TRB	BOT-PMO
Transfer	TRB	BOT-PMO and DPWH
Policy Issues	Depending on the Issue	Both

Source: The Consultant's Estimates.

Certain activities such as general policy issues or setting operating and maintenance standards would be a joint activity. This could be done through a Committee which, depending on the issues involved, would include representatives from the private sector. For instance, a technical committee on maintenance standards might be established with representatives from the BOT-PMO, the TRB, the DPWH and the concessionaire. Together they would prepare a set of standards.

The relationship between these two agencies is described in more detail in the following sections.

8.4.1 Planning Stage

While the primary agency responsible for the activities done during the Planning stage is the BOT-PMO, the TRB can provide important insights based upon their experience in regulating tollways.

As the lead agency, the BOT-PMO would be responsible for the following activities:

- Identifying and setting potential BOT highway projects for national roads;
- Planning the integration of these projects into the national, provincial and local road networks;
- Coordinating with the NEDA, DENR and the DOTC at the national level and with local and regional organizations;
- Preparing technical and financial feasibility studies of those BOT projects which appear to be most viable;
- Supervising the preliminary designs and the preparation of the right-of-way drawings;
- Assisting in the acquisition of the right-of-way.

A number of these activities would be done through the use of consultants. The BOT-PMO would then be responsible for managing the consulting contracts and preparing the contract documents.

In addition, the BOT-PMO will have to develop a public involvement and public relations program for larger BOT projects. This program will begin in the Planning Stage and continue through the Construction Stage.

The Toll Regulatory Board would assist the BOT-PMO by reviewing the feasibility studies particularly in their financial analysis and the levels of tolls utilized in the evaluation of the BOT project. The Board will review the Terms of Reference for consulting service contracts as they

concern tolls and toll setting procedures. The TRB would assist in developing criteria by which the BOT-PMO would evaluate the financial viability of BOT projects and establish guidelines for setting tolls. Finally, the TRB would review and comment on feasibility study reports prepared by BOT-PMO consultants.

8.4.2 Pre-Contract or Pre-Concession Stage

The BOT-PMO will be the agency that will be primarily responsible for managing the tendering activities undertaken during this stage. The TRB will play an important but supportive role.

The BOT-PMO will work closely with the Prequalification, Bid and Award Committee or PBAC Committee formed to pre-qualify bidders to evaluate and rank the bidders and to select the highest ranking bidder. This bidder would negotiate with the PBAC the final details of the concession agreement. As the lead agency, the BOT-PMO would therefore be responsible for:

- Preparing the pre-qualification documents and assisting the PBAC Committee in their evaluation;
- Preparing the bidding documents and assisting the PBAC Committee in their evaluation;
- Assisting the Government's negotiating team during the negotiations with the highest ranked bidder.

The role of the TRB would be to assist the BOT-PMO and the PBAC Committee in the review of all bid documents to determine if they will protect the Government's and the public's interests. In particular, the TRB would review toll levels and tolls setting issues, and it would comment on the quality of the maintenance and management proposals prepared by the bidders. Attention would be given to the evaluation of the financial package presented by the different bidders and the level of the tolls set by the bidders and the method of adjusting the tolls. These are all important considerations in the final selection of the highest ranked bidder. The TRB would also be expected to advise the negotiating team in toll setting issues.

The assistance provided by the BOT-PMO to the PBAC Committee and the negotiating team would be supplemented by specialized consultants in the area of tollway construction, finance and law. The BOT-PMO would assist in recruiting these consultants.

8.4.3 Construction Stage

As the lead agency for the Government during the Construction Stage, the BOT-PMO will have to work closely with the concessionaire to ensure that the project is completed on time. The concessionaire will have to work through the BOT-PMO in order to obtain various clearances

from government organizations and from public utilities.

Much of the BOT-PMO's work load will be done through the use of: 1) an Independent Design Checker to review the final designs prepared by the concessionaire and 2) an Independent Certification Engineer (ICE) to oversee the progress and the quality of construction being done by the concessionaire and its constructors.

During this stage of project implementation, the role of the TRB would be limited to keeping abreast of the progress being made by the concessionaire. The BOT-PMO through the ICE would certify that the tollway and its various facilities were constructed according to standards and specifications in the concession agreement. This certification would act to reassure the TRB that the operation and maintenance of the tollway would be free of technical problems.

8.4.4 Operation and Maintenance Stage

The TRB takes on the responsibility of overseeing the tollway for the Government when the project is certified and the tollway is open to traffic. Most of the technical issues regarding the construction of the tollway will have been resolved prior to certification. Those unresolved concerns will remain the responsibility of the BOT-PMO until they are settled.

The Toll Regulatory Board will be the primary agency responsible for supervision of the concession agreement with the BOT operator during this stage. Its main concern will be the periodic revision of tolls. This should be done on the basis of parameters set in the concession agreement. The TRB degree of involvement in the monitoring of the concession agreement in areas other than toll setting are:

- Policing of the concession;
- Quality of service offered by the concessionaire;
- Traffic management; and
- Quality and adequacy of the maintenance.

This list is not necessarily inclusive of all the problem areas that might occur during the life of the concession. For a responsible concessionaire, these issues might never warrant much attention on the part of the TRB. Problems are likely to come to the attention of the TRB through communications between users of the facility and the Board.

As noted in this Chapter, the concessionaire, the TRB or local politicians might propose to expand or extend the service provided by the tollway. This might entail added lanes, new ramps and interchanges, and/or extending the tollway to a new area. In its evaluation, the proposal would involve legal, financial and technical considerations. The main legal concern will be how the proposal would affect the basic concession agreement. If the proposal comes towards the end of the franchise period, the concessionaire would be unwilling to make a large investment unless the franchise period was extended. Once the legal issues are resolved, the financial and

technical evaluation of the proposal would have to be reviewed by the BOT-PMO. If the proposals are approved, the BOT-PMO would oversee the construction of the improvements to the tollway.

Throughout the Operations and Maintenance Stage, the BOT-PMO and the other sections of the DPWH will be available to assist the TRB on a periodic basis. Assistance might be needed for the following activities:

- Legal guidance and explanation of Departmental orders and guidelines;
- Setting technical standards or tollway operation and maintenance;
- Traffic management issues;
- Verification of the technical adequacy of the maintenance performed by the concessionaire; and
- Technical verification of various types of expenditures.

The issues surrounding the technical adequacy of the maintenance should be covered by the concession agreement. For instance, the agreement might stipulate that the facilities would be periodically inspected by the Independent Certification Engineer. A report would be prepared giving the recommended actions which the concessionaire must take. The BOT-PMO would oversee this activity for the TRB.

8.4.5 Transfer

The TRB would be responsible for overseeing the transfer of the tollway and its facilities from the concessionaire the Department of Public Works and Highways. This would require a final inspection of the facilities and an inventory of equipment. These inspections could be done through the Independent Certification Engineer or by the Department itself. The BOT-PMO could provide assistance to the TRB in these matters.

8.5 INSTITUTIONAL ARRANGEMENTS WITH OTHER GOVERNMENT AGENCIES

In order to implement a project as large as the MST, the Department of Public Works and Highways as it sponsor, will have to interact with a large number of government agencies and departments some of which are identified in Table 8-4. In some cases, their role will be consultative; in others, their involvement will be directly in the decision making process, and in certain cases, they will have to give their approval of an action taken or to be taken by the concessionaire and/or Department. As a project goes through its different stages of implementation, the concerns of the agencies will also vary. Linkages between these agencies and the Department through its BOT-PMO and/or concessionaire are shown in Table 8-4, some

of which are briefly described below:

- National Economic And Development Authority. The NEDA will be responsible for approving the project as an investment. It will scrutinize the Economic and Financial Internal Rates of Return to determine if the project is economically viable and meets the national economic objectives.

- Department of Budget and Management. The DMB would be responsible for approving any budgetary allocations for consulting services and for the right-of-way acquisition.

- Board Of Investment. The Board of Investment will be consulted to identify the privileges that a BOT concessionaire might obtain. Later the concessionaire will avail itself of the various priveledges offered by the Board.

- Philippine National Railways and the Department of Transportation and Communication. The PNR owns the right-of-way on which a large portion of the MST will be constructed. The PNR will have to participate and be informed of a number of decisions throughout the implementation of the project. The PNR might want to be compensated for use of their air rights. The Department and the PNR would have to negotiate an agreement. The DOTC which supervises the PNR will also be involved.

- Philippine National Construction Corporation. An accommodation with the PNCC will have to be made for use of the South Luzon Expressway. Since the MST will connect with the PNCC overpass at Alabang, the concessionaire will have to work with the PNCC in designing the interphase between the two facilities.

- Environmental Management Bureau, Department of Environment and Natural Resources. Proponents of a major infrastructure project such as the MST are required by law to submit an Environmental Impact Statement (EIS) to the EMB which is under the DENR. EMB is tasked to process and finally grant or deny environmental approval to the project. The EMB would therefore be responsible for granting the Environmental Compliance Certificate (ECC) of the MST indicating that the project has satisfied Philippine environmental requirements and can be implemented.

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Table 8-4
FUNCTIONAL REQUIREMENTS AND INSTITUTIONAL ARRANGEMENTS
OF MANILA SOUTH TOLLWAY (BOT) PROJECT

ACTIVITIES	PRIME RESPONSIBILITY	APPROVAL/ CONSULTATIVE	FUNDING
Stage One - Planning			
• Pre-feasibility Study	BOT-PMO	DPWH-BOT/NEDA	GOP + Donor [1]
• Conceptual Designs or	BOT-PMO	NEDA	
• Preliminary Designs	BOT-PMO	NEDA	GOP + Donor [1]
• Detailed Feasibility Study	BOT-PMO	NEDA/TRB	GOP + Donor [1]
• ROW Acquisition Begins	BOT-PMO/DPWH-Legal	DBM (budget)	GOP
• Environmental Assessment	BOT-PMO	DENR/EMB	GOP + Donor [1]
• Squatters Relocation	BOT-PMO	Relocation Task Force DBM/DOH	GOP + Donor [1] GOP + Donor [1]
Stage Two - Pre-Contract or Pre-Concession Activities			
• ROW Acquisition Continues	DPWH-Legal	DBM (budget)	GOP + Donor [1]
• Prequalification	PBAC	NA	GOP + Donor [1]
• Bidding Documents	BOT-PMO	TRB	
• Bid Evaluation	PBAC	BOT-PMO/TRB/DPWH-Legal/DOF/NEDA	GOP + Donor [1] GOP + Donor [1]
• Negotiations & Contract Signing	PBAC	DOJ/NEDA	GOP + Donor [1]
Stage Three - Construction			
• Investment Privileges	Concessionaire	BOI	NA
• Design Checkers & Certification Consultants	BOT-PMO	Concessionaire	Concessionaire
• Environmental Impact Statement [2]	BOT-PMO	DENR/EMB	GOP or Concessionaire
• Environmental Compliance Certificate	DENR/EMB	NA	NA
• Resettlement of Squatters	DPWH	Relocation Task Force	GOP
• Design	Concessionaire	IDC + BOT-PMO	Concessionaire
• Construction	Concessionaire	IDC + BOT-PMO	Concessionaire
Stage Four - Operation			
• Operations and Maintenance	Concessionaire	TRB	Concessionaire
• Tolls	Concessionaire	TRB	Concessionaire
• Expansion or Extension of the Tollway [3]	Concessionaire	TRB/BOT-PMO/NEDA	Concessionaire or DPWH
Stage Five - Transfer	Concessionaire/TRB	DPWH/BOT-PMO	Concessionaire

[1] Technical Assistance costs for consulting services.
[2] If an Environmental Impact Statement (EIS) is required it will be based upon the final designs prepared by the concessionaire.
[3] Add lanes, ramps, and/or interchanges or improve access roads.

Source: The Consultant's Estimate.

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The Relocation Task Force. This Task Force would be responsible for implementing and coordinating the relocation and resettlement of the squatters in the section of the PNR right-of-way required for the construction of the MST. DPWH as the proponent agency would create the Task Force to be composed of representatives and organizations that would assist in facilitating the process of relocation such as:

i. The financing agency;

ii. Local Government representation from the receiving sites (the Mayor or Governor's office);

iii. Presidential Commission for the Urban Poor (PCUP);

iv. Department of Social Welfare and Development;

v. Department of Health;

vi. Department of Interior and Local Government.

Chapter 9

CONCESSION AGREEMENT AND THE TENDERING PROCESS

CHAPTER 9

CONCESSION AGREEMENT AND THE TENDERING PROCESS

9.1 PARAMETERS AFFECTING THE CONCESSION AGREEMENT

9.1.1 Franchise Period

The length of the franchise period is a critical variable in the concession agreement. Internationally, it varies from 20 to 35 years or more. The Mexican experience allows the maximum length of the concession period to be 20 years, and the length of many concessions in that country is usually shorter than this. The effects of these concessions of short duration on the financial viability are not yet in; the long term success of the Mexican model has yet to be proved.

According to the BOT Law, the length of a concession period could be up to 50 years. This gives the upper limit in the Philippines. In the concession agreement between the Government (PD 1113) and PNCC, the franchise for the North and South Luzon Expressways is for 30 years and covers the period between 1987 and 2007. In contrast, power projects can have shorter concession periods. For instance, the agreement between Hopewell Energy (Philippines) Corporation and the National Power Corporation is for a franchise period of 12 years.

Based upon the evaluation of tollways in India done by Louis Berger International, Inc., the difference between the financial rate of return of a project with a 20 and 30 year concession period had considerable impact with rates of return falling in the range of 10 to 15 %.[1] In these cases, there is 3 to 6 percentage points difference in the rates of return, and the length of the concession period is an important factor to consider. Where the expected rates of return fall between 20 and 30 percent, the differences are in the order of magnitude of 1 to 2 percent. In these latter cases, the length of the concession period after the first twenty years is not a critical financial consideration in the agreement for the BOT operator. Its importance is more psychological.

The Consultant recommends that in the tender documents the length of the concession be set for a maximum period of 35 years. However, the bidders can propose that the length of the franchise be for a shorter period. The variability of the concession period may be a factor to consider during the evaluation of the bids; this can be done by comparing the present value of the alternative bids. This method has the further advantage of being the one recommended in the BOT Law.

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[1] Louis Berger International, Inc. et al, Private Sector Participation in Expressway Financing, Construction and Operation in India, for the Asian Development Bank, 1992

The Consultant recommends that the timing of the transfer of the concession back to the Government should not be fixed on the basis of traffic volumes and/or recovery of costs because the concessionaire might find ways to retard the growth of traffic in order to keep the concession. This might be done through charging high tolls, or adopting poor operating practices such as creating artificial traffic jams at peak hours and/or by poor maintenance. If based upon the recovery of costs, unnecessary expansions of the tollway might also occur with the concessionaire delaying transfer of the concession.

9.1.2 Toll Setting

The Toll Regulatory Board (TRB) has responsibility over the regulation of tolls. As a consequence, the TRB will be directly involved in overseeing the operation of the tollroad once its construction is completed. Any change in the toll rates will require approval of the TRB. There are two approaches to administering the setting of the tolls:

Tolls Based on a Reasonable Rate of Return

Tolls should be set on the basis of the costs incurred by the concessionaire. These costs should include a "reasonable" rate of return on the capital (equity) invested by the concessionaire in the project. This is equivalent to allowing the concessionaire to earn a profit.

A "reasonable" rate of return for the investor has yet to be defined by the Government of the Philippines. In principle this concept is easy to understand, but the actual rate is difficult to quantify. Whatever its value, it will not remain constant over the life of the project. Its determination is influenced by a number of economic and financial factors which are constantly changing. Although the BOT Law does not specifically recommend this method of evaluating future tolls, it does give this as the principle under which the concession will function.

Even if it can be quantified, it is not easy to administer since any cost incurred by the concessionaire reduces the rate of return of the tollway. Therefore, its management has less of an incentive to control and to minimize costs. Consequently, the regulatory agency such as the TRB will have to oversee the entire operation of the concessionaire in order to approve his costs. Any expense incurred by the concessionaire has a direct bearing on the rate of return of the project. For instance, the regulatory agency might not approve the full amount of the Chief Executive's renumeration if, in agency's opinion, it is too large. The criteria used is that it exceeds the pay scale set by the Government. Or the regulatory agency may question the moneys spent on maintenance since it exceeds, for instance, what the Department of Public Works and Highways is allocated to do similar work.

In conclusion, setting tolls on the basis of a rate of return calculation is difficult to administer and can be contentious since there is considerable leeway for disagreement.

To administer a tollway concession, this policy would require that detailed regulations be eventually developed to cover a large number of the operating procedures of the concessionaire. The rational for this is to keep costs within certain limits. A potential BOT operator may object to this.

Tolls Based on a Pre-Determined Formula

The bid documents ask the concessionaire to include in his submission the toll rates which will be charged over the life of the project. In addition, he is expected to specify by what method they would be adjusted over time.

The concession agreement for the Second Stage Expressway in Bangkok is formulated in this fashion. Here rates are set in five year increments. This method is satisfactory in a country with historically low rates of inflation. With high rates of inflation, the tolls would have to be indexed to the Consumer Price Index or some other similar method of determining price changes. In the case of the Manila South Tollway, a toll based on a pre-determined formula might have a component tied to the consumer price index, one to the foreign exchange rate to protect foreign investors and another based on the London Interbank Borrowing Rate (LIBOR) with the interest rate linked to this index. The weights given to each might vary over the life of the project. The weight given to the LIBOR would be highest in the first years of the project and lowest when all debt is paid off. The frequency at which the tolls are modified must be stated in the agreement as well. This method can make the administration of setting tolls quite simple and mechanical.

In the long run, if this approach is adopted it will have little to do with the profitability of the project from the perspective of the concessionaire. He may do quite well or poorly depending on how good or poor his initial assumptions and projections were.

With this method, there might be one area of contention. This is the case where the concessionaire makes a major mistake in the determination of the tolls in his original bid. As a result, the concession is not profitable and losses are sustained. Under such a case, the Government and the concessionaire would have to renegotiate the toll rates.

There is another procedure for determining the tolls which is used more in planning toll road projects than in the administration of a toll setting mechanism. The toll rate should be set as

a function of the estimated savings which the vehicle operators[2] receive from the use of the toll facility. The toll is then taken as a proportion of these savings. A value of 50 % is often employed; this is equivalent to a sharing of the benefits from the construction of the tollway between its "owner" and its users. This model is theoretically the more correct one from the point of view of welfare economics and social equity. The result of these calculations has no bearing on a "reasonable" rate of return for the BOT concessionaire or on a pre-determined toll given in the concession agreement. It is also difficult to see how this more complex model can be employed in administering and setting the future tolls for a BOT project unless this model could be employed as a basis for the initial calculation of the "pre-determined" toll rates given in the concession agreement. However, it is more likely that the "pre-determined" tolls would be based on an assumed rate of return.

9.1.3 Land Acquisition

The Government must take on the responsibility for land acquisition.

The difficulty which a BOT concessionaire is likely to have in acquiring right-of-way would be so great as to discourage private sector participation in the project. To leave even a small portion of the right-of-way acquisition to the private sector would open the possibility for long delays. Very long delays would make the project financially untenable. Again, this scenario would discourage all but the most ardent of the potential BOT bidders. Right-of-way issues are discussed in more detail in Chapter 2.

From the perspective of the BOT concessionaire, the best situation is not only to have the Government acquire the land but to make sure it is available prior to commencement of the project. This could be made as a "condition precedent" in the contract.

If all the land is unlikely to be available immediately after the contract is initiated, an alternative arrangement is possible. In this case, not only is the Government responsible for acquiring the land, but the costs to the concessionaire of the delays in the acquisition of the land are borne by the Government. These costs would not only include the cost of having to keep equipment and personnel idle or demobilize and mobilize them if the delays are extreme, but the financial costs, i.e. interest on the outstanding loans of the concessionaire. Under the BOT concept, the concessionaire would be responsible for project financing including payment of interest on non-productive assets.

To provide the BOT concessionaire with the assurances needed, the concession agreement would include a schedule when the right-of-way will be made available. In the case of the MST Project, this schedule would indicate that the construction of the interchanges would wait to the

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[2]These savings include some of the avoidable vehicle operating costs such as the fuel costs, time savings and quantification of the improvements in the quality of service provided by the tollway. These savings are calculated in terms of their financial rather than economic costs.

very end. In this way, the Government has the maximum length of time to acquire the right-of-way before the BOT concessionaire needs it. This is what is being done for the Don Muang Tollway in Bangkok, Thailand. However, this approach would not work in the case of the Second Stage Expressway also in Bangkok, Thailand. In this case, the ramps are needed to deliver the segmented box girders to the construction area. This method does not require ground access to assemble the girders. Consequently, the concession agreement for the Second Stage Expressway in Bangkok, Thailand includes a schedule for the delivery of the right-of-way. It is dictated by the construction schedule of the BOT concessionaire.

9.1.4 Payment of Rent or Concession Fees for Use of the Right-of-Way

In certain cases, a fee for use of the right-of-way or for the concession itself is charged to the BOT concessionaire. This may be done to placate those who assume that the concessionaire is given the use of land owned by the Government without compensation. In this case the rent is a token amount. In the case of the Philippines this is probably unnecessary. The BOT Law clearly allows the use of Government owned land without payment.

9.1.5 Force Majeure, Project Milestones and Penalties

9.1.5.1 Damage Due to Force Majeure

Delays and damage due to force majeure can have very adverse impacts upon the viability of a BOT project. Projects undertaken in the Philippines are particularly prone to disruptions caused by force majeure; they include but are not limited to earthquakes, volcanic eruptions, typhoons, flooding, coups, labor disputes, etc... They are expected to have a minimal impact upon the MST project. However, an earthquake of over 7 on the Richter scale could cause, for instance, severe damage to the erection equipment and parts of the viaduct while it is under construction.[3] Equipment would have to be replaced and/or repaired and sections of the viaduct being erected might have to be rebuilt. Other types of damage could occur. For instance, the precasting yard of the BOT concessionaire or its constructor might be partially destroyed so that it could not produce the necessary precast segments or beams required to erect the viaduct according to the project schedule.

Besides the cost of any physical damage caused by force majeure, there are also time delays associated with it. Since the premiums for insurance against force majeure are large, most Governments are self-insured against these possibilities when they themselves undertake a project. If the BOT concessionaire assumes these costs, either by having a large contingency for the risks of force majeure or by paying insurance premiums, project costs will be

[3] In theory, the structures are designed to withstand earthquakes of this magnitude; however, they are most easily damaged when they are being erected.

considerably higher. Consequently, the tolls required to obtain a reasonable rate of return will also have to be higher. For this reason, governments often assume the risks of force majeure for the BOT concessionaire. This is done by agreeing to pay for the damages and delays caused by force majeure. In the case of the Philippines, this would be the more prudent method.

9.1.5.2 Major Project Milestones

All concession agreements should include major project milestones such as its start and completion dates. They should be based upon a schedule presented by the BOT concessionaire in his bid or given in the tender documents. In general, once construction begins, the BOT concessionaire is strongly motivated to complete the project as fast as possible. His revenue comes only when the project is completed. In the interim, he must pay all the construction costs incurred[4] and those costs associated with financing the project. Even so, it is important to indicate key dates in the concession agreement such as start and completion of construction. Otherwise, there could be no incentive for the concessionaire to begin.

If the concessionaire does not commence work on the project by a given date or a certain amount of progress has not been made by a certain date, the concession agreement should be terminated and the completion guarantees forfeited. An example of this situation is the case of the PNCC concession for the Metro Manila Tollway. PNCC has had the franchise for this tollway since 1985. Work on this important road link has not begun. The agreement between PNCC and the Government does not stipulate a date by which work on the project would begin or a completion date. If these milestones are not met, the concession should return to the Government so that it might be given to another company.

In the case of the Manila South Tollway, the BOT concessionaire will also be Rehabilitating, Operating and Maintaining the South Luzon Expressway while it is building the tollway. Funds derived from the tolls on the MST would help to finance the rehabilitation costs. The Government should have assurances that these funds are applied for their intended purpose; to do this, the BOT concessionaire must begin work and complete it according to a fixed schedule. The increases in the tolls charged on the expressway could also be linked to meeting completion deadlines. This ensures the Government and critics of the project that the BOT concessionaire is not getting a free ride. Thus, the bidder should indicate project milestones in his schedule so that his performance can be monitored. If progress is not being made, the concession agreement would be terminated.

Finally, the concessionaire could be made to pay a penalty if it is late in fulfilling its obligations under the concession agreement. In the case of the EDSA LRT agreement, this penalty is $50,000 per day. A similar penalty should be set for the MST BOT Project.

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[4]This assumes that there is no subsidy.

9.1.5.3 Delays Caused by the Government

If the concessionaire is penalized for not meeting critical deadlines or project milestones due to causes of its own making, the Government too should be obliged to pay for the time lost by the concessionaire if the Government does not meet its obligations under the agreement. When these delays are passed onto the concessionaire, they may increase project costs.

Long delays are most likely to result from problems associated with acquiring the ROW in accordance to the construction schedule. Other common delays occur in coordinating the relocation of utilities since a number of agencies are involved in this activity. Some of these agencies might resent the extra work created by the project, and perform their responsibilities reluctantly. Not being able to meet scheduled deadlines is costly for the BOT concessionaire and its constructors. In the extreme cases, these conditions might result in the redeployment of equipment, manpower and materials and increases in storage, erection and other construction costs.

Demobilization and then the remobilization of equipment and personnel creates costs. Facilities such as the precast yard might have to be closed when the project is remobilized. This would add to costs. In the interim period, the concessionaire would still have to maintain its equipment, store materials and supplies and guard project property and maintain traffic management near project work sites. The costs associated with financing the works which are completed would have to be paid to the bankers. These costs are high. For instance, if a construction loan for $300 million is outstanding, the cost of servicing this loan at LIBOR plus 2 to 3 % (say 13 %) is $107,000 per day or $3.2 million per month. Thus, a penalty of $120,000 per day would not be unreasonable for a project as large as the MST. This amount would also act to motivate the Government since its payments to the concessionaire would be spelled out. Bureaucratic inertia would have a cost. Accountability for delays could then be established.

Under normal construction contracts, delays and other costs incurred by constructor and caused by the Government or force majeure are handled as extras and are negotiated by the Government and the constructor either during, or at completion of, construction. However, the big difference between an ordinary construction contract and a BOT concession is that the concessionaire is responsible for making all payments to the constructor and not the Government. In the normal contract, the Government pays the constructors directly. Revenues are received only after the project is completed. The contract could allow this alternative to paying a daily penalty as indicated above. Under this arrangement, the Government would still be responsible for paying the financial costs borne by the concessionaire as a result of the delays. The cleanest method would be to have a daily penalty for delays to cover financial costs and then negotiate legitimate extras.

The cost of these penalties for the Government can be even higher than suggested above. In the Second Stage Expressway Project contract, if the Government does not meet certain critical deadlines in the acquisition of the right-of-way, the BOT concessionaire can terminate the contract. The Government is then obligated to pay the BOT concessionaire the costs incurred to that date and a reasonable rate of return.

9.1.6 Project Management and Dispute Resolution

As suggested elsewhere, the coordination and management of a BOT concession agreement between the concessionaire and the Government is, in certain respects, more complex than an ordinary construction contract. This is partly due to the different types of skills needed by the Government in managing this type of project and also due to its long duration. The contractual arrangements cover not only the design of the project, but its construction and operation. Furthermore, it obligates the Government to commit itself to meeting deadlines in the case of acquisition of right-of-way or in the coordination of utility relocation. On the other hand, it is less demanding since the Government is not obligated to make progress payments on the work accomplished.

During the design and construction phase, most decisions regarding the actual undertaking of the work is left to the BOT concessionaire. However, the Government still has the responsibility to see that the designs, completed works, and installed equipment meet specifications, standards and performance criteria set in the concession agreement. Since the designs are prepared by the concessionaire, the Government merely has to review and approve them. Since the Government is not paying for the work completed, it is not so concerned about these details. Its main interest is that the concessionaire meet project deadlines, and the tollway performs according to the technical standards found in the concession agreement. To achieve these objectives, the project can be supervised using two alternative methods:

- The Government itself can monitor the progress of the work and its quality and oversee the performance of the concessionaire. These activities can include the review of the designs prepared by the concessionaire and supervision during construction; or

- A consulting firm(s) can review and approve the designs and/or certify the quality of the construction work and commissioning of any equipment. This can be done through a single contract or with two separate contracts, one for each activity.

Among the advantages of employing a consulting firm is its ability to act as a buffer between the concessionaire and the Government. This includes providing help in resolving disagreements between them and in the interpretation of the concession agreement. Conflict resolution should be an important aspect of the concession contract since no contract covering a period of 20 or more years involving the operation of a public conveyance can be free of disputes. The important point is that the contract should provide a method of dealing with them quickly and in a fair and equitable manner. In addition to the consultants who would not be available after construction is completed, there should be a panel made up of three experts able to resolve technical problems which may arise. If these alternatives are exhausted, binding arbitration should be used.

In the Second Stage Expressway in Bangkok, the design review is done through the services of an Independent Design Reviewer; the certification of the construction works is accomplished

through an Independent Certification Engineer. These consultants are selected by the Governmental agency overseeing the project and approved by the concessionaire. Their fees are paid by the concessionaire. Payments are made after approval of the Government. This arrangement is made to ensure than the consultant will be truly "independent" of either organization.

9.1.7 Project Subsidy

In order to keep the toll rates at reasonable levels, it might be necessary for the government to provide the concessionaire with a direct subsidy to cover a proportion of the project costs by the government. Subsides might be made as a direct proportion of the total project costs, or for certain specified activities such as the construction of the substructures or for a specific section(s) or interchange(s). Two approaches to funding these subsidies are:

- Funds could be transferred to the concessionaire as "progress" payments.
- A "lump sum" payment could be made to the concessionaire upon completion and certification by the Independent Certification Engineer.

Each alternative has certain obvious advantages and disadvantages. The use of progress payments implies that Government's direct involvement in the project will be quite great. During the construction phase, the concession agreement and the relationship between the concessionaire and the Government would be similar to the one normally found in construction contracts. If the progress payments are for certain activities, sections of highway or interchanges, the contract could be quite complex.

The advantage of a large lump sum payment is that it provides a further incentive to the concessionaire to finish on time. However, this method would make it more difficult for the concessionaire to obtain project financing during construction. In this case, the Government should provide an irrevocable guarantee of payment, and the funds deposited in escrow. The "lump sum" payment would make the project easier to manage, and it would provide a real incentive to complete it as quickly as possible. The size of the subsidy and method of payment would probably be decided during contract negotiations.

9.2 TENDERING PROCESS

9.2.1 Bid/Tender Documents

Bid/Tender documents have been prepared by the Consultant and are given in the Appendices to this Chapter. They include:

- **Prequalification of Proposed Bidders** (Appendix A9-1). This document outlines procedures for prequalification and for a potential contractor/investor to identify his interest in the MST BOT Project. It includes the **Evaluation Criteria for Prequalification** which are a set of criteria with a rating system for evaluation of potential contractors/investors in terms of legal requirements; their experience or track record; and the capability of the prospective bidder to undertake the project from the technical as well as the financial perspectives.

- **Invitation to Bid Including Instructions to Bidders** (Appendix A9-2). This document is meant to serve as a guideline for Bidders in the preparation and submission of bids. It provides information on the tender process, the particulars to be submitted with the bid, the bidding procedures and **Bid Evaluation Criteria.** The criteria proposed establish an evaluation method and a rating system for analyzing bids based on such items as financing terms and conditions, repayment schemes, the firm and key personnel experience and the financial condition of the principal contractor.

- **The Concession Agreement** (Appendix A9-3). This draft agreement or contract document reflects the parameters discussed in Section 9.1 of this Chapter, and the requirements of the tendering process discussed below.

  The Agreement incorporates the terms and conditions of the BOT contract and would be attached to the Invitation to Bid Including Instructions to Bidders.

9.2.2 Requirements For the MST Based on the BOT Law and IRR

The Consultant reviewed the BOT Law (RA No. 6957) and its Implementing Rules and Regulations (IRR) in some detail. This analysis ensured that the Bid/Tender documents take into consideration the pertinent GOP laws, rules and regulations set forth in the BOT Law, and the IRR.

A method of ranking or weighting the experience and capabilities of potential bidders and for the bids submitted by qualified bidders was developed by the Consultant. The proposed procedures follow the BOT Law and the IRR. The weighting assigned in the criteria for prequalifying Bidders and the criteria for evaluation of Bids can be changed to reflect other considerations than those used by the Consultant. These should be reviewed at the time when the MST BOT Project actually prequalifies potential bidders.

With respect to the Manila South Tollway BOT Project, it must be noted that there are some areas within the BOT Law which may present problems in the presentation or evaluation of bids. The following comments address these. Some minor modifications to the IRR are also proposed to simplify the preparation of documents or bids and their evaluation. They too are noted in the comments that follow.

The BOT Law requires that all BOT Infrastructure Projects shall be awarded on the results of a Public Bidding. Specifically, the BOT Law requires that:

> ***BOT SECTION 2a***
>
> *the ownership structure of the contractor of an infrastructure facility where operation requires a public utility franchise must be in accordance with the Constitution.*
>
> ***IRR, SECTION 10.1a***
>
> *Thus, at least 60% of the capital of the contractor/applicant must be owned by Filipino citizens .....*

Based on the Consultant's research, the MST BOT Project will require a public utility franchise.

In order to comply with the constitution, the maximum allowable foreign ownership of the contractor will be 40% (forty percent). This restriction on foreign ownership may severely limit available financing and foreign interest in the Project.

> ***BOT SECTION 5***
>
> *an advertisement be placed in two newspapers of general circulation and in at least one local newspaper which is circulated in the region, province, city or municipality in which the Project is to be constructed giving notice inviting all duly prequalified infrastructure contractors to participate in a Public Bidding.*
>
> *The contract shall be awarded to the lowest complying bidder based on the present value of its proposed tolls, fees, rentals and charges over a fixed term..*

The IRR approved on April 3, 1991 provides specific details regarding the prequalification of bidders and the contents of the bid. Specifically, the IRR requires that:

IRR SECTION 6

The Agency/LGU responsible for the Project shall lay down the technical and economic parameters to define the Project and to be used by the bidder in preparing his bid. The economic parameters to be provided by the Agency/LGU for the purpose of preparation of bids and comparison of the bids on a "present value" basis shall include:

- *Inflation and discounting rates*
- *Foreign exchange rates*
- *Maximum period of construction*
- *Fixed term for operation and collection of tolls, fees, rentals, etc.*
- *Formulas and price indices to be used in the adjustment of tolls, fees, rentals, etc.*

Comments:

Bid Instruction 8.2 establishes the inflation and discount rates, foreign exchange rates, maximum period of construction, and fixed term for operation.

Formulas and price indices to be used in the adjustment of tolls are not specified. The Consultant considers that the Bidders should be encouraged to develop their own formula. The composition of the financial package such as the proportion of local and foreign financing and the type of foreign financing are important factors in the cost of operating the tollway and in setting the formula.

The method of selecting the highest ranking bidder is according to "the lowest complying bidder based on the present value of its proposed tolls...". Therefore, the method of adusting the tolls would be considered in the evaluation of the bid based upon the indices proposed by the bidder.

IRR SECTION 6.3

The Agency/LGU shall indicate the facilities associated with the subject project which are to be provided by the government. These facilities may include, but not be limited to Right-of-Way. The cost of the same may be partly or wholly be financed and/or shouldered by the contractor as part of its bid and cost recovery scheme.

Comment:

Bid Instruction 9.1 states that right-of-way will be provided by DPWH free of all encumbrances. The responsibility and cost of relocation of the squatters will be that of the Government of the Philippines.

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IRR SECTION 7

A prequalification, bids and awards committee shall be formed by the head of the Agency/LGU.

IRR SECTION 9

The Bidding Documents shall consist of Project Objective and Description, Minimum Design and Performance Standards, Specifications and Economic Parameters, Draft Contract including terms and conditions, Prequalification Criteria and Procedures, Instructions to Bidders including bid form, and Evaluation Criteria.

Comments:

The Invitation to Bid Including Instructions to Bidders consists of:

BACKGROUND
DEFINITION
PROJECT PHILOSOPHY
GENERAL INSTRUCTIONS TO BIDDERS

- 1.0 Documents
- 1.1 Design Structures and Criteria
- 1.2 Technical Investigation, Studies and Conceptual Design
  - 1.2.1 Interchange Alignment Design
  - 1.2.2 Geotechnical Report
  - 1.2.3 Structural Design Studies
  - 1.2.4 Traffic Studies
- 1.3 BOT Law (RA 6957)
- 1.4 IRR RA 6957
- 1.5 DPWH Feasibility Study
- 1.6 Draft Concessionaire Agreement
- 1.7 Other Drawings
- 1.8 Monetary Regulations
- 1.9 Environmental Assessment

Bid Instruction 3.3 states that the bidder must submit the required bid information in four volumes:

- Volume I - Executive Summary
- Volume II - Financial Plan
- Volume III - Project Management Structure and Plan
- Volume IV - Technical Proposal for Design, Construction and Operation.

The contents of each of these volumes address the requirements of the IRR.

SECTION 10

The prequalification criteria for contractors shall include:

LEGAL

Ownership. The Contractor applicant may be Filipino and/or foreign owned.

Foreign owned/based contractors must be duly accredited by its government to undertake component activities of BOT projects.

Filipino owned contractor applicants must be duly registered by the SEC for the purpose of undertaking component activities of BOT projects. A foreign owned constructor must be duly accredited by its government to undertake construction work and certified as such by its embassy in the Philippines or by the Philippine Consular Office in the Constructor's domicile/head office location.

A Filipino owned constructor must be duly licensed and accredited by the Philippine Constructor Accreditation Board.

If the bidder is a Joint Venture, the participants shall submit a written commitment that, if awarded the contract, they shall immediately formalize their joint venture agreement which shall jointly and severally make them responsible for the obligations of contractor/constructor under the contract.

EXPERIENCE

By itself or through the member firms in the case of a joint venture, the contractor must have successfully undertaken a project(s) similar... which is in present value equal to 50% of the estimated cost of the subject project. This experience must include all phases of a BOT scheme including financing, engineering, construction, operation, and maintenance. A Joint Venture firm shall be evaluated based on the individual or collective experience of the corresponding member firms or of the joint venture itself.

The key personnel of the contractor must have sufficient experience...as specified by the Agency.

CAPABILITY

Organizational Capability

The contractor must possess sufficient capability to implement and operate the subject project in terms of...

- *Engineering, construction, operation, and support units and departments*
- *Personnel*
- *Construction equipment*
- *Operation and maintenance equipment*

Financing Capability

Its net worth must be equal to 10% of the estimated construction cost of the subject project.

It must submit a statement from... a financial institution committing to extend a credit line equal to that required by the Agency/LGU.

It must commit other sources of funds to sustain the initial operating expenses of the completed facility.

Comments:

The Prequalification documents address all of these requirements.

SECTION 10.4

The period of preparation of prequalification data shall be at least 45 days from the date of the last invitation to prequalify.

Comments:

Considering the magnitude and complexity of this Project, the Consultant considers that 45 days is not enough for a consortium of companies to be formed and then to prepare the prequalification documents. At least 90 days should be allowed for interested firms to make necessary agreements amongst themselves or other arrangements. In addition, financial institutions must be included in these agreements and initial arrangements so that the sources of project funding can be assured.

SECTION 11

The bid..shall usually include a) the feasibility study, b) the proposed schedule of tolls...c) the bid bond d) other supporting documents.

SECTION 11.1

The feasibility study of the bidder must be undertaken according to accepted standards and must conclusively demonstrate the feasibility/viability of the project in the following terms...

- *Marketability*
- *Technical Soundness*
- *Economic Feasibility*
- *Financial Viability*
- *Operational Feasibility*
- *Environmental Standards*

Comments:

These sections of the IRR are covered in Bid Instructions 8.2 and 8.4.1

The magnitude and complexity of the Project requires a technical feasibility study of the structural features and a financial feasibility/viability study to be prepared by the Bidder.

Bidders will have access to all studies and information previously developed by DPWH and its Consultants.

> *SECTION 11.2*
>
> *The bid shall indicate the amount in present values, schedules and fixed terms of the tolls... to be imposed on the users of the facility over the specified fixed term for project operation.*

Comment:

This section is addressed in Bid Instructions 9.2 and 9.3.

> *SECTION 11.4*
>
> *The bidder shall submit a bid bond not less than...1% of the estimated present value of the construction cost.*

Comment:

This section is covered by Bid Instruction 4.

> *SECTION 11.6*
>
> *Preparation of bids period "should not be less than 60 days nor more than 180 days from the date of first...issuance of bid documents.."*

Comments:

A time frame of 180 days is considered more than ample to prepare the bid. It is recommended that 150 days be used.

SECTION 12.1

A pre-bid conference shall be held at least 30 days before the deadline for submission of bids. Salient results of the pre bid conference will be embodied in bid bulletins.

Comment:

This is covered by Bid Instruction 5.0.

SECTION 12.5

If no complying bids are received, the bidding shall be declared a failure.

Comment:

This is included as Bid Instruction 3.5.

IRR SECTION 13.1

The evaluation of the bids will be in two stages. The first is the evaluation of the Feasibility Study, including preliminary Engineering Design... The second stage is the evaluation of the bid amounts. Only those which hurdle the first stage of evaluation will qualify for the second stage evaluation. The envelope containing the bid amounts shall be returned unopened to each bidder which does not hurdle the first stage.

SECTION 13.2

The minimum criteria for the first stage evaluation (feasibility study) are defined as:

- *The submitted feasibility study must conform to the minimum design and performance standards and specifications and economic parameters specified...*
- *the feasibility study must conclusively show the feasibility/viability of the project...*

SECTION 13.3

To consider the peculiarity of specific projects, the Agency/LGU may include in the bid documents additional evaluation criteria whose aggregate weight shall not exceed that of the basic criteria (present value of proposed tolls)...

SECTION 13.4

Not applicable to BOT Projects.

SECTION 13.5

The Agency/LGU reserves the right to reject any or all bids, waive any defect therein and accept the offer most advantageous to the government.

Comments:

This section is covered in Bid Instruction 3.5 and also under Bid Evaluation Criteria, Section 11 in Appendix A9-2.

The requirement for a "two envelope" system is not essential for the evaluation of the project since it is not possible to demonstrate the financial and economic viability of the Project without first disclosing the proposed tolls.

SECTION 13.6

The period of evaluation should not exceed 120 days from the date of submission of bids.

Comment:

This period of time appears to be adequate.

SECTION 14

The Agency/LGU concerned may resort to direct negotiation with the lone complying bidder if any of the following circumstances arise..

- *If... only one contractor applies for prequalification and it meets the prequalification requirements...*
- *If...more than one contractor applied for prequalification, but only one meets the prequalification requirements...*
- *If after prequalification of more than one contractor, only one submits a bid which is found by the Agency/LGU to be complying.*
- *If after prequalification, more than one contractor submit bids but only one is found by the Agency/LGU to be complying.*

Comment:

These possibilities are discussed in Bid Instruction 3.11.

IRR SECTION 16

The right of foreign contractor/investor to convert its peso earnings into foreign currency and to remit same to its foreign county is governed by existing monetary rules and regulations. The Agency/LGU shall include in the bid documents the pertinent monetary rules.

Comments:

Because of the dynamic situation regarding foreign currency and the formulation of new rules and regulations, the Consultant recommends that these documents be added to the package at the time of bidding.

Chapter 10

IMPLEMENTATION SCHEDULE

CHAPTER 10

IMPLEMENTATION SCHEDULE

An implementation schedule has been prepared. It indicates that nearly six years will be required to complete the MST project as shown in Figure 10-1. This estimate is based upon a realistic assessment of present conditions.

However, it assumes that pending legal issues can be resolved regarding the PNCC franchise - that is, the MST and SLE can operate as a single entity under one management. Further, it also assumes that the bleak condition of the major financial markets will improve so that putting together a financial package can be done in a reasonably short time. In the case of the Don Muang Tollroad in Bangkok, it took over one year to structure the financial package even with a signed concession agreement.

10.1 PRELIMINARY DESIGNS

For the Manila South Tollway Project, a decision will need to be made by the Government of the Philippines to continue with the implementation of this project, to modify its concept or not to proceed with it once this report is submitted. If this decision is to continue or to revise the project concept, the next major activity will be the preparation of the preliminary designs for the Manila South Tollway (MST) and for the rehabilitation of the South Luzon Expressway (SLE). The Terms of Reference for this activity have been prepared by the Consultant and are given in Appendix A10-1. This activity will begin with the selection of the design consultant whose scope of work should include the following tasks:

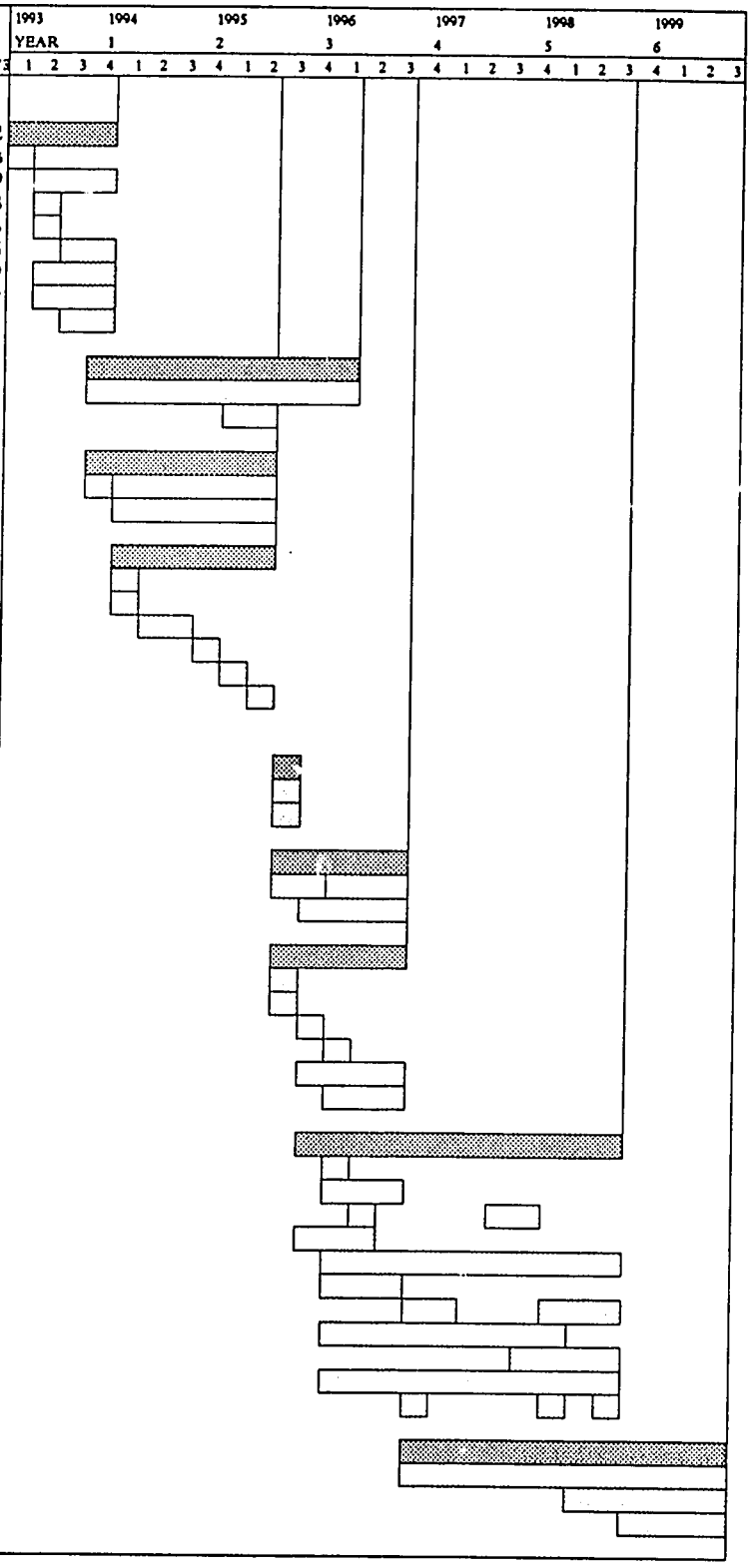
- Traffic Studies and Modeling

  The traffic studies done for the concept designs should be continually updated with new traffic count information to take into consideration changes in the network which might occur in the next few years. For instance, these studies should consider changes which are to be proposed for the Magallanes Interchange. They could have a great bearing on the project. The modeling techniques should take into consideration generated traffic and its growth in the corridor and south of the project.

  Another area where greater analysis is desirable is the siting of the interchanges. There might be advantages to locating interchanges at Bicutan and Sucat elsewhere. Finally, the traffic studies are needed to design the interchanges and the ramps.

Figure 10–1
IMPLEMENTATION SCHEDULE FOR THE MANILA SOUTH TOLLWAY PROJECT

	DESCRIPTION	TIME IN MONTHS
1.0	PRELIMINARY DESIGNS FOR THE MST & SLE AND ROW LOCATION PLANS	12
	Selection of a Consultant	3
	Traffic Studies and Modeling	9
	Drainage and Pavement Investigations for the SLE	3
	Squatters Census	3
	Environmental Impact Statement	6
	Prepare Preliminary Designs	9
	ROW Surveys and Title Searches	9
	Right–of–Way Location Plans	6
2.0	RIGHT–OF–WAY (ROW) ACQUISITION	30
	Condemnation and ROW Acquisition for MST	30
	Acquisition of Resettlement Site for Squatters	6
3.0	TECHNICAL ASSISTANCE DURING TENDERING	21
	Hire Advisors	3
	Technical Assistant during Item 4 Below	18
4.0	TENDERING, NEGOTIATIONS AND CLOSING	18
	Prequalification Documents	3
	Evaluation of Pre–qualification Documents	1
	Bid Preparation by Potential Concessionaires (1)	5
	Bid Evaluation by the Department of Public Works & Highways	3
	Negotiations	4
	Closing (Approvals & Signing of the Concession Agreement)	2
5.0	FINALIZE FINANCIAL PLAN AND CONDITIONS PRECEDENT	3
	Complete Negotiations with Financial Institutions	3
	Conditions Precedent for the Government and Concessionaire	3
6.0	SQUATTER RELOCATION	15
	Preparation of Resettlement Site for the Squatters	6
	Transfer to site	12
7.0	FINAL DESIGNS AND APPROVALS	15
	Select Independent Design Checker	3
	Select Independent Certification Engineer	3
	Finalize the Environmental Impact Statement	3
	Granting of the Environmental Compliance Certificate (ECC)	3
	Prepare Final Designs for MST & SLE by Concessionaire	12
	Approve Final Designs by IDC for the Department (2)	8
8.0	CONSTRUCTION & CERTIFICATION	36
	Project Management Agreement to Manage Construction	1
	Import Construction and Precast Plant Equipment	8
	Import Toll Equipment	8
	Construct Precast Yard for the MST	8
	Constructor Subcontracts for MST	33
	Rehabilitate the SLE–Phase I–Magallanes to Bicutan	9
	Rehabilitate the SLE–Phase II–Bicutan to Alabang	15
	Construction of MST–Phase I–Magallanes to Alabang	27
	Construction of MST–Phase II–Pres. Quirino Ave. to Magallanes	12
	Independent Certification Engineer Services	36
	Final Certification by ICE (3)	3
9.0	BEGINNING OF THE OPERATIONAL PHASE	36
	Operation of the SLE	36
	Operation of MST–Phase I–Magallanes to Alabang	18
	Operation of MST–Phase II–Pres. Quirino Ave to Magallanes	12



Notes:
1. This period includes putting together the financial package.
2. IDC = Independent Design Checker
3. ICE = Independent Certification Engineer

Source: Consultant's Estimate as of 20 Aug. 1992

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- Drainage and Pavement Investigations for SLE

  For those areas where there is persistent flooding, detailed topographical maps of the areas surrounding the SLE are a requisite to the preparation of the preliminary designs for an improved drainage system. Short sections of the SLE have to be raised.

  In order to provide more detailed information on the condition of the pavement structure, the Consultant recommends that the non-destructive testing of the entire SLE be undertaken. Selective coring of the pavement is also desirable since as-built drawings are not available.

  Based upon the information obtained from these investigations and the visual inspection of the pavement, a detailed program for the rehabilitation of the pavement will be prepared. The detailed analysis of whether to overlay the pavement or to replace the slabs will be one outcome of these investigations. By having this information, the BOT bidders will have a much better understanding of the work which is expected of them. Without this information, the bidders will place larger contingencies in their estimate of the work which will be done.

- Squatter Census

  This information will define, within a narrow margin, the requirements to relocate squatters under terms of their present socio-economic condition, and will help in developing a program for their eventual relocation.

- Environmental Impact Statement

  An Environmental Impact Statement will be required. Further field investigations in order to ascertain for example, land and building expropriation costs will be necessary. The EIS will outline the mitigating measures needed to minimize the adverse impacts of the project. The greatest impacts which are likely to occur will be at the interchanges.

- Preparation of the Preliminary Design

  The main objective of the preliminary design will be to define the right-of-way requirements for the project. This will entail detailed designs of the vertical and horizontal alignment at the interchanges as it is at the interchanges that considerable additional land will be needed.

- Re-evaluation of the Financial Analysis

  The re-evaluation of the financial analysis will take into consideration the revised and updated traffic forecasts and revised costs and implementation schedule. The revised cost estimates will be an outcome of the preparation of the preliminary designs.

- ROW Surveys and Title Searches

  With the results of the right-of-way surveys and title searches, property boundaries and ownership will be identified. This will be a time consuming activity.

- Right-of-Way Drawings

  These drawings will be the basis of acquiring the right-of-way.

The minimum time to complete the preliminary designs will be one year. Three months are indicated as the time required to select the consultant(s) who will do the preliminary designs and the traffic studies. Delays in completing the ROW drawings could easily occur due to the problems inherent in collecting right-of-way information.

10.2 ROW ACQUISITION

Right-of-way acquisition can be time consuming and could be encumbered by a number of legal cases. The planning of this activity is important and requires that adequate budgets be made available for this activity. Part of the preparation of the ROW drawings will include estimates of the costs of purchasing the land.

The resettlement of the squatters on the ROW will also be a time consuming activity and will require considerable coordination with a number of government agencies. A Relocation Task Force will have to be created to oversee the resettlement of the squatters. One of its first responsibilities will be to identify where the squatters might be relocated. The purchase of the site will again demand that adequate budgets be made available.

The time frame given for this activity is indicated in Figure 10-1 as 30 months. While it could begin before the preliminary designs and ROW drawings are completed, it is more probable that it will commence some time after the completion of the ROW drawings.

10.3 TECHNICAL ASSISTANCE DURING TENDERING

During the tendering and negotiations of the concession agreement, the Department of Public Works and Highways will need technical, financial and legal advice. These advisors or consultants will assist the Department in:

- updating the pre-qualification documents for the consortia which might bid on the MST project; and
- finalizing the bid documents which would reflect the results of the preliminary design effort.

The advisors or consultants will assist in the evaluation of the pre-qualification documents of the potential bidders and submit their recommendations to the Department or the Pre-qualification, Bids and Awards Committee (PBAC). These advisors could be the same ones involved in preparing the preliminary designs or they could be recruited specifically for the evaluation. They should have extensive experience in privatization and BOT projects, in particular, in the technical aspects of large elevated expressways, in the contract administration and negotiations and in financing of complex projects.

The advisors or consultants will work closely with the PBAC Committee throughout the period of tendering and negotiations and in the closing of the contract or concession agreement. They will not be needed for the entire duration of this period, but on an "as-required" basis since their assistance will be needed on critical elements of the tendering process. Three advisors are recommended:

- Expressway engineer,
- Legal Expert familiar with contracts, and
- Financial Advisor.

10.4 TENDERING, NEGOTIATIONS AND CLOSING

The tendering procedure consists of two basic tasks: 1) preparation of pre-qualification documents of potential bidders and the evaluation of their submittals and 2) preparation of the bid documentation for the pre-qualified bidders and the evaluation of the submitted bids. Tendering process results in the selection of the highest ranked bidder. In the case of a BOT project, there are likely to be several points of disagreement between the highest ranked bidder and the Government which become resolved through a process of negotiations. Upon conclusion of negotiations, the contract or concession agreement is approved and signed.

10.4.1 Tendering

10.4.1.1 Pre-qualifications of Potential Bidders

Even as the preliminary designs start, the DPWH can request that interested parties submit letters of interest. Because of the large size of the MST BOT project, it is suggested that the names and addresses of the companies which submitted letters of interest be made available to those interested in submitting pre-qualification documents. It is more than likely that only a consortium of companies will be able to meet pre-qualification criteria.

Later, as the preliminary designs are being finalized, the pre-qualification of potential bidders can begin. Pre-qualification documents will be prepared and a method of evaluating them will be established.

The preparation of these documents and their evaluation should take at least three months. The technical, financial and legal advisors should be available to assist in evaluating the pre-qualification documents. These documents will be more difficult to evaluate than similar documents for standard construction projects.

10.4.1.2 Bidding

Only pre-qualified bidders will be eligible to bid on the MST BOT project. The bid documents will include the proposed concession agreement. The Instructions to the Bidders will describe the method of submitting the bid and outline supporting documentation which will be submitted by each bidder. A Pre-Bid conference will be held with the prospective bidders to answer questions which the bidders might have. The Advisors will assist the PBAC Committee in preparing for this conference.

The supporting documentation will be used as annexes to the contract. The documentation submitted by the bidder will be evaluated to determine how well the bidder understands what is required throughout the life of the concession. According to the Implementing Rules and Regulations of the BOT Law, each bid must be accompanied by the bidder feasibility study of the project. As part of this effort, the bidder must take the preliminary designs and develop final design concepts in order to prepare definite cost estimates for the construction of the tollway and rehabilitation of the South Luzon Expressway. A large element of this effort will be the determination of the structural system that will be used for the MST. The bidder will probably prepare his own traffic forecast since this is critical to the financial viability of the project. The ability of the bidder to attract financial support from the banks and other financial institutions could depend upon a verification of the Government's traffic projections. This could entail the hiring of a traffic consulting firm. The level of effort needed to prepare the bid and its supporting documents is much greater than for the normal contract.

Significant attention will be given to the coordination of the various partners who are part of the consortium preparing the bid. This includes the promoters or shareholders in the company that will be formed to prepare the bid, the constructors who will be building the MST and/or rehabilitating the SLE and the local and foreign banks and other financial institutions that will underwrite the loans for the project. These financial institutions as well as the other partners in the consortium will be placing their own requirements on the bidders. The bidder will balance these demands and prepare a reasonable bid; a difficult task to do successfully. For all of these reasons, an estimated period of five to six months will be required to prepare a responsive bid.

Upon receiving the bids, the PBAC Committee, its secretariat and the advisors will begin the long process of bid evaluation. The bids will be reviewed and analyzed as to their technical compliance with the design standards and specifications, and for their quality, and responsiveness. A determination of the "lowest complying bidder based on the present value of the tolls, fees, rentals, and charges over a fixed term of the facility to be constructed, operated, and maintained according to the prescribed minimum design and performance standards, plans, and specifications" will be made.[1] Based upon this evaluation, the bidders will be ranked and the highest one selected to negotiate the final contract with the Department. Again, a significant amount of time will be needed to complete a thorough evaluation of each bid and weigh each against the other. The time allotted for this is three months. It could be shorter if there is, for instance, only one or two responsive bids, or longer if there are more.

10.4.2 Negotiations

As indicated, the highest ranked bidder might set a number of conditions to his bid that the Department might find objectionable or the bidder might propose modifications to the draft contract given with the Instructions to Bidders. Their bid might propose alternative designs or method of packaging the project which the Government of the Philippines might find attractive and will want to discuss in more detail. Thus, the Department through the PBAC Committee and its Secretariat and the successful bidder must meet and discuss modifications to the contract and the documentation given to the bidder and to the bid submitted.

Depending on the issues to be resolved, the negotiations could take place over a short period of time or over a protracted length of time. The four months given in the Implementation Schedule suggests a reasonable level of agreement on the basic conditions of the contract and only minor points will have to be settled. If negotiations break down, the second ranked bidder will be selected to negotiate.

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[1]Republic Act No. 6957 or the BOT Law, Section 5.

10.4.3 Closing

This term covers several activities that need to be resolved prior to signing of the contract between the successful bidder and the Department. Once the contract will be negotiated, various Departments and Offices of the Government of the Philippines will have to give their approval to the contract. At the very least, the Department will have to give its approval of the final contract negotiated by the PBAC Committee. Beyond this, it is difficult to determine what additional approvals will be required; this will depend upon the contract itself. For instance, the repatriation of foreign currency might require Central Bank approval.

10.5 FINALIZE FINANCIAL PLAN AND CONDITIONS PRECEDENT

Work should not begin on the project until the funding for its construction is assured. Once the contract is signed, the concessionaire should finalize the negotiations with the banks and other financial institutions based upon the conditions in the agreement between the concessionaire and the Government. Normally, the banks would be informed of the progress of the negotiations as they occurred. As a result, these negotiations should proceed without any surprises. Even so, there could be a need for the banks and the concessionaire to complete a complex syndication to underwrite the financing of the project.

Most contracts of this size might include certain conditions which either party must discharge prior to commencement of work. For instance, the Government will have to make available a certain amount of right-of-way free of all encumbrances. The concessionaire will be required to have a performance bond and to maintain certain levels of insurance. Until the bond is obtained and/or payment of the premiums on the insurance specified in the contract are paid, work on the project cannot commence.

An allowance of three months is given to completing these tasks.

10.6 SQUATTER RELOCATION

Planning for the relocation of the squatters along the right-of-way should begin as early as possible. This means that the land or area where they will be relocated will be identified well in advance, and efforts will be made to prepare it to receive the displaced squatters. Mobilization of the demolition crew, handling the removal of squatter structures and the actual transfer of people, to the resettlement site, however, can be delayed until after the contract is signed. The squatters will need to be transferred only in advance of the construction activities required for the building of the elevated section between President Quirino Avenue and Bicutan.

The concessionaire, the Department through the BOT-PMO and the Relocation Task Force will work closely together to schedule their relocation.

It is anticipated that planning the relocation and resettlement i.e. sourcing of financing, identification, purchase and preparation of site will take over one year. The actual transfer of the squatters to the new site should aim for completion within a two to four month period. If a longer duration is required, the increase in time will not adversely affect the overall schedule of the project.

10.7 FINAL DESIGN AND APPROVAL

10.7.1 Design Process

The assumed approval process is centered around employing two sets of independent consultants who will act as intermediaries between the Department of Public Works and Highways and the concessionaire. Together, the services provided by these consultants ensure that the design standards and specifications are observed by the concessionaire in the design of the tollway, that the quality of the construction of these facilities follow the designs and that the quality of the work is acceptable. They also monitor the performance of the Department as far as meeting its obligations under the contract, that is the transfer of the right-of-way free of squatters and other encumbrances according to a schedule given in the contract.

These consultants are referred to as the Independent Design Checker (IDC) and the Independent Certification Engineer (ICE). They are engaged by the DPWH through the BOT Project Management Office. The contract between these consultants and the Department is approved by the concessionaire who agrees to pay their fees as part of the concession agreement. Thus, their engagement can begin only after the conditions precedent have been met. The ICE is similar to a Works Engineer but does not represent the DPWH as its agent.

The concessionaire will probably hire an international design consultant who will prepare the final designs. These designs are submitted to the IDC and the Department for their approval. The more thorough review of the designs will be done by the IDC.

The selection of the IDC and ICE and the completion of the final designs is expected to take 15 months.

10.7.2 Environmental Impact Statement

The preparation and submission of an Environmental Impact Statement (EIS) forms part of the approval process required for the MST project. The preparation of the EIS is a specialized and

complex task and therefore requires that the Department of Public Works and Highways engages consultants to assist in its preparation.

During the preliminary design stage of the MST, a draft EIS would be prepared as part of planning and feasibility assessment from an environmental perspective. Since, as a BOT project, the final designs for the MST will be proposed by the private sector bidders through their bids for the project, certain environmental issues identified in the draft EIS will need to be re-evaluated when the bids come in.

Once the bidder has been selected and final designs have been approved, and the alignment options and ROW requirements are clarified, the draft EIS will be finalized and the environmental assessment process will be completed in the submission of the EIS document to the Environmental Management Bureau of the Department of Environment and Natural Resources.

The EIS should include an assessment of the impacts for their significance, and ensure that environmental considerations are given due weight in siting and design decisions. The EIS should also identify ways of mitigating adverse impacts by 1) outlining a relocation plan for the squatters 2) estimating land and building expropriation costs 3) determining 'just' values for property or buildings that will be displaced in acquiring the necessary right-of-way.

The EIS should focus on these critical environmental issues involved in acquiring the ROW, making recommendations on a mitigation plan.

As part of the preparation of the EIS, public scoping sessions should be conducted with municipalities, associations and other stakeholders affected by the project.

An estimated period of nine months total is required to prepare a draft and finalize the EIS for such a complex project, relating to modifications in the expressway's alignment or technical design and ROW acquisition.

10.7.3 Environmental Compliance Certificate

The EIS is submitted to the Environmental Management Bureau (EMB) which may request a presentation to its Review Committee. Upon review and approval of the EIS by the Committee, the Environmental Compliance Certificate (ECC) would be issued indicating that the project has adequately addressed environmental concerns and can be implemented. An ECC usually identifies guidelines for implementation related to the technical design of the project as well as mitigating measures which had been recommended in the Environmental Impact Statement.

The time needed for the granting of the ECC is estimated to be around six months.

10.8 CONSTRUCTION AND CERTIFICATION

10.8.1 Start-Up

The concessionaire's team would include the Construction or Project Manager who would have the overall responsibility for the construction of the tollway. More than likely the Project Manager would be one of the larger shareholders in the concession company. The Project Management Agreement would formalize this arrangement. Other start-up activities would include ordering the imported construction equipment. This would include mobile equipment such as heavy lift cranes, trucks (flat bed, concrete mixers, etc...), specialized erection equipment, and pre-cast plant equipment. The toll equipment for the SLE could be ordered at this time. The first priority would be setting up the pre-cast plant which would manufacture the pre-cast concrete sections to be employed in the elevated structure. At the same time, the concessionaire would enter into a number of construction contracts with Filipino and/or foreign constructors to build the substructures and then to erect the elevated superstructure.

10.8.2 Rehabilitation of the South Luzon Expressway

The sequence of construction depends upon the concessionaire. It is to his advantage to rehabilitate the SLE as soon as possible. With the completion of this activity, it will be possible to reimpose the toll on the SLE. With this revenue, the MST project will require less funds to complete.

One possible schedule is to rehabilitate the Magallanes to Bicutan section immediately since it will not be affected by the construction of the MST. South of Bicutan, the MST bifurcates into separate elevated viaducts over the SLE and East Service Road. This suggests that completing the rehabilitation work of this section has to wait until the MST is more or less complete over it. However, once the substructures and columns are built, it might be possible to finalize the rehabilitation of this section.

Another approach would see the partial rehabilitation of the Bicutan to Alabang section in the first year so that the toll could be reintroduced over the entire length of the expressway by the end of the first year. Having the SLE act as a source of revenue is advantageous for the concessionaire since the project becomes partially self-financing. However, the revenues generated by the tolls would be only a small percentage of the total project cost. This type of help in project financing would be received favorably by the banks and other financial institutions supporting the project. Again, the exact sequence of construction would be left to the concessionaire.

10.8.3 Construction of the MST

The exact construction schedule will depend upon the concessionaire who will also have to consider when the right-of-way will be available. Purchasing the right-of-way will be the responsibility of the Government and the timing of its transfer to the concessionaire will be part of the concession agreement.

It is assumed here that the right-of-way which will have to be acquired for the section from President Quirino Avenue to Magallanes Interchange will take longer to acquire than along the rest of the tollway. Therefore, construction of the tollway will be done in two phases: Phase I covers the section from Magallanes to Alabang (about 15.7 km with 4 interchanges) and Phase II from Pres. Quirino Ave. to Magallanes Interchange (4.3 km and 3 interchanges).

Once the Environmental Compliance Certificate is issued by the EMB, construction of the tollway will begin in earnest. The first task will be completing the pre-cast yard; concurrently with this will begin the construction of the foundations and piers for the elevated sections. Depending upon the structural system developed for the project, erection can be done from the ground or from the elevated section of the Tollway. (See Volume Three which contains drawings of the erection of the elevated sections.) Once ramps are built, it will be possible to deliver precast sections along the elevated section and reduce traffic congestion along the SLE.

10.8.4 Quality Control and Certification

Because the concessionaire will be responsible for operating and maintaining the SLE and the MST for a 20 to 35 year period, it is in his best interest to maintain high standards of construction. On many BOT projects, the quality control program is left to the concessionaire. It is usually enforced through the contracts between the concessionaire and the constructors. One of the responsibilities of the Independent Certification Engineer (ICE) is to oversee the quality control program of the concessionaire. Upon completion of construction, the ICE certifies that the facilities built by the concessionaire and its constructors meet the design standards and specification of the project and that the tollway and expressway will perform as intended.

10.8.5 Time Needed to Complete Construction

Throughout the rehabilitation of the SLE and the construction of the MST, a traffic management program will have to be enforced. This will constrain certain construction activities during peak hours and will require that much of the construction work be done during the night. Bad weather (heavy rains and typhoons) will also affect the rate of progress of the work. The design of the erection system and its operation will have to consider the high winds associated with typhoons.

A three year construction period is assumed to be required to complete the construction of the tollway. Projects of similar size and complexity are being undertaken in Thailand. The time needed to complete these projects are:

- Second Stage Expressway

  ($1+ billion and 31 km) 5 years for completion.

  (i) Opening of Priority Component: 3 years for 21 km
  (ii) Opening of Completion Component: 5 years for the full 31 km

  This expressway is built over an entirely new right-of-way. Delays are due to the acquisition of right-of-way. As of July 1992, the progress of the construction was plus or minus 90 percent on schedule.

- Don Muang Tollway

  ($0.4 billion and 15.4 km) 4 years for completion.

  One year was used to refinance the project and 3 years for its construction.

The erection of structures can be done quite quickly. On the Second Stage Expressway in Bangkok, the average time it takes to complete the erection of a 3 lane 45 meter span is 3.5 days. The complex geometry of the interchanges increases the time to between 5 and 7 days. Similar rates are achieved on the Don Muang Expressway; however, the distances between piers average 30 meters.

10.9 OPERATION OF THE SLE AND MST

Once the ICE certifies the project, the operational stage of the concession begins. For this project, it is anticipated that the SLE will be in operation prior to completion of the MST.

TECHNICAL ADVISORY SERVICES

for

REPUBLIC OF THE PHILIPPINES

COORDINATING COUNCIL OF THE PHILIPPINE ASSISTANCE PROGRAM

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MANILA SOUTH TOLLWAY
BOT PROJECT

DRAFT FINAL REPORT

VOLUME II-A: APPENDICES A1 TO A4

September 1992

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MST BOT PROJECT
ORGANIZATION OF REPORT

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TERMS OF REFERENCE

Appendix A1-1

TERMS OF REFERENCE
FOR THE PREPARATION OF BOT BID/TENDER DOCUMENTS
IN
THE CONSTRUCTION AND OPERATION
OF A MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE
AND
THE REHABILITATION, OPERATION AND MAINTENANCE OF
REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY

I. PROJECT CONCEPT

A. Rationale

This Project is aimed at providing a continuous and uninterrupted route through an expressway link between Metro Manila and the emerging industrial areas of the CALABARZON at its south end and the resource-rich and food producing provinces of Central and Northern Luzon. As its underlying concept, the Project is proposed for implementation utilizing the Build-Operate-Transfer scheme or similar other privatization arrangements. By tapping private sector resources to finance its construction, the Project is expected to further catalyze industrialization and investments into the CALABARZON and revive/enhance economic activities in the disaster-stricken areas of Central and Northern Luzon.

B. The Metro Manila Tollway

An expressway route has been in the proposal stage since 1985, known as the Metro Manila Tollway (MMT). Granted under a long-term franchise to the Philippine National Construction Corporation (PNCC), the MMT starts at the midpoint of the Bicutan and Sucat interchanges of the South Luzon Expressway up to the midpoint of the Malinta and Meycauayan interchanges of the North Luzon Expressway.

At this time, however, the financial position of the franchiseholder, PNCC, does not allow the implementation of the MMT within the foreseeable future.

C. An Alternative to Complement the MMT: A Manila South Tollway

Meanwhile, industrialization and rapid urbanization in areas south of Metro Manila have underscored the capacity limitations of the South Luzon Expressway. With only a few alternative corridors leading towards south Metro Manila, GOP transport planners believe that a Manila South Tollway (MST) would be a feasible alternative.

The Manila South Tollway is envisaged as a four-lane, ground level route running on both sides of the PNR tracks from Alabang to EDSA/Pasong Tamo (with fly-overs on the major intersections at Sucat and Bicutan) and subsequently using an elevated route (possibly atop the PNR right-of-way or the center island of the South Super Highway and Pres. Quirino Avenue) from EDSA to Pres. Quirino Avenue/Roxas Boulevard.

A tollway from Alabang, Muntinlupa to Pres. Quirino Avenue, Manila utilizing the right-of-way of Philippine National Railway (PNR) tracks will directly complement the traffic-heavy South Luzon Expressway and to a lesser degree, the Manila-Cavite Coastal Road. The development of the MST should complement and is designed to eventually incorporate into the implementation of the Metro Manila Tollway.

D. Rehabilitation, Operation, and Maintenance of the South Luzon Expressway

Since the take-over last August 1991 of reverted portions of the South Luzon Expressway from the Philippine National Construction Corporation (PNCC), GOP/DPWH officials had realized that its operation and maintenance were better left with the private sector.

Revisions by Louis Berger Int'l./April 11, 1992

Based on a Rehabilitate-Operate-Maintain (ROM) contract, a private firm having a more solid financial base than the heavily debt-ridden PNCC can be competitively selected to rehabilitate and efficiently maintain the reverted portions of the expressways yet still charge reasonably lower toll rates. Rehabilitation works may include, but not necessarily be limited to the: correction of road elevations for flood-prone sections; repair of damaged pavements and shoulders; re-installation of security fencing; provision of appropriate traffic signs, signals and monitoring systems; and efficient overall traffic management.

E. Integration of a Mass Transit System

The opening of a complementary route into south of Metro Manila can present both opportunities and disadvantages. The socio-economic advantages are probably more apparent in terms of better population and workforce mobility, appreciation of real estate values and distribution efficiencies. However, if based on the initial project concept, providing a tollway which shall solely be utilized for vehicular traffic may restrict options to develop more cost efficient transport modes.

The "Metrotren" railway commuter line running from the PNR Tutuban Station to Canlubang, Laguna has obvious cost economies. The PNR Metrotren also provides the unemployed/underemployed Metro Manila workforce with the mobility to access employment opportunities in the CALABARZON. Although still in operation with a few commuter trains running, the PNR has not been able to expand the line as it is beset by low financial resources.

The proposed complementary route (Alabang to Pres. Quirino Avenue) would make use of the same PNR railroad tracks utilized by the PNR Metrotren. With a four-lane road beside its tracks, the option to expand the Metrotren and/or install a better and improved mass transit system may be delimited if not altogether a dead-end.

A World Bank study on Metro Manila Urban Transport will be concluded in April 1992, while a JICA study on Metro Manila Mass Transit will be starting very soon. Based on the findings and recommendations of the World Bank study, the preparation of alternative plans for the development/expansion of the PNR Metrotren and the Metro Manila South Tollway in close coordination with the JICA team has been included in the Consultant's Scope of Work.

F. Social Considerations

Also of particular concern are potential adverse social effects of relocating numerous squatter communities illegally ingressing into the PNR railway right-of-way. This issue should be directly addressed prior to the Project's offer as a BOT/BOO Project to the private sector. The conduct of an Initial Environmental Examination covering each project component has also been included in the Consultant's Scope of Work.

G. A component of this work shall be to prepare recommendations to DPWH for an organizational structure within the Department to monitor/supervise the execution of BOT projects that fall within the purview of DPWH.

II. BACKGROUND

A. Metro Manila

Metro Manila, also known as the National Capital Region (NCR), is comprised of four (4) cities, namely: Manila, Caloocan, Pasay and Quezon and thirteen (13) municipalities, namely: Navotas, Malabon, Valenzuela, Makati, Pasig, Mandaluyong, Marikina, Las Pinas, Pateros, Taguig, San Juan del Monte, Paranaque, and Muntinglupa. Based on NCSO projections for CY 1990, Metro Manila's permanent population was estimated at 7.9 million. Metro Manila's population growth rate grew by more than 30% during the last decade (1980-1990). Metro Manila is the most densely populated region in the country with a density of 12,400 persons per square kilometer.

Similar to the situation of other developing countries, the expansion of the metropolis has generated far-reaching and complex problems, e.g., poverty, housing shortages, poor social services, limited employment opportunities and an inefficient transport system.

B. The Traffic Situation in Metro Manila

The inefficiencies in Metro Manila's transport system became pronounced as early as the 1970s. At that time, the construction of a complete system of circumferential and radial roads as well as the Light Rail Transit (LRT) lines were still at the planning stage.

Based on CY 1990 data from the Land Transportation Office, Metro Manila registered 588,238 vehicles. This roughly comprises 43% of all vehicles registered in the country. With a total road length of about 4,912 kilometers, only 15% or 720 kilometers are classified as national roads while the rest are either municipal, city or private roads. This means that Metro Manila has a density of 817 vehicles per kilometer of national or primary roads.

Cognizant of the situation and realizing that existing radial and circumferential roads as well as Light Rail Transit (LRT) lines may be able to solve only part of Metro Manila's anticipated traffic problems, the Government of the Philippines (GOP) with assistance from the Japan International Cooperation Agency (JICA) undertook the Urban Transportation Study for the Metro Manila Area (UTSMMA) which developed the concept for an urban expressway system. In 1985, the National Transportation Planning Project (NTPP) conceptualized and initiated planning for the Luzon Expressway System (LESS). The LESS included the Metro Manila Tollway (MMT) which was to follow the general alignment of the outermost circumferential road of the recommended thoroughfare system for Metro Manila and link the North and South Luzon Expressway Extensions. In the planning stage since 1985, implementation of the MMT has not been started.

A Metro Manila Mass Transport System Study jointly sponsored by the DPWH and the Department of Transportation and Communication and financed by the Japan International Cooperation Agency is programmed to be started by the 1st quarter of 1992. This mass transport study is necessary to integrate the Metro Manila Expressway system and its mass transport system.

C. The Existing North and South Luzon Expressways

With initial portions operational since 1968, the two (2) existing expressways (North Luzon and South Luzon Expressways) are the primary links connecting Metro Manila with the two of the most economically developed regions in the country, Central Luzon (Region III) to the north and Southern Tagalog (Region IV) to the south. These expressways likewise serve as the gateway to other regions, to the north are the Ilocos and Cagayan Valley (Regions I and II) and Bicol (Region V) in the south. The North Luzon Expressway has a length of around 90 kilometers up to Mabalacat, Pampanga while the South Luzon Expressway has a length of around 70 kilometers up to Los Banos, Laguna.

In order to maintain their function as the primary links north and south of Metro Manila, existing road rights-of-way of some portions of the expressways have been maximized and developed as additional traffic lanes. In spite of this, however, heavy traffic congestion is a daily occurrence along the expressways, most particularly for the South Luzon Expressway. Vehicular traffic to and from the regions also contribute substantially to traffic congestion within Metro Manila.

Prior to August 1991, the Philippine National Construction Corporation (PNCC), the franchisee for both tollways, had plans to extend the North Luzon Expressway up to Carmen, Rosales in Pangasinan while the South Luzon Expressway extension would reach Lucena City in Quezon Province. PNCC is also the franchise holder for the construction, operation and maintenance of another expressway corridor, the Metro Manila Tollway, also designed to link both North and South Luzon Expressways using the easternmost corridor of Metro Manila.

In August 1991, the Makati Regional Trial Court ruled in favor of a petition filed by a group of homeowners residing in subdivisions along the South Luzon Expressway to discontinue the collection of toll fees along portions of both the North and South Luzon Expressways. These portions constitute almost one half of the total length of both expressways, i.e: (1) Balintawak to Tabang, Malolos, Bulacan for the North Luzon Expressway; and (2) Nichols to Alabang, Muntinglupa, Metro Manila for the South Luzon Expressway.

Immediately thereafter, the PNCC drew back its area of operations, including tollbooths and maintenance equipment, to the remaining portions of the expressways which were not covered by the Makati Regional Trial Court ruling. The PNCC has subsequently filed another petition with the GOP Supreme Court seeking to overrule the Makati Regional Trial Court. Whatever the results of the PNCC petition with the GOP Supreme Court, however, it is highly doubtful that its capital resources as well as its construction capability will be able to complete any tollway extension or the MMT.

As a result, responsibility for the maintenance of the reverted portions had to be taken over by the Department of Public Works and Highways. Since its take-over, the DPWH had instituted improvements on the reverted portions, e.g., street lighting and road repairs. These expenditures, however, were not foreseen by DPWH and thus were not reflected in its annual operating budget. Constituting a drain on its resources, DPWH is considering to privatize the rehabilitation, operation and maintenance of the reverted portions of the North and South Luzon Expressways.

D. The Manila South Tollway from Alabang to Pres. Quirino Avenue

The development of an expressway line to interlink the North and South Luzon Expressways is envisioned to address the need to improve the transportation network in Metro Manila. With this objective, the DPWH feels that a Manila South Tollway would be able to generate sufficient private sector interest as a BOT project. The major road links of the Manila South Tollway to connect with the North Luzon Expressway is being programmed by the DPWH under ODA or GOP financing. A road link connecting Pres. Quirino Avenue and R. Magsaysay Boulevard in the Sta. Mesa District has been bidded out for construction by DPWH and is presently in the contract award stage.

A four (4) - lane expressway from Alabang to Pres. Quirino Avenue was conceived with the idea of utilizing the right-of-way of the Philippine National Railways (PNR) lines running along the South Luzon Expressway, through the South Super Highway and on to Pres. Quirino Avenue. The PNR lines from Alabang to Pres. Quirino Avenue has a total approximate length of twenty (20) kilometers.

An elevated route for the section from EDSA/Pasong Tamo to Pres. Quirino Avenue/ Roxas Boulevard is felt to be a practical alternative vis-a-vis a grade-level road line considering: (1) the overcrowded and congested situation of the South Super Highway and the area along its corridor which delimits the availability of new road rights-of-way; and (2) the availability of the south line of the Philippine National Railways (PNR) which runs parallel to the South Super Highway and Pres. Quirino Avenue.

E. Private Sector Participation Using the Build-Operate-Transfer Scheme

Republic Act No. 6957, signed on July 9, 1990, and known as "An Act Authorizing the Financing, Operation and Maintenance of Infrastructure Projects by the Private Sector and For Other Purposes defines the BOT scheme as a contractual arrangement whereby the contractor undertakes the construction, including financing, of a given infrastructure facility, and its operation and maintenance thereof. The contractor operates the facility over a fixed term during which it is allowed to charge users appropriate tolls, fees, rentals and charges sufficient to enable the contractor to recover its investment and operating and maintenance expenses, plus a reasonable rate of return thereon. The contractor transfers the facilities back to the GOP agency at the end of a fixed term which shall not exceed fifty (50) years.

The Implementing Rules and Regulations of R.A. 6957 serves as the guiding document in project implementation under the BOT/BT scheme.

Based on the DPWH Feasibility Study, project implementation based on the BOT scheme may be financially viable at an average toll fee of P 0.75 per light vehicle/km. with the GOP assuming the cost of installing the project's sub-structure.

F. Proponent Agency

The Department of Public Works and Highways (DPWH) is the proponent agency for this Project.

G. Previous Studies and Other Reference Materials

The Feasibility Study (dated 15 November 1991) for an Elevated Expressway from Alabang to Quirino Avenue prepared by the Urban Road Projects Office and the Bureau of Design, Department of Public Works and Highways and the Implementing Rules and Regulations (IRR) of Republic Act No. 6957 are expected to be used as reference materials in the preparation of BOT Bid Documents.

H. GOP Congressional Approval

Pursuant to Section 4 of Republic Act No. 6957, this project type is approved by the GOP Congress for implementation under the Build-Operate-Transfer scheme.

III. OBJECTIVE AND METHODOLOGY

The objective of this Terms of Reference is to provide a guide for the Consultant to:

A. Review the DPWH Feasibility Study of 15 November 1991, particularly in terms of its findings on the Project's financial and economic viability; conduct such additional data collection, conceptual design, analysis, traffic projections, and financial review as may be necessary to provide potential BOT bidders with basic minimum information;

B. Study the proper connection between the proposed Metro Manila Tollway along the alignment of C-6 with the proposed Manila South Tollway and the existing South Luzon Expressway;

C. Conduct reconnaissance surveys on the reverted portions of the South Luzon Expressway to determine the scope of the proposed Rehabilitate-Operate-Maintain proviso in the privatization package/s. The surveys shall identify areas or segments for: (1) correction of road elevations due to flooding; (2) repair of damaged pavements and shoulders; (3) re-installation of security fencing; (4) provision of appropriate traffic signs, signals and monitoring systems; and (5) efficient overall traffic management.

D. Conduct site investigations to develop design and performance standards, technical specifications, and recommend economic parameters necessary to provide the bases for contracting the Project under the BOT scheme.

E. Conduct an Initial Environmental Examination of all proposed Project components, recommend measures and develop cost estimates to mitigate the adverse social effects of relocating "squatter" families affected by the Project;

F. Develop appropriate BOT contract packages and prepare all documentation required for bidding, evaluation and award of a BOT contract agreement;

The Consultant is also expected to develop options for packaging the Project based on consultations with the private sector, e.g., real estate developers, constructors, etc. Based on initial discussions with DPWH, some possible options for packaging the Project under a privatization arrangement may include:

(a) a combined contract for the construction, operation and maintenance of the Manila South Tollway and the rehabilitation, operation and maintenance of the South Luzon Expressway;

(b) a contract for the construction, operation and maintenance of the Manila South Tollway and another separate contract for the rehabilitation, maintenance and operation of the South Luzon Expressway.

G. Provide specialized technical assistance to the proponent agency (DPWH), as may be required, for each stage of the contracting process.

H. To recommend organizational structures and institutional changes with DPWH to monitor/supervise BOT projects.

IV. SCOPE OF WORK

As scope of work for this study, the Consultant is expected to:

A. Site Investigations, Design/Performance Standards and Economic Parameters

1. Review the proposed alignment per the DPWH Feasibility Study of 15 November 1991, and verify the alignment's technical feasibility through field tests, surveys and investigations particularly those which directly relate to the Project's critical physical components. The results of these tests and investigations shall be the basis for developing standards and specifications most appropriate for the Project, and for preparing a conceptual design to facilitate cost estimating and R.O.W. acquisition. Use of existing and aerial photography supplemented by field survey of interchanges is suggested.

2. Conduct reconnaissance survey/s of the South Luzon Expressway in order to determine the scope of the proposed Rehabilitate-Operate-Maintain proviso in the privatization package/s. In consultation with the DPWH and DOTC, the Consultant shall identify areas or segments for: (1) correction of road elevations due to flooding; (2) repair of damaged pavements and shoulders; (3) re-installation of security fencing; (4) provision of appropriate traffic signs, signals and monitoring systems; (5) efficient overall traffic management; and (6) the latest state of the art in toll collection system.

3. As may be necessary to augment available data, conduct soil borings along the proposed alignment to obtain soil samples for laboratory analysis. Borings shall be sufficient to adequately cover all prospective construction areas. A soils investigation report shall be prepared which interprets, analyses and provides guidance for the design of foundations for permanent superstructures.

4. Based on discussions with potential private sector investors, recommend appropriate privatization packages determined to be of specific interest to the private sector and ensure successful implementation as a BOT Project. A market strategy and promotional package shall be developed.

5. Develop and recommend to the GOP/DPWH a minimum conceptual design, design criteria, performance standards and technical specifications to achieve the appropriate design the Project. These criteria and standards should conform with internationally accepted standards for expressways. Potential for a six (6)-lane expressway must also be examined.

6. Conduct an Initial Environmental Examination (IEE) and a "social-soundness analysis" on the Project, particularly as to how it would affect existing "squatter communities" which may be displaced or relocated in order to acquire the necessary rights-of-way and the clear the proposed alignment. The cost of mitigating these adverse social effects are to be made part of cost estimates.

   The Initial Environmental Examination shall cover each of the contract packages recommended. As reference, Attachment 1 provides an Environmental Checklist to guide the conduct of the IEEs.

7. Determine the transport economics and financial viability of the two (2) basic Project components, i.e.:

   (a) the Manila South Tollway from Alabang to Quirino Avenue by validating/ revising the assumptions and computation methodologies of DPWH Feasibility Study for the Elevated Expressway in order to determine the appropriate financial internal rates of return.

   (b) Rehabilitation-Operation-Maintenance of the South Luzon Expressway;

8. Recommend the most appropriate economic parameters, as a uniform basis for the preparation by the offerors of their bids and for comparison by the DPWH on a "present value" basis, including but not necessarily limited to the following:

   a. Inflation and Discounting Rates;
   b. Foreign Exchange Rates
   c. Maximum Period for Construction
   d. Fixed Term for Project Operation and Collection of Fees.

9. In consultation with the DPWH and DOTC, develop a list of facilities associated with the Project that are to be provided by the GOP/PNR. The cost of these facilities shall be established as these may be partly or wholly financed by the offeror as part of its bid and cost-recovery plan. These facilities may include:

a. Sub-structure of the elevated portions of the MST;
b. Rights-of-way on the existing PNR line;
c. Parts or components of existing PNR structures;
d. Rights-of-way and Easement requirements outside existing PNR ROW.

B. Evaluation Criteria for Prequalification of Contractors/Investors

Within the purview of R.A. 6957 and its Implementing Rules and Regulations, the Consultant shall establish and recommend sets of Prequalification criteria with a quantitative rating system applicable for the recommended contract packages which are most appropriate for evaluating potential investors. The criteria for Prequalification shall include, but not necessarily be limited to, the following:

1. Legal Requirements

a. Ownership. The Consultant shall provide recommendations on the proposed ownership structure for:

- the Principal Investor/Contractor;
- the Builder or Constructor;
- the Operator or Manager of the Facility.

b. Joint Venture Agreements. The Consultant may recommend specific requirements or limitations on joint venture participants for each of the recommended contract packages.

c. Registration with GOP Agencies. The Consultant may recommend any specific registration requirements with GOP agencies, e. g., the Philippine Consular Office in the country of origin or the GOP Securities and Exchange Commission in the case of the Principal Investor/Contractor or the GOP Philippine Constructor Accreditation Board in the case of the Builder/Constructor.

2. Experience or Track Record.

The Consultant shall recommend a set of minimum and/or specific experience or track record for the prospective bidder determined to be most appropriate for each of the recommended contract packages, e.g.,:

a. Firm Experience;
b. Key Personnel Experience.

3. Capability.

The Consultant shall recommend a set of minimum and/or specific capabilities that the prospective bidders must adequately possess and which would be most appropriate for each of the recommended contract packages in terms of:

a. Organizational Capability

- Engineering, construction, operations, support departments;
- Key personnel;
- Construction equipment
- Operation and maintenance equipment;

b. Financing Capability

- Ratio of Principal Investor Net Worth to Construction Cost;
- Credit Line with a Reputable Financial Institution;
- Initial Operating Capital for the Project, when completed.

C. Preparation of "Request for Bids" Document

For each of the recommended contract packages, the Consultant shall prepare Request for Bids (RFB) documents which shall include all pertinent GOP laws, rules and regulations, e.g., monetary restrictions involving the conversion of the Principal Investor/Contractor's peso earnings into foreign currency and regulations relating to toll fees set by the Toll Regulatory Board. These rules and regulations shall serve as a guide for Bidders in the preparation of their bids and repayment schedules. The Request for Bids shall also provide the following:

1. General Information
   a. Sample Advertisements for Notice of Prequalification/Invitation for Bids;
   b. Purpose of Bidding
   c. Objectives
   d. Summary of the Proposed Project
2. Bidder Requirements
   a. Availability of Financing and Financing Arrangements
   b. Performance Bond and Guarantees
   c. GOP Legal Requirements (e.g., By-Laws & Articles of Incorporation of the Principal and Registration with GOP Agencies)
3. All Conditions of Contract as required by the GOP/DPWH
4. Preliminary Plans and Specifications
5. Standards for Operation and Maintenance
6. Access to Project Site
7. Schedule of Existing and Proposed Toll Rates for the North and South Luzon Expressways
8. Applicability of Board Of Investments Tax Incentives
9. Method of Payment and Payment Procedures
10. Taxes and Duties
11. Disputes and Appeals
12. Force Majeure
13. Liquidated Damages
14. Inspections and Tests

D. Instructions to Bidders

Based on guidelines of Section 11 of the Implementing Rules and Regulations (IRR) for R.A. 6957, the Consultant shall develop "Instructions to Bidders" documents appropriate for each of the recommended contract packages. The Instructions To Bidders shall provide information regarding the tender process and describe a list of particulars to be submitted with the bid, to include but not necessarily be limited to the following:

1. Information Available to Bidders

   a. Deadlines for Submission of Bids
   b. Venues for Submission of Bids
   c. Mode of Bid Submission and Bid Markings
   d. Availability of Copies and Fee for Securing Copies of:
      - the Feasibility Study
      - General and Special Conditions of the Contract
      - Agreement Form
      - Bid Forms and Booklets
      - Preliminary Plans and Specifications
      - Minimum Technical Specifications
   e. Required Bid Bond
      - Bonding Companies Accredited by the GOP
      - Forms of Bid Bond

2. A detailed list of contents of the Bid to be submitted by bidders, e.g.,:

   a. a feasibility study or the modified version of the DPWH Feasibility Study as revised by the BOT Investor/Contractor including preliminary engineering design;
   b. the proposed fees and charges and attendant terms and conditions proposed by the prospective bidder with the amounts in present values, schedules and fixed terms of the fees and charges to be imposed on the users of the facility over the specified fixed term for project operation clearly indicated;
   c. requirements concerning the bid bond;
   d. other required supporting documents;

3. Period for Preparation of Bids. Based on an evaluation of the nature and scale of each of the recommended contract packages, the Consultant shall establish and recommend the appropriate time allowed for the prospective bidders to submit their bids. However, the limits set forth in Section 11.6 of the Implementing Rules and Regulations for R.A. 6957 shall be adopted by the Consultant.

4. Bidding Procedures. A detailed step-by-step procedure for conducting the tender and award process for each of the recommended contract package.

a. Pre-Bid Conference. The Consultant shall recommend the most appropriate venue, date and time for Pre-Bid Conferences.

b. Submission and Opening of Bids. The Consultant shall recommend the most appropriate venue, date and time for bid submission and opening.

c. Late Bids. The Consultant shall recommend rules and guidelines governing the acceptance or rejection of bids submitted later than the scheduled time and/or date.

d. Modification of Bids. The Consultant shall recommend rules and guidelines governing the modification of bids after the scheduled date for submission.

e. Evaluation of Bids. The Consultant shall recommend the most appropriate period for evaluation of bids in accordance with guidelines stipulated under Section 13.6 of the Implementing Rules and Regulations for R.A. 6957.

f. Award. The Consultant shall develop and recommend a minimum set of conditions precedent for awarding each of the recommended contract packages. These conditions may include, but not necessarily be limited to, the following:

- Deadline for Negotiations and Award
- Rights of the Prospective Awardee to Add, Modify or Revise Bid Offer
- Specific Obligations of the Awardee , e.g., Deadline for the Formation of a Joint Venture or Securities and Exchange Commission Registration

g. Failure of Bidding. The Consultant shall establish and prescribe the conditions whereby award of each of the recommended contract packages would be disadvantageous to the GOP and the conditions that may warrant the declaration of the tender process as a failure.

h. Rejection of Bids. The Consultant shall establish and prescribe the conditions for the rejection of bids. and establish parameters for determining the offers which are most advantageous to the GOP.

i. Performance Bonds. The Consultant shall establish performance milestones, prescribe the appropriate types of performance bond/s, and define the nature and size of the bonding agency (may be a foreign or Philippine firm) appropriate for each of the recommended contract packages.

E. Criteria for Evaluation of Bids

The Consultant shall develop and establish a set of detailed bid evaluation criteria most appropriate for each of the recommended contract package in accordance with the two-stage evaluation process set forth in Section 13 of the Implementing Rules and Regulations for R.A. 6957. Pursuant hereto, the Consultant shall propose methodologies and develop a set of criteria with a corresponding rating system for evaluation. The evaluation criteria should consider the following:

1. Proposed Franchise Period
2. Proposed Financing Terms and Conditions
3. Repayment Scheme
4. Firm and Key Personnel Experience
5. Financial Condition of the Principal Investor/Contractor
6. Operating Experience with Similar Projects

F. Contract Agreement

The Consultant shall develop a model "Contract Agreement" for each of the recommended contract packages incorporating proposed terms and conditions of the BOT contract to describe in detail:

1. The Obligations and Authority of the BOT Contractor in terms of:
a. Rights of the Franchise and the Franchise Period;
b. Responsibilities and Limitations of Project Financing;
c. Preparation of and Approval Rights on Detailed Engineering Designs;
d. Construction Standards and Specifications, Approval Rights, and Sub-Contracting to Philippine Firms;
e. Regulations on the Importation of Equipment/Materials and Contracting of Foreign Country Nationals
f. Assignments and Subcontracts
g. Minimum Standards for Operations;
h. Repair and Maintenance Procedures

1. Fees and Charges.
2. The Obligations and Authorities of the GOP/DPWH in terms of:
a. Grant of the Franchise;
b. Approval of Detailed Engineering Design;
c. Approval of Toll Fees;
d. Provision of Rights-of-Way and Other Facilities;
e. Project Supervision;
f. Audit of Collections
3. Contract Termination
4. Assurance of Compliance by Contractor
a. Taxes and Duties
b. Confiscation of Performance Bond;
c. Liquidated Damages;
d. Incentive Bonus
e. Cancellation of the Franchise
5. Adjustment of Toll Fees
6. Implementing Guidelines of the GOP/DPWH
7. Contract Effectivity

G. Terms of Reference (TOR) for Consulting Services in the Review of Design and Monitoring of Construction

The Consultant shall prepare a Terms Of Reference for Consulting Services in the review of design and monitoring of construction for each of the recommended contract package. This TOR shall guide the DPWH Prequalification, Bids and Award Committee in contracting and selecting firm/s to serve as "Works Engineer" for the Project. The Works Engineer shall monitor, inspect and report on the progress of construction. The principal duty of the Works Engineer is to ensure that construction is accomplished in accordance with approved plans and specifications and to keep the DPWH fully informed of construction progress. The Works Engineer shall also assist the Consultant or the DPWH in interpreting the intent of the approved plans and specifications.

H. Specialized Consulting Services

During the entire course of the tender process for each of the recommended contract packages, the Consultant is expected to provide timely technical and/or advise and assistance to the DPWH Prequalification Bids, and Award Committee (PBAC) and its Secretariat particularly during its critical stages, e.g., Prequalification, pre-bid conferences, bid evaluation, and contract negotiations. The DPWH PBAC may also call upon the services of the Consultant during direct contract negotiations, if a negotiated contract is resorted to.

The Consultant shall develop and conduct an orientation program to prepare the DPWH PBAC for pre-bid conferences. The Pre-Bid conferences are conducted in order to clarify the scope of work, tender documents, bid evaluation procedures, contract terms and conditions and any other questions that prospective bidders may raise. At the bid evaluation stage, the Consultant shall assist the DPWH PBAC by providing an in-depth evaluation of the repayment schemes proposed.

I. The Consultant will examine the existing management structure of DPWH-URPO and recommend organizational and/or institutional changes necessary to monitor and supervise the BOT undertaking.

V. REQUIRED SUBMISSIONS

A. Inception Report and Briefing

The Consultant shall prepare and submit an Inception Report and conduct a briefing for the DPWH, National Economic and Development Authority, U.S. Agency for International Development, and Coordinating Council for the Philippine Assistance Program/Project Facilitation Committee outlining the detailed work program and proposed methodology for the services contemplated herein, after completion of four (4) weeks of site investigations and consultations with the DPWH PBAC. At this time, the Consultant will prepare and submit comments, observations, and recommendations as to the commercial viability of this project. Also, at this time, a determination of the need for and content of ongoing work (if any) will be made. Should there be no need for ongoing work, not more than ten (10) person-months of professional time (including expatriate and Filipino) shall be expended in the inception report preparation.

B. Project Meetings and Briefings

In lieu of the need for a preliminary report, the Consultant shall meet weekly or bi-weekly with the proponent agency, DPWH, or as mutually agreed, to keep abreast of all progress and developments. A project briefing, when conducive or desired by CCPAP, DPWH, DOTC, or USAID, will be conducted to report on progress or discuss pertinent issues, including a contracting schedule for each contract package presenting a detailed summary of the approximate dates and/or durations for:

1. Issuing Invitations for Prequalification;
2. Reviewing and Finalizing the List of Prequalified Contractors;
3. Issuing Request for Bids;
4. Pre-Bid Conference(s)
5. Bid Submission and Opening;
6. Bid Evaluation and Contract Negotiations;
7. Award and Contract Approval

C. Draft Final Report

As a result of project work and continual consultation with proponent agencies, the Consultant will prepare and submit a Draft Final Report after five (5) months from starting work. A complete set of bid documents will be included for use in project bidding and evaluation of bids. Of specific concern would be a final report presenting the financial viability for the Manila South Tollway and the Rehabilitate-Operate-Maintain contract for the reverted portions of the South Luzon Expressway.

For each of the contract packages recommended for privatization, the Draft Final Report shall: (1) present in final form the pro-forma Request for Bids (RFB) document; (2) present in final form the pro-forma Instructions to Bidders (ITB) document; (3) summarize and explain in draft final form the criteria for evaluation of bids; (4) present in draft final form the pro-forma Contract Agreement; (5) submit in draft final form the TOR for Consulting Services in the review of design and monitoring of construction. The Draft Final Report will consider any initial comments made during the conduct of the work.

The pro-forma Request for Bids and Instructions to Bidders documents will be complete and ready for issuance after inserting the final dates which will be determined by the DPWH after due consideration of the recommended contracting schedule proposed by the Consultant. Twenty-five (25) copies, or a number deemed suitable by DPWH, will be submitted within five (5) months of start of work.

D. Final Report

The Consultant shall submit the Final Report, consisting of final versions of: (1) pro-forma Request for Bids (RFB) documents complete with a detailed contracting schedule; (2) pro-forma Instructions to Bidders (ITB) documents; (3) the proposed criteria for evaluation of bids applicable for each of the recommended contract package; (4) the pro-forma Contract Agreement for each of the recommended contract package; and (5) the TOR for Consulting Services in the review of design and monitoring of construction within one month of receiving all comments to the draft final report, assumed for purpose of scheduling to be within eight (8) months of start of work.

E. Specialized Consulting Services

The Consultant shall provide technical and financial advisory services during the bidding and award process for each of the recommended contract package. Based on requirements set forth under Section III.F of this document, the Consultant may be called upon to assist the DPWH PBAC during critical stages of the contracting process, e.g., prequalification, bid evaluation and contract negotiations. The maximum level of effort allocated for specialized consulting services is sixty (60) person-days of expatriate time.

A separate report detailing: (1) the nature of assistance provided; (2) activities undertaken; (3) and recommendations for the DPWH PBAC shall be rendered by the Consultant under each major activity of participation.

VI. SCHEDULE

The work should be completed in eight (8) months, broken down as follows:

4th week	-	Conduct a Briefing to present Work Program and proposed Methodology
Within 5 months	-	Submit Draft Final Report (25 copies) including Pro-forma Request for Bid Documents, and other documents as required under Sections IV and V of this TOR.
Within 8 months	-	Submit Final Report (25 copies) including the Final RFP, initial Environmental Examination and all other documents as required under Sections IV and V of this TOR.
Total 8 months		

VII. ESTIMATED LEVEL OF EFFORT

	(Original) Person-Months	(Revised) Person-Months
A. Expatriate Personnel		
1. Team Leader/Transport Specialist	5	6
2. Contracts Specialist	2	2
3. Highways/Transport Planning Engineer	2	3
4. Finance Specialist	1	1
5. Specialized Consulting Services	2	2
6. Capital Markets Specialist		1
7. Traffic Engineer		3
8. Structural Engineer		2
9. Environmental Specialist		2
Sub-Total	14	22
B. Local Personnel		
1. Legal/Contracts Specialist	2	4
2. Civil/Structural Works	2	2
3. Environmentalist/Sociologist (2)	1	6
4. Cost Engineer/Specifications	3	4
5. Finance Specialist	2	4
6. Surveyor/Geodetic Engineer/ROW	2	4
7. Draftsmen (2)/CADD	4	8
8. Capital Markets Specialist		1
9. Highway Engineer		4
10. Traffic Engineer		3
Sub-Total	24	40
C. Admin./Support Staff		
1. Secretary	5	all from
2. Clerk/Typists (3)	12	Core
3. Driver (1)	5	Group
4. Admin. Assistant/Accountant	3	
5. Janitor/Utility Man	5	
Sub-Total	30	
TOTAL	68	62

Additional
Survey Subcontract
Traffic Data Subcontract
Soil Boring Subcontract

Appendix A1-2
ECONOMIC AND REGIONAL SETTING

Appendix A1-2
ECONOMIC AND REGIONAL SETTING

1. THE PROJECT'S SERVICE AREA

The Manila South Tollways (MST) and the rehabilitation of the South Luzon Expressway (SLE) will run from President Quirino Avenue in Manila to Alabang in the municipality of Muntinlupa. This is designed to improve the flow of traffic through Metro Manila and to Southern Luzon by providing additional road capacity. The MST BOT project's primary service area is essentially the National Capital Region (NCR) consisting of the cities of Manila, Quezon, Pasay and Caloocan and thirteen (13) adjacent municipalities.

The project will benefit commuters and industries from nearby provinces south of the National Capital Region. In Region IV, Southern Tagalog, the provinces of Laguna, Cavite, Batangas and Quezon will directly benefit from this project. Commuters and goods travelling by land from areas further south such as the Bicol region (Region V), are likewise expected to be served by this facility.

The immediate and extended service areas which are expected to be served by the MST BOT project are shown in Table A1-2-1. This extended project area includes the entire National Capital Region, and selected provinces in Region IV. These areas have a combined population in 1990 of 16.7 million. Over the 1980-1990 period, the combined population in these areas has been growing at a compound annual rate of 2.6%.

Table A1-2-1
EXTENDED SERVICE AREA OF THE MANILA SOUTH TOLLWAYS BOT PROJECT
(In Thousands)

AREAS SERVED	1980	1990	COMPOUND ANNUAL GROWTH
National Capital Region	5,926	7,929	3.0
Region IV provinces	4,047	5,372	2.9
Batangas	1,174	1,477	2.3
Cavite	771	1,153	4.1
Laguna	973	1,370	3.5
Quezon	1,129	1,372	2.0
Region V provinces	2,976	3,387	1.3
Albay	809	903	1.1
Camarines Norte	308	391	2.4
Camarines Sur	1,099	1,306	1.7
Catanduanes	175	187	.7
Sorsogon	558	600	.2
TOTAL	12,949	16,688	2.6

Source of Basic Information: 1991 Philippine Statistical Yearbook, NSCB.

2. THE NATIONAL CAPITAL REGION (NCR)

As mentioned, the MST BOT Project's principal primary service area is the national Capital Region or Metropolitan Manila. This discussion of the project's economic and regional setting will therefore focus on Metropolitan Manila. In view, however, of the MST's strategic importance in improving access from and to several Southern Tagalog provinces, the economic linkages of the National Capital Region specially to the Batangas-Cavite-Laguna provinces is bound to become more intense. This is specially so in the light of the CALABARZON project designed to develop the provinces of Cavite, Laguna, Batangas and Rizal and to increasingly accommodate new industries and industrial operations that are being relocated from Metro Manila. The development of the port of Batangas as a reliever port for Manila is likewise foreseen to lead to increase traffic flow (of goods and passengers) between Batangas and the NCR.

There is also substantial volume of tourism-related traffic between the NCR and the Batangas-Cavite-Laguna-Quezon provinces specially during summer. The nearest, most popular and most frequented tourist destinations by Metro Manila residents are found in these provinces.

The provinces of Batangas, Cavite, Laguna and Quezon are likewise the major sources of basic foodstuffs that supply Metro Manila needs i.e. fruits, meat, fresh fish, grains and vegetables. All these products find their way to metro Manila markets on a daily basis via road-based transportation.

2.1 Land Area, Population and Density

The whole of Metro Manila has a total land area of only 636 sq km or 0.2% of the country's total land area. In 1990, however, the NCR had a share of 13.1% to the total population. As shown in Table A1-2-2, the largest political unit in the region is Quezon City with an area of 166.2 sq km. This is followed by Caloocan City and Valenzuela in that order with land areas of 55.8 and 47 sq km, respectively.

Table A1-2-2 also shows the breakdown of NCR population by its component cities and municipalities. Quezon City has the biggest population in 1990 of 1,667 thousand, followed by Manila and Caloocan with 1,599 thousand and 761 thousand, respectively. (See also Table A1-2-8)

In terms of population density, the entire NCR had 12,467 persons per square kilometer in 1990, increasing from 6,237 in 1970, and 9,317 in 1980. The national population density in 1990 was estimated at 202 per sq km. Among the 4 cities and 13 municipalities, Navotas has the highest density of 71,923 persons per sq km. This was followed by the city of Manila and Pasig with densities of 41,749 and 30,538, respectively. (See also Table A1-2-9)

2.2 Projected Population

Based on medium assumptions (moderate decline in fertility)[1], the population of Metropolitan Manila is projected to increase from the 1990 level of almost 8 million to 9.9 million by the year 2000, 11.5 million by the year 2010, 12.8 million by 2020 and 13.3 million by 2025. This shows a compound annual growth of 1.46% over the 35 year period.

Table A1-2-2
LAND AREA, POPULATION AND DENSITY OF METROPOLITAN MANILA
(In 1990)

	LAND AREA (sq km)	POPULATION (In Thousands)	DENSITY (Persons/sq km)
Philippines	300,000.0	60,685	202
National Capital Region	636.0	7,929	12,467
Manila	38.3	1,599	41,749
Caloocan City	55.8	761	13,638
Pasay City	13.9	367	26,402
Quezon City	166.2	1,667	10,030
Las Piñas	41.5	297	7,156
Makati	29.9	453	15,150
Malabon	23.4	278	11,880
Mandaluyong	26.0	245	9,423
Marikina	38.9	310	7,969
Muntinlupa	46.7	277	5,931
Navotas	2.6	187	71,923
Parañaque	38.3	308	8,041
Pasig	13.0	397	30,538
Pateros	10.4	51	4,903
San Juan Del Monte	10.4	127	12,211
Taguig	33.7	266	7,893
Valenzuela	47.0	340	7,234

Source: 1991 Philippine Statistical Yearbook, NSCB.

Based on the projected population figures, the population density of the NCR is projected as follows:

[1] Forecasts of the National Statistics Office (NSO)

YEAR	POPULATION DENSITY IN THE NCR (per sq. km)
1990	12,467
2000	15,558
2010	18,052
2020	20,066
2025	20,857

Note: Consultant estimates based on NSO population forecasts.

2.3 Labor Force and Employment

Table A1-2-3 shows the labor force participation rates in the National Capital Region from 1981 to 1990 as well as the employment trends. That segment of the population 15 years of age and over is considered the country's potential labor force. However, not all of these population are willing and able to work and therefore, are not in the labor force.

In 1990, the NCR had a population of 5.3 million with ages 15 years and over; of this number, 59.8% (3.2 million) were in the labor force. This segment of the population has grown at a compound annual rate of 3.2% since 1981. The total number of employed persons in 1990 was 2.7 million while about 451 thousand were unemployed.

Table A1-2-3
HOUSEHOLD POPULATION 15 YEARS AND OVER BY EMPLOYMENT STATUS IN THE NATIONAL CAPITAL REGION

YEAR	POPULATION 15 YEARS/OVER (In Thousands)	% IN LABOR FORCE	EMPLOYMENT RATE (% OF LF)	UNEMPLOYMENT RATE (% OF LF)
1981	3,976	54.9	84.0	16.0
1982	4,092	57.4	81.3	18.7
1983	4,203	55.4	84.7	15.3
1984	4,413	60.7	78.1	21.9
1985	4,575	60.4	73.9	26.1
1986	4,738	58.6	71.4	28.6
1987	4,865	60.0	81.7	18.3
1988	5,005	60.2	82.8	17.2
1989	5,148	58.5	86.3	16.7
1990	5,295	59.8	85.9	14.1

Source: 1991 Philippine Statistical Yearbook, NSCB.

In 1990, of the 2.7 million persons which were reported as employed, 34.5% were classified as production workers, transport equipment operators and laborers. Sales workers and service workers, had shares in total employment of 19.4% and 18.4%, respectively. Professional, technical, administrative, executive and managerial workers had a combined share of 13.6% in total employment. (See Table A1-2-4)

Table A1-2-4
EMPLOYED PERSONS BY MAJOR OCCUPATION GROUPS
IN THE NATIONAL CAPITAL REGION
(In Thousands, October 1990)

OCCUPATION	NUMBER	% DIST.
Professional, technical and related workers	289	10.6
Administrative, executive and managerial workers	82	3.0
Clerical and related workers	301	11.1
Sales workers	526	19.4
Service workers	501	18.4
Agricultural, animal husbandry and forestry workers (including fishermen and hunters)	35	1.3
Production and related workers, transport equipment operators and laborers	938	34.5
Occupation not adequately defined	46	1.7
TOTAL	2,718	100.0

Source of Basic Information: 1991 Philippine Statistical Yearbook, NSCB.

2.4 Gross Domestic Product

In 1990, the Gross Domestic Product (GDP) of Metropolitan Manila was estimated at ₱ 34.1 billion in constant prices[2] or ₱ 318 billion in current prices. In real terms, Metro Manila has a 31% share in the national GDP. The National Capital Region's GDP has grown at a compound annual rate of 1.2% from 1981 to 1990 in real terms, lower than the national average of 1.5% over the same period. In current prices, the compound annual growth over the same period was a high of 14.5%.

[2] In 1972 prices

Table A1-2-5
GROSS DOMESTIC PRODUCT OF METROPOLITAN MANILA
(1981 to 1989, in Million Pesos)

YEAR	PHILIPPINES (CONSTANT PRICES)	METRO MANILA (CURRENT PRICES)
1981	305,260	94,004
1982	340,599	106,140
1983	384,098	120,626
1984	540,467	158,053
1985	612,665	173,686
1986	627,128	186,550
1987	708,369	216,583
1988	825,852	263,395
1989	963,997	310,052
1990	988,703	317,993

Source: 1991 Philippines Statistical Yearbook, NSCB.

2.5 Per Capita Domestic Product

The per capita domestic product in Metro Manila in current and constant prices are shown in Table A1-2-6. In 1989, the per capita domestic product in Metro Manila in current and constant prices were estimated at ₱ 39,914 and ₱ 4,281, respectively.

From 1981 to 1989, the nominal (in current prices) per capita GDP grew at an average of 13% per year. In real terms, the per capita GDP actually showed a decline over the same period. (See Table A1-2-6)

Table A1-2-6
PER CAPITA DOMESTIC PRODUCT IN METROPOLITAN MANILA
(1981 TO 1989)

YEAR	AT CURRENT PRICES		AT CONSTANT PRICES	
	VALUE (Pesos)	GROWTH RATE	VALUE (Pesos)	GROWTH RATE
1981	15,273		4968	
1982	16,728	9.53	4984	0.32
1983	18,444	10.26	4968	(0.32)
1984	23,454	27.16	4339	(12.66)
1985	25,020	6.68	3842	(11.45)
1986	28,990	15.87	4072	5.99
1987	29,451	1.59	3865	(5.08)
1988	34,836	18.28	4108	6.29
1989	39,914	14.58	4281	4.21

[1] 1972 = 100
Source: 1991 Philippine Statistical Yearbook, NSCB.

2.6 Vehicle Population

In 1990, the total number of motor vehicles registered in the National Capital Region was recorded at 684,778. This figure gives Metro Manila a 42.3% share of the national vehicle population. The breakdown by vehicle type is shown in Table A1-2-7.

Table A1-2-7
NUMBER OF MOTOR VEHICLES REGISTERED IN THE NATIONAL CAPITAL REGION IN 1990: BY TYPE OF VEHICLES

TYPE OF VEHICLES	NO. OF VEHICLES	% DIST.	SHARE TO NATIONAL TOTAL
Cars	306,959	44.8	67.5
utility Vehicles	251,635	36.8	40.9
Trucks	44,892	6.6	34.3
Buses	5,247	.8	28.6
Motor Cycles/tricycles	66,577	9.7	17.4
Trailers	9,468	1.4	51.6
TOTAL	684,778	100.00	42.3

Source: 1991 Philippines Statistical Yearbook, NSCB.

The vehicle to population ratio in Metro Manila in 1990 is 1:12 compared to the national average of one vehicle for every 38 persons. As shown in Table A1-2-7, 67.5% of all registered car owners in the country are in Metro Manila. This reflects the very high concentration of car ownership in the area.

Table A1-2-8
POPULATION OF METROPOLITAN MANILA
(By Cities and Municipalities in Thousands)

	1970	1980	1990
Philippines	36,684	48,098	60,685
National Capital Region	3,967	5,926	7,929
Manila	1,331	1,630	1,599
Caloocan City	274	468	761
Pasay City	206	288	367
Quezon City	754	1,166	1,667
Las Piñas	46	136	297
Makati	265	373	453
Malabon	142	191	278
Mandaluyong	149	205	245
Marikina	113	212	310
Muntinlupa	65	137	277
Navotas	83	126	187
Parañaque	97	209	308
Pasig	156	269	397
Pateros	25	40	51
San Juan Del Monte	105	130	127
Taguig	55	134	266
Valenzuela	98	212	340

Source: 1991 Philippine Statistical Yearbook, NSCB.

Table A1-2-9
LAND AREA AND DENSITY OF METROPOLITAN MANILA
(By Cities and Municipalities in Persons/sq km)

	LAND AREA (sq km)	1970	1980	1990
Philippines	300,000	122.3	160.3	202.3
National Capital Region	636	6,236.9	9,317.4	12,467.0
Manila	38.3	34,746.4	42,571.4	41,749.3
Caloocan City	55.8	4,918.5	8,383.8	13,638.0
Pasay City	13.9	14,840.5	20,702.9	26,402.9
Quezon City	166.2	4,539.4	7,014.8	10,030.1
Las Piñas	41.5	1,102.0	3,289.5	7,196.6
Makati	29.9	8,860.1	12,462.6	15,150.5
Malabon	23.4	6,047.6	8,162.4	11,880.3
Mandaluyong	26.0	5,746.4	7,898.7	9,423.1
Marikina	38.9	2,915.2	5,439.9	7,969.2
Muntinlupa	46.7	1,393.1	2,926.7	5,931.5
Navotas	2.6	32,017.3	48,517.7	71,923.1
Parañaque	38.3	2,538.2	5,445.2	8,041.8
Pasig	13.0	12,037.8	20,659.2	30,538.5
Pateros	10.4	2,448.8	3,873.8	4,903.8
San Juan Del Monte	10.4	10,053.8	12,508.5	12,211.5
Taguig	33.7	1,693.7	3,980.3	7,893.2
Valenzuela	47.0	2,094.8	4,518.4	7,234.0

Source: 1991 Philippine Statistical Yearbook, NSCB.

Appendix A1-3
STUDY TEAM MEMBERS

Appendix A1-3
STUDY TEAM MEMBERS

NAME	POSITION	COMPANY
1. Expatriate		
1.1 Derek M. Sherman	Team Leader/Transportation Specialist	Louis Berger
1.2 Harry R. Taylor	Contracts Specialist	GHT, Inc.
1.3 Peter B. Dyson	Highway/Transportation Planning Engineer	Louis Berger
1.4 James W. Ladd	Finance Specialist	Louis Berger
1.5 Jon A. Bottom	Traffic Engineer	Louis Berger
1.6 Geoff W. Hughes	Structural Engineer	GHT, Inc.
1.7 Merrell Chin Yee	Environmental Specialist	Louis Berger
2. Local		
2.1 Margarita Furiscal	Highway Engineer/Deputy Team Leader	Trans-Asia
2.2 Rodolfo Gonzales	Traffic Engineer	GHT, Inc.
2.3 James Villafranca	Legal/Contracts Specialist	Trans-Asia
2.4 Celia Sta. Ana	Civil/Structural Engineer	Trans-Asia
2.5 Mabini Arevalo, Jr.	Environmental Specialist	GHT, Inc.
2.6 Jesusa Marco	Sociologist	Trans-Asia
2.7 Felix Sandoval	Senior Geotechnical Engineer	Trans-Asia
2.8 Ed Suñio	Cost/Specifications Engineer	GHT, Inc.
2.9 Ma. Theresa Ruiz	Finance Specialist	Trans-Asia
2.10 Prospero Añonuevo	Survey/ROW Engineer	Trans-Asia
2.11 Jesus Gotidoc	Capital Markets Specialist	Trans-Asia
2.12 Loreto Papa	Draftsman	GHT, Inc.
2.13 Alex Centeno	Draftsman	GHT, Inc.
2.14 Helen Gamboa	CADD Operator	Trans-Asia
2.15 Audie Pineda	DCA Highway Designer	Louis Berger

Appendix A1-4
LIST OF MEETINGS

Appendix A1-4
LIST OF MEETINGS

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
4 May	Ted Encarnacion Freddie Galano Winfred Villamil	Undersecretary Project Manager Chief, Eco. Devt. Sec.	DPWH URPO/DPWH NEDA	Briefing on project.
5 May	Freddie Galano	Project Manager	URPO/DPWH	Collect data on the project.
6 May	Sabino Perez	Board Secretary	TRB	Collect data on the project.
7 May	Jose Valdecañas George Esguerra Conrado Tolentino Miguel Añonuevo Juliet Bulenhagui	Undersecretary Director General Manager Manager, PW Executive Secretary	DOTC DOTC PNR PNR TRB	Briefing on project. PNR ROW drawings.
8 May	Freddie Galano George Esguerra Alex Sundermann	Project Manager Director Project Manager	URPO/DPWH DOTC USAID	BOT Film shown at LBII office.
13 May	Freddie Galano Gerry Balingti Cesar Mijia	Project Manager Right-of-way Agent Chief, Legal Office	URPO/DPWH DPWH DPWH	Collect data on the project. Right-of-way
14 May	Miguel Añonuevo Edna Ramos Esteban Cases, Jr.	Manager, PW Manager, Real Estate Deputy Director	PNR PNR UP TTC	Collect data on the project. Briefing on project.
15 May	Ibarra Paulino	Asst. Vice President	PNCC	Check availability of as-built plan of SLE. Request for traffic data, studies for MMTollways.
18 May	Jose Gloria Primitiva Cal Juliet Bulanhagui	Head, FSO Director Executive Secretary	DPWH UP TTC TRB	Briefing on project. Discuss VOC Model being used by DPWH.
20 May	George Esguerra Cesar Mijia	Director Chief, Legal Office	DOTC DPWH	Discuss Traffic Model (TRANPLAN) being used by DOTC.
21 May	Edna Ramos Jun Tolentino Atty. Nitura	Manager, Real Estate Head, EIA Group Chief, Entry of Judgement	PNR DENR-EMB Supreme Court	Relocation strategies. Clarification on EIA issues. Collect data.
22 May	Rey Alano Jun Fernandez Esteban Cases, Jr. Atty. Nitura	Engineer III Chief, Eco. Devt. Spec. Deputy Director Chief, Entry of Judgement	DPWH/URPO NEDA, Region IV UP TTC Supreme Court	Discuss Details of Traffic Model used by DPWH in preparing FS. Briefing on project. Collect data for CALABARZON. Collect data (JUMSUT studies). Collect data.
25 May	Arnold Ong Loreto Aquino	Controller Former Vice President	SLTG-PNCC CDCP/PNCC	Request for traffic data. Briefing on project. PNCC franchise.
25 May	Patrick Gatan	Head Squatter Relocation	DPWH	Relocation programs.
25 May	Tranquilino Atienza Ernie Camarillo Dante Inciong	Executive Director Press Relations Officer Head Planning & Design	Traffic Eng'g. Center TEC TEC	Discuss data requirement. Collect data. Collect data.

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
26 May	Rene David Rey Alano Fiarello R. Estuar Ma. Elena Francisco	Staff Engineer III Former Secretary/PNCC Pres Former Chief Legal Council	DOTC DPWH/URPO DPWH/PNCC PNCC	Request for MM traffic zones. Request for additional data. Collect data Collect data.
27 May	Mary Grace Mayor	Coordinator Land Resource Mgt Service	MMP	Collect data on MM land use and planning.
28 May	Juliet Bulanhagui	Executive Secretary	TRB	Collect data.
29 May	Frank Mandato Vicente F. Porazzo	Technical Specialist (Bridge & Structures) Technical Specialist (Geotech & Slope Stability)	Bureau of Maintenance DPWH (ADB Coord. Consult)	AASHTO SEISMIC Guidelines (Interim 1991).
02 June	Victor Balagtas	Hydrologist	MWSS	Discuss impacts on hydrology/ drainage.
02 June	Lope Villenas	Planning Officer	NWRB	Discuss impacts on hydrology/ drainage.
03 June	Jun Siador	Project Officer Infrastructure	EMB	Discuss environmental issues.
05 June	Andres Lingan	Manager Metro Manila	NHA	Briefing on squatter family population estimates.
05 June	Joseph Godilusao	Head	PCUP	Identify relevant data.
05 June	R. Singson, staff and guest	Director	CCPAP USAID, NEDA & DOTC	Briefing on Inception Report.
08 June	Jo Santos	Research Officer, Research Division	SCAPS Share & Care Apostolate for Poor Settlers	Collect data.
08 June	Jo Cabe	Officer in Charge, Resettlement Development and Services Department	NHA	Collect data on resettlement.
08 June	Mariano M. Martinez	Assistant Solicitor General	Office of the Solicitor General	Background of case against PNCC.
09 June	Lorenzo Ferrer	Manager	HLURB	Identify Areas for Priority Development.
09 June	Homobono de Guzman	Assistant Government Corporate Counsel	Office of the Government Corporate Counsel	Background of PNCC's Petition with Supreme Court.
10 June	Jun Tolentino Rey Alcances Romy Tarray	Coordinator Head, Environmental Monitoring Group Project Officer	EMB EMB EMB	Discuss environmental issues.

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
10 June	Ambassador Victor Frank, Jr. Teresa Curran	U.S. Executive Director Assistant Executive Director	ADB ADB	Briefing on Project and discussion of BOT Project in general.
10 June	Thomas Walsh	Senior Programs Officer - Philippine Desk	ADB	Briefing on project and Bank's involvement in BOT projects in the Philippines.
10 June	Engr. Dante Inciong	Head, Planning and Design	Traffic Engineering Center (TEC)	Request for detailed traffic counts at selected intersections.
10 June	Homobono de Guzman	Assistant Government Corporate Counsel	Office of the Government Corporate Counsel	Status of PNCC cases.
11 June	Cynthia Ferrer	Field Officer	AKAP	Identify squatter relocation issues.
11 June	R. A. Johnson and staff	Acting Director	USAID	Briefing in BOT Projects and MST.
11 June	I. G. Paulino Paul Davis	Assistant Vice President General Counsel	PNCC PNCC	Information on Alabang Viaduct strengthening measures. Status of PNCC cases.
15 June	Natividad Quirijero	Section Chief of Legal Department	Securities and Exchange Commission	Stock ownership of CDCP/PNCC.
16 June	Pedro Taningco	Bridge Structural Engineer	FIL-DICAYO	Information on Alabang Viaducts and design of Buendia Overpass.
17 June	Elsie Joson Rey Alano Mitsuo Halakeyama Shizuo Iwata	Engineer Engineer Managing Director Director	URPO-DPWH URPO-DPWH Katahira Eng. Int. ALMEC Corp.	Coordinating with Metro Manila Expressway Study, JICA Team.
17 June	Felipe T. Aguinaldo	Staff Head, ESS	Toll Regulatory Board TRB	Information on Alabang Viaduct original drawings. Permit to repair.
17 June	Terry C. Galvante	Chief, Railways Planning Division	DOTC	Data on PNR Clearance Envelope.
18 June	Jesus P. Cammayo	Regional Director	NCR-DPWH	Regarding DPWH Maintenance activities on SLE.
18 June	Elsie Joson Rey Alano Takashi Okumura Minjursa Mulsid	Engineer Engineer Project Manager Highway Engineer	URPO-DPWH URPO-DPWH Katahira Eng. Int. Proconsult	Coordination with Design Team for Circumferential Road (C-5).
18 June	Miguel L. Añonuevo	Manager, Permanent Ways Maintenance	PNR	Data on PNR Clearance Envelope.
18 June	Elsie Joson	Engineer	URPO-DPWH	Original drawings of bridge structures along SLE.

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
21 June	Aladin Monleon	Barangay Chairman	Bgy. 800	Collect data on squatters.
22 June	Rolly Dalipe	Barangay Chairman	Bgy. 801	Collect data on squatters.
23 June	Enrique Madamba	Flood Control Engineer	NCR-DPWH	Location of major flooding areas on SLE.
23 June	Vicky Corpuz	Economist IV	DPWH/FSO EDSA	Request for VOC detailed data.
24 June	Larry Cruz	Barangay Chairman	Bgy. 764	Collect data on squatters.
24 June	Minjursa Mulsid	Highway Engineer	Proconsult	Follow-up to the meeting of June 18, 1992.
25 June	Rey Alcances	Head, Environmental Monitoring Group	EMB	Collect data.
25 June	Romy Tarray	Project Officer	EMB	Clarify environmental requirements.
25 June	Marissa Concepcion	Director, Construction Department	Board of Investments	BOI registration/incentives.
26 June	Cesar Templo Paul Davis Ibarra Paulino Melvin Mazarno	Vice President - Tollways Head of Legal Division Assistant Vice President Treasurer	PNCC PNCC PNCC PNCC	Discuss progress of study and interaction of MST and SLE.
27 June	Ricardo Alindayong	Makati Barangay Chairman	Bgy. San Antonio	Collect data on squatters.
30 June	Deo Parial	Barangay Chairman	Chairman Bgy. 769	Collect data on squatters.
01 July	Ramon Dumaual	Division Chief	TRB	Inquiry on LRT plans along SLE.
02 July	Rafael Mosura	Director, Cooperate Planning and Management Services Department	DOTC	Inquiry on planned railway electrification program.
02 July	Cynthia Ferrer	Community Development Worker	Alay Kapwa Kilusang Pangkalusugan (AKAP)	Collect information on relocation and resettlement strategies.
03 July	Alberto J. Arevalo, Jr.	Administrator	Light Rail Transit Authority (LRTA)	Inquiry on construction clearances for LRT coaches.
03 July	Jose Gutierrez	Head, Line Equipment	Light Rail Transit Authority (LRTA)	Inquiry on minimum headroom requirements for LRT rails.
04 July	Tony de Leon	Makati Barangay Chairman	Bgy. Pio del Pilar	Collect data on squatters.
04 July	Virgilio Hilario	Makati Barangay Chairman	Bgy. Bangkal	Collect data on squatters.
04 July	Marilou Gordon	Makati Barangay	Bgy. Magallanes	Collect data on squatters.

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
05 July	Francisco Noche	Parañaque Barangay Chairman	Bgy. San Martin de Porres	Collect data on squatters. Briefing on field survey.
05 July	Preciosa Aliling	Bicutan Barangay Chairperson	Bgy. Bagong Tanyag	Collect data on squatters. Briefing on field survey.
06 July	Ibarra Paulino	Asst. Vice-President	PNCC	Follow-up on construction drawings for Alabang viaduct.
06 July	Jun Siador	Project Officer Infrastructure	EMB	Discuss environmental issues.
06 July	Teddy Encarnacion Freddie Galano (and staff)	Undersecretary BOT-PMO Manager	DPWH URPO-DPWH	Progress being made on MST.
07 July	Pedro Taningco	Structural Engineer	Fil Dravo/PNCC	Inquiry on design data of Buendia overpass and Alabang viaduct.
08 July	Antonio Goco	President	Proconsult	Follow-up on drawings for C-5 Interchange.
08 July	Froilan Kampitan Elsie Trinidad	Manager Division Manager	Resettlement and Development Services Department, NHA	Collect information on NHA relocation/resettlement strategies.
10 July	Freddie Galano Takashi Okumura Minjursa Mulsid	Director Project Manager Highway Engineer	URPO-DPWH Katahira Eng. Int. Proconsult	Coordination with design team for Circumferential Road No. 5 (C-5).
11 July	Epifanio Salvador	Muntinlupa Barangay Chairman	Bgy. Sucat	Collect data on squatters. Briefing on field survey.
11 July	Artemio Simundac	Muntinlupa Barangay Chairman	Bgy. Cupang	Collect data on squatters Briefing on field survey.
11 July	Enad Abas	Muntinlupa Barangay Chairman	Bgy. Cupang	Collect data on squatters Briefing on field survey.
13 July	Angeles Lucas	Supervisor	BIR-Makati	Consult BIR zonal valuation.
13 July	Amy Basa	Revenue Officer	BIR-Makati	Consult BIR zonal valuation.
13 July	George Esguerra	Director	Transportation Planning Service, DOTC	Discuss DOTC network model.
13 July	Alex Popoff	President	ABAM	Review of conceptual structural designs.
14 July	Eli Levin	President	EL Enterprises	Review EDSA-LRT.
14 July	Masayuki Hasegawa	Project Manager	Pacific Construction Int.	Discuss PNR plans for South Line and Commuter Line.
14 July	Eli Levin	President	Enterprises, Inc.	Discuss EDSA LRT.
15 July	Jovito Gammad	Major	Philippine Air Force	Possible access to restricted areas of Aerial Photos.

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
15 July	Eric Filamor	Partner	BFE-Financial	Discuss Financing Availability for MST.
15 July	Marissa Concepcion	BOT Team Leader	BOI	Discuss BOI incentives.
15 July	Reimerio de Veyra	Chief, Legal	BOI	Discuss BOI incentives.
16 July	Jun Quanico	Appraiser	Valencia Appraisal Corp.	Collect data on land market values.
17 July	Luz Villamiel	Revenue Officer	BIR-Manila	Consult BIR zonal valuation.
17 July	Chona Dimayuga Sabino Perez Emerson Benitez Ramon Dumaual	Exec. Director Board Secretary Exec. Assistant Division Chief	TRB TRB DPWH TRB	Briefing on MST.
18 July	Freddie Galano Rey Alano	Director Engineer	URPO-DPWH URPO-DPWH	Discuss basis of economic and financial costs.
18 July	Robert Cabigas	Engineer	DPWH-Maintenance	Discuss SLE Maintenance Program.
21 July	Chona Dimayuga Freddie Galano Sabino Perez Emerson Benitez	Exec. Director BOT-PMO Manager Board Secretary Exec. Asst.	TRB DPWH TRB DPWH	Discuss legal issues of MST.
22 July	Jose Pangilinan	Councilman, Ex-Barangay Chairman	BGY. 734 (Manila)	Collect data on selected squatter site near Quirino.
22 July	Derlyn Geminiano	Chief, Pollution Control Section	Lake Laguna Development Authority (LLDA)	Discuss environmental issues.
22 July	Thomas Taylor	Project Manager	Independent Design Checker Bangkok Second Stage Expressway	Review post tension segmented box girder erection techniques.
22 July	Roger Bryan	Project Manager	Independent Certification Engineer Bangkok Second Stage Expressway	Review construction problems associated with BOT urban tollways.
22 July	Ovadee Rungrangroj	Managing Director	Wardley Thailand United	Financial Package for Dang Muang Tollway Bangkok.
23 July	Peter Cramer	General Manager	Don Muang Tollway Co., Ltd.	Construction management of BOT-tollway projects.
23 July	Thomas Keenan	Senior Manager, Precast	Kumagai Gumi Co., Ltd. SES Project Management Office	Management of BOT projects.
23 July	Rey Alano	Engineer	URPO-DPWH	Discuss URPO analysis network.

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
24 July	Jose Pangilinan	Councilman	Bgy. 734	Collect data on selected squatter site (Quirino).
24 July	Artemio Aquino	Supervisor	BIR	Consult BIR Zobal Valuation.
26 July	Gina Rojales	Youth Leader	Bgy. BF Homes	Collect data on selected squatter site (Sucat).
29 July	Gloria Santos	Director, Service Department	BOI	Discuss BOI Incentives for MST project.
30 July	Rey Alano	Engineer	URPO-DPWH	Review: 1) Modifications to URPO; 2) Committed road projects.
30 July	Jose de Jesus T.T. Encarnacion Freddie Galano Chona Dimayuga Sabino Perez Ramon Dumaual Emerson Benitez	DPH Secretary Undersecretary BOT-PMO Manager Exec. Director Board Secretary Division Chief Exec. Asst.	DPWH DPWH DPWH TRB TRB TRB DPWH	Briefing on MST and project schedule.
03 Aug.	Patrick Gatan	Project Manager	DPWH, Relocation Unit	Briefing on DPWH relocation schemes.
05 Aug.	Virginia Domingo	Manager	Sites and Services Group, NHA	Discuss NHA relocation and resettlement programs.
06 Aug.	Arnold Bongat	Controller, South Luzon Expressway	PNCC	Review financial information.
07 Aug.	Tom Arroyo	Secretary General	HUDCC	Consult on HUDCC's role and relocation issues.
09 Aug.	Hilario Sean Palmiano	Traffic Engineer/Project Coordinator	Transport Training Center	Discuss TTC traffic counts carried out for MST Study.
10 Aug.	Isidro Consunji	Executive Vice-President	D.M. Concunji, Inc.	Discuss commercial feasibility of MST.
11 Aug.	Joel Macalincay	Division Manager	Resettlement and Development Services Department, NHA	Discuss NHA Housing Projects.
12 Aug.	Senen Matoto	Senior Vice-President	Bank of the Philippine Islands	Explore private banks' interest in MST.
12 Aug.	Gil Buenaventura Vaughan Montes	Vice-President Senior-Economist	Citibank	Investigate Citibank's potential public sector investments.
13 Aug.	Antolin Oreta Pedro Carillo B.V. Buencamino	Chairman of the Board President Exec. Vice-President	A.M. Oreta Construction	Identify interest in MST.
14 Aug.	Edna Ramos	Manager	Real Estate Department, PNR	Consult PNR on housing/relocation plan.

DATE	NAME OF PERSON CONTACTED	POSITION	ORGANIZATION	REMARKS OR VERY BRIEF RESUME OF MEETING
14 Aug.	Antonio Sundiang	Senior Vice-President	Philippine National Bank	Identify funding possibilities for MST.
14 Aug.	Eli Levin	President	E.L. Enterprises	Discussion of funding for EDSA LRT.
19 Aug.	Ian Gill Hans Schulte	Information Officer Director	ADB Infrastructure Transport Section, ADB	Get information on potential ADB funding for squatter resettlement.
23 Aug.	Dolores Yuvienco	Assistant Director	Debt Restructuring Dept., Central Bank of the Philippines	Discuss debt-equity conversion program of GOP.
27 Aug.	Freddie Galano Diding Firmalino Sabino Perez Ramon Dumanal	BOT-PMO Manager Engineer Board Secretary Division Chief	DPWH URPO-DPWH TRB TRB	Briefing on progress of two (2) urban BOT expressway projects in Bangkok, Thailand.

Appendix A1-5
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Appendix A1-5
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APPENDICES TO CHAPTER 2

Appendix A2-1
BOT LAW RA NO. 6957

Appendix A2-1
BOT LAW

Republic of the Philippines
Congress of the Philippines
Metro Manila

Third Regular Session

Begun and held in Metro Manila, on Monday, the twenty-fourth day of July, nineteen hundred and eighty-nine.

(REPUBLIC ACT NO. 6957)

AN ACT AUTHORIZING THE FINANCING, CONSTRUCTION, OPERATION AND MAINTENANCE OF INFRASTRUCTURE PROJECTS BY THE PRIVATE SECTOR, AND FOR OTHER PURPOSES

Be it enacted by the Senate and House of Representatives of the Philippines in Congress assembled:

SECTION 1. *Declaration of Policy.* - It is the declared policy of the State to recognize the indispensable role of the private sector as the main engine for national growth and development and provide the most appropriate favorable incentives to mobilize private resources for the purpose.

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SECTION 2. *Definition of Terms.* - The following terms used in this Act shall have the meanings stated below:

(a) *Build-operate-and-transfer scheme* - A contractual arrangement whereby the contractor undertakes the construction, including financing, of a given infrastructure facility, and the operation and maintenance thereof. The contractor operates the facility over a fixed term during which it is allowed to charge facility users appropriate tolls, fees, rentals, and charges sufficient to enable the contractor to recover its operating and maintenance expenses and its investment in the project plus a reasonable rate of return thereon. The contractor transfers the facility to the government agency or local government unit concerned at the end of the fixed term which shall not exceed fifty (50) years. For the construction stage, the contractor may obtain financing from foreign and/or domestic sources and/or engage the services of a foreign and/or Filipino constructor: *Provided,* That the ownership structure of the contractor of an infrastructure facility whose operation requires a public utility franchise must be in accordance with the Constitution: *Provided, however,* That, in the case of corporate investors in the build-operate-and-transfer corporation, the citizenship of each stockholder in the corporate investors shall be the basis for the computation of Filipino equity in the said corporation:

Provided, further, That, in the case of foreign constructors, Filipino labor shall be employed or hired in the different phases of the construction where Filipino skills are available: *Provided, furthermore,* That the financing of a foreign or foreign-controlled contractor from Philippine government financing institutions shall not exceed twenty percent (20%) of the total cost of the infrastructure facility or project: *Provided, finally,* That financing from foreign

sources shall not require a guarantee by the Government or by government-owned or controlled corporations. The build-operate-and-transfer scheme shall include a supply-and-operate situation which is a contractual arrangement whereby the supplier of equipment and machinery for a given infrastructure facility, if the interest of the Government so requires, operates the facility providing in the process technology transfer and training to Filipino nationals.

(b) *Build-and-transfer scheme* - A contractual arrangement whereby the contractor undertakes the construction, including financing, of a given infrastructure facility, and its turnover after completion to the government agency or local government unit concerned which shall pay the contractor its total investment expended on the project, plus a reasonable rate of return thereon. This arrangement may be employed in the construction of any infrastructure project including critical facilities which, for security or strategic reasons, must be operated directly by the Government.

SEC. 3. *Private Initiative in Infrastructure.* - All government infrastructure agencies, including government-owned and controlled corporations and local government units, are hereby authorized to enter into contract with any duly prequalified private contractor for the financing, construction, operation and maintenance of any financially viable infrastructure facilities through the build-operate-and-transfer or build-and-transfer scheme, subject to the terms and conditions hereinafter set forth.

SEC. 4. *Priority Projects.* - All concerned infrastructure agencies, including government-owned and controlled corporations and local government units, shall include in their infrastructure programs those priority projects that may be financed, con-

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structed, operated and maintained by the private sector under the provisions of this Act. It shall be the duty of all concerned infrastructure agencies to give wide publicity to all projects eligible for financing under this Act, including publication in national newspapers of general circulation once every six (6) months and official notification of contractors registered with them. The lists of all such national projects must be part of the medium-term infrastructure programs of the agencies concerned and must be duly approved by Congress. Local projects funded and implemented by the local government units concerned shall be submitted to the local development councils for confirmation or approval.

SEC. 5. *Public Bidding of Projects.* - Upon approval of the projects mentioned in Section 4 of this Act, the concerned head of the infrastructure agency or local government unit shall forthwith cause to be published, once every week for three (3) consecutive weeks, in at least two (2) newspapers of general circulation and in at least one (1) local newspaper which is circulated in the region, province, city or municipality in which the project is to be constructed a notice inviting all duly prequalified infrastructure contractors to participate in a public bidding for the projects so approved. In the case of a build-operate-and-transfer arrangement, the contract shall be awarded to the lowest complying bidder based on the present value of its proposed tolls, fees, rentals and charges over a fixed term for the facility to be constructed, operated, and maintained according to the prescribed minimum design and performance standards, plans and specifications. For this purpose, the winning contractor shall be automatically granted by the infrastructure agency or local government unit the franchise to operate and maintain the facility, including the collection of tolls, fees, rentals, and charges in accordance with Section 6 hereof.

In the case of a build-and-transfer arrangement, the contract shall be awarded to the lowest complying bidder based on the present value of its proposed schedule of amortization payments for the facility to be constructed according to the prescribed minimum design and performance standards, plans and specifications: *Provided, however,* That a Filipino constructor who submits an equally advantageous bid shall be given preference.

A copy of each build-operate-and-transfer or build-and-transfer contract shall forthwith be submitted to Congress for its information.

SEC. 6. *Repayment Scheme.* - For the financing, construction, operation and maintenance of any infrastructure project undertaken pursuant to the provisions of this Act, the contractor shall be entitled to a reasonable return of its investment and operating and maintenance costs in accordance with its bid proposal as accepted by the concerned contracting infrastructure agency or local government unit and incorporated in the contract's terms and conditions. In the case of a build-operate-and-transfer arrangement, this repayment scheme is to be effected by authorizing the contractor to charge and collect reasonable tolls, fees, rentals, and charges for the use of the project facility not exceeding those proposed in the bid and incorporated in the contract: *Provided,* That the government infrastructure agency or local government unit concerned shall approve the fairness and equity of the tolls, fees, rentals and charges except in case of tolls for national highways, roads, bridges and public thoroughfares which shall be approved by the Toll Regulatory Board: *Provided, further,* That the imposition and collection of tolls, fees, rentals and charges shall be for a fixed term as proposed in the bid

and incorporated in the contract but in no case shall this term exceed fifty (50) years: *Provided, finally,* That during the lifetime of the franchise, the contractor shall undertake the necessary maintenance and repair of the facility in accordance with standards prescribed in the bidding documents and in the contract. In the case of a build-and-transfer arrangement, the repayment scheme is to be effected through amortization payments by the government infrastructure agency or local government unit concerned to the contractor according to the scheme proposed in the bid and incorporated in the contract.

In the case of land reclamation or the building of industrial estates, the repayment scheme may consist of the grant of a portion or percentage of the reclaimed land or industrial estate built, subject to the constitutional requirements with respect to the ownership of lands.

SEC. 7. *Contract Termination and Adjustment.* - In the event that a project is revoked, cancelled or terminated by the Government through no fault of the contractor or by mutual agreement, the Government shall compensate the said contractor for its actual expenses incurred in the project plus a reasonable rate of return thereon not exceeding that stated in the bidding documents and in the contract as of the date of such revocation, cancellation or termination: *Provided,* That the interest of the Government in these instances shall be duly insured with the Government Service Insurance System or any other insurance entity duly accredited by the Office of the Insurance Commissioner: *Provided, finally,* That the cost of the insurance coverage shall be included in the terms and conditions of the bidding referred to above. The tolls, fees, rentals and charges on the facility are subject to adjustment according to a formula related

to official government price indices which shall be defined before the bidding, through the bidding documents, and incorporated in the contract.

SEC. 8. *Toll Regulatory Board.* - The Toll Regulatory Board is hereby attached to the Department of Public Works and Highways with the Secretary of Public Works and Highways as Chairman.

SEC. 9. *Project Supervision.* - Every infrastructure project undertaken under the provisions of this Act shall be constructed, operated and maintained by the contractor concerned in accordance with the plans, specifications, standards, and costs approved by the concerned government infrastructure agency and under the technical supervision of the said agency.

SEC. 10. *Implementing Rules and Regulations.* - A committee composed of representatives from the Department of Public Works and Highways, the Department of Finance, the Department of Local Government, the National Economic and Development Authority, and duly accredited organizations representing the private Philippine construction industry shall formulate and prescribe, after public hearing and publication as required by law, the implementing rules and regulations, including, among others, the criteria and guidelines for evaluation of bid proposals, provisions to subject the facility collections to audit by the Commission on Audit, and conditions for the cancellation of contracts, in order to carry out the provisions of this Act.

SEC. 11. *Repealing Clause.* - All laws or parts of any law inconsistent with the provisions of this Act are hereby repealed or modified accordingly.

SEC. 12. *Separability Clause.* - If any provision of this Act is held invalid, the other provisions not affected thereby shall continue in operation.

SEC. 13. *Effectivity.* - This Act shall take effect fifteen (15) days after its publication in at least two (2) newspapers of general circulation.

Approved,

JOVITO R. SALONGA
President of the Senate

Fr RAMON V. MITRA
Speaker of the House of Representatives

This Act which is a consolidation of House Bill No. 19440 and Senate Bill No. 1285 was finally passed by the House of Representatives and the Senate on June 7, 1990.

EDWIN P. ACOBA
Secretary of the Senate

QUIRINO D. ABAD SANTOS, JR.
Secretary of the House of Representatives

Approved: July 9, 1990

CORAZON C. AQUINO
President of the Philippines

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Appendix A2-2

IMPLEMENTING RULES AND REGULATIONS RA NO. 6957

Appendix A2-2
IMPLEMENTING RULES AND REGULATIONS (IRR)

IMPLEMENTING RULES & REGULATIONS

REPUBLIC ACT 6957

"An Act Authorizing the Financing, Construction, Operation and Maintenance of Infrastructure projects by the private sector and other purposes" (Build-Operate-Transfer and Build-And-Transfer Schemes)

BEST AVAILABLE DOCUMENT

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IMPLEMENTING RULES AND REGULATIONS FOR R.A. NO. 6957, "AN ACT AUTHORIZING THE FINANCING, CONSTRUCTION, OPERATION AND MAINTENANCE OF INFRASTRUCTURE PROJECTS BY THE PRIVATE SECTOR AND FOR OTHER PURPOSES" (BUILD-OPERATE-AND-TRANSFER AND BUILD-AND-TRANSFER SCHEMES)

Pursuant to Section 10 of the Republic Act (R.A.) No. 6957, which was approved on 9 July 1990, the following Implementing Rules and Regulations (IRR) are hereby prescribed to carry out the provisions of the said Act."

1. DEFINITION OF BOT AND BT SCHEMES

1.1 Build-operate-and-transfer (BOT) scheme: This is "a contractual arrangement whereby the contractor undertakes the construction, including financing, of a given infrastructure facility, and the operation and maintenance thereof. The contractor operates the facility over a fixed term during which it is allowed to charge facility users appropriate tolls, fees, rentals, and charges sufficient to enable the contractor to recover its operating and maintenance expenses and its investment in the project plus a reasonable rate of return thereon. The contractor transfers the facility to the government agency or local government unit (LGU) concerned at the end of the fixed term which shall not exceed fifty (50) years."

"For the construction stage, the contractor may obtain financing from foreign and /or domestic sources and/or engage the services of a foreign and/or Filipino constructor."

"The ownership structure of the contractor of an infrastructure whose operation requires a public utility franchise must be in accordance with the Constitution."

"In the case of corporate investors in the build-operate-and-transfer corporation, the citizenship of each stockholder in the corporate investors shall be the basis for the computation of Filipino equity in the said corporation."

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"In the case of foreign contractors, Filipino labor shall be employed or hired in the different phases of the construction where Filipino skills are available." The use of Filipino labor shall also apply to Filipino contractors.

"The financing of a foreign or foreign-controlled contractor from Philippine government institutions shall not exceed twenty percent (20%) of the total cost of the infrastructure facility or project."

"Financing from foreign sources shall not require a guarantee by the Government or government-owned or controlled corporations."

"The build-operate-and-transfer scheme shall include a supply-and-operate situation which is a contractual arrangement whereby the supplier of equipment and machinery for a given infrastructure facility, if the interest of the Government so requires, operates the facility, providing in the process technology transfer and training to Filipino nationals."

1.2 Build-and-transfer (BT) scheme: This is "a contractual arrangement whereby the contractor undertakes the construction, including financing, of a given infrastructure facility, and its turnover after completion to the government agency or LGU concerned which shall pay the contractor its total investment expended on the project, plus a reasonable rate of return thereon." The BT scheme shall be adopted for financially viable infrastructure projects, i.e., the project cost should be recovered from tolls, fees, rentals and other charges on the facility users, as well as other related income of the Agency/LGU concerned. The agency/LGU shall pay the contractor based on an agreed amortization schedule.

"This arrangement may be employed in the construction of any infrastructure project, including critical facilities which, for security or strategic reasons, must be operated directly by the Government."

2. AUTHORIZED CONTRACTING GOVERNMENT AGENCIES/ UNITS

The following Government entities are authorized to enter into contract for BOT or BT projects under the provisions of R.A. No. 6957:

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2.1 Government Infrastructure agencies, including government-owned and controlled corporations (hereinafter referred to as Agency/ies): These include the Department of Public Works and Highways (DPWH), Department of Transportation and Communications, National Irrigation Administration, Metropolitan Waterworks and Sewerage System, Local Water Utilities Administration, Philippine National Railways, Light Rail Transit Authority, Philippine Ports Authority, Manila International Airport Authority, National Power Corporation, National Electrification Administration, Philippine National Oil Company, Export Processing Zone Authority, and Public Estates Authority, among others.

2.2 Local Government Units (LGUs)

3. ELIGIBLE INFRASTRUCTURE PROJECTS

Infrastructure projects which are financially viable and meet the other provisions of these IRR may be undertaken through BOT or BT schemes under R.A. No. 6957, including but not limited to the construction, which includes engineering, rehabilitation, improvement, expansion, and modernization, supply of equipment and machineries, operation and maintenance of the following:

3.1 Highways, including expressways, roads, bridges, interchanges, tunnels, and related facilities

3.2 Rail-based projects packaged with commercial development opportunities, e.g. use of government facilities

3.3 Non-rail based mass transit facilities, navigable inland waterways and related facilities

3.4 Port infrastructure like piers, wharves, quays, storage, handling, ferry services, and related facilities

3.5 Airports, air navigation, and related facilities

3.6 Power generation, distribution of electrification, and related facilities

3.7 Telecommunications, backbone network, terrestial and satellite facilities and related service facilities

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3.8 Irrigation and related facilities

3.9 Water supply, sewerage, drainage, and related facilities

3.10 Educational and health infrastructure

3.11 Land reclamation, dredging and other related development facilities

3.12 Industrial estates, including infrastructure facilities and utilities

3.13 Markets, slaughterhouses, and related facilities

3.14 Warehouses and post-harvest facilities

3.15 Public fishports and fishponds, including storage and processing facilities.

3.16 Environmental and solid waste management related facilities such as collection equipment, composting plants, incinerators, landfill and tidal barriers, among others.

In the case of highway projects, the concerned Agencies/LGUs shall, prior to the call for bids for their implementation, secure from the DPWH, its clearance, on a no-objection basis, of their plans for BOT and BT projects in order to avoid undue proliferation and unwieldy operation of the same (e.g., a series of toll road stations along a given route separately managed by numerous private operators which would greatly hamper the flow of traffic and inconvenience the public).

4. INCLUSION OF PROPOSED BOT AND BT PROJECTS IN AGENCY/ LGU INFRASTRUCTURE PROGRAMS

4.1 In accordance with Section 4 RA No. 6957, the concerned Agencies/ LGUs "shall include in their infrastructure programs those priority projects that may be financed, constructed, operated and maintained by the private sector" through the BOT or BT schemes "under the provisions of this Act."

4.2 The Agency/LGU shall "give wide publicity to all such projects. In the case of a national agency, once every six (6) months, it shall publish the list of such

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projects in at least two (2) newspapers of general national circulation. In the case of an LGU, the publication must be made in at least one (1) newspaper of local/national general circulation." The Agency/LGU must also give written "official notification to the contractors registered with them," including the concerned chapters of the Philippine Constructors Association, the National Confederation of Constructors Associations of the Philippines and the Philippine Chamber of Commerce and Industry, of the list of such projects at least once every six (6) months.

5. APPROVAL OF PROPOSED BOT AND BT PROJECTS

5.1 The head of the concerned Agency shall, in accordance with Section 4 of RA No. 6957, see to it that "the lists of all such national projects (proposed for BOT or BT schemes) must be part of the medium-term infrastructure programs of the agencies concerned and must be duly approved by Congress" prior to the call for bids for their implementation. For this purpose, the Agency shall submit such list to Congress as the need for a BOT or BT project arises, but preferably once every six (6) months.

5.2 "Local projects (traditionally) funded and implemented by the local government units concerned," are to be "submitted to the local development councils, for approval or confirmation." This means that the concerned Municipal Mayor shall submit municipal-level projects (e.g., market) to the Municipal Development Council, the City Mayor shall submit city-level projects (e.g., waterworks) to the City Development Council, and the Provincial Governor shall submit province-level projects (e.g., provincial expressways) to the Provincial Development Council for appropriate action. Then the projects are transmitted to the respective local sangguniians for approval prior to the call for bids for their implementation. For this purpose, the LGU shall submit the list to the Local Development Council concerned as the need for BOT or BT arises, but preferably once every six (6) months.

6. MINIMUM STANDARDS AND BASIC PARAMETERS

The Agency/LGU shall lay down the minimum design and performance standards and specifications, as well as economic parameters, which shall be observed by the bidder/contractor in preparing its bid and, if successful, in building and operating the facility. These shall also be used by the Agency/LGU in comparatively evaluating the bids and in supervising and monitoring the project construction and operation.

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6.1 Minimum Output Standards and Specifications

The contractor shall build and operate the subject infrastructure facility which shall comply with the minimum design and performance standards and specifications prescribed by the Agency/LGU. These standards and specifications shall refer more to the desired quantity and quality of the outputs of the facility, i.e., goods and services to be produced, than to the inputs of funds and resources to produce the outputs.

(Example - Toll Expressway Project: Provide a fully access-controlled expressway between points A and B, with a design speed of 100 kph at least Service Level "B" within 20 years, per AASHTO specifications; entries/exits at points C, D, and E; drainage for 100-year frequency floods; etc.)

6.2 Economic Parameters

To provide a uniform basis for the preparation by the contractors of their bids and the comparison by the tendering Agency/LGU of the bids on a "present value" basis, the Agency/LGU shall prescribe the following economic parameters:

a. Inflation and discounting rates

b. Foreign exchange rates

c. Maximum period of project construction

d. Fixed term for project operation and collection of tolls/fees/ rentals/charges, in the case of BOT projects

e. Formula and price indices to be used in adjustment of tolls/fees/ rentals/charges, in the case of BOT projects

f. Minimum period of repayment, in the case of BT projects

6.3 Facilities to be Provided by the Government

The Agency/LGU shall indicate the facilities associated with the subject project which are to be provided by the Government. The cost of the same may be

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partly or wholly be financed and/or shouldered by the contractor as part of its bid and cost-recovery scheme. These facilities may include, but not be limited to the following:

a. Right-of-way

b. Part of the structure, e.g., carriageway and stations for a rail transit project

7. PREQUALIFICATION, BIDS, AND AWARDS COMMITTEE

The head of the concerned Agency/LGU shall create a Prequalification, Bids, and Awards Committee (PBAC) for the BOT or BT projects to be bid. The PBAC shall have the following minimum composition:

a. At least a second ranking officer of the Agency/LGU ———————— Chairman

b. A legal officer ---------- Member-Secretary

c. A technical officer knowledgeable on the project ---------- Member

d. A financial/management officer ---------- Member

e. Two representatives to be nominated by facility users and/or contracting sector ------ Observers

8. ADVERTISEMENT

In accordance with the provision of Section 5 of R.A. No. 6957, the concerned Agency/LGU shall, upon approval by the Congress/Local Sanggunian of a proposed BOT or BT project, "cause to be published, once every week for three (3) consecutive weeks, in at least two (2) newspapers of general circulation and in at least one (1) local newspaper which is circulated in the region, province, city or municipality in which the project is to be constructed, a notice inviting all duly prequalified infrastructure contractors to participate in the bidding for the projects so approved."

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9. BIDDING DOCUMENTS

The Agency/LGU shall prepare the Bidding Documents for the project to guide the prospective bidder in preparing and submitting its prequalification application and bid proposal.

These documents shall consist of the following:

9.1 Project Objective and Description
9.2 Minimum Design and Performance Standards and Specifications, and Economic Parameters (Section 6 above)
9.3 Draft Contract, including Terms and Conditions
9.4 Prequalification Criteria and Procedures (Section 10)
9.5 Instructions to Bidders, including Bid form
9.6 Bid Evaluation Criteria (Section 13)

10. PREQUALIFICATION OF CONTRACTORS

The criteria for prequalification of contractors shall include the following:

10.1 **Legal Requirements:** The BOT/BT contractor-applicant must meet the following requirements:

a. For BOT Projects Where Operation Requires a Public Utility Franchise:

i. "The ownership structure of a contractor of an infrastructure facility whose operation requires a public utility franchise must be in accordance with the Constitution." Thus, at least sixty percent (60%) of the capital of the contractor-applicant must be owned by Filipino citizens, provided that "in the case of corporate investors in the build-operate-and-transfer corporation, the citizenship of each stockholder in the corporate investors shall be the basis for the computation of the Filipino equity in the said corporation." The (Filipino) contractor must be duly registered with the Securities and Exchange Commission (SEC) for purposes of undertaking component activities of BOT projects.

ii. The projects falling under this category whose contractor must meet the 60 percent minimum Filipino ownership requirement are those defined as public utilities under the Public Service Act including but not limited to the following:

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a) Railways and urban rail mass transit

b) Distribution of electricity and gas

c) City and municipal water distribution and sewerage systems

d) Telephone systems serving the general public

iii. For the construction phase, however, the (Filipino) contractor-applicant "may obtain financing from foreign and/or domestic sources and/or engage the services of a foreign and/or Filipino contractor." If the constructor to be engaged is Filipino, it must be duly licensed and accredited by the Philippine Constructor Accreditation Board (PCAB).

If the constructor is foreign, it must be duly accredited by its government to undertake construction work and certified as such by its embassy in the Philippines, or by the Philippine Consular Office located in the constructor's domicile/head office location.

iv. In the case of a joint venture, in addition to complying with the requirements under items a-i and a-ii above, the joint venture participants shall submit a written commitment that, if awarded the contract, they shall immediately formalize their joint venture agreement which shall jointly and severally make them responsible for the obligations of contractor/constructor under the contract.

b. For BOT Projects other than item (a) above and for BT Projects:

i. The contractor-applicant may be Filipino and/or foreign-owned. If Filipino, the contractor must be duly registered by the SEC for purposes of undertaking component activities of BOT projects. If foreign-owned, the contractor must be duly accredited by its government to undertake component activities of BOT projects and certified as such by its embassy in the Philippines, or by the Philippine Consular Office located in the constructor's domicile/head office location.

ii. For the construction phase, the same provision as in item a-ii above shall apply.

iii. In the case of a joint venture, in addition to complying with items b-i and/or b-ii above, the joint venture participants shall submit a written commitment that, if awarded the contract, they shall immediately formalize their joint venture

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agreement which shall jointly and severally make them responsible for the obligations of the contractor/constructor under the contract.

10.2 Experience or Track Record: The contractor-applicant must possess adequate experience in terms of the following:

a. Firm Experience: By itself or through the member-firms in case of a joint venture, the contractor must have successfully undertaken a project(s) similar or related to the subject infrastructure to be bid and whose the aggregate capital (construction) cost of which is, in present value, at least equal to fifty percent (50%) of the estimated cost of the subject project. In the case of major national projects (costing at least P300 million) this experience must include all phases of a BOT/BT scheme, including financing, engineering, construction, operation and maintenance.

The member firms of a joint venture may individually specialize on any or several phases of a BOT/BT scheme. A joint venture contractor firm shall be evaluated based on the individual or collective experience of the corresponding member firms or of the joint venture itself.

b. Key Personnel Experience: The key personnel of the contractor (e.g., managers, chief engineers, et al) must have sufficient experience in the relevant aspects of schemes similar or related to the subject project, as specified by the Agency/LGU.

10.3 Capability: The ~~contractor must~~ meet the following requirements:

a. Organizational Capability: The contractor must possess sufficient capability to implement and operate the subject project in terms of having adequate types, numbers, and capacities of:

i. Engineering, construction, operation, and support units and departments,

ii. Personnel, especially key personnel with sufficient background and experience per item 10.2 b above,

iii. Construction equipment, owned/leased, which satisfy the minimum specified by the Agency/LGU, and

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iv. Operation and maintenance equipment, owned/leased, which satisfy the minimum specified by the Agency/LGU.

b. Financing Capability: The contractor must have adequate capability to sustain the financing requirements for the engineering, construction and operation phases of the project. This shall be measured in terms of the following:

i. Its net worth must at least be equal to ten percent (10%) of the estimated construction cost of the subject project.

ii. It must submit a statement from a reputable financial institution commituing to extend a credit line to it, in an amount at least equal to that required by the tendering Agency/LGU.

iii. It must commit other sources of funds to sustain the initial operating expenses of the completed facility.

The concerned Agency/LGU shall adopt a quantitative rating system for the above technical and managerial and financial criteria, taking into account the nature and scale of the project.

10.4 Period of Preparation of Prequalification Documents

The Agency/LGU concerned shall allow prospective contractors at least thirty (30) days from the last date of advertisement of the Invitation to Prequalify to prepare their respective prequalification documents.

For major projects costing at least P300 million, the period of preparation shall at least be forty-five (45)days from the last date of advertisement of the Invitation To Prequalify.

The deadline, last day for submission of prequalification documents must be clearly stated in the Invitation To Prequalify.

11. CONTENT OF THE BID

The bid of each prequalified contractor for a BOT project shall usually include (a) the feasibility study, including preliminary engineering design , of the project, (b) the proposed schedule of tolls, fees, rentals, and other charges to be imposed, (c) the bid bond, and (d) other supporting documents.

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For a BT project, the bid shall usually include (a) the feasibility study, including preliminary engineering design, (b)the proposed schedule of payments and attendant terms and conditions (c) the bid bond, and(d) other supporting documents.

As an alternative, the Agency/LGU may conduct the feasibility study and, in some cases, even the detailed engineering design, and call for porposals based on such feasibility study/detailed engineering design. In this case, the bid of each prequalified contractor shall cover only items (b), (c) and (d) above.

However, the bidder is solely responsible for the validity and soundness, including the assumptions, projections, analyses, and outputs, as well as the input data used. Acceptance by the Agency/LGU concerned of the proposal does not diminish this responsibility; neither does it transfer any part of this responsibility to the Agency/LGU.

11.1 Feasibility Study, including Preliminary Engineering Design

The bidder shall prepare and submit a feasibility study, including preliminary engineering design, for the subject project, which shall conform to the minimum design and performance standards and specifications and economic parameters set by the Agency/LGU (Section 6 of these IRR).

The feasibility study of the bidder must be undertaken according to accepted standards and must conclusively demonstrate the feasibility/viability of the project in the following terms before it is approved for implementation:

a. Marketability: The need for the project outputs (goods/services) must be clearly defined and justified. This should be done through evaluation and projection of the market conditions, including the magnitudes of supply and demand (e.g., traffic volumes for expressways) and pricing (e.g., tolls) over the project operational life.

b. Technical soundness (preliminary engineering design): The basic engineering design of the project should conform to the minimum design and performance standards and specifications (outputs)set by the Agency/LGU (Section 6). The engineering surveys, plans, and estimates should be undertaken within at least +/-20% of the final quantities. The construction methods and schedules should also be presented and shown to be doable. Should the contractor be awarded the contract, its submitted preliminary engineering design shall be the basis of the detailed engineering to be done as part of the contract.

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c. Economic feasibility: The benefits to the national economy of the project must be properly defined and quantified to the fullest extent possible (e.g., savings in transport costs and travel time). The project should yield an economic internal rate of return which is at least equal to the social discount rate, currently 15%. It should conform with established and accepted criteria set by the Investment Coordination Committee of the NEDA Board.

d. Financial viability: The sources of financing of the contractor for the construction and operation phases of the project should be defined. Letters of commitment from the financing institutions to the effect that they shall extend the specified financing to the contractor if and when awarded the contract shall be submitted. The project should give a financial internal rate of return which is at least equal to the effective cost of capital corresponding to the financing packages proposed. The proposed user tolls/fees/rentals/charges and the period of cost recovery must be realistic and affordable.

e. Operational feasibility: The proposed organization, methods, and procedures for operating and maintaining the completed facility must be well defined, conform to the minimum performance standards, and be shown to be workable, and where feasible provide for the transfer of technology used in every phase of the project.

f. Environmental Standards: The proposed project design and the technology to be used in the project must be in accordance with the environmental standards set forth by the Agency/LGU concerned and acceptable to the Department of Environment and Natural Resources (DENR). Any negative or adverse effects on the environment as a consequence of the projects as proposed by the private contractor must be properly identified and corrective measures be indicated by the contractor. Appropriate clearances from the DENR, while not required during the bidding, shall henceforth be required of the winning contractor for each stage of the project, from design and engineering, to construction and the pre-operating stage, whenever applicable. The contractor assumes full responsibility for the assessment of the environmental impact of the project as proposed.

Alternatively as mentioned earlier, the Agency/LGU may conduct the feasibility study, and the bidder may use the study as its own, subject to its validation of its contents, including the data, assumptions, analyses, and outputs thereof, and/or modifying the same to its satisfaction. In this case, the responsibility for the validation and integrity of the feasibility study shall still be lodged with the bidder.

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11.2 For BOT Project - Proposed Tolls/Fees/Rentals/Charges: The bid shall indicate the amounts in present values, schedules, and fixed terms of the tolls/fees/rentals/charges to be imposed on the users of the facility over the specified fixed term for project operation.

11.3 For BT Project - Proposed Payments: The bid shall indicate the amounts in present values, schedules and attendant terms and conditions of the payments to be made by the Agency/LGU to the contractor.

11.4 Bid Bond: The bidder shall submit a bid bond in an amount not less than two percent (2.0%), one-and-one half percent (1.5%), and one percent (1%) of the estimated present value of the construction cost, i.e., less than P5 Billion, P5 to 10 Billion and greater than P10 Billion, respectively. The bond shall be in the form of cash , or certified check, manager's check, letter of credit, or bank draft/ guarantee issued by a reputable bank, or surety bond issued by an entity duly registered and recognized by the Office of the Insurance Commissioner and acceptable to the Agency/LGU, or any combination thereof. The purpose of the bid bond is to guarantee that the bidder, if awarded the contract, shall within the period specified in the Instructions to Bidders, enter into a contract with Agency/LGU for the project. Bid bonds shall be valid for a reasonable period as specified in the Instructions to Bidders, but in no case later than one hundred twenty (120) days from the opening of bids.

11.5 Other Supporting Documents: The bidder shall submit such other relevant documents as may be required by the Agency/LGU to support its bid.

11.6 Period of Preparation of Bids The prequalified bidder shall be allowed sufficient time to prepare their bids depending upon the nature and scale of the project. However, preparation period should not be less than sixty (60) days nor more than one hundred-eighty (180) days from the date of first day of issuance of bid documents to duly prequalified bidders up to the deadline for submission of bids.

The Invitation To Bid must clearly indicate the date of the last day of the submission of bids including the time and place of submission.

12. BIDDING PROCEDURE

12.1 Prebid Conference. A prebid conference shall be conducted by the concerned Agency/LGU at least thirty (30) days before the deadline for submission of bids. This will clarify the scope of work, bidding documents, bid evaluation procedures, contract terms and conditions, and any other matter that the

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agency or prospective bidder may raise. The salient results of the prebid conference shall be embodied in bid bulletins to be issued to the bidders. For major national projects (P300 million and above) the Prebid Conference maybe conducted ninety (90) to one hundred-twenty (120) days before the submission of bids.

12.2 Receipt and Opening of Bids. The PBAC shall receive and open the bids publicly at the designated time and place.

12.3 Evaluation of Bids. The PBAC shall evaluate the bids received as to compliance with the requirements and as to their prices, using the preset evaluation criteria stated in Section 13 below.

12.4 Award. The PBAC shall recommend to the agency head, for approval, the award of the contract to the lowest evaluated complying bid, based on the said evaluation criteria.

12.5 Declaration of Failure of Bidding

When no complying bids are received, the bidding shall be declared a failure.

13. BID EVALUATION CRITERIA

13.1 Two Stage Evaluation

The evaluation of the bids will be in two stages. The first is the evaluation of the Feasibility Study, including Preliminary Engineering Design, following the criteria under Section 13.2 below.

The second stage is the evaluation of the bid amounts, following the criteria under Sections 13.3 and 13.4 below.

Only those which hurdle the first stage of evaluation (Feasibility Study) will qualify for the second stage evaluation. The second envelope containing the bid amounts shall be returned unopened to each bidder which does not hurdle the first stage.

13.2 Evaluation of Feasibility Study

The Agency/LGU shall evaluate the submitted feasibility study, including

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preliminary engineering design, of each bidder to determine if it meets the following hurdle requirements:

a. The submitted feasibility study must conform to the minimum design and performance standards and specifications and economic parameters specified in Section 6.

b. The feasibility study must conclusively show the feasibility/viability of the project in terms of marketability, technical soundness (preliminary engineering design), economic feasibility, financial viability, operational feasibility, and environmental impact, in accordance with the guidelines in Section 11 above.

13.3 Evaluation of Bid Amounts for BOT Project

"In the case of a build-operate-and-transfer arrangement, the contract shall be awarded to the lowest complying bidder based on the present value of its proposed tolls, fees, rentals and other charges over a fixed term for the facility to be constructed, operated, and maintained according to the prescribed minimum design and performance standards, plans, and specifications." To arrive at the present value, the discounting rates and foreign exchange rates prescribed under the economic parameters (Section 6.2 of this IRR) which are part of the Instructions to Bidders shall be used.

"The government infrastructure agency or local government unit shall approve the fairness and equity of the tolls, fees, rentals and charges, except in the case of tolls for national highways, roads, bridges and public thoroughfares which shall be approved by the Toll Regulatory Board." In determining the fairness and equity of the tolls/fees/rentals/charges, the Agency/LGU shall see to it that these shall not exceed the amounts needed to recover (a) the capital cost, with a reasonable rate of return, and (b) the operation and maintenance costs, over the project construction and operation life.

"To consider peculiarities of specific projects, the Agency/LGU may include in the bid documents additional evaluation criteria whose aggregate weight shall not exceed that of the basic criteria (present value of proposed tolls, fees, rentals and other charges) specified in R.A. 6957, as mentioned in the preceding paragraph.

13.4 Evaluation of Bid Amounts for BT Project

"In the case of a build-and-transfer arrangement, the contract shall be

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awarded to the lowest complying bidder based on the present value of its proposed schedule of amortization payments for the facility to be constructed according to the minimum design and performance standards, plans and specifications." For this purpose, the discounting rates and foreign exchange rates prescribed under the economic parameters (Section 6.2 of these IRR) which are part of the Instructions to Bidders shall be used. In case a Filipino contractor and a foreign contractor submit bids whose present values are the same, the former "shall be given preference," i.e., shall be recommended for award.

To consider peculiarities of specific projects, the Agency/LGU may include in the bid documents additional evaluation criteria whose aggregate weight shall not exceed that of the basic criteria (present value of proposed schedule of amortization) specified in R.A. 6957, as mentioned in the preceding paragraph.

13.5 Rejection of Bids

The Agency/LGU reserves the right to reject any or all bids, waive any defect therein and accept the offer most advantageous to the government.

13.6 Period of Evaluation

The Agency/LGU concerned shall complete its evaluation of all bid proposals/tenders within a reasonable period depending upon the nature and scale of the project and on the number of proposals/tenders submitted.

For major projects costing at least P300 million, the period of evaluation should not exceed one hundred-twenty (120) days from the date of submission of bids. For projects costing below P300 million, the evaluation period should not exceed sixty (60) days. Within these indicative period the Agency/LGU concerned shall decide on the award or rejection of bids.

14. NEGOTIATED CONTRACT

The Agency/LGU concerned may resort to direct negotiation with the lone complying bidder if any of the following circumstances arise from steps to conduct public bidding for the BOT or BT project:

a. If, after advertisement pursuant to Section 8 of these IRR, only one contractor applies for prequalification and it meets the prequalification requirements pursuant to Section 10 of these IRR, after which it is required to submit a bid/proposal which is subsequently found by the Agency/LGU to be complying.

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b. If after advertisement, more than one contractor applied for pre-qualification but only one meets the prequalification requirements, after which it submits a bid/proposal which is found by the Agency/LGU to be complying.

c. If after prequalification of more than one contractor, only one submits a bid which is found by the Agency/LGU to be complying.

d. If, after prequalification, more than one contractor submit bids but only one is found by the Agency/LGU to be complying.

15. PERFORMANCE BONDS AND CONTRACT APPROVAL

The concerned agency/LGU shall require such performance bonds and/or other guarantees as may be needed to ensure compliance with stipulated performance milestones.

The contract shall be subject to the approval of the head of the Agency/LGU or higher authorities, depending upon the contract cost, within two (2) weeks upon receipt thereof.

16. REPAYMENT SCHEME

In accordance with Section 6 of R.A. No. 6957, "the contractor shall be entitled to a reasonable return on its investment and operating and maintenance costs in accordance with its bid proposal as accepted by the concerned infrastructure agency or local government unit and incorporated in the contract's terms and conditions."

The right of foreign BOT contractor/investor to convert its peso earnings into foreign currency and to remit the same to its foreign country is governed by existing monetary rules and regulations. The agency/LGU concerned shall therefore include as part of the bid documents pertinent monetary rules and regulations that may be applicable to said right of foreign BOT contractor/investor. This will serve as a guide to prospective contractors. However, the prospective contractor on its own is encouraged to confer with the Philippine monetary authorities as to the financial implications of said rules and regulations.

16.1 For BOT Project

"In the case of a build-operate-and-transfer arrangement, this repayment scheme is to be effected by authorizing the contractor to charge and collect

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reasonable tolls, fees, rentals, and charges for the use of the project facility not exceeding those proposed in the bid and incorporated in the contract."

"The government agency or local government unit concerned shall approve the fairness and equity of the tolls, fees, rentals and charges except in the case of tolls for national highways, roads, bridges and public thoroughfares which shall be approved by the Toll Regulatory Board."

However, fees and charges mandated by law to be remitted to the National Treasury, shall be collected by the agency/LGU in accordance with the provisions of the said law.

16.2 For BT Project

"In the case of a Build-Transfer arrangement, the repayment is to be effected through amortization payments by the government infrastructure agency or local government unit concerned to the contractor according to the scheme proposed in the bid and incorporated in the contract."

16.3 For Land Reclamation or Industrial Estate

"In the case of a land reclamation or the building of industrial estates, the repayment scheme may consist of a portion or percentage of the reclaimed land or industrial estate built, subject to the constitutional requirement with respect to the ownership of lands."

17. CONTRACT TERMS AND CONDITIONS

17.1 Obligations and Authorities of BOT Contractor

a. Franchise: "The winning contractor shall be automatically granted by the infrastructure agency or local government unit the franchise to operate and maintain the facility, including the collection of tolls, fees, rentals, and charges in accordance with Section 6 hereof (i.e., R.A. No. 6957)."

b. Financing: The contractor shall provide the funds needed for the construction of the infrastructure facility "from foreign and/or domestic sources," provided that the financing of a foreign or foreign-controlled contractor from Philippine government financing institutions shall not exceed twenty percent (20%) of the total cost of the infrastructure facility or project," which is the total estimated capital expenditure of the contractor on the project; and "that financing

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from foreign sources shall not require a guarantee by the Government or by government-owned or controlled corporations," while financing from domestic sources shall not require a guarantee by the National Government. Financing for operating costs may be sourced from local financing institutions provided that such shall not require a guarantee by the national government.

c. Detailed Engineering Design: The contractor shall prepare the detailed engineering designs and plans based on the preliminary engineering design submitted as part of its bid and in conformance with the minimum design and performance standards and specifications (Section 6 of these IRR) set by the Agency/LGU. The contractor shall submit the detailed engineering designs and plans to the Agency/LGU for approval prior to actual construction. This notwithstanding, the contractor shall be solely responsible for the integrity of its detailed engineering designs and plans. The approval thereof by the Agency/LGU does not diminish this responsibility, nor does it transfer any part of such responsibility to the Ageny/LGU.

d. Construction: The contractor shall build the facility in accordance with the minimum design and performance standards and specifications (Section 6 of these IRR) prescribed by the Ageny/LGU and with the detailed plans prepared by the contractor and approved by the Agency/LGU. For this construction stage, the contractor may "engage the services of a foreign and /or Filipino constructor," which shall be duly prequalified per Section 10 of these IRR.

e. Operation: The contractor shall operate the facility in order to provide the desired outputs (goods/services) in accordance with the prescribed minimum design and performance standards and specifications (Section 6 of these IRR) and the approved detailed engineering designs and plans.

f. Maintenance: "During the lifetime of the franchise, the contractor shall undertake the necessary maintenance and repair of the facility in accordance with the (minimum design and performance) standards (Section 6 of these IRR) prescribed in the bidding documents and in the contract, " in order to ensure that the facility operates at the desired level of service.

g. Tolls/Fees/Rentals/Charges: The contractor shall be entitled to collect tolls/fees/rentals/charges on the users of the facility, following the amounts, schedules, and fixed term as proposed in its bid, subject to the approval of the Agency/LGU/Toll Regulatory Board, as the case may be. Fees and charges mandated by law to be collected by the Agency/LGU, however, shall be remitted in accordance with the provision of the said law.

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b. Revenue Sharing: The Agency/LGU may share in the revenue from the operation of the contractor in the form of either a fixed fee or a certain percentage of the gross revenue, provided that the same is indicated in the bidding documents and included in the contract.

17.2 Obligations and Authorities of the Agency/LGU

a. Grant of Franchise: The Agency/LGU shall "automatically grant" the winning contractor "the franchise to operate and maintain the facility, including the collection of tolls, fees, rentals and charges in accordance with Section 6 hereof (i.e., R.A. No. 6957)."

b. Approval of Detailed Engineering Design: The Agency/LGU shall review the detailed engineering designs and plans prepared by the contractor and, if satisfied with its compliance with the prescribed standards and specifications (Section 6 of these IRR), shall approve the same. Such approval does not reduce the responsibility of the contractor over the integrity of the designs and plans, nor does it shift to the Agency/LGU any part of that responsibility.

c. Approval of Tolls/Fees/Rentals/Charges: "The government infrastructure agency or local government unit concerned shall approve the fairness and equity of the tolls, fees, rentals, and charges, except in the case of tolls for national highways, roads, bridges and public thoroughfares which shall be approved by the Toll Regulatory Board."

d. Provision of Right-Of-Way and Other Facilities: The Agency/LGU shall acquire and provide to the contractor the required right-of-way and other associated facilities for the project (per Section 6.3 of these IRR), free of any third-party rights which will prevent or hamper the implementation and operation of the project. These right-of-way and associated facilities shall be provided according to the timetables and specifications stated in the Instructions to Bidders and in the contract. The Agency/LGU may require, in the said Instructions to Bidders and in the contract, that the cost of the right-of-way or associated facilities be part of the bid, i.e., of the project cost to be financed and recovered by the contractor.

e. Project Supervision: The Agency/LGU shall exercise "technical supervision" over the project activities of the contracts. The Agency/LGU shall inspect and check whether the project is "constructed, operated, and maintained in accordance with the plans, specifications, standards and costs approved by the concerned government infrastructure agency." Should the Agency/LGU find any

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deviation from or non-compliance with the approved plans, specifications and standards, it shall bring the same to the attention of the contractor for the necessary corrective actions. Such technical supervision by the Agency/LGU does not diminish the singular responsibility of the contractor for the proper construction, operation, and maintenance of the facility, nor does it transfer any part of that responsibility to the Agency/LGU.

f. Audit of Collections: The collection of tolls/fees/rentals/charges for the use of the infrastructure facility by the public for the recovery of its cost plus reasonable rate of return on investment is of public interest. To ascertain that such tolls/fees/rentals/charges are properly collected and recorded according to established rules and procedures, the Commission on Audit shall, after consultation with the implementing agency/LGU concerned, audit the pertinent books and records of the contractor-operator in accordance with the existing auditing rules and regulations.

18. CONTRACT TERMINATION

The Agency/LGU, by itself and through no fault of the contractor or by mutual agreement with the contractor, may revoke, cancel or terminate the contract in case of force majeure such as war, rebellion, major calamities or extraordinary economic upheaval.

The Agency/LGU, through no fault of the contractor and by mutual agreement with the contractor, may also revoke, cancel, or terminate the contract in case of (a) failure of the Agency/LGU to provide the required right-of-way and other facilities which the government is obliged to provide under the contract, or (b) changes in government plans and policies that require stoppage of the project or major revisions therein which substantially affect the original design and feasibility of the project (e.g., cancellation of plans for a new international airport and, instead, mere expansion of the present airport).

In any of the stated cases under the two preceding paragraph, the Agency/LGU "shall compensate the said contractor for its actual expense in the project plus a reasonable rate or return therein not exceeding that stated in the bidding documents and in the contract as of the date of such revocation, cancellation or termination, provided that the interest of the Government in these instances shall be duly insured (by the Agency/LGU) with the Government Service Insurance System or any other insurance entity duly accredited by the Office of the Insurance Commission, provided finally that the cost of the Insurance shall be included in the terms and conditions of the biddings" and incorporated in the bid and the contract.

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19. ASSURANCE OF COMPLIANCE BY CONTRACTOR

To assure compliance by the contractor with the performance targets or milestones - both physical and financial - set out in the contract, the said contract shall include any or all of the following provisions:

a. Confiscation by the Agency/LGU of the performance bond of the contractor in case of contract rescission due to the fault of the contractor to meet its obligations.

b. Liquidated damages on the contractor for failure to complete the project within the stipulated period, which will reflect the foregone economic and financial benefits to the country/facility users/Agency/LGU.

c. Incentive bonus to the contractor for completing the project earlier than stipulated, which will reflect the additional/earlier economic and financial benefits to be realized by the country/facility users/Agency/LGU.

d. Nullification of the franchise of the contractor for failure to build, operate and maintain the project facility and services according to the minimum design and performance standards prescribed in the contract.

20. ADJUSTMENT OF TOLLS/FEES/RENTALS/CHARGES

"The tolls, fees, rentals and charges on the facilities are subject to adjustments according to a formula related to official government price indices which shall be defined before the bidding through the bidding documents and incorporated in the contract."

These official price indices shall mainly be those issued by the National Statistics Office and the Central Bank of the Philippines, among others.

The Agency/LGU shall also make appropriate adjustments in the tolls, fees, rentals, and charges, to compensate for opportunity costs to the contractor due to any undue delay and/or inadequacy in the right-of-way or other project facilities which are required to be provided by the Agency/LGU, provided that this provision is defined in the bidding documents and the contract.

21. AGENCY/LGU IMPLEMENTING GUIDELINES

The Agency/LGU concerned may issue its own implementing guidelines

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provided the same are not inconsistent with the provisions of the law of these implementing rules and regulations.

22. EFFECTIVITY

These Implementing Rules and Regulations shall take effect fifteen (15) days after the date of publication in a newspaper of general circulation.

Done in the City of Manila, this 3rd day of April 1991.

JOSE P. DE JESUS
Secretary
Department of Public Works
and Highways

CAYETANO W. PADERANGA, JR.
Director-General
National Economic and
Development Authority

JESUS P. ESTANISLAO
Secretary
Department of Finance

LUIS T. SANTOS
Secretary
Department of Interior
and Local Government

ANTONIO W. DIOKNO
Philippine Constructors
Association

GODOFREDO J. MARQUEZ
National Confederation of
Constructors Association
of the Philippines

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Appendix A2-3
SYNOPSIS OF PENDING PNCC CASES

Appendix A2-3
SYNOPSIS OF PENDING PNCC CASES

1. PNCC VS. REPUBLIC OF THE PHILIPPINES, ET AL. GR NO. 89557-SUPREME COURT

In May 1987, the Republic of the Philippines filed with the Regional Trial Court of Makati (RTC) an action for Quo Warranto with a prayer for the issuance of a writ of preliminary injunction and restraining order. The purpose of the action was to exclude from the PNCC franchise portions of the expressways from Villamor Air Base, Pasay City to Alabang, Muntinlupa, among others, on the ground that PNCC had long fully recovered its investments and expenses in the construction.

On May 28, 1987, the RTC denied the application for preliminary prohibitory injunction but ordered the PNCC to deposit with the Philippine National Bank all toll fees collected from the questioned portions of the expressways effective May 29, 1987 until further orders.

The Republic of the Philippines moved for a reconsideration, which was denied on July 29, 1987. Hence, it filed a petition for certiorari, prohibition and injunction and/or temporary restraining order, seeking to declare null and void the RTC's denial of the injunction and also the motion for reconsideration.

In the meantime, the Federation of Parañaque Homeowners Association, Ceferino Padua, Amelito Multuc, and Fernando Garte were allowed by the Court of Appeals to intervene.

In due course, the Court of Appeals rendered a decision on May 28, 1987 excluding from the PNCC franchise the questioned portions of the expressway and permanently enjoining the PNCC to collect toll fees.

Hence, the PNCC filed with the Supreme Court a petition for certiorari and prohibition with an application for the issuance of a writ of preliminary and/or temporary restraining order. Among others, the PNCC questioned the Court of Appeals for granting a final relief when what was prayed was merely a provisional remedy, and for depriving PNCC due process.

Before further action could be taken on the case, the parties moved for a judgement based on a compromise agreement arrived at by them. The compromise agreement settled the cases originally filed with the RTC of Makati and the Court of Appeals, including a case before the Toll Regulatory Board which has reached the office of the President. The compromise agreement contained several conditions the PNCC should comply with, failure of which shall make final and immediately executory the Court of Appeal's decision excluding the questioned portions of the expressway from the PNCC franchise.

The Supreme Court found the compromise agreement not contrary to law, morals, public order, good customs or public policy, and accordingly approved the same on August 20, 1990.

2. CHILDREN'S GARDEN OF THE PHILIPPINES, INC. ET. AL. VS. THE ASSETS PRIVATIZATION TRUST, ET. AL - GR NO. 101057, SUPREME COURT

Children's Garden of the Philippines, Inc. Acacia Mutual Aid Society, Amtel Trading Confederation, Unigrowth Development, Inc, and Edgardo C. Ylo, for themselves and in behalf of 5,000 stockholders of the Construction Development Corporation of the Philippines (CDCP), filed a petition to enjoin the Assets privatization Trust (APT) and its designated directors and officers with the PNCC from continuing to implement Letter of Instruction No. 1295 and the privatization of PNCC.

The petitioners claim that on February 23, 1983, President Marcos issued LOI No. 1295 directing the several government financial institutions (GFIs) such as the Government Service Insurance System, Land Bank of the Philippines, National Development Company, Philippine Export and Foreign Loan Guarantee Corporation, and the Philippine National Bank, to convert their loans as of December 31, 1982 to CDCP and its wholly-owned subsidiaries into common stock of CDCP as par value. Petitioners claim that LOI No. 1295 was not published and therefore has no force and effect. They also claim that LOI No. 1295 deprived them of their property rights without due process of law.

The respondents, on the other hand, contend that there was no violation of the equal protection clause because the stockholders met and approved the resolution increasing the authorized capital stock of CDCP, part of which was to be used to accommodate the conversion of CDCP's outstanding liabilities to the GFIs into equity. Respondents also contend that petition cannot exercise their pre-emptive rights because the shares were used as payment for previously contracted debts.

The Supreme Court found the petition without merit. The court said that even assuming that LOI No. 1295 was not published, the acquisition by the GFIs of CDCP shares was valid because said acquisition was with the knowledge and approval of CDCP's stockholders, in compliance with the provisions of the Corporation Code. The Supreme Court also said that under the Corporation Code, the pre-emptive right cannot be exercised over shares of stock that would be used for the payment of a debt previously constructed.

APPENDICES TO CHAPTER 3

Appendix A3-1
DESIGN STANDARDS

Appendix A3-1
DESIGN STANDARDS

1. INTRODUCTION

The following design standards are to be applied to both the design of the new MST and to the design of the rehabilitation of the SLE.

The design of facilities not covered here is to be in accordance with the standards of a recognized international authority and as AASHTO, suitably modified to suit local conditions.

2. HIGHWAY DESIGN STANDARDS

The geometric design standards given in the Pre-Feasibility Study are said to be based on the DPWH Design Guidelines Criteria and Standards. The DPWH Guidelines are largely derived from AASHTO policies.

It is therefore suggested that the highway design standards be based on current AASHTO policies and guidelines for Freeways,[1] with modifications appropriate to the Philippines and additions necessary for toll roads.

Table A3-1-1 shows the proposed modified geometric design standards. The principal changes from those given in the Pre-Feasibility Study are listed below.

- Maximum Gradient of Expressway

  It is desirable to have a maximum gradient of 3.00 percent. However, there may be situations where it will be difficult to maintain such a flat gradient. It is suggested that gradients up to an absolute maximum of 5.00 percent should be permitted in exceptional circumstances.

- Shoulder Width (Service Lane)

  The normal shoulder width at grade should be 3.00m. Although a shoulder width of 1.20m is permitted as an absolute minimum on long viaducts in some countries, such as Australia, every effort should be made to maintain the full shoulder width of 3.00m in the Philippines on four-lane tollways. A width of 1.20m is acceptable on six-lane viaducts.

[1] A Policy on Geometric Design of Highways and Streets, 1990, and Roadside Design Guide, 1988.

Table A3-1-1
EXPRESSWAY AND INTERCHANGE DESIGN STANDARDS

A. DESIGN ELEMENT - EXPRESSWAY	UNIT	VALUE
1. Design Speed	kph	100
2. Horizontal Alignment		
♦ Minimum Curve Radius	m	700
♦ Length of Curve	m	110
3. Vertical Alignment		
♦ Desirable Maximum Gradient	%	3.00
♦ Absolute Maximum Gradient	%	5.00
♦ Minimum Gradient	%	0.35
♦ Length of Curve		
• Crest	m/%	100A
• Sag	m/%	50A
4. Sight Distance		
♦ Minimum Stopping Sight Distance	m	200
5. Maximum Superelevation	%	6
6. Lane Width	m	3.50
7. Service Lane (Shoulder)	m	3.00
8. Median Width	m	3.00
9. Standard Pavement Cross Slope	%	1.50
10. Minimum Vertical Clearance	m	4.88

B. DESIGN ELEMENT - INTERCHANGE	UNIT	VALUE
1. Minimum Design Speed	kph	40
2. Horizontal Alignment		
♦ Minimum Curve Radius	m	60
♦ Minimum Length of Curve	m	70
3. Vertical Alignment		
♦ Maximum Gradient	%	6.00
♦ Minimum Gradient	%	0.35
♦ Length of Curve		
♦ Crest	m/%	5A
♦ Sag	m/%	7A
4. Maximum Superelevation	%	6
5. Sight Distance		
♦ Minimum Stopping Sight Distance	m	45
♦ Minimum Passing Sight Distance	m	200
6. Lane Width	m	3.50
7. Service Lane	m	1.20
8. Median Width	m	1.00
9. Standard Pavement Cross Slope	%	1.50
10. Minimum Vertical Clearance	m	4.88
11. Taper Length	m	90
12. Acceleration Length of Taper	m	90
13. Acceleration Length of Parallel	m	500

Source: Consultant's Estimates.

In developed countries vehicle breakdowns on expressways are comparatively rare. In countries at the stage of development of the Philippines, vehicle breakdowns on high speed highways are far more common because a large proportion of the vehicle fleet is old and poorly maintained. If peak hour flows are to be accommodated at an acceptable level of service on an elevated MST it is essential for the shoulder width of the four lane expressway to be 3.00m to accommodate breakdowns.[2]

If provision is made for six lanes, an ultimate outer shoulder of 1.20m is more acceptable as broken down vehicles would still leave two unobstructed lanes.

- Median Width

There will be a standard concrete barrier in the median. The minimum width of inner shoulder should be 1.20 m. Therefore, the minimum median width should be 3.00 m.

If provision is made for six lanes, the initial four-lane expressway will have a median 10.00 m wide.

3. DRAINAGE DESIGN STANDARDS

Drainage design shall be in accordance with the DPWH Design Guidelines Criteria and Standards supplemented by Highway Drainage Guidelines, 1987, published by AASHTO.

4. PAVEMENT DESIGN

Pavement design shall be performed in accordance with the methods and procedures given in AASHTO Guide for Design of Pavement Structures, 1986. This method involves consideration of factors including pavement performance, traffic, roadbed soil, materials of construction, environment, drainage, reliability, life-cycle costs and shoulder design.

[2]Good traffic management requires mandatory tow service, with high fees for all stalled vehicles removed from the tollway.

5. STRUCTURAL DESIGN STANDARDS

The National Structural Code of the Philippines[3] shall be adopted as the Structural Design Standard, except as modified by the following specific design criteria:

- Vertical Clearance (Clause 2.3.2)

  A minimum vertical clearance for vehicular traffic of 4.88 m shall be provided.

  A minimum vertical clearance for PNR railway traffic of 4.83 m shall be generally provided, except at Bicutan where a vertical clearance of 5.32 m shall be provided.

  A minimum vertical clearance for a possible future LRT system along the PNR route of 6.365 m shall be provided.

  A composite clearance diagram incorporating both PNR and LRT requirements is shown in Figure A3-1-1.

- Horizontal Clearance beside Railway

  The minimum horizontal clearance to the PNR railway shall conform with the clearance diagram in Figure A3-1-1.

- Collision Loads (Clause 2.4.1)

  Bridge piers which are not protected by guardrail or other barrier devices and are located less than 9 m from the edges of through traffic lanes shall be designed to resist an equivalent static load of 500 kN applied at an angle of 10° from the direction of the road centerline passing under the bridge. The load shall be applied 1.2 m above ground level.

  Bridge piers situated within 5.5 m of a rail track centerline shall be designed to resist the following minimum simultaneously applied impact loads:

  1,000 kN parallel to rails, and

  500 kN normal to rails.

  Both loads shall be applied horizontally, 2 m above rail level.

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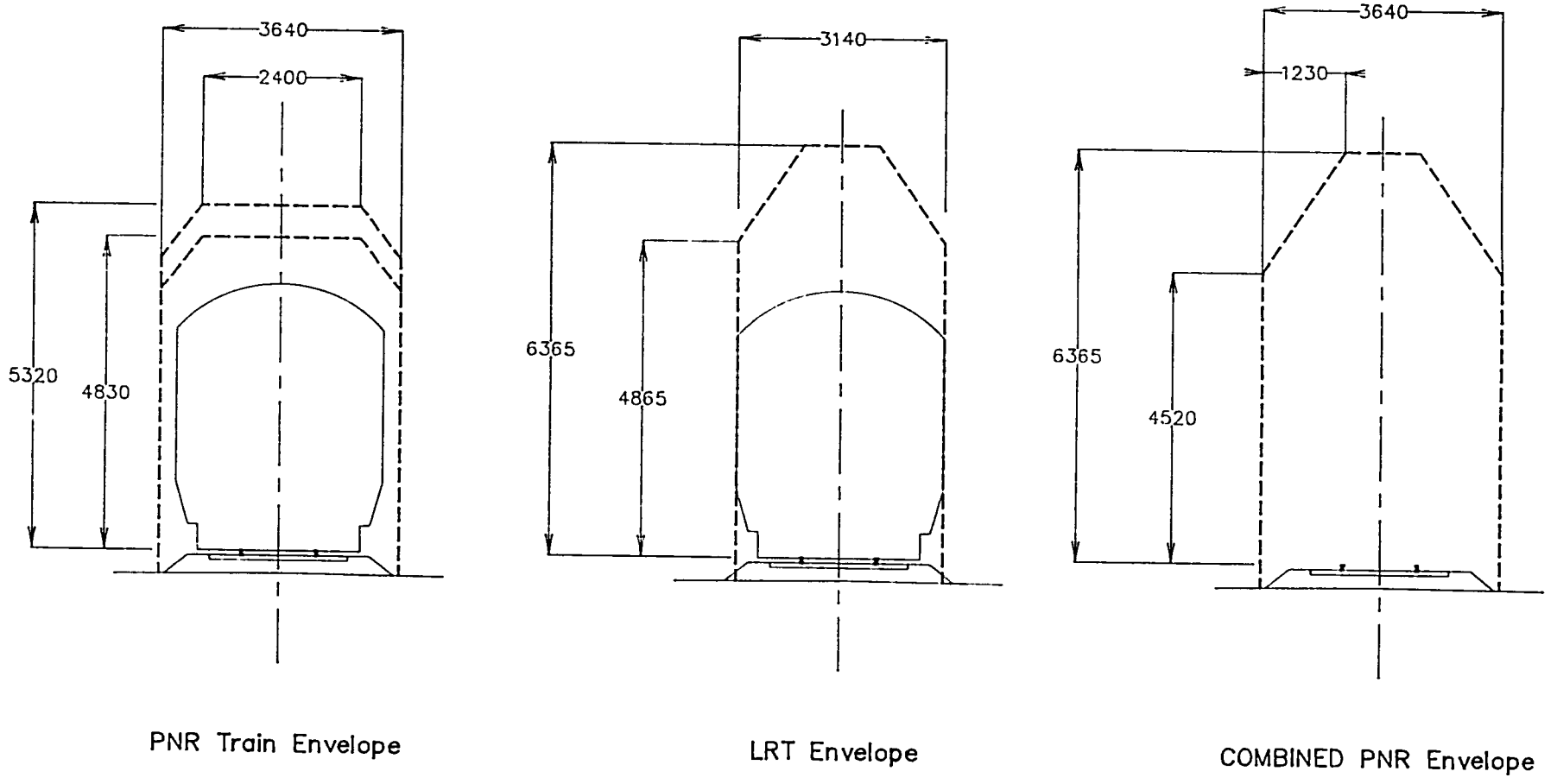
[3] Volume II Bridges, First Edition December 1987, published by the Association of Structural Engineers of the Philippines, which is based on the AASHTO 'Standard Specifications for Highway Bridges" 13th Edition 1983 with modifications to suit local conditions.



MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVE. CONCEPTUAL STUDY	PNR CLEARANCE ENVELOPE	FIGURE A3–1–1

- Vehicular Railing (Clause 2.7.1.1.2)

  The use of timber or concrete for traffic railings shall be excluded. The use of a continuous New Jersey concrete parapet should be considered.

- Pedestrian Railing (Clause 2.7.3.1.2)

  The use of timber or concrete for pedestrian railings shall be excluded.

- Standard Highway Loading (Clause 3.7)

  The standard highway loading shall be MS18

- Earthquakes (Clause 3.21)

  The seismic design shall be based on the AASHTO "Standard Specifications for Seismic Design of Highway Bridges 1983".[4] An acceleration coefficient of 0.4 shall be adopted, the standard for Metro Manila.

- Shrinkage and Temperature Reinforcement (Clauses 5.5,7.4.2,8.20)

  The minimum area of reinforcement for shrinkage and temperature effects shall be 500 mm^2 per meter.

- Differential Movement of Supports

  Allowance shall be made in the analysis of the estimated effects of differential settlement of the supports.

  The effects of differential settlement or rotation may take account of the relief afforded by creep and soil-structure interaction.

- Special Provisions for Brackets and Corbels

  The provisions of Clauses 8.15.5.8 and 8.16.6.8 of the AASHTO "Standard Specifications for Highway Bridges"[5] shall be used for the design of brackets and corbels.

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[4] Published by the American Association of State Highway and Transportation Officials, with Revisions from Interim Specifications, Bridges, 1985, 1987-1988 and 1991.

[5] Fourteenth Edition, 1989, Published by the American Association of State Highway and Transportation Officials.

- Elastomeric Bearings (Section 14)

  The provisions of Section 14 of the AASHTO "Standard Specifications for Highway Bridges"[4] shall be substituted.

- Pot Bearings

  The provisions of Section 19 of the AASHTO "Standard Specifications for Highway Bridges"[4] shall be used for the design of pot bearings.

- Disc Bearings

  The provisions of Section 20 of the AASHTO "Standard Specifications for Highway Bridges"[4] shall be used for the design of disc bearings.

- Errata

  Errors in the text of the structural code, which are not necessarily limited to those listed, shall be amended as shown in Table A3-1-2.

As an alternative to the use of the National Structural Code of the Philippines, any approved equivalent current national bridge design code, such as the Ontario, California, German, British or Australian codes, may be adopted as the Structural Design Standard together with the specific requirements stated above.

6. BUILDING DESIGN STANDARDS

The National Structural Code of the Philippines[6] shall be adopted as the Building Design Standard. Seismic design shall be in accordance with "Earthquake Resistant Design of Structures."[7]

7. ELECTRICAL DESIGN STANDARDS

Electrical design and street lighting shall be in accordance with the Philippine Electrical Code published by the Institute of Integrated Electrical Engineers of the Philippines, Inc.

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[6]Volume I: Buildings, Towers and Other Vertical Structures, Third Edition June 1986, published by the Association of Structural Engineers of the Philippines.

[7]Published by the Association of Structural Engineers of the Philippines, 1991 Edition.

Table A3-1-2
ERRATA TO THE STRUCTURAL CODE

Clause 3.7.1.2	Substitute "linear meter" for "linear foot"
Clause 3.7.1.3	Substitute "Figure 3.7.6B" for "Figure 3.7.2B"
Figure 3.7.6.A	Substitute "Standard M Trucks" for "Standard H Trucks".
Figure 3.7.7A	Substitute "Standard MS Trucks" for "Standard HS Trucks".
Clause 3.10.1	Omit "D = degree of curve"
Clause 3.11.1	Substitute "3.05 m" for 0.305 m"
Clause 3.21.3	Substitute "3.0 seconds" for "33.0 seconds"
Table 3.23.3.1	All wheel load fractions should be multiplied by 3.28
Clause 3.30	Substitute the following, "The tire contact area shall be assumed as a rectangle with an area in square millimeters of 14.5P, and a Length in Direction of Traffic/Width of Tire ratio of 1/2.5, in which P=wheel load in kN.
Clause 8.1.3	Add the following: "Bracket or corbel - Short (haunched) cantilever that projects from the face of a column or wall to support a concentrated load or beam reaction. See Articles 8.15.5.8 and 8.16.6.8."
Clause 8.7.1	Substitute "MPa" for "psi"
Clause 8.19.1.2	Substitute "b_w and s are in mm" for "b_w and s are in m."
Clause 9.16.2.1	Substitute "1720 MPa" for "1.72 MPa" Substitute "1860 MPa" for "1.86 MPa" Substitute "1650 MPa" for "1.70 MPa" Substitute "1000 MPa" for "1.00 MPa" Substitute "1100 MPa" for "1.10 MPa"
Clause 9.16.2.1.2	Substitute "$E_{ci} = 0.043\ w^{3/2}\sqrt{f'_{ci}}$ for " $E_{ci} = 0.428\ w^{3/2}\sqrt{f'_{ci}}$.

Source: Consultant's review.

8. CONSTRUCTION SPECIFICATIONS

The DPWH Standard Specifications[8] shall be adopted as the Construction Specification, with supply and testing of materials to the relevant AASHTO and ASTM Standards.

The Standard Specifications shall be augmented or modified as necessary at the design stage by Supplementary Specifications.

9. DESIGN LIFE

The minimum design life of the Tollway shall be:

- 100 years for bridge structures
- 40 years for road pavement
- 20 years for major mechanical and electrical items, and
- 10 years for road surface

Renewable items shall have the following minimum residual life at handover to the Government of the Philippines:

- road surface - 5 years
- road pavement - 10 years

10. UNITS

SI units shall be used in the design and construction of all works and in all drawings.

11. TRAFFIC SIGNS

Traffic signs shall be in accordance with the Philippine Road Signs Manual (Revised Edition), 1982, augmented where necessary using the Manual on Uniform Traffic Control Devices, U.S. Department of Transportation, Federal Highway Administration, 1988.

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[8] Volume II: Highways Bridges and Airports, 1988, published by the Republic of the Philippines, Department of Public Works and Highways.

12. PAVEMENT MARKINGS

Pavement markings shall be in accordance with the Manual on Pavement Markings, Republic of the Philippines, 1980.

13. LIGHTING

The design procedure for toll road lighting shall be in accordance with the Philippine Electrical Code 1988, Part 2, Appendix G, Street Lighting Guide and the general principles of one of the following references:

- The Illuminating Engineers Society (IES) Lighting Handbook 1981, Application Volume, Section 14 Roadway Lighting.
- British Standard BS 5489, Road Lighting, Parts 1, 5, 6, 8 and 10.
- Commission Internationale de l'Eclairage, Publication No. 23 (TC-4.6). International Recommendations for Motorway Lighting, 1972, and Publication No. 30.2 (TC-4.6), Calculation and measurement of luminance and illuminance in road lighting: 2nd edition. CIE. 1982.

Warrants for provision of toll road lighting are as follows:

- Continuous Toll Road Lighting

  The following four conditions are considered to warrant continuous toll road lighting:

  Case CTL-1 - Continuous lighting is considered to be warranted on those sections in and near cities where the current ADT is 30,000 or more.

  Case CTL-2 - Continuous lighting is considered to be warranted on those sections where three or more successive interchanges are located with an average spacing of 2.5 km or less, and adjacent areas outside the right-of-way are substantially urban in character.

  Case CTL-3 - Continuous lighting is considered to be warranted where for a length of 3 km or more the toll road passes through a substantially developed suburban or urban area in which one or more of the following conditions exist; (a) local traffic operates on a complete street grid having some form of street lighting, parts of which are visible from the toll road; (b) the toll road passes

through a series of developments such as residential, commercial, industrial and civic areas, colleges, parks, truck and bus terminals, etc., which include roads, streets and parking areas, yards, etc., that are lighted; (c) separate cross streets, both with and without connecting ramps, occur with an average spacing of 1 km or less, some of which are lighted as part of the local street system; and (d) the toll road cross section elements, such as median and borders, are substantially reduced in width below desirable sections used in relatively open country.

Case CTL-4 - Continuous lighting is considered to be warranted on those sections where the ratio of night to day accident rate at least 2.0 or higher than the average for all unlighted similar sections, and a study indicates that lighting may be expected to result in a significant reduction in the night accident rate.

- Complete Interchange Lighting

Case CIL-1 - Complete interchange lighting is considered to be warranted where the total current ADT ramp traffic entering and leaving the toll road within the interchange areas exceeds 10,000 for urban conditions, 8,000 for suburban conditions or 5,000 for rural conditions.

Case CIL-2 - Complete interchange lighting is considered to be warranted where the current ADT on the crossroad exceeds 10,000 for urban conditions, 8,000 for suburban conditions, or 5,000 for rural conditions.

Case CIL-3 - Complete interchange lighting on an unlighted toll road is considered to be warranted at locations where existing substantial commercial or industrial development, which is lighted during hours of darkness, is located in the immediate vicinity of the interchange, or where the cross road approach legs are lighted for 1 km or more on each side of the interchange.

Case CIL-4 - Complete interchange lighting is considered to be warranted where the ratio of night to day accident rate within the interchange area is at least 1.5 or higher than the average for all unlighted similar sections, and a study indicates that lighting may be expected to result in a significant reduction in the night accident rate.

- Partial Interchange Lighting

Case PIL-1 - Partial interchange lighting is considered to be warranted where the total current ADT ramp traffic entering and leaving the toll road within the interchange areas exceeds 5,000 for urban conditions, 3,000 for suburban conditions or 1,000 for rural conditions.

Case PIL-2 - Partial interchange lighting is considered to be warranted where the current ADT on the toll road through traffic lanes exceeds 25,000 for urban conditions, 20,000 for suburban conditions, or 10,000 for rural conditions.

Case PIL-3 - Partial interchange lighting is considered to be warranted where the ratio of night to day accident rate within the interchange area is at least 1.25 or higher than the average for all unlighted similar sections, and a study indicates that lighting may be expected to result in a significant reduction in the night accident rate.

- Special Considerations

  Where there is continuous toll road lighting, there should be complete interchange lighting. When continuous lighting is warranted, but not initially installed, partial interchange lighting is considered to be justified under the continuous lighting warrants CTL-1 of CTL-2. This would preclude the requirements of satisfying the partial interchange lighting warrants PIL-1 or PIL-2.

  Where the interchange lighting is warranted, but not initially fully installed, a partial lighting system which exceeds the normal partial installation in number of lighting units is considered to be justified.

  Lighting of crossroad ramp terminals is warranted regardless of traffic volumes, where the design requires the use of raised channelizing of divisional islands, and/or where there is poor sight distance.

The selection of light source, luminaire distribution, mounting height, and luminaire overhang is an engineering decision based on such factors as geometry and character of the roadway, environment, proposed maintenance, economics, aesthetics, and overall lighting objectives.

Design variables that usually are most influential to both effectiveness and costs are as follows:

- Arrangement or placement of lighting units with respect to the roadway (median, one-side, staggered on opposite sides, opposite on two sides, and median plus on the side);
- Mounting heights;
- Pole and base type;
- Lamp characteristics (type, initial lumens, lumen maintenance, wattage);
- Luminaire type;

- Light distribution type;
- Type of distribution system;
- Burning hours per year; and
- Type of maintenance.

In addition to these design variables, there are roadway, traffic, and environmental variables, influencing effectiveness and costs that shall be considered in cost analysis. The following are included among the influential roadway variables:

- Median width;
- Presence or absence (or plans for such) of a median barrier and its type;
- Number of traffic lanes;
- Width of roadway shoulders;
- Overall roadway cross section;
- Number and type of exit and entrance ramps; and
- Number and type of intersections and intersecting roadways and streets.

Among other important variables are the amount and type of traffic, the type of area through which the roadway passes, and weather conditions in the area.

The level and uniformity of illuminance for each situation is given below:

- Continuous Toll Road Lighting

  Where continuous toll road lighting is warranted, it shall normally be designed to provide an average maintained horizontal illuminance in the range of 6 to 9 lux on the traveled way being lighted. The point of least illuminance on the road surface shall not be less than 2 lux at the time of lowest effective output of the luminaire and for the above base range of 6 to 9 lux of average maintained horizontal illuminance.

  In cities where the toll road is generally adjacent to major arterial streets, a higher level of illuminance is justified. The average maintained horizontal illuminance in such conditions should be in the range of 9 to 12 lux, with the point of least illuminance not less than 4 lux.

The uniformity ratio of average lux on the pavement area to the lux at the point of minimum pavement illuminance shall be 4:1 of better, except in cities where it shall be 3:1.

- Complete Interchange Lighting

Complete interchange lighting shall be designed to the same levels of illuminance as continuous toll road lighting. Where complete interchange lighting is provided in a section of toll road which is not lighted, the mainline roadway lighting should start at the beginning of a deceleration lane, continue through the interchange, and stop at the end of an acceleration lane. In addition, transition lighting shall be provided.

Ramps should be lighted both within the interchange and beyond the toll plaza, up to a point where the ramps merge with other major highways or local roads. Where the toll road ramps merge with other highways, continuous lighting should be provided for the full length of the acceleration and deceleration lanes. Where the toll road ramps merge with local roads and the intersection is channelized, lighting shall be provide covering the channelized intersection. In all cases at least one lighting standard should be provided on each side of the intersection.

Toll plazas shall be provided with lighting designed for an average maintained horizontal illuminance of 15 lux, except on cities where the toll road design level of illuminance is 9 to 12 lux. In the latter situation, the toll plaza lighting shall be designed for 24 lux.

The parking areas around toll plaza offices and other buildings should be lighted to a level of illuminance of 12 lux.

There may be situations where a higher level of illuminance than these design values is justified. For example, unusually high environmental brightness near the roadway may indicate such a need.

Physical roadside conditions may require adjustment of spacing determined from the base levels of illuminance indicated above. Higher levels of illuminance are justified when overhead structures, safety, and object clearances restrict the placement of lighting standards. It is advisable to provide the higher levels at the gores and intersections rather than to distribute the increased illuminance uniformity throughout the road section.

- Partial Interchange Lighting

Where partial interchange lighting is warranted, luminaires shall be located to best light the through lanes and speed change lanes at diverging and merging

locations. The design levels of illuminance and uniformity are of less importance than overall illumination of the roadway area at the approach nose and merging end, but should be in the range of 4 to 9 lux. Lighting shall start at the beginning of the deceleration lane of each roadway and stop two luminaires after the diverging gore area. For acceleration lanes, lighting shall start two luminaires before the merging gore areas and stop at the end of the acceleration lane.

Application of the above partial interchange lighting criteria will result in the toll road roadways through the interchange area not being lighted continuously. If the resulting unlit portion is short, then continuous lighting on such roadways shall be installed.

Toll plazas shall be provided with lighting designed for an average maintained horizontal illuminance of 15 lux. The adjoining parking areas shall be lighted at a level of 12 lux.

- Transition Lighting

The design of transition lighting shall be provided at the beginning and end of each section of lighted mainline roadway. One method used to provide transition lighting is to vary the size and spacing of the luminaires, but other methods are acceptable.

The design of transition lighting shall be such that over a distance of about 500m there is a gradual transition of the level of illuminance from about half the design value to the full design value.

- Bridges and Overpasses

On continuously lighted sections of toll road and lighted interchanges, the lighting of bridges and overpasses shall be at the same level as the roadway.

It may sometimes be desirable to provide lighting on long bridges in urban and suburban areas where traffic volumes are heavy, even though the approaches are not lighted. In case of accidents or breakdowns on long bridges, lighting enhances safety.

14. TOLL COLLECTION

- Barrier toll plazas shall be located where they are clearly visible from a considerable distance by approaching vehicles. The amount of paving should be generous and the approach geometrics smooth and unconstrained to provide for

easy maneuvering of vehicles approaching at high speed in areas where driver errors are likely to occur. Plazas should be located well away from overpasses which could restrict visibility and approach geometrics.

The rate of taper approach roads shall be not greater than 5:1.

Toll plazas shall preferably be located at a high point on the profile grade line. This is particularly important for barrier plazas approached by high speed traffic. For barrier plazas, the approach upgrades should be at least 2 percent.

The horizontal and vertical alignments at barrier toll plazas shall be carefully coordinated to ensure that the plaza is clearly visible to drivers approaching from both directions.

- Cement Concrete Pavement

For 50 m each side of the toll booths, total 100m, the pavement shall be Reinforced Portland Cement Concrete 330mm thick. Pavement shall be constructed in 5.0 m widths separated by longitudinal contact (butt) joints, or monolithically in multiples of 5.0 m widths with a longitudinal weakened-plane joint at each traffic island line.

Transverse weakened-plane joints provided at a spacing of approximately 5.0 m shall be continuous across the full width of the pavement.

- Drainage

Surface runoff from large toll plazas must be dealt with by means of a combination of longitudinal gradient and crossfall. The cente of the plaza should preferably be at a high point on the road profile and must never be at low point. A crossfall of at least 1.5%, preferably 2.00% should be provided at the toll booths.

- Capacity of Toll Gates

On the New Jersey Turnpike a study of 28 interchanges determined that the two-hour peak period during peak traffic days varied between 14% and 26% of the total 24-hour traffic volume. Where local traffic counts are not available a value of 18% is considered to be a reasonable figure for design purposes.[9]

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[9]Technical Report Nos: 1, Toll Road Planning Strategies, February 1984. Technical Assistance and Training in Toll Road Management. New Jersey Turnpike Authority/Louis Berger International, Inc.

Studies on the New Jersey Turnpike and on toll roads in Indonesia determined that average entry/exit times through a toll plaza are of the following order:

(i) Cars enter in 6 seconds, or 600 per hour;

(ii) Trucks and buses enter in 9 seconds, or 400 per hour;

(iii) Cars exit in 13 seconds, or 275 per hour; and

(iv) Trucks and buses exit in 20 seconds, or 180 per hour.

This indicates that each entry or exit truck and bus is equivalent to 1.5 cars; cars enter a toll lane at the rate of 2.2 per exit car; and trucks and buses also enter at the rate of 2.2 per exit truck and bus.

All traffic through a two-direction plaza can thus be converted to equivalent exit cars using the above factors. All toll lanes can also be converted to equivalent exit lanes, each with a capacity of 275 cars. This approach establishes the number of lanes a toll gate requires to handle the combined exit and entry traffic. It should be noted, however, that it does not determine whether a given toll gate has sufficient usable exit and entry lanes. This can be determined following the same procedure using directional peak volumes.

- Toll Gate Islands

Toll islands shall be 2100mm wide and curbed. Bumper blocks shall be either precast or cast-in-place reinforced concrete. The width of pavement between toll islands shall be 2900mm except for the two outside toll lanes, which shall be 3500mm wide.

Toll islands shall be completely paved in portland cement concrete.

A piped water supply with a heavy-duty hose bibcock shall be provided at every second toll island for roadway washing purposes.

- Utility and Access Tunnels

All barrier toll plazas and all other toll plazas with six or more toll lanes shall have a combined utility and access tunnel. The tunnel will connect the Supervisor's Office building with the toll gate by means of a stairway at every second-toll island.

The minimum size of access tunnel shall be 2,000mm wide by 2,350mm high. The size may be increased where necessary to accommodate air ducts, cables and other utilities. All utilities should be located on the side of the tunnel opposite the access stairways.

Suitably sized sleeves and ducts shall be provided through the roof and walls of the tunnel to accommodate the utility connections to each toll booth. These will include air ducts and cables for electric power and toll collection equipment. The sleeve for each toll booth air duct shall be large enough to accommodate a duct of 500 cm^2 area. Cable ducts shall be at least 75mm nominal internal diameter. Six cable ducts shall be provided at each toll booth.

- Utility Ducts

At small toll plazas with up to five lanes where an access tunnel is not provided, suitable ducts for utility connections to the toll booths are required. For cables, six P.V.C. or steel ducts of at least 100mm nominal diameter are needed. For the main distribution of fresh air, a duct of up to 2,500 cm^2 may be required. P.V.C., concrete, asbestos cement or steel pipes are suitable. P.V.C. water pipe is manufactured in sizes up to 500mm diameter and may be the best alternative in most cases.

- Toll Booths

Toll booths shall be designed to be prefabricated and portable to facilitate easy replacement, to meet the following criteria.

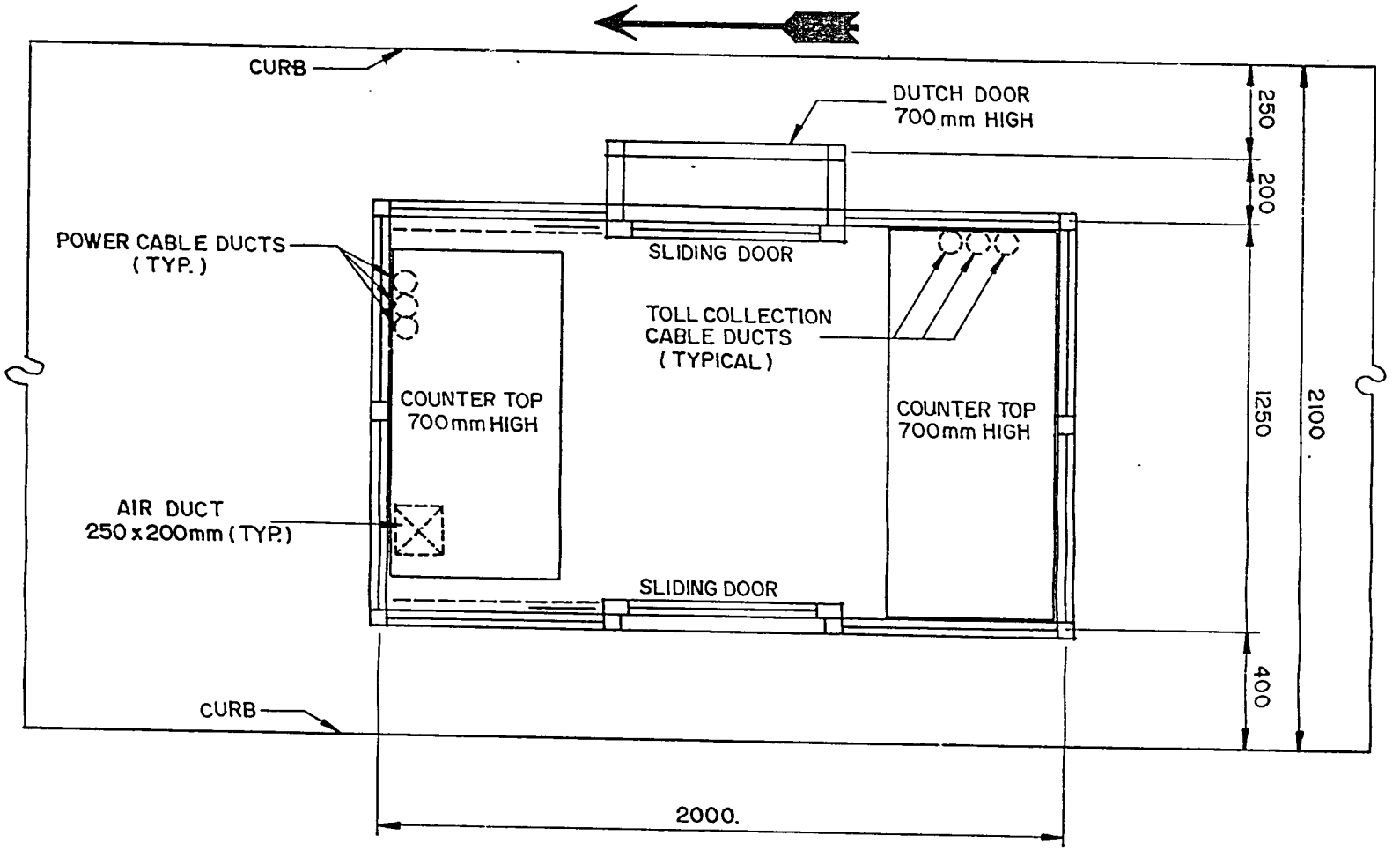
(i) The booth shall be completely prefabricated, with the possible exception of window glazing. Site installation shall be limited to fixing to holding down bolts, connection of fresh air and electric power, and installation of toll collection equipment.

(ii) Exterior size shall be approximately 2,000mm long by 1,250mm wide by 2,500mm high. Other key dimensions are shown in Figure A3-1-2.

(iii) Roof may have a slight slope from front to back.

(iv) Front window may have a slight tilt forward to reduce headlight reflection and glare.

(v) Structural frame of booth shall be fabricated from 50 x 50 x 5 minimum thickness square steel tubing with fully welded joints. The completed framework shall be hot-dipped galvanized.



PHILIPPINE ASSISTANCE PROGRAM SUPPORT (PAPS) PROJECT UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0452-C-00-0099-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A3-1-2
LOUIS BERGER INTERNATIONAL, INC. • LOCKWOOD GREENE INT'L. • ERNST & YOUNG INT'L. • GLOBETROTTERS ENG'G. CORP. • TRANS-ASIA (PHIL.), INC • CONSULTANT MANAGEMENT SERVICES, INC.	**STANDARD TOLL BOOTH**	

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(vi) Booth panels shall be designed for long life and heavy duty use, faced with corrosion-resistant materials such as galvanized steel, stainless steel and aluminum alloy, at least 1.0 mm thick.

(vii) There shall be a sliding entrance floor on the right side and a sliding emergency exit door on the left side, both sliding towards the back of the booth. Sliding door track shall be for heavy duty usage and long life.

(viii) Outside the entrance door on the right side there shall be a hinged counter-height (700mm) Dutch door projecting 200mm beyond the outer face of the booth.

(ix) The forward and side windows shall be glazed with safety glass at least 5 mm thick, using the largest possible panes with the smallest possible glazing strips, to provide maximum visibility to toll collectors.

(x) The upper part of both sliding doors shall be glazed with safety glass.

(xi) The upper part of the rear wall and rear side panels may be either glazed or solid panels.

(xii) Counters shall be 700mm high and constructed of heavy duty durable materials such as laminated plastic (Formica) mounted on a heavy steel sheet base.

(xiii) In addition to suitable lighting fixtures, the booth shall be fitted with an automatic fluorescent emergency lamp which operates when a power failure occurs.

- Toll Booth Ventilation

Fresh air from a source clear of pollution by exhaust fumes shall be provided to every toll booth at a rate of at least 350 cubic feet per minute (1,000 cu decimeter per min.). The fresh air shall be introduced into each toll booth at floor level by means of a duct of 500 cm^2. Fans of suitable type, size and capacity shall deliver the fresh air via a main distribution duct located under the toll plaza. Where a tunnel is provided the air duct may be located in the tunnel.

The fresh air distribution duct should be accurately sized by the design Engineer. For space planning purposes, 400 cm^2 per toll booth may be used.

- Toll Plaza Canopies

Canopies shall be designed to meet the following criteria:

(i) The width of the canopy shall be 12,000mm.

(ii) The minimum vertical clearance between toll lane pavement and the underside of the canopy shall be 5,100mm.

(iii) The preferred canopy design has a single column support on alternate toll islands, giving all toll collectors an unobstructed view forward. The column may be either structural steel or reinforced concrete. The access tunnel is located off center under one line of toll booths.

(iv) Where there is no access tunnel, a design requiring a single column support on every toll island is acceptable.

(v) If a single column support is not considered feasible, two columns on alternate islands is the next most desirable choice. The columns shall be steel I sections with the narrowest possible flanges, so as to provide minimum visual obstruction to toll collectors. With this layout, the access tunnel should be located on the toll plaza centerline.

(vi) Where there is no access tunnel, a design requiring two columns on every toll island is acceptable if a single column is not considered feasible.

- Toll Plaza Buildings

The functional needs of each particular building will be determined by a coordinated and systematic approach to determining the specific functions and needs of each facility, including the working relationship of the various groups to be accommodated. This coordinated review is to ensure that the planning and proposed design will provide facilities which are ergonomic (designed for maximum functional efficiency) and which meet all the objectives.

A similar procedure will be followed in the case of workshops and other facilities which may be incorporated into a toll plaza facility.

The Supervisor's Office at each toll plaza must be designed for efficient round-the-clock operations. It should be located such that a window overlooks the toll plaza.

Facilities used by Toll Collectors should be located as close as possible to the toll lanes to keep their walking time to a minimum.

15. FIRE PROTECTION

A fire protection system complying with the National Fire Code 1980 and all local codes and ordinances shall be provided. When there is insufficient access to the local water supply from viaduct sections, a water supply pipe with hydrants shall be provided on the structure. This may be placed within the concrete bridge barrier.

Appendix A3-2
GEOTECHNICAL REPORT

Appendix A3-2
GEOTECHNICAL REPORT

PREFACE

As-built drawings and other construction reports for the SLE could not be located. Geotechnical data taken from other studies in the vicinity of the project gives insufficient geotechnical information for the conceptual designs. Limited geotechnical investigations for the design of the structures and pavement were undertaken.

Discussions were held with local geotechnical companies. A scope of work for borings, laboratory analysis, data processing and interpretation of results was prepared. The firm of Philippine Geoanalytics was selected as the sub-contractor to perform the work. Their geotechnical report is attached. The laboratory test results and the CBR test results are available but not included in this Report.

The Report on the Sub-Surface Soil Investigation prepared by the sub-contractor's Geotechnical Engineer is included in this Report as a reference and guide for the BOT bidder. The findings and opinions expressed by the Geotechnical Engineer are his alone. The responsibility for validating the same or verifying actual subsoil conditions belongs to the BOT bidder.

SUBMITTAL:

FINAL ENGINEERING REPORT

SUBSURFACE SOIL INVESTIGATION

PROPOSED MANILA SOUTH TOLLWAYS FEASIBILITY STUDY

SUBMITTED TO:

MR. PETER DAYSON
Highway Engineer
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E. M. MORALES
and Associates

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FINAL ENGINEERING REPORT

SUBSURFACE SOIL INVESTIGATION
PROPOSED MANILA SOUTH TOLLWAYS
FEASIBILITY STUDY

1.0 INTRODUCTION

This report embodies our findings and conclusions on the recently concluded subsurface soil investigation program for the feasibility study of the **Proposed Manila South Tollways Project.**

The investigation program for this project covers the various locations along the stretch by the Manila South Toll Expressway. A total of **Eleven (11) Boreholes** ***(BH-1 to BH-11)*** were drilled at site at locations and depths shown in the accompanying Boring Plan and Soil Profile Sheets.These were further augmented by shallow test pits which were hand excavated to a maximum depth of -1.50 meters.

The information on underlying soil condition would be needed for the preliminary design of substructure elements for the proposed project.

The results of the Field Boring Tests together with Laboratory Tests on extracted soil samples and our studies and observations served as bases for our conclusions and recommendations contained in this report.

2.0 FIELD AND LABORATORY TEST PROCEDURES

2.1 Drilling Procedure

The boreholes were advanced by wash boring and Rotary Drilling to the maximum boring depths. Standard Penetration Tests were conducted at every 1.5 meter interval or oftener with change in formation.

The Standard Penetration Test consisted of driving a Standard Split Spoon Sampler of 5.08 cm (2" O.D.) diameter in three successive 15 cm. (6") intervals using a drop hammer of 64 kg. (140 lbs.) weight from a height of 76 cm (30"). The number of blows to penetrate 15 cm. are recorded successively until the third interval is penetrated. The first interval blow count is considered as the seating drive and is discarded. The last two blow counts from the second and third intervals are added to give what is known as the N-value which is a measure of the density or consistency of the underlying soils. In order to eliminate operator error and enable repeatability of results, an **automatic hammer** was used for this project. Undisturbed samples were taken in soft to stiff soil deposits for strength testing and determination of consolidation characteristics. Coring using Double Tube Core Barrels was resorted to in order to penetrate the tuffaceous Siltstone and Sandstone formations.

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2.2 LABORATORY TEST PROCEDURE

The following laboratory tests and their brief description were carried out on soil samples obtained from the site:

2.2.1 Classification of Soils for Engineering Purposes
ASTM D 2487 - 69

2.2.2 One-Dimensional Consolidation Properties of Soil
ASTM D 2435 - 70
This method covers the determination of the rate and magnitude of consolidation of soil when it is restrained laterally and loaded and drained axially.

2.2.3 Unconfined Compressive Strength of Cohesive Soil
ASTM D 2166-66
This method covers the determination of the Unconfined Compressive Strength of cohesive soil in the undisturbed and remolded conditions using strain-controlled application of the test load.

2.2.4 Particle Size Analysis of Soils
ASTM D 422-63
Soil was passed through a series of sieves, the weight of soil retained on each sieve determined and recorded. For each sample analyzed, a gradation curve was drawn based on the percent finer by weight.

2.2.5 Liquid Limit of Soils
ASTM D 425-66
Is the water content expressed as a percentage of the weight of the oven-dried soil, at the boundary between the liquid and plastic states.

2.2.6 Plastic Limit and Plasticity of Soils
ASTM D 424-59
The plastic limit of a soil is the water content, expressed as a percentage of the mass of the oven-dried soil, at the boundary between the plastic and semi-solid states.

2.2.7 Laboratory Determination of Moisture Content of Soils
ASTM D 2216-71
The ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles.

2.2.8 Unconfined Compressive Strength of Intact Rock Cores
ASTM D 2938
This method covers the determination of the Uniaxial Compressive Strength of intact rock cores by a strain controlled application of load.

2.2.9 Specific Gravity of Soils
ASTM D 854
This test is used to determine the specific gravity of soils.

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3.0 LOCATION AND GEOLOGY

3.1 LOCATION

The proposed site is located along side of the existing Manila South Diversion Road traversing parts of Manila, Makati, Bicutan and Muntinlupa. It is situated in relatively flat ground in Manila and Makati and continues with a mild gradient towards Bicutan and Muntinlupa where gently rolling terrain is encountered near the lakeside.

3.2 GEOLOGY

Since the alignment traverses Geographical boundaries because of its length, it also traverses Geologic boundaries particularly near the Makati and Manila Boundary where there is a gradual transition into Bedrock from the Flood plain deposits of the Pasig. These loose soil deposits are characteristic site deposition in the areas of Manila particularly near Pandacan. The soils are poor to very poor and exhibit liquefaction potential. On the other hand, the tuffaceous bedrock of the Makati and Muntinlupa area is due to the horizontally extensive *"Guadalupe Tuff"* formation which extends to parts of Bulacan in the North to as far South as Cavite.

According to *Gervasio,* [1] the Guadalupe Tuff Formation is a thick sequence of well Bedded Tuff and Tuffaceous Clastics. Most of the beds are waterlaid. Bedding planes regionally dip from 5° to 10° to the West. The bulk of the formation consists of lithified volcanic ash, lapilli and crystal sands. Beds rich in sand not directly derived from volcanic activity are common, especially in the upper stratigraphic section. They are generally compacted and slightly lithified or cemented by precipitated Silica and/or Clay.

The thickness of the Guadalupe Formation is uncertain. Numerous drillholes in Quezon City and Parañaque have penetrated depths of from 720 ft. to 1,470 ft. yet failed to bottom the sequence.

Thin beds of fluvial gravel are intercalated with the Tuff and occur in places. In certain places, veneer patches of younger fluvial gravel deposits are found uncomformably above the Tuff.

The Guadalupe Tuff being a layered sequence of sedimentary deposits, the various layers are expected to have been subjected to varying degrees of weathering, erosion and deposition. Thus, highly variable rock competence and quality are to be expected and are common particularly in the Makati and Parañaque areas.

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[1] Gervasio, F. "The Geology, Structures and Landscape Development of Manila

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4.0 OBSERVATIONS

4.1 BH No. 1

The results of the soil investigation reveal very poor soil condition underlying the proposed site.

Compressible deposits of highy plastic clays (CH) predominates the underlying foundation soils exhibiting soft to medium stiff site soil consistency, beyond 3.5m thick of overburden soil, extending down to depths until dense competent layers are found.

Unconfined Compression (qu) Tests performed on undisturbed soil samples extracted at the proposed site yield a qu_{mean} value = 0.265 kg/cm^2.

Depths to ground water were relatively shallow at 0.94m from existing ground line. Deep foundation solutions are indicated for this location.

4.2 BH No. 2

The site is underlain by interbedding layers of silts (ML/MH) and highly plastic clays (CH) interspersed with granular material within the depths investigated.

Resistance to penetration follow a fairly narrow band with depth and is found to be generally poor with practical refusal *(N-Value > 50 Blows/Ft.)* invariably found at -20.0m from existing Natural Ground Line (NGL).

It is anticipated that the load support as well as compressibilities of the underlying soils would vary and the possibility of differential settlements can not be ruled out with the use of shallow foundations.

4.3 BH No. 3

The borings reveal fairly competent foundation soil deposits underlying the proposed site.

Depths to competent rock stratum is relatively shallow and is within reasonable reach for shallow foundation elements.

Unconfined Compressive Strengths of this tuffaceous rock stratum yield a range of values from 6.5 kg/cm^2 to 70.8 kg/cm^2 with a mean value of qu_{mean} = 26.98 kg/cm^2.

The underlying thick bed of Tuffaceous Rocks are further overlain by stratum of clay (CL) deposits sandwiched between layers of granular (SC/SM) soils. Unconfined Compressive Strengths of this clay layer is equal to 0.51 kg/cm^2.

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4.4 BH No. 4

Predominant deposits of medium dense to very dense granular materials interspersed with some fines predominates the underlying soil deposits within the influence area of BH-4.

These are further underlain by interbedding layers of tuffaceous siltstone and sandstone stratum exhibiting variability in Rock Quality Designation (RQD) Values within the depths investigated. Unconfined Compressive Strength Tests performed on intact rock core samples of this Tuffaceous Rocks yield a mean value (qu_{mean}) = 23.65 kg/cm^2.

Relatively shallow ground water were observed at a depth of -2.97m from existing ground line.

4.5 BH No. 5

The results of the boring along influence borehole BH-5 reveal interbedding layers of medium dense to very dense sands and stiff clays (CH) at shallow depths. These are immediately replaced by a thick bed of Tuffaceous Rocks exhibiting varying degrees of weathering resistance from a mean depth of -5.0m extending down to the final depth of drilling.

4.6 BH No. 6

Shallow foundation are feasible as revealed by the results of the borings within the influence area of BH-6 provided that the overlying layers of sand (SM)-clay (CL/CH) materials are bypassed. Competent material exists starting at a mean depth of -4.0m from Natural Ground Line (NGL) and beyond. This could serve as a stable platform for shallow foundation elements.

4.7 BH No. 7

The boring shows interbedding layers of sand (SM) and clays (CL/CH) exhibiting medium dense to very dense and stiff site soil density and consistency from existing groundline extending down to depths until bedrock is reached.

These underlying stratum of bedrock deposits further exhibits poor to fair weathering resistance within the depths investigated.

Unconfined Compression (qu) tests performed on intact rock core specimen extracted at site yield a range of values from 4.14 kg/cm^2 to 40.0 kg/cm^2 with a mean value (qu_{mean}) = 18.09 kg/cm^2.

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4.8 BH No. 8

Resistance to penetration of the underlying soils initially increase with depth with very slight retrogression extending down until depths to practical refusal *(N>50 Blows/Ft.)* is reached at a mean depth of -4.50m. These are immediately underlain by layers of very hard and very dense silts (ML) and sands (SM) respectively which further extends down until layers of tuffaceous rocks is reached.

The underlying bedrock exhibits poor to fair weathering resistance extending down to the maximum depths investigated.

4.9 BH No. 9

The result of the soil investigation reveal predominant deposits of silts (MH) interrupted by layers of clays (CH) and sands (SM).

Consistency and or density of the underlying soils initially increase with depth with some retrogression in the upper layer and again increase extending down to a mean depth of -6.0m where blowcounts again retrograde and slightly increases in penetration resistance until dense competent layers are found.

The very dense underlying soil is immediately replace by layers of highly weathered rocks extending down to the maximum drilling depth encountered.

4.10 BH No. 10

The site sits generally on fairly competent rock stratum overlain by layers of overburden soils (ML/SM) from existing ground line down to a mean depth of -2.0m.

The thick bedrock deposits consists of interbedding siltstone and sandstone layers exhibiting very poor Rock Quality Designation (RQD) extending down to the final depth of drilling encountered for the influence area of BH-10.

4.11 BH No. 11

The borings reveal thick bedrock deposits within the depth investigated. The interbedding layers of tuffaceous siltstone and sandstone stratum exhibits very poor weathering resistance and is further interrupted by dense silty granular soils (SM/SW) which have been altered and weathered in place.

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5.0 ENGINEERING ANALYSES AND CONSIDERATIONS

5.1 General

Because of the variable subsurface soil conditions along the alignment of the proposed expressway, several foundation solutions present themselves.

For clarity, these are explained in the following subsections:

5.2 Conventional Shallow Foundations

Conventional shallow foundations are feasible in case of shallow bedrock occurrence or the presence of favorable ground conditions. Isolated mat or continuous footings could be used to support the expressway superstructure.

5.3 Excavation and Replacement by Engineered Fill

In cases where the bearing stratum is sufficiently depressed as to make column lengths longer than necessary, it may be more advantageous to overexcavate down to the competent layer and replace this with well compacted clean granular Engineered fill. In order to assure a stable base and eliminate or reduce differential settlements, it would be necessary to excavate the poor soils to the shallow bedrock level competent soil from existing Natural Ground Line (NGL) and replace this with well compacted clean engineered fill. The Engineered fill should essentially be free draining sands or gravels.

If the poor soils are excavated and replaced with Engineered Fill compacted to a minimum density of 95% MDD Based on ASTM D-698, we expect that the Expressway superstructure can be adequately supported without any potential distress or adverse settlements. In some cases, the shallow water table may hinder the excavation and Engineered Fill compaction and provision for dewatering pumps will have to be made.

5.4 Use of Jet Grouted Piles

The very poor soils can also be stabilized using Jet Grouting. Jet grouting is a soil stabilization procedure using a Portland cement slurry injected at ultra high pressure (6,000 psi) by a rotating nozzle that is raised incrementally in a controlled manner. This results in a columnar solidified mass of soil known as *"Soilcrete"* with a resulting unconfined compressive strength of about 600 to 1000 psi these stabilized columns or piles can then be expected to carry the superimposed loads bypassing the weak surrounding materials into firmer strata. The procedure also has the effect of laterally densifying the immediate surrounding ground mass.

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6.0 CONSTRUCTION CONSIDERATIONS

The relative shallow occurrence of the ground water in most of the locations investigated indicate that excavation may be troublesome due to the need to dewater. Dewatering pumps should be provided in such cases.

Compaction of clean granular materials as Engineered fill should be done by Vibratory compactors of adequate size. Liberal saturation of the lifts being compacted would aid in ensuring attainment of the desired relative compaction.

Engineered fill should be compacted to minimum 95% of Maximum Dry Density (MDD) based on ASTM D-698 criteria. Compaction in the field should be monitored based on procedures outlined in ASTM D-1556.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the foregoing soil investigation and our studies reveal differing ground conditions along the alignment of the project. This condition would indicate the need for various foundation solutions and alternatives that require study in order to determine the optimal foundation support system for the proposed Expressway structure.

Table I in the appendix shows the various foundation options for the specific Borehole Locations and their influence areas. It would be necessary to conduct a more detailed soil investigation during the Design Stage in order to more accurately delineate the Geotechnical boundaries. For purposes of this feasibility study only, interpolation of soil conditions between influence boreholes may be made for preliminary studies subject to corrections during the detailed investigation.

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In the event that conclusions or recommendations on the data contained in this report are made by others, such conclusions or recommendations are not the responsibility of the undersigned. In addition, this report has been prepared to aid the **Structural Design Engineers** in the preliminary feasibility design of the specific project. Its scope is limited to this project and locations described herein and represents our understanding of the significant aspects relevant to the soil and foundation considerations as occured in this study.

If there are any differences in location and/or design features as we understand them and as are defined by the test borings, the undersigned should be informed so that modifications or revision of the conclusions and recommendations can be made.

In preparing this report, the professional services have been performed, findings obtained and recommendations have been prepared by the undersigned in accordance with generally accepted Engineering Principles and Practices.

If you require additional comment or clarification pertaining to the findings and recommendations, the undersigned will be pleased to comply.

20 August 1992

Submitted by:

EMILIO M. MORALES, MSCE
Consulting Civil Engineer
PRC Reg. No. 11236

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PROPOSED FOUNDATION SOLUTIONS
MANILA SOUTH TOLLWAYS FEASIBILITY STUDY

BOREHOLE LOCATION	FOUNDATION SOLUTION OPTION	BEARING CAPACITY	FOUNDATION EMBEDMENT DEPTH (M)	REMARKS
BH-1	Pile Foundations	74.0 MT	- 16.0	For 14" x 14" R.C. Pile
BH-2	Pile Foundations	78.4 MT	- 20.0	For 14" x 14" R.C. Pile
BH-3	Shallow Foundation	287 KPa	- 3.0	On Weathered Sandstone
BH-4, 5 & 6	Shallow Foundation On Engineered Fill Jet Grouted Pile	239 KPa 144 KPa 30 MT	- 4.0 - 2.0 - 5.0	On Very Dense Silty Sand or Hard Clay Excavate to -4.0 and Backfill Single Jet Grouted Pile Capacity L=3.0m
BH-7	Pile Foundations Jet Grouted Pile	77 MT 40 MT	- 6.0 - 8.0	For 14" x 14" R.C. Pile Single Jet Grouted Pile Capacity L=4.0m
BH-8	Shallow Foundation Jet Grouted Pile Engineered Fill	287 KPa 35 MT 144 KPa	- 4.5 - 6.0 - 2.0	On Very Hard Clayey Silt Single Jet Grouted Pile Capacity L=4.0m Excavate to -4.5 Backfill w/ Engineered Fill
BH-9	Shallow Foundations	95 KPa	- 2.0	On Stiff Clayey Silt
BH-10	Shallow Foundations	287 KPa	- 2.0	On Very Hard Clayey Silt
BH-11	Shallow Foundations	335 KPa	- 2.0	On Sandstone

NOTE:

1. Embedment depths in meters are minimum depths for foundations.
2. Intermediate locations may be interpolated from these locations only for purposes of preliminary study. Detailed soil investigation and studies required for specific locations during the detailed design.
3. Engineered Fill to be clean granular soils compacted to minimum 95% MDD based on ASTM D-698 Criteria.

BEST AVAILABLE DOCUMENT

B. M. MORALES and ASSOCIATES

==========

STATIC LOAD CAPACITY OF PILES
(FROM CORRELATION WITH SPT AND COHESION VALUES)

==========

PROJECT : PROPOSED MLA SOUTH TOLLWAYS
STRUCTURE : PILE FOUNDATION (14"X14")

INPUT DATA

SOURCE OF SOIL PARAMETERS : PG BOREHOLES BH-1
NUMBER OF SOIL STRATA IN SAND : 2
NUMBER OF SOIL STRATA IN CLAY : 2

	LAYER	EMBEDMENT(M)	N-VALUE or COHESION (T/SM)
SAND	1	4	8
SAND	2	4	34
CLAY	1	6	2.08
CLAY	2	4	4.814

N-VALUES AT THE TIP ARE THE FOLLOWING : 34 o5 50 50

Square Pile .356 x .356 Meter

Negative Skin Friction = 0 MT/Sq M
Pile Shaft lenght under Negative Skin Friction = 0

ANALYSIS RESULTS

PILE TIP AREA = .126736 Sq. Meter
Pile Perimeter = 1.424 meter

JAPANESE FORMULA (Modified Meyerhof)

SKIN FRICTION = 93.03 TON(S)
POINT LOAD = 129.27 TON(S)
TOTAL LOAD = 222.3 TON(S)

ALLOWABLE LOAD (F.S.= 3.0) = 74.1 TON(S)
NEGATIVE SKIN FRICTION = 0 TON(S)

NET ALLOWABLE LOAD = 74.1 TON(S

MEYERHOF FORMULA

SKIN FRICTION = 91.98 TON(S)
POINT LOAD = 168.56 TON(S)
TOTAL LOAD = 260.55 TON(S)

ALLOWABLE LOAD (F.S.= 3.0) = 86.85 TON(S)
NEGATIVE SKIN FRICTION = 0 TON(S)

NET ALLOWABLE LOAD = 86.85 TON(S)

BEST AVAILABLE DOCUMENT

4/4/9

=== ==========

STATIC LOAD CAPACITY OF PILES
(FROM CORRELATION WITH SPT AND COHESION VALUES)

=== ==========

PROJECT : PROPOSED MLA SOUTH TOLLWAYS
STRUCTURE : PILE FOUNDATION (14"X14")

INPUT DATA

SOURCE OF SOIL PARAMETERS : PG BOREHOLES BH-2
NUMBER OF SOIL STRATA IN SAND : 1
NUMBER OF SOIL STRATA IN CLAY : 2

	LAYER	EMBEDMENT(M)	N-VALUE or COHESION (T/SM)
SAND	1	3	8
CLAY	1	8	4.332
CLAY	2	9	5.952

N-VALUES AT THE TIP ARE THE FOLLOWING : 27 50 50 50

Square Pile .356 x .356 Meter

Negative Skin Friction = 0 MT/Sq M
Pile Shaft lenght under Negative Skin Friction = 0

ANALYSIS RESULTS

PILE TIP AREA = .126736 Sq. Meter
Pile Perimeter = 1.424 meter

JAPANESE FORMULA (Modified Meyerhof)

SKIN FRICTION = 132.46 TON(S)
POINT LOAD = 102.65 TON(S)
TOTAL LOAD = 235.12 TON(S)

ALLOWABLE LOAD (F.S.= 3.0) = 78.37 TON(S)
NEGATIVE SKIN FRICTION = 0 TON(S)

NET ALLOWABLE LOAD = 78.37 TON(S)

MEYERHOF FORMULA

BEST AVAILABLE DOCUMENT

SKIN FRICTION = 132.31 TON(S)
POINT LOAD = 133.86 TON(S)
TOTAL LOAD = 266.17 TON(S)

ALLOWABLE LOAD (F.S.= 3.0) = 88.72 TON(S)
NEGATIVE SKIN FRICTION = 0 TON(S)

NET ALLOWABLE LOAD = 88.72 TON(S)

===== ==========

STATIC LOAD CAPACITY OF PILES
(FROM CORRELATION WITH SPT AND COHESION VALUES)

===== ==========

PROJECT : PROPOSED MANILA SOUTH TOLLWAYS
STRUCTURE : PILE FOUNDATIONS (14" X 14")

INPUT DATA

SOURCE OF SOIL PARAMETERS : PGA BOREHOLE BH-7
NUMBER OF SOIL STRATA IN SAND : 1
NUMBER OF SOIL STRATA IN CLAY : 1

	LAYER	EMBEDMENT(M)	N-VALUE or COHESION (T/SM)
SAND	1	1	48
CLAY	1	5	5

N-VALUES AT THE TIP ARE THE FOLLOWING : 48 48 48 48

Square Pile .356 x .356 Meter

Negative Skin Friction = 0 MT/Sq M
Pile Shaft lenght under Negative Skin Friction = 0

ANALYSIS RESULTS

PILE TIP AREA = .126736 Sq. Meter
Pile Perimeter = 1.424 meter

JAPANESE FORMULA (Modified Meyerhof)

SKIN FRICTION = 49.27 TON(S)
POINT LOAD = 182.49 TON(S)
TOTAL LOAD = 231.77 TON(S)

ALLOWABLE LOAD (F.S.= 3.0) = 77.25 TON(S)
NEGATIVE SKIN FRICTION = 0 TON(S)

NET ALLOWABLE LOAD = 77.25 TON(S)

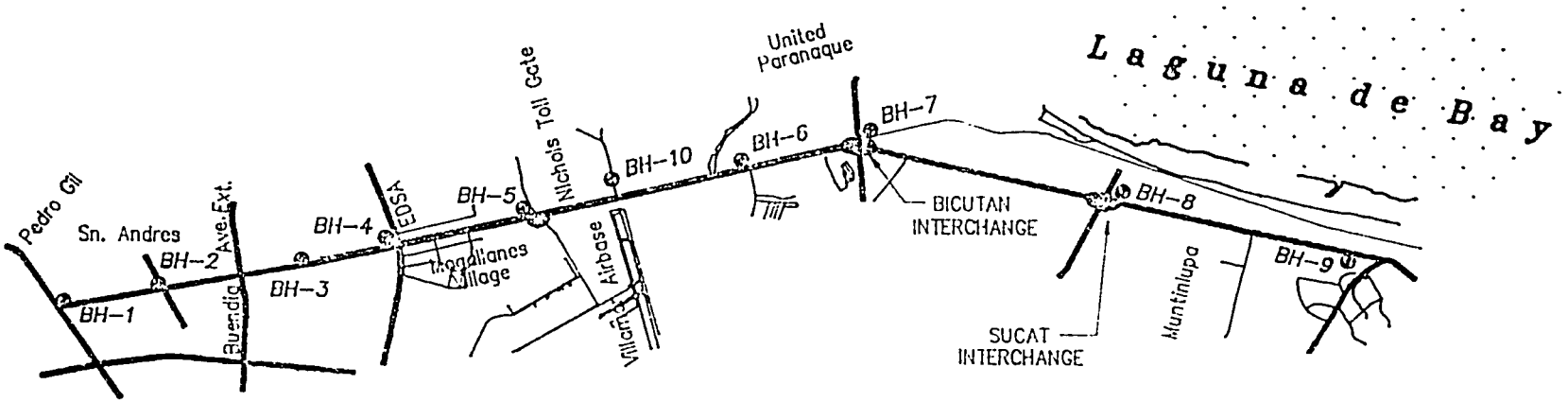
MEYERHOF FORMULA

SKIN FRICTION = 48.97 TON(S)
POINT LOAD = 237.97 TON(S)
TOTAL LOAD = 286.94 TON(S)

ALLOWABLE LOAD (F.S.= 3.0) = 95.64 TON(S)
NEGATIVE SKIN FRICTION = 0 TON(S)

NET ALLOWABLE LOAD = 95.64 TON(S)

BEST AVAILABLE DOCUMENT



1 BORING PLAN

NOT TO SCALE

BEST AVAILABLE DOCUMENT

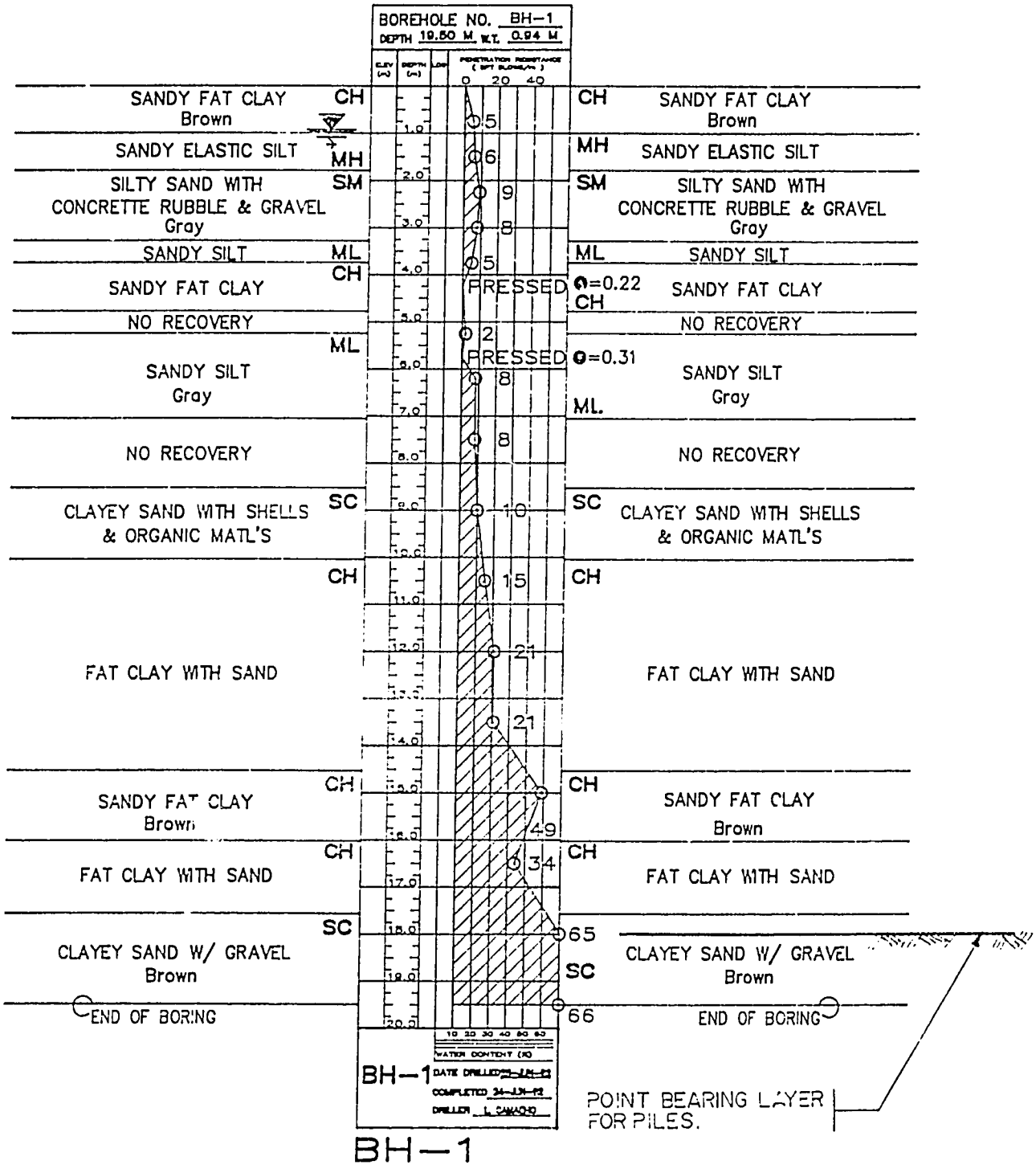
Philippine GEOANALYTICS
CONSULTING ENGINEERS
395 QUEZON AVENUE . QUEZON CITY
PHONE / FAX No.: 922-92-71

PROJECT / LOCATION :
PROPOSED MANILA SOUTH TOLLWAYS
MANILA SOUTH DIVERSION ROAD

SHEET CONTENT/S :
BOREHOLE LOCATION PLAN

CADD OPTR. :	FFZ
CHECKED BY :	FFZ
DATE :	06 AUG 1992
D BY :	EMM
	07 AUG 1992
SCALE :	AS SHOWN

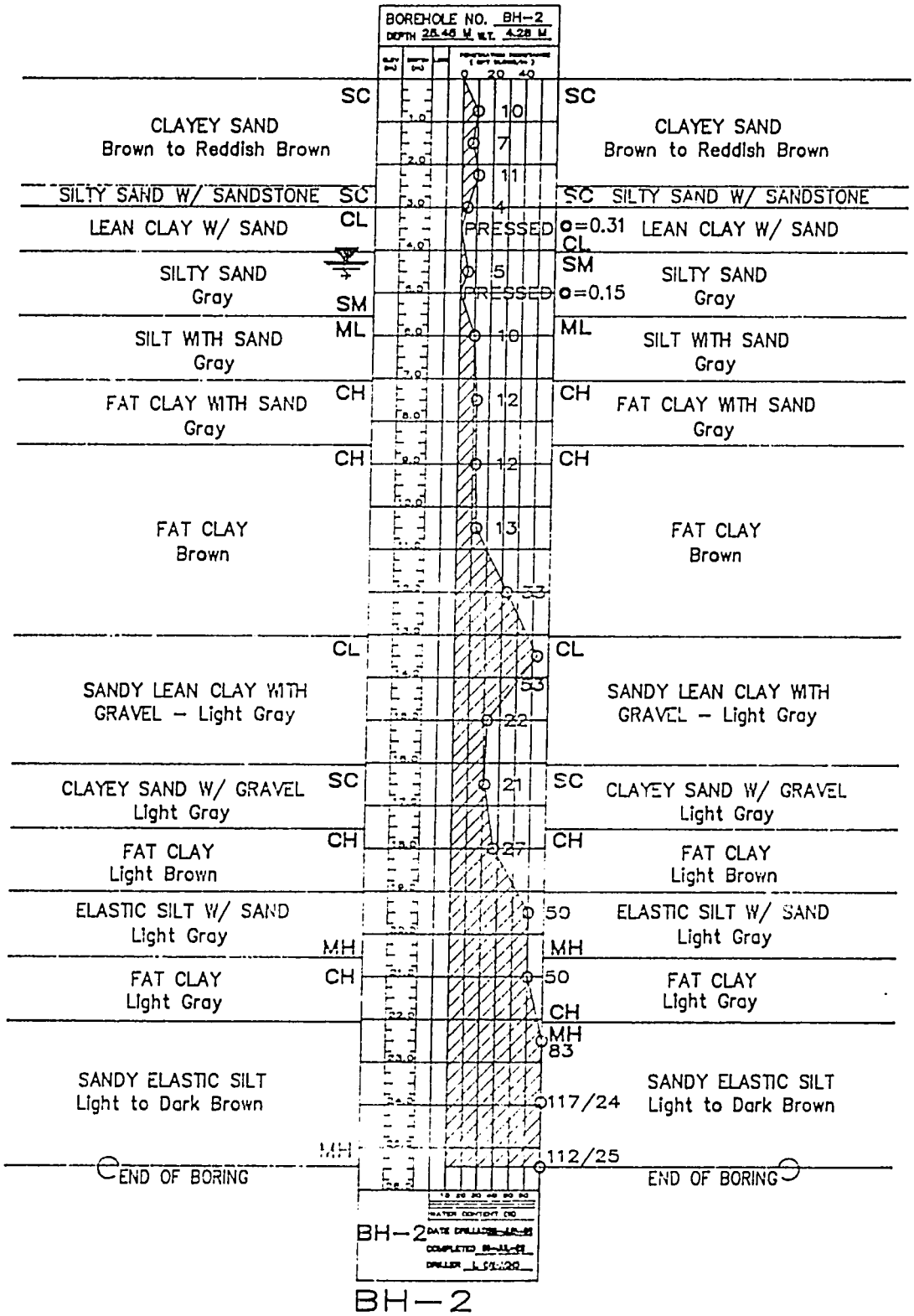
SHEET NO.



1 G 1 SOIL PROFILE ALONG BH-1

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Guia St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS QUIRINO AVE. COR MLA. SOUTH DIVERSION RD.	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G-1
		DATE :02 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.1	CHECKED BY : EMM	11
		DATE :03 AUG 1992	
		SCALE : AS SHOWN	



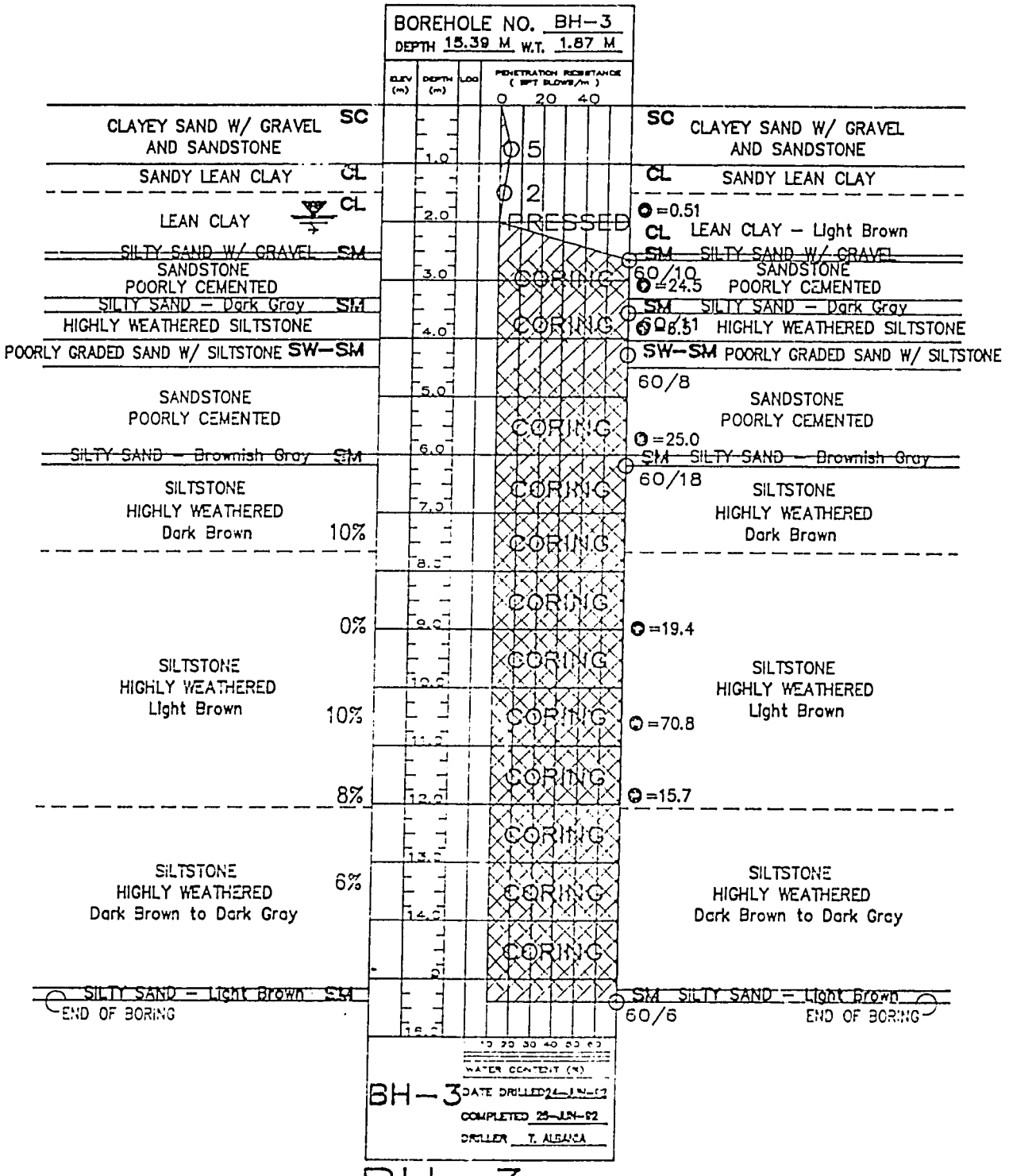
BH—2

1 G 2 SOIL PROFILE ALONG BH—2

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Guia St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS MANILA SOUTH DIVERSION ROAD	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G—2
		DATE :03 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.2	CHECKED BY : EMM	11
		DATE :04 AUG 1992	
		SCALE : AS SHOWN	

GEOTECHNICAL WORKS



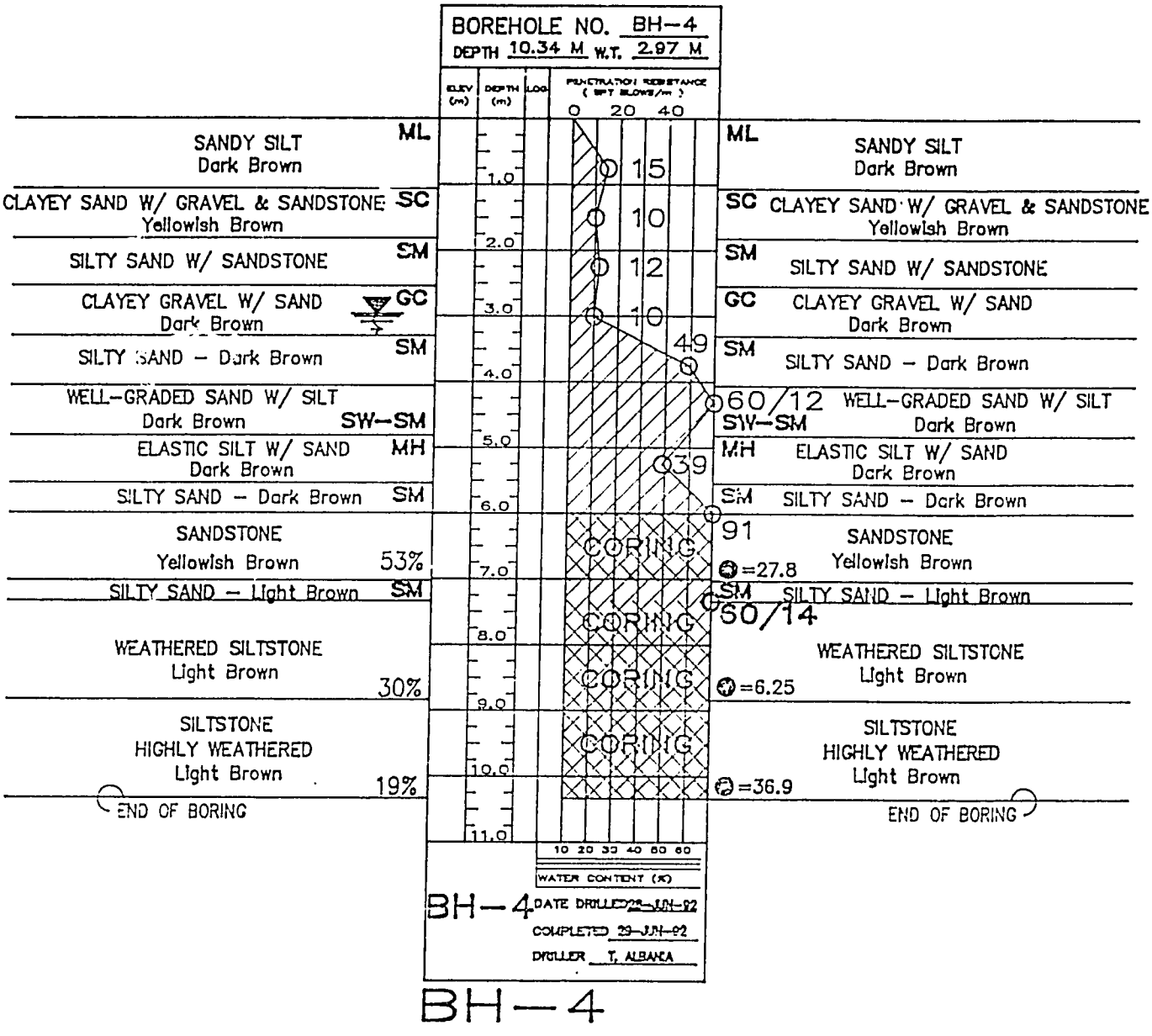
BH—3

1 G 3 SOIL PROFILE ALONG BH—3

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Gula St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS PASAY RD. COR MLA. SOUTH DIVERSION	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G—3
		DATE :03 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.3	CHECKED BY : EMM	11
		DATE :04 AUG 1992	
		SCALE : AS SHOWN	

GEOTECHNICAL WORKS



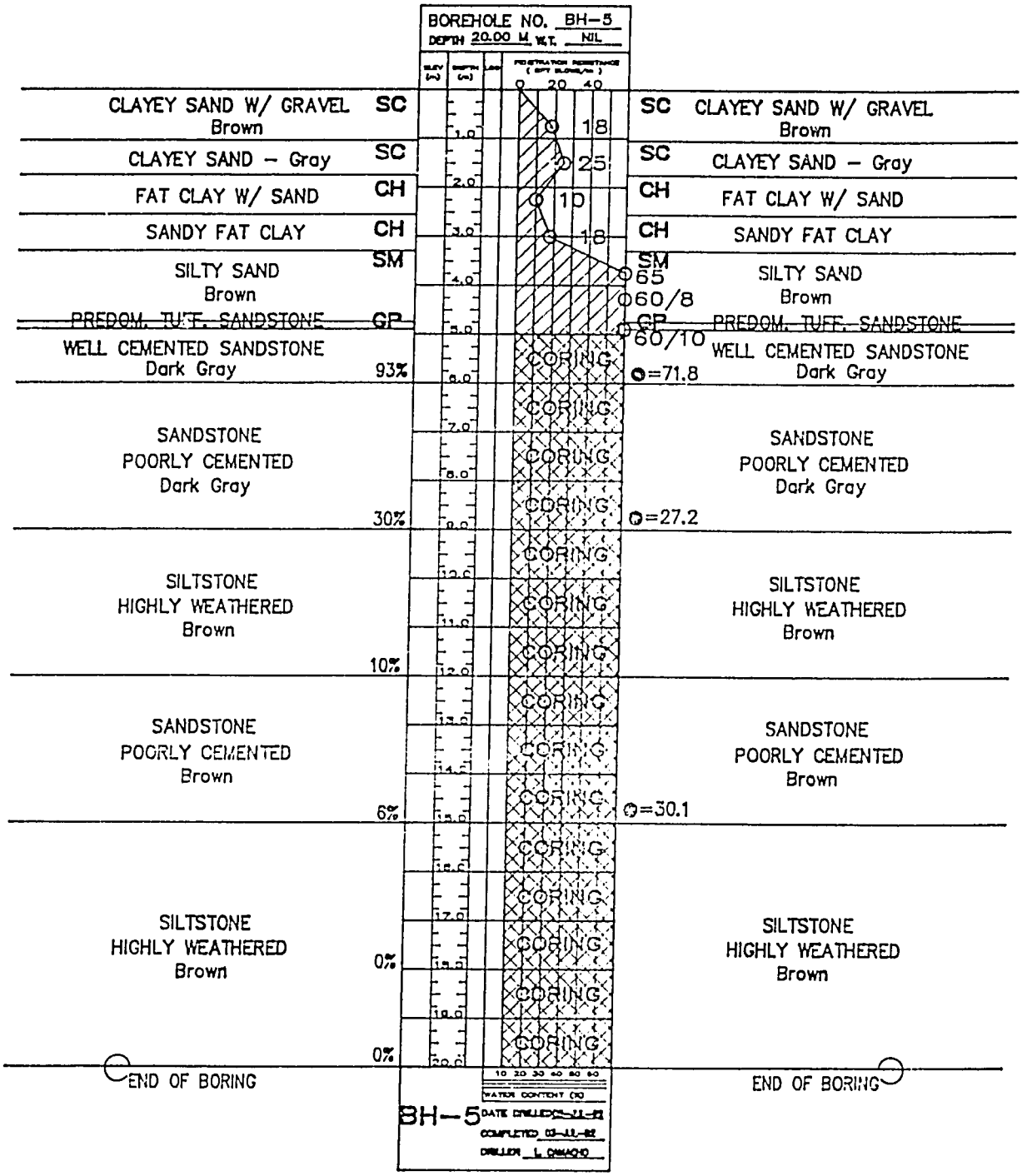
BH-4

1 / G4 SOIL PROFILE ALONG BH-4

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Guia St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS EDSA – MAGALLANES INTERSECTION	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G-4
		DATE :03 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.4	CHECKED BY : EMM	11
		DATE :04 AUG 1992	
		SCALE : AS SHOWN	

GEOTECHNICAL WORKS

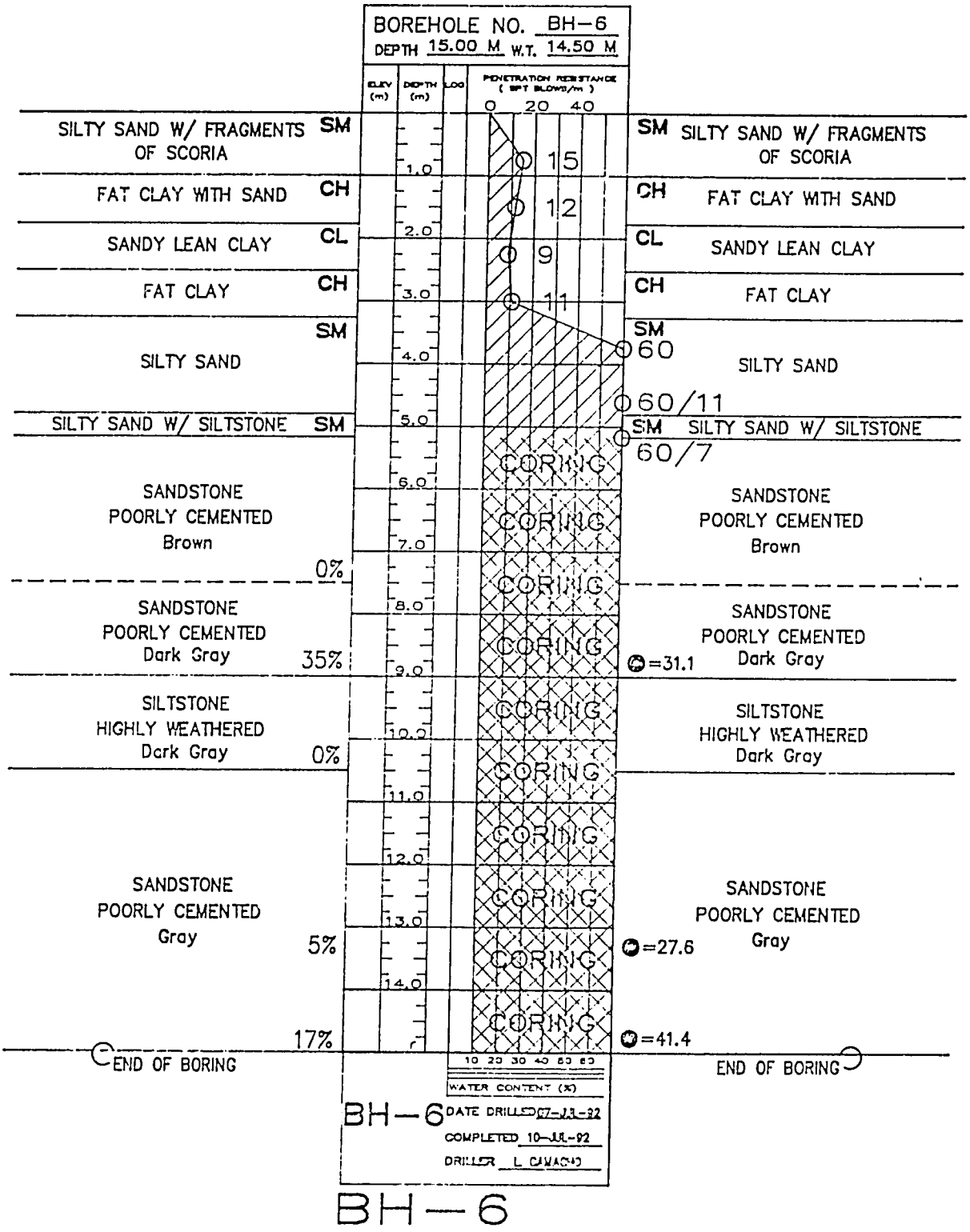


BH-5

1 G 5 SOIL PROFILE ALONG BH-5

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Gula St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS MANILA SOUTH DIVERSION ROAD	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G-5
		DATE :02 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.5	CHECKED BY : EMM	11
		DATE :03 AUG 1992	
		SCALE : AS SHOWN	



BH-6

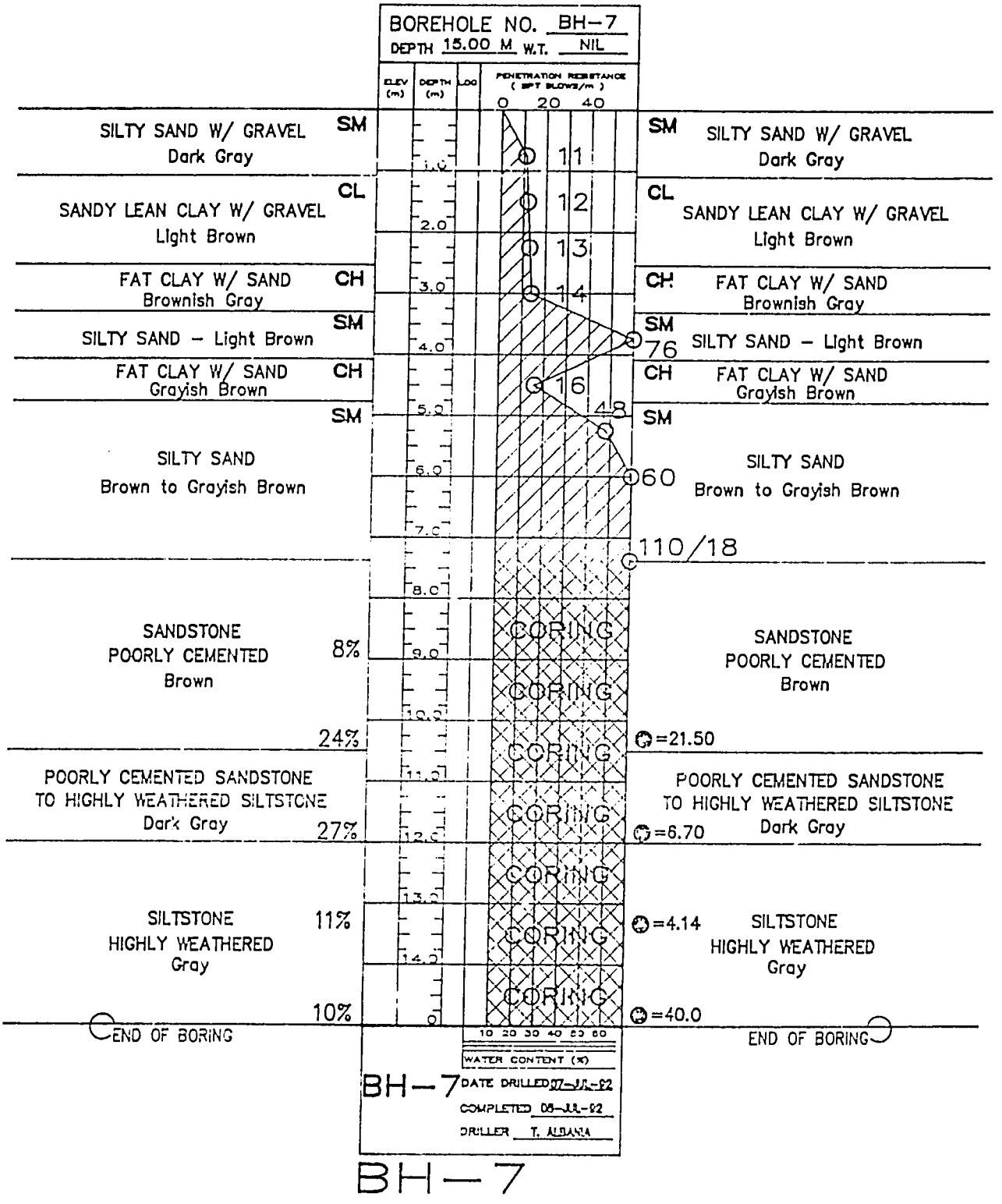
1 G 6 SOIL PROFILE ALONG BH-6

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Guia St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS MANILA SOUTH DIVERSION ROAD	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G-6
		DATE :02 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.6	CHECKED BY : EMM	11
		DATE :03 AUG 1992	
		SCALE : AS SHOWN	

TOLL WORKS

458

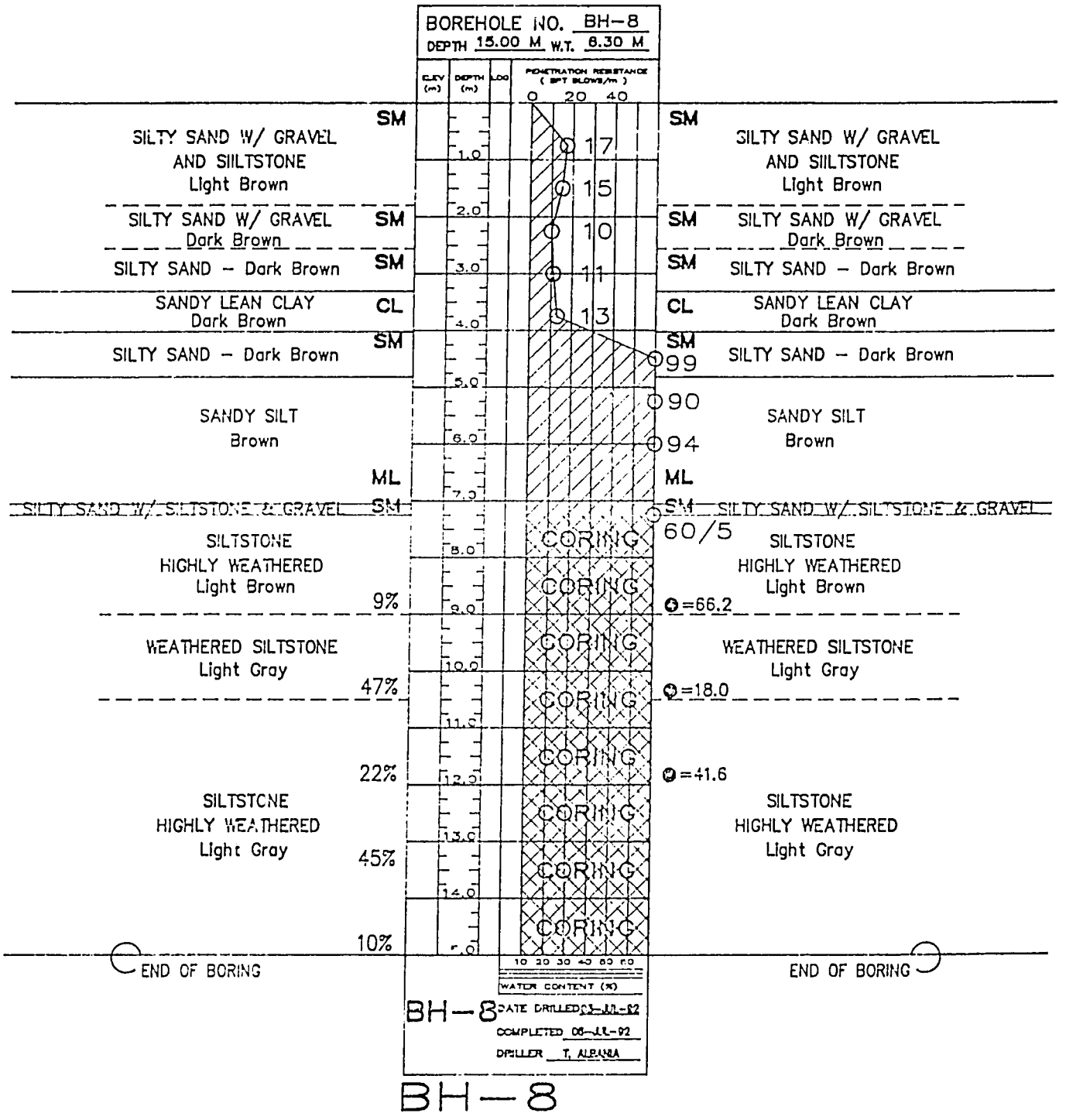


BH-7

1 G 7 SOIL PROFILE ALONG BH-7

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS 421 Sct. de Guia St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS MANILA SOUTH DIVERSION ROAD	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G-7
		DATE :02 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.7	CHECKED BY : EMM	11
		DATE :03 AUG 1992	
		SCALE : AS SHOWN	



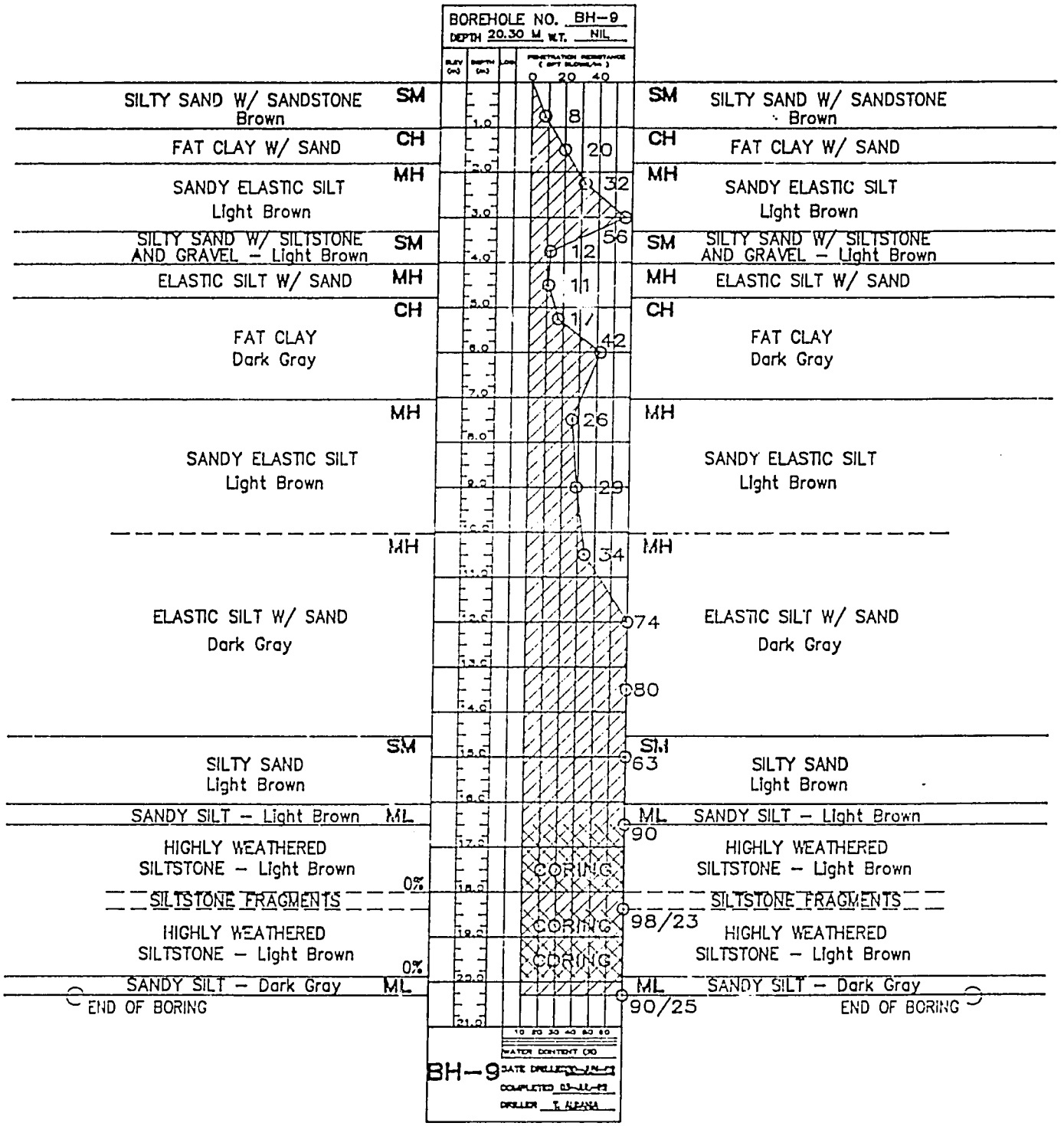
BH-8

1 G 8 SOIL PROFILE ALONG BH-8

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sot. de Guia St., Q.C.	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS MANILA SOUTH DIVERSION ROAD	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G-8
		DATE :03 AUG 1992	
	SHEET CONTENT/S :	CHECKED BY : EMM	11
	SOIL PROFILE ALONG BH-No.8	DATE :04 AUG 1992	
		SCALE : AS SHOWN	

460

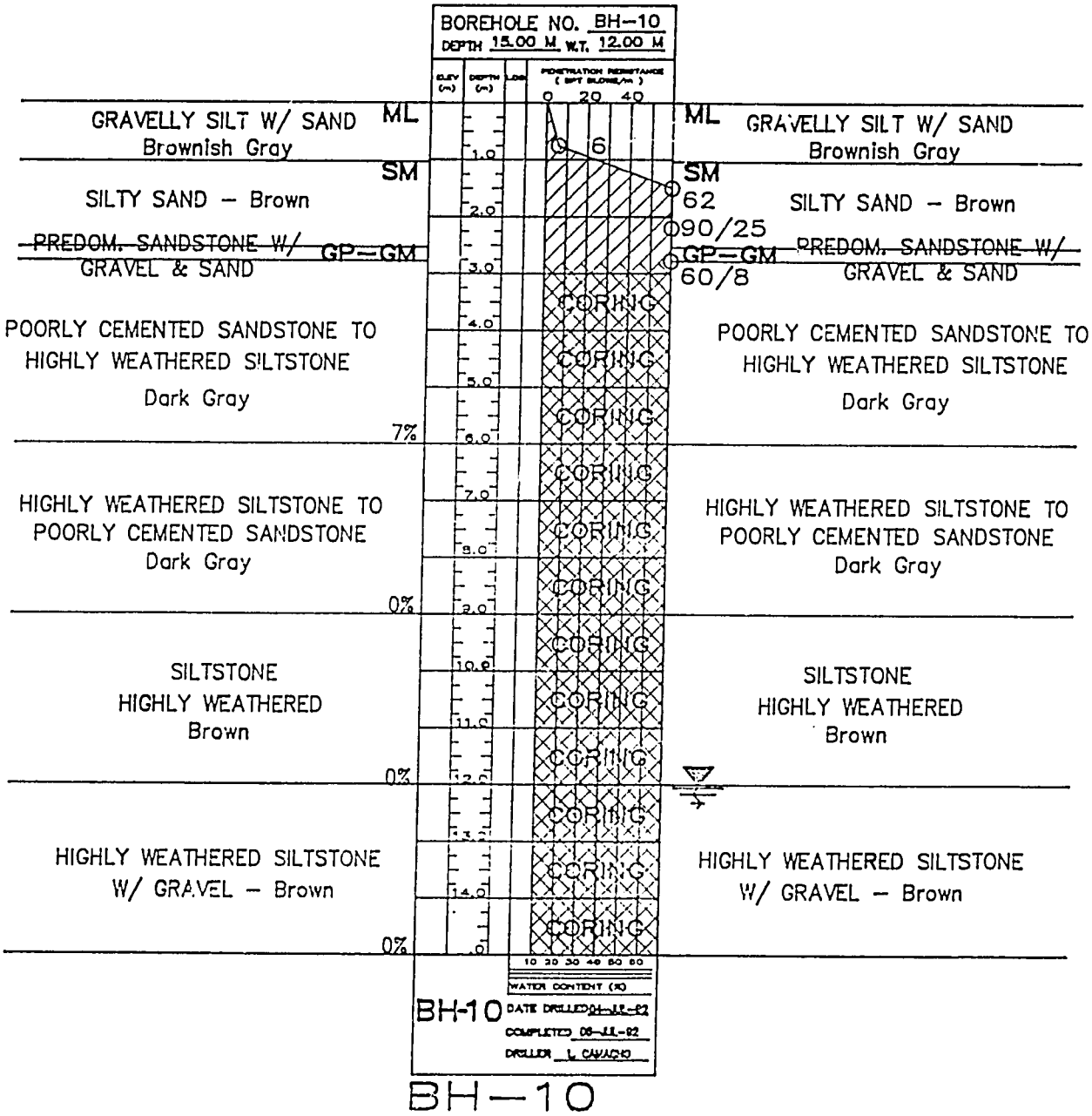


BH—9

1 G 9 SOIL PROFILE ALONG BH—9

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Guia St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS ALABANG	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G—9
		DATE :03 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.9	CHECKED BY : EMM	11
		DATE :04 AUG 1992	
		SCALE : AS SHOWN	

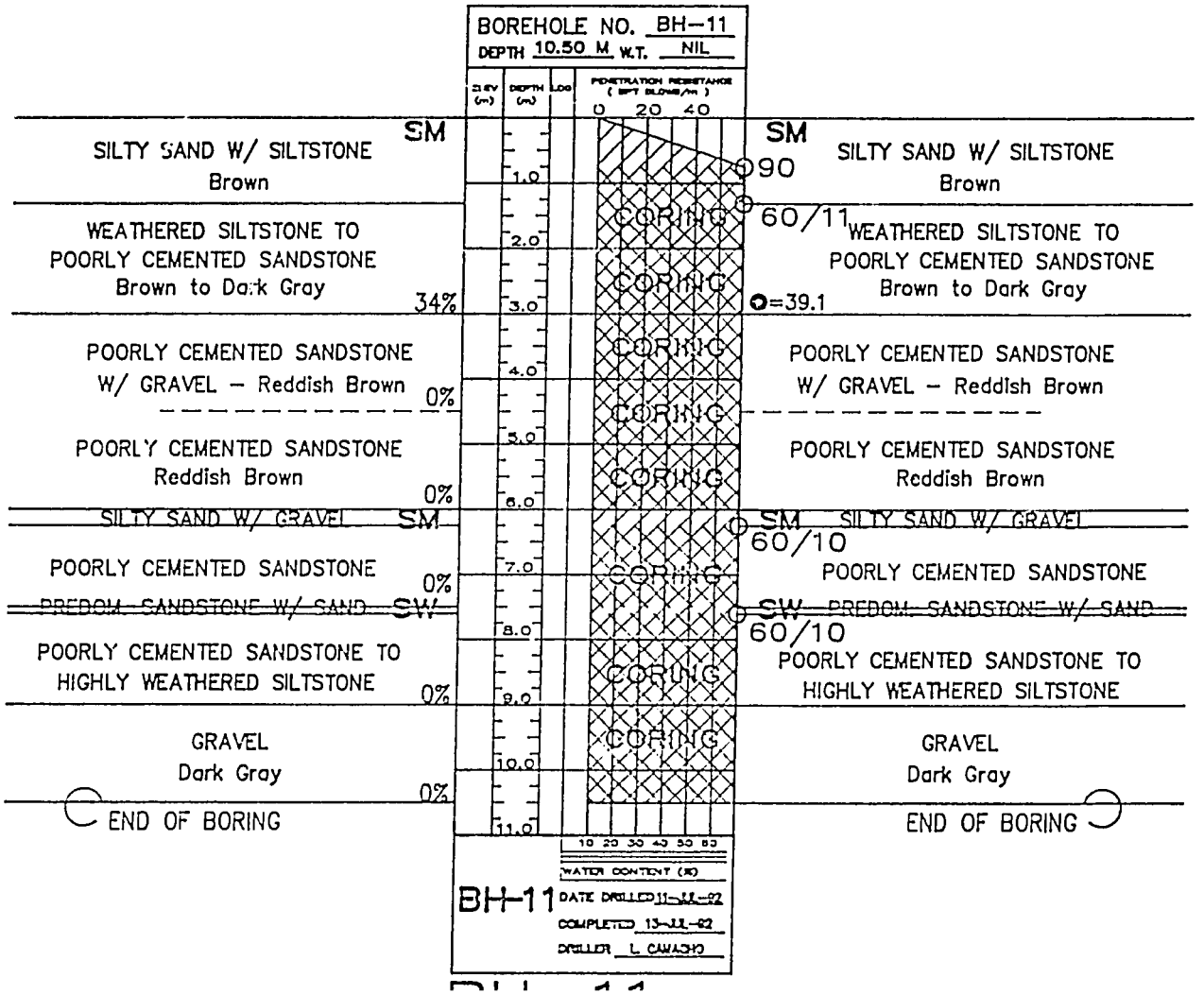


1 G10 SOIL PROFILE ALONG BH–10

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Gula St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS MANILA SOUTH DIVERSION ROAD	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G–10
		DATE :03 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.10	CHECKED BY : EMM	11
		DATE :04 AUG 1992	
		SCALE : AS SHOWN	

GEOTECHNICAL WORKS



1 / G 11 SOIL PROFILE ALONG BH-11

NOT TO SCALE

Philippine GEOANALYTICS CONSULTING ENGINEERS #21 Sct. de Guia St., Q.C., MM	PROJECT/LOCATION : PROPOSED MANILA SOUTH TOLLWAYS SUCAT, PARANAQUE, METRO MLA.	CADD OPRT : FFZ	SHEET NO.
		CHECKED BY : FFZ	G-11
		DATE :03 AUG 1992	
	SHEET CONTENT/S : SOIL PROFILE ALONG BH-No.11	CHECKED BY : EMM	11
		DATE :04 AUG 1992	
		SCALE : AS SHOWN	

GEOTECHNICAL WORK

Appendix A3-3
STRUCTURAL DESIGN STUDIES

Appendix A3-3
STRUCTURAL DESIGN STUDIES

1. GENERAL

Preliminary designs were prepared for the following structural types and lane configurations:

Lane Configurations (Both Carriageways)	Superstructure Type	
	40 m Span Box Girders	30 m Span AASHTO Girders
Four lanes	•	•
Four lanes with future widening to six lanes	•	•
Six lanes	•	•

The structures were designed using the National Structural Code of the Philippines Volume II Bridges together with the additional requirements given in Appendix A3-1.

The designs were completed in sufficient detail to obtain preliminary quantities for the derivation of estimates of cost.

The lateral live load distribution on the AASHTO I girder superstructures was determined using a grillage analysis.

The substructures were analyzed for earthquake loading using the seismic design standard given in Appendix A3-1 with an acceleration coefficient of 0.4, the standard for Metro Manila.

The foundations were designed using spread footings founded on firm stratum. In locations where the soil borings indicated that the depth to rock was large, cast-in-place piles were used.

2. ALTERNATIVE LANE CONFIGURATIONS

The overall deck widths of the four lane options are approximately 88% of the widths of the corresponding six lane structures. The provision of a four lane facility within this corridor, with both substructure and superstructure designed for four lanes of traffic, would have the following disadvantages:

- it would preclude the future provision of additional capacity when required by increases in traffic volumes, and

- the six lane configuration is more cost-effective since an increased road capacity of 50% can be achieved for an additional capital cost of only 13-14%.

The construction of a four lane facility with provision for future widening to six lanes would not be an attractive alternative because:

- The substructure would need to be designed and built for six lanes of traffic, and its construction would not involve any cost savings.

- The superstructure of the box girder option would only achieve a marginal initial cost saving, corresponding to the width of cantilever omitted, the remainder of the box having to be designed for the future 6 lanes of traffic.

- The future widening of the box girder would be expensive, would cost many times the initial increase in the cost of providing six lanes and would severely disrupt traffic.

- The future widening of the AASHTO I girder configuration would be impossible from ground level, as crane access to the center of the bridge could not be achieved. Widening of the bridge in the center is necessary to avoid modifying entrance and exit ramp structures on the outer edges of the viaduct. The alternative would be to lift the girders into place using cranes on top of the bridge deck, which would involve initially designing the girders and deck to support this substantial loading. The cost of the strengthening measures would offset any cost saving obtained from constructing the bridge to a reduced initial four lane width. Additionally, the girder erection would have to be done at night, as there would only be one lane in each direction available to traffic. Limiting its construction to working at night would considerably increase the cost of the widening.

The initial provision of a six lane facility is therefore the most cost-effective and practical lane configuration to adopt.

3. ALTERNATIVE SUPERSTRUCTURES

After consideration of the two superstructure types, the box girder option, constructed by overhead gantry, is favored over the AASHTO I girder alternative because the interference to road and rail traffic and other activities at ground level would be substantially reduced.

The minimizing of interference to the existing traffic network is considered to be an essential requirement of the system adopted.

The 40 m box girder span length can comfortably clear other roadways and structures at the interchanges, and the construction of the high level section of the viaduct at the interchanges by overhead gantry rather than by large cranes at ground level are additional advantages of the box girder option.

4. SUBSTRUCTURE

Subsoil investigation were undertaken along the alignment of the MST to get a general idea of the underlying substratum in order to be able to design the foundations to a level that can be used to estimate costs.

As the project is a conceptual study rather than a detailed design, only 11 boreholes were drilled along the proposed alignment with one borehole located at each of the eight (8) interchanges. The results of the soil survey exhibited variable soil stratification as shown on the Soil Profile in Volume III. Considering that the soil borings are only exploratory and hence, few and far between, only a generalized view of the foundation materials can be obtained. The detailed design will be based on more comprehensive investigations.

As the foundation are variable, several foundation solutions are available. For this study, the foundations considered are of three types: spread footings, cast-in-place piles founded on deep firm stratum and short cast-in-place piles for areas where the firm layer is shallow but spread footings are not possible due to excavation limitations.

Deep foundations are expected at the Pres. Quirino Avenue Interchange and until about halfway between Vito Cruz and Pasay Road intersections. These are covered by the influence areas of BH-1, 2 & 3.

From the Pasay Road intersection southward to Sucat Interchange, spread footings are possible since bedrock or tuff can be reached at shallow levels below the ground surface. However, due to the presence of the PNR tracks, excavation across the PNR right-of-way is limited to 5.00 m or thereabouts. In such cases short cast-in-place piles socketed in the firm layer may be more appropriate.

Piles are likewise expected to be required along the MST portion north of Alabang.

Further subsoil investigations during the detailed engineering phase will determine the exact foundations necessary for the various segments of the MST. Driven piles have not been included as an alternative foundation due to limited areas for pile driving and the attendant noise pollution.

5. ERECTION

The BOT concessionaire will be responsible for determining which structural system is most cost-effective from his perspective and which one meets the performance criteria of the project. This includes: 1) the structural type, such as box girder, I beam, etc..., 2) the spacing between piers which depends upon the soil conditions and 3) the erection method. The erection sequence has an important bearing on how the project will impact the continuous use of the South Luzon Expressway and the PNR during construction. Traffic management considerations will, in turn, affect costs. Only a limited number of alternatives were investigated to determine their technical feasibility within the context of the MST project and to estimate their costs for the financial analysis.

Appendix A3-4

PAVEMENT CONDITION SURVEY OF SLE

Appendix A3-4
PAVEMENT CONDITION SURVEY OF SLE

1. METHODOLOGY

Engineers performing the pavement condition survey were directed to visually inspect every 100 m of each lane and to record the type, severity and amount of distress present (Figure A3-4-1). They recorded the results on forms, samples of which are appended.

Figure A3-4-1

PAVEMENT CONDITION SURVEY

1. The basic information requirements are:

   - Type of Distress - Identify types of physical distress in pavement (Table 3.2 for asphalt and Table 3.3 for concrete)
   - Severity of Distress - Level of severity of distress (Low, Medium or High)
   - Amount of Distress - Relative area affected by each combination of distress type and severity (Percentage of total area).

2. Lanes are numbered 1 - 4 from the median.

3. If an area of pavement has failed, note this under "Remarks". Failure is judged to have occurred when one or more the following conditions exist:

   - Concrete

     i. A medium (> 0.5 mm) or wide (> 1.3m) crack crosses a bay longitudinally or transversely.
     ii. A medium longitudinal crack and a medium transverse crack longer than 200 mm intersect.
     iii. There is wide corner cracking of more than 200 mm radius.

   - Asphalt

     i. Rutting in the wheel paths is greater than 10 mm deep.
     ii. There are longitudinal cracks in the wheel paths.

The types of distress visible in July 1992 were categorized in accordance with Table 3-2 for asphalt and Table 3-3 for concrete pavement from the AASHTO guide.[1] (See Table A3-4-1 and Table A3-4-2).

[1] AASHTO Guide for Design of Pavement Structures, 1986.

Table A3-4-1
GENERAL CATEGORIZATION OF ASPHALT PAVEMENT DISTRESS

DISTRESS TYPE	PRIMARILY TRAFFIC LOAD CAUSED	PRIMARILY CLIMATE/MATERIALS CAUSED
1. Alligator or Fatigue Cracking	X	
2. Bleeding		X
3. Block Cracking		X
4. Corrugation		X
5. Depression		X
6. Joint Reflection Cracking From PCC Slab		X
7. Lane/Shoulder Dropoff or Heave		X
8. Lane/Shoulder Separation		X
9. Longitudinal and Transverse Cracking		X
10. Patch Deterioration	X	
11. Polished Aggregate	X	
12. Potholes	X	
13. Pumping and Water Bleeding	X(M,H)	X(L)
14. Raveling and Weathering		X
15. Rutting	X	
16. Slippage Cracking		X
17. Swell		X

Source: Table 3-2, AASHTO Guide for Design of Pavement Structures, 1986

Table A3-4-2
GENERAL CATEGORIZATION OF JOINTED CONCRETE PAVEMENT DISTRESS

DISTRESS TYPE	PRIMARILY TRAFFIC LOAD CAUSED	PRIMARILY CLIMATE/MATERIALS CAUSED
1. Blow-up		X
2. Corner Break	X	
3. Depression		X
4. Durability "D" Cracking		X
5. Faulting of Transverse Joints and Cracks	X	
6. Joint Load Transfer Associated Distress	X	X
7. Joint Seal Damage of Transverse Joints		X
8. Lane/Shoulder Dropoff or Heave		X
9. Land/Shoulder Joint Separation		X
10. Longitudinal Cracks		X
11. Longitudinal Joint Faulting	X	X
12. Patch Deterioration	X(M,H)	X(L)
13. Patch Adjacent Slab Det.	X	X
14. Popouts		X
15. Pumping and Water Bleeding	X(M,H)	X(L)
16. Reactive Agg. Dur. Dist.		X
17. Scaling, Map Cracking and Crazing		X
18. Spalling (Trans. and Long. Jts.)	X(M,H)	X(L,M,H)
19. Spalling (Corner)		X
20. Swell		X
21. Transverse and Diagonal Cracks	X(L,M,H)	X(L)

Source: Table 3-3, AASHTO Guide for Design of Pavement Structures, 1986.

2. ASSESSMENT OF PAVEMENT CONDITION

An assessment was then made of the condition of each 100 m of lane under one of four categories.

R. Either portland cement concrete or a recent thin asphalt wearing course. Few signs of distress were visible at the time of inspection.

C. Some of the pavement exhibits distress of types considered to be primarily caused by climate or materials.

T. Up to 50 percent of the pavement exhibits distress of types considered to be primarily caused by traffic load.

F. More than 50 percent of the pavement exhibits distress of types considered to be primarily caused by traffic load and the pavement is judged to have failed.

When the results were analysed the R category was divided into three sub-categories.

R_c. Cement concrete of recent origin.
R_a. Asphalt wearing course of recent origin.
R_o. Old cement concrete pavement, probably original construction.

3. RESULTS OF SURVEY

The survey results are summarized by roadway and distress category in Table A3-4-3.

All the pavement in a state of failure is located in the northbound roadway just south of Magallanes interchange. Most of the recent pavement repair work has been replacement of concrete slabs on the southbound roadway and application of an asphalt wearing course to part of the northbound roadway between Magallanes and Bicutan.

Table A3–4–3
SOUTH LUZON EXPRESSWAY PAVEMENT CONDITION SURVEY
SUMMARY OF RESULTS

STATION TO STATION	SOUTHBOUND ROADWAY												NORTHBOUND ROADAY												REMARKS
	Category of Distress Lane – km/10						Percent						Category of Distress Lane – km/10						Percent						
km	R_c	R_a	R_o	C	T	F	R_c	R_a	R_o	C	T	F	R_c	R_a	R_o	C	T	F	R_c	R_a	R_o	C	T	F	
08 – 09	15	0	0	12	13	0	38	0	0	30	32	0	0	5	0	1	16	18	0	13	0	2	40	45	S. Magallanes Interchange
09 – 10	6	0	0	12	22	0	15	0	0	30	55	0	0	24	0	3	5	4	0	67	0	8	14	11	Nichols Overpass
10 – 11	4	12	0	0	31	0	9	26	0	0	65	5	0	22	0	0	14	4	0	55	0	0	35	10	
11 – 12	3	0	0	3	32	2	7	0	0	8	80	0	0	19	0	8	13	0	0	48	0	20	32	0	
12 – 13	7	0	0	11	22	0	18	0	0	27	55	0	0	20	0	8	12	0	0	50	0	20	30	0	
13 – 14	8	0	0	26	6	0	20	0	0	65	15	0	0	19	0	19	2	0	0	48	0	48	4	0	
14 – 15	7	0	2	14	11	0	21	0	6	41	32	0	0	8	0	12	13	1	0	24	0	35	38	3	Bicutan Overpass
15 – 16	1	0	14	12	3	0	3	0	47	40	10	0	0	7	4	14	5	0	0	23	13	47	17	0	
16 – 17	0	0	19	9	2	0	0	0	63	30	7	0	0	1	6	17	6	0	0	3	20	57	20	0	
17 – 18	0	0	10	14	6	0	0	0	33	47	20	0	0	3	3	16	8	0	0	10	10	53	27	0	
18 – 19	0	0	6	19	5	0	0	0	20	63	17	0	0	0	0	19	11	0	0	0	0	63	37	0	Sucat Overpass
19 – 20	0	0	7	14	9	0	0	0	23	47	30	0	0	0	4	22	4	0	0	0	13	74	13	0	
20 – 21	0	8	5	11	6	0	0	27	17	36	20	0	0	4	7	10	9	0	0	13	23	34	30	0	
21 – 21.60	0	1	1	12	10	0	0	4	4	50	42	0	0	0	2	10	11	0	0	0	9	44	47	0	N. Alabang Viaduct
TOTALS	51	21	64	169	178	2	11	4	13	35	37	0	0	132	26	159	129	27	0	28	5	34	27	6	

Key:

R_c Recent Concrete
R_a Recent Asphalt
R_o Original Concrete
C Climate or Materials
T Traffic
F Failure

Of the total pavement area, about one third showed no visible signs of distress, one third showed distress attributable to traffic load and one third showed distress attributable to climate or materials.

It may be noted that there were substantial differences between the two roadways at the time of survey:

Table A3-4-4
CONDITIONS OF SLE PAVEMENT

PAVEMENT CATEGORY	PERCENT	
	SLE Southbound	SLE Northbound
R_c	11	0
R_a	4	28
R_o	13	5
C	35	34
T	37	27
F	0	6

PHILIPPINE ASSISTANCE PROGRAM SUPPORT
LOUIS BERGER INTERNATIONAL, INC.

SUB-PROJ. NO.	SHEET NO. 3 of 28
DESIGNED BY:	DATE: 7-4-92
CHECKED BY:	DATE:

PAVEMENT CONDITION SURVEY, SOUTH LUZON EXPRESSWAY

Station to Station	Roadway (NB or SB)	Lane No. (1,2,3,4)	Pavement Type (A or C)	Distress Type (No)	Distress Severity (L, M, H)	Area Affected (Percent)	Remarks
9+000	SB	1	C	2 11	M	50	
	"	2	C	10 11	M	50	
	"	3	C	2 17	M	30	
	"	4	C	2	L	10	
	NB	1	C	10	M	50	
	"	2	C	10 21	H	100	
	"	3	C	10 21	M	50	
	"	4	C	9	M	50	
9+100	SB	1	C	2	L	10	
	"	2	C	10 11	M	50	
	"	3	C	10 11	L	20	
	"	4	C	–	–	–	RECENT
	NB	1	C	2 17	L	10	
	"	2	C	11	M	30	
	"	3	C	10 11	M	20	
	"	4	A	–	–	–	RECENT ASPHALT OVERLAY
9+200	SB	1	C	2	L	10	
	"	2	C	2 17	L	20	
	"	3	C	2 17	L	20	
	"	4	C	–	–	–	RECENT
	NB	1	C	9 10 11 21	H	100	
	"	2	C	11 21	H	100	
	"	3	C	11 21	M	60	
	"	4	A	–	–	–	RECENT ASPHALT OVERLAY
9+300	SB	1	C	2	L	10	
	"	2	C	2	L	10	
	"	3	C	2 17	L	20	
	"	4	C	–	–	–	RECENT
	NB	1	A	–	–	–	" ASPHALT OVERLAY
	"	2	A	–	–	–	" "
	"	3	C	10	L	10	
	"	4	A	–	–	–	" "
9+400	SB	1	C	17	L	10	
	"	2	C	17	L	10	
	"	3	C	17	L	10	
	"	4	C	–	–	–	RECENT
	NB	1	A	–	–	–	"
	"	2	A	–	–	–	"
	"	3	A	–	–	–	"
	"	4	C	12	L	10	NICHOLS OVERPASS EXIT RAMP

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PHILIPPINE ASSISTANCE PROGRAM SUPPORT
LOUIS BERGER INTERNATIONAL, INC,.

SUB-PROJ. NO.	SHEET NO. 2 of 4
DESIGNED BY:	DATE:
CHECKED BY:	DATE:

PAVEMENT CONDITION SURVEY, SOUTH LUZON EXPRESSWAY

ASSESSMENT OF CONDITION

Station to Station	Southbound Roadway 1	2	3	4	Remarks	Northbound Roadway 1	2	3	4	Remarks
12+000	R	R	C	T		T	T	R	R	
+100	T	T	T	R		T	T	[illegible]	[illegible]	
+200	T	T	C	T		T	T	[illegible]	[illegible]	
+300	R	T	T	T		T	T	[illegible]	[illegible]	
+400	T	T	T	C		C	T	[illegible]	R	
+500	T	T	T	R		T	T	[illegible]	[illegible]	
+600	C	C	T	C		C	C	[illegible]	[illegible]	
+700	T	C	C	R		T	C	[illegible]	R	
+800	T	T	T	R		C	C	[illegible]	[illegible]	
+900	C	C	C	T		C	C	[illegible]	[illegible]	
13+000	[illegible]	C	C	R		[illegible]	[illegible]	[illegible]	[illegible]	
+100	R	[illegible]	[illegible]	R		T	[illegible]	[illegible]	[illegible]	
+200	R	T	T	R		C	C	T	C	
+300	R	C	C	C		C	C	[illegible]	[illegible]	
+400	T	C	C	C		[illegible]	T	[illegible]	[illegible]	
+500	C	[illegible]	T	C		[illegible]	C	[illegible]	[illegible]	
+600	C	C	C	C		[illegible]	[illegible]	[illegible]	[illegible]	
+700	T	[illegible]	[illegible]	T		[illegible]	C	[illegible]	[illegible]	
+800	T	[illegible]	[illegible]	C		C	C	[illegible]	[illegible]	
+900	R	[illegible]	[illegible]	[illegible]		C	C	[illegible]	[illegible]	
14+000	[illegible]	T	T	T		T	T	[illegible]	[illegible]	
+100	R	C	C	R		C	C	[illegible]	[illegible]	
+200	T	T	T	T		T	T	[illegible]	[illegible]	
+300	C	C	C	C		C	C	[illegible]	[illegible]	
+400	C	C	T	X		T	C	T	X	
+500	R	T	C	X		T	C	C	X	
+600	R	C	C	X		C	C	T	X	
+700	R	C	C	X		T	T	T	X	
+800	R	T	T	X		T	T	T	X	
+900	R	C	R	X		C	C	C	X	
15+000	T	T	T	X		C	C	R	X	
+100	R	R	R	X		C	R	C	X	
+200	R	C	R	X		R	R	C	X	
+300	R	C	R	X		R	R	T	X	
+400	R	C	C	X		T	R	T	X	
+500	R	C	R	X		C	R	T	X	
+600	R	C	C	X		C	C	C	X	
+700	C	C	R	X		R	C	C	X	
+800	C	C	C	X		R	C	C	X	
+900	R	R	R	X		T	C	R	X	

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Appendix A3-5
REHABILITATION OF THE SLE

Appendix A3-5
REHABILITATION OF THE SLE

1. GENERAL

The Terms of Reference require the Consultant to perform surveys of the reverted portion of the SLE between Magallanes and Alabang to determine the scope of rehabilitation work needed in the following areas:

- Correction of road elevations due to flooding;
- Repair of damaged pavements and shoulders;
- Reinstallation of security fencing;
- Provision of appropriate traffic signs, signals and monitoring systems;
- Efficient overall traffic management.

According to PNCC records, the history of construction of the SLE from Nichols Toll Plaza to Alabang is as follows:

- Nichols Toll Plaza to Bicutan Toll Plaza
  Constructed in 1966 (four lanes)
  Two additional lanes added in 1984

- Bicutan Toll Plaza to Sucat Toll Plaza
  Constructed in 1967 (four lanes)
  Two additional lanes added in 1985

- Sucat Toll Plaza to Alabang Toll Plaza
  Constructed in 1967 (four lanes)
  Two additional lanes added in 1987-88

To date it has not been possible to locate copies of construction or as-built plans for any part of the project.

2. CORRECTION OF ROAD ELEVATION DUE TO FLOODING

The Consultant obtained a PNCC internal memorandum dated August 3, 1989 identifying some sites of flooding on the SLE, listing the probable causes and proposing solutions (Attachment A3-5-1). Field reconnaissance indicated that in all cases but two the proposed work was not accomplished prior to the reversion. At the time of writing DPWH is attempting to alleviate the flooding conditions between Bicutan and Sucat and proposes to tackle other problem areas if and when funds are made available.

The contents of this memorandum are summarized below together with the Consultant's observations.

- **Lane # 1 under Magallanes Bridge (Km 7+930)**

  Water up to 100 mm deep collects after heavy rain because the gutter is higher than the nearest outlet. The proposed solution was to lower 10 m of gutter. This was evidently done, but the outlet appears to be at least partially blocked.

- **Lane # 1 Northbound about 100 m south of Magallanes Bridge (Km 8+100)**

  Water up to 100 mm deep collects after heavy rain because a catch basin is clogged up and attempts to clear it have failed. The proposed solution was to construct a new catch basin and pipe it to a drainage channel. There is no evidence that this work was performed.

- **Lanes Nos. 1, 2 & 3 Southbound in the vicinity of La Suerte Cigarette Factory (Km 11+500)**

  Temporary flooding to 100 mm deep occasionally occurs when runoff from the West Service Road overflows onto the SLE, overloading the drainage system. The proposed solution was to build a concrete block wall to prevent the West Service Road flood water overflowing onto the SLE. This wall was evidently built but is now in a dilapidated condition.

- **Lanes Nos. 1, 2, 3 &4 Northbound adjoining the entrance toll plaza at Bicutan (Km 13+950)**

  Water up to 500 mm deep collected after heavy rain because a creek west of the SLE was clogged. The proposed solution was to dredge 70 m of the creek which was done in 1989 with the cooperation of the landowner.

- **Northbound and Southbound Lanes near Motorola (Km 15+600)**

  During unusually heavy rain the southbound roadway floods up to a depth of 900 mm. The proposed long term solution was to raise the pavement about 1 m and install drainage facilities with greater capacity. There is no evidence that this work was performed.

- **Northbound and Southbound Lanes between Alabang Hills Subdivision Area and Mintcor Subdivision Area (Km 19+900 to Km 20+350)**

  During unusually heavy rain, the southbound roadway floods up to a depth of 600 mm and the northbound roadway up to a depth of 300 mm. A two span box culvert under the SLE discharges into Carmina Compound on the east side. Squatters in Carmina Compound have blocked the culvert with rocks to alleviate flooding of their homes. Various industrial complexes on the east side of the SLE have built walls to prevent flooding of their premises, constricting the outlet channel, while on the west side new subdivision drainage systems flow into the culvert.

  In 1989 the Muntinlupa Municipal Engineer proposed to construct two lines of 48 in. diameter pipe culvert along the East Service Road from the outlet of the box culvert to discharge into Pasong Diablo River. There is no evidence that this work was performed.

- **Northbound and Southbound Lanes at Halang (Km 23 I)**

  During unusually heavy rain the northbound roadway floods to a depth of up to 150 mm and the southbound roadway to a depth of up to 450 mm. The cause appears to be that insufficient drainage was provided across the SLE. The proposed solution was to raise the embankment and pavement between 600 mm and 900 mm and install adequate drainage. There is no evidence that this work was performed.

None of the proposed solutions to these problems of flooding addressed the root cause which appears to be an initially inadequate SLE drainage system overwhelmed by 25 years of development along its corridor. Environmental changes such as real estate development near the roadway since it was built are likely to have caused a runoff condition that has overloaded the drains, resulting in subgrade saturation leading to pavement failure and periodic flooding of the roadways.

The pavement condition survey revealed evidence of moisture-related distress such as joint deterioration, faulting and corner breaks in some areas, indicating inadequate drainage. Normally drainage is improved by installing roadside drains below the level of the pavement and along the edge of the pavement.

Without as-built drawings, it is difficult to judge whether the existing system is lacking in maintenance or whether it needs to be augmented with additional drainage features. In the Consultant's opinion, a complete drainage survey and study of the corridor should be made and a reconstructed piped drainage system for the whole SLE corridor, including the service roads, is probably required. These activities should be done during the preliminary design stage.

3. REPAIR OF DAMAGED PAVEMENT AND SHOULDERS

The original pavements are 25 or more years old and mostly constructed of unreinforced portland cement concrete on a granular base and sub-base. There is little evidence of maintenance of joints and many areas are showing signs of structural distress and incipient failure. Where additional lanes have been added, the work was done between 1984 and 1988. In many areas, the joint between the original and widened pavement is showing signs of joint separation and faulting. During 1992, the DPWH replaced some failed concrete slabs and has applied a thin asphalt maintenance wearing course to many of the worst areas.

ROM bidders will be required to devise a potentially sound economic rehabilitation strategy to increase the functional life of the existing pavement based upon evaluation of its characteristics. The key tool in this process will be non-destructive deflection testing to determine pavement edge deflection levels and differential deflection across joints. Pavement cores, base and subgrade samples will also be taken and tested. This is outside the scope of the present study.

Based upon visual observation, a structural deficiency exists in much of the existing SLE pavement. Lacking construction history for any part of the facility and without performing tests on the pavement, it is difficult to assess the remaining pavement life, if any, or to select an economic strategy for rehabilitation to extend its functional life for the duration of the concession.

The two major categories of rehabilitation are methods other than overlay and methods with overlays. Methods other than overlay range from complete reconstruction to partial reconstruction. Methods with overlays range from complete reconstruction to partial reconstruction with overlay. The overlay may be flexible or rigid.

As a significant amount of the existing pavement is considered to have failed, partial reconstruction is certainly necessary. The Consultant therefore decided that for conceptual design purposes the rehabilitation method selected would be partial reconstruction with a flexible overlay throughout. This would constitute the first stage of a pavement management program

for the life of the concession involving periodic overlays to maintain structural integrity, riding quality and skid resistance.

A visual pavement condition survey was performed to identify the types, severity and amount of distress present. The general categories of distress in asphalt and jointed concrete pavement given in Tables 3.2 and 3.3 of the AASHTO Guide[1] were recorded for each lane. (See Appendix A3-4).

An assessment was then made of the pavement condition under four categories:

R. Either portland cement concrete or a recent thin asphalt wearing course. Few signs of distress were visible at the time of inspection.

C. Some of the pavement exhibits distress of types considered to be primarily caused by climate or materials.

T. Up to 50 percent of the pavement exhibits distress of types considered to be primarily caused by traffic load.

F. More than 50 percent of the pavement exhibits distress of types considered to be primarily caused by traffic load and the pavement is judged to have failed

When the results were analyzed the R category was divided into three sub-categories:

Rc. Cement concrete of recent origin.

Ra. Asphalt wearing course of recent origin.

Ro. Old cement concrete pavement, probably original construction.

The existing pavement is considered to be in fair to poor condition, with moderate to severe faulting, cracking and spalling. Ridability is also fair to poor and most of the surface is moderately rough and uneven, except where thin asphalt overlays have recently been applied as a maintenance measure.

As there are no construction histories and insufficient data available to make a structural overlay analysis, the following procedure was adopted. It was assumed that the concessionaire would select planned stage construction in order to minimize his initial expenditure and because it is difficult to estimate the traffic levels accurately for a period of 25 to 30 years.

[1] AASHTO Guide for Design of Pavement Structures, 1986.

The original pavement is believed to have the following construction:

- Unreinforced Cement Concrete Pavement 230 mm
- Aggregate Base Course 200 mm
- Sub-Base Course 250 mm

These values and any subsequent repairs/rehabilitation or extension of the pavement will have to be verified through a combination of coring and non-destructive testing.

Using the British pavement design procedure[2], a new pavement of such construction is suitable for an opening year traffic volume of 900 commercial vehicles/day (cv/d) at an assumed growth rate of 2 percent. After 25 years such a pavement could be expected to have some residential life if the cv/d had grown to about 1500. The SLE pavements are carrying several times that volume.

It is essential to correct distress in the deteriorated pavement by proper preparation before attempting rehabilitation. Failure to do this will lead to reflective cracking and other deterioration in the overlay. The observed differential movement of joints and cracks indicates a probable need to underseal the existing pavement to provide stable and uniform support conditions, to replace badly deteriorated slabs, to seal cracks and joints and to improve the drainage system.

The following rehabilitation procedure was assumed for the SLE pavement:

- Replace all failed concrete slabs;
- Underseal faulted concrete slabs;
- Seal all joints and cracks;
- Apply a tack coat;
- Where necessary, apply an asphalt leveling course;
- First stage asphalt overlay of 100 mm;
- After six years, second stage asphalt overlay of 50 mm; and
- Every six years after the second stage overlay, an overlay of 50 mm.

Because of the reflective cracking potential of an asphalt overlay on a rigid pavement or base and the need to minimize or eliminate cracks, a minimum overlay thickness of 100 mm is recommended by AASHTO and the Asphalt Institute on existing cement concrete pavements with a maximum slab length of 10 m and where the maximum annual temperature differential is 20°C. In British practice, 100 mm is also the minimum thickness of asphalt surfacing on a rigid base. Typical rehabilitation overlay thicknesses are more than 100 mm. For purposes of this study, an overlay thickness of 100 mm was therefore selected as the minimum first stage of a 30-year pavement management system. Where necessary to correct the contour of the old pavement, an asphalt leveling course would be required in addition.

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[2]Departmental Standard HD 14/87, Structural Design of New Road Pavements, Department of Transport, United Kingdom.

To estimate the quantity of slabs that would have to be replaced, it was assumed that all judged to have failed and 25 percent of those recently given a thin asphalt overlay would fall into this category. It was also assumed that all pavement exhibiting distress of types considered to be primarily caused by traffic load would be undersealed and that 25 percent of the whole pavement would need a leveling course averaging 25 mm.

4. RÉINSTALLATION OF SECURITY FENCING

Control of access to the SLE was originally enforced by means of cyclone fencing mounted on reinforced concrete posts. At the present time, some of the fencing has been removed; much of what remains has been damaged or is in a dilapidated condition and there are many large and small openings. As a result there is no longer any effective control of access to the SLE and trespassing by pedestrians and vehicles is commonplace.

If the SLE is to be rehabilitated as a ROM project, it will be necessary to replace all the original fencing. It is recommended that instead of using cyclone fencing, the replacement consists of a standard concrete safety shape or W-beam steel traffic barrier surmounted by an anti-glare fence approximately 1.00 m high. One type of headlight glare screen consists of expanded mesh panels tied to a top and bottom tension wire and mounted on metal posts. The expanded mesh panels are fabricated from aluminum alloy or galvanized steel sheet with diamond openings about 35 by 100mm and metal bridges between diamonds of about 20mm. This would discourage the current common practice of cutting the fence to provide access for people and vehicles.

5. PROVISION OF APPROPRIATE TRAFFIC SIGNS, SIGNALS AND MONITORING SYSTEMS

Appropriate traffic signs are necessary to give drivers information about routes, directions, destinations, regulations and hazards that are not self-evident. Functionally, signs are classified into three groups; regulatory, warning, and guide and informational signs.

Whether the SLE and MST are operated as a single facility or as two separate facilities, complete re-signing of the combined SLE/MST corridor will be required to direct vehicles onto their desired routes.

Existing traffic signals should be updated to the latest solid state technology and re-programmed for proper management of intersection traffic.

The requirements of monitoring systems will have to be defined by the BOT concessionaire to suit the particular toll collection and control system he proposes to use, and the location of the

operating and maintenance headquarters he establishes. In general terms, it should include a surveillance element to provide traffic information and locate incidents, a control center with operator and various response elements to take appropriate action.

6. EFFICIENT OVERALL TRAFFIC MANAGEMENT

A new toll collection system is needed. See Section 3.2.5.7 for requirements and Appendix A3-6 for a description of the toll system.

Rehabilitation of the SLE should incorporate current safety standards and the latest concepts in traffic management during construction. This will require preparation of a detailed traffic control plan considering such factors as safety of motorists and workers, extent of work areas required, cost of motorist delay in time and money, access for emergency vehicles, location of available ramps, availability of alternative routes, etc.

The traffic control plan for the rehabilitation phase will need to be based on consideration of various alternatives such as full closure, closure of one roadway leaving one direction of traffic flow on the other, two-way traffic flow on one roadway, lane closures in work areas only, etc. The most practical alternative may prove to be different for different sections of the project. Severe disruption of traffic is inevitable and a detailed traffic control plan to minimize this is essential.

The Concessionaire will be required to provide and operate a Traffic Management System for the completed facility. It is in his interest to have an efficient system so as to maximize traffic flow.

7. CONDITION OF EXISTING STRUCTURES

Inspections of the major structures which support or pass over the SLE between Pres. Quirino Avenue and Alabang at Buendia Avenue, Magallanes Interchange, Nichols-McKinley Road Interchange, Bicutan Overpass, Sucat Overpass and the Alabang Viaduct were carried out. Copies of the Bridge Inspection Reports are attached. (Attachment A3-5-2).

Apart from the Viaduct at Alabang, which is discussed in greater detail below, the bridges inspected appeared to be structurally sound and not in need of rehabilitation. All bridges, however, were in need of maintenance to remove drainage blockages, replace deck joints, repair damage caused by traffic and to rectify other deficiencies.

7.1 Alabang Viaduct

The Alabang viaduct, which was constructed in 1977, comprises twenty-five simply supported spans of precast prestressed concrete box girders acting integrally with a reinforced concrete deck slab. Each girder was constructed from three precast segments which were post-tensioned together. The nominal span lengths are 30 m, 35 m and 40 m.

Soon after the construction of the bridge, flexural cracks appeared in the soffits of the box girders in the mid-span region. The girders have additionally deflected downwards within each span, creating an undulating riding surface.

In order to supplement the flexural capacity of the girders, an external prestressing arrangement, comprising a stressed tendon attached below the soffit of each box girder, was designed by a consultant to the PNCC. The strengthening was approved by the Toll Regulatory Board and was completed on a trial basis for one of the spans in 1991. The remaining spans are scheduled to be strengthened in 1992/93.

In view of the possibility that the MST may terminate and connect to the Alabang viaduct, the superstructure of the viaduct has been analyzed to obtain a rational assessment of its structural adequacy.

The analysis was based on copies of the design drawings of the box girders and of the strengthening arrangement, and on measurements of the carriageway and overall bridge superstructure widths.

The following conclusions have been drawn from the analysis:

- The girders have insufficient prestressing force for serviceability loading. Based on an uncracked section, calculated bottom flange tensions at mid-span of up to 3 MPa occur under dead load only and of up to 7 MPa under dead load and live load. Top flange compressions of up to 19 MPa occur in the 38.4 m span girders. Significant cracking of the bottom flange would be expected under this stress regime.

- The stress block is triangular under dead load only with high compression on the top flange and tension on the bottom flange. Substantial elastic and inelastic downward deflections within each span would be expected.

- The girders have adequate ultimate moment capacity, which means that there is no risk of collapse due to failure in flexure, assuming the bridge was constructed in accordance with the design drawings and that there has been no degradation of the prestressing tendons due to corrosion or fatigue.

The proposed external prestress virtually eliminates the bottom flange tensions under dead load only, and reduces the maximum tension under dead load and the design live load to 4 MPa. Maximum compressions are reduced to 18 MPa.

Although not strictly complying with the allowable stresses in the bridge design code, it is considered that the superstructure will be structurally adequate after the implementation of the strengthening measures in all spans, although its life may be reduced.

In the analysis, the impact factor for live loading was calculated on the basis of the bridge design code provisions which are applicable to normal smooth running surfaces. The undulating deck surface would increase the impact effects of live loading, and it would therefore be advantageous to reduce the impact by filling the hollow in each span with asphaltic concrete, thereby achieving a smooth profile. Levels taken of the viaduct surface indicate that the maximum depth of asphaltic concrete would be approximately 100 mm. This is calculated to produce a maximum tensile stress of 1.1 MPa under the girders which, although reducing the effectiveness of the additional external prestress by approximately 40%, would significantly decrease the live load impact effect.

After completion of the proposed additional external prestress, the extent of rehabilitation of the viaduct would be limited to the addition of an asphaltic concrete leveling course in each span.

Attachment A3-5-1

PNCC INTERNAL MEMORANDUM ON FLOODING[3]

SLTG-TFS
Carmona, Cavite

FOR:	VP & HEAD, TOLLWAYS DIVISION
FROM:	Manager & Head - TFS (SLTG)
SUBJECT:	IDENTIFICATION OF SLTG FLOODED AREAS, PROBABLE CAUSES AND PROPOSED SOLUTIONS
DATE:	August 03, 1989
REF. DATE:	TFS89 JMU 08-003

1.0 Per your instructions during our conference yesterday afternoon and early this morning, we are submitting the following report on the identification of the usual flooded areas within SLTG, their probable causes and our proposed solutions.

2.0 Generally, these flooded areas are located at the bottom of the vertical parabolic curves along the length of our South Luzon Expressway. Thus, if the flooded area is say thirty (30) meters in length, the height of water ranges from 0 at both ends to a maximum depth at the center.

In cross section, we have a center island at the middle which separates the northbound lanes from the southbound lanes. Both northbound and southbound lanes has 3-4 traffic lanes. In this report, the traffic lane nearest to the center island is designated as lane no. 1 (Fast lane) followed by Lane No. 2 & 3, Lane No. 4 is actually the shoulder lane (for stalled vehicles). The elevation of the northbound and southbound lanes are not the same. Hence, during flood, sometimes the northbound lanes are passable, while the southbound lanes are not, or vice-versa. Also, because of the crown along its cross section, the depth of flood water at lanes 1, 2, 3 and the shoulder are different from each other. Usually, the shoulder has the lowest elevation. In some instance, the top of the crown is at lanes 2 & 3 with lanes 1 and the shoulder having the lowest elevation (and the highest water depth during flood).

3.0 The usual flooded areas at SLTG, their extent/frequency of flooding, their probable causes and their proposed solutions are:

3.1 Lane No. 1 under Magallanes Bridge near U-Turn from northbound to southbound lane in Makati (Km. 7+930).

[3]This a typed copy of the original document whose condition is such that it cannot be photocopied.

3.1.A EXTENT/FREQUENCY OF FLOODING:

After a heavy rain water collects at lane no. 1 Length is about five (5) meters, width ranges from 0 to 3.5 meters; depth 1-4 inches. This water dissipates by splashing and/or water evaporation after the rain.

Although not very critical this situation poses a danger to our motorist. Hence, it is included in this report.

3.1.B PROBABLE CAUSE:

This is the lowest portion but the nearest drainage gutter outlet is located about ten (10) meters away and is slightly higher than this lowest portion. Hence, water cannot drain out into the nearest gutter.

3.1.C PROPOSED SOLUTION:

Lower the concrete gutter from this flooded section to the nearest gutter outlet to allow this stagnant water to drain out by gravity. This could be done using a jackhammer and air compressor for partial demolition of the concrete gutter followed by reconcreting of same. This operation could be completed in two (2) days after all the materials needed have been acquired. We are scheduling this renovation work this coming weekend during slack traffic hours.

3.2 Lane No. 1 Northbound, about a hundred meters before Magallanes Bridge (Km. 8+100).

3.2.A EXTENT/FREQUENCY OF FLOODING:

After a heavy rain, this area is usually flooded with 1-4 inches of water. Length is about 5-10 meters. Width ranges from 0 to 3.5 meters (beyond 4" the water will overflow into lane # 2; thence to the drainage canal on the right (Eastern) shoulder. After the rain, water will dissipate due to splashing by motorist or by evaporation.

During weekdays, traffic volume is heavy on this area from 7:00-10:00 am and from 4:00-6:00 pm. Hence, any water on this area will greatly aggravate our traffic problem since the motorist will either slow down or swerve to the right (lane #2) to avoid the stagnant water.

3.2.B PROBABLE CAUSE:

The outlet to nearby catch basin located on the center island (near the acacia tree) is clogged up. Attempt to clear this up has failed.

3.2.C PROPOSED SOLUTION:

Construct a new catch basin at this center island adjacent the lowest point on lane # 1 and construct a 15" diameter reinforced concrete pipe culvert across the northbound lanes 1, 2, 3 and 4 to connect said new catch basin to the Eastern drainage canal (see attach sketch plan).

However, because of heavy traffic at this area during day time, any work thereat has to be programmed only during night time (one lane at a time) after which the unfinished

construction site shall be covered with "steel plates" to allow traffic to pass thru during day time. Nevertheless, the necessary road signs shall be placed to warn motorist to slow down to avoid accidents. Our Security guards should also coordinate to avoid pilferage of these costly steel plates.

We are now preparing the equipments, materials and signboards needed for this activity and work will be started in one (1) or two (2) weeks time.

3.3 Southbound Lanes (Lane # 1, 2 & 3) in the vicinity of La Suerte Cigarette Factory (Km. 11+500).

3.3.A EXTENT/FREQUENCY OF FLOODING:

This happens only occasionally. Length is about 10-50 meters; width ranges from 0-10 meters; depth from 1-4 inches.

3.3.B PROBABLE CAUSE:

Flood water from the adjacent West Service Road overflows over our road right-of-way fence/gutters into our expressway southbound lanes. This is beyond the capacity of our existing drainage system resulting in temporary flooding.

3.3.C PROPOSED SOLUTION:

Placing of a water deflector wall consisting of three (3) vertical layers of 6" concrete hollow blocks along our road right-of-way fence along the area between our southbound lanes and the West Service Road. This deflector wall will prevent the flood water from the West Service Road from overflowing into our expressway.

3.4 Northbound Lanes No. 1, 2, 3, & 4 after toll booth entry at Bicutan (Km. 13+950).

3.4.A EXTENT/FREQUENCY OF FLOODING:

After a prolonged heavy rain traffic could barely pass at lane # 1 while at the shoulder and at Bicutan entry road the depth of water could reach as high as 0.50 meters. Length is about 0-15 meters; width ranges from 0-14 meters. Water recedes rapidly after the rain stops.

3.4.B PROBABLE CAUSE:

Our drainage system for this area consists of drain gutter and pipe culverts. From here, the drain water flows westward thru underground drainage pipe culverts below the whole width of our expressway (northbound and southbound lanes) as well as the adjoining West Service Road). Thence, water was supposed to flow out westward thru a natural creek. Said creek is inside a private property owned by Dra. Pascual. Unfortunately, about seventy (70) lineal meters of this former creek has been clogged up either thru soil erosion or by fill/garbage thrown into it. Hence, this former open natural drainage has been constricted and during heavy rain, it cannot cope with the volume of water coming from our Expressway, thereby resulting in a temporary flooding near our Bicutan Entry Toll booth which happens to be the lowest elevation in the vicinity. After the rain, water will gradually subside.

3.4.C PROPOSED SOLUTION:

Remove this bottleneck in our drainage system by dredging the clogged up seventy (70) lineal meters of former creek inside the property of Dra. Pascual, using a backhoe.

Fortunately, our long overdue requisition for such a backhoe finally arrived last Wednesday, August 2, and same was immediately used in dredging this open canal/creek inside the private lot of Dra. Pascual today, August 3, 1989.

This work is scheduled to last for 15 days after which the backhoe shall be used for improving the drainage system in other parts of SLTG.

We are thankful for the cooperation of Dra. Pascual in allowing us to work inside her property.

3.5 Southbound and Northbound Lanes near Motorola (Km 15+600).

3.5.A EXTENT/FREQUENCY OF FLOODING:

At least once a year (July or August), this area is flooded. However, this year's flooding (8:00-11:00 am, Thursday, July 27, 1989) had the highest flood depth.

During this flood:

3.5.A1 The Southbound lanes was flooded from 8:30-10:00 am. Length was about forty (40) meters; Depth ranges from 0-0.50 meters; Width was for whole southbound lane 1, 2, & 3 and the West Service Road.

3.5.A2 The Northbound lanes was flooded from 8:30-10:00 am. Length was about 50-60 meters; Depth ranges from 0-0.90 meters; Width was for whole northbound lanes and beyond to the East Service Road.

3.5.B PROBABLE CAUSE:

During extraordinary long heavy rain, the run-off water along the length of the expressway and the adjoining Service roads flows down into this area (which is at the bottom of the longitudinal vertical parabolic curve) and is beyond the capacity of its drainage system. Please note its short duration during the last flood and the fact that it happens only about once a year during the month of July or August.

3.5.C PROPOSED SOLUTION:

We should consider the possible future raising up of the road grade elevation of this area by about one (1) meter with proper and sufficient underground drainage facilities to cope with this occasional flash floods. Meanwhile, we may construct a water deflector wall along our road right-of-way fence/to prevent flood water from the East Service Road from overflowing into our Northbound lanes. More cross drainage to existing drainage outlets should be constructed on Southbound lanes.

3.6 Northbound and Southbound lanes from Alabang Hills Subdivision Area to Mintcor Subdivision Area (Km. 19+700 to Km. 20+350). Please see attach sketch plan.

3.6.A EXTENT/FREQUENCY OF FLOODING:

This happens only once or twice a year, especially during the month of July or August. However, the flood this year was the biggest (8:30-11:00 am, Thursday, July 27, 1989). Moreover, due to rapid housing and developments of this area which are constricting the natural drainage outlets more severe flooding is expected in the future.

During the last flood (July 27, 1989), extent of flooding were:

3.6.A1 Southbound lanes 1, 2 & 3 duration from (9:00-11:00 am, Length about 600 meters from Mintcor Housing to Alabang Hills marked A to B is enclosed sketch plan, Depth was from 0-0.60 meters. Width was for whole southbound lane 1, 2, & 3 and adjoining West Service Road.

3.6.A2 Northbound lanes 1, 2, & 3 duration from 9:00-10:30 am; Length about 50 meters in the vicinity of Liberty Homes marked C in enclosed sketch plan; Depth was about 0.30 meters and width was for whole northbound lanes 1, 2, & 3.

3.6.B PROBABLE CAUSE:

We should again note its short duration during the last flood and the fact that this happens only about once or twice a year. This is due to heavy, continuous rain where the run-off water collects at the bottom most part of our expressway.

This is further aggravated by the following recent developments:

a.) The residents of Carmina Compound mostly composed of poor people suffers about five (5) to six (6) ft. deep of flood water in their residential houses every time there is such a flood.

REASON: The ground elevation of their compound is six (6) ft. below that of our Expressway pavement and our two (2) span box culvert flows directly into their compound, whose bottom elevation is level with the ground elevation of Carmina Compound. One child left alone in their home was drowned during such a flood.

More than a year ago, these residents reacted by placing rock boulders inside our box culvert to block the flow of water into their compound.

Last year, after such a flood, our TFS personnel tried to clean up said box culvert of rocks but were prevented by irate residents of Carmina Compound. Subsequently, they were able to do so under the protection of some policeman. However, the residents claimed that the rock boulders were their property, hence, same were left in the compound. Said boulders are now back inside our box culvert.

b.) Uratex Foam has built a high wall to block the flow of water into their compound. However, they placed a pipe culvert for said flow of water. At present, this pipe culvert is half buried and perhaps clogged up. The adjoining Agchem and Libpipe also placed a high wall leaving only a one (1) meter wide space for passage of water towards the East.

c.) On the West side of the expressway, the Hills Borrough drainage system flows into our two (2) span box culvert (see attach sketch).

d.) Hence, during flash flood, our Southbound lanes are flooded together with the West Service Road and the access road to Alabang Hills Subdivision on the West and Carmina and Bunyi Compound on the East.

e.) On the Northbound lanes, the lowest portion is in the vicinity of Liberty Homes Subdivision. Water comes from both ends of the Northbound lanes as well as water that overflows thru the center island from the Southbound lanes.

3.6.C PROPOSED SOLUTION:

Last Wednesday, August 1, 1989, we conferred with the Engineer of Muntinlupa Municipal Engineer's Office about this problem (Muntinlupa Mayor has referred this matter to their Municipal Engineer's Office).

One possible solution was to deepen the one (1) meter drainage space between the high walls of Agchem and Uratex Foam Compound. This however, would raise complaints from the residents of Cabeza Compound.

The solution, per Muntinlupa Municipal Engineer's Office plans is to construct one (1) (later to be improved into two) lines of 48" Reinforced pipe culvert along the side of the East Service Road from our two (2) span box culvert at Carmina Compound to Pasong Diablo River, a distance about Six Hundred (600) lineal meters. Although they have already prepared their plans and estimates, funding is still a problem and they are banking on the help of the various companies along the vicinity concerned.

Long term solution to this problem will therefore, involve proper coordination with the town officials of Muntinlupa, Metro Manila, thru the Office of the Municipal Engineer.

As additional information, PNCC-POD Plant at Carmona has a stockpille of 48" diameter Reinforced pipe culvert. Per our physical count, there are at present Four Hundred Fifteen (415) pieces.

On the bridge across the Pasong Diablo Bridge, near Mintcor Townhouse, (Km. 20+350), the depth of water (as shown by the water mark on the right-of-way fence during the last flood on July 27) was about ten (10) inches. This could readily be solved by increasing the capacity of the 4" diameter water drain pipe at the bridge floor slab to say 6" or 8" diameter. There are three (3) such water drain pipe on each side of this bridge. This work will be programmed this coming weekend when traffic is not so big.

3.7 Southbound and Northbound Lanes at Halang (Km. 23, more or less).

3.7.A EXTENT OF FREQUENCY OF FLOODING:

This happens only once in a while or about once a year (so far there has been no flood for this year, 1989) during extra-ordinary heavy rain. At the Northbound lanes, the length is about fifty (50) meters and the depth ranges from 0-6 inches. The Southbound lanes is deeper from 0-18 inches and the length is about one hundred (100) meters.

3.7.B PROBABLE CAUSE:

During flash flood the run-off water from the Hills West of the South Luzon Expressway will overflow across the South Expressway in its natural drainage flow towards the East (Laguna Bay Area). Sometimes, this flooding even occurs after the heavy rain has stopped. Duration of the last flood (last year) was from 5:00-10:00 pm.

3.7.C PROPOSED SOLUTION:

The embankment and road pavement on this portion of the road should be raised by about two (2) to three (3) feet at some future date with proper and sufficient underground drainage facilities to cope with occasional flash flood problems.

3.8 Southbound Traffic Lane under our Alabang Viaduct (near Alabang Viaduct Column No. 15 at Km. 23+500)

3.8.A EXTENT/FREQUENCY:

Every prolonged continuous heavy rain, the run-off water collects in this area. Length is about one hundred (100) meters and depth ranges from 0 to 15 inches at its western side. Hence, the buses could hardly pass except on the Eastern side during peak flooding of this area. However, water thereat readily subside after the heavy rain have stopped.

3.8.B PROBABLE CAUSE:

Our drainage system at this area was for the run-off water to drain into our open canal located about eight (8) meters from said roadway. However, except for a small opening left, an elevated concrete sidewalk along the waterside of said roadway has recently been constructed, thus, obstructing the run-off water from draining into said drainage canal. Said small opening is not sufficient during heavy rain to convey the run-off water resulting in the temporary flooding of the area.

3.8.C PROPOSED SOLUTION:

Coordinating with DPWH Traffic Engineering Center (TEC) who is undertaking the road improvement projects under our Alabang Viaduct for a bigger drainage facility (open/culvert) to convey the run-off water from the road pavement into our drainage canal.

4.0 Our TFS Roadway personnel are also tasked with cleaning the various drainage canals, gutters and outlets. During heavy rains, TFS Roadway personnel are automatically assigned to attend to our drainage problem especially on the above mentioned possible flooding areas.

5.0 We are also preparing a Water Pump and Hoses to pump out water in case of roadway flooding.

(Sgd.) JUNNE M. UYCOQUE

NOTED:

(Sgd.) F. R. SUAREZ
OIC/Head-SLTG

cc. H.P. Gayota
Engineering Division
File

Attachment A3-5-2

BRIDGE INSPECTION REPORTS

LOUIS BERGER INTERNATIONAL, INC.

BRIDGE INSPECTION REPORT

ROAD: South Luzon Expressway

NAME OF BRIDGE: Buendia Avenue Overpass

DATE INSPECTED: 6/16/92

WEATHER CONDITIONS: Hot

CONDITION RATINGS

4 Good	2 Poor
3 Fair	1 Critical
NA Not Applicable	NI Not Inspected

ITEM	COMPONENT	CONDITION RATING
1	Footing/Piles	NI
2	Bridge Abutments • Headstock and Main Wall	3
	• Wingwalls	3
3	Piers	3
4	Bearings	NI
5	Girders • General	3
	• Protective Coating of Steel Girders	NA
6	Deck Slab • Top	NI
	• Underside	3
7	Parapet/Kerbs	3
8	Median	3
9	Sidewalk Slabs	NA
10	Drainage System/Scuppers/Drainage Outlets	3
11	Deck Joints	NI
12	Railings • Metalwork	NA
	• Protective Coating	NA
13	Protection Angles	3
14	Cover Plates	NA
15	Wearing Surface	2
16	Approach Slabs	NI
17	Approach Pavement	3
18	Waterway • Vegetation	NA
	• Scour	NA
	• Scour Protection Work	NA
19	Batter Protection	NA
20	Culvert Units	NA
21	Headwalls and Wingwalls of Culvert	NA

BUENDIA AVENUE OVERPASS (continued)

COMMENTS:

Piers and Headstocks

- Generally painted and cracks hard to see.
- Some flexural cracks evident on undersides of headstocks.
- Wide cracks near prestressing anchorages at southern end of bridge, probably due to inadequate spalling reinforcement.

Deck Soffit

- Many longitudinal and some traverse shrinkage cracks, probably due to inadequate shrinkage reinforcement.
- Some large cracks under soffit on eastern side of bridge north of Buendia Avenue.
- Lack of concrete cover on reinforcement with rusting and spalling in many areas.

Deck Joints

- Small trees growing in expansion joints

Deck Surface

- Road alignment is undulating due to deflection of concrete members under wearing surface.

CONCLUSIONS

The bridge appears to be basically sound, but is in urgent need of maintenance. Treatment of the wide cracks near the prestressing anchorages in the southern pier headstock should include checking whether the prestressing tendons have been affected by corrosion.

Inspecting Officer

LOUIS BERGER INTERNATIONAL, INC.

BRIDGE INSPECTION REPORT

ROAD: South Luzon Expressway

NAME OF BRIDGE: Magallanes Interchange (6 Structures)

DATE INSPECTED: 6/30/92

WEATHER CONDITIONS: Warm and wet

CONDITION RATINGS	
4 Good	2 Poor
3 Fair	1 Critical
NA Not Applicable	NI Not Inspected

ITEM	COMPONENT		CONDITION RATING
1	Footing/Piles		NI
2	Bridge Abutments	• Headstock and Main Wall	3 (where applicable)
		• Wingwalls	3 (where applicable)
3	Piers		3
4	Bearings		NI
5	Girders	• General	3
		• Protective Coating of Steel Girders	3 (where applicable)
6	Deck Slab	• Top	2
		• Underside	4
7	Parapet/Kerbs		2
8	Median		3 (where applicable)
9	Sidewalk Slabs		NA
10	Drainage System/Scuppers/Drainage Outlets		2
11	Deck Joints		2
12	Railings	• Metalwork	3 (where applicable)
		• Protective Coating	2 (where applicable)
13	Protection Angles		NA
14	Cover Plates		NA
15	Wearing Surface		2
16	Approach Slabs		NA
17	Approach Pavement		3 (where applicable)
18	Waterway	• Vegetation	NA
		• Scour	NA
		• Scour Protection Work	NA
19	Batter Protection		NA
20	Culvert Units		NA
21	Headwalls and Wingwalls of Culvert		NA

MAGALLANES INTERCHANGE (continued)

COMMENTS:

Piers and Headstocks

- Substantial surface crazing, probably due to inadequate shrinkage reinforcement.

Parapets/ Curbs

- Areas damaged by traffic which have not been repaired have exposed, rusted reinforcement and in some cases are potential traffic hazards.
- Many lamp standard base plates and anchor bolts have rusted, staining the parapets.

Drainage System/Scuppers/Drainage Outlets

- Many deck drainage outlets are blocked with rubbish. Deck drainage occurs through the deck joints onto the pier headstocks below, with rubbish being deposited around the bearings. Small trees are growing on some headstocks.

Deck Joints

- Many joint sealants are damaged or missing, which allows deck drainage to occur through the open joints.

Wearing Surface

- The riding surface is undulating on sections of the structures.

CONCLUSIONS

The bridges appear to be sound, but are in urgent need of maintenance.

Inspecting Officer

LOUIS BERGER INTERNATIONAL, INC.

BRIDGE INSPECTION REPORT

ROAD: South Luzon Expressway

NAME OF BRIDGE: Nichols-McKinley Road Interchange

DATE INSPECTED: 6/30/92

WEATHER CONDITIONS: Warm and wet

CONDITION RATINGS

4 Good — 2 Poor
3 Fair — 1 Critical
NA Not Applicable — NI Not Inspected

ITEM	COMPONENT	CONDITION RATING
1	Footing/Piles	NI
2	Bridge Abutments • Headstock and Main Wall	3
	• Wingwalls	NA
3	Piers	2
4	Bearings	NI
5	Girders • General	3
	• Protective Coating of Steel Girders	NA
6	Deck Slab • Top	3
	• Underside	4
7	Parapet/Kerbs	2
8	Median	NA
9	Sidewalk Slabs	NA
10	Drainage System/Scuppers/Drainage Outlets	3
11	Deck Joints	2
12	Railings • Metalwork	NA
	• Protective Coating	NA
13	Protection Angles	3
14	Cover Plates	NA
15	Wearing Surface	3
16	Approach Slabs	NA
17	Approach Pavement	3
18	Waterway • Vegetation	NA
	• Scour	NA
	• Scour Protection Work	NA
19	Batter Protection	NA
20	Culvert Units	NA
21	Headwalls and Wingwalls of Culvert	NA

NICHOLS-MCKINLEY ROAD INTERCHANGE (continued)

COMMENTS:

Piers

- Some steel columns have substantial loss of section at bases due to rust.

Parapets/Curbs

- Areas damaged by traffic which have not been repaired have exposed, rusted reinforcement and in some cases are potential traffic hazards.

Deck Joints

- The deck joints are not sealed and allow deck drainage to occur through the joints and rubbish to accumulate on the headstocks below.

CONCLUSIONS

The bridges appear to be sound but are in need of maintenance.

Inspecting Officer

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LOUIS BERGER INTERNATIONAL, INC.

BRIDGE INSPECTION REPORT

ROAD: South Luzon Expressway

NAME OF BRIDGE: Bicutan Interchange

DATE INSPECTED: 6/30/92

WEATHER CONDITIONS: Hot

CONDITION RATINGS	
4 Good	2 Poor
3 Fair	1 Critical
NA Not Applicable	NI Not Inspected

ITEM	COMPONENT		CONDITION RATING
1	Footing/Piles		NI
2	Bridge Abutments	• Headstock and Main Wall	3
		• Wingwalls	3
3	Piers		3
4	Bearings		NI
5	Girders	• General	3
		• Protective Coating of Steel Girders	NA
6	Deck Slab	• Top	3
		• Underside	3
7	Parapet/Kerbs		3
8	Median		3
9	Sidewalk Slabs		NA
10	Drainage System/Scuppers/Drainage Outlets		2
11	Deck Joints		3
12	Railings	• Metalwork	3
		• Protective Coating	3
13	Protection Angles		NA
14	Cover Plates		NA
15	Wearing Surface		2
16	Approach Slabs		NA
17	Approach Pavement		3
18	Waterway	• Vegetation	NA
		• Scour	NA
		• Scour Protection Work	NA
19	Batter Protection		NA
20	Culvert Units		NA
21	Headwalls and Wingwalls of Culvert		NA

BICUTAN INTERCHANGE (continued)

COMMENTS:

Drainage System/Scuppers/Drainage Outlets

- Drainage system is ineffective due to blockages.

CONCLUSIONS

The bridge appears to be sound but is in need of maintenance.

Inspecting Officer

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LOUIS BERGER INTERNATIONAL, INC.

BRIDGE INSPECTION REPORT

ROAD: South Luzon Expressway

NAME OF BRIDGE: Sucat Interchange

DATE INSPECTED: 6/30/92

WEATHER CONDITIONS: Hot

CONDITION RATINGS	
4 Good	2 Poor
3 Fair	1 Critical
NA Not Applicable	NI Not Inspected

ITEM	COMPONENT	CONDITION RATING
1	Footing/Piles	NI
2	Bridge Abutments • Headstock and Main Wall	3
	• Wingwalls	3
3	Piers	3
4	Bearings	NI
5	Girders • General	3
	• Protective Coating of Steel Girders	3
6	Deck Slab • Top	3
	• Underside	3
7	Parapet/Kerbs	3
8	Median	3
9	Sidewalk Slabs	NA
10	Drainage System/Scuppers/Drainage Outlets	2
11	Deck Joints	3
12	Railings • Metalwork	NA
	• Protective Coating	NA
13	Protection Angles	NA
14	Cover Plates	NA
15	Wearing Surface	3
16	Approach Slabs	NA
17	Approach Pavement	3
18	Waterway • Vegetation	NA
	• Scour	NA
	• Scour Protection Work	NA
19	Batter Protection	NA
20	Culvert Units	NA
21	Headwalls and Wingwalls of Culvert	NA

SUCAT INTERCHANGE (continued)

COMMENTS:

Parapets/Curbs

- Minor traffic damage.

Drainage System/Scuppers/Drainage Outlets

- Drainage system is ineffective due to blockages.

CONCLUSIONS

The bridge appears to be sound but is in need of maintenance.

Inspecting Officer

BRIDGE INSPECTION REPORT

ROAD: South Luzon Expressway

NAME OF BRIDGE: Alabang Viaduct

DATE INSPECTED: 6/30/92

WEATHER CONDITIONS: Hot

CONDITION RATINGS

4 Good
3 Fair
2 Poor
1 Critical
NA Not Applicable
NI Not Inspected

ITEM	COMPONENT	CONDITION RATING
1	Footing/Piles	NI
2	Bridge Abutments • Headstock and Main Wall	3
	• Wingwalls	NA
3	Piers	4
4	Bearings	NI
5	Girders • General	2
	• Protective Coating of Steel Girders	NA
6	Deck Slab • Top	3
	• Underside	3
7	Parapet/Kerbs	3
8	Median	3
9	Sidewalk Slabs	NA
10	Drainage System/Scuppers/Drainage Outlets	2
11	Deck Joints	2
12	Railings • Metalwork	NA
	• Protective Coating	NA
13	Protection Angles	NA
14	Cover Plates	NA
15	Wearing Surface	2
16	Approach Slabs	NA
17	Approach Pavement	3
18	Waterway • Vegetation	NA
	• Scour	NA
	• Scour Protection Work	NA
19	Batter Protection	NA
20	Culvert Units	NA
21	Headwalls and Wingwalls of Culvert	NA

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ALABANG VIADUCT (continued)

COMMENTS:

Girders

- Many girders have flexural cracks at mid-span. Such cracking, under service loading only, is indicative of inadequate flexural capacity.

  Attempts have been made to supplement the flexural capacity:

  - several girders have external draped strands bonded to the outer surfaces of the webs
  - the girders in one entire span each have an external stressed tendon below the bottom flange.

Drainage System/Scuppers/Drainage Outlets

- Scuppers are generally blocked with debris.

Deck Joints

- The concrete has been damaged by traffic along each deck joint due to the non-provision of steel protection angles at the joints.

Wearing Surface

- The riding surface is undulating with a significant dip in each span.

CONCLUSIONS

Apart from the structural adequacy of the girders, which is discussed in the text of Appendix A3-4, the viaduct appears to be sound, but in need of maintenance. The alignment of the riding surface has evidently not been corrected to avoid overloading the girders.

Inspecting Officer

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Appendix A3-6
TOLL SYSTEM CONCEPT

Appendix A3-6
TOLL SYSTEM CONCEPT

1. GENERAL REQUIREMENTS

The basic concept of a toll collection system is provision of a means for counting vehicles independently of the toll collector in order to ensure accuracy, reliability and security. This is best achieved using equipment which meets with the following general criteria:

- Is composed of integrated, industry standard computers, sub-systems, peripherals and software;
- Can be easily expanded and adapted to meet changed conditions;
- Avoids the need for manual ticket processing; and
- Provides means for a plaza supervisor to monitor toll collector workstation.

The toll system adopted for the MST and SLE should therefore include the follc

- The detector loops are large and configured for accurate counting of all sizes and types of vehicles.
- The loop detectors are of the digital type to provide consistent and reliable performance.
- Each toll collector's number is recorded when a lane is opened and closed using his/her magnetically encoded identification card.
- Traffic totals are recorded by vehicle classification and lane.
- Totals for audit purposes are recorded for each individual toll collector.
- Each toll collector counts his/her money at the end of a shift, fills out a deposit report and keys the report into the plaza computer.
- Each plaza sends computer data to a central office, either on diskette or by modem over telephone lines, for reconciliation of loop counts, tickets and money and preparation of the toll revenue audit.

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- Toll revenue audit information is entered into the Management Information System (MIS).

A closed system should have the following additional features:

- Toll tickets are magnetically encoded and re-usable.
- Different tickets are used for each combination of entry plaza and vehicle classification.
- Toll tickets are pre-encoded with the entry plaza, vehicle classification and ticket number.
- Each ticket is read by magnetic stripe card reader at the entry and exit lane.
- Ticket data is totalled in the plaza computer.
- The exit collector sorts tickets by entry plaza and vehicle classification, either manually or by machine.
- Sorted ticket packs are returned to entry plazas for re-use.
- A receipt printer is provided in each exit and reversible toll lane.

A barrier system should have the following additional features:

- The toll collectors record each vehicle by classification by pressing the appropriate button on a keypad.
- Vehicle totals by classification are accumulated in the plaza computer.
- A receipt printer is provided in each toll lane.

From the toll revenue audit reports provided from such a system, an MIS can produce reports such as the following:

- Total kilometers travelled by vehicle classification;
- Average vehicle - kilometers travelled by vehicle classification;
- Total number of vehicles using the facility by vehicle classification;
- Number of vehicles passing each toll booth;

- Number of toll collector transactions per hour;
- Average cost per vehicle for all classes;
- Percentage distribution of vehicle classes;
- Average revenue per vehicle of each class;
- Average kilometers travelled by each vehicle class;
- Cost and revenue per vehicle - kilometer for each class;
- Average Daily Traffic (ADT) between interchanges by direction and vehicle class;
- ADT by toll plaza origin and destination by vehicle class; and
- Revenue/Cost percentage ratios showing revenue comparisons to components of cost.

There are other essential elements to a toll collection system. For it to operate continuously, an Uninterruptible Power Supply (UPS) of adequate rating with 30 - minute battery back-up should be installed to provide power to the plaza, its computers and toll lane equipment. One or more back-up generators which start up automatically and takes over the load whenever a failure occurs in the commercial power supply are an essential requirement.

At least two computers should be installed at each plaza to permit continuous operation of the toll collection system during maintenance operations.

The supervisor workstation at each toll plaza should be located such that the toll lanes are all visible to the supervisor. If necessary, a closed circuit television system should be utilized. It should include a personal computer capable of displaying transactions and maintenance information for each toll lane. The supervisor should also have a means of voice communication with each toll booth.

A radio system should be provided for communication between the central office and toll plazas, official vehicles and maintenance vehicles.

2. AUTOMATIC VEHICLE IDENTIFICATION TECHNOLOGY

Automatic Vehicle Identification (AVI) is a term used for techniques that uniquely identify vehicles as they pass specific points without requiring any action by the driver. AVI technology is particularly appropriate for automatic toll collection and a number of such system are being used in Europe and USA. Vehicles are equipped with a transponder device which reflects a unique identification code when read automatically at the toll booth. The data are checked for integrity before being transmitted automatically to a computer for processing and storage.

A number of technologies have been tried out in the past, including optical scanner and infrared systems. Various problems encountered with early systems of these types have resulted in their general rejection in favor of radio frequency (RF) based systems.

RF systems require sophisticated hardware and software and are provided by specialist vendors. A recent installation on a toll bridge in New Orleans, Louisiana, USA costs the following amount:

• Hardware cost per toll lane	US$	30,000
• Software cost for the entire system		50,000
• Monthly charge for use of software		4,500

The individual windshield mounted card transponders cost US$ 32 each and are purchased by users. Maintenance services are provided on demand by the specialist vendor.

AVI systems usually operate on a pre-payment method. Road users set up an account by either a direct cash prepayment or by using a credit card. Experience indicates that cash accounts tend to lapse resulting in higher administrative costs and use of credit cards is preferred.

An AVI system may be advantageous at MST toll barriers where traffic volumes are high with a large number of regular users such as trucks, buses and commuters. BOT bidders may elect to install an AVI system in order to maximize traffic flow through toll plazas whose size is limited by restricted ROW.

Dallas North Tollway in USA has such an AVI system. Table A3-6-1 shows the effect this has had on increasing the number of vehicles passing through a barrier toll lane. The increase in traffic flow reduces the number of toll lanes needed, and the capital and operating costs to the owner. Thus, the ₱30,000 cost of providing the AVI hardware could be easily recovered by not having to build an additional lane, always provided that tollway users are willing to pay the relatively high price for a card transponder. The cost of transponders will no doubt decrease as usage increases.

Table A3-6-1
EFFECT OF AVI TRANSPONDER DEVICE ON TRAFFIC

TRAFFIC COMPARISONS			
	TOLL TAG*	EXACT CHANGE	CHANGE MADE
Seconds per car	3.0	5.2	12.4
Km per hour	8.0	5.0	2.0
Cars per hour	1200.0	692.0	290.0
Percentage gain	--	74%	314%

*AVI transponder device.
Source: Proceedings of IBTTA Cleveland Workshop, April 26, 1988.

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Appendix A3-7
MST AND SLE PROJECT COSTS

Appendix A3-7
MST AND SLE PROJECT COSTS

Preparation of the cost estimates is described in Chapter 3 - Section 3.5. This Appendix includes the procedures used to develop the unit costs from which the project costs summarized in Tables 3-4 and 3-5 were calculated.

A detailed cost estimate was made for Bicutan Interchange, see Tables 3-7-4a and 3-7-4b. Average interchange costs per lane-meter were developed from this estimate and used to determine the estimated cost of the other interchanges.

The following cost tables are appended:

TABLE	TITLE
A) PRES. QUIRINO TO ALABANG	
Table A3-7-1	Cost Summary
Table A3-7-2	Cost Estimate Breakdown, Part A
Table A3-7-3a	Cost Estimate Breakdown, Part B, Alternative 1
Table A3-7-3b	Cost Estimate Breakdown, Part B, Alternative 2
Table A3-7-3c	Cost Estimate Breakdown, Part B, Alternative 3
Table A3-7-3d	Cost Estimate Breakdown, Part B, Alternative 4
Table A3-7-4a	Cost Estimate Breakdown, Part B, Alternative 1 for Bicutan Interchange
Table A3-7-4b	Cost Estimate Breakdown, Part B, Alternative 3 for Bicutan Interchange
Table A3-7-5	Cost Estimate Breakdown, Part C
Table A3-7-6a	Summary of Unit Costs, Part B (Structures)
Table A3-7-6b	Summary of Unit Costs, Part B (Interchanges)
Table A3-7-6c	Summary of Unit Costs, Part C
Table A3-7-7	Unit Cost Development per Pay Item
B) MAGALLANES TO ALABANG	
Table A3-7-8	Cost Summary
Table A3-7-9	Cost Estimate Breakdown, Part A
Table A3-7-10a	Cost Estimate Breakdown, Part B, Alternative 1
Table A3-7-10b	Cost Estimate Breakdown, Part B, Alternative 2
Table A3-7-10c	Cost Estimate Breakdown, Part B, Alternative 3
Table A3-7-10d	Cost Estimate Breakdown, Part B, Alternative 4
Table A3-7-11	Cost Comparison

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Table A3–7–1
TOTAL PROJECT COST

DESCRIPTION	FOREIGN COMPONENT	LOCAL COMPONENT	TAXES	TOTAL COST
	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)
PART A—PRE-CONCESSION AGREEMENT OR CONTRACT	146,307,720	966,996,660	53,064,360	1,166,368,740
PART B–MANILA SOUTH TOLLWAY				
1. Alternative 1–AASHTO Girder, 4 Lanes	5,329,981,133	3,280,297,797	2,029,880,450	10,640,159,380
2. Alternative 2–AASHTO Girder, 6 Lanes	5,869,736,365	3,586,925,636	2,241,371,131	11,698,033,131
3. Alternative 3–Box Girder, 4 Lanes	4,854,265,249	2,847,537,047	1,819,356,132	9,521,158,428
4. Alternative 4–Box Girder, 6 Lanes	5,578,624,494	3,315,883,730	2,029,798,980	10,924,307,203
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	362,354,936	474,358,061	223,090,259	1,059,803,256
TOTAL with PART B, Alternative 1	5,838,643,789	4,721,652,518	2,306,035,069	12,866,331,376
TOTAL with PART B, Alternative 2	6,378,399,021	5,028,280,357	2,517,525,750	13,924,205,128
TOTAL with PART B, Alternative 3	5,362,927,905	4,288,891,768	2,095,510,751	11,747,330,424
TOTAL with PART B, Alternative 4	6,087,287,150	4,757,238,451	2,305,953,599	13,150,479,199

COST TO BE BORNE BY CONCESSIONAIRE

DESCRIPTION	FOREIGN COMPONENT	LOCAL COMPONENT	TAXES	TOTAL COST
	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)
PART B–MANILA SOUTH TOLLWAY				
1. Alternative 1–AASHTO Girder, 4 Lanes	5,329,981,133	3,280,297,797	2,029,880,450	10,640,159,380
2. Alternative 2–AASHTO Girder, 6 Lanes	5,869,736,365	3,586,925,636	2,241,371,131	11,698,033,131
3. Alternative 3–Box Girder, 4 Lanes	4,854,265,249	2,847,537,047	1,819,356,132	9,521,158,428
4. Alternative 4–Box Girder, 6 Lanes	5,578,624,494	3,315,883,730	2,029,798,980	10,924,307,203
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	362,354,936	474,358,061	223,090,259	1,059,803,256
TOTAL with PART B, Alternative 1	5,692,336,069	3,754,655,858	2,252,970,709	11,699,962,636
TOTAL with PART B, Alternative 2	6,232,091,301	4,061,283,697	2,464,461,390	12,757,836,388
TOTAL with PART B, Alternative 3	5,216,620,185	3,321,895,108	2,042,446,391	10,580,961,684
TOTAL with PART B, Alternative 4	5,940,979,430	3,790,241,791	2,252,889,239	11,984,110,459

BEST AVAILABLE DOCUMENT

Table 3-7-2
COST ESTIMATE BREAKDOWN
PART A – PRE-CONCESSION AGREEMENT OR CONTRACT

DESCRIPTION	UNIT	QTY.	UNIT COST (PESOS)	FOREIGN COMPONENT		LOCAL COMPONENT		TAXES		FINANCIAL COST	
				%	AMT (PESOS)	%	AMT (PESOS)	%	AMT (PESOS)	%	AMT (PESOS)
1. Planning Activities, Technical Investigations, Preliminary Designs and Detailed Surveys, Right-Of-Ways, Title Searches, ROW Plans, Traffic Studies and Other Studies.	LS	1	125,000,000	45	56,250,000	55	68,750,000	10	12,500,000		137,500,000
2. Environmental Impact Study	LS	1	6,675,000	60	4,005,000	40	2,670,000	10	667,500		7,342,500
3. Public Involvement and Information Program	LS	1	8,750,000	5	437,500	95	8,312,500	20	1,750,000		10,500,000
4. Technical Assistance During the Tendering Negotiations	LS	1	8,750,000	50	4,375,000	50	4,375,000	10	875,000		9,625,000
5. Right-Of-Way Acquisition											
Land (Type 1 & Type 2)	sq.m.	75,055	7,350	0	0	100	551,654,250	10	0		551,654,250
Subtotal Land	sq.m.			0	0	100	551,654,250	10	0		551,654,250
Buildings Type 1	sq.m.	24,633	3,000	40	29,559,600	60	44,339,400	20	14,779,800		88,678,800
Buildings Type 2	sq.m.	13,648	5,000	40	27,296,000	60	40,944,000	20	13,648,000		81,888,000
Subtotal Buildings	sq.m.	38,281		40	56,855,600	60	85,283,400	20	28,427,800		170,566,800
Total					**56,855,600**		**636,937,650**		**28,427,800**		**722,221,050**
6. Resettlement of Squatters	Persons	11,215	7,560	0	0	100	84,785,400	0	0		84,785,400
Subtotal					**121,923,100**		**805,830,550**		**44,220,300**		**971,973,950**
Contingencies (20%)					24,384,620		161,166,110		8,844,060		194,394,790
Total Part A					**146,307,720**		**966,996,660**		**53,064,360**		**1,166,368,740**

Table A3-7-3a

COST ESTIMATE BREAKDOWN

PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 1: AASHTO Girder Structure, Two Separate Carriageways (2 lanes each), 30.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	39,800	11	429,840	12	491,246	2	77,212	5	214,920	14	568,458	18	721,972
101 (1)	Removal of existing fence	sq.m.	21,200	150	3,181 484	172	3,635,982	16	332,840	75	1,590,636	187	3,968,822	241	5,104,960
(2)	Removal of existing curb and gutter	m	1,200	90	108,268	103	123,758	29	34,212	45	54,132	132	157,970	164	196,532
(3)	Removal of existing median	m	750	310	232,620	354	265,851	71	52,928	155	116,348	425	318,779	536	401,895
(4)	Removal of existing pavement/sidewalk	sq.m.	12,500	138	1,720,250	157	1,966,000	36	445,375	69	860,250	193	2,411,375	242	3,025,875
(5)	Demolish existing concrete structures	cu.m.	1,000	485	484,640	554	553,874	121	120,650	245	244,960	675	674,524	850	850,250
103 (1)	Structure excavation	cu.m.	164,400	251	41,338,360	287	47,243,863	50	8,274,252	118	19,341,660	338	55,518,115	419	68,954,292
(2)	Foundation fill	cu.m.	27,300	159	4,337,970	182	4,957,680	114	3,099,642	90	2,446,353	295	8,057,322	362	9,883,965
105 (7)	Subgrade preparation	sq.m.	5,000	6	30,750	7	35,143	1	5,600	9	44,500	8	40,743	16	80,850
	TOTAL SITE PREPARATION				51,864,222		59,273,397		12,442,711		24,913,759		71,716,107		89,220,691
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	5,000	166	830,150	190	948,743	75	373,000	86	428,450	264	1,321,743	326	1,631,600
201	Aggregate base course	cu.m.	–	–	–	–	–	–	–	–	–	–	–	–	–
206	Cement treated aggregate base course	cu.m.	5,000	659	3,296,550	753	3,767,486	278	1,392,350	297	1,485,600	1,032	5,159,836	1,235	6,174,500
311(1)	Portland cement conc. pavement(330thk)	sq.m.	6,600	471	3,108,402	538	3,552,459	242	1,596,012	186	1,224,300	780	5,148,471	898	5,928,714
	TOTAL PAVEMENT				7,235,102		8,268,688		3,361,362		3,138,350		11,630,050		13,734,814
	III. STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to C-5 Interchange-At grade pavement														
	• C-5 Interchange to Bicutan-over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	68,900	5,916	407,598,620	6,761	465,826,994	4,037	278,175,432	1,592	109,695,001	10,798	744,002,476	11,545	795,469,103
(2)	Bored Piles, 1.00 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
(3)	Bored Piles, 1.20 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	96 900	1,499	145,252,131	1,713	166,002,435	977	94,689,711	570	55,226,217	2,690	260,692,146	3,046	295,168,059
(2)a	Column	cu.m.	35,800	2,136	76,473,454	2,441	87,398,233	1,378	49,340,276	854	30,573,558	3,820	136,738,509	4,368	156,387,288
(3)a	Headstock(precast)	cu.m.	35,200	1,960	68,977,568	2,240	78,831,506	798	28,087,488	973	34,245,728	3,037	106,918,994	3,730	131,310,784
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	7,806,400	8	65,651,824	10	75,030,656	11	88,602,640	2	14,754,096	21	163,633,296	22	169,008,560
(2)a	Column	kg.	11,594,800	8	96,584,684	10	110,382,496	12	134,615,628	2	21,450,380	21	244,998,124	22	252,650,692
(3)a	Headstock	kg.	8,380,400	8	70,311,556	10	80,356,064	12	101,738,056	2	15,755,152	22	182,094,120	22	187,804,764
	SUB TOTAL SUBSTRUCTURE				930,849,837		1,063,828,385		775,249,281		281,700,132		1,839,077,666		[illegible]7,799,[illegible]50

Table A3-7-3a (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 1: AASHTO Girder Structure, Two Separate Carriageways (2 lanes each), 30.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	IIIB. SUPERSTRUCTURE														
406(1)	Precast, Pretensioned, Type IV AASHTO Girder, 29900 long	ea.	6,852	183,690	1,258,646,073	209,932	1,438,452,654	71,237	488,112,498	82,367	564,380,054	281,168	1,926,565,152	337,294	2,311,138,625
406(2)	Precast reinforced concrete deck form-work slab (100 x 1690 span)	sq.m.	289,500	533	154,176,120	609	176,201,260	217	62,812,815	237	68,524,650	826	239,014,095	986	285,513,585
405	Concrete 30 MPa in														
(1)b	Deck Slab	cu.m.	70,600	1,751	123,600,126	2,001	141,257,287	1,041	73,463,536	683	48,223,330	3,041	214,720,823	3,474	245,286,992
(2)b	Parapets	cu.m.	16,700	2,338	39,047,606	2,672	44,625,835	2,048	34,200,765	881	14,716,541	4,720	78,826,600	5,267	87,954,912
(3)b	End Cross Girders	cu.m.	6,300	2,075	13,070,799	2,371	14,938,056	2,182	13,745,970	728	4,586,290	4,553	28,684,026	4,985	31,405,059
404	Reinforcement Steel Grade 275 in														
(4)b	Deck Slab	kg.	3,620,200	10	34,645,314	11	39,594,645	10	36,202,000	2	8,905,692	21	75,796,645	22	79,753,006
(2)b	Parapets	kg.	1,576,000	10	16,406,160	12	18,749,897	11	17,383,280	3	4,554,640	23	36,133,177	24	38,344,080
(3)b	End Cross Girders	kg.	1,039,300	10	10,611,253	12	12,127,146	10	10,860,685	3	2,899,647	22	22,987,831	23	24,371,585
	Reinforcement Steel Grade 400 in														
(4)b	Deck	kg.	6,315,300	10	64,858,131	12	74,123,578	11	66,626,415	3	16,735,845	22	140,749,993	23	148,220,091
(5)b	Parapets	kg.	1,119,200	11	12,232,856	12	13,980,407	11	12,523,848	3	3,335,216	24	26,504,255	25	28,091,920
416	Laminated Elastomeric Bearing, 60 tonne capacity	ea.	13,710	2,803	38,423,646	3,203	43,912,738	2,223	30,477,330	974	13,359,024	5,426	74,390,068	6,000	82,260,000
401	Aluminum railings 190 high	m	68,600	711	48,757,450	812	55,722,800	290	19,863,816	316	21,670,054	1,102	75,586,616	1,316	90,291,320
414	Expansion joint Compression joint seal WABD WD 350 or equivalent	m	12,800	2,336	29,894,400	2,669	34,165,029	1,853	23,712,000	812	10,393,600	4,522	57,877,029	5,000	64,000,000
415	Drain pipe – 2 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	39,400	353	13,898,350	403	15,883,829	445	17,521,968	42	1,670,954	848	33,405,797	840	33,091,272
	SUB-TOTAL SUPERSTRUCTURE				1,858,268,284		2,123,735,181		907,506,926		783,957,237		3,031,242,107		3,549,732,447
	TOTAL STRUCTURES				2,789,118,121		3,187,563,566		1,682,756,207		1,065,657,369		4,870,319,773		5,537,531,697
	IV INTERCHANGES (2 lane, 30m span)														
	a. Pres. Quirino Ave.	lane m	1,680	56,695	95,247,600	64,794	108,854,400	36,537	61,382,160	20,575	34,566,000	101,331	170,236,560	113,807	191,195,760
	b. Vito Cruz	lane m	1,800	56,695	102,051,000	64,794	116,629,714	36,537	65,766,600	20,575	37,035,000	101,331	182,396,314	113,807	204,852,600
	c. Pasay Road	lane m	1,920	56,695	108,854,400	64,794	124,405,029	36,537	70,151,040	20,575	39,504,000	101,331	194,556,069	113,807	218,509,440
	d. Magallanes/EDSA	lane m	2,800	56,695	158,746,000	64,794	181,424,000	36,537	102,303,600	20,575	57,610,000	101,331	283,727,600	113,807	318,659,600
	e. Bicutan	lane m	2,600	56,695	147,407,000	64,794	168,465,143	36,537	94,996,200	20,575	53,495,000	101,331	263,461,343	113,807	295,898,200
	g/Sucat	lane m	2,640	56,695	149,674,800	64,794	171,056,914	36,537	96,457,680	20,575	54,318,000	101,331	267,514,594	113,807	300,450,480
	g. Alabang	lane m	2,720	56,695	154,210,400	64,794	176,240,457	36,537	99,360,640	20,575	55,964,000	101,331	275,621,097	113,807	309,555,040
	TOTAL INTERCHANGES				916,191,200		1,047,075,657		590,437,920		332,492,000		1,637,513,577		1,839,121,120

Table A3-7-3a (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 1: AASHTO Girder Structure, Two Separate Carriageways (2 lanes each), 30.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28)		FOREIGN COMPONENT ECONOMIC (1$=P32)		LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
				UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.
	V DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
	VI STREET LIGHTING	km	18	899,357	16,548,171	1,027,837	18,912,195	238,065	4,380,398	185,162	3,406,976	1,265,902	23,292,594	1,322,584	24,335,546
	VII TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	18	463,971	8,537,070	530,253	9,756,652	214,587	3,948,395	149,962	2,759,303	744,839	13,705,046	828,520	15,244,768
	VIII TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,880,000
	Toll Collection System	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
	TOTAL TOLL COLLECTION SYSTEM				90,120,000		102,994,286		90,120,000		45,060,000		193,114,286		225,300,000
	SUB-TOTAL				3,880,865,831		4,435,275,236		2,388,450,413		1,477,996,541		6,823,725,649		7,747,312,786
	20% CONTINGENCIES				776,173,166		887,055,047		477,690,083		295,599,308		1,364,745,130		1,549,462,557
	SUB-TOTAL				4,657,038,998		5,322,330,283		2,866,140,496		1,773,595,849		8,188,470,779		9,296,775,343
	5% GENERAL ITEMS				232,851,950		266,116,514		143,307,025		88,679,792		409,423,539		464,838,767
	SUB-TOTAL				4,889,890,948		5,588,446,797		3,009,447,521		1,862,275,642		8,597,894,318		9,762,614,110
	2% DETAILED DESIGN COST														
	a. 1.5% for Concessionaire's Designer				73,348,364		83,826,702		45,141,713		27,934,135		128,968,415		146,424,212
	b. 0.5% for Independent Design Checker (IDC)				24,449,455		27,942,234		15,047,238		9,311,378		42,989,472		48,808,071
	1% QUALITY CONTROL COST				48,898,909		55,884,468		30,094,475		18,622,756		85,978,943		97,616,141
	6% PROJ. MANAGEMENT & SUPV.														
	a. 5% for Concessionaire's supervision of his constructors				244,494,547		279,422,340		150,472,376		93,113,782		429,894,716		488,080,705
	b. 1% for the Independent Certification Engineer (ICE)				48,898,909		55,884,468		30,094,475		18,622,756		85,978,943		97,616,141
	GRAND TOTAL				5,329,981,133		6,091,407,009		3,280,297,791		2,029,880,450		9,371,704,806		10,640,159,380

Table A3-7-3b
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 2: AASHTO Girder Structure, Two Separate Carriageways (3 lanes each), 30.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	39,800	11	429,840	12	491,246	2	77,212	5	214,920	14	568,458	18	721,972
101 (1)	Removal of existing fence	sq.m.	21,200	150	3,181,484	172	3,635,982	16	332,840	75	1,590,636	187	3,968,822	241	5,104,960
(2)	Removal of existing curb and gutter	m	1,200	90	108,288	103	123,758	29	34,212	45	54,132	132	157,970	164	196,632
(3)	Removal of existing median	m	750	310	232,620	354	265,851	71	52,928	155	116,348	425	318,779	536	401,895
(4)	Removal of existing pavement/sidewalk	sq.m.	12,500	138	1,720,250	157	1,966,000	36	445,375	69	860,250	193	2,411,375	242	3,025,875
(5)	Demolish existing concrete structures	cu.m.	1,000	485	484,640	554	553,874	121	120,650	245	244,960	675	674,524	850	850,250
103 (1)	Structure excavation	cu.m.	164,400	251	41,338,380	287	47,243,863	50	8,274,252	118	19,341,660	338	55,518,115	419	68,954,292
(2)	Foundation fill	cu.m.	27,300	159	4,337,970	182	4,957,680	114	3,099,642	90	2,446,353	295	8,057,322	362	9,883,965
105 (7)	Subgrade preparation	sq.m.	7,500	6	46,125	7	52,714	1	8,400	9	66,750	8	61,114	16	121,275
	TOTAL SITE PREPARATION				51,879,597		59,290,968		12,445,511		24,936,009		71,736,479		89,261,116
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	7,500	166	1,245,225	190	1,423,114	75	559,500	86	642,675	264	1,982,614	326	2,447,400
201	Aggregate base course	cu.m.	–	–	–	–	–	–	–	–	–	–	–	–	–
206	Cement treated aggregate base course	cu.m.	7,500	659	4,944,825	753	5,651,229	278	2,088,525	297	2,228,400	1,032	7,739,754	1,235	9,261,750
311(1)	Portland cement concr. pavement(330thk)	sq.m.	9,900	471	4,662,603	538	5,328,689	242	2,394,018	186	1,836,450	780	7,722,707	898	8,893,071
	TOTAL PAVEMENT				10,852,653		12,403,032		5,042,043		4,707,525		17,445,075		20,602,221
	III. STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to C-5 – At grade pavement														
	• C-5 Interchange to Bicutan-over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m													
(2)	Bored Piles, 1.00 m ø	m	68,900	6,869	473,263,765	7,850	540,872,874	4,722	325,357,513	1,851	127,531,144	12,572	866,230,387	13,442	926,152,422
(3)	Bored Piles, 1.20 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	96,900	1,499	145,252,131	1,713	166,002,435	977	94,689,711	570	55,226,217	2,690	260,692,146	3,046	295,168,059
(2)a	Column	cu.m.	39,700	2,136	84,804,361	2,441	96,919,270	1,378	54,715,334	854	33,904,197	3,820	151,634,604	4,368	173,423,892
(3)a	Headstock(precast)	cu.m.	44,200	1,960	86,613,878	2,240	98,987,289	798	35,268,948	973	43,001,738	3,037	134,256,237	3,730	164,884,564
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	7,806,400	8	65,651,824	10	75,030,656	11	88,602,640	2	14,754,096	21	163,633,296	22	169,008,560
(2)a	Column	kg.	13,087,200	8	109,016,376	10	124,590,144	12	151,942,392	2	24,211,320	21	276,532,536	22	285,170,088
(3)a	Headstock	kg.	10,561,600	8	88,611,824	10	101,270,656	12	128,217,824	2	19,855,808	22	229,488,480	22	236,685,456
	SUB-TOTAL SUBSTRUCTURE				1,053,214,159		1,203,673,325		878,794,362		318,484,520		2,082,467,687		2,250,493,041

Table A3-7-3b (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 2: AASHTO Girder Structure, Two Separate Carriageways (3 lanes each), 30.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	IIIB. SUPERSTRUCTURE														
406(1)	Precast, Pretensioned, Type IV AASHTO Girder, 29900 long	ea.	7,994	183,690	1,468,420,418	209,932	1,678,194,764	71,237	569,464,581	82,367	658,443,397	281,168	2,247,659,345	337,294	2,696,328,396
406(2)	Precast reinforced concrete deck form-work slab (100 x 1690 span)	sq.m.	363,900	533	193,798,584	609	221,484,096	217	78,955,383	237	86,135,130	826	300,439,479	986	358,889,097
405	Concrete 30 MPa in														
(1)b	Deck Slab	cu.m.	76,400	1,751	133,754,244	2,001	152,861,993	1,041	79,498,784	683	52,185,020	3,041	232,360,777	3,474	265,438,048
(2)b	Parapets	cu.m.	12,000	2,338	28,058,160	2,672	32,066,469	2,048	24,575,400	881	10,574,760	4,720	56,641,869	5,267	63,208,320
(3)b	End Cros Girders	cu.m.	7,900	2,075	16,390,367	2,371	18,731,848	2,182	17,237,010	728	5,753,570	4,553	35,968,858	4,985	39,380,947
(4)b	Median	cu.m.	2,400	2,338	5,611,632	2,672	6,413,294	2,048	4,915,080	881	2,114,952	4,720	11,328,374	5,267	12,641,664
404	Reinforcement Steel Grade 275 in														
(4)b	Deck Slab	kg.	3,914,700	10	37,463,679	11	42,815,633	10	39,147,000	2	9,630,162	21	81,962,633	22	86,240,841
(2)b	Parapets	kg.	1,352,400	10	14,078,484	12	16,089,696	11	14,916,972	3	3,908,436	23	31,006,668	24	32,903,892
(3)b	End Cross Girders	kg.	1,303,100	10	13,304,651	12	15,205,315	10	13,617,395	3	3,635,649	22	28,822,710	23	30,557,695
	Reinforcement Steel Grade 400 in														
(4)b	Deck	kg.	7,362,600	10	75,613,902	12	86,415,888	11	77,675,430	3	19,510,890	22	164,091,318	23	172,800,222
(5)b	Parapets	kg.	960,400	11	10,497,172	12	11,996,768	11	10,746,876	3	2,861,992	24	22,743,644	25	24,106,040
416	Laminated Elastomeric Bearing, 60 tonne capacity	ea.	15,988	2,803	44,807,969	3,203	51,209,107	2,223	35,541,324	974	15,578,707	5,426	86,750,431	6,000	95,928,000
401	Aluminum railings 190 high	m	49,100	711	34,897,825	812	39,883,229	290	14,217,396	316	15,510,199	1,102	54,100,625	1,316	64,625,420
414	Expansion joint														
	Compression joint seal WABD WD 350 or equivalent	m	14,850	2,336	34,682,175	2,669	39,636,771	1,853	27,509,625	812	12,058,200	4,522	67,146,396	5,000	74,250,000
415	Drain pipe – 2 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	39,400	353	13,898,350	403	15,883,829	445	17,521,968	42	1,670,954	848	33,405,797	840	33,091,272
	SUB-TOTAL SUPERSTRUCTURE				2,125,277,612		2,428,888,699		1,025,540,224		899,572,018		3,454,428,923		4,050,389,854
	TOTAL STRUCTURES				3,178,491,771		3,632,562,024		1,904,334,586		1,218,056,538		5,536,896,610		6,300,882,895
	IV INTERCHANGES (2 lane, 30m span)														
	a. Pres. Quirino Ave.	lane m	1,680	56,695	95,247,600	64,794	108,854,400	36,537	61,382,160	20,575	34,566,000	101,331	170,236,560	113,807	191,195,760
	b.Vito Cruz	lane m	1,800	56,695	102,051,000	64,794	116,629,714	36,537	65,766,600	20,575	37,035,000	101,331	182,396,314	113,807	204,852,600
	c.Pasay Road	lane m	1,920	56,695	108,854,400	64,794	124,405,029	36,537	70,151,040	20,575	39,504,000	101,331	194,556,069	113,807	218,509,440
	d. Magallanes/EDSA	lane m	2,800	56,695	158,746,000	64,794	181,424,000	36,537	102,303,600	20,575	57,610,000	101,331	283,727,600	113,807	318,659,600
	e. Bicutan	lane m	2,600	56,695	147,407,000	64,794	168,465,143	36,537	94,996,200	20,575	53,495,000	101,331	263,461,343	113,807	295,898,200
	f.Sucat	lane m	2,640	56,695	149,674,800	64,794	171,056,914	36,537	96,457,680	20,575	54,318,000	101,331	267,514,594	113,807	300,450,480
	g. Alabang	lane m	2,720	56,695	154,210,400	64,794	176,240,457	36,537	99,380,640	20,575	55,964,000	101,331	275,621,097	113,807	309,555,040
	TOTAL INTERCHANGES				916,191,200		1,047,075,657		590,437,920		332,492,000		1,637,513,577		1,839,121,120

Table A3-7-3b (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 2: AASHTO Girder Structure, Two Separate Carriageways (3 lanes each), 30.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	V DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
	VI STREET LIGHTING	km	18	899,357	16,548,171	1,027,837	18,912,195	238,065	4,380,398	185,162	3,406,976	1,265,902	23,292,594	1,322,584	24,335,546
	VII TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	18	463,971	8,537,070	530,253	9,756,652	214,587	3,948,395	149,962	2,759,303	744,839	13,705,046	828,520	15,244,768
	VIII TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,880,000
	Toll Collection S.ystem	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
	TOTAL TOLL COLLECTION SYSTEM				90,120,000		102,994,286		90,120,000		0 45,060,000		193,114,286		225,300,000
	SUB-TOTAL				4,273,872,408		4,884,425,609		2,611,712,273		1,631,987,135		7,496,137,882		8,517,571,815
	20% CONTINGENCIES				854,774,482		976,885,122		522,342,455		326,397,427		1,499,227,576		1,703,514,363
	SUB-TOTAL				5,128,646,889		5,861,310,731		3,134,054,728		1,958,384,562		8,995,365,458		10,221,086,179
	5% GENERAL ITEMS				256,432,344		293,065,537		156,702,736		97,919,228		449,768,273		511,054,309
	SUB-TOTAL				5,385,079,234		6,154,376,267		3,290,757,464		2,056,303,790		9,445,133,731		10,732,140,488
	2%DETAILED DESIGN COST														
	a. 1.5% for Concessionaire's Designer				80,776,189		92,315,644		49,361,362		30,844,557		141,677,006		160,982,107
	b. 0.5% for Independent Design Checker(IDC)				26,925,396		30,771,881		16,453,787		10,281,519		47,225,669		53,660,702
	1%QUALITY CONTROL COST				53,850,792		61,543,763		32,907,575		20,563,038		94,451,337		107,321,405
	6%PROJ. MANAGEMENT & SUPV.														
	a. 5% for Concessionaire's supervision of his constructors				269,253,962		307,718,813		164,537,873		102,815,189		472,256,687		536,607,024
	b. 1% for the Independent Certification Engineer (ICE)				53,850,792		61,543,763		32,907,575		20,563,038		94,451,337		107,321,405
	GRAND TOTAL				5,869,736,365		6,708,270,131		3,586,925,636		2,241,371,131		10,295,195,767		11,698,033,131

Table A3-7-3c
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 3: Box Girder Structure, Two Separate Carriageways (2 lanes each), 40.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	39,800	11	429,840	12	491,246	2	77,212	5	214,920	14	568,458	18	721,972
101 (1)	Removal of existing fence	sq.m.	21,200	150	3,181,484	172	3,635,982	16	332,840	75	1,590,636	187	3,968,822	241	5,104,960
(2)	Removal of existing curb and gutter	m	1,200	90	108,288	103	123,758	29	34,212	45	54,132	132	157,970	164	196,632
(3)	Removal of existing median	m	750	310	232,620	354	265,851	71	52,928	155	116,355	425	318,779	536	401,903
(4)	Removal of existing pavement/sidewalk	sq.m.	12,500	138	1,720,250	157	1,966,000	36	445,375	69	860,250	193	2,411,375	242	3,025,875
(5)	Demolish existing concrete structures	cu.m.	1,000	485	484,640	554	553,874	121	120,650	245	244,960	675	674,524	850	850,250
103 (1)	Structure excavation	cu.m.	117,300	251	29,495,085	287	33,708,669	50	5,903,709	118	13,800,345	338	39,612,378	419	49,199,139
(2)	Foundation fill	cu.m.	19,400	159	3,082,660	182	3,523,040	114	2,202,676	90	1,738,434	295	5,725,716	362	7,023,770
105	Subgrade preparation	sq.m.	7,500	6	46,125	7	52,714	1	8,400	9	66,750	8	61,114	16	121,275
	TOTAL SITE PREPARATION				38,780,992		44,321,134		9,178,002		18,686,782		53,499,135		66,645,776
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	5,000	166	830,150	190	948,743	75	373,000	86	428,450	264	1,321,743	326	1,631,600
201	Aggregate base course	cu.m.		190											
206	Cement treated aggregate base course	cu.m.	5,000	659	3,296,550	753	3,767,486	278	1,392,350	297	1,485,600	1,032	5,159,836	1,235	6,174,500
311(1)	Portland cement concrete pavement (330 thk)	sq.m.	6,600	471	3,108,402	538	3,552,459	242	1,596,012	186	1,224,300	780	5,148,471	898	5,928,714
	TOTAL PAVEMENT				7,235,102		8,268,688		3,361,362		3,138,350		11,630,050		13,734,814
	III. STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to G-5 – At grade pavement														
	• G-5 Interchange to Bicutan – Over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
(2)	Bored Piles, 1.00 m ø	m	69,000	6,869	473,950,650	7,850	541,657,886	4,722	325,829,730	1,851	127,716,240	12,572	867,487,616	13,442	927,496,620
(3)	Bored Piles, 1.20 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	72,800	1,499	109,126,472	1,713	124,715,968	977	71,139,432	570	41,490,904	2,690	195,855,400	3,046	221,756,808
(2)a	Column	cu.m.	27,200	2,136	58,102,736	2,441	66,403,127	1,378	37,487,584	854	23,229,072	3,820	103,890,711	4,368	118,819,392
(3)a	Headstock (precast)	cu.m.	—	—	—	—	—	—	—	—	—	—	—	—	—

Table A3-7-3c (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 3: Box Girder Structure, Two Separate Carriageways (2 lanes each), 40.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	5,861,600	8	49,296,056	10	56,338,350	11	66,529,160	2	11,078,424	21	122,867,510	22	126,903,640
(2)a	Column	kg.	10,775,000	8	89,755,750	10	102,578,000	12	125,097,750	2	19,933,750	21	227,675,750	22	234,787,250
(3)a	Headstock	kg.	—	—	—	—	—	—	—	—	—	—	—	—	—
	SUB-TOTAL SUBSTRUCTURE				780,231,664		891,693,330		626,083,656		223,448,390		1,517,776,986		1,629,763,710
	III B. SUPERSTRUCTURE														
406(3)	Structural concrete 40 MPa in precast segmented box girders 39900 long	cu.m.	242,900	3,967	963,601,303	4,534	1,101,258,632	932	226,365,797	1,786	433,897,128	5,466	1,327,624,429	6,685	1,623,864,228
405(c)	Structural concrete 40 MPa in cast-in-place deck concrete	cu.m.													
405	Structural concrete 30 MPa in														
(1)d	Outer parapets	cu.m.	16,700	2,574	42,979,287	2,941	49,119,185	2,205	36,827,007	950	15,873,183	5,146	85,946,192	5,729	95,679,477
(2)d	Median	cu.m.													
404	Reinforcement Steel Grade 275 in														
(1)c	Box (precast and cast-in-place)	kg.	18,626,600	8	151,806,790	9	173,493,474	12	225,381,860	2	32,782,816	21	398,875,334	22	409,971,466
(2)c	Parapets (and median)	kg.	1,575,100	10	16,396,791	12	18,739,190	11	17,373,353	3	4,552,039	23	36,112,543	24	38,322,183
(3)c	Reinforcement Grade 400 in box	kg.	8,192,000	9	71,761,920	10	82,013,623	11	92,651,520	2	15,482,880	21	174,665,143	22	179,896,320
412	Post Tensioning tendons n/12.7 mm ø high tensile low relaxation 7 wire strand (including all accessories and grouting)														
(1)	36/12.7	m	205,500	2,011	413,223,510	2,298	472,255,440	819	168,349,710	894	183,655,350	3,117	640,605,150	3,724	765,228,570
(2)	39/12.7	m													
401 (1)	Aluminum railings 190 high	m	68,500	711	48,686,375	812	55,641,571	290	19,834,860	316	21,638,465	1,102	75,476,431	1,316	90,159,700
413	Pot type bearing, 300 tonne capacity														
(1)	Fixed	ea.	856	11,678	9,995,940	13,346	11,422,931	9,263	7,928,700	4,060	3,475,360	22,608	19,352,631	25,000	21,400,000
(2)	Guided/Sliding	ea.	2,568	14,013	35,985,384	16,015	41,126,153	11,115	28,543,320	4,872	12,511,296	27,130	69,669,473	30,000	77,040,000
414	Expansion joint Compression joint seal WABD WD 350 or equivalent	m	9,700	2,336	22,654,350	2,669	25,890,686	1,853	17,969,250	812	7,876,400	4,522	43,859,936	5,000	48,500,000
415	Drain pipe – 200 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	39,400	353	13,898,350	403	15,883,829	445	17,521,968	42	1,670,954	848	33,405,797	840	33,091,272
	SUB-TOTAL SUPERSTRUCTURE				1,790,990,000		2,046,845,714		858,747,345		733,415,871		2,905,593,059		3,383,153,216
	TOTAL STRUCTURES				2,571,221,664		2,938,539,045		1,484,831,001		956,864,261		4,423,370,046		5,012,916,926
	IV INTERCHANGES (Two lane, 40m span)														
	a. Pres. Quirino Ave.	lane m	1,680	49,554	83,250,720	56,633	95,143,680	29,488	49,539,840	18,207	30,587,760	86,121	144,683,520	97,249	163,378,320
	b. Vito Cruz	lane m	1,800	49,554	89,197,200	56,633	101,939,657	29,488	53,078,400	18,207	32,772,600	86,121	155,018,057	97,249	175,048,200
	c. Pasay Road	lane m	1,920	49,554	95,143,680	56,633	108,735,634	29,488	56,616,960	18,207	34,957,440	86,121	165,352,594	97,249	186,718,080

Table A3-7-3c (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 3: Box Girder Structure, Two Separate Carriageways (2 lanes each), 40.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	d. Magallanes/EDSA	lane m	2,800	49,554	138,751,200	56,633	158,572,800	29,488	82,566,400	18,207	50,979,600	86,121	241,139,200	97,249	272,297,200
	e. Bicutan	lane m	2,600	49,554	128,840,400	56,633	147,246,171	29,488	76,668,800	18,207	47,338,200	86,121	223,914,971	97,249	252,847,400
	f. Sucat	lane m	2,640	49,554	130,822,560	56,633	149,511,497	29,488	77,848,320	18,207	48,066,480	86,121	227,359,817	97,249	256,737,360
	g. Alabang	lane m	2,720	49,554	134,786,880	56,633	154,042,149	29,488	80,207,360	18,207	49,523,040	86,121	234,249,509	97,249	264,517,280
	TOTAL INTERCHANGES				800,792,640		915,191,589		476,526,080		294,225,120		1,391,717,669		1,571,543,840
V	DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
VI	STREET LIGHTING	km	18	899,357	16,548,171	1,027,837	18,912,195	238,065	4,380,398	185,162	3,406,976	1,265,902	23,292,594	1,322,584	24,335,546
VII	TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	18	463,971	8,537,070	530,253	9,756,652	214,587	3,948,395	149,962	2,759,303	744,839	13,705,046	828,520	15,244,768
VIII	TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,880,000
	Toll Collection System	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
	TOTAL TOLL COLLECTION SYSTEM				90,120,000		102,994,286		90,120,000		45,060,000		193,114,286		225,300,000
	SUB-TOTAL				3,534,487,585		4,039,414,383		2,073,348,658		1,324,709,576		6,112,763,041		6,932,545,819
	20% CONTINGENCIES				706,897,517		807,882,877		414,669,732		264,941,915		1,222,552,608		1,386,509,164
	SUB-TOTAL				4,241,385,102		4,847,297,259		2,488,018,390		1,589,651,491		7,335,315,649		8,319,054,983
	5% GENERAL ITEMS				212,069,255		242,364,863		124,400,919		79,482,575		366,765,782		415,952,749
	SUB-TOTAL				4,453,454,357		5,089,662,122		2,612,419,309		1,669,134,066		7,702,081,431		8,735,007,732
	2% DETAILED DESIGN COST														
	1.5% for Concessionaire's Designer				66,801,815		76,344,932		39,186,290		25,037,011		115,531,221		131,025,116
	.5% for Independent Design Checker(IDC)				22,267,272		25,448,311		13,062,097		8,345,670		38,510,407		43,675,039
	1% QUALITY CONTROL COST				44,534,544		50,896,621		26,124,193		16,691,341		77,020,814		87,350,077
	6% PROJ.MANAGEMENT COST														
	5% for Concessionaire's supervision of his constructors				222,672,718		254,483,106		130,620,965		83,456,703		385,104,072		436,750,387
	1% for Independent Certification Engr.(ICE)				44,534,544		50,896,621		26,124,193		16,691,341		77,020,814		87,350,077
	GRAND TOTAL				4,854,[illegible]249		5,547,731,713		2,847,537,047		1,819,356,132		8,395,268,760		9,521,158,428

Table A3-7-3d
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 4: Box Girder Structure, Two Separate Carriageways (3 lanes each), 40.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	39,800	11	429,840	12	491,246	2	77,212	5	214,920	14	568,458	18	721,972
101 (1)	Removal of existing fence	sq.m.	21,200	150	3,181,484	172	3,635,982	16	332,840	75	1,590,636	187	3,968,822	241	5,104,960
(2)	Removal of existing curb and gutter	m	1,200	90	108,288	103	123,758	29	34,212	45	54,132	132	157,970	164	196,632
(3)	Removal of existing median	m	750	310	232,620	354	265,851	71	52,928	155	116,355	425	318,779	536	401,903
(4)	Removal of existing pavement/sidewalk	sq.m.	12,500	138	1,720,250	157	1,966,000	36	445,375	69	860,250	193	2,411,375	242	3,025,875
(5)	Demolish existing concrete structures	cu.m.	1,000	485	484,640	554	553,874	121	120,650	245	244,960	675	674,524	850	850,250
103 (1)	Structure excavation	cu.m.	117,300	251	29,495,085	287	33,708,669	50	5,903,709	118	13,800,345	338	39,612,378	419	49,199,139
(2)	Foundation fill	cu.m.	19,400	159	3,082,660	182	3,523,040	114	2,202,676	90	1,738,434	295	5,725,716	362	7,023,770
105	Subgrade preparation	sq.m.	7,500	6	46,125	7	52,714	1	8,400	9	66,750	8	61,114	16	121,275
	TOTAL SITE PREPARATION				38,780,392		44,321,134		9,178,002		18,686,782		53,499,135		66,645,776
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	7,500	166	1,245,225	190	1,423,114	75	559,500	86	642,675	264	1,982,614	326	2,447,400
201	Aggregate base course	cu.m.		190											
206	Cement treated aggregate base course	cu.m.	7,500	659	4,944,825	753	5,651,229	278	2,088,525	297	2,228,400	1,032	7,739,754	1,235	9,261,750
311(1)	Portland cement concrete pavement (330 thk)	sq.m.	9,900	471	4,662,603	538	5,328,689	242	2,394,018	186	1,836,450	780	7,722,707	898	8,893,071
	TOTAL PAVEMENT				10,852,653		12,403,032		5,042,043		4,707,525		17,445,075		20,602,221
	III. STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to C-5 – At grade pavement														
	• C-5 Interchange to Bicutan – Over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
(2)	Bored Piles, 1.00 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
(3)	Bored Piles, 1.20 m ø	m	69,000	11,873	819,232,170	13,569	936,265,337	8,290	572,007,240	3,013	207,885,960	21,859	1,508,272,577	23,176	1,599,125,370
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	72,800	1,499	109,126,472	1,713	124,715,968	977	71,139,432	570	41,490,904	2,690	195,855,400	3,046	221,756,808
(2)a	Column	cu.m.	31,000	2,136	66,220,030	2,441	75,680,034	1,378	42,724,820	854	26,474,310	3,820	118,404,854	4,368	135,419,160
(3)a	Headstock (precast)	cu.m.	—	—	—	—	—	—	—	—	—	—	—	—	—

Table A3-7-3d (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 4: Box Girder Structure, Two Separate Carriageways (3 lanes each), 40.00 m span from Pres. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	5,861,600	8	49,296,056	10	56,338,350	11	66,529,160	2	11,078,424	21	122,867,510	22	126,903,640
(2)a	Column	kg.	12,154,200	8	101,244,486	10	115,707,984	12	141,110,262	2	22,485,270	21	256,818,246	22	264,840,018
(3)a	Headstock	kg.	—	—	—	—	—	—	—	—	—	—	—	—	—
	SUB-TOTAL SUBSTRUCTURE				1,145,119,214		1,308,707,673		893,510,914		309,414,868		2,202,218,587		2,348,044,996
	IIIB. SUPERSTRUCTURE														
406(3)	Structural concrete 40 MPa in precast segmented box girders 39900 long	cu.m.	267,600	3,967	1,061,587,932	4,534	1,213,243,351	932	249,384,468	1,786	478,019,232	5,466	1,462,627,819	6,685	1,788,991,632
405(c)	Structural concrete 40 MPa in cast-in-place deck concrete	cu.m.	1,800	2,197	3,955,194	2,511	4,520,222	1,550	2,790,414	768	1,382,616	4,061	7,310,636	4,516	8,128,224
405	Structural concrete 30 MPa in														
(1)d	Outer parapets	cu.m.	11,900	2,338	27,824,342	2,672	31,799,248	2,048	24,370,605	881	10,486,637	4,720	56,169,853	5,267	62,681,584
(2)d	Median	cu.m.	2,400	2,338	5,611,632	2,672	6,413,294	2,048	4,915,080	881	2,114,952	4,720	11,328,374	5,267	12,641,664
404	Reinforcement Steel Grade 275 in														
(1)c	Box (precast and cast-in-place)	kg.	20,475,600	8	166,876,140	9	190,715,589	12	247,754,760	2	36,037,056	21	438,470,349	22	450,667,956
(2)c	Parapets (and median)	kg.	1,351,500	10	14,069,115	12	16,078,989	11	14,907,045	3	3,905,835	23	30,986,034	24	32,881,995
(3)c	Reinforcement Grade 400 in box	kg.	9,544,400	9	83,608,944	10	95,553,079	11	107,947,164	2	18,038,916	21	203,500,243	22	209,595,024
412	Post Tensioning tendons n/12.7 mm ø high tensile low relaxation 7 wire strand (including all accessories and grouting)														
(1)	36/12.7	m													
(2)	39/12.7	m	205,500	2,265	465,436,950	2,588	531,927,943	923	189,623,070	1,007	206,860,410	3,511	721,551,013	4,194	861,920,430
401 (1)	Aluminum railings 190 high	m	49,100	711	34,897,825	812	39,883,229	290	14,217,396	316	15,510,199	1,102	54,100,625	1,316	64,625,420
413	Pot type bearing, 300 tonne capacity														
(1)	Fixed	ea.	856	11,678	9,995,940	13,346	11,423,931	9,263	7,928,700	4,060	3,475,360	22,608	19,352,631	25,000	21,400,000
(2)	Guided/Sliding	ea.	2,568	14,013	35,985,384	16,015	41,126,153	11,115	28,543,320	4,872	12,511,296	27,130	69,669,473	30,000	77,040,000
414	Expansion joint Compression joint seal WABD WD 350 or equivalent	m	11,200	2,336	26,157,600	2,669	29,894,400	1,853	20,748,000	812	9,094,400	4,522	50,642,400	5,000	56,000,000
415	Drain pipe – 200 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	39,400	353	13,898,350	403	15,883,829	445	17,521,968	42	1,670,954	848	33,405,797	840	33,091,272
	SUB-TOTAL SUPERSTRUCTURE				1,949,905,348		2,228,463,255		930,651,990		799,107,863		3,159,115,245		3,679,665,201
	TOTAL STRUCTURES				3,095,024,562		3,537,170,928		1,824,162,904		1,108,522,731		5,361,333,832		6,027,710,197
	IV INTERCHANGES (Two lane, 40m span)														
	a. Pres. Quirino Ave.	lane m	1,680	49,554	83,250,720	56,633	95,143,680	29,488	49,539,840	18,207	30,587,760	86,121	144,683,520	97,249	163,378,320
	b. Vito Cruz	lane m	1,800	49,554	89,197,200	56,633	101,939,657	29,488	53,078,400	18,207	32,772,600	86,121	155,018,057	97,249	175,048,200
	c. Pasay Road	lane m	1,920	49,554	95,143,680	56,633	108,735,634	29,488	56,616,960	18,207	34,957,440	86,121	165,352,594	97,249	186,718,080

Table A3-7-3d (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

Alternative No. 4: Box Girder Structure, Two Separate Carriageways (3 lanes each), 40.00 m span from Prea. Quirino Avenue – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	d. Magallanes/EDSA	lane m	2,800	49,554	138,751,200	56,633	158,572,800	29,488	82,566,400	18,207	50,979,600	86,121	241,139,200	97,249	272,297,200
	e. Bicutan	lane m	2,600	49,554	128,840,400	56,633	147,246,171	29,488	76,668,800	18,207	47,338,200	86,121	223,914,971	97,249	252,847,400
	f. Sucat	lane m	2,640	49,554	130,822,560	56,633	149,511,497	29,488	77,848,320	18,207	48,066,480	86,121	227,359,817	97,249	256,737,360
	g. Alabang	lane m	2,720	49,554	134,786,880	56,633	154,042,149	29,488	80,207,360	18,207	49,523,040	86,121	234,249,509	97,249	264,517,280
	TOTAL INTERCHANGES				800,792,640		915,191,589		476,526,080		294,225,120		1,391,717,669		1,571,543,840
V	DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
VI	STREET LIGHTING	km	18	899,357	16,548,171	1,027,837	18,912,195	238,065	4,380,398	185,162	3,406,976	1,265,902	23,292,594	1,322,584	24,335,546
VII	TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	18	463,971	8,537,070	530,253	9,756,652	214,587	3,948,395	149,962	2,759,303	744,839	13,705,046	828,520	15,244,768
VIII	TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,880,000
	Toll Collection System	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
	TOTAL TOLL COLLECTION SYSTEM				90,120,000		102,994,286		90,120,000		45,060,000		193,114,286		225,300,000
	SUB-TOTAL				4,061,908,034		4,642,180,610		2,414,361,242		1,477,937,221		7,056,541,852		7,954,206,497
	20% CONTINGENCIES				812,381,607		928,436,122		482,872,248		295,587,444		1,411,308,370		1,590,841,299
	SUB-TOTAL				4,874,289,641		5,570,616,732		2,897,233,491		1,773,524,665		8,467,850,223		9,545,047,797
	5% GENERAL ITEMS				243,714,482		278,530,837		144,861,675		88,676,233		423,392,511		477,252,390
	SUB-TOTAL				5,118,004,123		5,849,147,569		3,042,095,165		1,862,200,899		8,891,242,734		10,022,300,186
	2% DETAILED DESIGN COST														
	a. 1.5% for Concessionaire's Designer				76,770,062		87,737,214		45,631,427		27,933,013		133,368,641		150,334,503
	b. 0.5% for Independent Design Checker(IDC)				25,590,021		29,245,738		15,210,476		9,311,004		44,456,214		50,111,501
	1% QUALITY CONTROL COST				51,180,041		58,491,476		30,420,952		18,622,009		88,912,427		100,223,002
	6% PROJ.MANAGEMENT COST														
	a. 5% for Concessionaire's supervision of his constructors				255,900,206		292,457,378		152,104,758		93,110,045		444,562,137		501,115,009
	b. 1% for Independent Certification Engr.(ICE)				51,180,041		58,491,476		30,420,952		18,622,009		88,912,427		100,223,002
	GRAND TOTAL				5,578,624,494		6,375,570,850		3,315,883,730		2,029,798,980		9,691,454,580		10,924,307,203

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Table A3-7-4a
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE
BICUTAN INTERCHANGE

Alternative No. 1: AASHTO Girder Structure, (2 lanes).
Length = 1300 m
Lane length=13000 x 2 = 2600 m

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	3,900	11	42,120	12	48,137	2	7,566	5	21,060	14	55,703	18	70,746
101 (2)	Removal of existing curb and gutter	m	300	90	27,072	103	30,939	29	8,553	45	13,533	132	39,492	164	49,158
(3)	Removal of existing median	m	200	310	62,032	354	70,894	71	14,114	155	31,028	425	85,008	536	107,174
(4)	Removal of existing pavement/sidewalk	sq.m.	200	138	27,524	157	31,456	36	7,126	69	13,766	193	38,582	242	48,416
(5)	Demolish existing concrete structures	cu.m.	100	485	48,464	554	55,387	121	12,065	245	24,496	675	67,452	850	85,025
103 (1)	Structure excavation	cu.m.	1,520	251	382,204	287	436,805	50	76,502	118	178,828	338	513,306	419	637,534
(2)	Foundation fill	cu.m.	252	159	40,043	182	45,763	114	28,612	90	22,582	295	74,375	362	91,237
105	Subgrade preparation, existing pavement	sq.m.	1,200	6	7,380	7	8,434	1	1,344	9	10,680	8	9,778	16	19,404
	TOTAL SITE PREPARATION				636,839		727,816		155,882		315,973		883,697		1,108,693
	II. PAVEMENT														
201	Aggregate base course	cu.m.	300	190	56,955	217	65,091	88	26,253	98	29,463	304	91,344	376	112,671
311 (2)	Portland cement conc. at approaches(200thk)	sq.m.	1,200	285	342,528	326	391,461	147	175,872	112	134,904	473	567,333	544	653,304
	TOTAL PAVEMENT				399,483		456,552		202,125		164,367		658,677		765,975
	III. STRUCTURES														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	5,266	5,916	31,152,603	6,761	35,602,975	4,038	21,263,055	1,592	8,381,734	10,799	56,866,029	11,545	60,797,392
(2)	Bored Piles, 1.00 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
(3)	Bored Piles, 1.20 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	7,410	1,499	11,107,516	1,713	12,694,304	977	7,240,978	570	4,223,107	2,690	19,935,282	3,046	22,571,601
(2)a	Column	cu.m.	2,730	2,136	5,831,635	2,441	6,664,726	1,378	3,762,541	854	2,331,447	3,820	10,427,266	4,368	11,925,623
(3)a	Headstock(precast)	cu.m.	1,714	1,960	3,358,737	2,240	3,838,557	798	1,367,669	973	1,667,533	3,037	5,206,226	3,730	6,393,940
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	596,720	8	5,018,415	10	5,735,332	11	6,772,772	2	1,127,801	21	12,508,104	22	12,918,988
(2)a	Column	kg.	886,300	8	7,382,879	10	8,437,576	12	10,289,943	2	1,630,792	21	18,727,519	22	19,303,614
(3)a	Headstock	kg.	408,800	8	3,429,832	10	3,919,808	12	4,962,832	2	768,544	22	8,882,640	22	9,161,208

Table A3-7-4a (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE
BICUTAN INTERCHANGE

Alternative No. 1: AASHTO Girder Structure, (2 lanes).
Length = 1300 m
Lane length=13000 x 2 = 2600 m

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	IIIB. SUPERSTRUCTURE														
406(1)	Precast, Pretensioned, Type IV AASHTO Girder, 29900 long	ea.	264	202,359	53,422,776	231,267	61,054,601	78,476	20,717,664	90,738	23,954,832	309,743	81,772,265	371,573	98,095,272
(2)	Precast reinforced concrete deck formwork slab (100 x 1690 span)	sq.m.	11,154	586	6,536,244	670	7,469,993	239	2,665,806	260	2,900,040	909	10,135,799	1,085	12,102,090
405	Concrete 30 MPa in														
(1)b	Deck Slab	cu.m.	2,720	1,926	5,238,122	2,201	5,986,425	1,145	3,113,339	751	2,043,699	3,346	9,099,764	3,822	10,395,160
(2)b	Parapets	cu.m.	644	2,572	1,656,368	2,939	1,892,992	2,253	1,450,765	969	624,261	5,192	3,343,757	5,794	3,731,394
(3)b	End Cros Girders	cu.m.	242	2,282	552,292	2,608	631,191	2,400	580,800	801	193,895	5,008	1,211,991	5,483	1,326,988
404	Reinforcement Steel Grade 275 in														
(1)b	Deck Slab	kg.	139,480	11	1,534,280	13	1,753,463	11	1,534,280	2	278,960	24	3,287,743	24	3,347,520
(2)b	Parapets	kg.	60,720	11	667,920	13	763,337	12	728,640	4	242,880	25	1,491,977	27	1,639,440
(3)b	Enc Cross Girders	kg.	40,040	11	440,440	13	503,360	11	440,440	4	160,160	24	943,800	26	1,041,040
	Reinforcement Steel Grade 400 in														
(4)b	Deck	kg.	243,320	11	2,676,520	13	3,058,880	12	2,919,840	3	729,960	25	5,978,720	26	6,326,320
(5)b	Parapets	kg.	43,120	12	517,440	14	591,360	12	517,440	4	172,480	26	1,108,800	28	1,207,360
416	Laminated Elastomeric Bearing, 60 tonne capacity	ea.	528	2,803	1,479,984	3,203	1,691,410	2,223	1,173,744	974	514,272	5,426	2,865,154	6,000	3,168,000
401	Aluminum railings 190 high	m	264	735	193,940	840	221,645	319	84,216	263	69,321	1,159	305,861	1,316	347,477
414	Expansion joint Compression joint seal WABD WD 350 or equivalent	m	516	2,336	1,205,376	2,670	1,377,573	1,853	956,148	811	418,476	4,523	2,333,721	5,000	2,580,000
415	Drain pipe – 2 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	3,080	388	1,195,040	443	1,365,760	489	1,506,120	47	144,760	932	2,871,880	924	2,845,920
	TOTAL STRUCTURES				144,598,359		165,255,267		94,049,031		52,578,956		259,304,298		291,226,346
	VI STREET LIGHTING	km	1	899,357	1,169,164	1,027,837	1,336,188	238,065	309,485	185,162	240,711	1,265,902	1,645,672	1,322,584	1,719,359
	VII TRAFFIC SIGNS ANF PAVEMENT MARKINGS	km	1	463,971	603,162	530,253	689,328	214,587	278,963	149,962	194,951	744,840	968,291	828,520	1,077,076
	TOTAL COST				147,407,007		168,465,151		94,995,486		53,494,957		263,460,636		295,897,449
	COST/LANE METER				56,695		64,794		36,537		20,575		101,331		113,807

5.22

Table A3-7-4b
COST ESTIMATE BREAKDOWN
BICUTAN INTERCHANGE

Alternative No. 3: Box Girder Structure, Bicutan Interchange (2 lanes)
Length = 1300 m
Lane length = 1300 x 2 = 2600 m

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	3,900	11	42,120	12	48,137	2	7,566	5	21,060	14	55,703	18	70,746
101 (2)	Removal of existing curb and gutter	m	300	90	27,072	103	30,939	29	8,553	45	13,533	132	39,492	164	49,158
(3)	Removal of existing median	m	200	310	62,032	354	70,894	71	14,114	155	31,026	425	85,008	536	107,172
(4)	Removal of existing pavement/sidewalk	sq.m.	200	138	27,524	157	31,456	36	7,12	69	13,764	193	38,582	242	48,414
(5)	Demolish existing concrete structures	cu.m.	100	485	48,464	554	55,387	121	12,065	245	24,496	675	67,452	850	85,025
103 (1)	Structure excavation	cu.m.	1,350	251	339,458	287	387,951	50	67,946	118	158,828	338	455,897	419	566,231
(2)	Foundation fill	cu.m.	192	159	30,509	182	34,867	114	21,800	90	17,205	295	56,667	362	69,514
105	Subgrade preparation, existing pavement	sq.m.	1,200	6	7,380	7	8,434	1	1,344	9	10,680	8	9,778	16	19,404
	TOTAL SITE PREPARATION				584,558		668,067		140,513		290,592		808,580		1,015,663
	II. PAVEMENT														
201	Aggregate base course	cu.m.	300	190	56,955	217	65,091	88	26,253	98	29,463	304	91,344	376	112,671
311 (2)	Portland cement conc. at approx. yes(200kk)	sq.m.	1,200	285	342,528	326	391,461	147	175,872	112	134,904	473	567,333	544	653,304
	TOTAL PAVEMENT				399,483		456,552		202,125		164,367		658,677		765,975
	III. STRUCTURES														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
(2)	Bored Piles, 1.00 m ø	m	3,200	6,869	21,980,320	7,850	25,120,366	4,722	15,110,944	1,851	5,923,072	12,572	40,231,310	13,442	43,014,336
(3)	Bored Piles, 1.20 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	5,300	1,499	7,944,647	1,713	9,079,597	977	5,179,107	570	3,020,629	2,690	14,258,704	3,046	16,144,383
(2)a	Column	cu.m.	1,980	2,136	4,229,537	2,441	4,833,757	1,378	2,728,876	854	1,690,940	3,820	7,562,633	4,368	8,649,353
(3)a	Headstock (precast)	cu.m.	—	—	—	—	—	—	—	—	—	—	—	—	—
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	426,224	8	3,584,544	10	4,096,622	11	4,837,642	2	805,563	21	8,934,264	22	9,227,750
(2)a	Column	kg.	783,500	8	6,526,555	10	7,458,920	12	9,096,435	2	1,449,475	21	16,555,355	22	17,072,465
(3)a	Headstock	kg.	—	—	—	—	—	—	—	—	—	—	—	—	—

Table A3-7-4b (continued)
COST ESTIMATE BREAKDOWN
BICUTAN INTERCHANGE

Alternative No. 3: Box Girder Structure, Bicutan Interchange (2 lanes)
Length = 1300 m
Lane length = 1300 x 2 = 2600 m

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	IIIB. SUPERSTRUCTURE														
406(3)	Structural concrete 40 MPa in precast segmented box girders 39900 long	cu.m.	9,646	4,364	42,092,925	4,987	48,106,200	1,025	9,888,404	1,965	18,953,908	6,012	57,994,604	7,354	70,935,237
405 (c)	Structural concrete 40 MPa in cast-in-place deck concrete	cu.m.	—	—	—	—	—	—	—	—	—	—	—	—	—
405	Structural concrete 30 MPa in														
(1)d	Outer parapets	cu.m.	660	2,572	1,697,520	2,939	1,940,023	2,253	1,486,808	969	639,771	5,192	3,426,831	5,794	3,824,099
(2)d	Median	cu.m.	—	—	—	—	—	—	—	—	—	—	—	—	—
404	Reinforcement Steel Grade 275 in														
(1)c	Box (precast and cast-in-place)	kg.	739,840	9	6,658,560	10	7,609,783	13	9,617,920	2	1,479,680	23	17,227,703	24	17,756,160
(2)c	Parapets (and median)	kg.	62,560	11	688,160	13	786,469	12	750,720	4	250,240	25	1,537,189	27	1,689,120
(3)c	Reinforcement Grade 400 in box	kg.	325,380	10	3,253,800	11	3,718,629	12	3,904,560	2	650,760	23	7,623,189	24	7,809,120
412	Post Tensioning tendons n/12.7 mm ø high tensile low relaxation 7 wire strand (including all accessories and grouting)														
(3)	40/12.7	m	8,400	2,559	21,495,600	2,925	24,566,400	1,042	8,752,800	1,138	9,559,200	3,967	33,319,200	4,739	39,807,600
413 (1)	Aluminum railings 190 high	m	2,720	782	2,127,040	894	2,430,903	319	867,680	347	943,840	1,213	3,298,583	1,448	3,938,560
413	Pot type bearing, 300 tonne capacity														
(1)	Fixed	ea.	34	11,678	397,035	13,346	453,754	9,263	314,925	4,060	138,040	22,608	768,679	25,000	850,000
(2)	Guided/Sliding	ea.	102	14,013	1,429,326	16,015	1,633,515	11,115	1,133,730	4,872	496,944	27,130	2,767,245	30,000	3,060,000
414	Expansion joint														
	Compression joint seal WABD WD 350 or equivalent	m	390	2,336	910,845	2,669	1,040,966	1,853	722,475	812	316,689	4,522	1,763,441	5,000	1,950,000
415	Drain pipe–200 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	2,750	388	1,067,000	443	1,219,429	489	1,344,750	47	129,250	932	2,564,179	924	2,541,000
	TOTAL STRUCTURES				126,083,415		144,095,331		75,737,776		46,447,992		219,833,107		248,269,183
	VI STREET LIGHTING	km	1	899,357	1,169,164	1,027,837	1,336,183	238,065	309,485	185,162	240,710	1,265,902	1,645,672	1,322,584	1,719,359
	VII TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	1	463,971	603,163	530,253	689,329	214,587	278,963	149,962	194,951	744,839	968,291	828,520	1,077,076
	TOTAL COST				128,839,783		147,245,466		76,668,862		47,338,612		223,914,328		252,847,256
	COST/LANE METER				49,554		56,633		29,488		18,207		86,121		97,249

Table A3-7-5
COST ESTIMATE BREAKDOWN
PART C – REHABILITATION, OPERATION AND MAINTENACE OF
REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY

I. REHABILITATION

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
101 (1)	Removal of existing failed concrete slabs	sq.m.	23,500	138	3,243,000	158	3,706,286	36	846,000	68	1,598,000	194	4,552,286	242	5,687,000
(3)	Removal of existing fence	sq.m.	40,800	150	6,120,000	171	6,994,286	16	652,800	75	3,060,000	187	7,647,086	241	9,832,800
(5)	Removal of existing toll booths, toll plazas and utility buildings	L.S.	1	1,430,000	1,430,000	1,634,286	1,634,286	354,750	354,750	715,250	715,250	1,989,036	1,989,036	2,500,000	2,500,000
105(1)	Subgrade preparation, existing pavement	sq.m.	23,500	6	141,000	7	161,143	7	164,500	3	70,500	14	325,643	16	376,000
	TOTAL SITE PREPARATION				10,934,000		12,496,000		2,018,050		5,443,750		14,514,050		18,395,800
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	6,200	166	1,029,200	190	1,176,229	75	465,000	85	527,000	265	1,641,229	326	2,021,200
201	Aggregate base course	cu.m.	4,935	190	937,650	217	1,071,600	88	434,280	98	483,630	305	1,505,880	376	1,855,560
302	Bituminous Tack Coat(RC-800 Cut-Back Asphalt)	ton	668	16,929	11,308,572	19,347	12,924,082	928	619,904	5,352	3,575,136	20,275	13,543,986	23,209	15,503,612
310	Bituminous Concrete Surface Course, Hot Laid	ton	16,927	1,895	32,076,665	2,166	36,659,046	104	1,760,408	601	10,173,127	2,270	38,419,454	2,600	44,010,200
311(1)	Portland cement concrete pavement(230thk)	sq.m.	141,100	376	53,053,600	430	60,632,686	143	20,177,300	200	28,220,000	573	80,809,986	719	101,450,900
	REPAIR OF EXISTING PAVEMENT														
	Seal joints and cracks	m	242,600	90	21,834,000	103	24,953,143	60	14,556,000	23	5,579,800	163	39,509,143	173	41,969,800
	TOTAL PAVEMENT				120,239,687		137,416,785		38,012,892		48,558,693		175,429,677		206,811,272
	III DRAINAGE WORKS	km	14	1,251,946	17,026,466	1,430,795	19,458,818	1,003,420	13,646,512	568,784	7,735,462	2,434,215	33,105,330	2,824,150	38,408,440
	IV TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	14	463,971	6,310,006	530,253	7,211,435	214,587	2,918,383	149,962	2,039,483	744,840	10,129,818	828,520	11,267,872
	V STREET LIGHTING	km	14	89,357	1,215,255	102,122	1,388,863	238,065	3,237,684	995,162	13,534,203	340,187	4,626,547	1,322,584	17,987,142
	VI FENCING														
	New Jersey Barrier mounted with anti-glare screen(1m high), cyclone fence	m	27,200	208	5,657,600	238	6,465,829	3,495	95,064,000	458	12,457,600	3,733	101,529,829	4,161	113,179,200
	VII TOLL COLLECTION SYSTEM														
	Toll Plaza Reconstruction														
	a. Nichols Toll Gate	lot			7,520,000		8,594,286		7,520,000		3,760,000		16,114,286		18,800,000
	b. Bicutan Toll Gate	lot			2,780,000		3,177,143		2,780,000		1,390,000		5,957,143		6,950,000
	c. Sucat Toll Gate	lot			3,176,000		3,629,714		3,176,000		1,588,000		6,805,714		7,940,000
	d. Alabang Toll Gate	lot			14,412,000		16,470,857		14,412,000		7,206,000		30,882,857		36,030,000

Table A3-7-5 (continued)
COST ESTIMATE BREAKDOWN
PART C – REHABILITATION, OPERATION AND MAINTENACE OF
REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY

I. REHABILITATION

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28)		FOREIGN COMPONENT ECONOMIC (1$=P32)		LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
				UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.
	Toll Collection System														
	a. Nichols Toll Gate	lot			13,572,000		15,510,857		13,572,000		6,786,000		29,082,857		33,930,000
	b. Bicutan Toll Gate	lot			6,736,000		7,698,286		6,736,000		3,368,000		14,434,286		16,840,000
	c. Sucat Toll Gate	lot			7,528,000		8,603,429		7,528,000		3,764,000		16,131,429		18,820,000
	d. Alabang Toll Gate	lot			13,572,000		15,510,857		13,572,000		6,786,000		29,082,857		33,930,000
	Communication System														
	a. Nichols Toll Gate	lot			316,000		361,143		316,000		158,000		677,143		790,000
	b. Bicutan Toll Gate	lot			160,000		182,857		160,000		80,000		342,857		400,000
	c. Sucat Toll Gate	lot			176,000		201,143		176,000		88,000		377,143		440,000
	d. Alabang Toll Gate	lot			316,000		361,143		316,000		158,000		677,143		790,000
	Plaza Administration Building														
	a. Nichols Toll Gate	lot			4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	b. Bicutan Toll Gate	lot			4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	c. Sucat Toll Gate	lot			4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	d. Alabang Toll Gate	lot			4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Standby Generator														
	a. Nichols Toll Gate	lot			752,000		859,429		752,000		376,000		1,611,429		1,880,000
	b. Bicutan Toll Gate	lot			752,000		859,429		752,000		376,000		1,611,429		1,880,000
	c. Sucat Toll Gate	lot			752,000		859,429		752,000		376,000		1,611,429		1,880,000
	d. Alabang Toll Gate	lot			752,000		859,429		752,000		376,000		1,611,429		1,880,000
	TOTAL TOLL COLLECTION SYSTEM				102,454,861		117,091,269		190,492,067		72,667,286		307,583,337		365,614,214
	SUB-TOTAL				263,837,874		301,528,999		345,389,588		162,436,478		646,918,587		771,663,941
	20% CONTINGENCIES				52,767,575		60,305,800		69,077,918		32,487,296		129,383,717		154,332,788
	SUB-TOTAL				316,605,449		361,834,799		414,467,506		194,923,774		776,302,305		925,996,729
	5% GENERAL ITEMS				15,830,272		18,091,740		20,723,375		9,746,189		38,815,115		46,299,836
	SUB-TOTAL				332,435,721		379,926,539		435,190,881		204,669,963		815,117,420		972,296,565
	2%DETAILED DESIGN COST														
	a. 1.5% for Concessionaire's Designer				4,986,536		5,698,898		6,527,863		3,070,049		12,226,761		14,584,448
	b. 0.5% for Independent Design Checker(IDC)				1,662,179		1,899,633		2,175,954		1,023,350		4,075,587		4,861,483
	1%QUALITY CONTROL COST				3,324,357		3,799,265		4,351,909		2,046,700		8,151,174		9,722,966
	6%PROJ. MANAGEMENT & SUPV.														
	a. 5% for Concessionaire's supervision of his constructors				16,621,786		18,996,327		21,759,544		10,233,498		40,755,871		48,614,828
	b. 1% for the Independent Certification Engineer (ICE)				3,324,357		3,799,265		4,351,909		2,046,700		8,151,174		9,722,965
	GRAND TOTAL				362,354,936		414,119,927		474,358,061		223,090,259		888,477,988		1,059,803,256

Table A3-7-6a
SUMMARY OF UNIT COSTS
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
	I. SITE PREPARATION															
100 (1)	Removal of trees, vegetation	sq.m.	60	11	–	–	60	11	11	2	30	5	70	13	100	18
101 (1)	Removal of existing fence	sq.m.	62	150	–	–	62	150	7	16	31	75	69	166	100	241
101 (2)	Removal of exisiting curb and gutter	m	55	90	–	–	55	90	17	29	28	45	72	119	100	164
(3)	Removal of exisitng median	m	58	310	–	–	58	310	13	71	29	155	71	381	100	536
(4)	Removal of existing pavement/sidewalk	sq.m.	57	138	–	–	57	138	15	36	28	69	72	173	100	242
(5)	Demolish existing concrete structures	cu.m.	57	485	–	–	57	485	14	121	29	245	71	605	100	850
103 (1)	Structure excavation	cu.m.	60	251	–	–	60	251	12	50	28	118	72	302	100	419
(2)	Foundation fill	cu.m.	44	159	–	–	44	159	31	114	25	90	75	272	100	362
105 (1)	Subgrade preparation, existing pavement	sq.m.	38	6	–	–	38	6	7	1	55	9	45	7	100	16
	II. PAVEMENT															
200	Aggregate subbase	cu.m.	51	166	–	–	51	166	23	75	26	86	74	241	100	326
201	Aggregat Base Course	cu.m.	51	190	–	–	51	190	23	88	26	98	74	277	100	376
206	Cement treated aggregate base course	cu.m.	39	485	14	174	53	659	23	278	24	297	76	938	100	1,235
311(1)	Portland cement concrete pavement (230 thk)	sq.m.	26	230	27	241	52	471	27	242	21	185	79	713	100	898
311 (2)	Portland cement conc. at approaches(200thk)	sq.m.	26	139	27	146	52	285	27	147	21	112	79	432	100	544
	III. STRUCTURES															
	IIIA. SUBSTRUCTURE															
400 (1)	Bored Piles, 0.90 m ø	m	11	1,245	40	4,671	51	5,916	35	4,037	14	1,592	86	9,953	100	11,545
(2)	Bored Piles, 1.00 m ø	m	11	1,433	40	5,436	51	6,869	35	4,722	14	1,851	86	11,591	100	13,442
(3)	Bored Piles, 1.20 m ø	m	9	2,118	42	9,755	51	11,873	36	8,290	13	3,013	87	20,163	100	23,176
405	Structural concrete, 21 MPa in															
(1)a	File Cap	cu.m.	23	695	26	804	49	1,499	32	977	19	570	81	2,476	100	3,046
(2)a	Column	cu.m.	28	1,236	21	900	49	2,136	32	1,378	20	854	80	3,514	100	4,368
(3)a	Headstock (precast)	cu.m.	30	1,118	23	842	53	1,960	21	798	26	973	74	2,758	100	3,730
404	Reinforcement Steel Grade 275 in															
(1)a	File Cap	kg.	1	0	38	8	39	8	52	11	9	2	91	20	100	22
(2)a	Column	kg.	1	0	37	8	38	8	53	12	8	2	92	20	100	22
(3)a	Headstock	kg.	1	0	36	8	37	8	54	12	8	2	92	21	100	22

Table A3-7-6a (continued)
SUMMARY OF UNIT COSTS
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
	IIIB. SUPERSTRUCTURE															
	AASHTO Girder Type															
406(1)	Precast, Pretensioned, Type IV AASHTO Girder, 29900 long	ea.	4	12,311	51	171,379	54	183,690	21	71,236	24	82,367	76	254,927	100	337,294
405(2)	Precast reinforced concrete deck formwork slab (100 x 1690 span)	sq.m.	0	0	54	533	54	533	22	217	24	237	76	750	100	986
405	Structural Concrete 30 MPa in															
(1)b	Deck Slab	cu.m.	25	870	25	881	50	1,751	30	1,041	20	683	80	2,791	100	3,474
(2)b	Parapets and Median	cu.m.	23	1,189	22	1,149	44	2,338	39	2,048	17	881	83	4,386	100	5,267
(3)b	End Cross Girders	cu.m.	17	867	24	1,208	42	2,075	44	2,182	15	728	85	4,257	100	4,985
404	Reinforcement Steel Grade 275 in															
(1)b	Deck Slab	kg.	6	1	37	8	43	10	45	10	11	2	89	20	100	22
(2)b	Parapets and Median	kg.	9	2	34	8	43	10	45	11	12	3	88	21	100	24
(3)b	End Cross Girders	kg.	9	2	35	8	44	10	45	10	12	3	88	21	100	23
	Reinforcement Steel Grade 400 in															
404(1)b	Deck	kg.	6	2	37	9	44	10	45	11	11	3	89	21	100	23
(2)b	Parapets and Median	kg.	9	2	35	9	44	11	45	11	12	3	88	22	100	25
416	Laminated elastomeric bearing, 60 tonne capacity	ea.	17	1,003	30	1,800	47	2,803	37	2,223	16	974	84	5,026	100	6,000
	BOX GIRDER TYPE															
406(3)	Structural concrete 40 MPa in precast segmented box girders 39900 long	cu.m.	45	3,006	14	961	59	3,967	14	932	27	1,786	73	4,899	100	6,685
405(c)	Structural concrete 40 MPa in cast-in-place deck slab	cu.m.	17	770	32	1,427	49	2,197	34	1,550	17	768	83	3,748	100	4,516
405	Structural concrete 30 MPa in															
(1)d	Outer parapets	cu.m.	22.58	1,189	21.81	1,149	44	2,338	38.88	2,048	17	881	83	4,386	100	5,267
(2)d	Median	cu.m.	22.58	1,189	21.81	1,149	44	2,338	38.88	2,048	17	881	83	4,386	100	5,267

Table A3-7-6a (continued)
SUMMARY OF UNIT COSTS
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
404	Reinforcement Steel Grade 275 in															
(1)c	Box (precast and cast-in-place)	kg.	0	0	37	8	37	8	55	12	8	2	92	20	100	22
(2)c	Parapets (and median)	kg.	9	2	34	8	43	10	45	11	12	3	88	21	100	24
(3)c	Reinforcement Grade 400 in box	kg.	0	0	40	9	40	9	52	11	9	2	91	20	100	22
412	Post Tensioning tendons n/12.7 mm ø high tensile low relaxation 7 wire strand (including all accessories and grouting)															
(1)	36/12.7	m	0	0	54	2,011	54	2,011	22	819	24	894	76	2,830	100	3,724
(2)	39/12.7	m	0	0	54	2,265	54	2,265	22	923	24	1,007	76	3,188	100	4,194
(3)	40/12.7	m	0	0	54	2,323	54	2,323	22	946	24	1,032	76	3,269	100	4,302
401 (1)	Aluminum railings 190 high	m	0	0	54	711	54	711	22	290	24	316	76	1,000	100	1,316
413	Pot type bearing, 300 tonne capacity															
(1)	Fixed	ea.	17	4,178	30	7,500	47	11,678	37	9,263	16	4,060	84	20,940	100	25,000
(3)	Guided/sliding	ea.	17	5,013	30	9,000	47	14,013	37	11,115	16	4,872	84	25,128	100	30,000
414	Expansion joint					0		0		0	0	0	0	0		
	Compression joint seal WABD WD					0		0		0	0	0	0	0		
	350 or equivalent	m	17	836	30	1,500	47	2,336	37	1,853	16	812	84	4,188	100	5,000
415	Drain pipes–200 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	0	0	42	353	42	353	53	445	5	42	95	797	100	840
IV.	DRAINAGE WORKS	km	30	856,565	14	395,381	44	1,251,946	36	1,003,420	20	568,784	80	2,255,366	100	2,824,150
V.	STREET LIGHTING	km	16	211,613	52	687,744	68	899,357	18	238,065	14	185,162	86	1,137,422	100	1,322,584
VI.	TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	16	132,563	40	331,408	56	463,971	26	214,587	18	149,962	82	678,558	100	828,520

Table A3-7-6b
SUMMARY OF UNIT COSTS(INTERCHANGES)
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
	I. SITE PREPARATION															
100 (1)	Removal of trees, vegetation	sq.m.	60	11	–	–	60	11	11	2	30	5	70	13	100	18
101 (1)	Removal of existing fence	sq.m.	62	150	–	–	62	150	7	16	31	75	69	166	100	241
101 (2)	Removal of existing curb and gutter	m	55	90	–	–	55	90	17	29	28	45	72	119	100	164
(3)	Removal of existing median	m	58	310	–	–	58	310	13	71	29	155	71	381	100	536
(4)	Removal of existing pavement/sidewalk	sq.m.	57	138	–	–	57	138	15	36	28	69	72	173	100	242
(5)	Demolish existing concrete structures	cu.m.	57	485	–	–	57	485	14	121	29	245	71	605	100	850
103 (1)	Structure excavation	cu.m.	60	251	–	–	60	251	12	50	28	118	72	302	100	419
(2)	Foundation fill	cu.m.	44	159	–	–	44	159	31	114	25	90	75	272	100	362
105 (1)	Subgrade preparation, existing pavement	sq.m.	38	6	–	–	38	6	7	1	55	9	45	7	100	16
	II. PAVEMENT															
200	Aggregate subbase	cu.m.	51	166	–	–	51	166	23	75	26	86	74	241	100	326
201	Aggregat Base Course	cu.m.	51	190	–	–	51	190	23	88	26	98	74	277	100	376
206	Cement treated aggregate base course	cu.m.	39	485	14	174	53	659	23	278	24	297	76	938	100	1,235
311(1)	Portland cement concrete pavement (330 thk)	sq.m.	26	230	27	241	52	471	27	242	21	185	79	713	100	898
311 (2)	Portland cement conc. at approaches(200thk)	sq.m.	26	139	27	146	52	285	27	147	21	112	79	432	100	544
	III. STRUCTURES															
	IIIA. SUBSTRUCTURE															
400 (1)	Bored Piles, 0.90 m ø	m	11	1,245	40	4,671	51	5,916	35	4,037	14	1,592	86	9,953	100	11,545
(2)	Bored Piles, 1.00 m ø	m	11	1,433	40	5,436	51	6,869	35	4,722	14	1,851	86	11,591	100	13,442
(3)	Bored Piles, 1.20 m ø	m	9	2,118	42	9,755	51	11,873	36	8,290	13	3,013	87	20,163	100	23,176
405	Structural concrete, 21 MPa in															
(1)a	Pile Cap	cu.m.	23	695	26	804	49	1,499	32	977	19	570	81	2,476	100	3,046
(2)a	Column	cu.m.	28	1,236	21	900	49	2,136	32	1,378	20	854	80	3,514	100	4,368
(3)a	Headstock (precast)	cu.m.	30	1,118	23	842	53	1,960	21	798	26	973	74	2,758	100	3,730
404	Reinforcement Steel Grade 275 in															
(1)a	Pile Cap	kg.	1	0	38	8	39	8	52	11	9	2	91	20	100	22
(2)a	Column	kg.	1	0	37	8	38	8	53	12	8	2	92	20	100	22
(3)a	Headstock	kg.	1	0	36	8	37	8	54	12	8	2	92	21	100	22

Table A3-7-6b (continued)
SUMMARY OF UNIT COSTS(INTERCHANGES)
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
	III B. SUPERSTRUCTURE															
	AASHTO Girder Type															
406(1)	Precast, Pretensioned, Type IV AASHTO Girder, 29900 long	ea.	4	13,562	51	188,796	54	202,359	21	78,476	24	90,738	76	280,835	100	371,573
405(2)	Precast reinforced concrete deck formwork slab (100 x 1690 span)	sq.m.	0	0	54	586	54	586	22	239	24	260	76	824	100	1,085
405	Structural Concrete 30 MPa in															
(1)b	Deck Slab	cu.m.	25	957	25	969	50	1,926	30	1,145	20	751	80	3,070	100	3,822
(2)b	Parapets and Median	cu.m.	23	1,308	22	1,264	44	2,572	39	2,253	17	969	83	4,825	100	5,794
(3)b	End Cross Girders	cu.m.	17	954	24	1,329	42	2,282	44	2,400	15	801	85	4,682	100	5,483
404	Reinforcement Steel Grade 275 in															
(1)b	Deck Slab	kg.	6	2	37	9	43	11	45	11	11	3	89	22	100	24
(2)b	Parapets and Median	kg.	9	2	34	9	43	11	45	12	12	3	88	24	100	27
(3)b	End Cross Girders	kg.	9	2	35	9	44	11	45	11	12	3	88	23	100	26
	Reinforcement Steel Grade 400 in															
404 (1)b	Deck	kg.	6	2	37	10	44	11	45	12	11	3	89	23	100	26
(2)b	Parapets and Median	kg.	9	2	35	10	44	12	45	12	12	3	88	24	100	28
416	Laminated elastomeric bearing, 60 tonne capacity	ea.	17	1,003	30	1,800	47	2,803	37	2,223	16	974	84	5,026	100	6,000
	BOX GIRDER TYPE															
406(3)	Structural concrete 40 MPa in precast segmented box girders 39900 long	cu.m.	45	3,307	14	1,057	59	4,364	14	1,025	27	1,965	73	5,389	100	7,354
405(c)	Structural concrete 40 MPa in cast-in-place deck slab	cu.m.	17	847	32	1,570	49	2,417	34	1,705	17	845	83	4,122	100	4,967
405	Structural concrete 30 MPa in															
(1)d	Outer parapets	cu.m.	23	1,308	22	1,264	44	2,572	39	2,253	17	969	83	4,825	100	5,794
(2)d	Median	cu.m.	23	1,308	22	1,264	44	2,572	39	2,253	17	969	83	4,825	100	5,794

Table A3-7-6b (continued)
SUMMARY OF UNIT COSTS(INTERCHANGES)
PART B – MANILA SOUTH TOLLWAY FROM ALABANG TO QUIRINO AVENUE

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
404	Reinforcement Steel Grade 275 in															
(1)c	Box (precast and cast-in-plance)	kg.	0	0	37	9	37	9	55	13	8	2	92	22	100	24
(2)c	Parapets (and median)	kg.	9	2	34	9	43	11	45	12	12	3	88	24	100	27
(3)c	Reinforcement Grade 400 in box	kg.	0	0	40	10	40	10	52	12	9	2	91	22	100	24
412	Post Tensioning tendons n/12.7 mm ø high tensile low relaxation 7 wire strand (including all accessories and grouting)															
(1)	36/12.7	m	0	0	54	2,212	54	2,212	22	901	24	983	76	3,113	100	4,096
(2)	39/12.7	m	0	0	54	2,491	54	2,491	22	1,015	24	1,107	76	3,506	100	4,614
(3)	40/12.7	m	0	0	54	2,555	54	2,555	22	1,041	24	1,136	76	3,596	100	4,732
401 (1)	Aluminum railings 190 high	m	0	0	54	782	54	782	22	319	24	347	76	1,100	100	1,448
413	Pot type bearing, 300 tonne capacity															
(1)	Fixed	ea.	17	4,178	30	7,500	47	11,678	37	9,263	16	4,060	84	20,940	100	25,000
(3)	Guided/sliding	ea.	17	5,013	30	9,000	47	14,013	37	11,115	16	4,872	84	25,128	100	30,000
414	Expansion joint					0		0		0	0	0	0	0		
	Compression joint seal WABD WD 350 or equivalent	m	17	836	30	1,500	47	2,336	37	1,853	16	812	84	4,188	100	5,000
415	Drain pipes – 200 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	0	0	42	388	42	388	53	489	5	47	95	877	100	924
	IV. DRAINAGE WORKS	km	30	856,565	14	395,381	44	1,251,946	36	1,003,420	20	568,784	80	2,255,366	100	2,824,150
	V. STREET LIGHTING	km	16	211,613	52	687,744	68	899,357	18	238,065	14	185,162	86	1,137,422	100	1,322,584
	VI. TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	16	132,563	40	331,408	56	463,971	26	214,587	18	149,962	82	678,558	100	828,520

Table A3-7-6c
SUMMARY OF UNIT COSTS
PART C – REHABILITATION, OPERATION AND MAINTENANCE OF REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
	I. SITE PREPARATION															
101 (2)	Removal of existing failed concrete slabs	sm	57	138	–	–	57	138	15	36	28	69	72	173	100	242
(3)	Removal of existing fence	m	62	150	–	–	62	150	7	16	31	75	69	166	100	241
(5)	Removal of existing toll booths, toll plazas and utility buildings	LS	57	1,430,000	–	–	57	1,430,000	14	354,750	29	715,250	71	1,784,750	100	2,500,000
105 (1)	Subgrade preparation, existing pavement	sq.m.	38	6	–	–	38	6	43	7	19	3	81	13	100	16
	II. PAVEMENT															
200	Aggregate subbase	cu.m.	51	166	–	–	51	166	23	75	26	86	74	241	100	326
201	Aggregat Base Course	cu.m.	51	190	–	–	51	190	23	88	26	98	74	277	100	376
206	Cement treated aggregate base course	cu.m.	36	485	17	227	53	712	23	313	23	312	77	1,025	100	1,338
302	Bituminous Tack Coat(RC-800 Cut Back Asphalt)	ton	28	6,485	45	10,444	73	16,929	4	928	23	5,352	77	17,857	100	23,209
310	Bituminous Concrete Surface Course, Hot Laid	ton	27	699	46	1,196	73	1,895	4	104	23	601	77	1,999	100	2,600
311(1)	Portland cement concrete pavement (230 thk)	sq.m.	22	160	30	215	52	376	20	143	28	200	72	519	100	719
	REPAIR OF EXISTING PAVEMENT															
	Seal joints and cracks	m	15	26	37	64	52	90	35	60	13	22	87	150	100	173
	III DRAINAGE WORKS	km	30	856,565	14	395,381	44	1,251,946	36	1,003,420	20	568,784	80	2,255,366	100	2,824,150
	IV TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	16	132,563	40	331,408	56	463,971	26	214,587	18	149,962	82	678,558	100	828,520

Table A3-7-6c (contiaued)
SUMMARY OF UNIT COSTS
PART C – REHABILITATION, OPERATION AND MAINTENANCE OF REVERTED
PORTION OF THE SOUTH LUZON EXPRESSWAY

PAY ITEM NO.	DESCRIPTION	UNIT	FOREIGN COMPONENT						LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
			DIRECT		INDIRECT		TOTAL									
			%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)	%	UNIT COST (PESOS)
	V STREET LIGHTINGS	km	16	211,613	52	637,744	68	899,357	18	238,065	14	185,162	86	1,137,422	100	1,322,584
	VI FENCING New Jersey Barrier mounted with anti-glare screen(1m high), cyclone wire fence	m	3	125	2	83	5	208	84	3,495	11	458	89	3,703	100	4,161

Table A3-7-7
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

I. SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
100(1)	REMOVE EXISTING TREES & VEGETATION	1,000.00	sq. m.						
	A. EQUIPMENT								
	Dozer (D6)	1.25	hr.	802.98	1,003.73			501.86	1,505.59
	Loader (1.75 m^3)	5.22	hr.	766.03	3,998.68			1,999.34	5,998.01
	Dump Truck (9-11 m^3)	3.22	hr.	981.01	3,158.85			1,579.43	4,738.28
	Miscellaneous tools (5% of above)	1.00	L.S.	408.06			408.06		408.06
	TOTAL A				8,161.25	0.00	408.06	4,080.63	12,649.94
	B. LABOR								
	Skilled Labor	31.47	hr.	22.50			708.08		708.08
	Unskilled labor	10.44	hr.	18.00			187.92		187.92
	Foreman	6.47	hr.	25.00			161.75		161.75
	TOTAL B						1,057.75		1,057.75
	TOTAL A + B				8,161.25	0.00	1,465.81	4,080.63	13,707.69
	UNIT COST (P/sq.m.),Eq. & Labor only				8.16	0.00	1.47	4.08	13.71
	SUB-TOTAL DIRECT COST (DC)				8.16	0.00	1.47	4.08	13.71
	INDIRECT COST (IDC)				0.82	0.00	0.15	0.41	1.37
	PROFIT 10% of DC + IDC				0.90	0.00	0.16	0.45	1.51
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.82	0.00	0.15	0.41	1.37
	BOND INSURANCE 1% OF TOTAL COST				0.11	0.00	0.02	0.05	0.18
	TOTAL UNIT COST				10.80	0.00	1.94	5.40	18.14
	PERCENT (%)				59.54	0.00	10.69	29.77	100.00

I. SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
101(1)	REMOVE EXISITNG FENCE	100.00	sq. m.						
	A. EQUIPMENT								
	Dozer (D6)	0.92	hr.	802.98	738.74			369.37	1,108.11
	Loader (1.75 m^3)	10.00	hr.	766.03	7,660.30			3,830.15	11,490.45
	Dump Truck (9-11 m^3)	3.00	hr.	981.01	2,943.03			1,471.52	4,414.55
	Miscellaneous tools (5% of above)	1.00	L.S.				567.10		567.10
	TOTAL A				11,342.07		567.10	5,671.04	17,580.21
	B. LABOR								
	Skilled Labor	5.83	hr.	22.50			131.18		131.18
	Unskilled labor	16	hr.	18.00			288.00		288.00
	Foreman	8.00	hr.	25.00			200.00		200.00
	TOTAL B				0.00	0.00	619.18	0.00	619.18
	TOTAL A + B				11,342.07	0.00	1,186.28	5,671.04	18,199.39
	UNIT COST (P/sq.m.),Eq. & Labor only				113.42	0.00	11.86	56.71	181.99
	SUB-TOTAL DIRECT COST (DC)				113.42	0.00	11.86	56.71	181.99
	INDIRECT COST (IDC)				11.34	0.00	1.19	5.67	18.20
	PROFIT 10% of DC + IDC				12.48	0.00	1.30	6.24	20.02
	VALUE ADDED TAX (VAT)10% Eq.& Labor				11.34	0.00	1.19	5.67	18.20
	BOND INSURANCE 1% OF TOTAL COST				1.49	0.00	0.16	0.74	2.38
	TOTAL UNIT COST				150.07	0.00	15.70	75.03	240.80
	PERCENT (%)				62.32	0.00	6.52	31.16	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

I. SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
101(2)	REMOVE EXISTING CURB & GUTTER	63.00	m.						P
	A EQUIPMENT								
	Dozer (D6)								
	Air Compressor (160 CFM)	7.00	hr.	225.00	1,575.00			787.50	2,362.50
	Pavement breakers	21.00	hr.	42.00	882.00			441.00	1,323.00
	Wheel Loader (1.75 m^3)	0.25	hr.	766.03	191.51			95.75	287.26
	Dump Truck (9 – 11 m^3)	1.68	hr.	981.01	1,648.10			824.05	2,472.15
	Misc. Tools (5% of above)	1.00	L.S.				214.83		214.83
	TOTAL A				4296.604		214.830215	2148.302	6659.7367
	B. LABOR								
	Skilled Labor	29.93	hr.	22.50			673.43		673.43
	Unskilled of Labor	14.00	hr.	18.00			252.00		252.00
	Foreman	8.68	hr.	25.00			217.00		217.00
	TOTAL B				0.00	0.00	1,142.43	0.00	1,142.43
	TOTAL A + B				4,296.60	0.00	1,357.26	2,148.30	7,802.16
	UNIT COST (P/sq.m.),Eq. & Labor only				68.20	0.00	21.54	34.10	123.84
	SUB-TOTAL DIRECT COST (DC)				68.20	0.00	21.54	34.10	123.84
	INDIRECT COST (IDC)				6.82	0.00	2.15	3.41	12.38
	PROFIT 10% of DC + IDC				7.50	0.00	2.37	3.75	13.62
	VALUE ADDED TAX (VAT)10% Eq.& Labor				6.82	0.00	2.15	3.41	12.38
	BOND INSURANCE 1% OF TOTAL COST				0.89	0.00	0.28	0.45	1.62
	TOTAL UNIT COST				90.24	0.00	28.50	45.12	163.86
	PERCENT (%)				55.07	0.00	17.40	27.53	100.00

I. SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
101(3)	REMOVE EXISITNG MEDIAN ISLAND	50.00	m.						
	A. EQUIPMENT								
	Air compressor (160 CFM)	12.11	hr.	225.00	2,724.75			1,362.38	4,087.13
	Pavement Breakers	36.33	hr.	42.00	1,525.86			762.93	2,288.79
	Wheel Loader (1.75 m^3)	1.16	hr.	766.03	888.59			444.30	1,332.89
	Dump Truck (9–11 m^3)	6.71	lot	981.01	6,582.58			3,291.29	9,873.87
	Miscellaneous tools (5% of above)	1.00	L.S.				586.09		586.09
	TOTAL A				11,721.78	0.00	586.09	5,860.89	18,168.76
	B. LABOR								
	Skilled labor	56.31	hr.	22.50			1,266.98		1,266.98
	Unskilled labor	26.84	hr.	18.00			483.12		483.12
	Foreman	13.27	hr.	25.00			331.75		331.75
	TOTAL B				0.00	0.00	2,081.85	0.00	2,081.85
	TOTAL A + B				11,721.78	0.00	2,667.93	5,860.89	20,250.61
	UNIT COST (P/sq.m.),Eq. & Labor only				234.44	0.00	53.36	117.22	405.01
	SUB-TOTAL DIRECT COST (DC)				234.44	0.00	53.36	117.22	405.01
	INDIRECT COST (IDC)				23.44	0.00	5.34	11.72	40.50
	PROFIT 10% of DC + IDC				25.79	0.00	5.87	12.89	44.55
	VALUE ADDED TAX (VAT)10% Eq.& Labor				23.44	0.00	5.34	11.72	40.50
	BOND INSURANCE 1% OF TOTAL COST				3.07	0.00	0.70	1.54	5.31
	TOTAL UNIT COST				310.10	0.00	70.60	155.09	535.87
	PERCENT (%)				57.88	0.00	13.17	28.94	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

I. SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
101(4)	REMOVE EXISTING PAVEMENT/SIDEWALK	62.50	sq. m.						P
	A. EQUIPMENT								
	Dozer (D6)	1.00	hr.	802.98	802.98			401.49	1,204.47
	AirCompressor (160 CFM)	7.81	hr.	225.00	1,757.25			878.63	2,635.88
	Pavement breakers	23.43	hr.	42.00	984.06			492.03	1,476.09
	Wheel Loader (1.75 m^3)	0.27	hr.	766.00	206.82			103.41	310.23
	Dump Truck (9 – 11 m^3)	1.56	hr.	981.01	1,530.38			765.19	2,295.56
	Misc. Tools (5% of above)		L.S.				264.07		264.07
	TOTAL A				5,281.49	0.00	264.07	2,640.74	8,186.30
	B. LABOR								
	Skilled Labor	34.07	hr.	22.50			766.58		766.58
	Unskilled Labor	18.74	hr.	18.00			337.32		337.32
	Foreman	9.37	hr.	25.00			234.25		234.25
	TOTAL B				0.00	0.00	1,103.90	0.00	1,103.90
	TOTAL A + B				5,281.49	0.00	1,367.97	2,640.74	9,290.20
	UNIT COST (P/sq.m.),Eq. & Labor only				84.50	0.00	21.89	42.25	148.64
	SUB–TOTAL DIRECT COST (DC)				105.63	0.00	27.36	52.81	185.80
	INDIRECT COST (IDC)				10.56	0.00	2.74	5.28	18.58
	PROFIT 10% of DC + IDC				11.62	0.00	3.01	5.81	20.44
	VALUE ADDED TAX (VAT)10% Eq.& Labor				8.45	0.00	2.19	4.23	14.86
	BOND INSURANCE 1% OF TOTAL COST				1.36	0.00	0.35	0.68	2.40
	TOTAL UNIT COST				137.62	0.00	35.65	68.81	242.08
	PERCENT (%)				56.85	0.00	14.72	28.43	100.00

SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
103(1)	STRUCTURE EXCAVATION	45.00	cu. m.						
	A. EQUIPMENT								
	Backhoe (0.75 cu. yd.)	1.35	hr.	658.03	888.34			444.17	1,332.51
	Wheel Loader (1.75 cu.m.)	1.22	hr.	766.03	934.56			467.28	1,401.83
	Dump Truck (9–11 cu. m)	6.86	hr.	981.01	6,729.73			3,364.86	10,094.59
	Miscellaneous tools (5% of above)		L.S.				427.63		427.63
	TOTAL A			2,405.07	8,552.63	0.00	427.63	4,276.31	13,256.57
	B. LABOR								
	Skilled Labor	9.43	hr.	22.50			212.18		212.18
	Unskilled labor	32.84	hr.	18.00			591.12		591.12
	Foreman	8.21	hr.	25.00			205.25		205.25
	TOTAL B				0.00	0.00	1,008.55	0.00	1,008.55
	TOTAL A + B				8,552.63	0.00	1,436.18	4,276.31	14,265.11
	UNIT COST (P/sq.m.),Eq. & Labor only				190.06	0.00	31.92	95.03	317.00
	SUB–TOTAL DIRECT COST (DC)				190.06	0.00	31.92	95.03	317.00
	INDIRECT COST (IDC)				19.01	0.00	3.19	9.50	31.70
	PROFIT 10% of DC + IDC				20.91	0.00	3.51	10.45	34.87
	VALUE ADDED TAX (VAT)10% Eq.& Labor				19.01	0.00	3.19	9.50	31.70
	BOND INSURANCE 1% OF TOTAL COST				2.49	0.00	0.42	1.24	4.15
	TOTAL UNIT COST				251.47	0.00	42.23	125.73	419.43
	PERCENT (%)				59.95	0.00	10.07	29.98	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

I. SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
103(2)	FOUNDATION FILL	27.00	cu. m.						
	A. EQUIPMENT								
	Plate Compactor (12 H.P.)	16.15	hr.	97.00	1,566.55			783.28	2,349.83
	Miscellaneous Tools (5% of above)						78.33		78.33
	TOTAL A				1,566.55	0.00	78.33	783.28	2,428.15
	B. LABOR								
	Unskilled labor	27.66	hr.	18.00			497.88		497.88
	Skilled Labor	16.15	hr.	22.50			363.38		363.38
	Foreman	8.08	hr.	25.00			202.00		202.00
	TOTAL B				0.00	0.00	1,063.26	0.00	1,063.26
	TOTAL A + B				1,566.55	0.00	1,141.58	783.28	3,491.41
	UNIT COST (P/sq.m.),Eq. & Labor only				58.02	0.00	42.28	29.01	129.31
	C. MATERIALS								
	Fill mat'l's	33.75	hr.	125.00	1,814.91		1,264.36	1,139.48	4,218.75
	TOTAL C				1,814.91	0.00	1,264.36	1,139.48	4,218.75
	UNIT COST (P/sq.m.),Materials only				67.22	0.00	46.83	42.20	156.25
	SUB–TOTAL DIRECT COST (DC)				125.24	0.00	89.11	71.21	285.56
	INDIRECT COST (IDC)				12.52	0.00	8.91	7.12	28.56
	PROFIT 10% of DC + IDC				13.78	0.00	9.80	7.83	31.41
	VALUE ADDED TAX (VAT)10% Eq.& Labor				5.80	0.00	4.23	2.90	12.93
	BOND INSURANCE 1% OF TOTAL COST				1.57	0.00	1.12	0.89	3.58
	TOTAL UNIT COST				158.91	0.00	113.17	89.96	362.05
	PERCENT (%)				43.89	0.00	31.26	24.85	100.00

I. SITE PREPARATION

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
105	SUBGRADE PREPARATION	300.00	sq. m.						
	EQUIPMENT								
	Grader (motorized), 125HP	1.00	hr.	796.01	796.01			398.01	1,194.02
	Pneumatic roller (11–24 T)	0.33	hr.	699.97	230.99			115.50	346.49
	Water Truck (3,000 gal.)	0.30	hr.	1,227.00	368.10			184.05	552.15
	Misc. Tools (5% of above)		L.S.				1,395.10		1,395.10
	TOTAL A				1,395.10	0.00	1,395.10	697.55	3,487.75
	LABOR								
	Skilled Labor	4.32	hr.	22.50			97.20		97.20
	Unskilled Labor	2.66	hr.	18.00			47.88		47.88
	Foreman	1.33	hr.	25.00			33.25		33.25
	TOTAL B				0.00	0.00	178.33	0.00	178.33
	TOTAL A + B				1,395.10	0.00	1,573.43	697.55	3,666.08
	UNIT COST (P/sq.m.),Eq. & Labor only				4.65	0.00	5.24	2.33	12.22
	SUB–TOTAL DIRECT COST (DC)				4.65	0.00	5.24	2.33	12.22
	INDIRECT COST (IDC)				0.47	0.00	0.52	0.23	1.22
	PROFIT 10% of DC + IDC				0.51	0.00	0.58	0.26	1.34
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.47	0.00	0.52	0.23	1.22
	BOND INSURANCE 1% OF TOTAL COST				0.06	0.00	0.07	0.03	0.16
	TOTAL COST/ UNIT COST				6.15	0.00	6.94	3.08	16.17
	PERCENT (%)				38.05	0.00	42.92	19.03	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
405(3)a	PRECAST CONCRETE FOR HEAD STOCK, 21Mpa	30.60	cu.m.						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.40	hr.	1,200.00	480.00			240.00	720.00
	Wheel Loader (1.75 cu.m.)	0.70	hr.	766.03	536.22			268.11	804.33
	Transit mixer (5 cu.m. cap.)	4.48	hr.	855.14	3,831.03			1,915.51	5,746.54
	Crane, Crawler (80T)	5.66	hr.	2,010.91	11,381.75			5,690.88	17,072.63
	High bed trailer with truck tractor	1.83	hr.	750.00	1,372.50			686.25	2,058.75
	Misc. Tools (5% of above)		L.S.				279.10		279.10
	TOTAL A				17,601.50	0.00	279.10	8,800.75	26,681.35
	B. LABOR								
	Skilled Labor	164.87	hr.	22.50			3,709.58		3,709.58
	Unskilled Labor	61.67	hr.	18.00			1,110.06		1,110.06
	Foreman	10.64	hr.	25.00			266.00		266.00
	TOTAL B				0.00	0.00	5,085.64	0.00	5,085.64
	TOTAL A + B				17,601.50	0.00	5,364.74	8,800.75	31,766.99
	UNIT COST(Eq. & Labor only)		P/cu.m.		575.21	0.00	175.32	287.61	1,038.14
	C. MATERIALS								
	Portland Cement	337.37	bag	100.00		17,205.87	11,470.58	5,060.55	33,737.00
	Gravel (crushed)	26.99	cu.m.	480.00	6,866.26		2,591.04	3,497.90	12,955.20
	Sand (screened)	13.49	cu.m.	300.00	2,031.54		930.81	1,054.65	4,047.00
	Steel Moulds (Depreciation cost)	1.00	L.S.	8,239.34		3,877.43	3,523.97	837.94	8,239.34
	Form Oil	1.92	gal	18.00			34.56		34.56
	TOTAL C				8,927.80	21,083.30	18,550.96	10,451.04	59,013.10
	UNIT COST(Materials only)		P/cu.m.		291.76	689.00	606.24	341.54	1,928.53
	SUB-TOTAL DIRECT COST (DC)				866.97	689.00	781.56	629.14	2,966.67
	INDIRECT COST (IDC)10% DC				86.70	68.90	78.16	62.91	296.67
	PROFIT 10% of DC + IDC				95.37	75.79	85.97	69.21	326.33
	VALUE ADDED TAX (VAT)10% Eq.& Labor				57.52	0.00	17.53	28.76	103.81
	BOND INSURANCE 1% OF TOTAL COST				11.07	8.34	9.63	7.90	36.93
	TOTAL UNIT COST				1,117.62	842.02	972.85	797.92	3,730.42
	PERCENT (%)				29.96	22.57	26.08	21.39	100.00

Table A3-7-7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

PAVEMENT

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
200	AGGREGATE SUBBASE COURSE	50.00	cu.m.						P
	A. EQUIPMENT								
	Dozer (D6)	0.50	hr.	802.98	401.49			200.75	602.24
	Grader, Motorized (125 HP)	1.25	hr.	796.01	995.01			497.51	1,492.52
	Pneumatic Roller (11 – 24 T)	0.37	hr.	699.97	258.99			129.49	388.48
	Water Truck (3,000 gal.)	0.33	hr.	1,227.00	404.91			202.46	607.37
	Misc. Tools (5% of above)		L.S.				103.02		103.02
	TOTAL A				2,060.40	0.00	103.02	1,030.20	3,193.62
	B. LABOR								
	Skilled Labor	9.57	hr.	22.50			215.33		215.33
	Unskilled Labor	7.12	hr.	18.00			128.16		128.16
	Foreman	3.56	hr.	25.00			89.00		89.00
	TOTAL B				0.00	0.00	432.49	0.00	432.49
	TOTAL A + B				2,060.40	0.00	535.51	1,030.20	3,626.11
	UNIT COST(Eq. & Labor only)				41.21	0.00	10.71	20.60	72.52
	C. MATERIALS								
	Aggregate Base Course	65.00	cu.m.	145.00	4,561.70		2,472.18	2,391.12	9,425.00
	TOTAL C				4,561.70	0.00	2,472.18	2,391.12	9,425.00
	UNIT COST(Materials only)				91.23	0.00	49.44	47.82	188.50
	SUB-TOTAL DIRECT COST (DC)				132.44	0.00	60.15	68.43	261.02
	INDIRECT COST (IDC)10% DC				13.24	0.00	6.02	6.84	26.10
	PROFIT 10% of DC + IDC				14.57	0.00	6.62	7.53	28.71
	VALUE ADDED TAX (VAT)10% Eq.& Labor				4.12	0.00	1.07	2.06	7.25
	BOND INSURANCE 1% OF TOTAL COST				1.64	0.00	0.74	0.85	3.23
	TOTAL UNIT COST				166.02	0.00	74.60	85.70	326.32
	PERCENT (%)				50.88	0.00	22.86	26.26	100.00

PAVEMENT

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
201	AGGREGATE BASE COURSE	50.00	cu.m.						P
	A. EQUIPMENT								
	Dozer (D6)	0.50	hr.	802.98	401.49			200.75	602.24
	Grader, Motorized (125 HP)	1.25	hr.	796.01	995.01			497.51	1,492.52
	Pneumatic Roller (11 – 24T)	0.37	hr.	699.97	258.99			129.49	388.48
	Water Truck (3,000 gal.)	0.33	hr.	1,227.00	404.91			202.46	607.37
	Misc. Tools (5% of above)		L.S.				103.02		103.02
	TOTAL A				2,060.40	0.00	103.02	1,030.20	3,193.62
	B. LABOR								
	Skilled Labor	9.57	hr.	22.50			215.33		215.33
	Unskilled Labor	7.12	hr.	18.00			128.16		128.16
	Foreman	3.56	hr.	25.00			89.00		89.00
	TOTAL B				0.00	0.00	432.49	0.00	432.49
	TOTAL A + B				2,060.40	0.00	535.51	1,030.20	3,626.11
	UNIT COST(Eq. & Labor only)				41.21	0.00	10.71	20.60	72.52
	C. MATERIALS								
	Aggregate Base Course	65.00	cu.m.	176.00	5,536.96		3,000.71	2,902.33	11,440.00
	TOTAL C				5,536.96	0.00	3,000.71	2,902.33	11,440.00
	UNIT COST(Materials only)				110.74	0.00	60.01	58.05	228.80
	SUB-TOTAL DIRECT COST (DC)				151.95	0.00	70.72	78.65	301.32
	INDIRECT COST (IDC)10% DC				15.19	0.00	7.07	7.87	30.13
	PROFIT 10% of DC + IDC				16.71	0.00	7.78	8.65	33.15
	VALUE ADDED TAX (VAT)10% Eq.& Labor				4.12	0.00	1.07	2.06	7.25
	BOND INSURANCE 1% OF TOTAL COST				1.88	0.00	0.87	0.97	3.72
	TOTAL UNIT COST				189.86	0.00	87.51	98.20	375.57
	PERCENT (%)				50.55	0.00	23.30	26.15	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

I. PAVEMENT

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
204	CEMENT TREATED AGGREGATE BASE COURSE	50.00	cu.m.						P
	A. EQUIPMENT								
	Cement Treated Base Plant	1.08	hr.	1,081.20	1,167.70			583.85	1,751.54
	Transit Mixer	14.08	hr.	855.14	12,040.37			6,020.19	18,060.56
	Miscellaneous Tools (5% of above)		L.S.				660.40		660.40
	TOTAL A				13,208.07	0.00	660.40	6,604.03	20,472.50
	B. LABOR								
	Skilled Labor	70.40	hr.	22.50			1,584.00		1,584.00
	Unskilled Labor	42.24	hr.	18.00			760.32		760.32
	Foreman	14.08	hr.	25.00			352.00		352.00
	TOTAL B				0.00	0.00	2,696.32	0.00	2,696.32
	TOTAL A + B				13,208.07	0.00	3,356.72	6,604.03	23,168.82
	UNIT COST (Eq. & Labor only)				264.16	0.00	67.13	132.08	463.38
	C. MATERIALS								
	Portland Cement	140.00	bag	100.00		7,140.00	4,760.00	2,100.00	14,000.00
	Aggregate base course	65.00	cu.m.	176.00	5,536.96		3,000.71	2,902.33	11,440.00
	TOTAL C				5,536.96	7,140.00	7,760.71	5,002.33	25,440.00
	UNIT COST (Materials only)				110.74	142.80	155.21	100.05	508.80
	SUB-TOTAL DIRECT COST (DC)			19.44	374.90	142.80	222.35	232.13	972.18
	INDIRECT COST (IDC)10% DC				37.49	14.28	22.23	23.21	97.22
	PROFIT 10% of DC + IDC				41.24	15.71	24.46	25.53	106.94
	VALUE ADDED TAX (VAT)10% Eq & Labor				26.42	0.00	6.71	13.21	46.34
	BOND INSURANCE 1% OF TOTAL COST				4.80	1.73	2.76	2.94	12.23
	TOTAL UNIT COST				484.85	174.52	278.51	297.02	1,234.90
	PERCENT (%)				39.26	14.13	22.55	24.05	100.00

I. PAVEMENT

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
311(2)	CONCRETE PAVEMENT, 21 MPa AT APPROACHES, 200 mm thk	250.00	sq.m.						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.66	hr.	1,200.00	792.00			396.00	1,188.00
	Wheel Loader (1.75 cu.m.)	1.09	hr.	766.03	834.97			417.49	1,252.46
	Transit mixer (5 cu.m. cap.)	13.16	hr.	855.14	11,253.64			5,626.82	16,880.46
	Miscellaneous Tools (5% of above)		L.S.				644.03		644.03
	TOTAL A				12,880.62	0.00	644.03	6,440.31	19,964.95
	B. LABOR								
	Skilled Labor	31.76	hr.	22.50			714.60		714.60
	Unskilled Labor	36.83	hr.	18.00			662.94		662.94
	Foreman	6.59	hr.	25.00			164.75		164.75
	TOTAL B				0.00	0.00	1,542.29	0.00	1,542.29
	TOTAL A + B				12,880.62	0.00	2,186.32	6,440.31	21,507.24
	UNIT COST (Eq. & Labor only)				51.52	0.00	8.75	25.76	86.03
	C. MATERIALS								
	Portland Cement	551.25	bag	100.00		28,113.75	18,742.50	8,268.75	55,125.00
	Gravel (crushed)	44.10	cu.m.	480.00	11,219.04		4,233.60	5,715.36	21,168.00
	Sand (screened)	22.05	cu.m.	300.00	3,369.68		1,521.45	1,723.87	6,615.00
	Lumber	250.00	bf	14.00		980.00	2,380.00	140.00	3,500.00
	Nails	1.70	kg	25.00			42.50		42.50
	Steel Dowels	108.94	kg	15.00		769.01	698.90	166.19	1,634.10
	TOTAL C				14,588.72	29,862.76	27,618.95	16,014.17	88,084.60
	UNIT COST (Materials only)				58.35	119.45	110.48	64.06	352.34
	SUB-TOTAL DIRECT COST (DC)			1.75	109.88	119.45	119.22	89.82	438.37
	INDIRECT COST (IDC)10% DC				10.99	11.95	11.92	8.98	43.84
	PROFIT 10% of DC + IDC				12.09	13.14	13.11	9.88	48.22
	VALUE ADDED TAX (VAT)10% Eq & Labor				3.15	0.00	0.87	2.58	8.60
	BOND INSURANCE 1% OF TOTAL COST				1.38	1.45	1.45	1.11	5.39
	TOTAL UNIT COST				139.48	145.98	146.58	112.37	544.42
	PERCENT (%)				25.62	26.81	26.92	20.64	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

III A. SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
400(1)	BORED PILES 900 ø	15.00	m						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.14	hr.	1,200.00	168.00			84.00	252.00
	Wheel Loader (1.75 cu.m.)	0.25	hr.	766.03	191.51			95.75	287.26
	Transit mixer (5 cu.m. cap.)	3.50	hr.	855.14	2,992.99			1,496.50	4,489.49
	Crane, Crawler (45T)	0.50	hr.	979.00	489.50			244.75	734.25
	Gen Set (200 KVA)	1.45	hr.	175.25	254.11			127.06	381.17
	Gen Set (300 KVA)	1.45	hr.	231.00	334.95			167.48	502.43
	Air Compressor (250 CFM)	1.45	hr.	334.00	484.30			242.15	726.45
	Trailer, High Bed with Truck Tractor	0.50	hr.	750.00	375.00			187.50	562.50
	Water Pump (assorted)	4.35	hr.	15.00	65.25			32.63	97.88
	Miscellaneous Tools (5% of above)						267.78		267.78
	TOTAL A				5,355.61	0.00	267.78	2,677.81	8,301.20
	B. LABOR								
	Skilled Labor	14.09	hr.	22.50				317.03	317.03
	Unskilled Labor	8.70	hr.	18.00				156.60	156.60
	Foreman	1.70	hr.	25.00				42.50	42.50
	TOTAL B				0.00	0.00	0.00	516.13	516.13
	TOTAL A + B				5,355.61	0.00	267.78	3,193.93	8,817.32
	UNIT COST (Eq. & Labor only)				357.04	0.00	17.85	212.93	587.82
	C. MATERIALS								
	Portland Cement	120.20	bag	100.00		6,130.20	4,086.80	1,803.00	12,020.00
	Gravel (crushed)	9.62	cu.m.	480.00	2,447.33		923.52	1,246.75	4,617.60
	Sand (screened)	4.79	cu.m.	300.00	732.01		330.51	374.48	1,437.00
	Steel Reinforcement, Grade 400	2,003.40	kg	14.50		13,670.60	12,424.39	2,954.31	29,049.30
	Tie wires	26.04	kg	22.00			572.88		572.88
	TOTAL C				3,179.34	19,800.80	18,338.10	6,378.55	47,696.78
	UNIT COST (Materials only)				211.96	1,320.05	1,222.54	425.24	3,179.79
	D. SUBCONTRACT								
	Excavation	9.54	cu. m.	1,200.00	6,296.40		1,717.20	3,434.40	11,448.00
	Fabricate and install reinforcing bars	2,003.40	kg.	4.50		4,633.86	3,606.12	775.32	9,015.30
	Steel Casing	800.00	kg.	80.00		32,896.00	25,600.00	5,504.00	64,000.00
	TOTAL D				6,296.40	37,529.86	30,923.32	9,713.72	84,463.30
	UNIT COST (Subcon only)				419.76	2,501.99	2,061.55	647.58	5,630.89
	SUB–TOTAL DIRECT COST (DC)			626.57	988.76	3,822.04	3,301.95	1,285.75	9,398.49
	INDIRECT COST (IDC)10% DC				98.88	382.20	330.19	128.57	939.85
	PROFIT 10% of DC + IDC				108.76	420.42	363.21	141.43	1,033.83
	VALUE ADDED TAX (VAT)10% Eq.& Labor				35.70	0.00	1.79	21.29	58.78
	BOND INSURANCE 1% OF TOTAL COST				12.32	46.25	39.97	15.77	114.31
	TOTAL UNIT COST				1,244.42	4,670.92	4,037.11	1,592.82	11,545.27
	PERCENT (%)				10.78	40.46	34.97	13.80	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
400(2)	BORED PILES 1000 ø	20.00	m						₱
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.24	hr.	1,200.00	288			144.00	432.00
	Wheel Loader (1.75 cu.m.)	0.41	hr.	766.03	314.07			157.04	471.11
	Transit mixer (5 cu.m. cap.)	4.85	hr.	855.14	4,147.43			2,073.71	6,221.14
	Crane, Crawler (45T)	0.50	hr.	979.00	489.50			244.75	734.25
	Gen Set (200 KVA)	2.07	hr.	175.25	362.77			181.38	544.15
	Gen Set (300 KVA)	2.07	hr.	231.00	478.17			239.09	717.26
	Air Compressor (250 CFM)	2.07	hr.	334.00	691.38			345.69	1,037.07
	Trailer, High Bed with Truck Tractor	0.50	hr.	750.00	375.00			187.50	562.50
	Water Pump (assorted)	6.21	hr.	15.00	93.15			46.58	139.73
	Miscellaneous Tools (5% of above)						361.97		361.97
	TOTAL A				7,239.47	0.00	361.97	3,619.73	11,221.18
	B. LABOR								
	Skilled Labor	19.35	hr.	22.50				435.38	435.38
	Unskilled Labor	12.42	hr.	18.00				223.56	223.56
	Foreman	2.48	hr.	25.00				62.00	62.00
	TOTAL B				0.00	0.00	0.00	720.94	720.94
	TOTAL A + B				7,239.47	0.00	361.97	4,340.67	11,942.11
	UNIT COST (Eq. & Labor only)				361.97	0.00	18.10	217.03	597.11
	C. MATERIALS								
	Portland Cement	197.95	bag	100.00		10,095.45	6,730.30	2,969.25	19,795.00
	Gravel (crushed)	15.84	cu.m.	480.00	4,029.70		1,520.64	2,052.86	7,603.20
	Sand (screened)	7.92	cu.m.	300.00	1,210.33		546.48	619.19	2,376.00
	Steel Reinforcement, Grade 400	3,299.10	kg	14.50		22,512.07	20,459.86	4,865.02	47,836.95
	Tie wires	42.89	kg	22.00			943.58		943.58
	TOTAL C				5,240.03	32,607.52	30,200.86	10,506.32	78,554.73
	UNIT COST (Materials only)				262.00	1,630.38	1,510.04	525.32	3,927.74
	D. SUBCONTRACT								
	Excavation	15.71	cu. m.	1,200.00	10,368.60		2,827.80	5,655.60	18,852.00
	Fabricate and install reinforcing bars	3,299.10	kg.	4.50		7,630.82	5,938.38	1,276.75	14,845.95
	Steel Casing	1,185.00	kg.	80.00		48,727.20	37,920.00	8,152.80	94,800.00
	TOTAL D				10,368.60	56,358.02	46,686.18	15,085.15	128,497.95
	UNIT COST (Subcon only)				518.43	2,817.90	2,334.31	754.26	6,424.90
	SUB-TOTAL DIRECT COST (DC)			547.49	1,142.40	4,448.28	3,862.45	1,496.61	10,949.74
	INDIRECT COST (IDC)10% DC				114.24	444.83	386.25	149.66	1,094.97
	PROFIT 10% of DC + IDC				125.66	489.31	424.87	164.63	1,204.47
	VALUE ADDED TAX (VAT)10% Eq.& Labor				36.20	0.00	1.81	21.70	59.71
	BOND INSURANCE 1% OF TOTAL COST				14.19	53.82	46.75	18.33	133.09
	TOTAL UNIT COST				1,432.69	5,436.24	4,722.13	1,850.92	13,441.98
	PERCENT (%)				10.66	40.44	35.13	13.77	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
400(3)	BORED PILES 1200 ø	12.70	m						₱
	A. EQUIPMENT								
	Batch plant, AP[illegible] (80cu.m./hr)	0.18	hr.	1,200.00	216			108.00	324.00
	Wheel Loader (1.75 cu.m.)	0.31	hr.	766.03	237.47			118.73	356.20
	Transit mixer (5 cu.m. cap.)	5.00	hr.	855.14	4,275.70			2,137.85	6,413.55
	Crane, Crawler (45T)	0.50	hr.	979.00	489.50			244.75	734.25
	Gen Set (200 KVA)	1.94	hr.	175.25	339.99			169.99	509.98
	Gen Set (300 KVA)	1.94	hr.	231.00	448.14			224.07	672.21
	Air Compressor (250 CFM)	1.94	hr.	334.00	647.96			323.98	971.94
	Trailer, High Bed with Truck Tractor	0.50	hr.	750.00	375.00			187.50	562.50
	Water Pump (assorted)	5.82	hr.	15.00	87.30			43.65	130.95
	Miscellaneous Tools (5% of above)						355.85		355.85
	TOTAL A				7,117.05	0.00	355.85	3,558.53	11,031.43
	B. LABOR								
	Skilled Labor	18.13	hr.	22.50				407.93	407.93
	Unskilled Labor	12.26	hr.	18.00				220.68	220.68
	Foreman	2.25	hr.	25.00				56.25	56.25
	TOTAL B				0.00	0.00	0.00	684.86	684.86
	TOTAL A + B				7,117.05	0.00	355.85	4,243.38	11,716.29
	UNIT COST (Eq. & Labor only)				560.40	0.00	28.02	334.12	922.54
	C. MATERIALS								
	Portland Cement	181.44	bag	100.00		9,253.44	6,168.96	2,721.60	18,144.00
	Gravel (crushed)	14.52	cu.m.	480.00	3,693.89		1,393.92	1,881.79	6,969.60
	Sand (screened)	7.26	cu.m.	300.00	1,109.47		500.94	567.59	2,178.00
	Steel Reinforcement, Grade 400	2,880.00	kg	14.50		19,652.26	17,860.75	4,246.99	41,760.00
	Tie wires	39.31	kg	22.00			864.82		864.82
	TOTAL C				4,803.36	28,905.70	26,789.39	9,417.97	69,916.42
	UNIT COST (Materials only)				378.22	2,276.04	2,109.40	741.57	5,505.23
	D. SUBCONTRACT								
	Excavation	14.40	cu. m.	1,200.00	9,504.00		2,592.00	5,184.00	17,280.00
	Fabricate and install reinforcing bars	2,880.00	kg.	4.50		6,661.44	5,184.00	1,114.56	12,960.00
	Steel Casing	1,600.00	kg.	80.00		65,792.00	51,200.00	11,008.00	128,000.00
	TOTAL D				9,504.00	72,453.44	58,976.00	17,306.56	158,240.00
	UNIT COST (Subcon only)				748.35	5,705.00	4,643.78	1,362.72	12,459.84
	SUB–TOTAL DIRECT COST (DC)			1,487.21	1,686.96	7,981.03	6,781.20	2,438.42	18,887.61
	INDIRECT COST (IDC) 10% DC				168.70	798.10	678.12	243.84	1,888.76
	PROFIT 10% of DC + IDC				185.57	877.91	745.93	268.23	2,077.64
	VALUE ADDED TAX (VAT) 10% Eq.& Labor				56.04	0.00	2.80	33.41	92.25
	BOND INSURANCE 1% OF TOTAL COST				20.97	96.57	82.08	29.84	229.46
	TOTAL UNIT COST				2,118.24	9,753.62	8,290.13	3,013.74	23,175.73
	PERCENT (%)				9.14	42.09	35.77	13.00	100.00

Table A3-7-7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
405(1)a	STRUCTURAL CONCRETE FOR PILE CAP, 21 MPa	84.40	cu.m.						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	1.05	hr.	1,200.00	1,260.00			630.00	1,890.00
	Wheel Loader (1.75 cu.m.)	1.83	hr.	766.03	1,401.83			700.92	2,102.75
	Transit mixer (5 cu.m. cap.)	22.15	hr.	855.14	18,941.35			9,470.68	28,412.03
	Miscellaneous Tools (5% of above)						1,080.16		1,080.16
	TOTAL A				**21,603.19**	**0.00**	**1,080.16**	**10,801.59**	**33,484.94**
	B. LABOR								
	Skilled Labor	101.01	hr.	22.50			2,272.73		2,272.73
	Unskilled Labor	103.56	hr.	15.00			1,553.40		1,553.40
	Foreman	39.93	hr.	25.00			998.25		998.25
	TOTAL B				**0.00**	**0.00**	**4,824.38**	**0.00**	**4,824.38**
	TOTAL A + B				**21,603.19**	**0.00**	**5,904.53**	**10,801.59**	**38,309.31**
	UNIT COST (Eq. & Labor only)				255.96	0.00	69.96	127.98	453.90
	C. MATERIALS								
	Portland Cement	930.51	bag	100.00		47,456.01	31,637.34	13,957.65	93,051.00
	Gravel (crushed)	74.44	cu.m.	480.00	18,937.54		7,146.24	9,647.42	35,731.20
	Sand (screened)	37.22	cu.m.	300.00	5,687.96		2,568.18	2,909.86	11,166.00
	Lumber	1,355.90	bf	14.00		5,315.13	12,908.17	759.30	18,982.60
	Plywood (½")	28.00	pc	350.00		2,744.00	6,664.00	392.00	9,800.00
	Nails	5.13	kg	25.00			128.25		128.25
	Form Oil	1.88	kg	18.00			33.84		33.84
	TOTAL C				**24,625.50**	**55,515.14**	**61,086.02**	**27,666.24**	**168,892.89**
	UNIT COST (Materials only)				291.77	657.76	723.77	327.80	2,001.10
	SUB-TOTAL DIRECT COST (DC)			29.09	547.73	657.76	793.73	455.78	2,455.00
	INDIRECT COST (IDC)10% DC				54.77	65.78	79.37	45.58	245.50
	PROFIT 10% of DC + IDC				60.25	72.35	87.31	50.14	270.05
	VALUE ADDED TAX (VAT)10% Eq.& Labor				25.60	0.00	7.00	12.80	45.39
	BOND INSURANCE 1% OF TOTAL COST				6.88	7.96	9.67	5.64	30.16
	TOTAL UNIT COST				**695.24**	**803.85**	**977.08**	**569.93**	**3,046.10**
	PERCENT (%)				22.82	26.39	32.08	18.71	100.00

Table A3-7-7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
405(2)a	STRUCTURAL CONCRETE FOR COLUMNS 21 MPa	36.00	cu.m.						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m/hr)	0.45	hr.	1,200.00	540.00			270.00	810.00
	Wheel Loader (1.75 cu.m.)	0.78	hr.	766.03	597.50			298.75	896.26
	Transit mixer (5 cu.m. cap.)	14.85	hr.	855.14	12,698.83			6,349.41	19,048.24
	Crane Mobile (25 T)	11.60	hr.	871.00	10,103.60			5,051.80	15,155.40
	Miscellaneous Tools (5% of above)						1,197.00		1,197.00
	TOTAL A				**23,939.93**	**0.00**	**1,197.00**	**11,969.97**	**37,106.90**
	B. LABOR								
	Skilled Labor	118.48	hr.	22.50			2,665.80		2,665.80
	Unskilled Labor	73.56	hr.	15.00			1,103.40		1,103.40
	Foreman	31.65	hr.	25.00			791.25		791.25
	TOTAL B				**0.00**	**0.00**	**4,560.45**	**0.00**	**4,560.45**
	TOTAL A + B				**23,939.93**	**0.00**	**5,757.45**	**11,969.97**	**41,667.35**
	UNIT COST (Eq. & Labor only)				665.00	0.00	159.93	332.50	1,157.43
	C. MATERIALS								
	Portland Cement	396.60	bag	100.00		20,226.60	13,484.40	5,949.00	39,660.00
	Gravel (crushed)	31.75	cu.m.	480.00	8,077.20		3,048.00	4,114.80	15,240.00
	Sand (screened)	15.68	cu.m.	300.00	2,426.78		1,095.72	1,241.50	4,764.00
	Lumber	1,201.50	bf	14.00		4,709.88	11,438.28	672.84	16,821.00
	Plywood (½")	16.00	pc	350.00		1,568.00	3,808.00	224.00	5,600.00
	Nails	17.00	kg	25.00			425.00		425.00
	Form Oil	2.00	kg	18.00			36.00		36.00
	Form Ties (1/2 "dia. Tie rod)	64.00	pc	10.00			640		640.00
	Form Tie Clamps	128.00	pc	3.00			384		384.00
	TOTAL C				**10,503.98**	**26,504.48**	**34,359.40**	**12,202.14**	**83,570.00**
	UNIT COST (Materials only)				291.78	736.24	954.43	338.95	2,321.39
	SUB-TOTAL DIRECT COST (DC)			96.63	956.78	736.24	1,114.36	671.45	3,478.82
	INDIRECT COST (IDC)10% DC				95.68	73.62	111.44	67.14	347.88
	PROFIT 10% of DC + IDC				105.25	80.99	122.58	73.86	382.67
	VALUE ADDED TAX (VAT)10% Eq.& Labor				66.50	0.00	15.99	33.25	115.74
	BOND INSURANCE 1% OF TOTAL COST				12.24	8.91	13.64	8.46	43.25
	TOTAL UNIT COST				**1,236.44**	**899.75**	**1,378.01**	**854.16**	**4,368.36**
	PERCENT (%)				28.30	20.60	31.55	19.55	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
404(1)a	STEEL REINFORCEMENT GRADE 275 in PILE CAP	6,800.00	kg.						₱
	EQUIPMENT								
	Bar Cutter	68.00	hr.	75.00			5,100.00	0.00	5,100.00
	Service Truck (11T)	1.50	hr.	874.67	1,312.01			656.00	1,968.01
	Miscellaneous Tools (5% of above)		L.S.				65.60		65.60
	TOTAL A				1,312.01	0.00	5,165.60	656.00	7,133.61
	LABOR								
	Skilled Labor	259.91	hr.	22.50			5,847.98		5,847.98
	Unskilled Labor	319.60	hr.	18.00			5,752.80		5,752.80
	Foreman	64.60	hr.	25.00			1,615.00		1,615.00
	TOTAL B				0.00	0.00	13,215.78	0.00	13,215.78
	TOTAL A + B				1,312.01	0.00	18,381.38	656.00	20,349.38
	UNIT COST(Eq. & Labor only)				0.19	0.00	2.70	0.10	2.99
	C. MATERIALS								
	Steel Reinforcement, Grade 275	7,140.00	kg	13.50		45,361.13	41,226.00	9,802.86	96,390.00
	Tie wires	92.82	kg	22.00			2,042.04		2,042.04
	TOTAL C				0.00	45,361.13	43,268.04	9,802.86	98,432.04
	UNIT COST(Materials only)				0.00	6.67	6.36	1.44	14.48
	SUB-TOTAL DIRECT COST (DC)			0.00	0.19	6.67	9.07	1.54	17.47
	INDIRECT COST (IDC)10% DC				0.02	0.67	0.91	0.15	1.75
	PROFIT 10% of DC + IDC				0.02	0.73	1.00	0.17	1.92
	VALUE ADDED TAX (VAT)10% Eq.& Labo.				0.02	0.00	0.27	0.01	0.30
	BOND INSURANCE 1% OF TOTAL COST				0.00	0.08	0.11	0.02	0.21
	TOTAL UNIT COST				0.26	8.15	11.35	1.89	21.65
	PERCENT (%)				1.18	37.66	52.44	8.73	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(2)a	STEEL REINFORCEMENT GRADE 275 in COLUMNS	10,100.00	kg.						₱
	EQUIPMENT								
	Bar Cutter	101.00	hr.	75.00			7,575.00		7,575.00
	Service Truck (11T)	1.50	hr.	874.67	1,312.01			656.00	1,968.01
	Miscellaneous Tools (5% of above)		L.S.				65.60		65.60
	TOTAL A				1,312.01	0.00	7,640.60	656.00	9,608.61
	LABOR								
	Skilled Labor	456.00	hr.	22.50			10,260.00		10,260.00
	Unskilled Labor	565.00	hr.	15.00			8,475.00		8,475.00
	Foreman	113.63	hr.	25.00			2,840.75		2,840.75
	TOTAL B				0.00	0.00	21,575.75	0.00	21,575.75
	TOTAL A + B				1,312.01	0.00	29,216.35	656.00	31,184.36
	UNIT COST(Eq. & Labor only)				0.13	0.00	2.89	0.06	3.09
	C. MATERIALS								
	Steel Reinforcement, Grade 275	10,605.00	kg	13.50		67,374.63	61,232.74	14,560.13	143,167.50
	Tie wires	137.87	kg	22.00			3,033.14		3,033.14
	TOTAL C				0.00	67,374.63	64,265.88	14,560.13	146,200.64
	UNIT COST(Materials only)				0.00	6.67	6.36	1.44	14.48
	SUB–TOTAL DIRECT COST (DC)			0.00	0.13	6.67	9.26	1.51	17.56
	INDIRECT COST (IDC)10% DC				0.01	0.67	0.93	0.15	1.76
	PROFIT 10% of DC + IDC				0.01	0.73	1.02	0.17	1.93
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.01	0.00	0.29	0.01	0.31
	BOND INSURANCE 1% OF TOTAL COST				0.00	0.08	0.11	0.02	0.22
	TOTAL UNIT COST				0.17	8.15	11.60	1.85	21.78
	PERCENT (%)				0.79	37.44	53.29	8.49	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA SUBSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(3)a	STEEL REINFORCEMENT GRADE 275 in HEADSTOCK	7,300.00	kg.						P
	EQUIPMENT								
	Bar Cutter	73.00	hr.	75.00			5,475.00	0.00	5,475.00
	Service Truck (11T)	1.50	hr.	874.67	1,312.01			656.00	1,968.01
	Miscellaneous Tools (5% of above)		L.S.				65.60		65.60
	TOTAL A				1,312.01	0.00	5,540.60	656.00	7,508.61
	LABOR								
	Skilled Labor	366.50	hr.	22.50			8,246.25		8,246.25
	Unskilled Labor	445.30	hr.	18.00			8,015.40		8,015.40
	Foreman	91.25	hr.	25.00			2,281.25		2,281.25
	TOTAL B				0.00	0.00	18,542.90	0.00	18,542.90
	TOTAL A + B				1,312.01	0.00	24,083.50	656.00	26,051.51
	UNIT COST(Eq. & Labor only)				0.18	0.00	3.30	0.09	3.57
	C. MATERIALS								
	Steel Reinforcement, Grade 275	7,665.00	kg	13.50		48,696.51	44,257.33	10,523.66	103,477.50
	Tie wires	99.65	kg	22.00			2,192.30		2,192.30
	TOTAL C				0.00	48,696.51	46,449.63	10,523.66	105,669.80
	UNIT COST(Materials only)				0.00	6.67	6.36	1.44	14.48
	SUB-TOTAL DIRECT COST (DC)			0.00	0.18	6.67	9.66	1.53	18.04
	INDIRECT COST (IDC)10% DC				0.02	0.67	0.97	0.15	1.80
	PROFIT 10% of DC + IDC				0.02	0.73	1.06	0.17	1.98
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.02	0.00	0.33	0.01	0.36
	BOND INSURANCE 1% OF TOTAL COST				0.00	0.08	0.12	0.02	0.22
	TOTAL UNIT COST				0.24	8.15	12.14	1.88	22.41
	PERCENT (%)				1.06	36.37	54.17	8.39	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
406(1)	PRECAST								P
	POST TENSIONED, TYPE IV								
	AASHTO GIRDER, 29900mm long	7.00							
	A. EQUIPMENT								
	Crane, Truck Mounted, Hyd.80T	35.00	hr.	2,010.91	70,381.85			35,190.93	105,572.78
	Misc. tools/Sundries (5% of above)		L.S.				100.55		100.55
	Launching Accessories	7.00	ea.	1,000.00			7,000.00		7,000.00
	TOTAL A				**70,381.85**	**0.00**	**7,100.55**	**35,190.93**	**112,673.32**
	B. LABOR								
	Skilled labor	140.00	hr.	22.50	140.00	162.50	302.50	325.00	930.00
	Foreman	17.50	hr.	25.00			437.50		437.50
	TOTAL B				**140.00**	**162.50**	**740.00**	**325.00**	**1,367.50**
	TOTAL A + B				**70,521.85**	**162.50**	**7,840.55**	**35,515.93**	**114,040.82**
	UNIT COST (Eq. & Labor only)				10,074.55	23.21	1,120.08	5,073.70	16,291.55
	C. MATERIALS								
	Girder (FRESSINET supplied)	7.00	ea.	260,000.00		982,800.00	400,400.00	436,800.00	1,820,000.00
	TOTAL C				**0.00**	**982,800.00**	**400,400.00**	**436,800.00**	**1,820,000.00**
	UNIT COST (Materials only)				0.00	140,400.00	57,200.00	62,400.00	260,000.00
	SUB–TOTAL DIRECT COST (DC)				10,074.55	140,423.21	58,320.08	67,473.70	276,291.55
	INDIRECT COST (IDC)				1,007.46	14,042.32	5,832.01	6,747.37	27,629.15
	PROFIT 10% of DC + IDC				1,108.20	15,446.55	6,415.21	7,422.11	30,392.07
	VALUE ADDED TAX (VAT)10% Eq.& Labor				14.00	16.25	74.00	32.50	136.75
	BOND INSURANCE 1% OF TOTAL COST				122.04	1,699.28	706.41	816.76	3,344.50
	TOTAL UNIT COST				**12,326.25**	**171,627.62**	**71,347.71**	**82,492.44**	**337,794.02**
	PERCENT(%)				3.65	50.81	21.12	24.42	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
405(1)b	STRUCTURAL CONCRETE FOR DECK SLAB, 30Mpa	68.90	cu.m.						₱
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.86	hr.	1,200.00	1,032.00			516.00	1,548.00
	Wheel Loader (1.75 cu.m.)	1.5	hr.	766.03	1,149.05			574.52	1,723.57
	Transit mixer (5 cu.m. cap.)	21.53	hr.	855.14	18,411.16			9,205.58	27,616.75
	Crane, Mobile (25T)	6.89	hr.	871.00	6,001.19			3,000.60	9,001.79
	Misc. Tools (5% of above)		L.S.				184.61		184.61
	TOTAL A				26,593.40	0.00	184.61	13,296.70	40,074.71
	B. LABOR								
	Skilled Labor	112.96	hr.	22.50			2,541.60		2,541.60
	Unskilled Labor	188.01	hr.	18.00			3,384.18		3,384.18
	Foreman	25.62	hr.	25.00			640.50		640.50
	TOTAL B				0.00	0.00	6,566.28	0.00	6,566.28
	TOTAL A + B				26,593.40	0.00	6,750.89	13,296.70	46,640.99
	UNIT COST (Materials only)				385.97	0.00	97.98	192.99	676.94
	C. MATERIALS								
	Portland Cement	868	bag	100.00		44,268.00	29,512.00	13,020.00	86,800.00
	Gravel (crushed)	61	cu.m.	480.00	15,518.40		5,856.00	7,905.60	29,280.00
	Sand (screened)	31	cu.m.	300.00	4,737.42		2,139.00	2,423.58	9,300.00
	Lumber	812	bf	14.00		3,183.04	7,730.24	454.72	11,368.00
	Plywood ($^3/_4$")	14	pc.	560.00		2,195.20	5,331.20	313.60	7,840.00
	Nails	31	kg.	25.00			775.00		775.00
	Form Oil	1	gal	18.00			18.00		18.00
	TOTAL C				20,255.82	49,646.24	51,361.44	24,117.50	145,381.00
	UNIT COST (Materials only)				293.99	720.56	745.45	350.04	2,110.03
	SUB-TOTAL DIRECT COST (DC)			40.45	679.96	720.56	843.43	543.02	2,786.97
	INDIRECT COST (IDC)10% DC				68.00	72.06	84.34	54.30	278.70
	PROFIT 10% of DC + IDC				74.80	79.26	92.78	59.73	306.57
	VALUE ADDED TAX (VAT)10% Eq.& Labor				38.60	0.00	9.80	19.30	67.69
	BOND INSURANCE 1% OF TOTAL COST				8.61	8.72	10.30	6.76	34.40
	TOTAL UNIT COST				869.96	880.59	1,040.65	683.12	3,474.32
	PERCENT (%)				25.04	25.35	29.95	19.66	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

III B. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN DIRECT	FOREIGN INDIRECT	LOCAL COMPONENT	TAXES	TOTAL AMOUNT
405(2)b	STRUCTURAL CONCRETE FOR PARAPETS/ MEDIAN 30Mpa	14.60	cu.m.						₱
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.183	hr.	1,200.00	219.60			109.80	329.40
	Wheel Loader (1.75 cu.m.)	0.317	hr.	766.03	242.83			121.42	364.25
	Transit mixer (5 cu.m. cap.)	4.643	hr.	855.14	3,970.42			1,985.21	5,955.62
	Crane, Mobile (25T)	5.46	hr.	871.00	4,755.66			2,377.83	7,133.49
	Misc. Tools (5% of above)		L.S.				184.61		184.61
	TOTAL A				9,188.51	0.00	184.61	4,594.25	13,967.37
	B. LABOR								
	Skilled Labor	139.57	hr.	22.50			3,140.33		3,140.33
	Unskilled Labor	68.77	hr.	18.00			1,237.86		1,237.86
	Foreman	32.59	hr.	25.00			814.75		814.75
	TOTAL B				0.00	0.00	5,192.94	0.00	5,192.94
	TOTAL A + B				9,188.51	0.00	5,377.54	4,594.25	19,160.30
	UNIT COST (Eq. & Labor only)				629.35	0.00	368.32	314.67	1,312.35
	C. MATERIALS								
	Portland Cement	183.96	bag	100.00		9,381.96	6,254.64	2,759.40	18,396.00
	Gravel (crushed)	12.88	cu.m.	480.00	3,276.67		1,236.48	1,669.25	6,182.40
	Sand (screened)	6.44	cu.m.	300.00	984.16		444.36	503.48	1,932.00
	Lumber	348	bf	14.00		1,364.16	3,312.96	194.88	4,872.00
	Plywood (3/4")	19	pc.	560.00		2,979.20	7,235.20	425.60	10,640.00
	Nails	5	kg.	25.00			125.00		125.00
	Form Oil	2	gal	18.00			36.00		36.00
	TOTAL C				4,260.83	13,725.32	18,644.64	5,552.61	42,183.40
	UNIT COST (Materials only)				291.84	940.09	1,277.03	380.32	2,889.27
	SUB-TOTAL DIRECT COST (DC)			287.78	921.19	940.09	1,645.36	694.99	4,201.62
	INDIRECT COST (IDC)10% DC				92.12	94.01	164.54	69.50	420.16
	PROFIT 10% of DC + IDC				101.33	103.41	180.99	76.45	462.18
	VALUE ADDED TAX (VAT)10% Eq.& Labor				62.93	0.00	36.83	31.47	131.23
	BOND INSURANCE 1% OF TOTAL COST				11.78	11.38	20.28	8.72	52.15
	TOTAL UNIT COST				1,189.35	1,148.88	2,047.99	881.13	5,267.35
	PERCENT (%)				22.58	21.81	38.88	16.73	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
405(3)b	STRUCTURAL CONCRETE FOR END CROSS GIRDERS, 30Mpa	6.60	cu.m.						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.08	hr.	1,200.00	96.00			48.00	144.00
	Wheel Loader (1.75 cu.m.)	0.14	hr.	766.03	107.24			53.62	160.87
	Transit mixer (5 cu.m. cap.)	2.74	hr.	855.14	2,343.08			1,171.54	3,514.63
	Misc. Tools (5% of above)		L.S.				141.06		141.06
	TOTAL A				2,546.33	0.00	141.06	1,273.16	3,960.55
	B. LABOR								
	Skilled Labor	66.61	hr.	22.50			1,498.73		1,498.73
	Unskilled Labor	19.58	hr.	18.00			352.44		352.44
	Foreman	15.45	hr.	25.00			386.25		386.25
	TOTAL B				0.00	0.00	2,237.42	0.00	2,237.42
	TOTAL A + B				2,546.33	0.00	2,378.47	1,273.16	6,197.97
	UNIT COST (Eq. & Labor only)				385.81	0.00	360.37	192.90	939.09
	C. MATERIALS								
	Portland Cement	83.16	bag	100.00		4,241.16	2,827.44	1,247.40	8,316.00
	Gravel (crushed)	5.82	cu.m.	480.00	1,480.61		558.72	754.27	2,793.60
	Sand (screened)	2.91	cu.m.	300.00	444.71		200.79	227.50	873.00
	Lumber	157	bf	14.00		615.44	1,494.64	87.92	2,198.00
	Plywood (1/2")	17	pc.	350.00		1,666.00	4,046.00	238.00	5,950.00
	Nails	2.5	kg.	25.00			62.50		62.50
	Form Oil	1	gal	18.00			18.00		18.00
	TOTAL C				1,925.31	6,522.60	9,208.09	2,555.10	20,211.10
	UNIT COST (Materials only)				291.71	988.27	1,395.17	387.14	3,062.29
	SUB–TOTAL DIRECT COST (DC)			606.27	677.52	988.27	1,755.54	580.04	4,001.37
	INDIRECT COST (IDC)10% DC				67.75	98.83	175.55	58.00	400.14
	PROFIT 10% of DC + IDC				74.53	108.71	193.11	63.80	440.15
	VALUE ADDED TAX (VAT)10% Eq.& Labor				38.58	0.00	36.04	19.29	93.91
	BOND INSURANCE 1% OF TOTAL COST				8.58	11.96	21.60	7.21	49.36
	TOTAL UNIT COST				866.97	1,207.77	2,1[illegible].84	728.35	4,[illegible]84.93
	PERCENT (%)				17.39	24.23	43.77	14.61	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(1)b	REINFORCEMENT STEEL, GRADE 275 IN DECK SLAB	3,530.00	kg.						₱
	A. EQUIPMENT								
	Crane, Mobile (25T)	0.50	hr.	871.00	435.50			217.75	653.25
	Bar cutter	35.30	hr.	75.00	2,647.50			1,323.75	3,971.25
	Service truck (11T)	0.75	hr.	874.67	656.00			328.00	984.00
	Miscellaneous tools (5% of above)		L.S.				186.95		186.95
	TOTAL A				3,739.00	0.00	186.95	1,869.50	5,795.45
	B. LABOR								
	Skilled Labor	112.37	hr.	22.50			2,528.33		2,528.33
	Unskilled labor	139.20	hr.	18.00			2,505.60		2,505.60
	Foreman	27.84	hr.	25.00			696.00		696.00
	TOTAL B				0.00	0.00	5,729.93	0.00	5,729.93
	TOTAL A + B				3,739.00	0.00	5,916.88	1,869.50	11,525.38
	UNIT COST (Eq. & Labor only)				1.06	0.00	1.68	0.53	3.26
	C. MATERIALS								
	Steel reinforcement, grade 275	3,710.00	kg.	13.50		23,570.00	21,421.35	5,093.64	50,085.00
	Tie wires	48.18	kg.	22.00			1,059.96		1,059.96
	TOTAL C				0.00	23,570.00	22,481.31	5,093.64	51,144.96
	UNIT COST (Materials only)				0.00	6.68	6.37	1.44	14.49
	SUB-TOTAL DIRECT COST (DC)				1.06	6.68	8.04	1.97	17.75
	INDIRECT COST (IDC)				0.11	0.67	0.80	0.20	1.78
	PROFIT 10% of DC + IDC				0.12	0.73	0.88	0.22	1.95
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.11	0.00	0.17	0.05	0.33
	BOND INSURANCE 1% OF TOTAL COST				0.01	0.08	0.10	0.02	0.22
	TOTAL UNIT COST				1.40	8.16	10.00	2.46	22.03
	PERCENT (%)				6.36	37.05	45.40	11.19	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(2)b	REINFORCEMENT STEEL, GRADE 275 IN PARAPETS	1,380.00	kg.						₱
	A. EQUIPMENT								
	Bar cutter	13.80	hr.	75.00	1,035.00			517.50	1,552.50
	Service truck (11T)	1.50	hr.	874.67	1,312.01			656.00	1,968.01
	Miscellaneous tools (5% of above)		L.S.				117.35		117.35
	TOTAL A				2,347.01	0.00	117.35	1,173.50	3,637.86
	B. LABOR								
	Skilled Labor	52.44	hr.	22.50			1,179.90		1,179.90
	Unskilled labor	64.86	hr.	18.00			1,167.48		1,167.48
	Foreman	13.11	hr.	25.00			327.75		327.75
	TOTAL B				0.00	0.00	2,675.13	0.00	2,675.13
	TOTAL A + B				2,347.01	0.00	2,792.48	1,173.50	6,312.99
	UNIT COST (Eq. & Labor only)				1.70	0.00	2.02	0.85	4.57
	C. MATERIALS								
	Steel reinforcement, grade 275	1,450.00	kg.	13.50		9,212.00	8,372.23	1,990.78	19,575.00
	Tie wires	48.18	kg.	22.00			1,059.96		1,059.96
	TOTAL C				0.00	9,212.00	9,432.19	1,990.78	20,634.96
	UNIT COST (Materials only)				0.00	6.68	6.83	1.44	14.95
	SUB–TOTAL DIRECT COST (DC)				1.70	6.68	8.86	2.29	19.53
	INDIRECT COST (IDC)				0.17	0.67	0.89	0.23	1.95
	PROFIT 10% of DC + IDC				0.19	0.73	0.97	0.25	2.15
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.17	0.00	0.20	0.09	0.46
	BOND INSURANCE 1% OF TOTAL COST				0.02	0.08	0.11	0.03	0.24
	TOTAL UNIT COST				2.25	8.16	11.03	2.89	24.33
	PERCENT (%)				9.25	33.54	45.34	11.87	100.00

Table A3–7-1 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(3)b	REINFORCEMENT STEEL, GRADE 275 IN END CROSS GIRDERS	1,090.00	kg.						₱
	A. EQUIPMENT								
	Bar cutter	10.90	hr.	75.00	817.50			408.75	1,226.25
	Service truck (11T)	1.00	hr.	874.67	874.67			437.34	1,312.01
	Miscellaneous tools (5% of above)		L.S.				84.61		84.61
	TOTAL A				1,692.17	0.00	84.61	846.09	2,622.86
	B. LABOR								
	Skilled Labor	41.42	hr.	22.50			931.95		931.95
	Unskilled labor	51.23	hr.	18.00			922.14		922.14
	Foreman	10.36	hr.	25.00			259.00		259.00
	TOTAL B				0.00	0.00	2,113.09	0.00	2,113.09
	TOTAL A + B				1,692.17	0.00	2,197.70	846.09	4,735.95
	UNIT COST (Eq. & Labor only)				1.55	0.00	2.02	0.78	4.34
	C. MATERIALS								
	Steel reinforcement, grade 275	1,145.00	kg.	13.50		7,274.30	6,611.17	1,572.03	15,457.50
	Tie wires	14.89	kg.	22.00			327.58		327.58
	TOTAL C				0.00	7,274.30	6,938.75	1,572.03	15,785.08
	UNIT COST (Materials only)				0.00	6.67	6.37	1.44	14.48
	SUB-TOTAL DIRECT COST (DC)				1.55	6.67	8.38	2.22	18.83
	INDIRECT COST (IDC)				0.16	0.67	0.84	0.22	1.88
	PROFIT 10% of DC + IDC				0.17	0.73	0.92	0.24	2.07
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.16	0.00	0.20	0.08	0.43
	BOND INSURANCE 1% OF TOTAL COST				0.02	0.08	0.10	0.03	0.23
	TOTAL UNIT COST				2.05	8.16	10.45	2.79	23.45
	PERCENT (%)				8.76	34.78	44.56	11.90	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASIITO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(4)b	REINFORCEMENT STEEL, GRADE 400 IN DECK SLAB	6,640.00	kg.						P
	A. EQUIPMENT								
	Bar cutter	66.40	hr.	75.00	4,980.00			2,490.00	7,470.00
	Service truck (11T)	3.00	hr.	874.67	2,624.01			1,312.01	3,936.02
	Miscellaneous tools (5% of above)		L.S.				380.20		380.20
	TOTAL A				7,604.01	0.00	380.20	3,802.01	11,786.22
	B. LABOR								
	Skilled Labor	211.49	hr.	22.50			4,758.53		4,758.53
	Unskilled labor	261.95	hr.	18.00			4,715.10		4,715.10
	Foreman	52.37	hr.	25.00			1,309.25		1,309.25
	TOTAL B				0.00	0.00	10,782.88	0.00	10,782.88
	TOTAL A + B				7,604.01	0.00	11,163.08	3,802.01	22,569.09
	UNIT COST (Eq. & Labor only)				1.15	0.00	1.68	0.57	3.40
	C. MATERIALS								
	Steel reinforcement, grade 275	6,970.00	kg.	14.50		47,561.19	43,225.50	10,278.31	101,065.00
	Tie wires	90.61	kg.	22.00			1,993.42		1,993.42
	TOTAL C				0.00	47,561.19	45,218.92	10,278.31	103,058.42
	UNIT COST (Materials only)				0.00	7.16	6.81	1.55	15.52
	SUB–TOTAL DIRECT COST (DC)				1.15	7.16	8.49	2.12	18.92
	INDIRECT COST (IDC)				0.11	0.72	0.85	0.21	1.89
	PROFIT 10% of DC + IDC				0.13	0.79	0.93	0.23	2.08
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.11	0.00	0.17	0.06	0.34
	BOND INSURANCE 1% OF TOTAL COST				0.02	0.09	0.10	0.03	0.23
	TOTAL UNIT COST				1.52	8.75	10.55	2.65	23.47
	PERCENT (%)				6.46	37.31	44.95	11.29	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(5)b	REINFORCEMENT STEEL, GRADE 400 IN PARAPETS	980.00	kg.						₱
	A. EQUIPMENT								
	Bar cutter	9.80	hr.	75.00	735.00			367.50	1,102.50
	Service truck (11T)	1.00	hr.	874.67	874.67			437.34	1,312.01
	Miscellaneous tools (5% of above)		L.S.				80.48		80.48
	TOTAL A				1,609.67	0.00	80.48	804.84	2,494.99
	B. LABOR								
	Skilled Labor	41.10	hr.	22.50			924.75		924.75
	Unskilled labor	48.36	hr.	18.00			870.48		870.48
	Foreman	9.78	hr.	25.00			244.50		244.50
	TOTAL B				0.00	0.00	2,039.73	0.00	2,039.73
	TOTAL A + B				1,609.67	0.00	2,120.21	804.84	4,534.72
	UNIT COST (Eq. & Labor only)				1.64	0.00	2.16	0.82	4.63
	C. MATERIALS								
	Steel reinforcement, grade 275	1,029.00	kg.	14.50		7,021.59	6,381.50	1,517.41	14,920.50
	Tie wires	13.38	kg.	22.00			294.36		294.36
	TOTAL C				0.00	7,021.59	6,675.86	1,517.41	15,214.86
	UNIT COST (Materials only)				0.00	7.16	6.81	1.55	15.53
	SUB–TOTAL DIRECT COST (DC)				1.64	7.16	8.98	2.37	20.15
	INDIRECT COST (IDC)				0.16	0.72	0.90	0.24	2.02
	PROFIT 10% of DC + IDC				0.18	0.79	0.99	0.26	2.22
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.16	0.00	0.22	0.08	0.46
	BOND INSURANCE 1% OF TOTAL COST				0.02	0.09	0.11	0.03	0.25
	TOTAL UNIT COST				2.17	8.76	11.19	2.98	25.10
	PERCENT (%)				8.66	34.89	44.58	11.87	100.00

Table A3-7-7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM
AASHTO GIRDER STRUCTURE

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
406(2)	PRECAST REINFORSED CONCRETE DECK FORMWORK SLAB 100mmthk x 1690mm SPAN	304.20	sq.m.						₱
	SUPPLY AND INSTALL (SUBCON)	304.20		807.00		132,564.28	54,007.67	58,917.46	245,489.40
	UNIT COST				0.00	435.78	177.54	193.68	807.00
	SUB-TOTAL DIRECT COST (DC)				0.00	435.78	177.54	193.68	807.00
	INDIRECT COST (IDC)				0.00	43.58	17.75	19.37	80.70
	PROFIT 10% of DC + IDC				0.00	47.94	19.53	21.30	88.77
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	0.00	0.00	0.00
	BOND INSURANCE 1% OF TOTAL COST				0.00	5.27	2.15	2.34	9.76
	TOTAL UNIT COST				0.00	532.57	216.97	236.70	986.23
	PERCENT (%)				0.00	54.00	22.00	24.00	100.00

IIIB. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
401	ALUMINUM RAILING 190mm HIGH	60.00	sq.m.						₱
	SUPPLY AND INSTALL (SUBCON)	60.00		1,077.00		34,894.80	14,216.40	15,508.80	64,620.00
	UNIT COST				0.00	581.58	236.94	258.48	1,077.00
	SUB-TOTAL DIRECT COST (DC)				0.00	581.58	236.94	258.48	1,077.00
	INDIRECT COST (IDC)				0.00	58.16	23.69	25.85	107.70
	PROFIT 10% of DC + IDC				0.00	63.97	26.06	28.43	118.47
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	0.00	0.00	0.00
	BOND INSURANCE 1% OF TOTAL COST				0.00	7.04	2.87	3.13	13.03
	TOTAL UNIT COST				0.00	710.75	289.56	315.89	1,316.20
	PERCENT (%)				0.00	54.00	22.00	24.00	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
406(3)	CONCRETE 40MPa IN PRECAST SEGMENTAL BOX GIRDERS 39900 LONG	283.70	cu.m.						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	3.72	hr.	1,200.00	4,464.00			2,232.00	6,696.00
	Wheel Loader (1.75 cu.m.)	6.48	hr.	766.03	4,963.87			2,481.94	7,445.81
	Transit mixer (5 cu.m. cap.)	43.45	hr.	855.14	37,155.83			18,577.92	55,733.75
	Crane, Crawler (80T)	11.00	hr.	2,010.91	22,120.01			11,060.01	33,180.02
	High bed trailer with truck tractor	72.50	hr.	750.00	54,375.00			27,187.50	81,562.50
	Erection Truss(Depreciation cost)	56	hr.	7950.16	445,208.96			222,604.48	667,813.44
	Misc. Tools (5% of above)		L.S.				676.61		676.61
	TOTAL A				568,287.68	0.00	676.61	284,143.84	853,108.13
	B. LABOR								
	Skilled Labor	949.39	hr.	22.50			21,361.28		21,361.28
	Unskilled Labor	268.86	hr.	18.00			4,839.48		4,839.48
	Foreman	109.68	hr.	25.00			2,742.00		2,742.00
	TOTAL B				0.00	0.00	28,942.76	0.00	28,942.76
	TOTAL A + B				568,287.68	0.00	29,619.37	284,143.84	882,050.88
	UNIT COST(Eq. & Labor only)		P/cu.m.		2,003.13	0.00	104.40	1,001.56	3,109.10
	C. MATERIALS								
	Portland Cement	4,170.00	bag	100.00		212,670.00	141,780.00	62,550.00	417,000.00
	Gravel (crushed)	250.00	cu.m.	480.00	63,600.00		24,000.00	32,400.00	120,000.00
	Sand (screened)	125.00	cu.m.	300.00	19,102.50		8,625.00	9,772.50	37,500.00
	Steel Moulds (Depreciation cost)	1.00	L.S.	22,061.00		10,381.91	9,435.49	2,243.60	22,061.00
	Form Oil	24.00	gal	18.00			432.00		432.00
	TOTAL C				82,702.50	223,051.91	184,272.49	106,966.10	596,993.00
	UNIT COST(Materials only)		P/cu.m.		291.51	786.22	649.53	377.04	2,104.31
	SUB-TOTAL DIRECT COST (DC)				2,294.64	786.22	753.94	1,378.60	5,213.41
	INDIRECT COST (IDC)10% DC				229.46	78.62	75.39	137.86	521.34
	PROFIT 10% of DC + IDC				252.41	86.48	82.93	151.65	573.47
	VALUE ADDED TAX (VAT)10% Eq.& Labor				200.31	0.00	10.44	100.16	310.91
	BOND INSURANCE 1% OF TOTAL COST				29.77	9.51	9.23	17.68	66.19
	TOTAL UNIT COST				3,006.60	960.85	931.93	1,785.95	6,685.32
	PERCENT (%)				44.97	14.37	13.94	26.71	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
405(c)	STRUCTURAL CONCRETE(CAST-IN-PLACE) FOR DECK SLAB, 40MPa	7.20	cu.m.						P
	A. EQUIPMENT								
	Batch plant, ARBAU (80cu.m./hr)	0.09	hr.	1,200.00	108.00			54.00	162.00
	Wheel Loader (1.75 cu.m.)	0.16	hr.	766.03	122.56			61.28	183.85
	Transit mixer (5 cu.m. cap.)	2.36	hr.	855.14	2,018.13			1,009.07	3,027.20
	Misc. Tools (5% of above)		L.S.				141.06		141.06
	TOTAL A				**2,248.70**	**0.00**	**141.06**	**1,124.35**	**3,514.10**
	B. LABOR								
	Skilled Labor	37.31	hr.	22.50			839.48		839.48
	Unskilled Labor	16.94	hr.	18.00			304.92		304.92
	Foreman	4.42	hr.	25.00			110.50		110.50
	TOTAL B				**0.00**	**0.00**	**1,254.90**	**0.00**	**1,254.90**
	TOTAL A + B				**2,248.70**	**0.00**	**1,395.95**	**1,124.35**	**4,769.00**
	UNIT COST(Eq. & Labor only)		P/cu.m.		312.32	0.00	193.88	156.16	662.36
	C. MATERIALS								
	Portland Cement	105.84	bag	100.00		5,397.84	3,598.56	1,587.60	10,584.00
	Gravel (crushed)	6.35	cu.m.	480.00	1,615.44		609.60	822.96	3,048.00
	Sand (screened)	3.18	cu.m.	300.00	485.97		219.42	248.61	954.00
	Lumber	382.00	bf.	14.00		2,516.77	2,287.34	543.89	5,348.00
	Plywood	3.00	pc.	350.00		494.13	449.09	106.79	1,050.00
	Nails	1.00	kg.	25.00			25.00		25.00
	Form Oil	24.00	gal	18.00			432.00		432.00
	TOTAL C				**2,101.41**	**8,408.74**	**7,621.00**	**3,309.85**	**21,441.00**
	UNIT COST(Materials only)		P/cu.m.		291.86	1,167.88	1,058.47	459.70	2,977.92
	SUB-TOTAL DIRECT COST (DC)				604.18	1,167.88	1,252.36	615.86	3,640.28
	INDIRECT COST (IDC)10% DC				60.42	116.79	125.24	61.59	364.03
	PROFIT 10% of DC + IDC				66.46	128.47	137.76	67.74	400.43
	VALUE ADDED TAX (VAT)10% Eq.& Labor				31.23	0.00	19.39	15.62	66.24
	BOND INSURANCE 1% OF TOTAL COST				7.62	14.13	15.35	7.61	44.71
	TOTAL UNIT COST				**769.91**	**1,427.27**	**1,550.09**	**768.42**	**4,515.68**
	PERCENT (%)				17.05	31.61	34.33	17.02	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
404(1)	REINFORCEMENT STEEL, GRADE 275 IN BOX (PRECAST AND CAST-IN-PLACE)	21,760.00	kg.						P
	A. EQUIPMENT								
	Bar Cutter	217.60	hr.	75.00			16,320.00	0.00	16,320.00
	Miscellaneous Tools		LS				816.00		816.00
	TOTAL A				0.00	0.00	17,136.00	0.00	17,136.00
	B. LABOR								
	Skilled Labor	1,085.28	hr.	22.50			24,418.80		24,418.80
	Unskilled Labor	1,342.32	hr.	18.00			24,161.76		24,161.76
	Foreman	217.00	hr.	25.00			5,425.00		5,425.00
	TOTAL B				0.00	0.00	54,005.56	0.00	54,005.56
	TOTAL A + B				0.00	0.00	71,141.56	0.00	71,141.56
	UNIT COST(Eq. & Labor only)		P/cu.m.		0.00	0.00	3.27	0.00	3.27
	C. MATERIALS								
	Steel Reinforcement, Grade 400	22,848.00	cu.m.	13.50		145,155.63	131,923.21	31,369.16	308,448.00
	Tie Wires	297.02	cu.m.	22.00			6,534.44		6,534.44
	TOTAL C				0.00	145,155.63	138,457.65	31,369.16	314,982.44
	UNIT COST(Materials only)		P/cu.m.		0.00	6.67	6.36	1.44	14.48
	SUB-TOTAL DIRECT COST (DC)				0.00	6.67	9.63	1.44	17.74
	INDIRECT COST (IDC)10% DC				0.00	0.67	0.96	0.14	1.77
	PROFIT 10% of DC + IDC				0.00	0.73	1.06	0.16	1.95
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	0.33	0.00	0.33
	BOND INSURANCE 1% OF TOTAL COST				0.00	0.08	0.12	0.02	0.22
	TOTAL UNIT COST				0.00	8.15	12.10	1.76	22.02
	PERCENT (%)				0.00	37.03	54.97	8.00	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
403(c)	REINFORCEMENT STEEL, GRADE 400 IN BOX GIRDER	9,570.00	kg.						P
	A. EQUIPMENT								
	Bar Cutter	95.70	hr.	75.00			7,177.50	0.00	7,177.50
	Miscellaneous Tools		LS				358.88		358.88
	TOTAL A				0.00	0.00	7,536.38	0.00	7,536.38
	B. LABOR								
	Skilled Labor	47.33	hr.	22.50			1,064.93		1,064.93
	Unskilled Labor	590.38	hr.	18.00			10,626.84		10,626.84
	Foreman	95.47	hr.	25.00			2,386.75		2,386.75
	TOTAL B				0.00	0.00	14,078.52	0.00	14,078.52
	TOTAL A + B				0.00	0.00	21,614.89	0.00	21,614.89
	UNIT COST(Eq. & Labor only)		P/kg		0.00	0.00	2.26	0.00	2.26
	C. MATERIALS								
	Steel Reinforcement, Grade 400	10,049.00	cu.m.	14.50		68,571.36	62,320.38	14,818.76	145,710.50
	Tie Wires	130.64	cu.m.	22.00			2,874.08		2,874.08
	TOTAL C				0.00	68,571.36	65,194.46	14,818.76	148,584.58
	UNIT COST(Materials only)		P/cu.m.		0.00	7.17	6.81	1.55	15.53
	SUB-TOTAL DIRECT COST (DC)				0.00	7.17	9.07	1.55	17.78
	INDIRECT COST (IDC)10% DC				0.00	0.72	0.91	0.15	1.78
	PROFIT 10% of DC + IDC				0.00	0.79	1.00	0.17	1.96
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	0.23	0.00	0.23
	BOND INSURANCE 1% OF TOTAL COST				0.00	0.09	0.11	0.02	0.22
	TOTAL UNIT COST				0.00	8.76	11.31	1.89	21.96
	PERCENT (%)				0.00	39.87	51.51	8.62	100.00

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Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
412(1)	POST-TENSIONING TENDONS 36/12.7 mmdia. HIGH TENSILE LOW RELAXATION 7 WIRE STRAND (INCLUDING ALL ACCESSORIES AND GROUTING)	240.00	m						₱
	Supply, stress and grout tendons(Subcon)	240.00	m	3,047.00		394,891.20	160,881.60	175,507.20	731,280.00
	SUB-TOTAL DIRECT COST (DC)				0.00	1,645.38	670.34	731.28	3,047.00
	INDIRECT COST (IDC)10% DC				0.00	164.54	67.03	73.13	304.70
	PROFIT 10% of DC + IDC				0.00	180.99	73.74	80.44	335.17
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	0.00	0.00	0.00
	BOND INSURANCE 1% OF TOTAL COST				0.00	19.91	8.11	8.85	36.87
	TOTAL UNIT COST				0.00	2,010.82	819.22	893.70	3,723.74
	PERCENT (%)				0.00	54.00	22.00	24.00	100.00

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
412(2)	POST-TENSIONING TENDONS 39/12.7 mm dia. HIGH TENSILE LOW RELAXATION 7 WIRE STRAND (INCLUDING ALL ACCESSORIES AND GROUTING)	240.00	m						₱
	Supply, stress and grout tendons(Subcon)	240.00	m	3,432.00		444,787.20	181,209.60	197,683.20	823,680.00
	SUB-TOTAL DIRECT COST (DC)				0.00	1,853.28	755.04	823.68	3,432.00
	INDIRECT COST (IDC)10% DC				0.00	185.33	75.50	82.37	343.20
	PROFIT 10% of DC + IDC				0.00	203.86	83.05	90.60	377.52
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	0.00	0.00	0.00
	BOND INSURANCE 1% OF TOTAL COST				0.00	22.42	9.14	9.97	41.53
	TOTAL UNIT COST				0.00	2,264.89	922.73	1,006.62	4,194.25
	PERCENT (%)				0.00	54.00	22.00	24.00	100.00

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
412(3)	POST-TENSIONING TENDONS 40/12.7 mm dia. HIGH TENSILE LOW RELAXATION 7 WIRE STRAND (INCLUDING ALL ACCESSORIES AND GROUTING)	240.00	m						₱
	Supply, stress and grout tendons(Subcon)	240.00	m	3,520.00		456,192.00	185,856.00	202,752.00	844,800.00
	SUB-TOTAL DIRECT COST (DC)				0.00	1,900.80	774.40	844.80	3,520.00
	INDIRECT COST (IDC)10% DC				0.00	190.08	77.44	84.48	352.00
	PROFIT 10% of DC + IDC				0.00	209.09	85.18	92.93	387.20
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	0.00	0.00	0.00
	BOND INSURANCE 1% OF TOTAL COST				0.00	23.00	9.37	10.22	42.59
	TOTAL UNIT COST				0.00	2,322.97	946.39	1,032.43	4,301.79
	PERCENT (%)				0.00	54.00	22.00	24.00	100.00

Table A3–7–7 (continued)
MANILA SOUTH TOLLWAY
UNIT COST DEVELOPMENT PER PAY ITEM

IIIA. SUPERSTRUCTURE

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT COST	FOREIGN		LOCAL COMPONENT	TAXES	TOTAL AMOUNT
					DIRECT	INDIRECT			
415	200 mm dia. UPVC longitudinal(including 150 mm dia. scuppers and fittings) drain under each carriageway with outlet down pier abd access to open drainage channel	230.00	m.						₱
	A. EQUIPMENT								
	Miscellaneous Tools		L.S.				5,000.00		5,000.00
	TOTAL A				**0.00**	**0.00**	**5,000.00**	**0.00**	**5,000.00**
	B. LABOR								
	Skilled Labor	575.00	hr.	22.50			12,937.50		12,937.50
	Unskilled Labor	594.00	hr.	18.00			10,692.00		10,692.00
	Foreman	115.00	hr.	25.00			2,875.00		2,875.00
	TOTAL B				**0.00**	**0.00**	**26,504.50**	**0.00**	**26,504.50**
	TOTAL A + B				**0.00**	**0.00**	**31,504.50**	**0.00**	**31,504.50**
	UNIT COST(Eq. & Labor only)		P/m.		0.00	0.00	136.98	0.00	136.98
	C. MATERIALS								
	200 mm dia. UPVC x 3000	81.00	pc.	1,450.00		46,980.00	46,980.00	23,490.00	117,450.00
	150 mm dia. UPVC x 3000	7.00	pc.	792.00		2,217.60	2,217.60	1,108.80	5,544.00
	200mm x 150 mm uPVC scuppers	22.00	pc.	37.00		325.60	325.60	162.80	814.00
	200mm uPVC elbow, 45°	4.00	pc.	30.00		48.00	48.00	24.00	120.00
	200mm uPVC elbow, 45°	1.00	pc.	30.00		12.00	12.00	6.00	30.00
	200mm uPVC coup dives	81	pc.	22.00		712.80	712.80	356.40	1,782.00
	G.I. Strap (9mm x 37.5mm x 450mm)	243	pc.	55.00		5,346.00	5,346.00	2,673.00	13,365.00
	PVC Sc.. /ent	1.50	gal	790.00		474.00	474.00	237.00	1,185.00
	TOTAL C				**0.00**	**49,583.20**	**49,583.20**	**24,791.60**	**123,958.00**
	UNIT COST(Materials only)		P/cu.m.		0.00	215.58	215.58	107.79	538.95
	SUB-TOTAL DIRECT COST (DC)				0.00	215.58	352.56	107.79	675.92
	INDIRECT COST (IDC)10% DC				0.00	21.56	35.26	10.78	67.59
	PROFIT 10% of DC + IDC				0.00	23.71	38.78	11.86	74.35
	VALUE ADDED TAX (VAT)10% Eq.& Labor				0.00	0.00	13.70	0.00	13.70
	BOND INSURANCE 1% OF TOTAL COST				0.00	2.61	4.40	1.30	8.32
	TOTAL UNIT COST				**0.00**	**263.46**	**444.69**	**131.73**	**839.88**
	PERCENT (%)				0.00	31.37	52.95	15.68	100.00

Table A3-7-8
COST SUMMARY
MAGALLANES TO ALABANG PORTION

TOTAL PROJECT COST

DESCRIPTION	FOREIGN COMPONENT	LOCAL COMPONENT	TAXES	TOTAL COST
	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)
PART A—PRE-CONCESSION AGREEMENT OR CONTRACT	123,298,440	571,892,160	41,559,720	736,750,320
PART B–MANILA SOUTH TOLLWAY				
1. Alternative 1–AASHTO Girder, 4 Lanes	4,235,081,007	2,606,910,828	1,619,870,973	8,461,862,808
2. Alternative 2–AASHTO Girder, 6 Lanes	4,685,074,501	2,867,525,291	1,794,762,379	9,347,362,170
3. Alternative 3–Box Girder, 4 Lanes	3,847,679,618	2,264,838,515	1,446,213,351	7,558,731,484
4. Alternative 4–Box Girder, 6 Lanes	4,458,345,843	2,657,649,413	1,624,792,573	8,740,787,829
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	362,354,936	474,358,061	223,090,259	1,059,803,256
TOTAL with PART B, Alternative 1	**4,720,734,383**	**3,653,161,049**	**1,884,520,952**	**10,258,416,384**
TOTAL with PART B, Alternative 2	**5,170,727,877**	**3,913,775,511**	**2,059,412,358**	**11,143,915,747**
TOTAL with PART B, Alternative 3	**4,333,332,994**	**3,311,088,736**	**1,710,863,330**	**9,355,285,060**
TOTAL with PART B, Alternative 4	**4,943,999,220**	**3,703,899,633**	**1,889,442,552**	**10,537,341,405**

COST TO BE BORNE BY THE CONCESSIONAIRE

DESCRIPTION	FOREIGN COMPONENT	LOCAL COMPONENT	TAXES	TOTAL COST
	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)	AMT (PESOS)
PART B–MANILA SOUTH TOLLWAY				
1. Alternative 1–AASHTO Girder, 4 Lanes	4,235,081,007	2,606,910,828	1,619,870,973	8,461,862,808
2. Alternative 2–AASHTO Girder, 6 Lanes	4,685,074,501	2,867,525,291	1,794,762,379	9,347,362,170
3. Alternative 3–Box Girder, 4 Lanes	3,847,679,618	2,264,838,515	1,446,213,351	7,558,731,484
4. Alternative 4–Box Girder, 6 Lanes	4,458,345,843	2,657,649,413	1,624,792,573	8,740,787,829
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	362,354,936	474,358,061	223,090,259	1,059,803,256
TOTAL with PART B, Alternative 1	**4,597,435,943**	**3,081,268,889**	**1,842,961,232**	**9,521,666,064**
TOTAL with PART B, Alternative 2	**5,047,429,437**	**3,341,883,351**	**2,017,852,638**	**10,407,165,427**
TOTAL with PART B, Alternative 3	**4,210,034,554**	**2,739,196,576**	**1,669,303,610**	**8,618,534,740**
TOTAL with PART B, Alternative 4	**4,820,700,780**	**3,132,007,473**	**1,847,882,832**	**9,800,591,085**

Table A3-7-9
COST ESTIMATE BREAKDOWN
PART A – PRE-CONCESSION AGREEMENT OR CONTRACT
(MAGALLANES TO ALABANG PORTION)

DESCRIPTION	UNIT	QTY.	UNIT COST (PESOS)	FOREIGN COMPONENT		LOCAL COMPONENT		TAXES		FINANCIAL COST	
				%	AMT (PESOS)	%	AMT (PESOS)	%	AMT (PESOS)	%	AMT (PESOS)
1. Planning Activities, Technical Investigations, Preliminary Designs and Detailed Surveys, Right-Of-Ways, Title Searches, ROW Plans, Traffic Studies and Other Studies.	LS	1	125,000,000	45	56,250,000	55	68,750,000	10	12,500,000		137,500,000
2. Environmental Impact Study	LS	1	6,675,000	60	4,005,000	40	2,670,000	10	667,500		7,342,500
3. Public Involvement and Information Program	LS	1	8,750,000	5	437,500	95	8,312,500	20	1,750,000		10,500,000
4. Technical Assistance During the Tendering Negotiations	LS	1	8,750,000	50	4,375,000	50	4,375,000	10	875,000		9,625,000
5. Right-Of-Way Acquisition											
Land (Type 1 & Type 2)	sq.m.	40,770	7,350	0	0	100	299,659,500	10	0		299,659,500
Subtotal Land	sq.m.			0	0	100	299,659,500	10	0		299,659,500
Buildings Type 1	sq.m.	11,426	3,000	40	13,711,200	60	20,566,800	20	6,855,600		41,133,600
Buildings Type 2	sq.m.	11,985	5,000	40	23,970,000	60	35,955,000	20	11,985,000		71,910,000
Subtotal Buildings	sq.m.	23,411		40	37,681,200	60	56,521,800	20	18,840,600		113,043,600
Total					37,681,200		356,181,300		18,840,600		412,703,100
6. Resettlement of Squatters	Persons	4,800	7,560	0	0	100	36,288,000	0	0		36,288,000
Subtotal					102,748,700		476,576,800		34,633,100		613,958,600
Contingencies (20%)					20,549,740		95,315,360		6,926,620		122,791,720
Total Part A					123,298,440		571,892,160		41,559,720		736,750,320

Table A3-7-10a
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 1: AASHTO Girder Structure, Two Separate Carriageways (2 lanes each), 30.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	33,200	11	358,560	12	409,783	2	64,408	5	179,280	14	474,191	18	602,248
101 (1)	Removal of existing fence	sq.m.	17,700	150	2,656,239	172	3,035,702	16	277,890	75	1,328,031	187	3,313,592	241	4,262,160
(2)	Removal of existing curb and gutter	m	1,000	90	90,240	103	103,131	29	28,510	45	45,110	132	131,641	164	163,860
(3)	Removal of existing median	m	650	310	201,604	354	230,405	71	45,871	155	100,835	425	276,275	536	348,309
(4)	Removal of existing pavement/sidewalk	sq.m.	10,500	138	1,445,010	157	1,651,440	36	374,115	69	722,610	193	2,025,555	242	2,541,735
(5)	Demolish existing concrete structures	cu.m.	850	485	411,944	554	470,793	121	102,553	245	208,216	675	573,346	850	722,713
103 (1)	Structure excavation	cu.m.	137,000	251	34,448,650	287	39,369,886	50	6,895,210	118	16,118,050	338	46,265,096	419	57,461,910
(2)	Foundation fill	cu.m.	22,800	159	3,622,920	182	4,140,480	114	2,588,712	90	2,043,108	295	6,729,192	362	8,254,740
105 (7)	Subgrade preparation	sq.m.	5,000	6	30,750	7	35,143	1	5,600	9	44,500	8	40,743	16	80,850
	TOTAL SITE PREPARATION				43,265,917		49,446,762		10,382,868		20,789,740		59,829,630		74,438,525
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	5,000	166	830,150	190	948,743	75	373,000	86	428,450	264	1,321,743	326	1,631,600
201	Aggregate base course	cu.m.	–	–	–	–	–	–	–	–	–	–	–	–	–
206	Cement treated aggregate base course	cu.m.	5,000	659	3,296,550	753	3,767,486	278	1,392,350	297	1,485,600	1,032	5,159,836	1,235	6,174,500
311(1)	Portland cement conc. pavement(330thk)	sq.m.	6,600	471	3,108,402	538	3,552,459	242	1,596,012	186	1,224,300	780	5,148,471	898	5,928,714
	TOTAL PAVEMENT				7,235,102		8,268,688		3,361,362		3,138,350		11,630,050		13,734,814
	III. STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to C-5 Interchange-At grade pavement														
	• C-5 Interchange to Bicutan-over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	57,000	5,916	337,200,600	6,761	385,372,114	4,037	230,130,660	1,592	90,749,130	10,798	615,502,774	11,545	658,080,390
(2)	Bored Piles, 1.00 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
(3)	Bored Piles, 1.20 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	80,180	1,499	120,189,018	1,713	137,358,878	977	78,351,094	570	45,696,987	2,690	215,709,972	3,046	244,237,100
(2)a	Column	cu.m.	29,545	2,136	63,111,961	2,441	72,127,955	1,378	40,719,510	854	25,231,725	3,820	112,847,465	4,368	129,063,196
(3)a	Headstock(precast)	cu.m.	29,070	1,960	56,965,281	2,240	65,103,179	798	23,196,118	973	28,281,912	3,037	88,299,294	3,730	108,443,309
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	6,460,000	8	54,328,600	10	62,089,829	11	73,321,000	2	12,209,400	21	135,410,829	22	139,859,000
(2)a	Column	kg.	9,595,000	8	79,926,350	10	91,344,400	12	111,397,950	2	17,750,750	21	202,742,350	22	209,075,050
(3)a	Headstock	kg.	6,935,000	8	58,184,650	10	6,496,743	12	84,190,900	2	13,037,800	22	150,687,643	22	155,413,350
	SUB-TOTAL SUBSTRUCTURE				769,906,460		879,893,098		641,307,230		232,957,705		1,521,200,327		1,644,171,395

Table A3-7-10a (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 1: AASHTO Girder Structure, Two Separate Carriageways (2 lanes each), 30.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	IIIB. SUPERSTRUCTURE														
406(1)	Precast, Pretensioned, Type IV AASHTO Girder, 29900 long	ea.	5,688	183,690	1,044,830,540	209,932	1,194,092,046	71,237	405,193,212	82,367	468,504,634	281,168	1,599,285,258	337,294	1,918,528,386
406(2)	Precast reinforced concrete deck form-work slab (100 x 1690 span)	sq.m.	240,318	533	127,983,754	609	146,267,148	217	52,141,796	237	56,883,271	826	198,408,944	986	237,008,821
405	Concrete 30 MPa in														
(1)b	Deck Slab	cu.m.	58,586	1,751	102,567,096	2,001	117,219,538	1,041	60,962,248	683	40,017,167	3,041	178,181,787	3,474	203,546,512
(2)b	Parapets	cu.m.	13,900	2,338	32,500,702	2,672	37,143,659	2,048	28,466,505	881	12,249,097	4,720	65,610,164	5,267	73,216,304
(3)b	End Cros Girders	cu.m.	5,214	2,075	10,817,642	2,371	12,363,020	2,182	11,376,427	728	3,797,356	4,553	23,739,446	4,985	25,991,425
404	Reinforcement Steel Grade 275 in														
(4)b	Deck Slab	kg.	3,005,160	10	28,759,381	11	32,867,864	10	30,051,600	2	7,392,694	21	62,919,464	22	66,203,675
(2)b	Parapets	kg.	1,308,240	10	13,618,778	12	15,564,318	11	14,429,887	3	3,760,814	23	29,994,205	24	31,829,479
(3)b	End Cross Girders	kg.	862,650	10	8,807,963	12	10,066,243	10	9,015,006	3	2,406,877	22	19,081,249	23	20,229,846
	Reinforcement Steel Grade 400 in														
(4)b	Deck	kg.	5,242,440	10	53,839,859	12	61,531,267	11	55,307,742	3	13,892,466	22	116,839,009	23	123,040,067
(5)b	Parapets	kg.	929,040	11	10,154,407	12	11,605,037	11	10,395,958	3	2,768,539	24	22,000,994	25	23,318,904
416	Laminated Elastomeric Bearing, 60 tonne capacity	ea.	11,376	2,803	31,882,378	3,203	36,437,003	2,223	25,288,848	974	11,084,774	5,426	61,725,851	6,000	68,256,000
401	Aluminum railings 190 high	m	56,900	711	40,441,675	812	46,219,057	290	16,475,964	316	17,974,141	1,102	62,695,021	1,316	74,891,780
414	Expansion joint														
	Compression joint seal WABD WD 350 or equivalent	m	10,450	2,336	24,405,975	2,669	27,892,543	1,853	19,358,625	812	8,485,400	4,522	47,251,168	5,000	52,250,000
415	Drain pipe – 2 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	30,530	353	10,769,458	403	12,307,951	445	13,577,302	42	1,294,777	848	25,885,253	840	25,641,536
	SUB-TOTAL SUPERSTRUCTURE				1,541,379,608		1,761,576,695		752,041,120		650,532,007		2,513,617,815		2,943,952,735
	TOTAL STRUCTURES				2,311,286,068		2,641,469,792		1,393,348,350		883,489,712		4,034,818,142		4,588,124,130
	IV INTERCHANGES (2 lane, 30m span)														
	a. Magallanes/EDSA	lane m	2,800	56,695	158,746,000	64,794	181,424,000	36,537	102,303,600	20,575	57,610,000	101,331	283,727,600	113,807	318,659,600
	b. Bicutan	lane m	2,600	56,695	147,407,000	64,794	168,465,143	36,537	94,996,200	20,575	53,495,000	101,331	263,461,343	113,807	295,898,200
	c. Sucat	lane m	2,640	56,695	149,674,800	64,794	171,056,914	36,537	96,457,680	20,575	54,318,000	101,331	267,514,594	113,807	300,450,480
	d. Alabang	lane m	2,720	56,695	154,210,400	64,794	176,240,457	36,537	99,380,640	20,575	55,964,000	101,331	275,621,097	113,807	309,555,040
	TOTAL INTERCHANGES				610,038,200		697,186,514		393,138,120		221,387,000		1,090,324,634		1,224,563,320

Table A3-7-10a (continued)
COST ESTIMATE BREAKDOWN
PART B - MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 1: AASHTO Girder Structure, Two Separate Carriageways (2 lanes each), 30.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	V DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
	VI STREET LIGHTING	km	15	899,357	13,490,357	1,027,037	15,417,551	238,065	3,570,977	185,162	2,777,426	1,265,902	18,988,527	1,322,584	19,838,760
	VII TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	15	463,971	6,959,568	530,253	7,953,792	214,587	3,218,800	149,962	2,249,432	744,839	11,172,592	828,520	12,427,800
	VIII TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,850,000
	Toll Collection System	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
	TOTAL TOLL COLLECTION SYSTEM				90,120,000		102,994,286		90,120,000		45,060,000		193,114,286		225,300,000
	SUB-TOTAL				3,083,647,158		3,524,168,180		1,898,143,897		1,179,460,444		5,422,312,077		6,161,251,499
	20% CONTINGENCIES				616,729,432		704,833,636		379,628,779		235,892,089		1,084,462,415		1,232,250,300
	SUB-TOTAL				3,700,376,589		4,229,001,817		2,277,772,676		1,415,352,532		6,506,774,493		7,393,501,798
	5% GENERAL ITEMS				185,018,829		211,450,091		113,888,634		70,767,627		325,338,725		369,675,090
	SUB-TOTAL				3,885,395,419		4,440,451,907		2,391,661,310		1,486,120,159		6,832,113,218		7,763,176,888
	2%DETAILED DESIGN COST														
	a. 1.5% for Concessionaire's Designer				58,280,931		66,606,779		35,874,920		22,291,802		102,481,698		116,447,653
	b. 0.5% for Independent Design Checker(IDC)				19,426,977		22,202,260		11,958,307		7,430,601		34,160,566		38,815,884
	1%QUALITY CONTROL COST				38,853,954		44,404,519		23,916,613		14,861,202		68,321,132		77,631,769
	6%PROJ. MANAGEMENT & SUPV.														
	a. 5% for Concessionaire's supervision of his constructors				194,269,771		222,022,595		119,583,066		74,306,008		341,605,661		388,158,844
	b. 1% for the Independent Certification Engineer (ICE)				38,853,954		44,404,519		23,916,613		14,861,202		68,321,132		77,631,769
	GRAND TOTAL				4,235,081,007		4,840,092,579		2,606,910,828		1,619,870,973		7,447,003,407		8,461,862,808

Table A3-7-10b
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 2: AASHTO Girder Structure, Two Separate Carriageways (3 lanes each), 30.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	33,200	11	358,560	12	409,783	2	64,408	5	179,280	14	474,191	18	602,248
101 (1)	Removal of existing fence	sq.m.	17,700	150	2,656,239	172	3,035,702	16	277,890	75	1,328,031	187	3,313,592	241	4,262,160
(2)	Removal of existing curb and gutter	m	1,000	90	90,240	103	103,131	29	28,510	45	45,110	132	131,641	164	163,860
(3)	Removal of existing median	m	650	310	201,604	354	230,405	71	45,871	155	100,835	425	276,275	536	348,309
(4)	Removal of existing pavement/sidewalk	sq.m.	10,500	138	1,445,010	157	1,651,440	36	374,115	69	722,610	193	2,025,555	242	2,541,735
(5)	Demolish existing concrete structures	cu.m.	850	485	411,944	554	470,793	121	102,553	245	208,216	675	573,346	850	722,713
103 (1)	Structure excavation	cu.m.	137,000	251	34,448,650	287	39,369,886	50	6,895,210	118	16,118,050	338	46,265,096	419	57,461,910
(2)	Foundation fill	cu.m.	22,800	159	3,622,920	182	4,140,460	114	2,588,712	90	2,043,108	295	6,729,192	362	8,254,740
105 (7)	Subgrade preparation	sq.m.	7,500	6	46,125	7	52,714	1	8,400	9	66,750	8	61,114	16	121,275
	TOTAL SITE PREPARATION				43,281,292		49,464,334		10,385,668		20,811,990		59,850,002		74,478,950
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	7,500	166	1,245,225	190	1,423,114	75	559,500	86	642,675	264	1,982,614	326	2,447,400
201	Aggregate base course	cu.m.	–	–	–	–	–	–	–	–	–	–	–	–	–
206	Cement treated aggregate base course	cu.m.	7,500	659	4,944,825	753	5,651,229	278	2,088,525	297	2,228,400	1,032	7,739,754	1,235	9,261,750
311(1)	Portland cement concr. pavement(330thk)	sq.m	9,900	471	4,662,603	538	5,328,689	242	2,394,018	186	1,836,450	780	7,722,707	898	8,893,071
	TOTAL PAVEMENT				10,852,653		12,403,032		5,042,043		4,707,525		17,445,075		20,602,221
	III. STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to C-5 – At grade pavement														
	• C-5 Interchange to Bicutan-over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m													
(2)	Bored Piles, 1.00 m ø	m	57,000	6,869	391,524,450	7,850	447,456,514	4,722	269,163,690	1,851	105,504,720	12,572	716,620,204	13,442	766,192,860
(3)	Bored Piles, 1.20 m ø	m	–	–	–	–	–	–	–	–	–	–	–	–	–
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	80,180	1,499	120,189,018	1,713	137,358,878	977	78,351,094	570	45,696,987	2,690	215,709,972	3,046	244,237,100
(2)a	Column	cu.m.	32,775	2,136	70,011,661	2,441	80,013,327	1,378	45,171,161	854	27,990,178	3,820	125,184,487	4,368	143,172,999
(3)a	Headstock(precast)	cu.m.	36,575	1,960	71,672,004	2,240	81,910,862	798	29,184,656	973	35,583,452	3,037	111,095,518	3,730	136,440,112
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	6,460,000	8	54,328,600	10	62,089,829	11	73,321,000	2	12,209,400	21	135,410,829	22	139,859,000
(2)a	Column	kg.	10,830,000	8	90,213,900	10	103,101,600	12	125,736,300	2	20,035,500	21	228,837,900	22	235,985,700
(3)a	Headstock	kg.	8,740,000	8	73,328,600	10	83,804,114	12	106,103,600	2	16,431,200	22	189,907,714	22	195,863,400
	SUB-TOTAL SUBSTRUCTURE				871,268,233		995,735,124		727,031,500		263,451,437		1,722,766,624		1,861,751,170

Table A3-7-10b (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 2: AASHTO Girder Structure, Two Separate Carriageways (3 lanes each), 30.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	IIIB. SUPERSTRUCTURE														
406(1)	Precast, Pretensioned, Type IV AASHTO Girder, 29900 long	ea.	6,636	183,690	1,218,968,964	209,932	1,393,107,387	71,237	472,725,414	82,367	546,588,739	281,168	1,865,832,801	337,294	2,238,283,117
406(2)	Precast reinforced concrete deck form-work slab (100 x 1690 span)	sq.m.	288,382	533	153,580,718	609	175,520,820	217	62,570,243	237	68,260,019	826	238,091,063	986	284,410,980
405	Concrete 30 MPa in														
(1)b	Deck Slab	cu.m.	65,317	1,751	114,351,125	2,001	130,687,000	1,041	67,966,258	683	44,614,777	3,041	198,653,258	3,474	226,932,159
(2)b	Parapets	cu.m.	10,000	2,338	23,381,800	2,672	26,722,057	2,048	20,479,500	881	8,812,300	4,720	47,201,557	5,267	52,673,600
(3)b	End Cros Girders	cu.m.	6,257	2,075	12,981,586	2,371	14,836,098	2,182	13,652,148	728	4,556,973	4,553	28,488,246	4,985	31,190,707
(4)b	Median	cu.m.	2,000	2,338	4,676,360	2,672	5,344,411	2,048	4,095,900	881	1,762,460	4,720	9,440,311	5,267	10,534,720
404	Reinforcement Steel Grade 275 in														
(4)b	Deck Slab	kg.	3,346,440	10	32,025,431	11	36,600,492	10	33,464,400	2	8,232,242	21	70,064,892	22	73,722,073
(2)b	Parapets	kg.	1,308,240	10	13,618,778	12	15,564,318	11	14,429,887	3	3,780,814	23	29,994,205	24	31,829,479
(3)b	Enc Cross Girders	kg.	1,033,320	10	10,550,197	12	12,057,368	10	10,798,194	3	2,882,963	22	22,855,562	23	24,231,354
	Reinforcement Steel Grade 400 in														
(4)b	Deck	kg.	6,294,720	10	64,646,774	12	73,882,028	11	66,409,296	3	16,681,008	22	140,291,324	23	147,737,078
(5)b	Parapets	kg.	929,940	11	10,164,244	12	11,616,279	11	10,406,029	3	2,771,221	24	22,022,308	25	23,341,494
416	Laminated Elastomeric Bearing, 60 tonne capacity	ea.	13,272	2,803	37,196,107	3,203	42,509,837	2,223	29,503,656	974	12,932,237	5,426	72,013,493	6,000	79,632,000
401	Aluminum railings 190 high	m	40,100	711	28,501,075	812	32,572,657	290	11,611,356	316	12,667,189	1,102	44,184,013	1,316	52,779,620
414	Expansion joint Compression joint seal WABD WD 350 or equivalent	m	12,255	2,336	28,621,553	2,669	32,710,346	1,853	22,702,388	812	9,951,060	4,522	55,412,733	5,000	61,275,000
415	Drain pipe – 2 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	30,530	353	10,769,458	403	12,307,951	445	13,577,302	42	1,294,777	848	25,885,253	840	25,641,536
	SUB-TOTAL SUPERSTRUCTURE				1,764,034,169		2,016,039,051		854,391,969		745,788,780		2,870,431,020		3,364,214,918
	TOTAL STRUCTURES				2,635,302,403		3,011,774,174		1,581,423,469		1,009,240,217		4,593,197,644		5,225,966,089
	IV INTERCHANGES (2 lane, 30m span)														
	a. Magallanes/EDSA	lane m	2,800	56,695	158,746,000	64,794	181,424,000	36,537	102,303,600	20,575	57,610,000	101,331	283,727,600	113,807	318,659,600
	b. Bicutan	lane m	2,600	56,695	147,407,000	64,794	168,465,143	36,537	94,996,200	20,575	53,495,000	101,331	263,461,343	113,807	295,898,200
	c. Sucat	lane m	2,640	56,695	149,674,800	64,794	171,056,914	36,537	96,457,680	20,575	54,318,000	101,331	267,514,594	113,807	300,450,480
	d. Alabang	lane m	2,720	56,695	154,210,400	64,794	176,240,457	36,537	99,380,640	20,575	55,964,000	101,331	275,621,097	113,807	309,555,040
	TOTAL INTERCHANGES				610,038,200		697,186,514		393,138,120		221,387,000		1,090,324,634		1,224,563,320

Table A3-7-10b (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 2: AASHTO Girder Structure, Two Separate Carriageways (3 lanes each), 30.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	V DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
	VI STREET LIGHTING	km	15	899,357	13,490,357	1,027,837	15,417,551	238,065	3,570,977	185,162	2,777,426	1,265,902	18,988,527	1,322,584	19,838,760
	VII TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	15	463,971	6,959,568	530,253	7,953,792	214,587	3,218,800	149,962	2,249,432	744,839	11,172,592	828,520	12,427,800
	VIII TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,880,000
	Toll Collection System	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
											0				
	TOTAL TOLL COLL. SYSTEM				90,120,000		102,994,286		90,120,000		45,060,000		193,114,286		225,300,000
	SUB-TOTAL				3,411,296,418		3,898,624,478		2,087,902,498		1,306,802,373		5,986,526,976		6,806,001,289
	20% CONTINGENCIES				682,259,284		779,724,896		417,580,500		261,360,475		1,197,305,395		1,361,200,258
	SUB-TOTAL				4,093,555,702		4,678,349,373		2,505,482,998		1,568,162,848		7,183,832,371		8,167,201,547
	5% GENERAL ITEMS				204,677,785		233,917,469		125,274,150		78,408,142		359,191,619		408,360,077
	SUB-TOTAL				4,298,233,487		4,912,266,842		2,630,757,147		1,646,570,990		7,543,023,989		8,575,561,624
	2%DETAILED DESIGN COST														
	a. 1.5% for Concessionaire's Designer				64,473,502		73,684,003		39,461,357		24,698,565		113,145,360		128,633,424
	b. 0.5% for Independent Design Checker (IDC)				21,491,167		24,561,334		13,153,786		8,232,855		37,715,120		42,877,808
	1%QUALITY CONTROL COST				42,982,335		49,122,668		26,307,571		16,465,710		75,430,240		85,755,616
	6%PROJ. MANAGEMENT & SUPV.														
	a. 5% for Concessionaire's supervision of his constructors				214,911,674		245,613,342		131,537,857		82,328,550		377,151,199		428,778,081
	b. 1% for the Independent Certification Engineer (ICE)				42,982,335		49,122,668		26,307,571		16,465,710		75,430,240		85,755,616
	GRAND TOTAL				4,685,074,501		5,354,370,858		2,867,525,291		1,794,762,379		8,221,896,148		9,347,362,170

Table A3-7-10c
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 3: Box Girder Structure, Two Separate Carriageways (2 lanes each), 40.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	I SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	33,200	11	358,560	12	409,783	2	64,405	5	179,280	14	474,191	18	602,248
101 (1)	Removal of existing fence	sq.m.	17,700	150	2,656,239	172	3,035,702	16	277,890	75	1,328,031	187	3,313,592	241	4,267,160
(2)	Removal of existing curb and gutter	m	1,000	90	90,240	103	103,131	29	28,510	45	45,110	132	131,641	164	163,860
(3)	Removal of existing median	m	650	310	201,604	354	230,405	71	45,871	155	100,841	425	276,275	536	348,316
(4)	Removal of existing pavement/sidewalk	sq.m.	10,500	138	1,445,010	157	1,651,440	36	374,115	69	722,610	193	2,025,555	242	2,541,735
(5)	Demolish existing concrete structures	cu.m.	850	485	411,944	554	470,793	121	102,553	245	208,216	675	573,346	850	722,713
103 (1)	Structure excavation	cu.m.	97,750	251	24,579,238	287	28,090,557	50	4,919,758	118	11,500,288	338	33,010,315	419	40,999,283
(2)	Foundation fill	cu.m.	16,200	159	2,574,180	182	2,941,920	114	1,839,348	90	1,451,682	295	4,781,268	362	5,865,210
105	Subgrade preparation	sq.m.	5,000	6	30,750	7	35,143	1	5,600	9	44,500	8	40,743	16	80,850
	TOTAL SITE PREPARATION				32,347,765		36,968,874		7,658,052		15,580,558		44,626,925		55,586,374
	II PAVEMENT														
200	Aggregate subbase	cu.m.	5,000	166	830,150	190	948,743	75	373,000	86	428,450	264	1,321,743	326	1,631,600
201	Aggregate base course	cu.m.		190											
206	Cement treated aggregate base course	cu.m.	5,000	659	3,296,550	753	3,767,486	278	1,392,350	297	1,485,600	1,032	5,159,836	1,235	6,174,500
311(1)	Portland cement concrete pavement (330 thk)	sq.m.	6,600	471	3,108,402	538	3,552,459	242	1,596,012	186	1,224,300	780	5,148,471	898	5,928,714
	TOTAL PAVEMENT				7,235,102		8,268,688		3,361,362		3,138,350		11,630,050		13,734,814
	III STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to C-5 – At grade pavement														
	• C-5 Interchange to Bicutan – Over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
(2)	Bored Piles, 1.00 m ø	m	56,690	6,869	389,395,107	7,850	445,022,979	4,722	267,699,817	1,851	104,930,922	12,572	712,722,796	13,442	762,025,846
(3)	Bored Piles, 1.20 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	60,093	1,499	90,078,806	1,713	102,947,207	977	58,722,279	570	34,248,803	2,690	161,669,486	3,046	183,049,888
(2)a	Column	cu.m.	22,428	2,136	47,909,124	2,441	54,753,284	1,378	30,910,718	854	19,153,736	3,820	85,664,002	4,368	97,973,578
(3)a	Headstock (precast)	cu.m.	—	—	—	—	—	—	—	—	—	—	—	—	—

Table A3-7-10c (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 3: Box Girder Structure, Two Separate Carriageways (2 lanes each), 40.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
404	Reinforcement Steel Grade 275 in														
(1)a	Pile Cap	kg.	4,841,600	8	40,717,856	10	46,534,693	11	54,952,160	2	9,150,624	21	101,486,853	22	104,820,640
(2)a	Column	kg.	8,900,000	8	74,137,000	10	84,728,000	12	103,329,000	2	16,465,000	21	188,057,000	22	193,931,000
(3)a	Headstock	kg.	—	—	—	—	—	—	—	—	—	—	—	—	—
	SUB-TOTAL SUBSTRUCTURE				642,237,892		733,986,163		515,613,974		183,949,086		1,249,600,137		1,341,800,953
	IIIB. SUPERSTRUCTURE														
406(3)	Structural concrete 40 MPa in precast segmented box girders 39900 long	cu.m.	201,427	3,967	799,075,009	4,534	913,228,582	932	187,715,864	1,786	359,813,079	5,467	1,100,944,446	6,685	1,346,603,952
405(c)	Structural concrete 40 MPa in cast-in-place deck concrete	cu.m.													
405	Structural concrete 30 MPa in														
(1)d	Outer parapets	cu.m.	13,900	2,574	35,773,179	2,941	40,883,633	2,205	30,652,419	950	13,211,811	5,146	71,536,052	5,729	79,637,409
(2)d	Median	cu.m.													
404	Reinforcement Steel Grade 275 in														
(1)c	Box (precast and cast-in-place)	kg.	15,449,600	8	125,914,240	9	143,901,989	12	186,940,160	2	27,191,296	21	330,842,149	22	340,045,696
(2)c	Parapets (and median)	kg.	1,306,400	10	13,599,624	12	15,542,427	11	14,409,592	3	3,775,496	23	29,952,019	24	31,784,712
(3)c	Reinforcement Grade 400 in box	kg.	6,794,700	9	59,521,572	10	68,024,654	11	76,848,057	2	12,841,983	21	144,872,711	22	149,211,612
412	Post Tensioning tendons n/12.7 mm ø high tensile low relaxation 7 wire strand (including all accessories and grouting)														
(1)	36/12.7	m	165,566	2,011	332,923,424	2,298	380,483,913	819	135,634,979	894	147,966,334	3,117	516,118,892	3,724	616,524,737
(2)	39/12.7	m													
401 (3)	Aluminum railings 190 high	m	56,900	711	40,441,675	812	46,219,057	290	16,475,964	316	17,974,141	1,102	62,695,021	1,316	74,891,780
413	Pot type bearing, 300 tonne capacity														
(1)	Fixed	ea.	710	11,678	8,291,025	13,346	9,475,457	9,263	6,576,375	4,060	2,882,600	22,608	16,051,832	25,000	17,750,000
(2)	Guided/Sliding	ea.	2,130	14,913	29,817,690	16,015	34,111,646	11,115	23,674,950	4,872	10,377,360	27,130	57,786,596	30,000	63,900,000
414	Expansion joint Compression joint seal WABD WD 350 or equivalent	m	7,952	2,336	18,571,896	2,669	21,225,024	1,853	14,731,080	812	6,457,024	4,522	35,956,104	5,000	39,760,000
415	Drain pipe – 200 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	30,530	353	10,769,458	403	12,307,951	445	13,577,302	42	1,294,777	848	25,885,253	840	25,641,536
	SUB-TOTAL SUPERSTRUCTURE				1,474,728,792		1,685,404,333		707,236,741		603,785,901		2,392,641,074		2,785,751,434
	TOTAL STRUCTURES				2,116,966,684		2,419,390,496		1,222,850,715		787,734,987		3,642,241,211		4,127,552,386
	IV INTERCHANGES (Two lane, 40m span)														
	a. Magallanes/EDSA	lane m	2,800	49,554	138,751,200	56,633	158,572,800	29,488	82,566,400	18,207	50,979,600	86,121	241,139,200	97,249	272,297,200
	b. Bicutan	lane m	2,600	49,554	128,840,400	56,633	147,246,171	29,488	76,668,800	18,207	47,338,200	86,121	223,914,971	97,249	252,847,400

Table A3-7-10c (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 3: Box Girder Structure, Two Separate Carriageways (2 lanes each), 40.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
	c. Sucat	lane m	2,640	49,554	130,822,560	56,633	149,511,497	29,488	77,848,320	18,207	48,066,480	86,121	227,359,817	97,249	256,737,360
	d. Alabang	lane m	2,720	49,554	134,786,880	56,633	154,042,149	29,488	80,207,360	18,207	49,523,040	86,121	234,249,509	97,249	264,517,280
	TOTAL INTERCHANGES				533,201,040		609,372,617		317,290,880		195,907,320		926,663,497		1,046,399,240
V	DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
VI	STREET LIGHTING	km	15	899,357	13,490,357	1,027,837	15,417,551	238,065	3,570,977	185,162	2,777,426	1,265,902	18,988,527	1,322,584	19,838,760
VII	TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	15	463,971	6,959,568	530,253	7,953,792	214,587	3,218,800	149,962	2,249,432	744,839	11,172,592	828,520	12,427,800
VIII	TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,880,000
	Toll Collection System	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
	TOTAL TOLL COLLECTION SYSTEM				90,120,000		102,994,286		90,120,000		45,060,000		193,114,286		225,300,000
	SUB-TOTAL				2,801,572,461		3,201,797,098		1,649,074,206		1,053,016,857		4,850,871,304		5,503,663,524
	20% CONTINGENCIES				560,314,492		640,359,420		329,814,841		210,603,371		970,174,261		1,100,732,705
	SUB-TOTAL				3,361,886,953		3,842,156,518		1,978,889,048		1,263,620,228		5,821,045,565		6,604,396,229
	5% GENERAL ITEMS				168,094,348		192,107,826		98,944,452		63,181,011		291,052,278		330,219,811
	SUB-TOTAL				3,529,981,301		4,034,264,343		2,077,833,500		1,326,801,240		6,112,097,843		6,934,616,040
	2% DETAILED DESIGN COST														
	1.5% for Concessionaire's Designer				52,949,720		60,513,965		31,167,503		19,902,019		91,681,468		104,019,241
	.5% for Independent Design Checker(IDC)				17,649,907		20,171,322		10,389,168		6,634,006		30,560,489		34,673,080
	1% QUALITY CONTROL COST				35,299,813		40,342,643		20,778,335		13,268,012		61,120,978		69,346,160
	6% PROJ.MANAGEMENT COST														
	5% for Concessionaire's supervision of his constructors				176,499,065		201,713,217		103,891,675		66,340,062		305,604,892		346,730,802
	1% for Independent Certification Engr.(ICE)				35,299,813		40,342,643		20,778,335		13,268,012		61,120,978		69,346,160
	GRAND TOTAL				3,847,679,618		4,397,348,134		2,264,838,515		1,446,213,351		6,662,186,649		7,558,731,484

Table A3-7-10d
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 4: Box Girder Structure, Two Separate Carriageways (3 lanes each), 40.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28)		FOREIGN COMPONENT ECONOMIC (1$=P32)		LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
				UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.
	I. SITE PREPARATION														
100 (1)	Removal of trees, vegetation	sq.m.	33,200	11	358,560	12	409,783	2	64,408	5	179,280	14	474,191	18	602,248
101 (1)	Removal of existing fence	sq.m.	17,700	150	2,656,239	172	3,035,702	16	277,890	75	1,328,031	187	3,313,592	241	4,262,160
(2)	Removal of existing curb and gutter	m	1,000	90	90,240	103	103,131	29	28,510	45	45,110	132	131,641	164	163,860
(3)	Removal of existing median	m	650	310	201,604	354	230,405	71	45,871	155	100,841	425	276,275	536	348,316
(4)	Removal of existing pavement/sidewalk	sq.m.	19,500	138	1,445,010	157	1,651,440	36	374,115	69	722,610	193	2,025,555	242	2,541,735
(5)	Demolish existing concrete structures	cu.m.	850	485	411,944	554	470,793	121	102,553	245	208,216	675	573,346	850	722,713
103 (1)	Structure excavation	cu.m.	97,750	251	24,579,238	287	28,090,557	50	4,919,758	118	11,500,288	338	33,010,315	419	40,999,283
(2)	Foundation fill	cu.m.	16,200	159	2,574,180	182	2,941,920	114	1,839,348	90	1,451,682	295	4,781,268	362	5,865,210
105	Subgrade preparation	sq.m.	7,500	6	46,125	7	52,714	1	8,400	9	66,750	8	61,114	16	121,275
	TOTAL SITE PREPARATION				32,363,140		36,986,445		7,660,852		15,602,808		44,647,297		55,626,799
	II. PAVEMENT														
200	Aggregate subbase	cu.m.	7,500	166	1,245,225	190	1,423,114	75	559,500	86	642,675	264	1,982,614	326	2,447,400
201	Aggregate base course	cu.m.		190											
206	Cement treated aggregate base course	cu.m.	7,500	659	4,944,825	753	5,651,229	278	2,088,525	297	2,228,400	1,032	7,739,754	1,235	9,261,750
311(1)	Portland cement concrete pavement (330 thk)	sq.m.	9,900	471	4,662,603	538	5,328,689	242	2,394,018	186	1,836,450	780	7,722,707	898	8,893,071
	TOTAL PAVEMENT				10,852,653		12,403,032		5,042,043		4,707,525		17,445,075		20,602,221
	III. STRUCTURES														
	• Pres. Quirino Ave. to Nichols – Over PNR														
	• Nichols to C-5 – At grade pavement														
	• C-5 Interchange to Bicutan – Over PNR														
	• Bicutan to Alabang – Over SLE														
	IIIA. SUBSTRUCTURE														
400 (1)	Bored Piles, 0.90 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
(2)	Bored Piles, 1.00 m ø	m	—	—	—	—	—	—	—	—	—	—	—	—	—
(3)	Bored Piles, 1.20 m ø	m	56,960	11,873	676,282,093	13,569	772,893,820	8,290	472,196,122	3,013	171,611,366	21,859	1,245,089,942	23,176	1,320,089,581
405	Structural concrete, 21 MPa in														
(1)a	Pile Cap	cu.m.	60,093	1,499	90,078,806	1,713	102,947,207	977	58,722,279	570	34,248,803	2,690	161,669,486	3,046	183,049,888
(2)a	Column	cu.m.	24,920	2,136	53,232,360	2,441	60,836,982	1,378	34,345,242	854	21,281,929	3,820	95,182,225	4,368	108,859,531
(3)a	Headstock (precast)	cu.m.	—	—	—	—	—	—	—	—	—	—	—	—	—

Table A3-7-10d (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 4: Box Girder Structure, Two Separate Carriageways (3 lanes each), 40.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28) UNIT COST (PESOS)	FOREIGN COMPONENT FINANCIAL (1$=P28) AMT.	FOREIGN COMPONENT ECONOMIC (1$=P32) UNIT COST (PESOS)	FOREIGN COMPONENT ECONOMIC (1$=P32) AMT.	LOCAL COMPONENT DIRECT UNIT COST (PESOS)	LOCAL COMPONENT DIRECT AMT.	TAXES UNIT COST (PESOS)	TAXES AMT.	ECONOMIC COST UNIT COST (PESOS)	ECONOMIC COST AMT.	FINANCIAL COST UNIT COST (PESOS)	FINANCIAL COST AMT.
404	Reinforcement Steel Grade 275 in														
(1)a	File Cap	kg.	4,841,600	8	40,717,856	10	46,534,693	11	54,052,160	2	9,150,624	21	101,486,853	22	104,820,640
(2)a	Column	kg.	10,039,200	8	83,626,536	10	95,573,184	12	116,555,112	2	18,572,520	21	212,128,296	22	218,754,168
(3)a	Headstock	kg.	—	—	—	—	—	—	—	—	—	—	—	—	—
	SUB-TOTAL SUBSTRUCTURE				943,937,650		1,078,785,886		736,770,915		254,865,243		1,815,556,801		1,935,573,808
	IIIB. SUPERSTRUCTURE														
406(3)	Structural concrete 40 MPa in precast segmented box girders 39900 long	cu.m.	223,153	3,967	885,263,572	4,534	1,011,729,796	932	207,962,975	1,786	398,622,667	5,466	1,219,692,772	6,685	1,491,849,214
405(c)	Structural concrete 40 MPa in cast-in-place deck concrete	cu.m.	1,500	2,197	3,295,995	2,511	3,766,851	1,550	2,325,345	768	1,152,180	4,061	6,092,196	4,516	6,773,520
405	Structural concrete 30 MPa in														
(1)d	Outer parapets	cu.m.	10,000	2,338	23,381,800	2,672	26,722,057	2,048	20,479,500	881	8,812,300	4,720	47,201,557	5,267	52,673,600
(2)d	Median	cu.m.	2,000	2,338	4,676,360	2,672	5,344,411	2,048	4,095,900	881	1,762,460	4,720	9,440,311	5,267	10,534,720
404	Reinforcement Steel Grade 275 in														
(1)c	Box (precast and cast-in-place)	kg.	16,983,200	8	138,413,080	9	158,186,377	12	205,496,720	2	29,890,432	21	363,683,097	22	373,800,232
(2)c	Parapets (and median)	kg.	1,306,400	10	13,599,624	12	15,542,427	11	14,409,592	3	3,775,496	23	29,952,019	24	31,784,712
(3)c	Reinforcement Grade 400 in box	kg.	7,916,500	9	69,348,540	10	79,255,474	11	89,535,615	2	14,962,185	21	168,791,089	22	173,846,340
412	Post Tensioning tendons n/12.7 mm ø high tensile low relaxation 7 wire strand (including all accessories and grouting)														
(1)	36/12.7	m													
(2)	39/12.7	m	166,566	2,265	377,255,333	2,588	431,148,952	923	153,697,111	1,007	167,668,667	3,511	584,846,063	4,194	698,621,111
401 (1)	Aluminum railings 190 high	m	40,100	711	28,501,075	812	32,572,657	290	11,611,356	316	12,667,189	1,102	44,184,013	1,316	52,779,620
413	Pot type bearing, 300 tonne capacity														
(1)	Fixed	ea.	710	11,678	8,291,025	13,346	9,475,457	9,263	6,576,375	4,060	2,882,600	22,608	16,051,832	25,000	17,750,000
(2)	Guided/Sliding	ea.	2,130	14,013	29,847,690	16,015	34,111,646	11,115	23,674,950	4,872	10,377,360	27,130	57,786,596	30,000	63,900,000
414	Expansion joint														
	Compression joint seal WABD WD 350 or equivalent	m	9,159	2,336	21,390,845	2,669	24,446,679	1,853	16,967,048	812	7,437,108	4,522	41,413,727	5,000	45,795,000
415	Drain pipe – 200 ø UPVC longitudinal (including scuppers and fittings) drain under each carriageway	m	30,530	353	10,769,458	403	12,307,951	445	13,577,302	42	1,294,777	848	25,885,253	840	25,641,536
	SUB-TOTAL SUPERSTRUCTURE				1,614,034,396		1,844,610,738		770,409,788		661,305,421		2,615,020,527		3,045,749,606
	TOTAL STRUCTURES				2,557,972,047		2,923,396,625		1,507,180,703		916,170,664		4,430,577,328		4,981,323,414
	IV INTERCHANGES (Two lane, 40m span)														
	a. Magallanes/EDSA	lane m	2,800	49,554	138,751,200	56,633	158,572,800	29,488	82,566,400	18,207	50,979,600	86,121	241,139,200	97,249	272,297,200
	b. Bicutan	lane m	2,600	49,554	128,840,400	56,633	147,246,171	29,488	76,668,800	18,207	47,338,200	86,121	223,914,971	97,249	252,847,400

Table A3-7-10d (continued)
COST ESTIMATE BREAKDOWN
PART B – MANILA SOUTH TOLLWAY FROM MAGALLANES TO ALABANG

Alternative No. 4: Box Girder Structure, Two Separate Carriageways (3 lanes each), 40.00 m span from Magallanes – Alabang

PAY ITEM NO.	DESCRIPTION	UNIT	QUANTITY	FOREIGN COMPONENT FINANCIAL (1$=P28)		FOREIGN COMPONENT ECONOMIC (1$=P32)		LOCAL COMPONENT DIRECT		TAXES		ECONOMIC COST		FINANCIAL COST	
				UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.	UNIT COST (PESOS)	AMT.
	c. Sucat	lane m	2,640	49,554	130,822,560	56,633	149,511,497	29,488	77,848,320	18,207	48,066,480	86,121	227,359,817	97,249	256,737,360
	d. Alabang	lane m	2,720	49,554	134,786,880	56,633	154,042,149	29,488	80,207,360	18,207	49,523,040	86,121	234,249,509	97,249	264,517,280
	TOTAL INTERCHANGES				533,201,040		609,372,617		317,290,880		195,907,320		926,663,497		1,04[illegible]399,240
V	DRAINAGE WORKS	km	1	1,251,946	1,251,946	1,430,795	1,430,795	1,003,421	1,003,421	568,784	568,784	2,434,216	2,434,216	2,824,150	2,824,150
VI	STREET LIGHTING	km	15	899,357	13,490,357	1,027,[illegible]37	15,417,551	238,065	3,570,977	185,162	2,777,426	1,265,902	18,988,527	1,322,584	19,838,760
VII	TRAFFIC SIGNS AND PAVEMENT MARKINGS	km	15	463,971	6,959,568	530,253	7,953,792	214,587	3,218,800	149,962	2,249,432	744,839	11,172,592	828,520	12,427,800
VIII	TOLL COLLECTION SYSTEM														
	Toll Plaza Construction	lot	1		30,752,000		35,145,143		30,752,000		15,376,000		65,897,143		76,880,000
	Toll Collection System	lot	1		7,820,000		8,937,143		7,820,000		3,910,000		16,757,143		19,550,000
	Communication System	lot	1		356,000		406,857		356,000		178,000		762,857		890,000
	Plaza Administration Building	lot	1		4,000,000		4,571,429		4,000,000		2,000,000		8,571,429		10,000,000
	Central Administration Building	lot	1		25,364,000		28,987,429		25,364,000		12,682,000		54,351,429		63,410,000
	Maintenance Building	lot	1		19,328,000		22,089,143		19,328,000		9,664,000		41,417,143		48,320,000
	Standby Generators (3)	lot	1		2,500,000		2,857,143		2,500,000		1,250,000		5,357,143		6,250,000
	TOTAL TOLL COLLECTION SYSTEM				90,120,000		102,994,286		90,120,000		45,060,000		193,114,286		225,300,000
	SUB-TOTAL				3,246,210,750		3,709,955,142		1,935,087,675		1,183,043,959		5,645,042,817		6,364,342,383
	20% CONTINGENCIES				649,242,150		741,991,028		387,017,535		236,608,792		1,129,008,563		1,272,868,477
	SUB-TOTAL				3,895,452,899		4,451,946,171		2,322,105,210		1,419,652,751		6,774,051,381		7,637,210,860
	5% GENERAL ITEMS				194,772,645		222,597,309		116,105,260		70,982,638		338,702,569		381,860,543
	SUB-TOTAL				4,090,225,544		4,674,543,479		2,438,210,470		1,490,635,388		7,112,753,950		8,019,071,403
	2% DETAILED DESIGN COST														
	1.5% for Concessionaire's Designer				61,353,383		70,118,152		36,573,157		22,359,531		106,691,309		120,286,071
	.5% for Independent Design Checker(IDC)				20,451,128		23,372,717		12,191,052		7,453,177		35,563,770		40,095,357
	1% QUALITY CONTROL COST				40,902,255		46,745,435		24,382,105		14,906,354		71,127,539		80,190,714
	6% PROJ.MANAGEMENT COST														
	5% for Concessionaire's supervision of his constructors				204,511,277		233,727,174		121,910,524		74,531,769		355,637,697		4[illegible]0,953,570
	1% for Independent Certification Engr.(ICE)				40,902,255		46,745,435		24,382,105		14,906,354		71,127,539		80,190,714
	GRAND TOTAL				4,458,345,843		5,095,252,393		2,657,649,413		1,624,792,573		7,752,901,805		8,740,787,829

Table A3-7-11
COST COMPARISON

TOTAL PROJECT COST

DESCRIPTION	PRES. QUIRINO TO ALABANG	MAGALLANES TO ALABANG		PRES. QUIRINO TO MAGALLANES	
	AMOUNT	AMOUNT	%	AMOUNT	%
PART A—PRE-CONCESSION AGREEMENT OR CONTRACT	1,166,368,740	736,750,320	63.17	429,618,420	36.83
PART B--MANILA SOUTH TOLLWAY					
1. Alternative 1–AASHTO Girder, 2 Lanes	10,640,159,380	8,461,862,808	79.53	2,178,296,572	20.47
2. Alternative 2–AASHTO Girder, 3 Lanes	11,698,033,131	9,347,362,170	79.91	2,350,670,961	20.09
3. Alternative 3–Box Girder, 2 Lanes	9,521,158,428	7,558,731,484	79.39	1,962,426,944	20.61
4. Alternative 4–Box Girder, 3 Lanes	10,924,307,203	8,740,787,829	80.01	2,183,519,374	19.99
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	1,059,803,256	1,059,803,256		—	—
TOTAL with PART B, Alternative 1	12,866,331,376	10,258,416,384	79.73	2,607,914,992	20.27
TOTAL with PART B, Alternative 2	13,924,205,128	11,143,915,747	80.03	2,780,289,381	19.97
TOTAL with PART B, Alternative 3	11,747,330,424	9,355,285,060	79.64	2,392,045,364	20.36
TOTAL with PART B, Alternative 4	13,150,479,199	10,537,341,405	80.13	2,613,137,794	19.87

Source: Consultant's Estimates.

.COST TO BE BORNE BY CONCESSIONAIRE

DESCRIPTION	PRES. QUIRINO TO ALABANG	MAGALLANES TO ALABANG		PRES. QUIRINO TO MAGALLANES	
	AMOUNT	AMOUNT	%	AMOUNT	%
PART B–MANILA SOUTH TOLLWAY					
1. Alternative 1–AASHTO Girder, 2 Lanes	10,640,159,380	8,461,862,808	79.53	2,178,296,572	20.47
2. Alternative 2–AASHTO Girder, 3 Lanes	11,698,033,131	9,347,362,170	79.91	2,350,670,961	20.09
3. Alternative 3–Box Girder, 2 Lanes	9,521,158,428	7,558,731,484	79.39	1,962,426,944	20.61
4. Alternative 4–Box Girder, 3 Lanes	10,924,307,203	8,740,787,829	80.01	2,183,519,374	19.99
PART C–REHABILITATION OF THE REVERTED PORTION OF THE SOUTH LUZON EXPRESSWAY	1,059,803,256	1,059,803,256		—	—
TOTAL with PART B, Alternative 1	11,699,962,636	9,521,666,064	81.38	2,178,296,572	18.62
TOTAL with PART B, Alternative 2	12,757,836,388	10,407,165,427	81.57	2,350,670,961	18.43
TOTAL with PART B, Alternative 3	10,580,961,684	8,618,534,740	81.45	1,962,426,944	18.55
TOTAL with PART B, Alternative 4	11,984,110,459	9,800,591,085	81.78	2,183,519,374	18.22

Source: Consultant's Estimates.

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APPENDICES TO CHAPTER 4

Appendix A4-1
PRESENTATION OF BASE TRAFFIC DATA

Appendix A4–1
PRESENTATION OF BASE TRAFFIC DATA

RECONCILIATION OF TRAFFIC VOLUME DATA ALONG THE SOUTH LUZON EXPRESSWAY

	DATE	PERIOD	VALUE	ACTION	RESULT
1) Alabang Terminus					
a) SB Mainline					
TTC	Jul–92	7–20	13,767	convert to 24 hr	17,897
PNCC	1991	AADT	16,962	keep	16,962
PNCC	1990	AADT	16,120	convert to base	16,297
b) SB Off–Ramp					
TTC	Jul–92	7–20	9,282	convert to 24 hr	12,067
PNCC	1991	AADT	19,648	keep	19,648
PNCC	1990	AADT	18,525	convert to base	18,729
c) NB Mainline					
TTC	Jul–92	7–20	14,786	convert to 24 hr	19,222
PNCC	1991	AADT	13,682	keep	13,682
PNCC	1990	AADT	16,051	convert to base	16,228
d) NB On–Ramp					
TTC	Jul–92	7–20	14,949	convert to 24 hr	19,434
PNCC	1991	AADT	17,300	keep	17,300
PNCC	1990	AADT	16,466	convert to base	16,647
2) Sucat Interchange					
a) SB Mainline					
PNCC	1991	AADT	31,181	keep	31,181
PNCC	1990	AADT	29,481	convert to base	29,805
TEC	Jun–87	7–20	18,671	convert to base/24 hr	27,889
b) SB Off–Ramp					
TTC	Jul–92	7–20	14,404	convert to 24 hr	18,725
PNCC	1991	AADT	13,312	keep	13,312
PNCC	1990	AADT	12,665	convert to base	12,804
TEC	Jun–87	7–20	8,898	convert to base/24 hr	13,291
c) SB On–Ramp					
TTC	Jul–92	7–20	4,870	convert to 24 hr	6,331
PNCC	1991	AADT	5,429	keep	5,429
PNCC	1990	AADT	5,164	convert to base	5,221
TEC	Jun–87	7–20	3,458	convert to base/24 hr	5,165
d) NB Mainline					
PNCC	1991	AADT	26,583	keep	26,583
PNCC	1990	AADT	28,336	convert to base	28,648
TEC	Jul–87	7–20	21,577	convert to base/24 hr	32,230
e) NB Off–Ramp					
TTC	Jul–92	7–20	4,357	convert to 24 hr	5,664
PNCC	1991	AADT	4,399	keep	4,399
PNCC	1990	AADT	4,181	convert to base	4,227
TEC	Jun–87	7–20	2,577	convert to base/24 hr	3,849
f) NB On–Ramp					
TTC	Jul–92	7–20	14,030	convert to 24 hr	18,239
PNCC	1991	AADT	13,042	keep	13,042
PNCC	1990	AADT	12,403	convert to base	12,539
TEC	Jun–87	7–20	12,241	convert to base/24 hr	18,284

RECONCILIATION OF TRAFFIC VOLUME DATA ALONG . . . (continued)

	DATE	PERIOD	VALUE	ACTION	RESULT
3) Bicutan Interchange					
a) SB Mainline					
TEC	Jan–92	7–20	30,228	convert to 24 hr	39,296
TEC	Jul–91	7–20	24,867	convert to 24 hr	32,327
PNCC	1991	AADT	38,499	keep	38,499
PNCC	1990	AADT	36,606	convert to base	37,009
b) SB Off–Ramp					
TTC	Jul–92	7–20	12,305	convert to 24 hr	15,997
TEC	Jan–92	7–20	8,855	convert to 24 hr	11,512
TEC	Jul–91	7–20	8,875	convert to 24 hr	11,538
PNCC	1991	AADT	9,509	keep	9,509
PNCC	1990	AADT	9,048	convert to base	9,148
c) SB On–Ramp					
TTC	Jul–92	7–20	5,933	convert to 24 hr	7,713
TEC	Jan–92	7–20	4,014	convert to 24 hr	5,218
TEC	Jul–91	7–20	7,279	convert to 24 hr	9,463
PNCC	1991	AADT	5,994	keep	5,994
PNCC	1990	AADT	5,540	convert to base	5,601
d) NB Mainline					
TEC	Jan–92	7–20	39,009	convert to 24 hr	50,712
TEC	Jul–91	7–20	34,111	convert to 24 hr	44,344
PNCC	1991	AADT	33,995	keep	33,995
PNCC	1990	AADT	35,399	convert to base	35,788
e) NB Off–Ramp					
TTC	Jul–92	7–20	5,819	convert to 24 hr	7,565
TEC	Jan–92	7–20	2,917	convert to 24 hr	3,792
TEC	Jul–91	7–20	4,134	convert to 24 hr	5,374
PNCC	1991	AADT	5,630	keep	5,630
PNCC	1990	AADT	5,340	convert to base	5,399
f) NB On–Ramp					
TTC	Jul–92	7–20	11,141	convert to 24 hr	14,483
TEC	Jan–92	7–20	11,540	convert to 24 hr	15,002
TEC	Jul–91	7–20	10,708	convert to 24 hr	13,920
PNCC	1991	AADT	15,446	keep	15,446
PNCC	1990	AADT	14,692	convert to base	14,854
4) Nichols Interchange					
a) SB Mainline					
TEC	Jul–91	7–20	38,008	convert to 24 hr	49,410
b) SB On–Ramp					
TEC	Jul–91	7–20	1,800	convert to 24 hr	2,340
c) NB Mainline					
TEC	Jul–91	7–20	40,438	convert to 24 hr	52,569
d) NB Off–Ramp					
TEC	Jul–91	7–20	4,029	convert to 24 hr	5,238
e) NB On–Ramp					
TEC	Jul–91	7–20	18,018	convert to 24 hr	23,423

RECONCILIATION OF TRAFFIC VOLUME DATA ALONG . . . (continued)

	DATE	PERIOD	VALUE	ACTION	RESULT
5) Pasay Road – SSH Intersection					
a) NB left turns					
TEC	Sep–91	7–20	1,905	convert to 24h	2,477
TEC	Oct–90	7–20	1,857	convert to base/24h	2,441
b) NB thru movements					
TEC	Sep–91	7–20	3,093	convert to 24h	4,021
TEC	Oct–90	7–20	3,332	convert to base/24h	4,379
c) NB right turns					
TEC	Sep–91	7–20	417	convert to 24h	542
TEC	Oct–90	7–20	214	convert to base/24h	281
d) WB left turns					
TEC	Sep–91	7–20	748	convert to 24h	972
TEC	Oct–90	7–20	536	convert to base/24h	704
e) WB thru movements					
TEC	Sep–91	7–20	18,375	convert to 24h	23,888
TEC	Oct–90	7–20	19,284	convert to base/24h	25,345
f) WB right turns					
TEC	Sep–91	7–20	257	convert to 24h	334
TEC	Oct–90	7–20	263	convert to base/24h	346
g) SB left turns					
TEC	Sep–91	7–20	11,445	convert to 24h	14,879
TEC	Oct–90	7–20	9,764	convert to base/24h	12,833
h) SB thru movements					
TEC	Sep–91	7–20	4,906	convert to 24h	6,378
TEC	Oct–90	7–20	4,010	convert to base/24h	5,270
i) SB right turns					
TEC	Sep–91	7–20	6,649	convert to 24h	8,644
TEC	Oct–90	7–20	6,178	convert to base/24h	8,120
j) EB left turns					
TEC	Sep–91	7–20	2,202	convert to 24h	2,863
TEC	Oct–90	7–20	3,867	convert to base/24h	5,082
k) EB thru movements					
TEC	Sep–91	7–20	17,683	convert to 24h	22,988
TEC	Oct–90	7–20	18,781	convert to base/24h	24,684
l) EB right turns					
TEC	Sep–91	7–20	265	convert to 24h	345
TEC	Oct–90	7–20	251	convert to base/24h	330

RECONCILIATION OF TRAFFIC VOLUME DATA ALONG . . . (continued)					
	DATE	PERIOD	VALUE	ACTION	RESULT
6) Buendia/Gil Puyat Avenues – SSH Intersection					
a) NB left turns TEC	Aug–91	7–20	6,011	convert to 24h	7,814
b) NB thru movements TEC	Aug–91	7–20	NOT AVAILABLE		
c) NB right turns TEC	Aug–91	7–20	3,779	convert to 24h	4,913
d) WB left turns TEC	Aug–91	7–20	NOT ALLOWED		
e) WB thru movements TEC	Aug–91	7–20	16,228	convert to 24h	21,096
f) WB right turns TEC	Aug–91	7–20	4,742	convert to 24h	6,165
g) SB left turns TEC	Aug–91	7–20	12,189	convert to 24h	15,846
h) SB thru movements TEC	Aug–91	7–20	NOT AVAILABLE		
i) SB right turns TEC	Aug–91	7–20	438	convert to 24h	569
j) EB left turns TEC	Aug–91	7–20	NOT ALLOWED		
k) EB thru movements TEC	Aug–91	7–20	15,454	convert to 24h	20,090
l) EB right turns TEC	Aug–91	7–20	1,963	convert to 24h	2,552

RECONCILIATION OF TRAFFIC VOLUME DATA ALONG . . . (continued)

	DATE	PERIOD	VALUE	ACTION	RESULT
7) **Vito Cruz Avenue – SSH Intersection**					
a) *NB left turns* TEC	Aug–91	7–20	13	convert to 24h	17
b) *NB thru movements* TEC	Aug–91	7–20	18,735	convert to 24h	24,356
c) *NB right turns* TEC	Aug–91	7–20	952	convert to 24h	1,238
d) *WB left turns* TEC	Aug–91	7–20	NOT ALLOWED		
e) *WB thru movements* TEC	Aug–91	7–20	7,525	convert to 24h	9,783
f) *WB right turns* TEC	Aug–91	7–20	6,823	convert to 24h	8,870
g) *SB left turns* TEC	Aug–91	7–20	6,451	convert to 24h	8,386
h) *SB thru movements* TEC	Aug–91	7–20	24,829	convert to 24h	32,278
i) *SB right turns* TEC	Aug–91	7–20	514	convert to 24h	668
j) *EB left turns* TEC	Aug–91	7–20	2,060	convert to 24h	2,678
k) *EB thru movements* TEC	Aug–91	7–20	9,546	convert to 24h	12,410
l) *EB right turns* TEC	Aug–91	7–20	5,051	convert to 24h	6,566

RECONCILIATION OF TRAFFIC VOLUME DATA ALONG . . . (continued)					
	DATE	PERIOD	VALUE	ACTION	RESULT
8) President Quirino Avenue Terminus					
a) NB Left Turns					
TTC	Jun–92	7–20	16,840	convert to 24h	21,892
TEC	Dec–91	7–20	18,115	convert to 24h	23,550
b) NB Right Turns					
TTC	Jun–92	7–20	18,017	convert to 24h	23,422
TEC	Dec–91	7–20	15,766	convert to 24h	20,496
c) WB Left Turns					
TTC	Jun–92	7–20	20,488	convert to 24h	26,634
TEC	Dec–91	7–20	21,711	convert to 24h	28,224
d) WB thru movements					
TTC	Jun–92	7–20	7,766	convert to 24h	10,096
TEC	Dec–91	7–20	7,253	convert to 24h	9,429
e) EB thru movements					
TTC	Jun–92	7–20	8,225	convert to 24h	10,693
TEC	Dec–91	7–20	9,397	convert to 24h	12,216
f) EB Right Turns					
TTC	Jun–92	7–20	15,052	convert to 24h	14,052
TEC	Dec–91	7–20	13,331	convert to 24h	17,330

COMPARISON OF SLE MAINLINE SEGMENT BASE YEAR 24–HOUR VOLUME ESTIMATES BY SOURCE

1) Alabang–Sucat Segment

a) Southbound direction

TTC at Alabang	29,964
TEC at Sucat	33,054
PNCC–91	36,610
PNCC–90	35,026

b) Northbound direction

TTC at Alabang	38,656
TEC at Sucat	36,079
PNCC–91	30,982
PNCC–90	32,875

2) Sucat–Bicutan Segment

a) Southbound direction

TTC and TTC ML NB est. at Alabang	42,358
TEC at Sucat	41,180
TEC at Bicutan–92	44,515
TEC at Bicutan–91	41,790
PNCC–91	44,493
PNCC–90	42,610

b) Northbound direction

TTC and TTC ML SB est. at Alabang	51,230
TEC at Sucat	50,514
TEC at Bicutan–92	54,504
TEC at Bicutan–91	49,719
PNCC–91	39,625
PNCC–90	41,187

3) Bicutan–Nichols Segment

a) Southbound direction

TEC at Bicutan–92	50,808
TEC at Bicutan–91	43,865
TEC at Nichols	51,750
PNCC–91	48,008
PNCC–90	46,156

b) Northbound direction

TEC at Bicutan–92	65,714
TEC at Bicutan–91	58,265
TEC at Nichols	57,807
PNCC–91	49,441
PNCC–90	50,642

4) Nichols–Magallanes Segment

a) Southbound direction

TEC at Nichols	49,410

b) Northbound direction

TEC at Nichols	75,993

COMPARISON OF SLE MAINLINE SEGMENT BASE YEAR ... (continued)

5) Magallanes–Pasay Road Segment

a) Southbound direction
??????

b) Northbound direction
??????

6) Pasay Road–Buendia Avenue Segment

a) Southbound direction	
TEC at Pasay Road	29,900
b) Northbound direction	
TEC at Pasay Road	DATA UNRELIABLE

7) Buendia Avenue–Vito Cruz Segment

a) Southbound direction	
TEC at Vito Cruz	41,332
b) Northbound direction	
TEC at Vito Cruz	35,903

8) Vito Cruz–President Quirino Avenue Segment

a) Southbound direction	
TEC at Vito Cruz	41,332
TTC at Pres. Quirino Ave.	40,686
TEC at Pres. Quirino Ave.	45,555
b) Northbound direction	
TEC at Vito Cruz	35,903
TTC at Pres. Quirino Ave.	45,314
TEC at Pres. Quirino Ave.	44,045

Appendix A4-2

PRESENTATION OF NETWORK BALANCING METHOD AND APPLICATION TO SLE SECTION FROM ALABANG TO MAGALLANES

Appendix A4-2
PRESENTATION OF NETWORK BALANCING METHOD AND APPLICATION TO SLE SECTION FROM ALABANG TO MAGALLANES

1. PRESENTATION OF THE METHOD

The following method was proposed by R. Hamerslag and M.C. Huisman for balancing traffic counts in a network. Balancing is a means of systematically adjusting such counts, which are subject to a variety of random variations, to ensure that the total traffic entering a node equals the total traffic leaving the node; this condition is known as flow conservation and is a requirement of most standard traffic network analysis methods and models.

Let $\hat{V}_{ij}$ be the counted one-way volume on link ij going from node i to node j. The problem is to use the count data $\hat{V}_{ij}$, together with information about the structure of the network (which defines the flow conservation requirements), to develop a "good" estimate of the true (but unknown) link volumes V_{ij}. A well-known technique for developing statistical estimators is the maximum likelihood method, which is based on finding the probability distribution parameter values that maximize the statistical likelihood of a set of observations.

Assume that the counted volume $\hat{V}_{ij}$ is Poisson distributed with mean V_{ij}. Then the probability of actually counting $\hat{V}_{ij}$ vehicles is

$$P(\hat{V}_{ij}) = \frac{e^{-V_{ij}} \, V_{ij}^{\hat{V}_{ij}}}{\hat{V}_{ij} \, !}$$

If the volumes V_{ij} are to satisfy flow conservation at a node n, the total traffic flow on links entering node n must equal the total flow on links leaving the node:

$$\sum_k V_{kn} - \sum_m V_{nm} = 0$$

where k ranges over the set of nodes such that there is a link from k to n, and m ranges over the set of nodes such that there is a link from n to m. Note that not all nodes need be involved in flow conservation constraints.

If counted link volumes are independent (as they should be if the counts have been carried out correctly), the statistical likelihood of observing a set $\hat{V}_{ij}$ of flows on a network is
In this case the maximum likelihood estimator for V_{ij} would be that which maximized L (or, equivalently, the natural logarithm of L known as the log likelihood function), subject to the flow conservation constraints.

$$L = \prod_{ij} \frac{e^{-V_{ij}} V_{ij}^{\hat{V}_{ij}}}{\hat{V}_{ij}\,!}$$

The solution to this constrained maximization problem can be found by finding a stationary point of the Lagrangian formed from the log likelihood function and the flow conservation constraints:

$$\mathcal{L} = \sum_{ij} (-V_{ij} + \hat{V}_{ij} \ln V_{ij}) + \sum_{n} \lambda_n (\sum_{k} V_{kn} - \sum_{m} V_{nm}) + \text{constant}$$

where the λ_ns are the Lagrangean multipliers corresponding to the flow conservation constraints at the nodes where these are imposed.

A stationary point can be found by differentiating $\mathcal{L}$ with respect to V_{ij} and setting the result equal to 0; the same procedure with respect to λ_n recovers the flow conservation constraints at the nodes.

$$\frac{\partial \mathcal{L}}{\partial V_{ij}} = -1 + \frac{\hat{V}_{ij}}{V_{ij}} + \delta_j \lambda_j - \delta_i \lambda_i = 0$$

where $\delta_k = 1$ if there is a flow conservation constraint involving node k and $\delta_k = 0$ otherwise. Solving for V_{ij} gives

$$V_{ij} = \frac{\hat{V}_{ij}}{(1 - \delta_j \lambda_j + \delta_i \lambda_i)}$$

In principle these nonlinear equations could be solved by combining them with the flow conservation equations and using appropriate numerical methods. However, since typically $|\lambda| \ll 1$, it is much simpler to use the approximation

$$\frac{1}{1 - \lambda} \approx 1 + \lambda$$

to obtain

$$V_{ij} = \hat{V}_{ij} (1 + \delta_j \lambda_j - \delta_i \lambda_i)$$

These, together with the flow conservation constraints, form a set of simultaneous linear equations that can be readily solved to give the V_{ij}s and λ_ns.

2. APPLICATION OF THE METHOD

Counts on the limited access portion of the SLE and its ramps were done by different groups at different times and over different periods of the day. They were then factored up to a common 24-hour 1992 base. (All counts discussed here are total volumes of cars, jeepneys, buses and trucks combined.) It is therefore not surprising that they do not satisfy flow conservation at the interchange nodes.

Rather than applying *ad hoc* manual adjustments to balance the flows, it was considered preferable to use a systematic method which would incorporate all available count data for locations between the Magallanes interchange and Alabang. The Hamerslag-Huisman balancing method is appropriate for this purpose.

Furthermore, the available count results did not clearly suggest equality of northbound and southbound mainline flows over a 24-hour period, whereas logically approximate equality of these flows would normally be expected. On further reflection, however, it was realized that some of the mainline's traffic may divert to the east and west service roads during periods of high congestion, so that equality of the mainline flows would not necessarily be obtained. Since there is no west service road between the Nichols and Magallanes interchanges, and since the east service road along this segment seems to serve mostly local traffic, it was finally decided to impose the directional volume equality requirement on the Nichols-Magallanes segment only. The additional constraint was easily accommodated within the constrained maximum likelihood framework of the Hamerslag-Huisman method.

As an additional elaboration of the method described above, it would have been possible to take account of the fact that several counts were available at most locations. The normal equations (ie, those resulting from differentiating the Lagrangian and setting the result equal to zero) again are non-linear but in this case cannot easily be linearized. Direct solution using numerical optimization software was attempted but the solution process did not converge.

For this reason, the available counts at each location were averaged together and the averages were used as inputs to the Hamerslag-Huisman procedure. This procedure is less statistically efficient than one which takes account of the entire set of observations at each location, but study time limitations and the convergence difficulties with the optimization software prevented the more rigorous approach from being further pursued.

The Hamerslag-Huisman procedure was implemented using the equation solving and numerical optimization capabilities of version 4.0 of the Quattro Pro spreadsheet package. The flow conservation constraints were treated by solving the equations specified above, while the constraint on the northbound and southbound volumes on the Nichols-Magallanes segment was handled directly using Quattro's constrained optimization capabilities. Once the problem was completely specified by calculating the average of available count data for each movement and inputting the equations and constraint, the solution using Quattro Pro was virtually instantaneous.

Table A4-2-1 below shows the spreadsheet that was created to structure the calculations, while Figure A4-2-1 illustrates the nomenclature used in the spreadsheet to identify the various traffic movements that were balanced.

The balanced flows resulting from this procedure were used in the traffic network model baseline calibration.

Table A4-2-1
BALANCE VOLUMES ON SLE BETWEEN ALABANG AND MAGALLANES
USING THE METHOD OF HAMERSLAG AND HUISMAN

Observed volumes for each movement (24-hour volumes)

ANBON	ANBML	SNBOFF	SNBML	SNBON	BNBOFF	BNBML	BNBON	NNBOFF	NNBML	NNBON
19,434	19,222	5,664	26,583	18,239	7,565	50,712	14,483	5,238	52,569	23,423
17,300	13,682	4,399	28,648	13,042	3,792	44,344	15,002			
16,647	16,228	4,227	32,230	12,539	5,374	33,995	13,920			
		3,849		18,284	5,630	35,788	15,446			
					5,399		14,854			

ASBOFF	ASBML	SSBON	SSBML	SSBOFF	BSBON	BSBML	BSBOFF	NSBON	NSBML
12,067	17,897	6,331	31,181	18,725	7,713	39,296	15,997	2,340	49,410
19,648	16,962	5,429	29,805	13,312	5,218	32,327	11,512		
18,729	16,297	5,221	27,889	12,804	9,463	38,499	11,538		
		5,165		13,291	5,994	37,009	9,509		
					5,601		9,148		

Average observed volume for each movement

CANBON	CANBML	CSNBOFF	CSNBML	CSNBON	CBNBOFF	CBNBML	CBNBON	CNNBOFF	CNNBML	CNNBON
17,794	16,377	4,535	29,154	15,526	5,552	41,210	14,741	5,238	52,569	23,423

CASBOFF	CASBML	CSSBON	CSSBML	CSSBOFF	CBSBON	CBSBML	CBSBOFF	CNSBON	CNSBML
16,815	17,052	5,537	29,625	14,533	6,798	36,783	11,541	2,340	49,410

Table A4-2-1 (continued)
BALANCE VOLUMES ON SLE BETWEEN ALABANG AND MAGALLANES
USING THE METHOD OF HAMERSLAG AND HUISMAN

Estimated balanced volumes and lambdas (solutions to constraint and normal equations below)

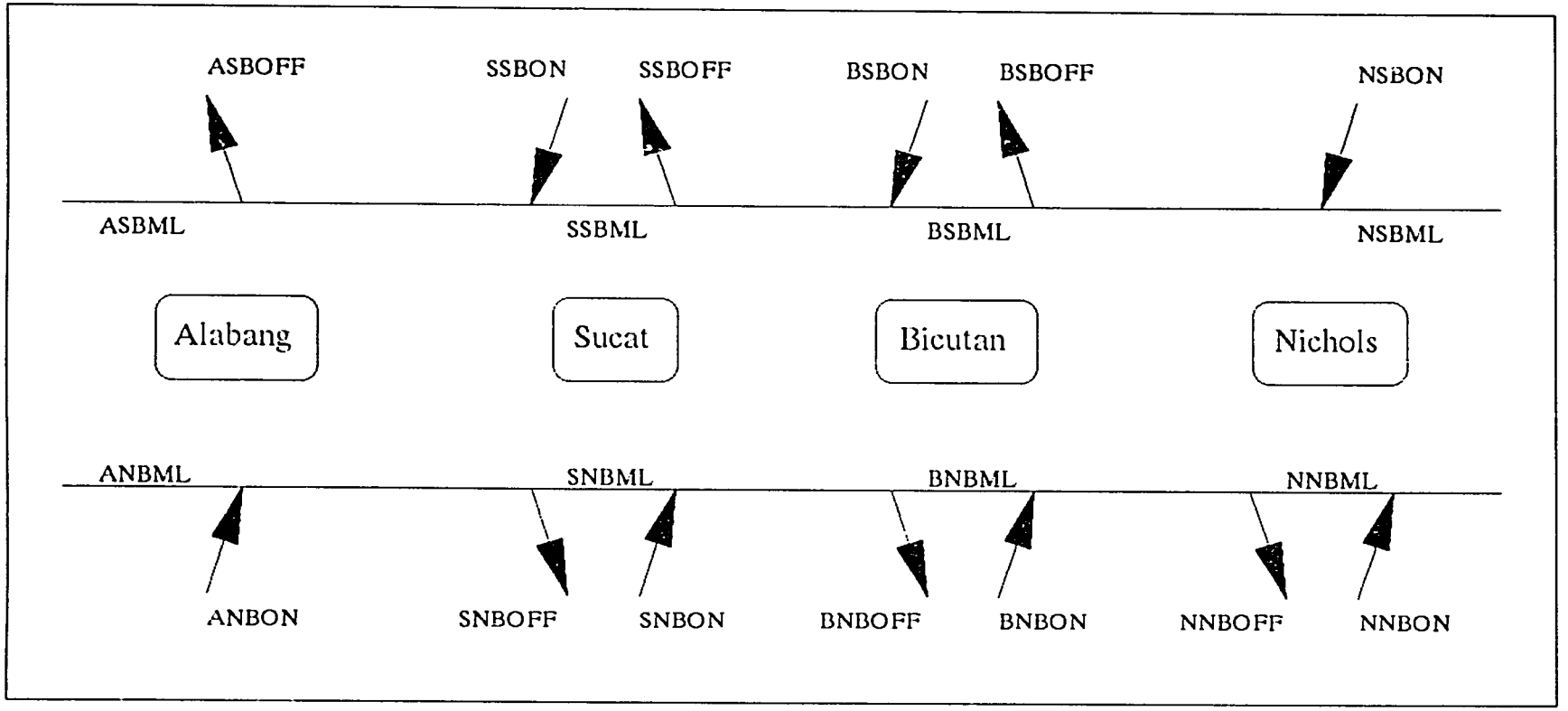
ANBON	ANBML	SNBOFF	SNBML	SNBON	BNBOFF	BNBML	BNBON	NNBOFF	NNBML	NNBON
17,035	15,679	4,728	27,987	14,243	6,011	36,219	11,738	6,305	41,652	13,786
ASBOFF	ASBML	SSBON	SSBML	SSBOFF	BSBON	BSBML	BSBOFF	NSBON	NSBML	
18,152	18,408	5,096	31,464	16,591	5,835	42,220	14,881	1,663	55,438	
LAMBDA1	LAMBDA2	LAMBDA3	LAMBDA4	LAMBDA5	LAMBDA6	LAMBDA7	LAMBDA8			
-0.043	-0.083	-0.204	-0.080	-0.142	-0.289	0.056	-0.411			

Constraint and normal equations and final values (should = 0)

+ ANBON − CANBON * (1 + LAMBDA1)	=	-0.00000
+ ANBML − CANBML * (1 + LAMBDA1)	=	-0.00000
+ SNBOFF − CSNBOFF * (1 − LAMBDA1)	=	0.00000
+ SNBML − CSNBML * (1 − LAMBDA1 + LAMBDA2)	=	-0.00000
+ SNBON − CSNBON * (1 + LAMBDA2)	=	0.00000
+ BNBOFF − CBNBOFF * (1 − LAMBDA2)	=	-0.00000
+ BNBML − CBNBML * (1 − LAMBDA2 + LAMBDA3)	=	0.00000
+ BNBON − CBNBON * (1 + LAMBDA3)	=	-0.00000
+ NNBOFF − CNNBOFF * (1 − LAMBDA3)	=	0.00000
+ NNBML − CNNBML * (1 − LAMBDA3 + LAMBDA8)	=	0.00000
+ NNBON − CNNBON * (1 + LAMBDA8)	=	-0.00000
+ ANBON + ANBML − SNBOFF − SNBML	=	-0.00000
+ SNBML + SNBON − BNBOFF − BNBML	=	-0.00000
+ BNBML + BNBON − NNBOFF − NNBML	=	0.00000
+ ASBOFF − CASBOFF * (1 − LAMBDA4)	=	-0.00000
+ ASBML − CASBML * (1 − LAMBDA4)	=	0.00000
+ SSBON − CSSBON *(1 + LAMBDA4)	=	0.00000
+ SSBML − CSSBML * (1 + LAMBDA4 − LAMBDA5)	=	0.00000
+ SSBOFF − CSSBOFF * (1 − LAMBDA5)	=	-0.00000
+ BSBON − CBSBON * (1 + LAMBDA5)	=	-0.00000
+ BSBML − CBSBML * (1 + LAMBDA5 − LAMBDA6)	=	0.00000
+ BSBOFF − CBSBOFF * (1 − LAMBDA6)	=	-0.00000
+ NSBON − CNSBON * (1 + LAMBDA6)	=	0.00000
+ NSBML − CNSBML * (1 + LAMBDA6 − LAMBDA8)	=	0.00000
− ASBOFF − ASBML + SSBON + SSBML	=	0.00000
− SSBOFF − SSBML + BSBON + BSBML	=	0.00000
− BSBOFF − BSBML + NSBON + NSBML	=	0.00000
+ NNBON + NNBML − NSBML	=	0.00000

NOTE: See Figure A4-2-1 for an explanation of the nomenclature designating the various mainline, on-and off-movements.

Figure A4-2-1
NOMENCLATURE USED IN NETWORK BALANCING EQUATIONS



Appendix A4-3

TRAFFIC VOLUME SUMMARIES AND TOLL REVENUE CALCULATIONS

Appendix A4-3
TRAFFIC VOLUME SUMMARIES AND TOLL REVENUE CALCULATIONS

Table A4–3–1a
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 10.0 km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	25,910	3,543
S–B	29,472	3,245
B–C5	25,378	2,759
C5–N	13,292	1,283

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	48,060	6,075
S–B	70,975	6,807
B–EDSA	98,588	8,332
EDSA–P	86,255	7,109
P–VC	59,310	4,301
VC–PQ	55,992	4,227

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	26,184	3,475
S–B	27,150	2,969
B–C5	30,037	2,803
C5–N	18,083	1,603

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	43,853	5,535
S–B	64,148	6,190
B–EDSA	76,624	6,693
EDSA–P	69,561	5,876
P–VC	50,670	3,748
VC–PQ	49,231	3,728

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	82.1
A–S	3.60	10.9
S–B	3.90	11.8
B–C5	3.07	10.0
C5–N	1.55	3.0
TOTAL		117.8

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	28,635	3,863
S–B	25,238	2,765
B–C5	34,340	2,966
C5–N	15,954	935

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	30,902	3,332
S–B	46,195	2,823
B–EDSA	56,329	4,260
EDSA–P	54,026	4,000
P–VC	45,292	2,822
VC–PQ	44,128	2,791

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	118.3
A–S	3.60	23.9
S–B	3.90	21.9
B–C5	3.07	22.6
C5–N	1.55	5.0
TOTAL		191.7

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	29,607	3,863
S–B	23,427	2,601
B–C5	32,822	2,649
C5–N	16,320	938

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A–S	30,260	3,182
S–B	40,378	3,499
B–EDSA	47,791	3,824
EDSA–P	45,488	3,564
P–VC	38,292	2,434
VC–PQ	37,474	2,394

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	151.8
A–S	3.60	36.8
S–B	3.90	30.6
B–C5	3.07	32.0
C5–N	1.55	7.7
TOTAL		258.9

Table A4-3-1a (continued)
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	28,486	3,850
S-B	23,437	2,590
B-C5	38,284	2,781
C5-N	21,816	1,080

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	25,549	3,077
S-B	34,411	3,214
B-EDSA	36,282	3,395
EDSA-P	33,859	3,122
P-VC	26,716	1,992
VC-PQ	25,898	1,970

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	157.2
A-S	3.60	47.5
S-B	3.90	40.7
B-C5	3.07	49.1
C5-N	1.55	13.6
TOTAL		308.2

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	20,770	2,769
S-B	20,400	2,220
B-C5	39,702	2,952
C5-N	23,229	1,251

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	29,544	3,076
S-B	33,824	3,200
B-EDSA	33,824	3,200
EDSA-P	30,848	2,928
P-VC	24,260	1,798
VC-PQ	23,442	1,776

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	183.5
A-S	3.60	43.2
S-B	3.90	44.2
B-C5	3.07	63.9
C5-N	1.55	18.2
TOTAL		353.0

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	0	0
S-B	15,094	1,568
B-C5	38,181	2,683
C5-N	21,477	966

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	29,234	2,949
S-B	33,500	3,193
B-EDSA	33,500	3,193
EDSA-P	31,342	2,928
P-VC	24,220	1,798
VC-PQ	23,402	1,776

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	218.4
A-S	3.60	0.0
S-B	3.90	38.9
B-C5	3.07	73.2
C5-N	1.55	19.9
TOTAL		350.4

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	0	0
S-B	9,532	979
B-C5	24,623	1,692
C5-N	11,450	399

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	28,009	2,910
S-B	31,330	3,006
B-EDSA	31,330	3,006
EDSA-P	30,237	2,878
P-VC	23,171	1,752
VC-PQ	22,635	1,738

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	238.5
A-S	3.60	0.0
S-B	3.90	28.6
B-C5	3.07	54.9
C5-N	1.55	12.1
TOTAL		334.2

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	0	0
S-B	443	14
B-C5	5,181	437
C5-N	0	0

MST VOLUMES 1999 (veh/day)		
	CARS	TRUCKS
A-S	22,326	2,299
S-B	23,600	2,335
B-EDSA	23,600	2,335
EDSA-P	22,822	2,244
P-VC	18,242	1,514
VC-PQ	18,193	1,514

ANNUAL TOLL REVENUES 1999		
	km	M P
MST	10.00	206.4
A-S	3.60	0.0
S-B	3.90	1.3
B-C5	3.07	13.6
C5-N	1.55	0.0
TOTAL		221.3

Table A4–3–1b
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 10.0 km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	40,363	6,131
S–B	45,439	5,574
B–C5	37,653	4,561
C5–N	16,256	1,742

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	68,698	9,316
S–B	101,769	10,471
B–EDSA	142,288	12,708
EDSA–P	124,441	10,831
P–VC	85,510	6,576
VC–PQ	80,646	6,462

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	41,751	6,211
S–B	45,865	5,448
B–C5	44,345	4,707
C5–N	25,436	2,183

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	64,675	8,673
S–B	94,386	9,700
B–EDSA	119,830	11,088
EDSA–P	107,843	9,648
P–VC	78,054	5,883
VC–PQ	73,190	5,769

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	129.6
A–S	3.60	17.8
S–B	3.90	20.2
B–C5	3.07	15.1
C5–N	1.55	4.2
TOTAL		186.9

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	41,384	6,140
S–B	39,167	4,717
B–C5	46,759	4,239
C5–N	29,973	2,497

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	55,706	7,212
S–B	83,409	8,185
B–EDSA	98,868	8,879
EDSA–P	92,474	8,059
P–VC	69,601	5,194
VC–PQ	67,549	5,135

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	212.8
A–S	3.60	35.3
S–B	3.90	34.6
B–C5	3.07	30.9
C5–N	1.55	9.9
TOTAL		323.5

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	43,901	6,557
S–B	36,235	4,471
B–C5	47,704	4,795
C5–N	20,706	1,282

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	43,223	4,841
S–B	61,627	5,485
B–EDSA	75,661	6,098
EDSA–P	72,362	5,702
P–VC	62,181	3,993
VC–PQ	61,064	3,960

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	240.5
A–S	3.60	56.2
S–B	3.90	48.2
B–C5	3.07	48.2
C5–N	1.55	9.9
TOTAL		403.0

Table A4-3-1b (continued)
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	43,901	6,557
S-B	36,352	4,473
B-C5	50,492	4,266
C5-N	25,524	1,434

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	43,083	4,818
S-B	55,841	5,237
B-EDSA	64,850	5,676
EDSA-P	61,551	5,280
P-VC	51,370	3,571
VC-PQ	50,253	3,538

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	278.1
A-S	3.60	74.9
S-B	3.90	64.5
B-C5	3.07	66.1
C5-N	1.55	16.1
TOTAL		499.7

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	43,769	6,543
S-B	36,293	4,459
B-C5	56,503	4,413
C5-N	31,657	1,596

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	42,130	4,673
S-B	48,981	4,884
B-EDSA	51,774	5,159
EDSA-P	48,344	4,749
P-VC	38,236	3,040
VC-PQ	37,119	3,007

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	283.3
A-S	3.60	93.4
S-B	3.90	80.4
B-C5	3.07	91.5
C5-N	1.55	24.6
TOTAL		573.3

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	35,370	5,284
S-B	34,820	4,203
B-C5	58,647	4,650
C5-N	34,183	1,867

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	42,512	4,708
S-B	48,285	4,895
B-EDSA	48,285	4,395
EDSA-P	44,472	4,450
P-VC	34,364	2,741
VC-PQ	33,247	2,708

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	318.0
A-S	3.60	90.5
S-B	3.90	92.3
B-C5	3.07	114.2
C5-N	1.55	32.2
TOTAL		647.2

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	12,450	1,567
S-B	22,917	2,583
B-C5	58,227	4,644
C5-N	33,602	1,846

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	42,331	4,694
S-B	48,104	4,881
B-EDSA	48,104	4,881
EDSA-P	44,422	4,450
P-VC	34,335	2,741
VC-PQ	33,218	2,708

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	369.6
A-S	3.60	35.8
S-B	3.90	70.0
B-C5	3.07	132.4
C5-N	1.55	36.9
TOTAL		644.7

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	0	0
S-B	22,026	2,447
B-C5	50,534	4,194
C5-N	25,428	1,352

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A-S	41,656	4,633
S-B	47,414	4,820
B-EDSA	47,414	4,820
EDSA-P	44,357	4,450
P-VC	34,320	2,741
VC-PQ	33,203	2,708

ANNUAL TOLL REVENUES 2010	km	M P
MST	10.00	416.5
A-S	3.60	0.0
S-B	3.90	76.6
B-C5	3.07	132.1
C5-N	1.55	31.8
TOTAL		657.0

Table A4-3-1c
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 10.0 km

SLB VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	52,700	8,394
S-B	59,299	7,622
B-C5	48,425	6,152
C5-N	20,151	2,076

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	85,702	11,980
S-B	126,923	13,475
B-EDSA	177,872	16,294
EDSA-P	155,770	13,894
P-VC	107,079	8,445
VC-PQ	100,928	8,298

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	0.0
A-S	3.60	0.0
S-B	3.90	0.0
B-C5	3.07	0.0
C5-N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLB VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	53,744	8,518
S-B	60,504	7,689
B-C5	55,189	6,244
C5-N	28,322	2,384

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	84,175	11,735
S-B	122,212	13,108
B-EDSA	158,917	15,261
EDSA-P	141,184	13,140
P-VC	100,639	7,694
VC-PQ	94,488	7,817

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	172.9
A-S	3.60	23.3
S-B	3.90	27.0
B-C5	3.07	19.0
C5-N	1.55	4.7
TOTAL		246.8

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLB VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	53,583	8,357
S-B	56,216	6,913
B-C5	59,298	6,091
C5-N	32,396	2,715

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	79,135	10,977
S-B	113,693	12,235
B-EDSA	135,427	13,173
EDSA-P	123,352	11,557
P-VC	90,194	7,398
VC-PQ	87,629	7,322

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	295.2
A-S	3.60	46.2
S-B	3.90	49.9
B-C5	3.07	40.0
C5-N	1.55	10.7
TOTAL		442.0

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLB VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	56,837	8,879
S-B	51,380	6,565
B-C5	60,862	6,314
C5-N	25,176	1,602

M VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	57,339	7,169
S-B	84,832	8,166
B-EDSA	103,855	9,027
EDSA-P	99,721	8,518
P-VC	83,631	6,131
VC-PQ	81,384	6,063

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	333.7
A-S	3.60	73.5
S-B	3.90	68.9
B-C5	3.07	61.8
C5-N	1.55	12.0
TOTAL		549.9

Table A4–3–1c (continued)
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	56,803	8,879
S–B	47,092	6,088
B–C5	58,830	5,426
C5–N	26,904	1,637

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	53,963	6,214
S–B	75,688	6,997
B–EDSA	92,467	7,741
EDSA–P	88,333	7,232
P–VC	75,655	5,038
VC–PQ	74,286	4,996

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	394.0
A–S	3.60	98.0
S–B	3.90	84.4
B–C5	3.07	78.1
C5–N	1.55	17.1
TOTAL		671.5

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	56,803	8,879
S–B	47,203	6,092
B–C5	64,026	5,603
C5–N	31,985	1,810

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	53,536	6,157
S–B	67,606	6,620
B–EDSA	79,102	7,185
EDSA–P	74,968	6,676
P–VC	62,315	4,482
VC–PQ	60,946	4,440

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	426.5
A–S	3.60	122.5
S–B	3.90	105.7
B–C5	3.07	105.4
C5–N	1.55	25.2
TOTAL		785.2

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	56,652	8,862
S–B	47,117	6,075
B–C5	70,441	5,776
C5–N	38,539	2,000

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	52,613	6,002
S–B	61,036	6,272
B–EDSA	65,860	6,643
EDSA–P	61,575	6,117
P–VC	48,986	3,923
VC–PQ	47,617	3,881

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	433.3
A–S	3.60	146.6
S–B	3.90	126.5
B–C5	3.07	137.8
C5–N	1.55	36.1
TOTAL		880.4

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	52,523	8,369
S–B	46,574	6,029
B–C5	73,056	5,885
C5–N	41,650	2,155

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	53,108	6,048
S–B	60,133	6,286
B–EDSA	61,750	6,500
EDSA–P	56,971	5,928
P–VC	44,382	3,734
VC–PQ	43,013	3,692

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	477.5
A–S	3.60	159.3
S–B	3.90	146.1
B–C5	3.07	166.3
C5–N	1.55	45.5
TOTAL		994.6

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	28,917	4,887
S–B	41,765	5,294
B–C5	74,314	6,103
C5–N	42,761	2,357

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	52,961	6,031
S–B	59,986	6,269
B–EDSA	59,986	6,269
EDSA–P	55,353	5,714
P–VC	42,764	3,520
VC–PQ	41,395	3,478

ANNUAL TOLL REVENUES 2020	km	M P
MST	10.00	529.[illegible]
A–S	3.60	101.7
S–B	3.90	149.0
B–C5	3.07	193.9
C5–N	1.55	53.7
TOTAL		1027.8

Table A4–3–1d
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 0.00 Trucks: 0.00 Pes /km MST toll based on 10.0 km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	62,082	9,975
S–B	69,801	9,050
B–C5	56,543	7,268
C5–N	23,247	2,385

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	98,782	13,935
S–B	146,549	15,682
B–EDSA	205,727	18,941
EDSA–P	180,266	16,155
P–VC	123,965	9,833
VC–PQ	116,805	9,661

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	62,688	10,047
S–B	71,547	9,118
B–C5	64,957	7,411
C5–N	32,919	2,745

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	98,176	13,861
S–B	142,806	15,495
B–EDSA	187,748	18,080
EDSA–P	166,195	15,519
P–VC	118,679	9,501
VC–PQ	111,519	9,329

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	204.3
A–S	3.60	27.2
S–B	3.90	32.0
B–C5	3.07	22.3
C5–N	1.55	5.4
TOTAL		291.2

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	63,017	9,924
S–B	69,989	8,721
B–C5	40	8,109
C5–N	39,386	3,558

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	93,158	12,983
S–B	134,368	14,498
B–EDSA	161,236	15,636
EDSA–P	144,306	13,503
P–VC	105,367	8,656
VC–PQ	102,400	8,567

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	351.3
A–S	3.60	54.4
S–B	3.90	62.2
B–C5	3.07	9.1
C5–N	1.55	13.2
TOTAL		490.3

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	61,996	9,735
S–B	32,711	7,681
B–C5	73,625	7,915
C5–N	29,597	1,865

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	82,567	11,178
S–B	122,470	12,645
B–EDSA	145,144	13,682
EDSA–P	135,361	12,304
P–VC	100,791	7,805
VC–PQ	97,823	7,716

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	472.2
A–S	3.60	80.3
S–B	3.90	51.3
B–C5	3.07	75.2
C5–N	1.55	14.1
TOTAL		693.2

Table A4-3-1d (continued)
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	66,626	10,511
S-B	59,850	7,728
B-C5	69,137	7,231
C5-N	29,146	1,836

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	63,856	7,677
S-B	92,887	8,740
B-EDSA	114,904	9,727
EDSA-P	110,148	9,134
P-VC	93,063	6,499
VC-PQ	90,427	6,419

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	490.4
A-S	3.60	115.2
S-B	3.90	107.2
B-C5	3.07	93.7
C5-N	1.55	18.6
TOTAL		825.0

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	66,599	10,511
S-B	55,342	7,220
B-C5	68,151	6,341
C5-N	30,890	1,874

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	62,163	7,228
S-B	87,733	8,163
B-EDSA	107,593	9,046
EDSA-P	102,837	8,453
P-VC	88,270	5,907
VC-PQ	86,702	5,858

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	573.4
A-S	3.60	143.9
S-B	3.90	124.2
B-C5	3.07	113.2
C5-N	1.55	24.5
TOTAL		979.2

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	66,591	10,511
S-B	55,425	7,224
B-C5	74,279	6,554
C5-N	36,897	2,083

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	62,028	7,204
S-B	78,603	7,757
B-EDSA	92,207	4,917
EDSA-P	87,451	7,830
P-VC	72,884	5,284
VC-PQ	73,252	5,235

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	558.7
A-S	3.60	172.7
S-B	3.90	149.2
B-C5	3.07	140.9
C5-N	1.55	34.8
TOTAL		1062.3

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	66,436	10,493
S-B	55,295	7,206
B-C5	81,167	6,736
C5-N	43,930	2,264

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	61,032	7,051
S-B	71,152	7,381
B-EDSA	77,544	7,843
EDSA-P	72,633	7,233
P-VC	58,091	4,687
VC-PQ	56,523	4,638

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	595.5
A-S	3.60	201.0
S-B	3.90	173.6
B-C5	3.07	185.6
C5-N	1.55	48.0
TOTAL		1203.8

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	62,511	10,019
S-B	54,778	7,150
B-C5	84,779	6,875
C5-N	48,136	2,478

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	61,192	7,037
S-B	69,229	7,315
B-EDSA	71,491	7,582
EDSA-P	65,986	6,915
P-VC	51,521	4,369
VC-PQ	49,953	4,320

ANNUAL TOLL REVENUES 2030	km	M P
MST	10.00	632.6
A-S	3.60	216.9
S-B	3.90	196.7
B-C5	3.07	220.8
C5-N	1.55	60.1
TOTAL		1327.1

Table A4–3–2a
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 8.5 km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	26,481	2,602
S–B	33,834	3,432
B–C5	43,192	3,706
C5–N	30,104	2,262

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	42,343	4,781
S–B	59,359	5,330
B–EDSA	64,842	5,579
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	26,848	1,783
S–B	31,282	3,151
B–C5	49,647	3,523
C5–N	40,132	2,721

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	36,443	4,078
S–B	47,654	4,432
B–EDSA	47,654	4,432
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	43.8
A–S	3.60	10.0
S–B	3.90	13.4
B–C5	3.07	15.9
C5–N	1.55	6.4
TOTAL		89.5

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	28,271	3,831
S–B	24,223	2,709
B–C5	42,514	3,284
C5–N	24,042	1,287

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	29,764	3,096
S–B	37,745	3,336
B–EDSA	37,745	3,336
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	68.9
A–S	3.60	23.6
S–B	3.90	21.1
B–C5	3.07	27.5
C5–N	1.55	7.5
TOTAL		148.6

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	28,173	3,816
S–B	22,355	2,536
B–C5	39,163	2,909
C5–N	27,691	1,233

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	29,862	3,111
S–B	34,911	3,255
B–EDSA	34,911	3,255
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	96.4
A–S	3.60	35.3
S–B	3.90	29.3
B–C5	3.07	37.8
C5–N	1.55	10.7
TOTAL		209.4

Table A4–3–2a (continued)
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	27,574	3,767
S–B	21,756	2,487
B–C5	38,427	2,857
C5–N	22,554	1,231

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	30,461	3,160
S–B	35,510	3,304
B–EDSA	35,510	3,304
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	130.7
A–S	3.60	46.1
S–B	3.90	38.1
B–C5	3.07	49.5
C5–N	1.55	14.2
TOTAL		278.5

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	19,752	2,677
S–B	18,656	2,095
B–C5	37,859	2,813
C5–N	22,281	1,225

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	30,754	3,199
S–B	35,792	3,343
B–EDSA	35,792	3,343
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	164.7
A–S	3.60	41.2
S–B	3.90	40.7
B–C5	3.07	60.9
C5–N	1.55	17.5
TOTAL		325.0

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	13,559	1,428
B–C5	36,570	2,526
C5–N	20,914	939

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	30,808	3,206
S–B	34,641	3,314
B–EDSA	34,641	3,314
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	192.1
A–S	3.60	0.0
S–B	3.90	35.1
B–C5	3.07	70.0
C5–N	1.55	19.3
TOTAL		316.4

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	9,007	926
B–C5	24,207	1,641
C5–N	11,320	396

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	27,795	3,028
S–B	29,549	3,077
B–EDSA	29,549	3,077
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	193.8
A–S	3.60	0.0
S–B	3.90	27.1
B–C5	3.07	53.9
C5–N	1.55	12.0
TOTAL		286.8

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	438	13
B–C5	5,169	437
C5–N	0	0

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	20,423	2,495
S–B	20,423	2,495
B–EDSA	20,423	2,495
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	8.50	157.7
A–S	3.60	0.0
S–B	3.90	1.3
B–C5	3.07	13.5
C5–N	1.55	0.0
TOTAL		172.6

Table A4–3–2b
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 8.5 km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	41,170	6,210
S–B	50,693	5,812
B–C5	62,602	5,950
C5–N	42,341	3,202

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	60,504	7,330
S–B	86,037	8,240
B–EDSA	93,853	8,606
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	40,737	6,083
S–B	49,586	5,621
B–C5	68,225	6,099
C5–N	49,648	3,534

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	59,657	7,227
S–B	83,195	8,064
B–EDSA	83,195	8,064
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	77.0
A–S	3.60	17.4
S–B	3.90	21.6
B–C5	3.07	22.5
C5–N	1.55	8.0
TOTAL		146.6

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	39,471	5,867
S–B	38,774	4,672
B–C5	62,193	4,863
C5–N	44,835	3,107

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	53,707	6,369
S–B	67,990	6,855
B–EDSA	67,990	6,855
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	126.7
A–S	3.60	33.6
S–B	3.90	34.2
B–C5	3.07	40.3
C5–N	1.55	14.4
TOTAL		249.4

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	43,387	6,508
S–B	35,323	4,410
B–C5	59,853	5,303
C5–N	33,251	1,847

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	42,512	4,708
S–B	49,735	4,940
B–EDSA	49,735	4,940
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	138.7
A–S	3.60	55.6
S–B	3.90	47.1
B–C5	3.07	59.2
C5–N	1.55	15.7
TOTAL		316.3

Table A4–3–2b (continued)
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	42,868	6,450
S–B	34,371	4,336
B–C5	57,522	4,568
C5–N	33,148	1,828

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	43,031	4,766
S–B	49,825	4,983
B–EDSA	49,825	4,983
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	185.5
A–S	3.60	73.3
S–B	3.90	61.3
B–C5	3.07	74.7
C5–N	1.55	20.8
TOTAL		415.6

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	41,356	6,290
S–B	32,859	4,176
B–C5	55,866	4,406
C5–N	33,002	1,826

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	44,543	4,926
S–B	51,337	5,143
B–EDSA	51,337	5,143
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	239.0
A–S	3.60	88.6
S–B	3.90	73.3
B–C5	3.07	90.6
C5–N	1.55	25.9
TOTAL		517.4

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	32,848	5,042
S–B	31,197	3,918
B–C5	55,006	4,361
C5–N	32,732	1,822

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	45,131	4,967
S–B	51,911	5,184
B–EDSA	51,911	5,184
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	289.8
A–S	3.60	84.6
S–B	3.90	83.3
B–C5	3.07	107.1
C5–N	1.55	30.9
TOTAL		595.8

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	10,678	1,394
S–B	19,599	2,298
B–C5	54,903	4,358
C5–N	32,629	1,819

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	45,131	4,967
S–B	51,511	5,172
B–EDSA	51,511	5,172
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	335.8
A–S	3.60	31.0
S–B	3.90	60.3
B–C5	3.07	124.8
C5–N	1.55	35.9
TOTAL		587.7

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	18,522	2,127
B–C5	47,188	3,864
C5–N	24,899	1,324

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	42,413	4,822
S–B	46,336	4,947
B–EDSA	46,336	4,947
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	8.50	348.9
A–S	3.60	0.0
S–B	3.90	64.8
B–C5	3.07	123.1
C5–N	1.55	31.2
TOTAL		568.0

Table A4-3-2c
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 8.5 km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	53,710	8,495
S-B	65,748	7,925
B-C5	79,740	7,918
C5-N	53,088	4,002

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	75,462	9,420
S-B	107,337	10,603
B-EDSA	117,075	11,064
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	0.0
A-S	3.60	0.0
S-B	3.90	0.0
B-C5	3.07	0.0
C5-N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	54,574	8,597
S-B	66,117	7,957
B-C5	89,719	8,406
C5-N	62,560	4,456

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	74,598	9,318
S-B	104,373	10,419
B-EDSA	104,373	10,419
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	97.1
A-S	3.60	23.6
S-B	3.90	29.2
B-C5	3.07	29.8
C5-N	1.55	10.1
TOTAL		189.8

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	52,934	8,294
S-B	54,466	6,779
B-C5	78,487	6,800
C5-N	52,423	3,531

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	73,528	9,138
S-B	93,514	9,848
B-EDSA	93,514	9,848
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	175.6
A-S	3.60	45.7
S-B	3.90	48.4
B-C5	3.07	51.6
C5-N	1.55	16.8
TOTAL		338.1

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	52,595	8,223
S-B	51,793	6,567
B-C5	77,495	7,032
C5-N	71,947	2,347

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A-S	56,670	6,641
S-B	73,257	7,213
B-EDSA	73,257	7,213
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	204.0
A-S	3.60	68.0
S-B	3.90	69.3
B-C5	3.07	76.9
C5-N	1.55	32.5
TOTAL		450.9

Table A4–3–2c (continued)
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	56,157	8,816
S–B	44,936	5,972
B–C5	73,355	6,051
C5–N	41,879	2,319

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	53,108	6,048
S–B	61,819	6,343
B–EDSA	61,819	6,343
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	231.2
A–S	3.60	97.0
S–B	3.90	81.0
B–C5	3.07	95.8
C5–N	1.55	26.3
TOTAL		531.2

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	55,537	8,744
S–B	44,769	5,916
B–C5	73,0[illegible]	5,992
C5–N	41,777	2,316

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	53,728	6,120
S–B	61,986	6,399
B–EDSA	61,986	6,399
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	290.0
A–S	3.60	119.9
S–B	3.90	100.7
B–C5	3.07	119.2
C5–N	1.55	32.8
TOTAL		662.7

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	53,625	8,536
S–B	42,857	5,708
B–C5	71,001	5,781
C5–N	41,604	2,313

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	55,640	6,328
S–B	63,898	6,607
B–EDSA	63,898	6,607
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	358.9
A–S	3.60	139.3
S–B	3.90	115.9
B–C5	3.07	138.8
C5–N	1.55	39.2
TOTAL		792.1

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	49,228	8,035
S–B	42,058	5,656
B–C5	70,162	5,727
C5–N	41,514	2,311

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	56,389	6,380
S–B	64,631	6,659
B–EDSA	64,631	6,659
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	423.2
A–S	3.60	150.2
S–B	3.90	133.0
B–C5	3.07	160.0
C5–N	1.55	45.7
TOTAL		912.0

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	26,332	4,612
S–B	37,166	4,897
B–C5	69,804	5,720
C5–N	41,156	2,304

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	56,389	6,380
S–B	64,174	6,645
B–EDSA	64,174	6,645
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	8.50	480.7
A–S	3.60	93.4
S–B	3.90	133.7
B–C5	3.07	182.1
C5–N	1.55	51.8
TOTAL		941.7

Table A4–3–2d
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 8.5 km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	63,249	10,093
S–B	76,629	9,379
B–C5	92,308	9,292
C5–N	90,622	4,592

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	86,936	10,954
S–B	124,489	12,362
B–EDSA	135,760	12,899
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	63,249	10,093
S–B	81,912	9,589
B–C5	108,718	10,033
C5–N	76,745	5,293

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	86,936	10,954
S–B	118,937	12,141
B–EDSA	118,937	12,141
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	111.1
A–S	3.60	27.4
S–B	3.90	36.0
B–C5	3.07	36.1
C5–N	1.55	12.4
TOTAL		222.9

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	63,699	9,995
S–B	73,789	8,892
B–C5	99,107	9,302
C5–N	67,270	4,570

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	83,820	10,582
S–B	118,525	11,881
B–EDSA	118,525	11,881
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	220.7
A–S	3.60	55.0
S–B	3.90	65.2
B–C5	3.07	66.0
C5–N	1.55	21.6
TOTAL		428.4

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	60,271	9,498
S–B	62,989	7,774
B–C5	93,619	8,623
C5–N	50,276	2,764

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	77,924	9,610
S–B	100,293	10,405
B–EDSA	100,293	10,405
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	281.8
A–S	3.60	78.1
S–B	3.90	83.8
B–C5	3.07	93.2
C5–N	1.55	23.7
TOTAL		560.6

Table A4-3-2d (continued)
PARTIAL LENGTH TOLLWAY FROM ALABANG TO MAGALLANES

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	65,842	10,437
S-B	60,091	7,718
B-C5	89,788	8,128
C5-N	48,756	2,710

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	61,192	7,037
S-B	75,366	7,540
B-EDSA	75,366	7,540
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	280.6
A-S	3.60	113.9
S-B	3.90	107.5
B-C5	3.07	118.8
C5-N	1.55	30.7
TOTAL		651.5

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	65,840	10,437
S-B	52,992	7,087
B-C5	85,479	7,087
C5-N	48,689	2,684

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	61,190	7,037
S-B	71,081	7,378
B-EDSA	71,081	7,378
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	332.9
A-S	3.60	142.4
S-B	3.90	119.5
B-C5	3.07	139.6
C5-N	1.55	38.2
TOTAL		772.6

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	65,201	10,362
S-B	52,735	7,028
B-C5	85,189	7,025
C5-N	48,586	2,681

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	61,828	7,111
S-B	71,268	7,436
B-EDSA	71,268	7,436
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	400.9
A-S	3.60	169.4
S-B	3.90	142.6
B-C5	3.07	166.8
C5-N	1.55	45.8
TOTAL		925.4

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	63,165	10,135
S-B	50,698	6,801
B-C5	82,957	6,793
C5-N	48,392	2,677

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	63,865	7,339
S-B	73,305	7,664
B-EDSA	73,305	7,664
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	481.2
A-S	3.60	191.9
S-B	3.90	160.2
B-C5	3.07	189.3
C5-N	1.55	53.2
TOTAL		1075.8

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLB VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	59,626	9,696
S-B	50,490	6,780
B-C5	82,749	6,773
C5-N	48,392	2,677

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A-S	64,073	7,359
S-B	73,513	7,684
B-EDSA	73,513	7,684
EDSA-P	0	0
P-VC	0	0
VC-PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	8.50	551.5
A-S	3.60	207.7
S-B	3.90	182.4
B-C5	3.07	215.8
C5-N	1.55	60.8
TOTAL		1218.1

Table A4–3–3a
SLE ONLY IN OPERATION

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 0.0 km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	68,824	8,383
S–B	93,193	8,762
B–C5	107,972	9,284
C5–N	94,058	7,773

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	58,777	7,037
S–B	70,114	6,515
B–C5	89,680	6,886
C5–N	81,275	6,277

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	23.9
S–B	3.90	29.6
B–C5	3.07	29.0
C5–N	1.55	13.3
TOTAL		95.8

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	58,035	6,927
S–B	60,296	5,987
B–C5	80,288	6,616
C5–N	60,423	4,502

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	47.2
S–B	3.90	51.4
B–C5	3.07	52.4
C5–N	1.55	19.6
TOTAL		170.7

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	58,035	6,927
S–B	57,266	5,791
B–C5	74,074	6,164
C5–N	56,262	4,358

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	70.8
S–B	3.90	73.5
B–C5	3.07	72.6
C5–N	1.55	27.6
TOTAL		244.5

Table A4–3–3a (continued)
SLE ONLY IN OPERATION

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	58,035	6,927
S–B	57,246	5,791
B–C5	73,915	6,161
C5–N	56,103	4,355

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	94.5
S–B	3.90	98.0
B–C5	3.07	96.6
C5–N	1.55	36.7
TOTAL		325.7

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	45,612	5,606
S–B	47,261	5,056
B–C5	66,464	5,774
C5–N	48,652	3,968

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	93.3
S–B	3.90	102.1
B–C5	3.07	109.3
C5–N	1.55	40.0
TOTAL		344.7

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	29,445	3,086
B–C5	52,378	4,167
C5–N	34,474	2,359

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	76.1
B–C5	3.07	102.0
C5–N	1.55	33.3
TOTAL		211.4

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	10,693	1,039
B–C5	25,892	1,755
C5–N	11,890	411

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	31.8
B–C5	3.07	57.7
C5–N	1.55	12.6
TOTAL		102.1

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	424	13
B–C5	5,131	437
C5–N	0	0

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	1.3
B–C5	3.07	13.5
C5–N	1.55	0.0
TOTAL		14.7

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Table A4–3–3b
SLE ONLY IN OPERATION

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 0.0 km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	101,674	13,540
S–B	136,730	14,052
B–C5	156,455	14,556
C5–N	134,440	11,640

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	92,359	12,187
S–B	122,933	12,358
B–C5	141,572	12,836
C5–N	129,700	11,271

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	38.3
S–B	3.90	52.5
B–C5	3.07	46.9
C5–N	1.55	21.5
TOTAL		159.3

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	85,899	11,216
S–B	90,925	9,703
B–C5	119,038	10,073
C5–N	105,528	8,983

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	71.2
S–B	3.90	78.5
B–C5	3.07	78.0
C5–N	1.55	34.9
TOTAL		262.6

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	85,899	11,216
S–B	85,058	9,350
B–C5	109,588	10,243
C5–N	90,757	6,598

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	106.8
S–B	3.90	110.8
B–C5	3.07	109.3
C5–N	1.55	39.9
TOTAL		366.7

Table A4–3–3b (continued)
SLE ONLY IN OPERATION

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	85,899	11,216
S–B	84,196	9,319
B–C5	107,347	9,551
C5–N	80,654	6,579

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	142.3
S–B	3.90	146.4
B–C5	3.07	141.7
C5–N	1.55	53.1
TOTAL		483.5

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	85,899	11,216
S–B	84,176	9,319
B–C5	107,181	9,549
C5–N	80,488	6,577

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	177.9
S–B	3.90	182.9
B–C5	3.07	176.9
C5–N	1.55	66.2
TOTAL		604.0

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	75,215	9,860
S–B	80,293	8,953
B–C5	104,601	9,396
C5–N	77,408	6,424

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	187.1
S–B	3.90	209.7
B–C5	3.07	207.4
C5–N	1.55	76.6
TOTAL		680.8

Toll: Cars: 1.[illegible] Trucks: 3.50 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	34,936	4,423
S–B	57,252	6,499
B–C5	92,555	6,559
C5–N	65,862	5,587

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	100.7
S–B	3.90	175.0
B–C5	3.07	215.1
C5–N	1.55	76.3
TOTAL		567.0

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	41,653	4,768
B–C5	70,239	6,510
C5–N	43,532	3,537

MST VOLUMES 2010 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2010	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	145.7
B–C5	3.07	186.6
C5–N	1.55	57.3
TOTAL		389.6

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Table A4–3–3c
SLE ONLY IN OPERATION

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 0.0 km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	129,172	17,915
S–B	173,085	18,528
B–C5	196,815	18,982
C5–N	167,992	14,849

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	129,070	17,915
S–B	168,174	18,115
B–C5	191,776	18,564
C5–N	162,953	14,431

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	54.2
S–B	3.90	72.7
B–C5	3.07	64.1
C5–N	1.55	27.1
TOTAL		218.2

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	110,893	15,156
S–B	127,605	13,547
B–C5	151,596	13,574
C5–N	131,052	11,321

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	92.8
S–B	3.90	110.1
B–C5	3.07	100.1
C5–N	1.55	43.5
TOTAL		346.5

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	109,265	14,864
S–B	120,597	13,154
B–C5	146,299	13,618
C5–N	107,979	8,693

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	137.0
S–B	3.90	156.8
B–C5	3.07	145.8
C5–N	1.55	53.2
TOTAL		492.9

Table A4–3–3c (continued)
SLE ONLY IN OPERATION

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	109,265	14,864
S–B	106,755	12,315
B–C5	135,174	12,394
C5–N	100,995	8,424

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	182.6
S–B	3.90	187.0
B–C5	3.07	179.2
C5–N	1.55	66.7
TOTAL		615.6

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	109,265	14,864
S–B	106,755	12,315
B–C5	135,072	12,391
C5–N	100,893	8,421

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	228.3
S–B	3.90	233.8
B–C5	3.07	223.9
C5–N	1.55	83.3
TOTAL		769.2

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	109,265	14,864
S–B	106,731	12,315
B–C5	134,875	12,388
C5–N	100,696	8,418

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	274.0
S–B	3.90	280.5
B–C5	3.07	268.3
C5–N	1.55	99.7
TOTAL		922.5

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	102,405	14,239
S–B	103,401	12,137
B–C5	131,502	12,208
C5–N	97,323	8,238

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	301.0
S–B	3.90	318.1
B–C5	3.07	305.7
C5–N	1.55	112.7
TOTAL		1037.4

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	59,547	8,902
S–B	87,181	10,616
B–C5	119,642	11,412
C5–N	85,463	7,442

MST VOLUMES 2020 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2020	km	M P
MST	0.00	0.0
A–S	3.60	203.3
S–B	3.90	308.7
B–C5	3.07	319.3
C5–N	1.55	113.5
TOTAL		944.8

Table A4–3–3d
SLE ONLY IN OPERATION

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 0.0 km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	150,189	21,047
S–B	201,124	21,741
B–C5	228,075	22,191
C5–N	194,187	17,240

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	150,160	21,047
S–B	196,530	21,279
B–C5	223,337	21,723
C5–N	189,449	16,772

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	63.2
S–B	3.90	85.1
B–C5	3.07	74.7
C5–N	1.55	31.5
TOTAL		254.5

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	129,028	17,826
S–B	172,469	17,796
B–C5	197,790	18,206
C5–N	177,785	15,336

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	108.2
S–B	3.90	148.1
B–C5	3.07	131.2
C5–N	1.55	59.0
TOTAL		446.5

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	127,034	17,474
S–B	146,611	15,616
B–C5	177,173	16,464
C5–N	130,379	10,297

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	159.6
S–B	3.90	189.9
B–C5	3.07	176.6
C5–N	1.55	64.1
TOTAL		590.1

Table A4–3–3d (continued)
SLE ONLY IN OPERATION

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	127,034	17,474
S–B	131,560	15,109
B–C5	161,019	15,511
C5–N	116,792	9,814

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	212.8
S–B	3.90	230.3
B–C5	3.07	215.2
C5–N	1.55	77.2
TOTAL		735.5

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	127,030	17,474
S–B	124,003	14,465
B–C5	156,560	14,464
C5–N	116,723	9,788

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	266.0
S–B	3.90	272.1
B–C5	3.07	259.8
C5–N	1.55	96.4
TOTAL		894.4

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	127,030	17,474
S–B	124,003	14,465
B–C5	156,457	14,461
C5–N	116,620	9,785

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	319.3
S–B	3.90	326.6
B–C5	3.07	311.6
C5–N	1.55	115.6
TOTAL		1073.0

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	127,030	17,474
S–B	124,003	14,465
B–C5	156,262	14,457
C5–N	116,426	9,781

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	372.5
S–B	3.90	381.0
B–C5	3.07	363.1
C5–N	1.55	134.6
TOTAL		1251.2

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	123,699	17,056
S–B	123,905	14,465
B–C5	156,164	14,457
C5–N	116,328	9,781

MST VOLUMES 2030 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 2030	km	M P
MST	0.00	0.0
A–S	3.60	414.7
S–B	3.90	435.1
B–C5	3.07	414.8
C5–N	1.55	153.8
TOTAL		1418.4

Table A4–3–4
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE
(VOT + 30%)

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 10.0 km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	25,910	3,543
S–B	29,473	3,245
B–C5	25,379	2,759
C5–N	13,292	1,283

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	48,070	6,075
S–B	70,978	6,807
B–EDSA	98,591	8,332
EDSA–P	86,258	7,109
P–VC	59,312	4,301
VC–PQ	55,99[illegible]	4,227

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	26,671	3,555
S–B	29,032	2,099
B–C5	29,459	2,716
C5–N	20,325	1,898

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	43,993	5,548
S–B	64,575	6,207
B–EDSA	79,212	6,905
EDSA–P	72,022	6,076
P–VC	52,288	3,808
VC–PQ	49,598	3,745

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	84.9
A–S	3.60	11.1
S–B	3.90	11.8
B–C5	3.07	9.8
C5–N	1.55	3.4
TOTAL		121.0

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	28,635	3,863
S–B	25,796	2,782
B–C5	34,230	2,957
C5–N	24,682	2,086

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	33,936	3,981
S–B	51,619	4,547
B–EDSA	62,183	5,006
EDSA–P	59,618	4,741
P–VC	48,501	3,397
VC–PQ	47,062	3,359

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	131.8
A–S	3.60	23.9
S–B	3.90	22.3
B–C5	3.07	22.5
C5–N	1.55	8.2
TOTAL		208.6

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	28,606	3,863
S–B	23,423	2,601
B–C5	33,373	2,673
C5–N	16,328	938

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	30,284	3,182
S–B	44,187	3,628
B–EDSA	53,846	4,045
EDSA–P	51,543	3,785
P–VC	43,434	2,627
VC–PQ	42,616	2,605

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	169.5
A–S	3.60	35.8
S–B	3.90	30.6
B–C5	3.07	32.5
C5–N	1.55	7.7
TOTAL		276.2

Table A4-3-4 (continued)
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE
(VOT + 30%)

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	28,607	3,863
S-B	23,490	2,603
B-C5	32,886	2,651
C5-N	16,320	938

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	30,260	3,182
S-B	40,293	3,497
B-EDSA	47,705	3,820
EDSA-P	45,402	3,560
P-VC	38,206	2,430
VC-PQ	37,388	2,408

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	202.0
A-S	3.60	47.7
S-B	3.90	40.8
B-C5	3.07	42.8
C5-N	1.55	10.3
TOTAL		343.7

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	28,486	3,850
S-B	23,437	2,590
B-C5	37,481	2,765
C5-N	21,013	1,065

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	29,617	3,087
S-B	34,647	3,228
B-EDSA	37,267	3,423
EDSA-P	34,843	3,151
P-VC	27,700	2,021
VC-PQ	26,882	1,999

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	201.3
A-S	3.60	59.4
S-B	3.90	50.9
B-C5	3.07	60.2
C5-N	1.55	16.4
TOTAL		388.2

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	26,420	3,640
S-B	23,378	2,590
B-C5	39,172	2,862
C5-N	22,704	1,162

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	29,549	3,077
S-B	33,829	3,201
B-EDSA	34,566	3,296
EDSA-P	32,142	3,023
P-VC	24,999	1,893
VC-PQ	24,181	1,871

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	225.3
A-S	3.60	66.4
S-B	3.90	61.0
B-C5	3.07	75.5
C5-N	1.55	21.2
TOTAL		449.4

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	12,268	1,677
S-B	20,111	2,175
B-C5	39,745	2,962
C5-N	23,156	1,249

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	29,427	3,064
S-B	33,707	3,188
B-EDSA	33,707	3,188
EDSA-P	31,404	2,928
P-VC	24,261	1,798
VC-PQ	23,443	1,776

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	256.0
A-S	3.60	35.9
S-B	3.90	60.9
B-C5	3.07	89.6
C5-N	1.55	25.4
TOTAL		467.8

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	0	0
S-B	15,094	1,568
B-C5	37,767	2,582
C5-N	21,063	865

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A-S	29,234	3,049
S-B	33,500	3,173
B-EDSA	33,500	3,173
EDSA-P	31,342	2,928
P-VC	24,220	1,798
VC-PQ	23,402	1,776

ANNUAL TOLL REVENUES 1999	km	M P
MST	10.00	290.9
A-S	3.60	0.0
S-B	3.90	51.9
B-C5	3.07	96.2
C5-N	1.55	25.8
TOTAL		464.8

Table A4–3–5
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE
(17 km MST TOLL)

Toll: Cars: 0.00 Trucks: 0.00 Pesos/km MST toll based on 17.0 km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	25,910	3,543
S–B	29,473	3,245
B–C5	25,379	2,759
C5–N	13,292	1,283

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	48,070	6,075
S–B	70,978	6,807
B–EDSA	98,591	8,332
EDSA–P	86,258	7,109
P–VC	59,312	4,301
VC–PQ	55,994	4,227

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	0.0
A–S	3.60	0.0
S–B	3.90	0.0
B–C5	3.07	0.0
C5–N	1.55	0.0
TOTAL		0.0

Toll: Cars: 0.25 Trucks: 0.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	34,959	4,731
S–B	36,894	3,910
B–C5	43,827	3,797
C5–N	34,242	2,970

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	27,447	3,070
S–B	41,590	3,527
B–EDSA	51,479	3,968
EDSA–P	51,479	3,968
P–VC	46,884	3,244
VC–PQ	46,066	3,222

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	92.2
A–S	3.60	14.6
S–B	3.90	15.9
B–C5	3.07	14.4
C5–N	1.55	5.7
TOTAL		142.8

Toll: Cars: 0.50 Trucks: 1.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	38,356	5,262
S–B	36,527	4,206
B–C5	55,408	4,742
C5–N	35,913	2,632

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	20,150	1,730
S–B	28,051	1,963
B–EDSA	28,732	2,049
EDSA–P	28,732	2,049
P–VC	28,493	2,006
VC–PQ	28,076	1,995

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	101.9
A–S	3.60	32.1
S–B	3.90	32.0
B–C5	3.07	36.4
C5–N	1.55	11.6
TOTAL		214.0

Toll: Cars: 0.75 Trucks: 1.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	38,662	5,305
S–B	36,596	4,136
B–C5	53,404	4,509
C5–N	35,641	2,703

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	19,373	1,622
S–B	20,670	1,655
B–EDSA	20,670	1,655
EDSA–P	20,670	1,655
P–VC	20,670	1,655
VC–PQ	20,639	1,655

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	111.6
A–S	3.60	48.6
S–B	3.90	47.9
B–C5	3.07	52.5
C5–N	1.55	17.4
TOTAL		277.9

Table A4–3–5 (continued)
FULL LENGTH TOLLWAY FROM ALABANG TO PRES. QUIRINO AVENUE
(17 km MST TOLL)

Toll: Cars: 1.00 Trucks: 2.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	39,024	5,340
S–B	38,236	4,204
B–C5	54,904	4,574
C5–N	37,092	2,768

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	19,011	1,587
S–B	19,011	1,587
B–EDSA	19,011	1,587
EDSA–P	19,011	1,587
P–VC	19,011	1,587
VC–PQ	18,980	1,587

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	137.7
A–S	3.60	65.3
S–B	3.90	66.4
B–C5	3.07	71.8
C5–N	1.55	24.1
TOTAL		365.3

Toll: Cars: 1.25 Trucks: 2.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	35,526	4,710
S–B	39,112	4,233
B–C5	58,115	4,925
C5–N	40,303	3,119

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	12,766	1,073
S–B	12,766	1,073
B–EDSA	12,766	1,073
EDSA–P	12,766	1,073
P–VC	12,766	1,073
VC–PQ	12,766	1,073

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	115.7
A–S	3.60	73.8
S–B	3.90	84.7
B–C5	3.07	95.2
C5–N	1.55	32.9
TOTAL		402.3

Toll: Cars: 1.50 Trucks: 3.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	24,418	2,603
B–C5	47,352	3,685
C5–N	29,448	1,877

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	5,255	503
S–B	5,255	503
B–EDSA	5,255	503
EDSA–P	5,255	503
P–VC	5,255	503
VC–PQ	5,255	503

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	58.3
A–S	3.60	0.0
S–B	3.90	63.3
B–C5	3.07	92.0
C5–N	1.55	28.2
TOTAL		241.7

Toll: Cars: 1.75 Trucks: 3.50 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	10,693	1,039
B–C5	25,892	1,755
C5–N	11,890	411

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	0.0
A–S	3.60	0.0
S–B	3.90	31.8
B–C5	3.07	57.7
C5–N	1.55	12.6
TOTAL		102.1

Toll: Cars: 2.00 Trucks: 4.00 Pesos/km

SLE VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	424	13
B–C5	5,131	437
C5–N	0	0

MST VOLUMES 1999 (veh/day)	CARS	TRUCKS
A–S	0	0
S–B	0	0
B–EDSA	0	0
EDSA–P	0	0
P–VC	0	0
VC–PQ	0	0

ANNUAL TOLL REVENUES 1999	km	M P
MST	17.00	0.0
A–S	3.60	0.0
S–B	3.90	1.3
B–C5	3.07	13.5
C5–N	1.55	0.0
TOTAL		14.7

TECHNICAL ADVISORY SERVICES

for

REPUBLIC OF THE PHILIPPINES

COORDINATING COUNCIL OF THE PHILIPPINE ASSISTANCE PROGRAM

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MANILA SOUTH TOLLWAY
BOT PROJECT

DRAFT FINAL REPORT

VOLUME II-B: APPENDICES A5 TO A10

September 1992

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ORGANIZATION OF REPORT

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Appendix A5-1
OVERVIEW OF THE FINANCIAL MARKETS IN THE PHILIPPINES

Appendix A5-1
OVERVIEW OF THE FINANCIAL MARKETS IN THE PHILIPPINES

1. INTRODUCTION AND OVERVIEW

This Appendix contains a detailed review of the Philippine financial markets and of the various internal and external sources of BOT financing for the country. It expands upon the observations and comments made in Chapter 5.

1.1 Financial Markets and BOT Projects

The Philippine financial markets today are characterized by the dominance of the money market. While the country has a well-developed market for short-term funds usually with maturities of one-year or less, the capital market or market for long-term funds is small and undeveloped. There is very limited financing available from internal sources to support projects with gestation periods of 7 years and over.

The country's present macroeconomic conditions basically define the short-term orientation of the financing that is available. Interest rates have been very volatile, with both nominal and real interest rates on an upward trend over the last few years. This is due to the public sector's increasing claim on the economy's financial resources. High interest rates also reflect premiums to offset increased risks associated with expectations of inflation and further depreciation in the foreign exchange rate. With a more favorable macroeconomic setting, the development of longer term local financing will be greatly facilitated.[1]

Philippine companies which do not have established track record of profitable operations find it difficult to raise funds via equity issuance and/or bond floatation. The reasons given for the lack of development of the capital market are as follows:

- Low investor confidence in the capital market and preference for short-term investments;
- Absence of a viable secondary market for corporate equity and bonds. The secondary market is considered an essential ingredient that must be in place if capital market instruments are to be saleable;

[1] Mr. McLindon, "Financing of BOT Projects in the Philippines", September 14, 1991, page 1. This paper was prepared for the Coordinating Council for the Philippine Assistance Program.

- The easy access of most companies to the traditional sources of finance, i.e. bank loans, money market funds and sometimes "cheap" foreign credit and limited incentives to open the companies to public scrutiny by going public;

- Raising funds via the capital market involves high cost of financing because of the present tax structure and cumbersome listing and disclosure requirements; and

- The Philippines is still considered to have a lower savings rate (19.8% of GDP) compared to such countries as Korea (33.2%), Singapore (47.2%) Malaysia (31.1%) and Indonesia (32.2%).[2]

A limited number of Philippine companies have been able to successfully raise long-term financing from local and foreign sources. These have been blue chip corporations. This experience points to the possibility of selling and placing shares for a Philippine company, as a sponsor/developer, to raise equity and/or long-term financing for projects in the near term. The financing of a BOT project depends on the financial and economic environment or setting of the project - that is the financial and economic condition of the country where the project is located and the financial viability of the project itself.

In general, raising financing for BOT projects in the Philippines will depend on the following factors:

- The attractiveness of projects which are being promoted;

- The state of the Philippine economy and the degree of political stability;

- The level of creativity and the ease of application of the government's BOT program which includes overcoming bureaucratic impediments; and

- The amount of official development assistance (ODA) funds available to support BOT projects.

On a project specific basis, those factors that affect the availability, interest rate, maturity and other terms of long-term financing include:

- Stability of the revenue from the project and its ability to generate foreign exchange for off-shore investors;

- Reputation of the sponsors, promoters and project managers; and

- Presence of government guarantees and subsidies.

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[2] 1991 Philippine Statistical Yearbook.

Only in the case where both the assessments of the country and of the project's viability are positive will the financing of the project succeed.

2. MONEY MARKET OR THE SHORT-TERM FUNDS MARKET

The money market is described as a network of institutions and facilities through which the need for short-term funds are met. The established financial institutions in the country including commercial banks, thrift banks, investment houses, finance companies, etc. are active participants in this market. The instruments used are generally short-term with maturities of one-year or less.

Borrowers go to the money market to source funds for working capital purposes or for adjusting their liquidity. As has been stated, this component of the Philippine financial market is very well-developed with total transaction volume in 1990 reaching ₱ 1,290 billion. Over the 1980-1990 period, the total volume of money market transactions has been growing at a high compound annual rate of 15.6%. Table A5-1-1 shows the 1990 volume of money market transactions by type of instrument.

Table A5-1-1
1990 MONEY MARKET TRANSACTIONS BY TYPE OF INSTRUMENT
(Volume in Million Pesos)

TYPE	VOLUME	% DIST.
Interbank call loans	₱ 730,742	56.7
Deposit substitutes	67,629	5.2
Commercial papers	26,340	2.0
Government securities	464,780	36.0
TOTAL	1,289,491	99.9

Source: Central Bank Statistical Bulletin, 1990

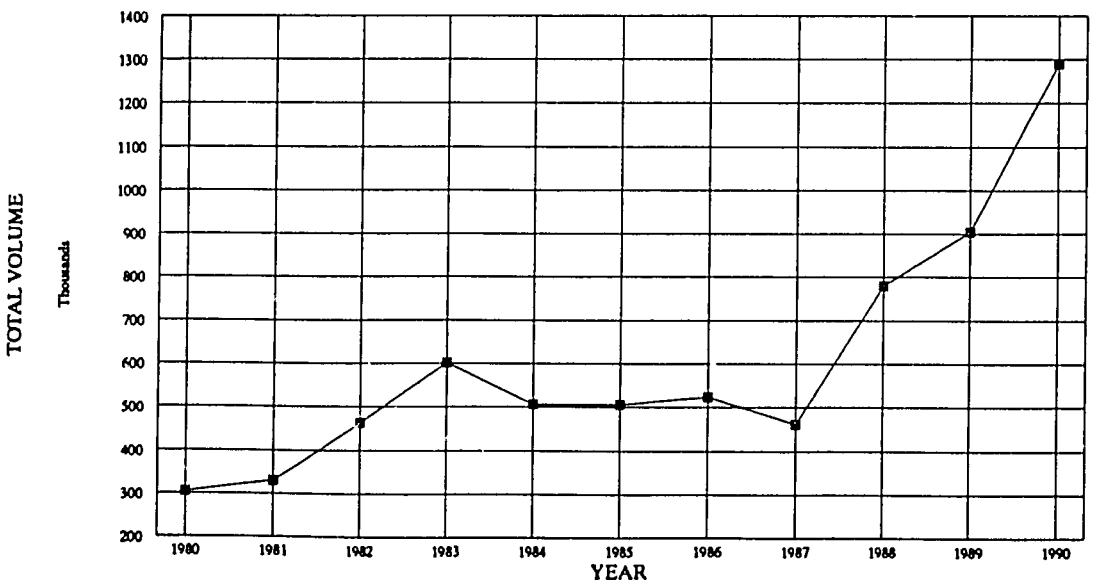
Table A5-1-2 and Figure A5-1-1 show the growth in the peso volume of money market transactions from 1980 - 1990.

Table A5-1-2
VOLUME OF MONEY MARKET TRANSACTIONS
(1980 - 1990)
(In Million Pesos)

YEAR	TOTAL VOLUME
1980	303,750
1981	329,621
1982	462,822
1983	600,562
1984	505,809
1985	505,754
1986	523,417
1987	460,854
1988	780,051
1989	904,953
1990	1,289,491

Source: Central Bank of the Philippines

Figure A5-1-1
GROWTH OF MONEY MARKET TRANSACTIONS



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As shown in Figure A5-1-1, the growth begun in 1987 as a result of heavy trading in government securities and complemented by heavy borrowings by banks in the interbank sector in 1989 and 1990. Table A5-1-3 shows the average interest rates for such instruments from 1980 to 1990. Except for the turbulent years of 1984 and 1985, the weighted average interest rate falls within the range 11 to 18%. With the exception of those two years, the average interest rate was 14.6%.

Table A5-1-3
AVERAGE INTEREST RATES ON MONEY MARKET TRANSACTIONS
BY TYPE OF INSTRUMENT[3]
(In Percent)

YEAR	COMMERCIAL PAPERS[a]	INTERBANK CALL LOANS	GOVERNMENT SECURITIES[b]	DEPOSIT SUBSTITUTES[c]	WEIGHTED AVERAGE[d]
1980	16.7	11.9	11.7	15.0	13.2
1981	17.3	14.9	12.7	16.0	15.7
1982	16.4	12.2	13.2	15.0	14.2
1983	16.0	16.7	11.9	15.2	16.8
1984	20.6	28.1	25.9	30.0	27.2
1985	21.0	20.0	21.0	18.8	20.6
1986	11.8	12.6	15.3	15.2	13.4
1987	11.8	12.2	11.9	11.3	11.1
1988	13.0	14.6	12.0	14.6	13.4
1989	17.0	15.3	15.9	20.0	15.7
1990	21.2	15.8	18.0	18.3	18.0

[a]Financial and non-financial papers issued by corporations
[b]Treasury bills, CBCI's, DBP bonds, others
[c]Pro-notes, repurchase agreements, certificates of assignments/participation
[d]Weighted average of all instruments

Source: Central Bank Statistical Bulletin, 1990

The four sub-markets of the money market are described in 2.1 to 2.4.

2.1 Interbank Market

The interbank call loan market is the sector of the money market where financial institutions borrow from each other. This is done primarily for purposes of adjusting their reserve positions and in some cases as a semi-permanent source of funds for their regular operations. Interbank call loans usually have maturity of less than one week. Only banks and quasi-banks can participate in this sub-market. They include commercial, thrift and rural banks and, investment houses and finance companies.

[3]The interest rates for government securities and deposit substitutes are arithmetic averages.

The interbank sector is the biggest of the four sub-markets of the money market. Its 1990 transaction volume was ₱ 731 billion or approximately 57% of total money market transactions. The statistics from 1988 indicate the growing importance of interbank call loans for satisfying bank liquidity requirements.

2.2 Market for Deposit Substitutes

The trading of deposit substitutes by banks and other financial institutes licensed to perform quasi-banking functions is an alternative method of obtaining funds from the public other than by deposits, through the issuance, endorsement or acceptance of debt instruments for the borrower's own account, for the purpose of relending or purchasing of receivables and other obligations. The relevant financial institutions perform dealership sales in instruments which may be private or government issue.

There are four types of deposit substitutes, namely: 1) Repurchase agreements, 2) Certificates of assignment, 3) Certificates of Participation, and 4) Promissory notes. The use of deposit substitutes has declined steadily in recent years. In 1990, about ₱ 67.6 billion or 5.2% of total money market transactions went through this sub-market. The largest borrowers in this sub-market are the investment houses and finance companies, a position formerly dominated by commercial banks. Commercial banks are, however, still the biggest lenders. Starting in 1988, promissory notes and repurchase agreements were the only instruments being used. Promissory notes amount to above 90% of total transaction in this sub-market.

2.3 Commercial Paper Sub-Market

This market is characterized by trading in money market instruments which are issued by financial and non-financial corporations to financial institutions and subsequently sold without recourse.

Central Bank records indicate that after 1988, only commercial paper issued by non-financial corporations, i.e. public utilities, commercial, industrial and agricultural enterprises was being traded. The volume of trading has also not expanded rapidly compared to the other segments of the money market. This lack of growth was traced to strict regulations imposed by the Securities and Exchange Commission and the availability of more attractive alternatives.

In 1990, the volume of commercial paper transactions reached ₱ 26.3 billion, 2% of the total money market transactions for this particular year. Individuals and private corporations are the largest investors in this sub-market.

2.4 Government Securities Sub-Market

The government securities sub-market is dominated mainly by trading in Treasury bills. In 1990, T-bills had a 91% share of the total government securities sub-market.

Aggregate government securities traded in 1990 amounted to ₱ 465 billion. From a level of only ₱ 681 million in 1980, the total volume traded grew approximately 682 times. This makes this sub-market the most rapidly growing sector in the Philippine money market. The main reason for this is the heavy trading by the Central Bank in treasury bills to support national government fiscal operations. This includes financing the budgetary deficits of the national government. This heavy reliance of the government on the financial markets has been criticized. It is counterproductive since there are less funds available to the private sector. This in turn reduces investment activities.

Government securities are very attractive forms of investments for individual and institutional investors because they are risk-free, carry attractive interest rates, and on the part of financial institutions, are eligible for satisfying requirements on reserves.

3. THE CAPITAL MARKET

By definition, the capital market is the market for the mobilization of medium and long-term funds. This is done through the use of such instruments as corporate equity (common and preferred shares), bonds, debentures and other certificates of long-term indebtedness.

The entire capital market is small. In 1992, it is estimated to have a volume of ₱ 100 billion, and this value is considered optimistic.[4] This is only about 7% of the size of the money market. Some financial institutions, notably commercial banks make medium to long-term loans with funds sourced from their regular deposits.

Projects financed by long-term credit are structured either as securities or non-securities. The entire market lacks depth (in volume terms) as compared to the size of the money market. The funds that are sourced from this market are used for acquiring and/or building fixed assets.

The institutions and the type of instruments used in the Philippine capital market are in Table A5-1-4.

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[4] See paper written by Dr. Aurora Sanchez, "Survey of the Regulatory and Institutional Framework-Financial" June 20, 1992 for the Local Development Assistance Program.

Table A5-1-4
INSTITUTIONS AND TYPE OF INSTRUMENTS USED IN THE PHILIPPINE CAPITAL MARKET

INSTITUTIONS	INSTRUMENTS
Development Banks Commercial Banks Savings and Mortgage Banks Investment Banks Insurance Companies Pension & Employee Provident Funds Leasing Companies Security Brokers and Dealers Venture Capital Firms Debenture Trustees Transfer Agents and Mutual Funds Clearance and Settlement Agencies Stock Exchanges	Loans Mortgages Leases Equity (shares of stocks) Equity Equivalents (convertible bonds or debentures) Debt Securities (bonds and debentures)

Source: Asian Development Bank

3.1 Securities Markets

The securities segment of the capital market provides medium and long-term financing through negotiable equity and debt instruments issued by companies needing these types of financial resources. Usually they source their funding requirements through financial intermediaries, i.e. investment/merchant banks, universal banks and securities brokers/dealers. The financial institutions tap a broad range of investors (individuals, corporate, institutional) to supply the funds. Investors take possession of securities which can be bought and sold (traded) through the secondary markets such as the stock exchanges or over-the-counter.

Judging by the volume of securities that have been underwritten by investment houses and securities brokers and dealers in recent years, the Philippine capital market cannot be considered as a reliable source of funds for project financing. The debt capital (bonds) securities market is small and dominated by government securities.

Private bonds issues are very few. Because of the aforementioned consideration, practically all of the country's investment houses instead of concentrating on "securities underwriting" which is their primary function, have opted to operate mainly as money market companies in order to survive.

The Philippine capital market still lacks essential ingredients to qualify as a vibrant and viable market. Aside from the reasons advanced in section 1.1 as responsible for the present level of development of the Philippine capital market, the following reasons can be added:

- The general lack of sophistication of the Filipino investing public to appreciate investments in capital market instruments;

- Most Philippine corporations are either close-family or foreign-owned and controlled corporations which have no desire or incentives to open their operations to outsiders and risk equity dilution or the danger of losing control of their company; and

- Lack of clear cut policy directions (including incentives) for the development of the capital market.

3.2 Non-Securities Markets

The non-securities segment of the capital markets provides debt funds in the form of non-negotiable medium and long-term instruments. These funds are provided by financial institutions such as by commercial banks, savings banks and development finance institutions to private and public companies. Commercial banks are a major source of this kind of financing. The total volume of intermediate and long-term loans from the commercial banks is relatively low compared to their demand and short-term transactions. The total outstanding intermediate and long-term loans of commercial banks as of September 1990 amounted to only ₱ 32.6 billion out of an aggregate loan outstanding of ₱ 127.5 billion. As shown in Table A5-1-5, only about 9.7% of the total loans outstanding was long-term.

Table A5-1-5
LOANS OUTSTANDING OF COMMERCIAL BANKS
BY MATURITY, 1983 - SEPT. 1990
(In Million Pesos)

YEAR	TOTAL	DEMAND/ SHORT-TERM		INTERMEDIATE		LONG-TERM	
		Amount	% Share	Amount	% Share	Amount	% Share
1983	115,390	79,601	69.0	17,530	15.2	18,259	15.8
1984	120,355	73,013	60.7	29,177	24.2	18,166	15.1
1985	91,827	60,565	65.6	15,646	17.0	15,646	17.0
1986	88,326	61,137	69.2	15,792	17.9	11,398	12.9
1987	101,112	72,264	71.5	22,899	22.6	5,948	5.9
1988	126,615	89,815	70.4	26,865	21.0	10,235	8.9
1989 (Dec)	165,858	123,844	74.7	31,780	19.2	10,233	6.2
1990 (Sept)	127,499	94,877	74.4	20,290	15.9	12,332	9.7

Source: Central Bank of the Philippines

4. SOURCES OF LONG-TERM FINANCING

The estimated potential financing that could be raised from both local and external sources for BOT financing in the country is roughly US$ 2.295 billion per year (₱ 58.52 billion at ₱ 25.50 per US Dollar). This estimate is summarized in Table A5-1-6. Local sources (local debt and equity) has the potential to contribute only $ 385 million or 16.8% of this amount, the bulk would have to come from external sources notably the IFC, ADB, foreign commercial banks and official development assistance (ODA).

4.1 Local Sources of Long-Term Financing

4.1.1 Commercial Banks

The commercial banking system is the largest sector of the Philippine financial system in terms of resources and is a very important source of term financing. Commercial banks source their funds mainly by gathering demand, savings and time deposits and through their quasi-banking or money market operations. In 1990, based on preliminary Central Bank figures, commercial banks accounted for ₱ 310 billion or 89% of the outstanding deposits of the country's banking system.

Most commercial bank term lending averages three to five years. To protect themselves from fluctuations in interest rates, the interest rates they charge on loans are also fluctuating with a spread of one to two percent over the 90 day or 120 day treasury bills. Grace periods of one to two years are possible. For loans that exceed 5 years, escalating amortization periods and balloon payments in years five to seven are arranged.

Even with the advent of universal banking in 1981 which greatly expanded the functions of commercial banks, their merchant banking operations, underwriting, and public offering activities have not really increased. The level of securities underwriting business has remained very limited.

The total loans granted by commercial banks which was averaging about ₱ 376 billion per year between 1986 to 1989 greatly increased to ₱ 512 billion in 1990. By type of debt instruments, these were mostly loans and discounts, bills purchased, customer's liability acceptances and trading account securities.

A major constraint facing big commercial bank borrowers specially for BOT projects is the Central Bank requirement on single borrower limits which is pegged at 15% of equity. At any one time, a bank's lending to a single borrower cannot exceed 15% of the bank's unimpaired capital and surplus. A syndicate of banks needs to be formed to raise the required financing and

to overcome this restriction. Based on the net worth as of December 18, 1991, only six of the country's existing commercial banks can grant loans of ₱ 500 million and above.[5]

Table A5-1-6
POTENTIAL SOURCES OF BOT FINANCING

SOURCE	TERMS	INTEREST RATE	POSSIBLE ANNUAL AMOUNTS AVAILABLE (US$ Million)
LOCAL DEBT			
Commercial Banks	3-5 years	Floating Rate	$ 100
Trust Funds	3-5 years	Floating/Fixed	25
Insurance Companies	3-5 years	Floating/Fixed	25
IRP	Up to 10	Fixed	20
Commercial Paper	3-5 years	Floating	10
Special Instruments	Unknown	Floating/Fixed	5
Sub-Total			$ 185
LOCAL EQUITY			
Share sale	Infinite	none	$ 100
Private Placement	Infinite	none	100
Sub-Total			$ 200
FOREIGN DEBT			
IFC	10 years+	LIBOR+	$ 500
ADB	10 years+	LIBOR+	500
Commercial Banks (ADB Linked)	7 years	LIBOR+	300
ODA (Other than IFC & ADB)	10 years+	LIBOR-	300
Sub-Total			$ 1,600
FOREIGN EQUITY			
IFC/ADB	Infinite	none	$ 10
Direct Foreign Investment	Infinite	none	200
Portfolio Investment			100
Sub-Total			$ 310
GRAND TOTAL			$ 2,295

Notes: IFC = International Finance Corporation
ADB = Asian Development Bank
ODA = Official Development Assistance
IRP = Industrial Restricting Project

Source: "Financing BOT Projects in the Philippines", Dr. Michael P. Mclindon, Sept. 14, 1991, page 3.

[5] Sycip, Gorres and Velayo (SGV), Study of Commercial Banks, December 1991.

4.1.2 Insurance and Trust Funds

Insurance premiums and trust funds are considered long-term savings. Theoretically, these sources of funds are ideal for long-term financing. An examination of the existing investment portfolios of insurance companies and retirement funds reveals that most of their funds are either in the money market or in blue-chip investments in the stock market. Except for big insurance companies who manage their own funds, they are generally managed by the trust departments of commercial banks.

Floating and fixed rate financing for a duration of three to five years and sometimes longer is possible from these funds. The insurance companies generally require commercial bank guarantees, a mortgage, or a government guarantee.

There are also two existing social insurance institutions, the Government Service Insurance System (GSIS) for government employees, and the Social Security System (SSS) for private employees. Aside from providing regular service to their members, these two institutions are potential sources of long-term or BOT funds.

4.1.3 Issuance of Long-Term Commercial Papers

A few large and established industrial, commercial and utility companies (blue chips) successfully floated long-term commercial paper of 3 to 5 years. This was true in the case of the Philippine Long Distance Telephone Company (PLDT), San Miguel Corporation and most recently Purefoods Corporation. These companies are considered blue chips and have been established for a number of years. The rates are floating and are set at 1 to 1.5 percent over T-bill rates.

4.1.4 Private Sector Infrastructure Development Fund (PSIDF)

In order to support the BOT program, the Philippine Government decided to allow the private sector to have access to new sources of financing. Any private sector entity interested in undertaking an approved BOT project can have access to Official Development Assistance (ODA) funds which the Philippine government will receive from the international community.

These funds will be available under the Private Sector Infrastructure Development Fund (PSIDF) through the Development Bank of the Philippines (DBP). Financing for the PSIDF is at present being negotiated by the Philippine Government with multilateral lenders such as the World Bank (WB) and the Asian Development Bank (ADB). Both these institutions had expressed interest in the program. The World Bank has indicated its willingness to provide US$ 300 million as its contribution to the initial funding for the PSIDF.

The PSIDF is scheduled to begin operating in 1993. The terms and conditions of the PSIDF are expected to be similar to the other programs of the DBP which are financed by the World Bank. These include the Industrial Investment Credit Program (IICP). The loans under the IICP have a repayment period of 3 to 13 years with a grace period of 3 to 5 years. Interest rates are based on the prevailing market lending rates which are between 17% to 23% in 1990. The maximum debt to equity ratio required under this program is 4:1.

There are pressures being exerted by some government officials to change the rules of the BOT Law. Provisions which extend government guarantees on official development assistance loans of private contractors for BOT projects would put the government at risk and increase its debt burden.

4.1.5 Industrial Restructuring Project (IRP)

This industrial restructuring facility funded by the World Bank is available with the Development Bank of the Philippines and other participating financial institutions. This was conceived as a lending facility for relending to investment enterprises at fixed rates of up to 10 years to finance long term requirements for modernization and expansion of existing as well as of new facilities, permanent working capital, equity and quasi-equity investments (common and preferred, convertible debentures and subordinated debt) and lease contracts. It is available both in local and foreign currency.

The DBP has recently (June 30, 1991) made announcements that it is lowering interest rates under this facility as follows:

RATE	TERM
13.7 %	Variable rate (regardless of term)
14.7 %	Fixed rate of up to 5 years
15.2 %	Over 5 years
15.7 %	Over 8 years

4.2 The Stock Exchanges

The country's equity market is considered relatively well-established but suffers from lack of adequate supply of high quality equities and poor demand for corporate shares. The country's two stock exchanges, the Manila Stock Exchange and the Makati Stock Exchange have an estimated combined capitalization as of 1990 of US$ 5,927 million. Compared to its regional neighbors, the Philippine stock exchanges lag behind as shown in Table A5-1-7.

Table A5-1-7
RANK AND PERFORMANCE OF REGIONAL STOCK MARKETS
(As of December 1990)

COUNTRIES	STOCK MARKET CAPITALIZATION (US$ Million)	ANNUAL TRADING TURNOVER (US$ Million)	AVERAGE P/E RATIO (x)
Taiwan	100,710	715,005	44.4
Malaysia	48,611	10,871	23.0
Thailand	23,896	22,894	10.9
Indonesia	8,081	3,992	30.8
Philippines	5,927	1,216	24.5

Source: International Finance Corporation (IFC), Emerging Stock Markets Factbook, 1991.

Over the last two years, approximately 20 companies have been listed and were able to raise capital from the exchanges. The Philippine stock market is still considered small. Only a limited number of companies are listed. As shown in Table A5-1-7, the Philippines has the lowest stock market capitalization and lowest annual trading turnover.

Total stock market trading value in 1990 was placed at ₱ 26.66 billion. This represented a 50.4% decline from the 1989 level resulting from unfavorable external and internal developments and the more attractive yields of alternative instruments i.e. treasury bills.

During the last two to three years, the stock exchanges have been useful as vehicles for the privatization of some state-owned enterprises. The Philippine National Bank has successfully floated 30% of its shares.

4.3 Recent Experience in Long-Term Sourcing

The following are recent experiences in the Philippines in long-term financing:

4.3.1 Flotation of Ayala Land Shares

The successful public offering of Ayala Land Inc. shares in May 1991 provides some indication of the potentials of the local equity market for raising funds for BOT projects.

The share sale was done both locally and internationally. It was a combination of the sale of existing shares and issue of new shares to raise funds for the company's real estate development projects and for future real estate acquisitions. It was able to raise the equivalent of US$ 58 million from the local offering and US$ 38 million from the international sale. These amounts are considered fairly substantial.

Ayala Land, however, is a well-known profitable and professionally managed company. There are not many firms in the country that enjoy this kind of reputation.

4.3.2 Cebu Equity - Bond Units

In 1991 the province of Cebu floated equity bond units with an initial offering valued at ₱ 300 million and redeemable in shares of the Cebu Properties Ventures Development Corporation (CPVDC), a joint venture with the Ayala Land Inc. Proceeds of the sale were intended to finance various infrastructure projects of the province. Demand for capital financing motivated this financial partnership between the province and Ayala which gave the bond issue strong financial credibility.

The financing of Cebu's projects through the CPVDC raised:

- ₱ 300 million immediately through the issue of quasi-equity instruments known as the CEBUs; and
- ₱ 700 million over a two to three - year period. This will be a secondary sale of the Cebu Government's share in the joint venture corporation.

At the end of the process, the goal of the Cebu Government is to raise ₱ 1 billion for its infrastructure projects, to divest its holdings in CPVDC, and to maximize its returns through the gradual sale of the financial instruments in the securities market.

The features of the CEBUs are summarized as follows:

Instrument	registered, direct obligations of the Provincial Government of Cebu
Term	three (3) years
Interest	Sixteen (16) percent per year, tax free payable every six months in arrears
Principal payment	In five semi-annual equal amortization
Type of payment	Class "A" shares of CPVDC according to a formula based on the current market value of the equity shares
Security	The Cebu is secured by class "A" equity shares of CPVDC.

4.4 External Funding Sources

Considering the limited amount of funds that could be raised from local sources for financing of BOT projects, the private sector promoter of a BOT scheme has to turn to external sources for most of its needs. Its ability to tap foreign funds in sizable quantity would, however, depend on several factors including the country's present credit rating, its present capability to service existing debts and the bankability of the projects for which the funds are being raised.

4.4.1 Foreign Commercial Debt

As shown in Table A5-1-6, a very important source of BOT financing could be through foreign commercial banks. This source could raise an estimated $ 300 million. Within the next few years, however, the scope for foreign commercial bank financing for BOT projects could be severely influenced by the country's large commercial debt.

As of December 1990, the country's total foreign exchange liabilities amounted to US$ 28.55 billion. The breakdown of this external debt by type of creditor is shown in Table A5-1-8 as follows:

Table A5-1-8
BREAKDOWN OF PHILIPPINE EXTERNAL DEBT

CREDITOR	AMOUNT (In Million US$)	% SHARE
Commercial Banks	11,491	40.25
Multilateral sources	6,005	21.10
Bilateral sources	8,547	29.94
Suppliers credit	2,312	8.10
Others	184	0.68
TOTAL	$ 28,549	100.00

Source: Central Bank of the Philippines

The exuberant days of project financing of the 1980's are over. The financial difficulties and recession in Europe, North America and Japan make packaging a BOT scheme for highway projects difficult. Even commercial banks have slowed down on their overseas lending activities. Discussions with local bank executives including representative offices of foreign banks revealed the continued reluctance of foreign commercial banks to make new loans to the Philippines.

During the 1986 to 1990 period, there has been a 29% decline in foreign commercial debt through various debt-reduction and debt-conversion schemes pursued by the government. During

the same period, however, borrowings from multilateral lending agencies and bilateral creditors and export credit agencies increased by 44% owing to stepped-up disbursements.

4.4.2 Direct Foreign and Portfolio Investment

The successful packaging of the Hopewell Energy Corporation's 200 megawatt gas turbine plant in Navotas, Metro Manila has been interpreted as a demonstration that foreign equity in the form of direct investment can be attracted, depending on a particular project. The success of the First Philippine Fund and other funds set up in Hong Kong and Europe and the recent successful sale of Ayala Land shares have likewise been used to gauge interest among foreign portfolio investors for share ownership in Philippine companies.

4.4.3 IFC and ADB

The International Finance Corporation and the Asian Development Bank are potentially important source of funds for financing of BOT projects specially as source for equity participation. This has been clearly demonstrated by the Hopewell energy project. There is current strong interest within the IFC to work with successful BOT bidders to finance their projects.

One advantage of dealing with the IFC is that it does not require government guarantees. This existing policy thrust of the IFC points to a continuing source of finance for the more bankable of the BOT projects.

4.4.4 Official Development Assistance (ODA)

There is current interest within the Central Bank of the Philippines to direct ODA funds for infrastructure projects into BOT types of funding mechanisms, especially for World Bank and ADB official development assistance.

One proposal being worked out within the Coordinating Council for the Philippine Assistance Program is the establishment of a BOT fund from ODA. From discussions with World Bank and the ADB, there is reported to be strong interest in the concept. An issue to be resolved with respect to this proposal is whether the concessionality embodied in ODA could be passed on to what would be a private sector led project.

When compared to the traditional way of using ODA for infrastructure, the BOT mechanism is a far superior mechanism. It reduces the financial and management burden on overly-indebted governments and involves the private sector in areas where they have greater competitive advantage vis-a-vis the public sector. Of the large number of possible BOT projects in the government portfolio of infrastructure projects, some will be more "bankable" than others. Those that are more bankable are likely to be power projects such as Hopewell - which was financed through IFC, ADB and private sector consortia. Those that are less bankable but socially beneficial would be the more logical candidates for ODA-BOT financing.

Appendix A5-2
THE FINANCING OF TWO RECENT BOT PROJECTS

Appendix A5-2
THE FINANCING OF TWO RECENT BOT PROJECTS

1. INTRODUCTION

This appendix reviews two recent BOT projects in the Southeast Asian region in order to highlight how financing for these particular projects was raised. These projects are the 200 MW Gas Turbine Power Station Project packaged by Hopewell Project Management Co. Ltd. (HPMC) for the National Power Corporation of the Philippines and the Second Stage Expressway in Bangkok, Thailand. These projects are used as illustrations because they included funding by international development organizations - the Asian Development Bank (ADB) in both cases and the International Finance Corporation (IFC), an affiliate of the World Bank for one project. The inclusion of Official Development Assistance (ODA) to help with the financing of the MST BOT Project is thought to be highly desirable.

2. REVIEW OF THE FINANCIAL CONDITIONS OF THE HOPEWELL GAS TURBINE PROJECT

2.1 Project Description

The project involves the design, construction, commissioning and operation of a 200 MW gas turbine power plant on a Build-Operate-Transfer (BOT) basis to meet the increasing peak demand for electricity for the Luzon grid. The project is located at the Navotas Fishing complex and was originally scheduled to be operational by the end of August 1990.

The National Power Corporation (NAPOCOR) of the Philippines invited bids from various potential suppliers and/or developers in 1987. A project agreement between Hopewell Project Management Co. Ltd. and the NAPOCOR was signed on November 16, 1988.

Hopewell was responsible for the arrangement of the foreign currency financing for the project. Hopewell through its Philippine subsidiary, the Hopewell Energy Philippines Corporation (HEPC), would be responsible for the development, management, operation and maintenance of the project.

The Project, which was completed in January 1991, is the first foreign investment project in the Philippines under the Build-Operate-Transfer scheme which was undertaken entirely by the private sector.

2.2 Project and Financing

The total project cost based on September 1989 prices was placed at $ 45.47 million consisting of $ 36.66 million (80.6%) in foreign exchange and $ 8.81 million (19.4%) in local currency.

The funding for this project was raised from a combination of equity contributions and long-term borrowings. Of the total project cost, US$ 11.0 million was sourced from equity contributions. The support facilities to be provided by the NAPOCOR was estimated at US$ 4.47 million. The rest of the project cost amounting to US$ 30.0 was funded through availments of long-term loans from the Asian Development Bank (ADB), the International Finance Corporation (IFC), (an affiliate of the World Bank) and four domestic commercial banks. Table A5-2-1 shows the details of the financing structure of the project.

Table A5-2-1
FINANCING STRUCTURE OF THE HOPEWELL
GAS TURBINE PROJECT
(In Thousand US$)

SOURCE OF FUNDS	AMOUNT (US$)	% DISTRIBUTION
A. EQUITY	11,000	24.2
HPMC	6,611	14.5
CITICORP	2,189	4.8
ADB	1,100	2.4
IFC	1,100	2.5
B. DEBT	30,000	66.0
ADB	10,000	22.0
IFC	10,000	22.0
Commercial Co-Financing	10,000	22.0
C. SUPPORT FACILITIES	4,477	9.8
NPC (local cost)	4,477	9.8
TOTAL	$ 45,477	100.0

Source: Asian Development Bank.

The financing structure of the project is based on a debt/equity ratio of 2.73:1. Hopewell Project Management Co. (HPMC) provided the leadership role by contributing US$ 6.61 million or 60% of the equity. HPMC is 83.35% owned by Hopewell Holdings Ltd. and 16.65% by Kanematsu Gosho Ltd. Citibank which acted as the financial advisor to the project contributed US$ 2.189 million or 20% of the equity. The remaining 20% of the equity was shared by the ADB and IFC.

2.3 Debt Financing

The ADB, IFC and the group of participating commercial banks contributed US$ 10.0 million each to raise the US$ 30 million debt financing required for the project.

The details of the ADB loan are as follows:

- Amount - $ 10.0 million in US Dollars from the Bank's OCR resources.
- Amortization period - 10 years including one year grace period.
- Interest - Fixed rate at 10.75% per annum for 10 years.
- Commitment fee - 1% per annum on 50% of loan amount less any disbursements during the first year, 1% per annum on loan amount less any disbursements thereafter.
- Front-end fee - ½% flat to recover bank's operating expenses.

The ADB as lender of record has also arranged for commercial co-financing to provide a currency-specific loan of US$ 10.0 million using the bank's Complimentary Financing Scheme (CFC). The participating banks together with the financing they provided were as follows: Osterreichishe LanderBank AG ($ 4 million), IndoSuez Asia Limited ($ 2.0 million), Credit Lyonnais ($ 2.0 million) and Girozentrale Bank ($2.0 million).

The terms of this loan are as follows:

- Amortization period - 7 years from date of loan signing including 1 year grace.
- Interest rate - 1 3/4% over 3 months LIBOR.
- Front end fee - 3/4% flat.
- Commitment fee - ½% per annum or undrawn commitment until end of availability period from date of loan signing.

2.4 Summary of Other Relevant Financial Conditions

The relevant conditions of the project are as follows:

- Cooperation Period (BOT life) is 12 years from the date of completion. During this period, Hopewell retains ownership of the power plant. At the end of the cooperation period, the ownership of the power plant will be transferred to Napocor without any compensation.

- During the cooperation period, Hopewell/HEPC's compensation will be as follows:

  (i) A monthly Capacity Fee based on capacity available, and

  (ii) An Energy Fee calculated on the amount of energy generated.

- All fees are paid in US Dollars with certain billings in Philippines Pesos. All payments due to HEPC by Napocor are likewise secured by a Performance Undertaking issued by the Republic of the Philippines.

- A Start Up Fee will be paid for electricity consumed during the start up process.

- The revenues will be used to meet all operating expenses, taxes, debt service requirements and dividend payments. Hopewell/HEPC will retain 100% of the revenues collected after deducting all project operating expenses as well as debt amortization.

- Napocor provided the land for the project and all fuel for electricity generation at no cost to the BOT concessionaire.

- As a registered Pioneer project with the Board of Investments, HEPC is fully exempted from payment of income taxes for six years from the start of operations.

3. FINANCIAL CONDITIONS OF THE SECOND STAGE EXPRESSWAY IN BANGKOK, THAILAND

3.1 Project Description

The Second Stage Expressway (SES) entails the construction of a 31 kilometer long elevated multi-lane expressway in Bangkok as an integral continuation and expansion of the First Stage Expressway System (FES) completed in 1987. The project design also envisages a 6 kilometer

optional extension to the Don Muang Airport. The basic project is to be completed in two construction phases. The Priority component is scheduled to open to traffic on 1 March 1993[1] and the Completion Component is to be completed by 1 August 1995. The project might be described as a Build, Transfer, Lease and Operate (BTLO) concept under a 30-year concession agreement between the Expressway and Rapid Transit Authority (ETA) and the Bangkok Expressway Company Limited (BECL).

The Bangkok Expressway Company Ltd. (BECL) is a public limited company incorporated on 23 December 1987. The ownership structures as of the time of incorporation was as follows:

Table A5-2-2
OWNERSHIP STRUCTURE OF BANGKOK EXPRESSWAY COMPANY LTD. (BECL)
(23 December 1992)

BANGKOK EXPRESSWAY COMPANY LTD. (BECL)	PERCENT HOLDING
Kumagai Gumi	70.0
Bangkok Bank Ltd.	9.4
Ch. Karnchang Co. Ltd.	5.0
Thai Military Bank Ltd.	3.8
Krung Thai Bank Ltd.	3.6
Siam Commercial Bank Ltd.	3.0
Bureau of Crown Property	2.7
Bank of Asia Ltd.	2.5

Source: BECL

The total project cost was estimated at 26.2 billion Baht (US$ 1.05 billion) including a direct foreign exchange component of $ 130 million. The cost estimate includes an estimated escalation of 5.5% per annum as well as a contractual 5% contingency on the final target cost.

3.3 Financial Plan

The project financial plan for the SES is complex and is summarized in Table A5-2-3. The financial plan consists of both equity and long-term debt with a debt to equity ratio of 4.2:1. Total equity financing is approximately US$ 220 million. The main promoter of the project is a foreign contractor (Kumagai Gumi) whose initial share of the equity is 70%. Local banks and other local sources contributed 22% and 3%, respectively, to the equity. The ADB was also an investor to the project for 5%.

[1]This date has been delayed.

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Debt financing was placed at US$ 928 million and is approximately 80.9% of the total project financing. Except for the participation of the ADB which will provide 3% of the debt financing and the deferred payments to foreign contractors, local banks and the local capital market are to absorb all of the project's debts.

This project was able to proceed because aside from the presence of a reputable foreign firm which is managing the project, local banks gave their all-out support for the project with 92% of the debt financing to be sourced internally in Thailand..

Table A5-2-3
FINANCIAL PLAN
SECOND STAGE EXPRESSWAY[1]
BANGKOK, THAILAND

SOURCE OF FUNDS	US$ MILLION[1]	% DISTRIBUTION	
1. Equity	220	100%	91.1%
Contractors - Foreign	144	65%	12.5%
- Local	11	5%	1.0%
Local Banks	49	22%	4.3%
Other Local Source	6	3%	0.5%
ADB	10	5%	0.9%
2. Debt			
Long-Term	928	100%	80.9%
Local Banks	649	70%	56.6%
Local Capital Market[3]	200	22%	17.4%
ADB	30	3%	2.6%
Short-Term			
Deferred Payments to Foreign Contractor	49	5%	4.3%
TOTAL	1,148		100.0%

Notes: [1] This plan includes the optional section C-2 which increases the cost of the base case from $ 1,050 million to 1,148 million.
[2] US$ = 25.05 Bahts
[3] Supported by onshore and offshore guarantee.

Source: Asian Development Bank.

The security to be provided to the banks consists of the assignment of the toll revenues as well as the pledges of BECL shares and the maintenance of an escrow account as a reserve available

to the creditors. The land on which the expressway is being built or the structures themselves could not be pledged as security because the land remains with the ETA and the structures are transferred to the ETA upon completion of each component.

The economic and financial indicators of the project appear good. The economic internal rate of return (EIRR) is 27% and the financial internal rate of return (FIRR) is 12.4%. A major risk which the shareholders are taking is that the land acquisition by the ETA might be delayed. Other risks consist of delays in obtaining increases in tolls, higher rates of interest and high rates of inflation.

The construction of the expressway is being done through a project management agreement between a major Japanese contractor (the principle project promoter) and BECL, the concessionaire. A number of trade (construction) contracts will be farmed out by BECL and managed by the project manager. Since the major shareholder in BECL is also the project manager, an Independent Design Contractor (IDC) under contract to ETA checks the project designs to confirm whether they conform with specifications and standards and with applicable laws and regulations. The designs are prepared under the direction of the project manager and reviewed by the IDC. The Independent Certification Engineer (ICE) under contract to ETA supervises project compliance with quality and adequacy requirements and issues completion certificates. The complex organizational relationships are shown in Figure A5-2-1. Each of the links in the diagram is covered by a legal agreement or contract which specifies the obligations of each party. The concession agreement between ETA and BECL is a relatively short document of less than 60 pages plus annexes.

3.4 Details of the Financing Plan

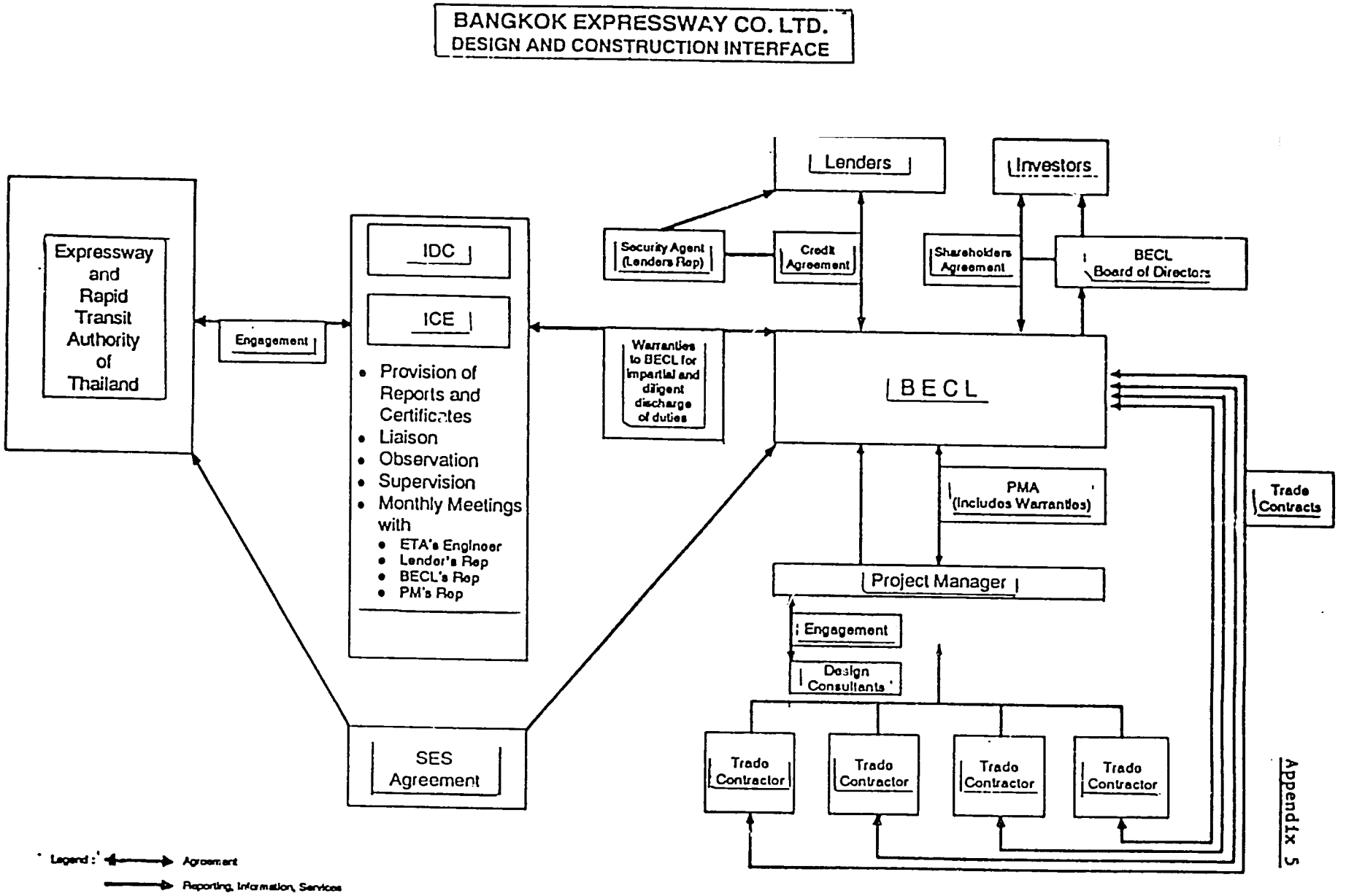
Based on official documents of the Asian Development Bank, the details of the project financing plan are as follows:

The financing plan is based on an Onshore Credit Facilities Agreement with a local bank consortium of 11 major banks, which commit loan proceeds totalling ฿ 20 billion and on a Shareholders Agreement, pursuant to which committed shareholders are required to invest ฿ 5.0 billion in the equity of BECL. In addition, these agreements also provide for commitment of ฿ 2 billion in debt and ฿ 500 million in equity, in case the optional component (sector C2) is included in the final Project scope. The debt facilities are divided into three tranches:

- tranche A - standard term loan of up to ฿ 15 billion including an earmarked component of ฿ 4 billion ($ 160 million) to be raised from "official sources" e.g. the ADB;

- tranche B - a guarantee facility (and/or term loan) of ฿ 5 billion, against which a variety of capital market instruments, such as promissory notes and bills of exchange may be secured; and

Figure A5-2-1


BANGKOK EXPRESSWAY CO. LTD.
DESIGN AND CONSTRUCTION INTERFACE
Expressway and Rapid Transit Authority of Thailand
Engagement
IDC
ICE
• Provision of Reports and Certificates
• Liaison
• Observation
• Supervision
• Monthly Meetings with
• ETA's Engineer
• Lender's Rep
• BECL's Rep
• PM's Rep
SES Agreement
Lenders
Investors
Security Agent (Lenders Rep)
Credit Agreement
Shareholders Agreement
BECL Board of Directors
Warranties to BECL for impartial and diligent discharge of duties
BECL
PMA (Includes Warranties)
Trade Contracts
Project Manager
Engagement
Design Consultants
Trade Contractor
Trade Contractor
Trade Contractor
Trade Contractor
Legend : Agreement
Reporting, Information, Services

tranche C - ฿ 2 billion for the optional sector C2. Utilization of tranche B is in turn secured by an offshore guarantee provided by a syndicate of 30 foreign banks under the Offshore Credit Facilities Agreement. The offshore facility, which expires after ten years, also includes an option to be partially used (up to $ 100 million) as a revolving short-term credit facility for all tranche A and tranche C costs. A schematic diagram of financing flows is given in Figure A5-2-2. Table A5-2-4 shows the financing plan and envisaged utilization of the various facilities. Shearson Lehman Hutton, the financial adviser of BECL, has played a substantial role in putting together the financial package.

Tranche ฿ is a vehicle which enables BECL to directly tap the local capital market. It is tentatively envisaged that BECL will be issuing medium term promissory notes (1-2 years) in ฿ 1.0 million denominations, thus aiming at corporations, provident funds and wealthy individuals. If successful, this vehicle will enable BECL to raise funds cheaper than through banks and at fixed rates. However, in view of the fact that neither such medium term nor long term fixed rate markets currently exist in Thailand, the prospects of success are difficult to predict. Nevertheless, this vehicle has an inherent capital market development feature which is worthy of imitating the Philippines. It may be noted that the original terms of reference for BECL required the design of a financing package which would catalyze and develop capital markets. At the expiry of the offshore guarantee after ten years, tranche B will be converted to a long-term loan on terms similar to those under tranche A.

Due to the pioneering nature of the Project, the participating banks were required to structure the financing facility in ways quite unique within the Thai market. Both the size of the loan and the length of its maturity (20 years) are unprecedented in Thailand. Moreover, since a complete financing structure was a pre-condition for making the SES Agreement effective, BECL and its local creditors, designed a package which complied with the requirements under the SES Agreement, but earmarked ฿ 4 billion ($ 160 million) to be filled by "official sources" later. As a result, most of the participating banks agreed to temporarily extend credit up to their single customer limits and are now anxious to fill as much as possible of the "official credit" window (i.e. by loan from ADB). In the Philippines, it might be possible to develop a similar unique financial package.

Drawdown conditions are such that a debt-to-equity ratio of not higher than 4:1 will be maintained at all times prior to the opening date of the Priority Component on 1 March 1993. Thereafter, due to the envisaged net losses in the early years of operations, the debt-to-equity ratio is allowed to reach 6:1 by 1 March 1996, whereafter it will gradually reduce. The Project is highly leveraged by Thai standards. However, the Project is large and to raise the currently envisaged level of equity has already proved difficult prompting Kumagai Gumi to stretch its exposure to the maximum (i.e. 70 percent) allowed by the Board of Investments (BOI). A long maturity on debt financing is essential to achieve acceptable debt-service-cover ratios. Even now, indications are that during certain critical years, debt-service cover ratios will hardly exceed 1.0. An added risk factor is the fact that tranche A would be entirely based on floating interest rates and is thus vulnerable to interest rate fluctuations.

Figure A5-2-2

BANGKOK EXPRESSWAY COMPANY LTD.

FINANCING FLOW DIAGRAM

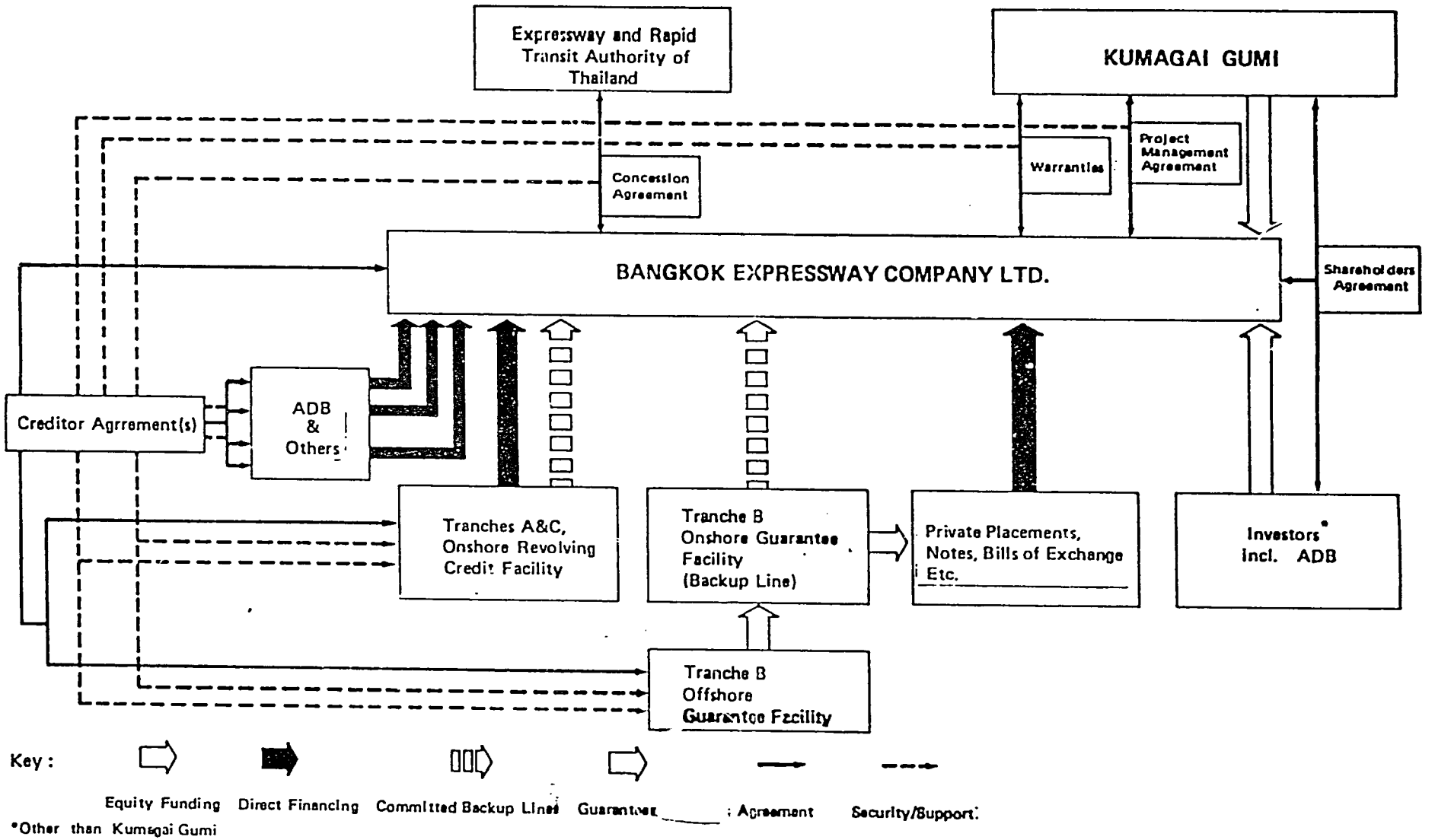


Table A5-2-4
FINANCING PLAN

	INCLUDING C2		EXCLUDING C2		% OF TOTAL	% OF
	B Mn	$ Million [a]	B Mn	$ Million [a]	COST	EQUITY
Equity	5,500	220.0	5,000	200.0	19.1	100.0
Kumagai Gumi	3,600	144.0	3,275	131.0	12.5	65.0
Ch. Karnchang	275	11.0	250	10.0	1.0	5.0
BBL	517	20.7	470	18.8	1.8	9.4
TMB	209	8.4	190	7.6	0.7	3.8
KTB	198	7.9	180	7.2	0.7	3.6
SCB	165	6.6	150	6.0	0.6	3.0
BCP	149	6.0	135	5.4	0.5	2.7
BOA	137	5.5	125	5.0	0.4	2.5
ADB	250	10.0	225	9.0	0.9	4.5
General Public [b]	-	-	-	-	-	-
Debt	23,240	929.6	21,240	849.6	80.9	
Long-Term	22,000	880.0	20,000	800.0	76.2	
Tranche A	16,250	650.0	14,250	570.0	54.3	
Tranche B [c]	5,000	200.0	5,000	200.0	19.1	
ADB	750	30.0	750	30.0	2.8	
Short-Term	1,240	49.6	1,240	49.6	4.7	
Deferred payment under PMA	1,240	49.6	1,240	49.6	4.7	
TOTAL FINANCING	B 28,740	$ 1,149.6	B 26,240	$ 1,049.6	100.0	

[a] At $ 1.0 = B 25.0

[b] A public share offering, tentatively assumed at $ 40 million equivalent, will be done as soon as practical after the opening of the Priority Component. It is envisaged that the commitment of existing shareholders will be reduced pro rata.

[c] E.g. promissory notes issued locally supported by onshore and offshore guarantees.

Source: Asian Development Bank.

An initial public offering of BECL shares and listing on the Securities Exchange of Thailand (SET) is envisaged as soon as practicable (possibly around three years) after the opining of the Priority Component on 1 March 1993. The amount subscribed by the public (tentatively assumed at $ 40 million equivalent or nearly 20 percent of BECL's equity) will reduce pro rata the obligations of the committed shareholders. In view of the BOT nature of the Project, the implications of listing are still under review by the Stock Exchange of Thailand (SET). This should not, however, pose any major problem since the Board of Investment (BOI) is strongly in favor of the public issue. The financing plan, which has foreseen the need to provide for "official credit" to lend credibility and support for the venture, is considered both innovative and appropriate for the Project.

Appendix A5-3
DEBT RATING SYSTEM

Appendix A5-3
DEBT RATING SYSTEM

The following is a brief explanation of the rating systems of Moody's Investors Services and Standard and Poor's Corporation - the leading debt rating agencies.

1. MOODY'S RATING SYSTEM

Moody's provides a nine-symbol system which classifies bonds according to relative investment quality. This system does not rate the "attractiveness" of bonds in terms of market price, yield, maturity date, or other factors. Rather, it appraises the investment quality of the bond based upon the issuer's debt burden, budgetary operations, revenues and overall socio-economic environment. Bonds carrying the same rating are not claimed to be of identical investment quality, since the symbols cannot reflect the fine shadings of risks which actually exist.

The top four categories are considered investment-grade quality. Within each of the top four categories, bonds deemed to have the strongest investment features are noted as Aa1, B1, etc. The numerical modifiers 2 and 3 indicate midrange and lower ranking, respectively. The prefix "Con." before a credit rating indicates that the bond security is dependent on:

- the completion of a construction project;
- earnings of a project with little operating experience;
- rentals being paid once the facility is constructed; or
- some other limiting conditions.

Explanation of Moody's Bond Ratings:

Aaa **Best quality**: Smallest degree of investment risk. High security of interest and principal. Foreseeable changes of protection parameters are unlikely to impair the security of these issues.

Aa **High Quality**: Rated lower than best quality because the margins of protection may not be as large as in Aaa securities, the protection parameters may be susceptible to greater fluctuation, or long-term risks appear somewhat larger than Aaa-rated bonds.

A **Upper Medium Grade**: Security of interest and principal is adequate, but could be susceptible to impairment.

Baa **Medium Grade**: Neither highly protected nor poorly secured. Security of interest and principal is adequate for the present, but protection parameters are lacking or unreliable over the long term. Sensitive to changes in economic circumstances.

Ba **Speculative:** Protection is very moderate. Security of interest and principal is uncertain.

B **Not Desirable Investment:** Sensitive to day-to-day economic circumstances. Little security of interest and principal over the long term.

Caa **Poor Standing:** Such issues may be in default but with a workout plan, or face threats with respect to interest or principal payments.

Ca **Highly Speculative:** May be in default but with a nominal workout plan.

C **Lowest Rated Class:** Often in default with extremely poor prospects of attaining any real investment standing.

2. STANDARD & POOR'S RATING SYSTEM

The Standard & Poor's bond rating system ranks the investment quality of bonds in an eleven-symbol system ranging from AAA to D. Like Moody's rating system, it evaluated the creditworthiness of the issuer and not the market attractiveness of the bond. Slight differences in the two systems arise from the general tendency of Standard & Poor's to place a higher weight on the issuer's economic environment, while Moody's tends to focus on debt burden and budgetary operations of the issuer.

A plus (+) or minus (-) shows relative standing within the major categories. Debt rated BB and below is regarded as speculative. Ratings for debt issued outside the United States do not take into account currency exchange and related uncertainties.

Explanation of Standard & Poor's Bond Ratings:

AAA **Highest Rating:** Capacity to pay interest and principal extremely strong.

AA **Very Strong Security:** Differs from AAA by only a small degree.

A **Strong:** Capacity to pay interest and principal but more susceptible to adverse economic conditions than AAA and AA.

BBB **Adequate:** Capacity to meet interest and principal payments. Adequate protection parameters, but adverse economic conditions are more likely to weaken the payment capacity than in AAA, AA or A categories.

BB **Lowest Degree of Speculation:** Faces exposure to adverse business, financial or economic conditions which could lead to inadequate capacity to meet payments. (This rating is also used for debt subordinated to senior debt that is assigned an actual or implied BB or BB- rating.)

CCC **Speculative:** Major risk exposure. Currently identifiable vulnerability to default, dependent upon favorable business, financial or economic conditions to meet payments. (This rating is also used for debt subordinated to senior debt that is assigned an actual or implied B or B- rating.)

CC **High Degree of Speculation:** Major risk exposure. (This rating is applied to debt subordinated to senior debt that is assigned an actual or implied CCC rating.)

C This rating is applied to debt subordinated to senior debt that is assigned an actual or implied CCC- rating. May be used to cover a situation where a bankruptcy petition has been filed, but debt service payments continue.

CI Income bonds on which no interest and/or repayment of principal in arrears.

NR Indicates that no public rating has been requested, that there is insufficient information on which to base a rating, or that S&P does not rate a particular type of obligation as a matter of policy.

3. SAMPLE RATINGS

Table A5-3-1 lists the current and previous ratings on selected sovereign debt.

Table A5-3-1
SAMPLE RATINGS ON SOVEREIGN DEBT

	MOODY'S	
India	Current	Ba2
Indonesia	No Listing	
Mexico	Current:	Ba2
	As of 12/90	Ba3
Philippines	No Listing	
Thailand	Current:	A2
	As of 12/90	A2
	As of 12/89	A2
	STANDARD AND POOR'S	
India	Current:	BB (implied)
	3/91-5/91	BBB (implied)
	9/90-3/91	BBB (implied)
Indonesia	No Listing	
Mexico	Current:	
	(initial rating as of 11/91)	BB+
Philippines	No Listing	
Thailand	Current:	
	(initial rating as of 8/89)	A-

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Appendix A5-4

FINANCING ALTERNATIVES FOR THE MANILA SOUTH TOLLWAYS

Appendix A5-4
FINANCING ALTERNATIVES FOR THE MANILA SOUTH TOLLWAYS

1. GENERAL

In Chapter 5, the potentials of the MST in being able to raise project financing was evaluated under the assumption that it will be undertaken under the BOT scheme. Given, however, the present constraints of the Philippine capital markets, the poor credit standing of the Philippines in the international financial markets and the disadvantages of tollroad projects compared to power projects, it is uncertain whether project financing could be raised for the MST as a BOT project at this time. Much will depend on how the project is ultimately packaged, who its sponsors and developers will be, the actual magnitude of the financing required, and the kind of support, incentives and guarantees that the Government of the Philippines (GOP) will provide.

The purpose of this appendix is to explore other financing options for the MST.

2. THE MANILA SOUTH TOLLWAYS AS A ORDINARY CAPITAL EXPENDITURES PROJECT

An option available to the government is to treat the MST as an ordinary capital expenditure project to the implemented by the DPWH under its annual investment program. The facility can be constructed over a staggered period (i.e. 3-5 years) financed by a combination of annual budgetary appropriations (as GOP counterpart) with the major project financing coming from long-term concessional loans from such financing agencies as the World Bank, the Asian Development Bank, and the Overseas Economic Cooperation Fund of Japan (OECF) for the financing of the imported input components.

Since the project was found to be economically feasible, the use of the facility can be opened for free to maximize the economic benefits from the use of the facility. The expectation is that the savings in vehicle operating costs and the time-savings of commuters within this particular corridor will translate into benefits for the economy that would be greater than the expected economic costs of the project.

While this option will impose additional budgetary and debt burden to the government, the financing sources that could be tapped are suitable for the long-term orientation of the project. The terms/conditions of the financing sources are as follows:

Table A5-4-1
SOURCES OF LONG-TERM CONCESSIONAL FINANCING

	WORLD BANK	ADB	OECF
Term	20-25 years 5 years grace	15 - 20 years 3 to 5 years grace	30 years 10 years grace
Interest Rate	7.65%	6.5%	2.7%
Other Charges	Commitment fee = .75%	Commitment Fee = .75%	No other charges

Source: Compiled by the Consultant from various sources.

This project avoids the complicated re-financing processes required if this project were undertaken under the BOT option as well as the heavy interest expense under a set-up where the financing is obtained from commercial sources.

The repayment of the project loans could be financed by any and/or combination of the following:

- Increasing the fuel tax with the proceeds from this added tax going into a reserve fund for purposes of debt repayment;
- Increasing the vehicle registration fees and/or
- Increasing property taxes on properties to be benefitted by the project.

3. A TOLLROAD AUTHORITY TO BUILD/MANAGE THE MST

Another option available to the government is to organize a tollroad authority. This will be a new government agency that will be mandated with the authority to construct the MST, rehabilitate the reverted portion of the SLE and operate, collect tolls and maintain both facilities. The tollroad authority will be a financially independent governmental entity which can run its own affairs and manage its own funds. The objective is to ensure that the toll facility is efficiently managed and maintained and kept financially self-sufficient.

The tollroad authority can have access to the following financing sources:

- Programmed equity infusion from the national government for the authority's capitalization to be received over a 3-5 year period,

- Additional government subsidy for its other major capital expenditure requirements,

- Long-term debt financing from the World Bank, ADB, OECF at terms as stipulated in Table A5-4-1,

- It can float its own long-term debt instruments (bonds and/or long-term commercial papers) with the debt instruments enjoying such features as tax exempt interest income or eligibility for purposes of satisfying Central Bank reserve requirements and

- It can borrow from government banks and other private financial institutions for its other financing needs.

The advantages for the governmental of this particular option are as follows:

- The tollroad authority can legally receive subsidy and other financial assistance from the national government,

- It can have access to long-term, low-cost concessional financing that would match the long-term financial recovery period of a tollroad project,

- The privilege to collect tolls over the facility and the long-term/low-cost financing available to the project would make the project financially feasible,

- Since the tollroad authority is a governmental entity, it can readily float debt instruments that can carry such sweeteners as tax-exempt features or eligibility for purposes of satisfying Central Bank requirement on reserves,

- Since the government is the operator of the project, this will ensure that tolls are kept at reasonable levels to maintain the patronage and efficient economic utilization of the facility and

- It can easily avail of other incentives i.e. exemption from payment of customs duties for capital equipment imports, accelerated depreciation, net operating loss carry-over, etc.

In Chapter 7, (FINANCIAL ANALYSIS) it was demonstrated that availability of debt financing at the right cost is crucial to the financial and commercial viability of the MST. Commercial financing rates currently prevailing in the Philippine financial markets are definitely not suited for 30 or more years of concession arrangements. This particular option, therefore, offers the government an implementable alternative for the MST. (See Table A5-4-2)

Table A5-4-2
FINANCING PLAN FOR THE MST
AS A TOLLWAY AUTHORITY[1]

SOURCE OF FUNDS	AMOUNT		% DIST	TERMS/CONDITIONS
	IN PESOS (Billion)	IN US DOLLARS (In Million)		
A. Equity of GOP	₱ 7.0	$ 280.0	26%	
B. Debt	20.0	800.0	74%	
WB, ADB, OECF	13.0	520.0		15-30 years, 2.7 to 7.65%
Local Bond Floatation	7.0	280.0		10-15 years bonds at 17% tax free
TOTAL	₱ 27.0[2]	$1,080	100%	

[1] Consultant assumptions
[2] This figures incorporates a 9% escalation for inflation and 6% allowance for annual devaluation.

APPENDICES TO CHAPTER 6

Appendix A6-1

SCREENING OF ENVIRONMENTAL IMPACTS OF MST PROJECT

Appendix A6-1
SCREENING OF ENVIRONMENTAL IMPACTS OF MST PROJECT

1. Environmental Parameters

1.	LAND. Will the proposal result in:		
a.	Compaction, covering, excavation or displacement of the soil in situ conditions?	1a.	This will occur as part of necessary excavations for foundations and footings of the elevated expressway.
b.	A change in the topography or ground surface relief features of site inconsistent with the natural surrounding conditions?	1b.	This will be limited to places where excavations and embankments will occur on hillsides such as in the Alabang interchange.
c.	Unstable earth conditions during or after completion of the proposal?	1c.	Slope protection measures are part of construction requirements in order to protect slopes against erosion.
d.	Change in the soil or geologic substructures?	1d.	Soils that are unsuitable as backfill materials may be replaced with approved material or disposed in designated areas.
e.	The continuation of or increase in wind or water erosion of soils, either on or off the site?	1e.	Standard construction procedures including slope protection, topsoilings, sodding and mulching of affected areas should be implemented in order to prevent soil erosion.
f.	Changes in deposition or erosion of beach sand, or changes in siltation, deposition or erosion which may modify the channel of a rive or stream or the bed of a lake?	1f.	Silt load would be minimal and construction will not cause streambank erosion and thus, will not modify existing river or stream channels.
g.	Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?	1g.	There are no existing geologic hazards in the area nor ones that will be triggered by the construction.

Source: Environmental parameters are based on checklists used for projects such as the Philippine Assistance Program Support and on environmental guidelines of the Asian Development Bank and the World Bank.

2.	**AIR.** Will the proposal result in:		
	a.	Substantial air emissions or deterioration of ambient air quality?	2a. Increased emission levels from additional vehicles may be expected during project operation. However, the project is designed to speed up traffic and promote fuel efficiency and therefore reduce air pollution.
	b.	The creation of objectionable odors?	2b. There will be no sources of objectionable odors during both construction and operation periods.
	c.	Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?	2c. It will cause no alteration of air movements and climatic patterns.
3.	**WATER.** Will the proposal result in:		
	a.	Changes in currents, or the course or direction of water movements?	3a. Substructures will avoid the few existing drainage channels along the alignment.
	b.	Changes in absorption rates, drainage patterns, or the rate and amount of surface water run-off so that a 2 yr. 6 hr. storm run-off cannot be contained on the site?	3b. Drainage of surface water run-off will be spread over the 20-km length of the road's corridor. Run-off will be drained into existing intermittent drainage mains that run parallel to the SLE.
	c.	Alterations to the course or flow of 100 year flood waters?	3c. Substructure columns will not cause obstruction and diversion of floodwaters.
	d.	Discharge into surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	3d. Water in existing drainage channels is in advanced state of pollution from domestic and industrial sources. Minimal silt which could cause turbidity will hardly affect the extremely poor water quality in these streams.
	e.	Alteration of the direction or rate of flow of ground waters?	3e-3g. The project will have no significant impact on groundwater supply. Excavation and bored piling will only affect shallow, seasonal water tables. Confined aquifers are normally found at depths of about 150 meters which already lie beyond the reach of bored piles (up to about 70 meters). No pumping of groundwater during construction will be made.
	f.	Change in the quantity of ground waters, either through interception of an aquifer by cuts or excavations?	
	g.	Substantial reduction in the amount of water otherwise available for public water supplies?	

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h. Exposure of people or property to water related hazards such as flooding; and/or wave action from 100 year storm occurrence or seiches?	3h. As previously mentioned, the project will cause no flooding of the areas along the project corridor.
4. **PLANT LIFE.** Will the proposal result in:	4a-5d. The following applies to both plant and animal life:
a. Removal of native vegetation in excess of the area utilized for the actual development permitted by the land capability system?	The project is located in an area characterized by high levels of residential, commercial and industrial development except along the military reservation of Fort Bonifacio which is open land covered by common types of grasses and shrubs. Proposed diversion of expressway into this area will cause removal of existing vegetation. There are, however, no unique, rare or endangered species of plants and animals in the area. Likewise, the project will cause no appreciable change in the diversity or number of species along the proposed route.
b. Removal or riparian vegetation or other vegetation associated with critical wildlife habitat?	
c. Introduction of new vegetation that will require excessive fertilizer or water, or will provide a barrier to the normal replenishment of existing species?	
d. Change in the diversity of species, or number of any species of plants (including trees, shrubs, grass, crops, microflora and aquatic plants)?	
e. Reduction of the numbers of any unique, rare or endangered species of plants?	
5. **ANIMAL LIFE.** Will the proposal result in:	
a. Change in the diversity of species, or numbers of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects or microfauna?	

b. Reduction of the number of any unique, rare or endangered species of animals?	
c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?	
d. Deterioration to existing fish or wildlife habitat?	
6. **NOISE.** Will the proposal result in:	
a. Increases in existing noise levels?	6a. During construction, potential noise sources consist of impact and earth-moving equipment, the former producing high levels of noise. During project operation, future traffic-generated noise may exceed current noise levels which range from 65 - 75 dBA. Elevating the expressway, however, is itself a noise-control measure which could shield traffic noise.
b. Exposure of people to severe noise levels?	6b. Noise-sensitive residential areas may experience severe noise levels during operation of noisy construction equipment. It would be best to locate these equipment far from residential districts.
7. **LIGHT AND GLARE.** Will the proposal produce new light or glare inconsistent with the surrounding area?	7. The light, impervious road surfaces may increase reflectance and glare along the route.
8. **LAND USE.** Will the proposal result in a substantial alteration of the present or planned land use of an area?	8. Proposed interchanges such as in Alabang, Sucat, C-5 will alter and displace present land uses. Planned land uses based on current zoning may give way to increasing commercial land use development around interchanges. Dislocation of squatter-occupied government lands will result from construction of MST above the PNR tracks.
9. **NATURAL RESOURCE.** Will the result in:	9a-9b. No natural resources will be encountered along the MST route.
a. Increase in the rate of use of any natural resources?	

	b.	Substantial depletion of any non-renewable natural resource?	
10.	**RISK OF UPSET.** Does the proposal involve a risk of an explosion or the release of hazardous substances (including, but not limited to oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions?	10.	Accident or upset conditions associated with vehicular traffic and transport may result in spills of hazardous and toxic substances. Proper safety and accident prevention measures such as visible signage and adequate lighting should be installed.
11.	**POPULATION.** Will the proposal alter the location, distribution, density, or growth rate of the human population planned for the Region?	11.	The MST would sustain and possibly accelerate the growth of population in the southern suburbs of Parañaque, Taguig, Las Piñas and Muntinlupa. Growth in these areas is presently encouraged by the MMA, the agency tasked with planning for the region.
12.	**HOUSING.** Will the proposal affect existing housing, or create a demand for additional housing?	12.	Sustained and increased population growth will create demand for additional housing in these areas as long as land values are not too costly or prohibitive.
13.	**TRANSPORTATION/CIRCULATION.** Will the proposal result in:		
	a. Generation of vehicle trips in excess of the existing road capacity?	13a.	The MST will generate more vehicle trips which may result into clogging of access arterial roads as well as local ones.
	b. Effects on existing parking facilities, or demand for new parking?	13b.	Increased commercial land use development induced by interchanges may increase demand for parking areas.
	c. Substantial impact upon existing transportation systems?	13c.	MST will improve transport between the southern sections of Metro Manila and Metro Manila's central business district.
	d. Alterations to present-patterns of circulation or movement of people and/or goods?	13d.	It will sustain the present pattern of circulation between the south and the center.
	e. Alteration to waterborne, rail or air traffic?	13e.	There will be no alteration to these.
	f. Increase in traffic hazards to motor vehicles, bicyclists or pedestrians?	13f.	The section between Nichols C-5 must be carefully aligned and designed in order to provide vertical clearance for air traffic at the MIA runway approach. Otherwise, this would pose major traffic hazards to both motorists and airline passengers.

14. **PUBLIC SERVICES.** Will the proposal have an unplanned effect upon, or result in a need for new or altered governmental services in any of the following areas: a. Fire protection? b. Police protection? c. Schools? d. Parks or other recreational facilities? e. Maintenance of public facilities, including roads? f. Other governmental services?	14a-14f. The MST would lead to increased requirements for effective traffic management at the intersections and the supporting arterial roads in order to ensure smooth flow of traffic at MST. Additional traffic control personnel may need to be deployed at critical road intersections. Traffic signs will also be required in strategic places.
15. **ENERGY.** Will the proposal result in: a. Use of substantial amounts of fuel or energy? b. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?	15a-15b. Construction of MST will not require use of substantial amounts of fuel. Fuel consumption will be limited to the operation of construction equipment and vehicles. Minimal electric power will be used for construction lighting if work is conducted on a 24-hour basis.
16. **UTILITIES.** Except for planned improvements, will the proposal result in a need for new systems, or substantial alterations to the following utilities? a. Power or natural gas? b. Communications systems? c. Water? d. Sewer water drainage? e. Storm water drainage? f. Solid waste and disposal?	16a-16f. New routes may dislocate existing power and water supply transmission lines at an undetermined extent. Sewer and storm water drainage lines may also be effected.

17. **HUMAN HEALTH.** Will the proposal result in: a. Creation of any health hazard or potential health hazard (excluding mental health)? b. Exposure of people to potential health hazards?	17a-17b. The MST corridor has been subject to air pollution both from vehicular and industrial sources. Potential air pollution due to increased traffic volume could be offset by improved fuel efficiency (with consequent pollution reduction). Thus, no new health hazards will be created.
18. **AESTHETICS.** Will the proposal result in the obstruction of any scenic vista or view open to the public or will the proposal result in the creation of an aesthetically offensive site open to the public view?	18. The corridor is a densely built-up area occupied by massive factory buildings and compounds, medium to high density housing and commercial establishments particularly around the interchanges. Most of these structures have already obstructed potential scenic views. The elevated position of MST may open up new and wider views of surrounding landscapes.
19. **RECREATION.** Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?	19. No functional, recreational facilities are found along the MST route.
20. **ARCHEOLOGICAL/HISTORICAL** Will the proposal result on an alteration of an significant archeological or historical site, structure, object or building?	20. One of the alternatives, a proposed diversion between Nichols and C-5 interchanges would encroach by about 100 meters into a military shrine reservation known as *Libingan ng mga Bayani* (Heroes Cemetery) or a distance of about 900 meters from the cemetery proper.
21. **MANDATORY/FINDINGS OF SIGNIFICANCE.** a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of Philippine Islands history or prehistory?	21a. The project is located along a built-up, urban environment which has long replaced the natural, pristine environment. The environment has been subject to varying degrees of impacts due to numerous development activities. These included terrain modification, removal of natural vegetation, pruning of natural drainage channels, air and water pollution and noise. Thus the project's impacts on the natural environment would tend to be secondary. The primary impacts of the project are expected to be confined to the socio-economic environment such as on the squatter communities as well as existing and planned land uses.

b.	Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definite period of time, while long-term impacts will endure well into the future.)	21b.	The project aims to achieve both short and long-term goals of improving transport between Metro Manila urban core and southern periphery. In the long run though, the project will need supporting measures such as constructing additional arterial and secondary roads and efficient traffic management. The project is viewed in the context of achieving long-term environmental as well as development objectives.
c.	Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact each resource is relatively small, but where the effect of the total of those impact and the environmental is significant.)	21c.	A large number of impacts are limited to the construction period. During project operation, impacts combine with impacts of other projects to further reduce environmental quality. For example, hydrology is affected by a variety of sources of impacts not limited to those of the project. Likewise, air pollutants from projected increase in vehicles would also combine with those from area and stationary sources notably the pollutive industries in the corridor.
d.	Does the project have environmental effects which will cause substantial adverse effects on human being, either directly or indirectly?	21d.	Substantial adverse impacts include dislocation of squatter communities along the railroad tracks and demolition of houses, factories and commercial establishments resulting in loss of housing and jobs. Cost of mitigating these impacts will be included in the total project cost.

2. Secondary Environmental Impacts

2.1 Hydrology

The construction of substructures for the MST is not expected to encroach into existing rivers, creeks and drainage channels. Further, underground water is estimated to be at least 100 meters below ground level (MWSS). Therefore, excavation and bored piling usually carried out at 7-8 meters and up to 15 meters for column piers would not disturb these water sources.

Impacts on hydrology will mostly be in the form of additional run-off that will be generated by the proposed expressway. A 6-lane, 20 km long expressway like other impervious surfaces is expected to produce considerable run-off based on high coefficients of run-off for paved surface cover. High run-off means less infiltration to the ground and more volume of water transmitted into the streams at usually rapid rates. Thus, it often causes saturation of streams especially those with poor drainage capacities.

High run-off levels already occur in the vicinity and also in Metro Manila owing to the advanced state of urbanization and development in the area. This has caused problems of flooding during rainstorm periods. It is compounded by poor flow capacity of rivers, creeks and drainage channels and those in the project area appear to be clogged and silted. The desilting and clearing operations of these inlets and waterways will be important.

Drainage pipes and gutters will conduct surface water by gravity flow into existing drainage mains which will eventually discharge into nearby rivers or creeks. Discharge points are usually located every couple of piles. Between President Quirino and EDSA, a drainage main runs parallel to the SLE on the east side. Drainage pipes from the expressway are expected to connect to this existing drainage canal which eventually discharges into rivers and esteros.

The drainage system along the SLE does not appear to be well maintained and the streams which cross the PNR appear to be silt laden or clogged with garbage. In the heavy downpours of July to December monsoons, these could cause problems. However, as the MST will be elevated over most portions, it will be less vulnerable to problems of flooding that exist on the SLE. Going north along the SLE from Magallanes flooding has been reported near the Magallanes Bridge; in the vicinity of La Suerte Cigarette Factory (Km 11+500); after the toll booth entry at Bicutan (Km 13+950); and near Motorola (Km 15+500). (PNCC information August 3, 1989).

The impact of the project on surface hydrology will be related to current conditions of drainage. However, the proposed expressway cannot be singled out as a major factor that will cause drainage and flooding problems in the future due to the existence of many other factors and sources: rapid rate of urbanization, uncontrolled development, deteriorating drainage systems, rampant disposal of solid wastes into waterways, illegal structures along waterways and lack of coordinated planning and implementation of flood control and drainage improvement measures.

2.2 Impacts on Air Quality

The proposed elevated expressway will be constructed over or beside the existing SLE alignment. Traffic diversion into new, uncharted areas is therefore not expected. Thus, air pollution associated with vehicular traffic will not be introduced into any new areas.

Wind data gathered at the PAGASA station at MIA in 1987 shows that easterly and ESE winds predominate in the area. This is due to the influence of the northeast monsoon and the Sierra Madre mountain east of Manila. Next most frequent are westerly and WSW winds which are caused by the Southwest monsoon and the sea breeze from Manila Bay. These winds, however, would more likely affect stationary sources of pollution, such as from industries and have less consequences for emissions from vehicular traffic.

However, the construction of a six (6) lane elevated expressway will definitely accommodate a greater volume of traffic. Thus, more vehicles would result in corresponding increase in the volume of pollutant emissions from mobile sources.

A method had been employed by EMB[1] to predict total annual emissions from mobile sources in tons/year. A spatial distribution of SO_2 emissions within Metro Manila was also presented for 1988. The emission estimates were based on the application of emission factors to the vehicle - kilometers travelled by eight (8) particular vehicle types. These different vehicle types are:

- Petrol vehicles: cars, utility, truck, motorcycle/tricycles
- Diesel vehicles: cars, utility, truck, buses

Emission factors for the eight types of vehicles were adapted from USEPA (1976) with adjustment made for SO_2 factors to reflect the higher sulfur content of local fuel.

Table 1 gives the emission factors for the five pollutants: total suspended particulates (TSP), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO) and total organic gases (TOG).

[1]Based on "A Model for Air Pollution Planning" by Dr. Peter Manins, WHO Consultant to EMB 1991.

Table A6-1-1
EMISSION FACTORS FOR DIFFERENT TYPES OF VEHICLES[2]

PETROL	TSP	SO_2*	NO_x	CO	TOG
Cars	0.33	0.123	2.70	33.0	3.04
Utility	0.33	0.134	2.70	33.0	3.04
Truck	0.68	0.246	7.80	117.0	12.20
Mo/Tricycle	0.21	0.049	0.08	17.0	10.10
DIESEL	**TSP**	**SO_2***	**NO_x**	**CO**	**TOG**
Cars	0.45	0.534	0.99	1.1	0.29
Utility	0.45	1.268	0.99	1.1	0.30
Truck	0.93	3.380	13.00	17.8	2.90
Buses	0.93	2.535	13.4	13.2	2.30

* Adjusted due to higher sulfur content of local fuel: 0.1 % S in Petrol and 0.6 % S in Diesel Oil

Vehicle - kilometers (veh-km) can be calculated for types of vehicles that will use the elevated expressway such as cars, trucks, utility vehicles and buses. For example, based on 1980 registration of vehicles, 96 percent of registered cars are petrol-using cars and 4 percent are diesel cars. This will be applied in estimating corresponding number of petrol and diesel-using cars out of the total number of cars counted in the traffic survey.

Vehicle kilometers can be derived from data on total fuel used and a previous survey data (MMUTSPP, 1984) on the vehicle-kilometers travelled by different vehicle types.

Although the method is more applicable for wider regions such as Metro Manila, it is useful enough to indicate future increases in mobile emissions as a result of increased number of vehicles which also means a proportional increase in vehicle-kilometers travelled. As previously mentioned, emission factors are applied to veh-km travelled to derive the total emission levels:

Emission (ton/year) = EF(g/km) x v-k (for a given year)

where: EF = Emission Factors
v-k = the vehicle-kilometers travelled by vehicle type and fuel type

With a proportional increase in vehicle-km travelled resulting from the use of the expressway, increase in pollutant emission levels in the project's area of influence is expected. If it would be necessary to calculate emission levels as a result of additional vehicles projected for the expressway, the following major data items will be used. Most of them are already available based on the EMB study. These are:

[2]USEPA 1976. Compilation of Air Pollution Emission Factors.

- the total consumption of petrol and automotive diesel fuel (available for 1988)
- the total registered number of vehicles by vehicle types
- assumed kilometer per liter for different vehicle types
- observed vehicle-kilometer data for different vehicle types
- number of vehicles counted at the intersections

The formulas for calculating total emission levels and distribution of vehicle emission by road and for particular pollutants are provided for in the EMB model. The model has limitations but is so far the most suitable for predicting annual pollutant emission levels based on available traffic data. However, this does not preclude the use of other models that may yet prove to be suitable for prediction.

2.3 Noise Levels

Noise measurements or sound pressure levels (SPL) are expressed in decibel values (DBA). Noise magnitudes are predicted for activities considered to be potential sources of noise. These activities fall under two general phases namely, 1) construction and 2) project operation.

- During construction

  During construction, the major activities are ground clearing, excavation , placing foundations, erection and finishing. Based on Table 2 the highest noise levels occur during excavation and foundation placement.

Table A6-1-2
PREDICTED NOISE LEVELS DURING CONSTRUCTION AND PROJECT OPERATION

PHASE	NOISE LEVELS IN dB
During Construction[3]	
Ground Clearing	84
Excavation	78-88
Foundations	88
Erection	78-79
Finishing	84

[3]From Canter, (1977) Environmental Impact Assessment.

Table A6-1-2 (continued)
PREDICTED NOISE LEVELS DURING CONSTRUCTION AND PROJECT OPERATION

PHASE	NOISE LEVELS IN dBA
<u>During Project Operation</u>[4]	
Vehicle Speed at 52 km/hr	
2000 veh/hr	67
4000 veh/hr	70
6000 veh/hr	72
Vehicle Speed at 60 km/hr	
2000 veh/hr	69
4000 veh/hr	72
6000 veh/hr	74

Likewise, various types of construction equipment generate different levels of noise as measured 50 ft. from them. The range of noise levels are:[5]

72 - 96 dBA for earth-moving equipment
75 - 88 dBA for materials-handling equipment
70 - 87 dBA for stationary equipment
Up - 150 dBA for impact equipment

The construction of the Alabang - Bicutan section of the expressway will occur along the SLE corridor which is zoned and more than 50 percent utilized as medium to heavy industrial area.

The Bicutan-President Quirino Avenue section of the expressway will be built atop the PNR railroad which runs parallel to SLE some 5 meters east of it. About half of this section passes through residential (medium to high density) and commercial areas. Between Bicutan and C-5 the area is marked by medium-density housing.

From Pasay Road to President Quirino Avenue the corridor is marked by medium to high density housing and some commercial establishments. The rest of the section is comprised of institutional and industrial land uses. The industrial area is considered a noisy district while the institutional consists of undeveloped and unpopulated areas.

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[4]Predicted noise levels on the road edge at 1.2 m height for different traffic volumes and running speeds. (1981) From JICA

[5]Canter, op cit.

Based on national standards for noise levels, the daytime maximum allowable noise levels in areas that are classified as residential and commercial range from 65-75 dBA. For light to heavy industrial areas, the maximum levels range from 75 to 80 dBA. Table 3 shows the national standards for noise.

Table A6-1-3
MAXIMUM ALLOWABLE NOISE LEVELS IN GENERAL AREAS

CATEGORY AREA	AREA	MORNING & EVENING		DAYTIME		NIGHTTIME	
		Ambient	Facing 4-Lane Road*	Ambient	Facing 4-Lane Road	Ambient	Facing 4-Lane Road
A	Residential	50	60	55	65	45	55
B	Commercial	60	70	65	75	55	65
C	Light Industrial	65	75	70	80	60	70
D	Heavy Industrial	70	80	75	85	65	75

*10 dBA is added for areas directly fronting or facing a minimum of four-lane road.
Source: Section 78. Ambient Quality and Emission Standards for Noise, EMB.

Although noise generated during construction exceeds these standards, the levels are not considered critical particularly for industrial areas which are regarded as relatively very noisy areas. Furthermore, the SLE corridor is regularly subject to noise levels that range from 65 to 75 dBA coming from highway vehicles plying the SLE daily (Table 2), thus making the entire corridor a generally noisy area.

Exceptionally high levels of noise will come from construction equipment such as pile drivers, jackhammers and rock drills and some earth-moving equipment. Operating these equipment along quieter portions of SLE will cause annoyance to the nearby residential communities.

- During Project Operation

  The new expressway is expected to accommodate a greater number of vehicles which are potential noise sources. It is estimated that with the speed of about 50 km/hr for the traffic volume of 2000 veh/hr, the noise level is 67 dBA. This increases to 69 dBA as speed increases to 60 km/hr. It is observed that as traffic speed increases by 10 km/hr, the noise level increases by about 2 dBA.

  Likewise, at a speed of about 50 km/hr, noise levels rise from 67 dBA to 72 dBA with an increase of traffic volume from 2000 to 6000 veh/hr. This represents an increase of 5 dBA.

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Traffic-generated noise will be in the range of 70 - 80 dBA which exceeds the daytime maximum allowable noise level of 65 dBA for residential areas and 75 dBA for commercial areas facing a 4-lane road. Exceedances are expected to be higher during nighttime since allowable noise levels are lower by 5-10 dBA.

However, vehicular noise is already a daily occurrence in the area due to its proximity to SLE. Thus, traffic-related noise will not pose a critical problem.

2.4 Other Secondary Impacts

Road construction through wildlands, parks, natural forests and undeveloped areas can lead to conversion to other land uses. As the expressway is not penetrating a new area with natural resources or natural vegetation in the right-of-way, but for the most part will use a route already traversed by the PNR and the South Luzon Expressway, it is expected that many of the environmental impacts will be secondary.

Impacts from these activities are likely to be secondary in nature and restricted to the duration of the construction period. The impacts include noise, fugitive dust, disruption of local traffic and disturbances to nearby residences and local businesses.

2.5 Rehabilitation of the South Luzon Expressway

The activities involved in the rehabilitation of the SLE include 1) correction of road elevations 2) repair of damaged pavements and shoulders 3) re-installation of security fencing 4) provision of appropriate traffic signs, signals and monitoring systems.

Secondary environmental impacts are associated with the construction phase, with disruption in traffic and of businesses, and noise nuisances to residential areas. Necessary barricades, suitable and sufficient lighting and traffic lights at various interchange points, danger signals, detour and other signs should be well marked.

Warning signs in advance of and 150 meters from the point of construction is importing for alerting traffic. More important, is the proper placement and storage of construction equipment. At construction sites along EDSA, it has been noted that 'barriers' are often left protruding haphazardly out from the side of the road. Lanes closed to traffic should be protected by effective barricades and obstructions should be illuminated at night.

Construction waste and other excavated materials should be dumped in embankments to avoid the depositing of such materials into the rivers and streams along the route which already are overloaded.

Other secondary impacts to consider are:

- Water supply distribution lines and power lines could be affected such as at Fabie Estate residential subdivision at Quirino, at the Pasay interchange, and at Sucat. Their locations should be mapped before construction begins.

- Water quality can be affected without proper siltation control measures. Silt run-off during construction operations particularly at the Alabang interchange could enter the Pasong Diablo River and eventually result in impairment of water quality in Lake Laguna. Siltation control measures such as gabions should be used during construction.

- With the construction of new expressways, there is also the risk of increased numbers of accidents so that proper safety and accident prevention measures will also need to be applied during the operational phase of the highway. Inadequate maintenance or improper practices with respect to chemical use, waste disposal etc. may lead directly to environmental impact if quality of runoff water, functioning of drains or accident frequency are affected. Deterioration because of inadequate maintenance may eventually necessitate rehabilitation work which potentially has greater impacts.

  The construction of the highway may increase traffic in the area particularly at Pres. Quirino Avenue, therefore consideration will have to be given to adequate and distinct markers on the road, dividers and well planned intersections clearly marked.

- The effect of the project on existing transportation systems will be largely beneficial. However, bottlenecks in traffic could occur without corollary improvements in arterial and feeder roads.

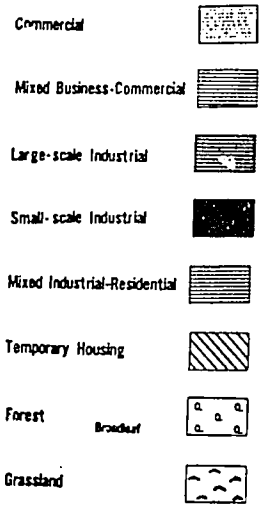
- The aesthetic quality of the local environment could be modified by the proposed expressway and interchange depending on whether the design is compatible with the existing landscape.

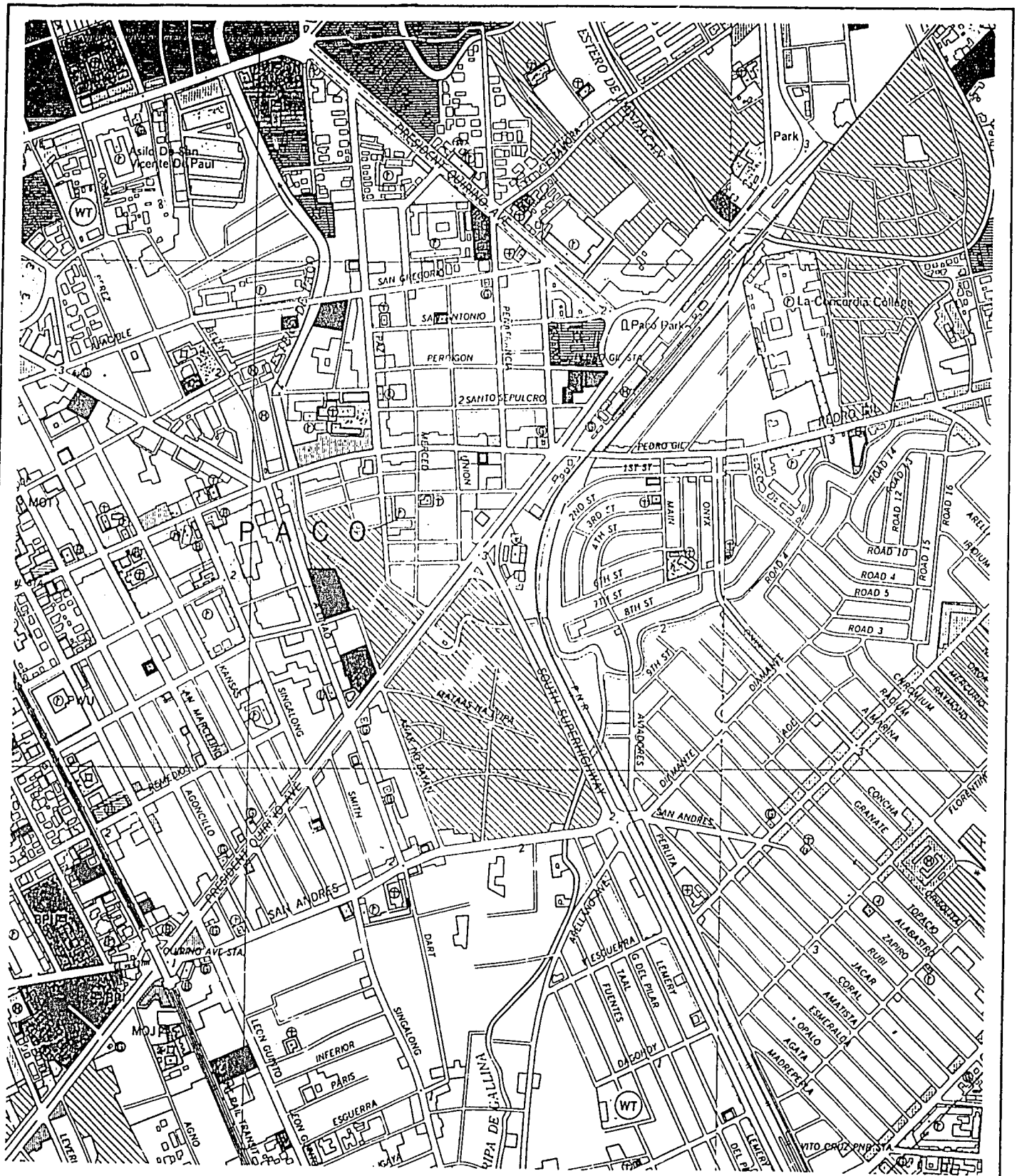
Appendix A6-2
MST INTERCHANGE AREAS

Appendix A6-2
MST INTERCHANGE AREAS

Figures A6-2-1 to A6-2-8 are maps showing existing land use at the MST Interchange areas. The most important land use features to note can be identified with the following legend:

LEGEND





Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0456-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-1
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF QUIRINO INTERCHANGE	

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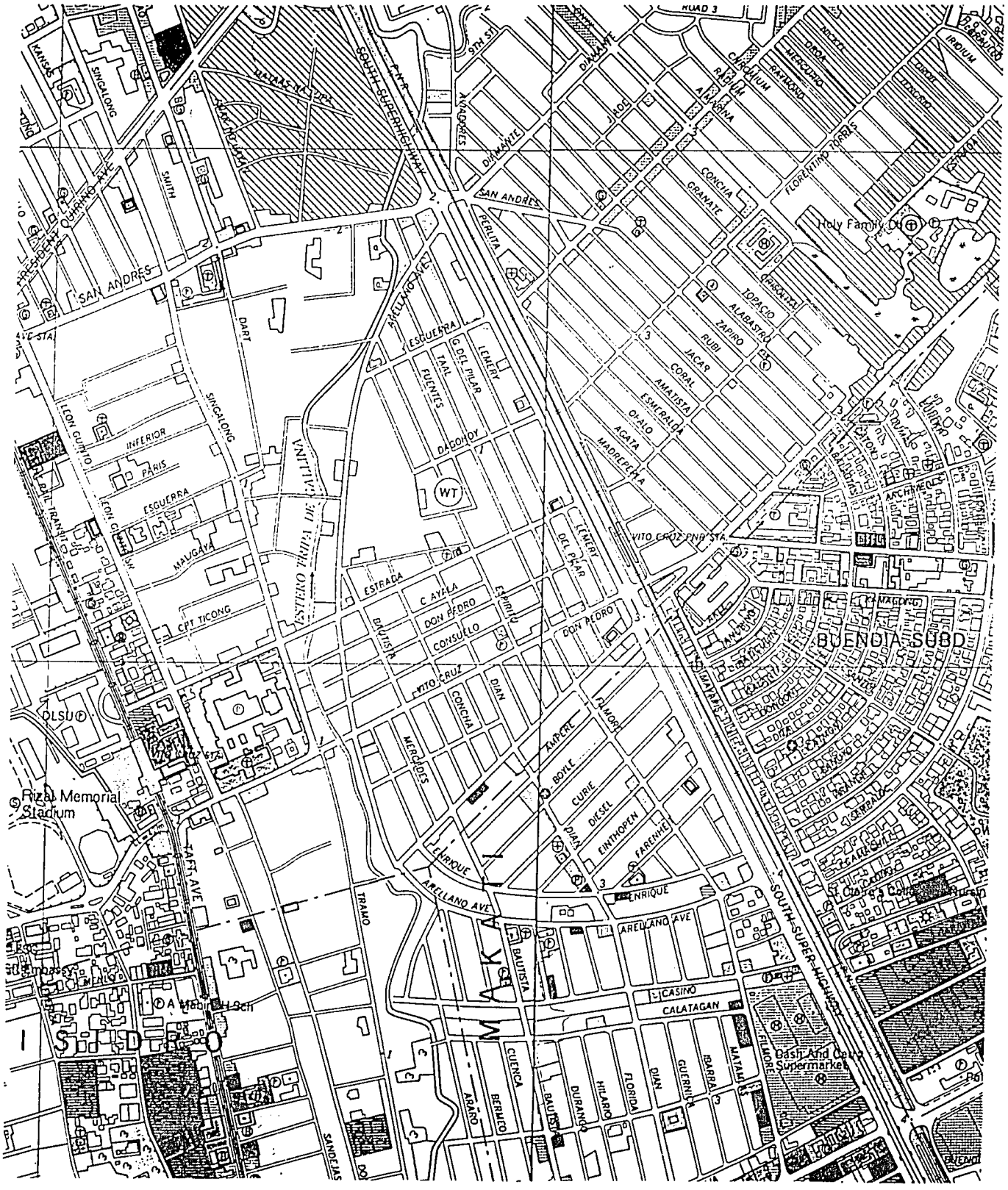
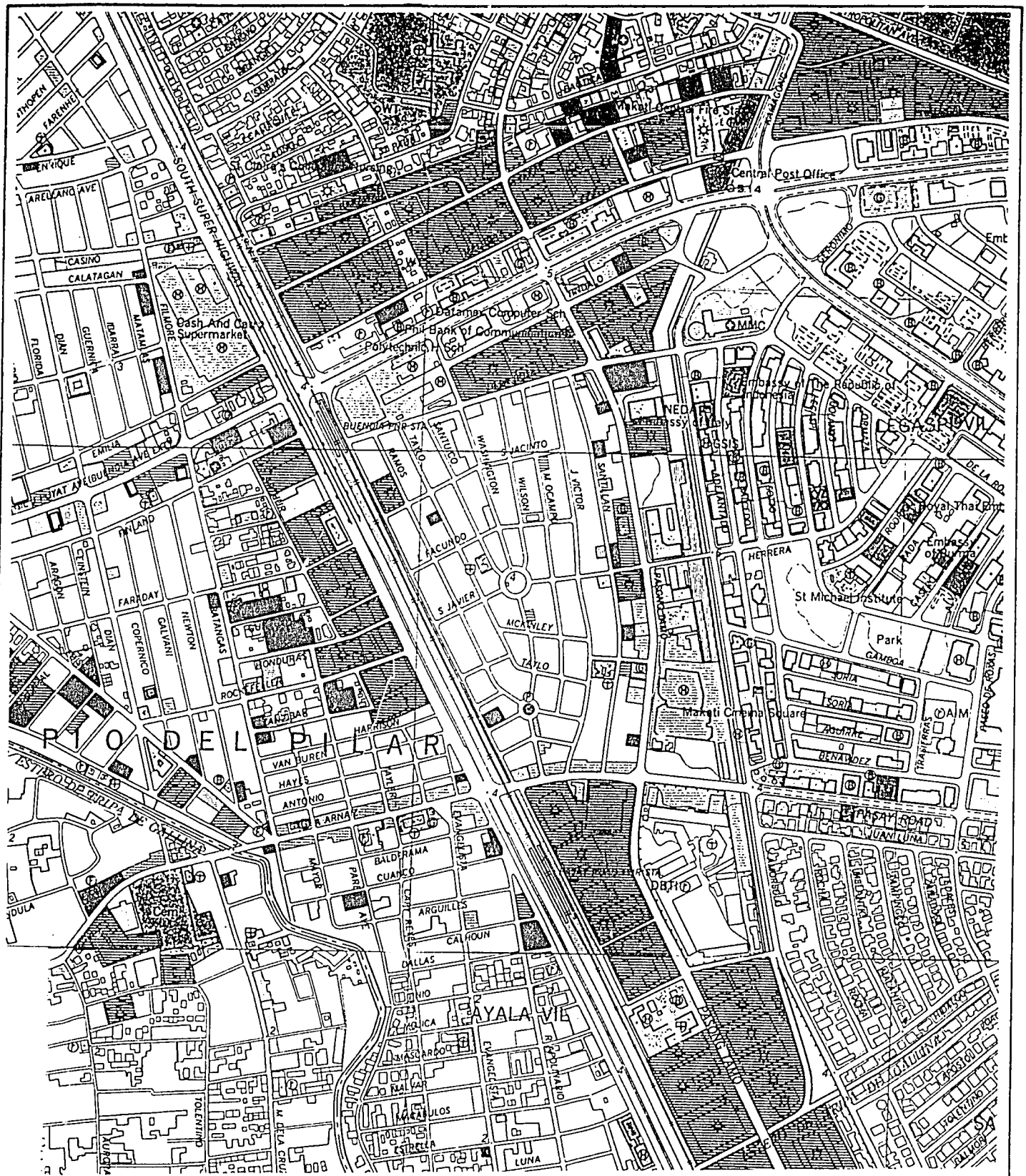


Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

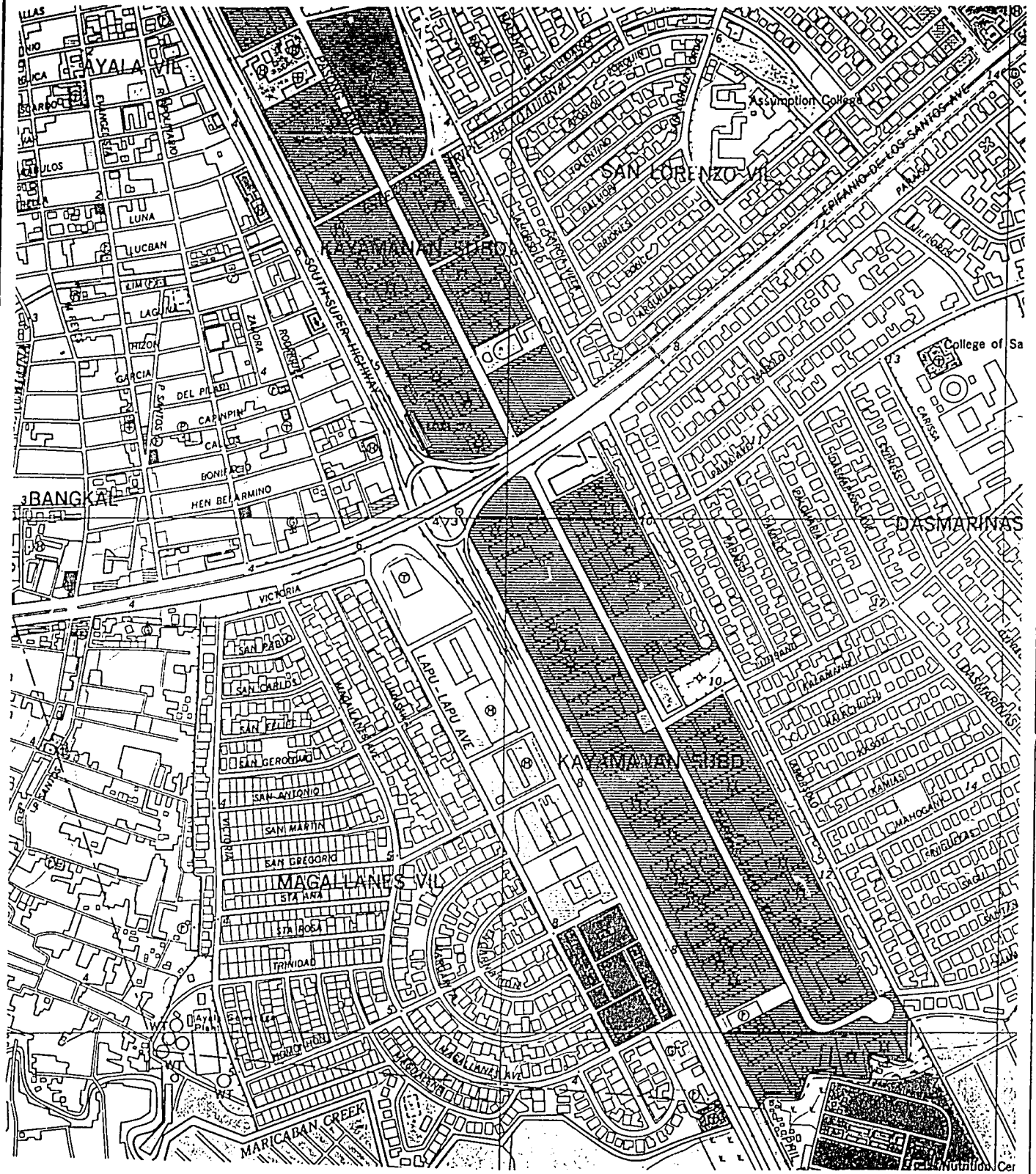
DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0456-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-2
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF VITO CRUZ INTERCHANGE	



Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

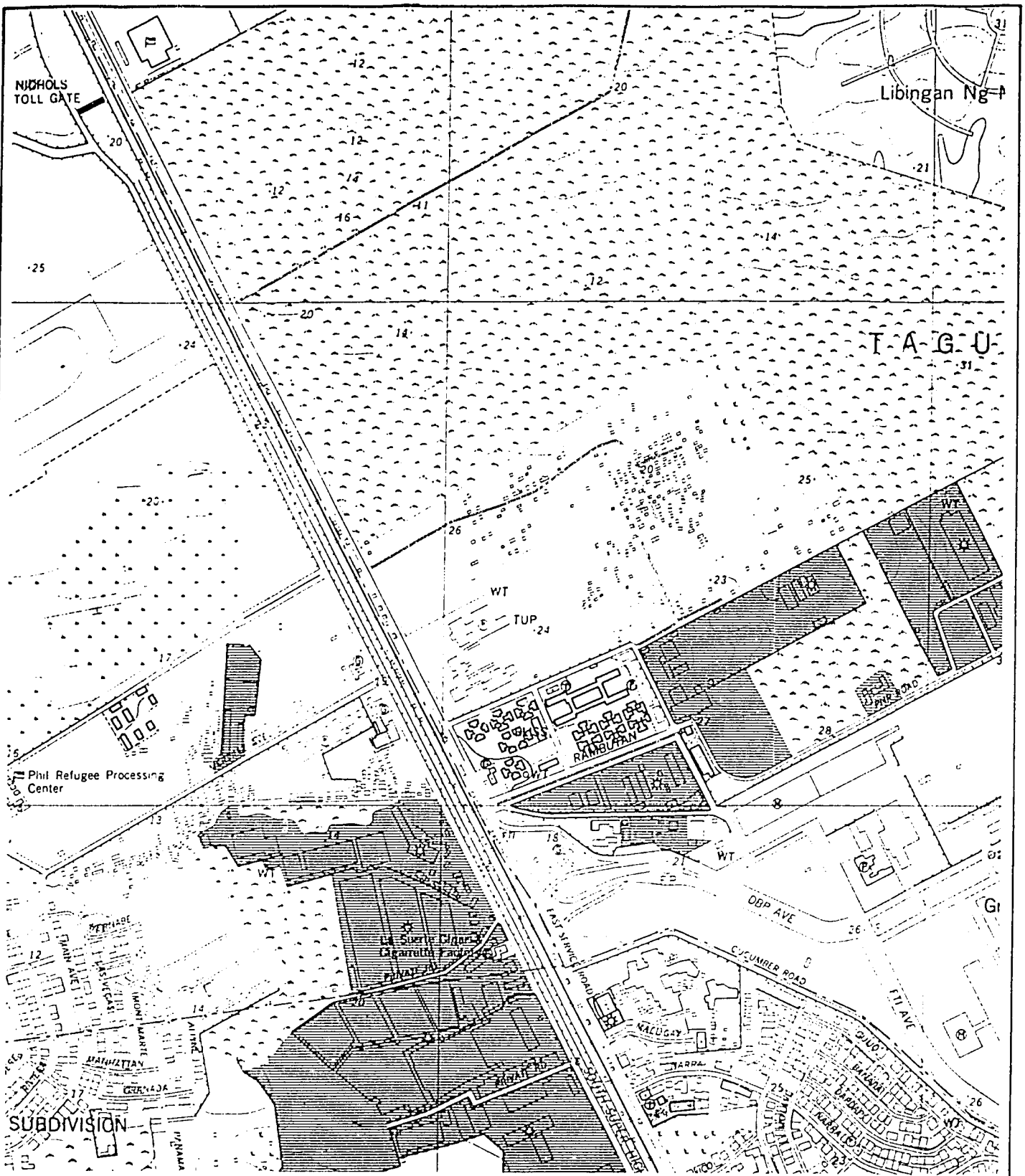
DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0456-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-3
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF PASAY ROAD INTERCHANGE	



Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0456-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-4
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF MAGALLANES INTERCHANGE	



Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0456-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-5
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF NICHOLS TOLLGATE AREA	

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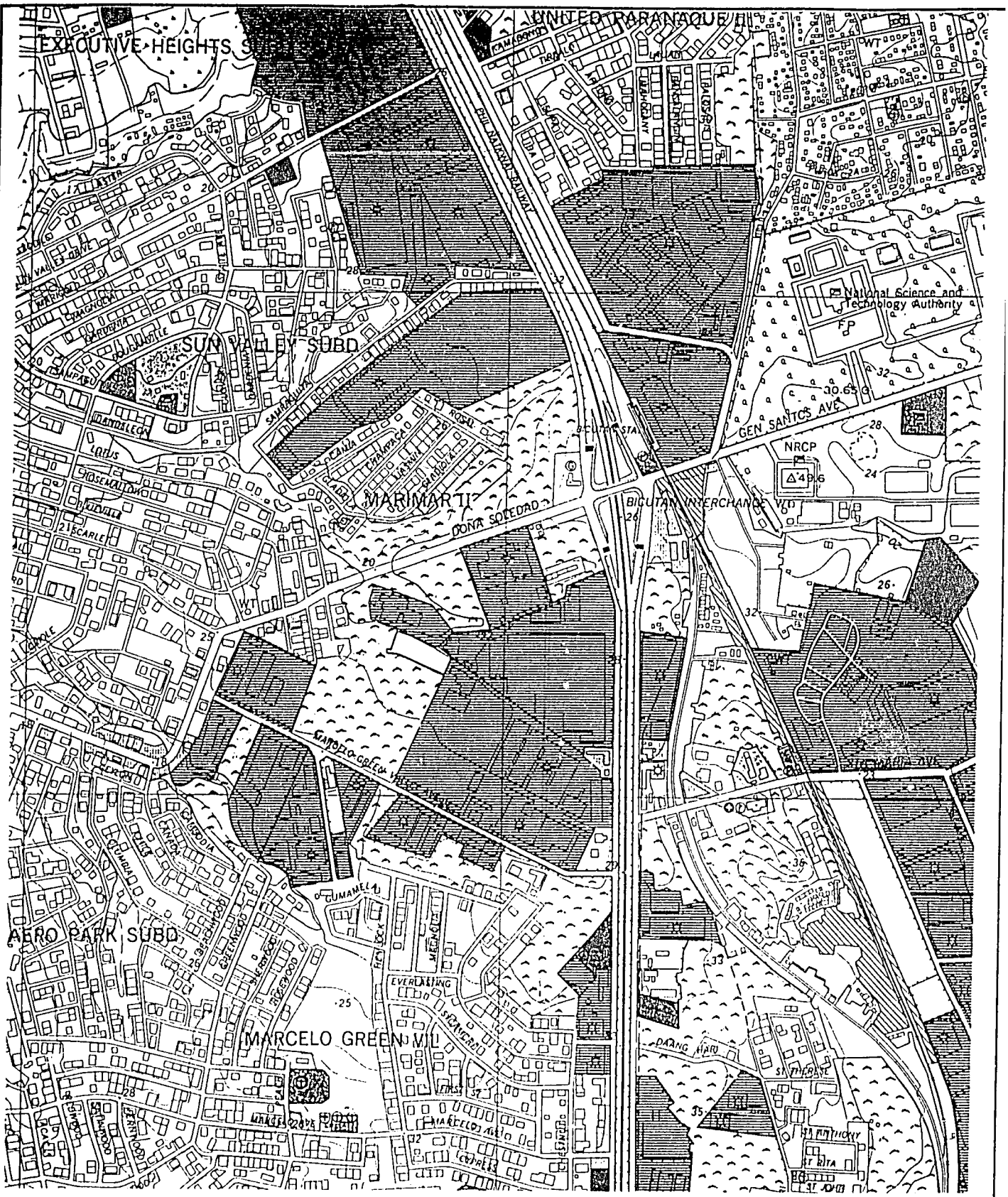
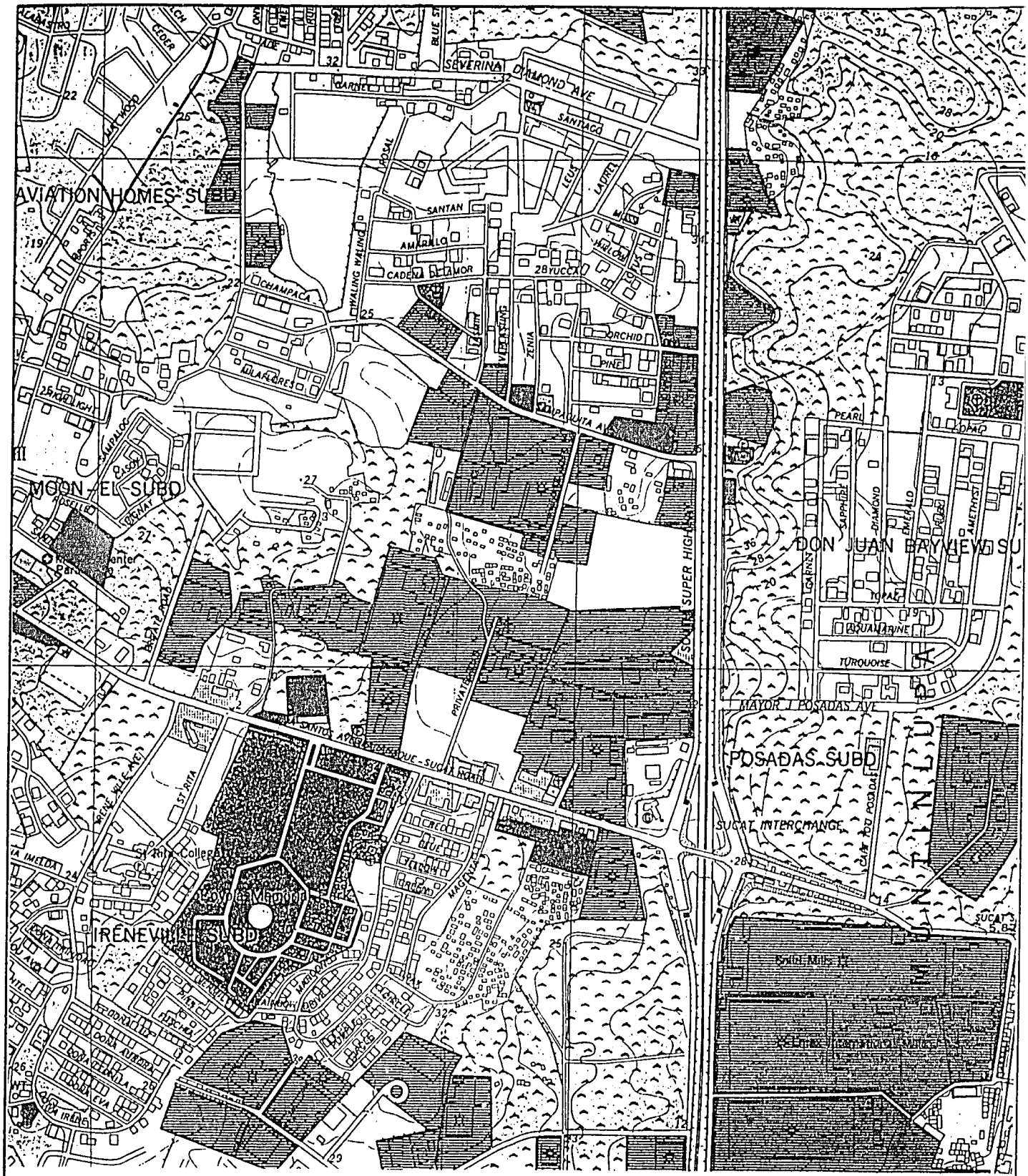


Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

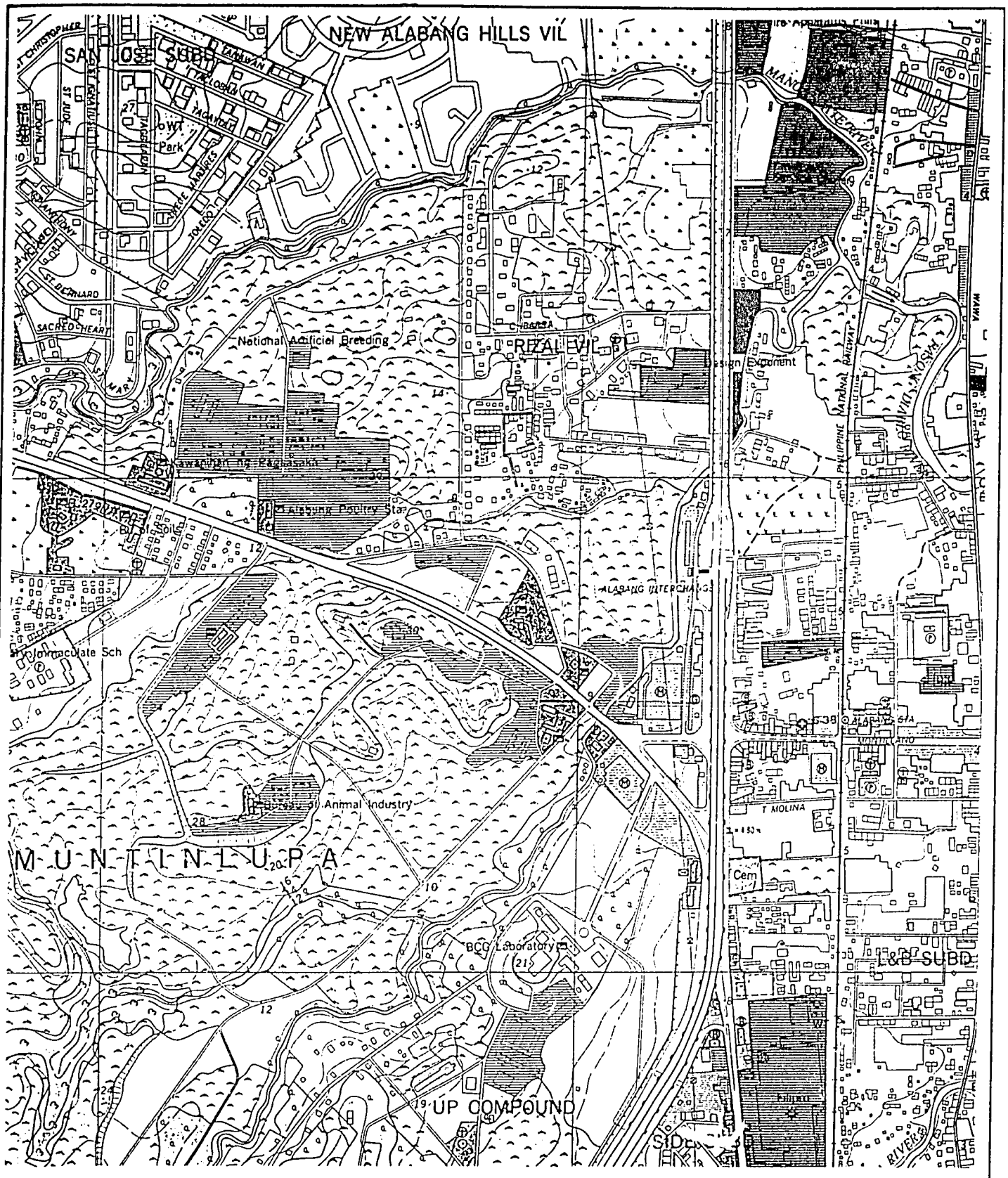
DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0436-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-6
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF BICUTAN INTERCHANGE	



Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0456-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-7
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF SUCAT INTERCHANGE	



Scale: 1:10,000

Source: NAMRIA Land Use Map of Metro Manila (1988)

DEPARTMENT OF AGRICULTURE, PHILIPPINES UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT NO.: 492-0456-C-00-2014-00	MANILA SOUTH TOLLWAY PROJECT	FIGURE A6-2-8
LOUIS BERGER INTERNATIONAL, INC. • ACCESS ASIA (PHIL.) INC. • GLOBETROTTERS ENGINEERING CORP. • URBAN INTEGRATED CONSULTANTS INC. • DAMES AND MOORE	LAND USE MAP OF ALABANG INTERCHANGE	

Appendix A6–2
MST INTERCHANGE AREAS

Table A6–2–1
ENVIRONMENTAL ANALYSIS OF RIGHT–OF–WAY ACQUISITION AT PROPOSED MST INTERCHANGES

PROPOSED INTERCHANGES	APPROXIMATE LAND AREA AFFECTED[1] (sq m)	DESCRIPTION OF AREA AND VICINITY	LAND USE ZONING[2]	PRESENT USAGE OF AFFECTED AREA	LAND AND PROPERTIES AFFECTED	ENVIRONMENTAL STRATEGIES[3]
President Quirino Alternative 1 rotary interchange	29,725 (22,040)	Densely developed mixed commercial – residential	Commercial/ Residential	Several small and large scale commercial businesses and high density poorer housing	Will displace approximately the same businesses affected by Alternative 2 plus some more establishments along Quirino Ave. These include mostly furniture businesses, a hardware store and a trucking business. Most severe impact will be the displacement of houses (mostly old) and apartments along the loop's circular path affecting 5 residential blocks. Of these, 3 blocks will be seriously affected in terms of number and quality of houses and structures in jeopardy of displacement. Among these are – a 16–unit Bliss Apartment, a high–rise commercial/residential building and a government bldg. Furthermore, about 40 old houses will be displaced in Fabie Estate Subd. On the aggregate, the interchange and ramp connections will affect these residential blocks, the 20–25 meter frontage along Pres. Quirino Ave. between Singalong St. and Paco PNR station and 3 blighted Barangays: Bgy. 734, 736 and 686. The number and type of structures affected are: a) 95 houses and apartments b) 9 big apartments c) 14 commercial structures d) 6 other buildings e) Around 160 shanties (mostly dilapilated) within the blighted housing district of Bgy. 734, 736, 686.	Relocation of affected squatters. Sustained consultations among affected property owners, the government and other stake–holders regarding compensation and alternative solutions.

[1] This refers to the area within the path of the proposed alignments. It is estimated as length of interchange and ramps multiplied by width. The width which is measured from edge to edge of the ramps varies according to number of lanes. The estimates used are: one lane: 7.65 m; 2 lanes: 9.90 m; 3 lanes: 13.80 m; 4 lanes: 18.70 m. Land area figures indicate the total area of land needed at interchanges for ROW. The approximate area of land that is privately owned is noted in brackets ( ).

[2] Land use zoning based on the Official Integrated Zoning Map, (1982) Metro Manila Commission

[3] Deal mostly with mitigating impact of ROW acquisition which is provided for under legal guidelines on ROW acquisition for infrastructure project. Another major component is consultation with affected parties regarding project design and further determination of most suitable mitigating measures. Severe impacts on residential properties and lifestyles are expected along the sections of Pasay Road, Vito Cruz and Quirino necessitating a greater degree of consultation with and participation of affected parties.

[4] Mitigating measures during construction period should be implemented for each interchange. These would include:
a) Dust emission control through immediate surfacing and street watering.
b) Traffic management plan during construction.
c) Control of silt run–off to nearby rivers and waterways eg. use of gabions.
d) Removal of construction wastes.
e) Sanitary waste disposal facility for construction workers.

Table A6–2–1 (continued)
ENVIRONMENTAL ANALYSIS OF RIGHT–OF–WAY ACQUISITION
AT PROPOSED MST INTERCHANGES

PROPOSED INTERCHANGES	APPROXIMATE LAND AREA AFFECTED[1] (sq m)	DESCRIPTION OF AREA AND VICINITY	LAND USE ZONING[2]	PRESENT USAGE OF AFFECTED AREA	LAND AND PROPERTIES AFFECTED	ENVIRONMENTAL STRATEGIES[3]
President Quirino Alternative 2	24,640 (2,525)	Densely developed mixed commercial – residential	Commercial/ Residential	Several small and large scale commercial businesses and high density poorer housing	Will cause removal of a 15 unit commercial edifice. Other affected structures are located in Barangay 734 near the corner of Quirino and SLE's southbound lane. These include businesses such as machine works, electrical supply and a blighted housing are bounded by Estero de Paco and the intersection. This housing area is occupied by 280 families or around 1,150 people.	Relocation of affected squatters. Sustained consultations among affected property owners, the government and other stake–holders regarding compensation and alternative solutions.
Vito Cruz	8,860 (7,270)	Commercial/residential area. Triangular island on the eastside is bounded by Vito Cruz, Zobel Roxas Avenue and SLE.	Residential/ Commercial	Mostly residential buildings along SLE and Mayapis St. interspersed with with businesses.	Exit ramp will cut through residential and commercial areas along Mayapis St. which runs parallel to SLE and the triangular island where Vito Cruz and Zobel Roxas meet. The following will be affected: a) Along Mayapis – 10 houses, (mostly single–detached) 7 apartments and one big car service center. Around 7 businesses form part of these structures b) Island – 12 businesses broken down into: 8 car service shops, 3 eateries and one furniture shop Southbound ramp along SLE will cut off frontage of structures along SLE's southbound lane between Zobel Roxas and Arellano Ave. The following will be affected: a) 23 structures along Arellano Ave. and Inca St. These include a pension house, an office building and a few large houses. The rest are old houses and two abandoned buildings. b) Businesses occupy some of these structures. Most of these are car service and motor works shops. Eateries are located on the corner of SLE and Zobel Roxas. c) 4 empty lots.	Review traffic forecasts to determine interchange requirements and options.

Table A6–2–1 (continued)
ENVIRONMENTAL ANALYSIS OF RIGHT–OF–WAY ACQUISITION
AT PROPOSED MST INTERCHANGES

PROPOSED INTERCHANGES	APPROXIMATE LAND AREA AFFECTED[1] (sq m)	DESCRIPTION OF AREA AND VICINITY	LAND USE ZONING[2]	PRESENT USAGE OF AFFECTED AREA	LAND AND PROPERTIES AFFECTED	ENVIRONMENTAL STRATEGIES[3]
Pasay Road	6,730 (4,975)	Commercial/industrial area with housing behind commercial establishments.	Commercial/ Residential/ Industrial	SLE portion near Pasay Road is predominantly commercial area. Cityland V, a high rise condominium building is a prominent feature in the vicinity. Pasong Tamo, which runs parallel to SLE on the east next to PNR tracks and a service road is a favorite location of industries.	Southbound ramp will result in removal of a condominium and neighboring establishments. Exit ramp will cut through back portions of industrial plants located along Pasong Tamo. Eastbound curve will remove the right portion of a townhouse apartment building.	Review traffic forecasts to determine interchange requirements and options.
Magallanes	32,670 (16,930)	Industrial/Commercial with prominent subdivisions behind establishments	Industrial/ Commercial	Magallanes commercial center is located along SLE's southbound lanes. Industrial firms lie along the northbound lanes.	Slightly diverted alignment to the west will affect the frontage (which serves as parking area) of Magallanes commercial in the south and a few business establishments in the north.	Negotiation with private land owners concerning compensation for displaced properties (land and improvements).
Between Nichols and C–5 Alternative 1 Parallel to Service Road	76,500 (0)	East service road runs parallel to SLE and PNR tracks and is adjacent to Fort Bonifacio.	Military/ Institutional	East service road provides feeder lanes to SLE and connection from from Bicutan Both sides of service road are occupied by small businesses such as construction supply, motor works, eateries, sari–sari stores.	To construct MST parallel to service road requires moving service road eastward and constructing the expressway at grade in between PNR track and the newly aligned service road. Major impact would be the denial of access to a large number of businesses in leasing arrangements with PNR along the service road. Approximate number and type of businesses that will be affected are the ff: a) 24 construction supply stores b) 14 motor works and service shops c) 9 sari–sari stores d) 8 eateries e) 8 other businesses	Coordinate with PNR on tenure provisions of its lease agreement with businesses currently occupying its property. Work out arrangements with military authorities of Fort Bonifacio to clear the area of its present occupants.

Note: The MST at grade section between Nichols and C–5, although not an interchange is included in the analysis here as it will have various impacts that will need to be considered.

Table A6-2-1 (continued)
ENVIRONMENTAL ANALYSIS OF RIGHT-OF-WAY ACQUISITION
AT PROPOSED MST INTERCHANGES

PROPOSED INTERCHANGES	APPROXIMATE LAND AREA AFFECTED[1] (sq m)	DESCRIPTION OF AREA AND VICINITY	LAND USE ZONING[2]	PRESENT USAGE OF AFFECTED AREA	LAND AND PROPERTIES AFFECTED	ENVIRONMENTAL STRATEGIES[3]
(cont'd) Between Nichols and C-5 Alternative 1 Parallel to Service Road					Most of these establishments also serve as residences of business operators and employees. These businesses are affiliated with the Taguig Rock and Pebbles Association which has a lease contract with PNR. They also obtain business permits from the municipal government of Taguig. Other structures to be affected are: a) 23 houses (mostly small, semi-concrete). b) Headquarters of the AFP Military Economic Welfare Service. c) Frontage of AFP-RSBS Industrial Park (a garment factory managed by military officials). Several more business and residential structures along the PNR side of the east service road will be affected as a result of the MST alignment above the PNR tracks going toward Bicutan. Alternatives 1 and 2 will connect with the proposed C-5 interchange (which is part of the C-5 road development.) This associated project will displace businesses located along SLE's east service road and cut off the left frontage of RSBS.	
Alternative 2 through Fort Bonifacio	+4,160 (0)	Gradually undulating open land owned by Fort Bonifacio, a military reservation.	Military/ Institutional	Part of military shrine reservation known as *Libingan ng mga Bayani*, a national cemetery for Filipino partriots and soldiers killed while in active military duty. Land is presently covered with grasses and shrubs. A few houses occupied by military personnel are scattered within the reservation.	Diverted, depressed section would comply with vertical clearance requirements of MIA runway approach. However this would enroach by around 250 m into the Libingan ng mga Bayani and displace 4 industrial structures within RSBS and around 10 houses within Fort Bonifacio.	Create a buffer strip of trees to enhance environmental aesthetics. Construct slope protection measures.

Table A6-2-1 (continued)
ENVIRONMENTAL ANALYSIS OF RIGHT-OF-WAY ACQUISITION
AT PROPOSED MST INTERCHANGES

PROPOSED INTERCHANGES	APPROXIMATE LAND AREA AFFECTED[1] (sq m)	DESCRIPTION OF AREA AND VICINITY	LAND USE ZONING[2]	PRESENT USAGE OF AFFECTED AREA	LAND AND PROPERTIES AFFECTED	ENVIRONMENTAL STRATEGIES[3]
Bicutan	12,165 (7,460)	Characterised by mixed land uses: heavy industrial, low-density housing (Better Living Subdivision) and small commercial establishments along Doña Soledad Avenue.	Industrial	Idle land -- Santos Pascual Property presently covered with grasses and shrubs Wooden commercial stalls are leased to vendors along Doña Soledad Ave.	Private property along both sides of Doña Soledad Ave., west of SLE would be affected. Value of idle lands in area may increase.	Mitigation of temporary environmental impacts during construction.[4]
Sucat Alternative 1 north of Parañaque-Sucat Road	11,425 (8,030)	Industrial/commercial with some vacant lands 400 meters from present interchange	Industrial	Mostly large industries such as Honda, Asea Brown Boveri, Philacor. Commercial service establishments are located along the road.	Proposed alignment will pass through an open portion of an industrial compound, an idle private land, an abandoned sawmill, a partially operational wood processing plant, a new fastfood establishment along the Parañaque - Sucat Road and possibly the back portion of an adjacent commercial building.	Negotiation with private land owners concerning compensation for displaced properties (land and improvements).
Alternative 2 south of Parañaque-Sucat Road	12,250 2,300	Mixed residential, commercial and industrial with open land lying toward the south	Industrial	Two large industrial firms: Huron Container and Zilog Electronics are mixed with squatter housing and subdivisions. Commercial establishments are located along the road.	Major impact will be on a government-sponsored slum improvement area of about 6 hectares which had been was subdivided in 1991 and awarded to squatters at an average of 32 sq m per family. The site is home to 10,000 people where they live in about 1000 houses of the barong-barong type. Other impacts will be the displacement of a few construction supply businesses along the road and the use of both idle, private and government lands.	Consultation with community regarding compensation and financial assistance for: a) loss of property b) costs of seeking alternative housing c) transport/moving costs
Alabang trumpet interchange	36,380 (8,350)	Mostly open land surrounded by residential subdivisions including three affluent Ayala Alabang Villages. Has hilly topography.	Institutional	Bureau of Animal Industry (BAI) animal breeding and experimental livestock farm.	Proposed alignment of loop and ramp connections would dissect the built-up portion (office and livestock pens) of the BAI. Would create four isolated sections of land unsuitable for continuing activities of the BAI.	Mitigation of temporary environmental impacts during construction[4] Some isolated portions can be landscaped and replanted with ornamental vegetation.
TOTAL AREA OF LAND AFFECTED PRIVATELY OWNED LAND AFFECTED				Alignment with Alt 1 214,455 sq m 75,055 sq m (35%)	Alignment with Alt 2 177,855 sq m 49,810 sq m (28%)	

Source: Consultant's field reconnaisance and site survey.

Table A6-2-2
ESTIMATED LAND ACQUISITION COSTS[1] FOR PROPOSED MST INTERCHANGES

INTERCHANGE	PRIVATELY OWNED LAND AFFECTED[2] (sq m)	COST OF LAND PER SQ M[3] (In Pesos)		APPROXIMATE TOTAL COST (In Million Pesos)	
		Based on Zonal Valuation	Based on Sellers' Asking Price	Based on Zonal Valuation	Based on Sellers' Asking Price
1. Pres. Quirino Ave.					
Alt. 1[4]	22,040	₱ 9,000	₱ 20,000	₱ 198.36	₱ 440.80
Alt. 2	2,525	9,000	20,000	22.73	50.50
2. Vito Cruz	7,270	5,400	13,000	39.26	94.51
3. Pasay Road (along SLE)	4,975	12,000	15,000	59.70	74.63
4. Magallanes	16,930	10,000	28,000	169.30	474.04
5. Bicutan	7,460	2,500	4,200	18.65	31.33
6. Sucat					
Alt. 1[4]	8,030	1,400	6,500	11.24	52.20
Alt. 2	2,300	1,400	6,500	3.22	14.95
7. Alabang	8,350	6,600	7,500	55.11	62.63
T O T A L					
Alignment with Alt.1	**75,055**			**₱ 551.62**	**₱ 1,230.13**
Alignment with Alt.2	**49,810**			**367.96**	**802.58**

Source: Consultant's estimates

[1]Limited to cost of privately owned land to be acquired for ROW. Compensation for affected buildings and improvements will have to be incorporated to complete the total cost picture.

[2]Excludes government-owned lands such as roads, railroad tracks and sites of government offices. For Alignment with Alt 1 government lands total 139,400 sq m or 65% of the total land area of 214,455 sq m needed for ROW at interchanges. For Alignment with Alt 2, government land represents 72%.

[3]Two bases for estimating cost of land per sq m are presented here: 1) 1992 zonal valuation given by city/municipal authorities for real estate tax assessment purposes and 2) Current (1992) asking prices of sellers for commercial and industrial lots at/or near interchanges from the higher estimates are used. The purpose is to provide a minimum and maximum approximate value of prices for lots. (See Tables A6-2-3 and A6-2-4.)

[4]Preferred route.

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Table A6-2-3
1992 ZONAL VALUATION OF LAND AT MST INTERCHANGES AND VICINITY
(Pesos/sq m)

MST INTERCHANGE AND VICINITY	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
1. Pres. Quirino Ave.			
• Quirino Ave. - Estero de Paco - SLE		₱ 9,000	
• SLE - Estero de Paco	₱ 3,400	5,400	
2. Vito Cruz			
• SLE - Zobel Roxas	3,500	5,400	
• Arellano - Vito Cruz - Zobel Roxas	2,400		
3. Pasay Road			
• Antonio Arnaiz Road		15,000	
• SLE		10,000	
• Bangkal	4,000		
• Pasong Tamo		12,000	
4. Magallanes			
• Bangkal		10,000	
• Magallanes	8,000		
• Galeria de Maga		15,000	
• Pasong Tamo		18,000	
5. Proposed C-5			₱ 800
• East Service Road-Fort Bonifacio			
6. Bicutan			
• Sun Valley - Miramar II	1,200		
• Marcelo Green Village		2,500	
• United Parañaque - SLE	1,500		
7. Sucat			
• Ireneville	1,000		
• Moon El			1,400
8. Alabang			
• Ayala - Alabang	5,000	6,600	
• Pleasant Village - SLE	800		
• Rizal Village	700		
• UP side Subdivision	600		

*Zonal valuations are the valuations given by city and municipal authorities for real estate tax assessment purposes. The values provided in this Table are those being used in 1992 by the BIR.

Source: BIR Revenue District Offices of Manila, Makati, Parañaque, Taguig and Muntinlupa.

Table A6-2-4
1992 SELLERS' ASKING PRICES FOR LOTS AT/OR NEAR MST INTERCHANGES
(Pesos/sq m)

MST INTERCHANGE AND VICINITY	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
1. Pres. Quirino Ave. • San Andres	₱ 6,000	₱ 20,000	
2. Vito Cruz	6,000	13,000	
3. Pasay Road • near SLE		45,000 15,000	
4. Magallanes • EDSA • near SLE • Pasong Tamo	8,500	₱ 28,000 18,000	
5. Bicutan • Better Living • SLE	2,200-2,900		₱2,500-4,200
6. Sucat • SLE			5,700-6,500
7. Alabang • Ayala - Alabang	₱ 4,500-7,500		

Sources:

(1) *Real Estate Monitor*, Monthly Publication of Econotech, Inc. March - June, 1992 issues.
(2) *Buy and Sell*, Weekly Ads Paper Published by Center for Consumer Information, Inc. June - July, 1992 Issues

Appendix A6-3
THE SQUATTER POPULATION OF METRO MANILA

Appendix A6-3
THE SQUATTER POPULATION OF METRO MANILA

1. LEGAL DEFINITION OF SQUATTER

Squatting is a legal term defined by law as the occupancy of public or private space without the consent of the owner. Under Philippine legislation, the term "squatter" is often used as synonymous with "underprivileged or homeless" but is also expanded to refer to other circumstances as well. Republic Act No. 7279 defines the terms as follows:

> **Underprivileged and homeless citizens** refers to the beneficiaries of this Act (RA 7279) and 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 and Development Authority and who do not own housing facilities. This shall include those who live in makeshift dwelling units and do not enjoy security of tenure.
>
> **Professional squatters** refers to individuals or groups who occupy lands without the express consent of the landowner and who have sufficient income for legitimate housing. The term shall also apply to persons who have previously been awarded homelots or housing units by the Government but who sold, leased or transferred the same to settle illegally in the same place or in another urban area, and *non-bona fide* occupants and intruders of lands reserved for socialized housing. The term shall not apply to individuals or groups who simply rent land and housing from professional squatters or squatting syndicates.
>
> **Squatting syndicates** refers to groups of persons engaged in the business of squatter housing for profit or gain.
>
> Source: Republic Act 7279 (February 1992)
> Urban Development and Housing Act

Squatter and slum are terms that are often used interchangeably. There two concepts do not exactly have the same meaning. Both invariably connote poverty, congestion, dilapidated and unsanitary environment, and poor basic services.

Squatting, however, is a legal term, while a slum (which is not legally forbidden), is a social condition that, like squatting, is also a consequence of poverty.

In reality, therefore, both terms are interrelated and interchangeable. It is most likely that squatters would be found in slum areas and likely that a slum area will be highly populated by squatters. In either case, slum and squatter communities are found in the more depressed sections of the city.

2. SQUATTERS ELIGIBLE FOR SOCIALIZED HOUSING

The NHA uses certain criteria from Republic Act No. 7279 for defining a "squatter" eligible for government assistance including resettlement programs. These are:

Underprivileged and homeless citizens (See page A6-3-1).

The poverty threshold level for underprivileged and homeless citizens is defined by NEDA as ₱ 5,821 for a household of six persons (1991 level).

Eligibility Criteria for Socialized Housing Program Beneficiaries

- Must be a Filipino citizen;
- Must be an underprivileged and homeless citizen, as defined in Section 3 of this Act;
- Must not own any real property whether in the urban or rural areas; and
- Must not be a professional squatter or member of squatting syndicates.

Source: Republic Act No. 7279 (February 1992)
Urban Development and Housing Act

3. SIZE OF SQUATTER POPULATION

Of the estimated eight million Metro Manilans, around 2.5 million people are reported to be living in squatter and slum areas. This represents 31 percent of the metropolis' total population (NCR-DSWD Planning and Monitoring Division, 1990).

A total of 591 slum communities have been identified as heavily populated with squatters (Table A6-3-1). According to the National Housing Authority (NHA), squatters occupy 695.5 hectares of slum areas in the National Capital Region.

Table A6-3-1
SQUATTER POPULATION OF METROPOLITAN MANILA[1]

CITY/ MUNICIPALITY	NO. OF SQUATTER COMMUNITIES	SQUATTER POPULATION	TOTAL CITY/ MUNICIPALITY POPULATION	PERCENT SQUATTER POPULATION
NCR	591	2,488,407	8,027,614	31.0
CITY				
Manila	83	545,496	1,855,374	29.2
Quezon	74	516,000	1,546,019	33.4
Caloocan	28	226,559	774,894	29.2
Pasay	27	266,220	411,680	64.7
MUNICIPALITY				
Parañaque	102	76,776	317,460	24.2
Las Piñas	61	37,578	281,633	13.3
Muntinlupa	55	141,540	266,870	53.0
Malabon	40	73,374	242,516	30.3
Marikina	25	61,692	299,902	20.6
Makati	19	81,612	457,431	17.8
Pasig	16	100,688	390,834	25.8
Navotas	14	102,714	163,910	62.7
Taguig	12	49,614	193,384	25.7
Mandaluyong	10	108,380	255,176	42.5
San Juan	7	21,972	150,969	14.5
Pateros	4	25,530	54,865	46.5
Valenzuela	4	52,682	363,667	14.5

Among the four cities of the Metropolis, the city of Manila has the most number of squatter communities and population. Quezon City ranks a close second. Among the municipalities, Parañaque hosts the most number of squatter communities, followed by Las Piñas and Muntinlupa. By the year 2000, it is projected that Metro Manila will have four million squatters if the current housing trends continue (BBC as cited in Manila Bulletin, October 3, 1990).

[1]Source: NCR-DSWD Planning and Monitoring Division, 1990 consolidated table on City/Municipality Subdivisions. The number of squatter colonies and population were drawn from PCUP 1987 data while the total population for NCR as of 1989 was derived from NCSO.

A considerable number of slum dwellers and squatter families are reported to have occupied areas declared to be dangerous and in land needed for government infrastructure projects. The latest survey (May 11, 1990) undertaken by the National Housing Authority (NHA) in collaboration with local government units and other national agencies indicated that there are around 220 such sites in Metro Manila which are occupied by 59,071 families.

Twenty-seven percent of these families are found in waterways, 13 percent are in Department of Public Works and Highways infrastructure project areas and 12 percent are along the Philippine National Railway tracks. Close to one-half are distributed on other government projects. According to NHA, squatters found in these areas are given the highest priority for clearing and resettlement.

Slum and squatter communities show common features that remain consistent over time. Studies reveal that the urban poor of Metro Manila are youthful migrants from provincial cities/towns or rural areas of the more depressed regions who have come to the metropolis in search of better opportunities in life.

Upon arrival in the city, they construct their homes in slums and other marginal areas where they have resided for several years without any security of land tenure. Because of their lack of skills and the limited number of industries able to absorb them, many of these migrants land in service-type jobs such as domestic help, drivers, construction workers, and street occupations such as food hawkers, newspaper/sweepstake sellers, scavengers, and beggars. Such jobs (except for beggars) pay only enough to allow them to live in the more depressed sections of the city.

4. HISTORICAL OVERVIEW OF URBAN POLICY ON SQUATTERS

The City of Manila government recognized the squatter problem as early as the late forties. However, it was only in the 1950s, after World War II, that the government took serious notice of the plight of the city's poor. The numbers of squatters and slum dwellers in Metro Manila rose after World War II. Initially, the government perceived slum and squatter areas as a legal problem involving unauthorized occupation of public or private land and, secondarily, as a manifestation of the housing shortage in urban areas. The problem was viewed as a government responsibility and special agencies were established to handle the problem.

In 1951, the City government began to eject and relocate squatters in sites that were outside Metro Manila. These strategies were found to be ineffective because although these sites offered land for housing, there were no available livelihood opportunities and basic services. Most relocatees eventually returned to the city and rebuilt shanties in marginal or unguarded areas. In 1975, the Anti-Squatting Law (PD 772), a harsher government policy was imposed. However, it did not prevent the proliferation of squatters.

Because the squatter problem was also seen as a issue of shelter, another initial response of the government was to develop low-cost public housing. Starting in the early 1950s, the government initiated the construction of multi-story tenement housing projects for ejected low-income families. Until the sixties and seventies, the government envisioned projects providing shelter and services for slum dwellers. In the late seventies, the highly budgeted BLISS (Bagong Lipunan Improvement of Sites and Services) program was developed. It was a program that was described as designed for the poor of Metro Manila and featured medium-rise walk-up apartment buildings.[2]

As with earlier government housing projects, BLISS did not benefit the squatters, its intended beneficiaries, because of the financial and stringent requirements. Like other housing programs, BLISS catered only to the middle class.[3] Meanwhile, the slum dwellers and squatters continued to crowd into every space in the city.

Because relocation and low-cost housing were unable to solve the slum and squatter problem, the government strategy, in the mid-seventies, was to upgrade slums and resettlement sites. Slum improvement and upgrading of sites and services was declared as the alternative but primary strategy to deal with squatters and other blighted communities. Mandated in Letter of Instruction (LOI) 555, the LOI defined the strategy as "basically introducing community facilities and services such as roads, footpaths, drainage, sewerage, water and power systems, schools, barangay centers, community centers, and clinics with a complementary socioeconomic program... particularly in the provision of employment among resident families.[4]

The first slum to be upgraded in the metropolis and for the entire country as well was the Tondo Foreshore. The nearby Dagat-Dagatan served as the first resettlement that was extended with sites and services.

Currently, in Metro Manila, the slum improvement policy is being implemented through the Zonal Improvement Program (ZIP). Adopting the on-site development concept, the Program involved the reblocking of existing lots to create a better-ordered settlement pattern, the installation of basic services, the provision of low-cost building materials and the eventual transfer of the ownership of the homelots to their occupants. At present, however, some local governments prefer to implement social housing projects in accordance with what is called the "socialized" housing strategy, i.e., the construction of standard government housing projects in squatter occupied areas. One of the housing projects designed along this strategy is the Manresa Socialized Housing Project in Quezon City. Compared to on-site development, this approach has been criticized by the urban poor to cause greater dislocation.

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[2]Jimenez, Pilar Ramos, Ma. Elena Chiong-Javier, Judy Carol C. Sevilla. Philippine Situation Analysis (1986). UNICEF Philippines.

[3]Makil, Perla Q. "Slums and Squatters in the Philippines." A paper prepared for the Institute of Developing Economics in Tokyo, Japan in April 1983.

[4]Jimenez, Chiong-Javier, Sevilla 1986 Ibid.

Outside Metro Manila, the upgrading program is called the Slum Improvement and Resettlement (SIR) Program in accordance with LOI 555. SIR projects are being undertaken in the blighted areas of regional urban centers.

The Urban Land Reform Act was passed in 1978 in support of the government's slum upgrading and sites and services projects. It restructured and controlled the acquisition, ownership and use of urban lands. Identification of slum areas that needed upgrading was based on a list of Areas for Priority Development (APDs) that was drawn up early that year. The APDs were the subject of urban land reform, in Presidential Decree (PD) 1517 decreed on July 11, 1978. The law sought protection of the urban poor by prohibiting eviction and granting the right of first refusal to the occupants. However, occupants could not buy the land even if first offered to them because the cost of land remained beyond their means. It was later assessed that the right of first refusal was unrealistic while the cost of land remained high.

PD 1517 was followed over a year later by Proclamation No. 1893 which declared the entire Metro Manila area as an Urban Land Reform Zone (ULRZ) and subsequently by Proclamation No. 1967 which identified 244 blighted sites in Metro Manila as APDs and also ULRZs. In 1983, the number of APDs increased to 245 with the inclusion of the Dagat-Dagatan area.

Since the Aquino government took over in 1986, it continued to maintain a number of the former dispensation's program policies and structures. However, it identified new areas of concern and designed new approaches and mechanisms for directing its assistance to low-income urban dwellers. It developed a National Shelter Program that was to be implemented by the Housing and Urban Development Coordinating Council (HUDCC), an umbrella structure that replaced the Ministry of Human Settlements.

The National Shelter Program was designed as a six-year program (1987-1992) with the goal of providing increased levels of shelter assistance or adequate housing facilities through affordable financing schemes to low and middle-income families especially in urban areas throughout the country. Specifically, the Program objectives are to: (1) increase the accessibility of lower-income families to home ownership; (2)provide stable, sustainable and viable long and medium-term financing; (3) provide security of land tenure for Urban Land Reform areas and Areas for Priority Development (APDs); (4) prevent unauthorized and unplanned squatting; (5) encourage private sector participation, both formal (i.e., professional builders and developers) and informal (i.e., individual families, community organizations, and non-government entities); and (6) ensure equitable distribution of benefits to the geographic regions in the country.[5]

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[5]Jimenez, Pilar Ramos, "Housing the Impoverished in the Metropolis: Situation and Prospects for Metro Manila's Poor." A paper delivered in the Squatter Settlement Workshop of the Third International Congress of the World Association of Major Metropolis, Melbourne 15-19 October 1990.

The policies and strategies that guide the Program are related to mortgage finance and focus on serving lower-income urban groups through the social mortgage window. They also aim at establishment of land policy programs, emphasize self-help through informal sector involvement, and the liberalization of physical housing standards, and improvement of institutional capabilities.

In spite of these measures, there has not been a substantial improvement in the urban poor situation in the Philippines. APDs increased to 316 in the late eighties. By the end of 1988, only 9.8% had completed development, 16.8 % were in the process of development, and 9.5% were programmed for development. A majority of the APDs, or 64%, remained untouched.[6] Efforts at improving financing schemes to benefit the very poor (through the Community Mortgage Program) have not matched efforts towards facilitating the availability of land.

Recent legislation with continuing urban development and housing program affecting squatter and slum areas, the urban poor and underprivileged and homeless citizens are:

- The Urban Development and Housing Act/RA No. 7279 of 1992. The Act has identified "danger areas" and "esteros", railroad tracks, riverbanks, shorelines, waterways and other public places such as sidewalks, roads, parks and playgrounds as having first priority for clearing and resettlement.

- The rules and regulations of the Housing and Land Use Regulatory Board (HLURB). This requires developers of proposed residential subdivision and condominium projects or proposed expansion of existing projects to develop an area for socialized housing comprising at least 20% of the total area or project cost.

  The housing package selling price is within the lowest interest rate under the Unified Home Lending Program (UHLP) or any equivalent housing program of the government, private sector or non-government organization.

5. AREAS FOR PRIORITY DEVELOPMENT

The following is a list of the APDs along the South Luzon Expressway and PNR tracks from Alabang to President Quirino Avenue. It must be noted, however, that with RA No. 7279 (1992), this original list of APDs no longer provides the basis for selecting sites for improved housing and services. Nevertheless, they are listed here as areas that are slum or blighted areas.

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[6] "Enhancing Capabilities of Government Implementors" Pulso, May 1990, p.33.

- **San Antonio. Lambayao, Makati**

  A rectangular shaped area bounded by Sampaloc Street on the northwest Lambayao Street on the northeast, St. Paul on the southeast and Mayapis Street on the southwest.

- **Tramo Line, Parañaque**

  An area along an abandoned PNR right-of-way bounded on the north by J. de Leon Street, by A. Bonifacio Street, on the west, by Parañaque and Kay Bobo River on the east and by Sucat Road on the south.

- **Banye Compound, Muntinlupa**

  An area bounded on the north by Intergas Railroad Tracks on the east; South Superhighway on the west; Liberty Homes on the south.

- **President Quezon, Muntinlupa**

  An area bounded on the north by Bgy. Sucat; Provincial Road on the east; Railroad Tracks on the west and Bgy. Buli on the south.

- **Concepcion Street, Muntinlupa**

  An area bounded by an unnamed Creek on the north; Railroad Tracks on the east; South Superhighway on the west and Concepcion Street on the south.

- **Pleasant Village, Muntinlupa**

  An area along Bautista Street bounded on the north by an unnamed Creek; Creek on the west and Pleasant Village on the south.

- **Alabang, Along Laguna de Bay, Muntinlupa**

  An area bounded by Cupang Creek on the north; Railroad on the east; South Superhighway on the west and Montellano Street on the south.

- **Mataas na Lupa, Manila**

  An area bounded on the northwest by Quirino Avenue, South Superhighway on the east, San Andres Street on the south, and on the west by Anak Bayan Street.

6. NHA RELOCATION AND RESETTLEMENT STRATEGIES

In 1986, the relocation and resettlement programs of the National Housing Authority were discontinued due mainly to the lack of funding to generate more sites for acquisition and development. Table A6-3-2 describes some of the early or 'traditional' programs of the NHA. Relocation strategies since then have been more developmental in approach and sensitive to the flaws of the original programs (e.g., resettlement sites were often far from the urban core).

NHA's current strategy is characterized by one or a combination of the following elements: (1) in-city resettlement; (2) joint venture especially for funding, and (3) land sharing. Projects, that have been undertaken recently are shown in Table A6-3-3.

In the joint venture approach NHA may also provide technical assistance and estate management. There is a pending project with a group of government landholders, Financial Services Center (PNB, SSS, GSIS, CCP, Asset Privatization Trust), who will buy PEA land fronting the Hyatt Hotel, along Roxas Boulevard in Pasay. In view of this, PEA has purchased land in Bo. Molino in Bacoor, Cavite. The Financial Services Center Group is tasked with land development (including funding) and NHA is mandated to provide technical assistance to the Group as well as the estate management function. In this project, a total of 4,822 families in Pasay and 2,500 families in Parañaque will be affected.

7. DPWH RESETTLEMENT SCHEMES

Tasked with infrastructure development, DPWH undertakes relocation and resettlement of squatters on government lands that will be used for infrastructure projects. (See Table A6-3-4)

To provide the resettlement requirements, DPWH has recently entered into a Trust Fund Agreement (March 1992) with the Housing and Urban Development Coordinating Council (HUDCC). The purpose of the Trust is the acquisition, development and construction of suitable relocation sites for squatter families to be displaced from areas affected by projects of DPWH. DPWH provided ₱ 60 million to initially constitute the Trust Fund. The financial arrangements are based on a revolving fund with the Trustee as the Housing Insurance Guaranty Corporation (HIGC) operating with the instructions of HUDCC. (See Figure A6-3-1)

Because of the limited numbers of areas (both government and private) available and affordable to displaced squatters, DPWH avails of lots still open in existing NHA sites (e.g., Bagong Silang, Sapang Palay).

8. PRIVATE SECTOR RELOCATION SCHEMES

There are also relocation/resettlement schemes which are directly undertaken by private landowners who pay the affected families only a cash compensation. A project along this line was carried out by Eco-Asia in 1991 involving the eviction of thirty-five families from private land in Muntinlupa. To mitigate the costs of dislocation, each squatter family was compensated ₱ 5,000 with an additional ₱ 500.00 to every household member. Funds were provided by the First Filipino Holding Corporation a private corporation owned by the landowner.

Table A6–3–2
NHA RELOCATION & RESETTLEMENT PROJECTS (1960–1982)

NAME OF PROJECT	RELOCATION SITE	TARGET NO. OF BENE-FICIARIES	STRATEGY	COST OF LOTS	REPAYMENT SCHEME	MONTHLY AMORTIZATION ₱	TIME FRAME	STATUS
• Bulihan (1970)*	Silang Cavite 84.92 hectares	5,160 families	Provision of infrastructure and community centers	Social lots (90 sq. m.) = covered by P.D. 251	25 years – no interest	30 – 50.00	1970 – 1980	Present number of Beneficiaries: 4,981 families
				Economic lots (180 sq. m.) = ₱ 123,000 – 165,000/sq. m.	15 years – 12% P.A.	135 – 350.00		
• Bagong Nayon (1982)	Antipolo, Rizal 179.05 hectares	8,425 families	Provision of infrastructure, livelihood activities, and social services.	Social lots (72 sq. m.) = ₱ 208.30/sq. m.	25 years	50.00	1982 – 1989	Present number of Beneficiaries: 4,013 families
				Economic lots (150 sq. m.) = ₱ 300.00/sq. m.	15 years	495.00		
• Bagong Silang (1982)	Caloocan City 598 hectares	32,280 lots	Provision of housing, infrastructure development community facilities, job opportunities, community/civic programs, and social services;	Social lots (60 sq. m.) = ₱ 165.00/sq. m.	25 years – no interest	30 – 50.00	1982–on–going	Present number of Beneficiaries: 18,662 families
			Project Kanlungan: – 150 thin shell units completed – 160 duplex homes – 160 2–storey rowhouses	Economic lots (90 sq. m.) = ₱ 265.00/sq. m.	15 years – 12% P.A.	204.18–312.20		
• Dasmariñas Bagong Bayan (1961)	Caloocan City 463 hectares	14,859 families	Provision of housing, infrastructure development community facilities, livelihood development through an inter–agency approach, social services and community development	Total project cost: ₱ 24 million	25 years – no interest	30 – 50.00	12 years dev't. of project (from 1961–1973)	Present number of Beneficiaries: 14,225 families
• Sapang Palay (1960)	San Jose del Monte, Bulacan 752.50 hectares	22,800 families	Provision of housing, asphalt roads, bridges, covered/underground drainage system, deepwells, pumps, available Meralco power supply, transport system, and established community/public facilities.	Total project cost: ₱ 203,872,771.50 Lot = ₱ 100/sq. m.	25 years – no interest	10.00	1960–1968	The project in processing at present the turn–over of 194,452 sq. m. parcel of land and 20 public facilities to different government agencies.

Source: National Housing Authority, Resettlement and Development Services Department and Sites and Services Group

* There are 2 other resettlement areas in Bulihan: General Mariano Alvarez (GMA) and San Pedro. GMA has 340.9 has with 18,333 resettled families at present. San Pedro has 51.6 has. with 7,400 resettled families.

Table A6–3–3
NHA RELOCATION AND RESETTLEMENT PROJECTS 1992

NAME OF PROJECT	RELOCATION STRATEGY	BENEFICIARIES	PARTICIPATING AGENCIES AND THEIR RESPONSIBILITIES		TIME FRAME	COSTS	
						TO BENEFICIARY	TO FINANCING AGENCIES
• Public Estates Authority (PEA)–NHA (Las Piñas)	– PEA purchased land in Las Piñas from private land owners. – NHA developed the land under their Sites and Services Program as a modest–type subdivision with basic infrastructure (i.e., major roads, foot–paths, water and electricity)	1,527 squatter families occu–pying reclaimed land owned by PEA	PEA NHA PCUP LGU DSWD HUDCC	Acquisitiom of private land Subdivision of lots Accreditation of squatters Approval of construction and provision of other services i.e. hospital, community centers Provision of social services Overall policy making	1988–Feasibility 1989–Infrastruc–ture dev. and intitial relocation 1990–Completed	₱ 250–300.00 monthly amortization	₱ 200–250.00/ sq.m. for land (one Home Lot 36 sq. m.)
• Philippine Ports Authority (PPA)–NHA Vitas Housing Project (Tondo, Manila)	– NHA had in– city property (Tondo) near the original site. PPA provided funds to develop property. – Low–cost medium rise housing (4–storey walk ups) constructed under the Community Mortgage Program. Groundfloor open for rental to commercial establishments.	501 families relocated from PPA land intended for international port	PPA NHA PCUP LGU DSWD HUDCC	Acquisition of land and construction of medium rise Accreditation of squatters Approval of construction Provision of social services Overall policy–making	Construction completed in '91 and occupancy is ongoing	₱ 250–515.44 monthly amortization	₱ 250 M (Total cost, covering land acquisition, development and housing)

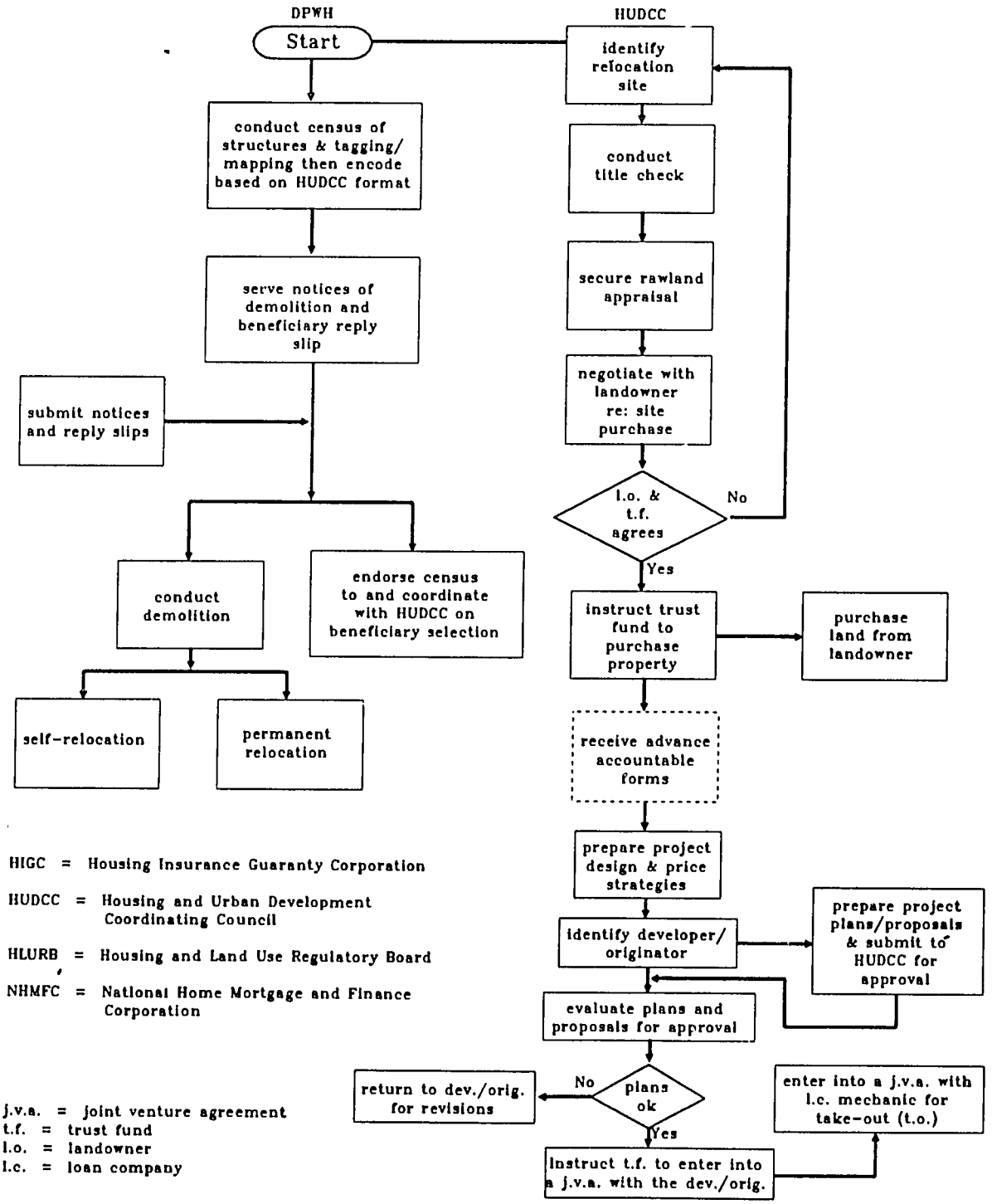
Source: National Housing Authority, Resettlement and Development Services Department.

PEA – Public Estates Authority
NHA – National Housing Authority
PCUP – Presidential Commission for the Urban Poor
LGU – Local Government Unit
DSWD – Department of Social Work and Development
HUDCC – Housing and Urban Development Coordinating Council
PPA – Philippine Ports Authority

Table A6–3–4
DPWH RESETTLEMENT PROJECTS

NAME OF PROJECT	RELOCATION SITE	TARGET NO. OF BENE–FICIARIES	STRATEGY	COST OF LOTS	REPAYMENT SCHEME	MONTHLY AMORTIZATION	TIME FRAME	STATUS
COMPLETED PROJECT								
• Mangahan (Pasig)	Cogeo (Quezon City) Bagong Silang (Caloocan City) Bulacan	3,000 families	– Trust agreement (DPWH – HIGC – HUDCC) – Community Mortagage Program available to squatters – Paid lot owners – Squatters served notice to vacate – Tenants'compensation of P 5,000 to help them look for another job in 2 months – relocation site within 20–25 km. radius from original site	P 49 million for lots P 20 – 30 million for improvements P 25,000 per family for the development of land and cost of land Price/sq. m. is no more than P 200.00	25 years	P 140/mo. for first 6 years P 240/mo. for remaining years	1975–1980	Present number of relocated families: 3,000 families
NEW PROJECTS 1992								
• C–5 (Pasig)	not available	520 families	– Trust agreement (DPWH – HIGC – HUDCC)	NO INFORMATION AVAILABLE YET			ONGOING	
• MMFCP (Manila)	not available	4,900 families	– Community Mortagage Program available to squatters					
• Link Road (Manila)	not available	2,000 families						

Figure A6-3-1
DPWH RELOCATION PROCEDURES INVOLVING TRUST FUND AGREEMENT WITH HIGC AND HUDCC



HIGC = Housing Insurance Guaranty Corporation

HUDCC = Housing and Urban Development Coordinating Council

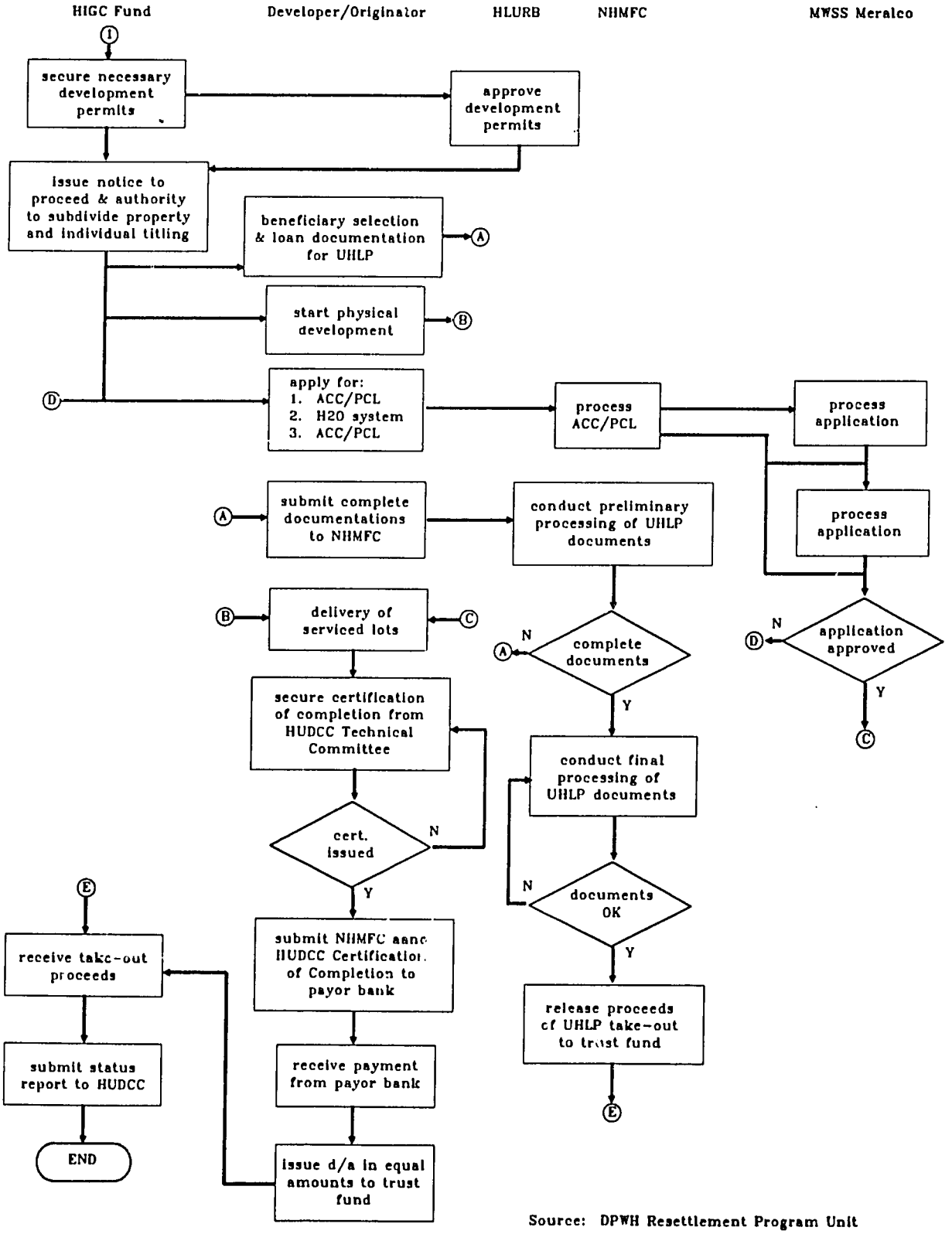
HLURB = Housing and Land Use Regulatory Board

NHMFC = National Home Mortgage and Finance Corporation

j.v.a. = joint venture agreement
t.f. = trust fund
l.o. = landowner
l.c. = loan company

Source: DPWH Resettlement Program Unit

Figure A6-3-1 (continued)
DPWH RELOCATION PROCEDURES INVOLVING
TRUST FUND AGREEMENT WITH HIGC AND HUDCC



Source: DPWH Resettlement Program Unit

Appendix A6-4

FIELD SURVEY OF SQUATTER POPULATION ALONG THE PNR RIGHT-OF-WAY (Pres. Quirino Ave. to Bicutan)

Appendix A6-4
FIELD SURVEY OF THE SQUATTER POPULATION ALONG THE PNR RIGHT-OF- WAY
(President Quirino to Bicutan)

1. OBJECTIVES AND METHODOLOGY

A field survey of the squatter population along the PNR right-of-way was conducted by the Consultant in June/July 1992.

The objective of the survey was to obtain current and reliable data that would provide an insightful analysis of the impact of the Manila South Tollway on this squatter population, and more precisely on issues in relocation.

Specifically the survey was designed to:

- Gather demographic, socio-economic data and data on living circumstances i.e. type of housing/structure, community life, previous locations of settlement
- Determine attitudes towards relocation
- Assist in identifying strategies for relocation

The survey adopts the descriptive - normative research design wherein the present state of affairs are described, reviewed, analyzed and interpreted. The circumstances of the squatters along the PNR right-of-way from President Quirino Avenue to Bicutan were analyzed to result in recommendations regarding ways of mitigating any negative impacts of the MST project on their communities.

As a field survey of the current circumstances of a squatter population that is rarely studied, (studies in the Philippines focus on squatters in open land), the survey will also be useful in providing municipalities, barangays, community organizations and agencies critical information.

Survey Locale

The primary concern of the survey was the squatter population from President Quirino Avenue to Bicutan since the recommended alignment of the MST is above the PNR track along this stretch. There are 11,215 squatters in this section of the PNR right-of-way. This represents 22% of the total estimated squatter population of 51,215 along the right-of-way from Quirino to Alabang.

Sample

The survey covered a total sample size of 130, given the above population estimate and using a sampling error of 0.10. Given the objective of the study, this sample size in relation to the

population falls within the 95% confidence level and .10 proportion of tolerable error specified in the Table of Sample Sizes of the Philippine Social Science Council.

Proportionate sampling was then employed in identifying respondents along the PNR right-of-way. On the basis of the obtained squatter population figures, the sample covered 30 randomly selected respondents from the five barangays of Manila, 60 from the four barangays of Makati, and 40 from Parañaque and Taguig. This comprises a total sample of 130.

Household heads mainly comprised the respondents of the study. In cases of the non-availability of the household head, the participation of a willing member of the household who was perceived as able to participate in the study was solicited.

Selected Sites

Field visits to two selected sites near the Sucat and Quirino interchanges were also conducted. These are 1) Masay and 2) Barangay 734 near the Esteros de Paco which could be affected by the alignment at the respective interchanges. The purpose of the field trips was essentially to gather and verify information on-site, determine potential impacts and compare alternative alignments near these sites.

The Masay site composed of the Manga Aratiles Silangan Homeowners Association has around 10,000 persons and 1,000 houses. The site was purchased in 1991 by government and the original squatters there were awarded lots under the Community Mortgage Program of the HIGC.

Barangay 734 has approximately 1,800 persons of whom 40% are squatters. The section of land along the creek is government owned and the section along the SLE is privately owned. Residents therefore also include "renters". Under legislation, the government would not be responsible for squatters on private land.

Questionnaire

A questionnaire was designed to gather the following data:

- demographic
- employment
- income
- existing basic and community services used by squatters along the track
- type of squatter houses/structures along the track
- circumstances of previous settlement/use of government assistance or relocation programs
- perceptions towards change and attitudes towards development projects
- preferences concerning relocation

A sample of the questionnaire is provided in this Appendix.

2. 1992 BARANGAY ESTIMATES OF THE SQUATTER POPULATION

BARANGAYS	BARANGAY POPULATION	PNR TRACKS SQUATTER POPULATION		PNR TRACKS SQUATTER FAMILIES
MANILA				
Quirino-Vito Cruz				
♦ Bgy. 800	5,000	1,038	(20.76%)	208
♦ Bgy. 803	2,000	150	(7.5%)	30
♦ Bgy. 807	5,000	12	(0.24%)	2
♦ Bgy. 764	3,000	--		--
♦ Bgy. 709	1,000	--		--
MAKATI				
Vito Cruz-Nichols				
♦ Bgy. San Antonio	18,000	1,500	(8.33%)	300
♦ Bgy. Pio del Pilar	50,000	815	(1.63%)	163
♦ Bgy. Bangkal	65,000	2,900	(4.46%)	580
♦ Bgy. Magallanes	14,000	4,000	(28.57%)	1,000
TAGUIG/PARAÑAQUE				
Bicutan-Sucat				
♦ Bgy. Tanyag	266,080	4,000	(1.50%)	800
Nichols-Bicutan				
♦ Bgy. Saint Martin de Pores	30,000	800	(2.67%)	200
MUNTINLUPA				
Sucat-Alabang				
♦ Bgy. Sucat	175,000	25,000	(14.29%)	5,000
♦ Bgy. Cupang	50,000	6,000	(12%)	1,200
♦ Alabang	45,000	5,000	(11.11%)	1,000
TOTAL	729,080	51,215	(7.02%)	10,483

% refers to the percentage of squatters in the respective barangay.
Source: Information was obtained from the Barangay Chairpersons of the Barangays crossed by the PNR track from Quirino to Alabang.

3. FIELD SURVEY RESULTS

The results of the field survey were coded, tabulated and analyzed and are presented in Tables A6-4-1 to A6-4-17.

Table A6-4-i
PNR SQUATTERS' PLACE OF ORIGIN AND LENGTH OF STAY ALONG THE TRACKS

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Place of Origin								
Luzon	14	46.67	21	35.0	26	65	61	46.92
Visayas	15	50	34	53.67	11	27.5	60	46.16
Mindanao	1	3.33	5	8.33	3	7.5	9	6.92
Year moved to Manila								
1930-1939	1	3.33	0	0	0	0	1	0.77
1940-1949	2	6.67	1	1.67	0	0	3	2.31
1950-1959	3	10	4	6.67	2	5	9	6.92
1960-1969	7	23.33	8	13.33	6	15	21	16.15
1970-1979	9	30.0	15	25	15	37.5	39	30
1980-1989	8	26.67	30	50	17	42.5	55	42.31
1990-1992	0	0	2	3.33	0	0	2	1.54
Lived in Squatter Area Prior to Track Location								
Yes	18	60	38	63.33	28	70	84	64.62
No	12	40	22	36.67	12	30	46	35.38
Length of Stay in Present Location								
Less than 1 year	0	0	6	10	2	5	8	6.16
1-3 years	3	10	10	16.67	11	27.5	24	18.46
4-6 years	10	33.33	22	36.67	6	15	38	29.23
7-9 years	10	33.33	11	18.33	4	10	25	19.23
10 & above	7	23.33	11	18.33	17	42.5	35	26.92

Question Nos. A.1a, b, c, d.

Table A6-4-2
HOUSEHOLD SIZE AND COMPOSITION

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Household Size								
1-3	5	16.67	16	26.67	14	35	35	26.92
4-6	18	60	29	48.33	14	35	61	46.92
7-9	4	13.33	14	23.33	8	20	26	20
10 above	3	10	1	1.67	4	10	8	6.16
Number of Families Living in the House								
1	21	70	17	85	33	82.5	105	80.77
2	6	20	5	8.33	5	12.5	16	12.31
3	3	10	2	3.33	1	12.5	6	4.61
4	0	0	0	0	1	2.5	1	0.77
5 above	0	0	2	3.33	0	0	2	1.54
Number of Children (14 below)								
1	6	20	18	30.0	7	17.5	31	23.85
2	7	23.33	10	16.67	8	20.0	25	19.23
3	9	10	10	16.67	6	15.0	25	19.23
4	4	13.33	7	11.6	1	2.5	12	9.23
5	0	0	5	8.33	2	5.0	7	5.38
6	0	0	1	1.67	3	0	4	3.08
7	0	0	0	0	0	0	0	0
8	0	0	0	0	1	2.5	1	0.77
Number of Adults (15 above)								
1	1	3.33	11	18.33	5	12.5	17	13.08
2	12	40	4	6.67	2	5	18	13.85
3	0	0	5	8.33	1	2.5	6	4.62
4	1	3.33	1	1.67	2	5	4	3.08
5	1	3.33	0	0	3	7.5	4	3.08
6	0	0	0	0	2	5	2	1.54
7	0	0	0	0	1	2.5	1	0.77
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	1	2.5	1	0.77

Question Nos. A.2a, b, c, d.

Table A6-4-3
FAMILIES WITH MEMBERS IN SCHOOL

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Numbers In School								
1	5	16.67	13	21.67	8	20	26	20
2	5	16.67	10	16.67	4	10	19	14.62
3	3	40	9	15	6	15	18	13.85
4	2	6.67	0	0	3	7.59	5	3.85
5	0	0	1	1.62	1	2.5	2	1.54

Question Nos. A.2e

Table A6-4-4
MONTHLY HOUSEHOLD INCOME AND OTHER INCOME

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Monthly Household Income								
Less than ₱1,000	3	10	4	6.67	3	7.5	10	7.69
₱1,000-2,000	13	43.33	24	40	9	22.5	46	35.38
₱2,001-3,000	10	33.33	14	23.33	10	25	34	26.15
₱3,001-4,000	3	10	6	10	3	7.5	12	9.23
₱4,001-5,000	1	3.33	6	10	2	5	9	6.92
₱5,001-6,000	0	0	2	3.33	4	10	6	4.62
₱6,001-7,000	0	0	1	1.67	1	2.5	2	1.54
₱7,001-8,000	0	0	0	0	0	0	0	0
₱8,001-9,000	0	0	2	3.33	1	2.5	3	2.31
₱9,001-10,000	0	0	1	1.67	3	7.5	4	3.08
₱10,001 above	0	0	0	0	4	10	4	3.08
Base	30		60		40		130	
With Other Sources of Income								
Yes	5	16.67	12	20.0	7	17.5	24	18.46
No	25	83.33	48	80.0	33	82.5	106	81.54

Question No. B.1, 3.

Table A6-4-5
NATURE OF JOB OF WORKING HOUSEHOLD MEMBERS

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	62		92		79		233	
	No.	%	No.	%	No.	%	No.	%
Nature of Job of Working Household Members								
Full-time	38	61.30	59	64.13	26	32.91	123	52.79
Part-time	13	20.97	20	21.74	6	7.59	39	16.74
Seasonal	2	3.22	0	0	0	0	2	0.86
Self-employed	9	0	13	14.13	47	49.50	69	29.61
Base	35		60		39		134	
Vendors	2	5.71	13	21.67	22	56.41	37	27.61
Construction Worker (Carpenter, Laborer)	11	31.43	17	28.33	7	17.95	35	26.12
Driver	6	17.14	14	23.33	3	7.69	23	17.16
Janitor; Messenger	5	14.29	3	9.09	0	0	8	5.97
Factory Worker	4	11.43	0	0	5	12.82	9	6.72
Domestic Worker	3	8.57	10	16.67	0	0	13	9.70
Security Guard	4	11.43	3	5.0	2	5.13	9	6.72
Base	30		60		40		130	
Own Business								
Yes	4	13.33	6	10.0	15	37.5	25	19.23
No	26	86.67	54	90.0	25	62.5	105	80.77
Base	30		60		40		130	
Have Other Job Interests								
Yes*	24	80	49	81.67	29	72.5	102	78.46
No	6	20	11	18.33	11	27.5	28	21.54

Question Nos. A.3, 5, E.2
*Mainly to own small business like sari-sari store and other "selling" activity/enterprises; sewing.

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Table A6-4-6
HOUSE OWNERSHIP

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Own/Rent House								
Own House	30	100	48	80	39	97.5	117	90
Rent House	0	0	12	20	1	2.5	13	10
Own/Rent Lot								
Own Lot	7	23.33	10	16.66	0	0	17	13.0
Rent Lot	2	6.67	1	1.67	0	0	3	2.3
Neither Own/nor Rent Lot	21	70	49	81.61	40	100	110	84.6

Question No. A.12

Table A6-4-7
TYPE OF HOUSE OF PNR SQUATTERS

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Type of House								
One storey/bungalow	30	100	59	98.33	32	80	121	93.08
Two storey	0	0	1	1.67	6	15	7	5.38
Others	0	0	0	0	2	5	2	1.54
House Structure Material[1]								
Wood	26	86.67	54	90.0	28	70	108	83.08
Concrete Block	0	0	0	0	4	10	4	3.08
Combination concrete and wood	1	3.33	6	10.0	8	20	15	11.54
Bamboo	0	0	0	0	0	0	0	.00
Others*	4	13.33	0	0	0	0	4	3.08
Type of Walling								
Rough Concrete	1	3.33	5	8.33	8	20	14	10.77
Cheap Wood	16	53.33	30	50.0	15	37.5	61	46.92
Finished Wood	0	0	0	0	0	0	0	0
Expensive Wood	0	0	0	0	0	0	0	0
Others*	13	43.33	25	41.67	17	42.5	55	42.31
Type of Roofing								
None	0	0	0	0	0	0	0	0
G.I. Sheet	27	90	57	95	39	97.5	123	94.61
Nipa	0	0	0	0	0	0	0	0
Cheap Wood	0	0	2	3.33	0	0	2	1.54
Plastic and Wood	0	0	0	0	0	0	0	0
Others*	3	10	1	1.67	1	2.5	5	9.85

[1]Multiple Responses
*Scrap Material

Question No. 8

Table A6-4-8
BASIC SERVICES AVAILABLE TO PNR SQUATTERS

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Direct Water Line								
Yes	1	3.33	2	3.33	0	0	3	2.30
No	29	96.67	58	96.67	40	100	127	97.70
Households Paying for Water								
Yes	25	83.33	26	43.33	40	100	91	70
No	5	16.67	34	56.67	0	0	39	30
Direct Electric Line								
Yes	3	10	2	3.33	9	22.5	14	10.77
No	27	90	58	96.67	31	77.5	116	89.23
Ways of Wastewater Disposal								
Septic Tank	1	3.33	8	13.33	15	37.5	24	18.46
Stream/River	12	40	6	10	0	0	19	13.85
Canal/Gutter	10	33.33	36	60	10	25	56	43.08
Others[1]	7	23.33	10	16.67	15	37.5	32	24.61
Type of Toilet Used								
Closed Pit	0	0	0	0	0	0	0	0
Open Pit	2	6.67	3	5	0	0	5	3.85
Pail System ("buhos")	14	46.67	50	83.33	37	92.5	101	77.69
Water Sealed, other depository shared with other households	0	0	0	0	0	0	0	0
None	0	0	3	5	2	5	5	3.85
Others[2]	14	46.67	4	6.67	1	2.55	19	14.61
Ways of Waste Disposal*								
Dumped anywhere but not collected by garbage truck	0	0	2	3.33	0	0	0	0
Collected by garbage truck	19	63.33	28	46.67	14	35	61	46.92
Burned/Compost	10	33.33	31	51.67	24	60	65	50.0
Others[3]	6	20	0	0	2	5	8	6.15
Presence of Health Center in Barangay								
Yes	30	100	52	86.67	37	92.5	119	91.54
No	0	0	8	13.33	3	7.5	11	8.46

Question Nos. C.1 - 6

[1]Along the tracks, basement of house, to water plants.
[2]Wrap and throw
[3]Garbage picked up daily by someone who they pay.
*Multiple Responses

Table A6-4-9
SOURCE OF WATER AND DISTANCE OF HOUSE FROM SOURCE

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	29		58		40		127	
	No.	%	No.	%	No.	%	No.	%
Sources of Water								
Public Faucet	13	44.83	35	60.35	32	80.0	80	63
Private Faucet (neighbor, relatives)	16	55.17	12	20.69	8	20.0	36	28.35
Artesian Well/Deep Well	0	0	10	17.24	0	0	10	7.87
Private Deep Well	0	0	1	1.72	0	0	1	0.78
Distance of House to Source of Water for Drinking/Cooking								
Less than 1 minute	15	51.72	5	8.62	6	15.0	26	20.47
1-5 minutes	13	44.83	38	65.51	22	55.0	73	57.48
6-10 minutes	0	0	4	6.9	6	15.0	10	7.87
11-15 minutes	0	0	4	6.9	3	7.5	7	5.51
16-20 minutes	0	0	2	3.45	1	2.5	3	2.36
21-25 minutes	0	0	0	0	0	0	0	0
26-30 minutes	0	0	3	5.17	1	2.5	4	3.15
More than 30 minutes	1	0	2	3.45	1	2.5	4	3.15
Distance of House to Source of Water for Washing								
Less than 1 minute	9	31.03	5	8.62	6	15.0	20	15.75
1-5 minutes	19	65.52	38	65.51	22	55.0	79	62.20
6-10 minutes	0	0	4	6.9	6	15.0	10	7.87
11-15 minutes	0	0	4	6.9	3	7.5	7	5.51
16-20 minutes	0	0	2	3.45	1	2.5	3	2.36
21-25 minutes	0	0	0	0	0	0	0	0
26-30 minutes	0	0	3	5.17	1	2.5	4	3.15
More than 30 minutes	1	3.45	2	3.45	1	2.5	4	3.15
Distance of House to Sources of Water for Bathing								
Less than 1 minute	8	37.59	5	8.62	6	15	19	14.96
1-5 minutes	20	68.96	38	65.51	22	55	80	62.99
6-10 minutes	0	0	4	6.9	6	15	10	7.87
11-15 minutes	0	0	4	6.9	3	7.5	7	5.51
16-20 minutes	0	0	2	3.45	1	2.5	3	2.36
21-25 minutes	0	0	0	0	0	0	0	0
26-30 minutes	1	3.45	3	5.17	1	2.5	5	3.94
More than 30 minutes	0	0	2	3.45	1	2.5	3	2.36

Question Nos. C1.1, 1.2

Table A6-4-10
COSTS OF BASIC SERVICES

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Paying Water								
Yes/Cost of Water	25	83.33	26	43.33	40	100	91	70
	₱ 2-5.00/container/day		₱ 3-5.00/gal/day		₱ 1-2.00/container/day			
No	5	16.67	34	56.67	0	0	39	30
Base	27		52		36		115	
Paying Electricity								
Yes/Cost of Electricity	20	74.07	35	67.31	32	88.89	87	75.65
	₱ 20-50.00/month		₱ 20-100.00/month		₱ 150-500/month			
No	7	25.92	17	32.69	4	11.11	28	24.35
Base	30		47		36		113	
Paying Health Services								
es/Cost	2	6.67	0	0	3	8.33	5	4.42
	Donation				Donation			
No	28	93.33	47	100	33	91.67	108	95.58
Base	30		60		40		130	
Paying for Schooling								
Yes	15	50	35	58.33	27	67.5	77	59.23
	₱ 10-20.00/month		₱ 5-10.00/month		₱ 6-10.00/month			
No	15	50	25	41.67	13	32.5	53	40.77

Question Nos. C.1.3, 2.2, 6.3, 7.

Table A6-4-11
AVAILABLE COMMUNITY SERVICES

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Presence of Community Organization Along Tracks								
Yes	17	56.67	39	65.0	20	50	76	58.46
No	13	43.33	21	35.0	20	50	54	41.54
Base	17		60		20		97	
Members of Community Organization								
Yes	15	88.24	39	65	10	50	64	65.98
No	2	11.76	21	35	10	50	33	34.02
Base	30		60		40		130	
Other Perceived Leaders Along Tracks*								
Yes	7	23.33	48	80	22	55	77	59.23
No	23	76.67	12	20	18	45	53	40.77

Question Nos. 10.2, 10.3, 10.5.

*Leaders of community association or organizations; e.g. Samahang Daang Bakal in Manila and Kapit Kamay in Makati

Table A6-4-12
HOUSEHOLDS WITH PREVIOUS PROBLEMS OF EVICTION AND SOUGHT/LAND ASSISTANCE

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Problem with Eviction								
Yes	27	90	30	50	17	42.5	74	56.92
No	3	10	30	50	23	57.5	56	43.08
Sought Housing/Land Assistance								
Yes	5	16.67	7	11.67	2	5	14	10.77
No	25	83.33	53	88.33	38	95	116	89.23

Question Nos. 9, 9.2.

Table A6-4-13
LIKE LIVING NEAR TRACKS AND WHETHER OR NOT RISKY

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Like Living Near Tracks								
Yes	20	66.67	53	88.33	39	97.5	112	86.15
No	10	33.33	7	11.67	1	2.5	18	13.85
Whether or Not Risky								
Yes	20	66.67	48	80	31	77.5	99	76.15
No	10	33.33	12	20	9	22.5	31	23.85

Question Nos. D.6.1, 6.2.

Table A6-4-14
HOUSEHOLDS WILLING TO BE RELOCATED, PLACE AND ASSISTANCE NEEDED

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Willing to be relocated								
Yes	25	83.33	52	86.67	28	70	105	80.77
No	5	36.67	8	13.33	4	10	17	13.08
It depends	0	0	0	0	8	20	8	6.15
Base	27		56		21		104	
Place willing to be relocated								
Within same area or city/municipality	6	22.22	35	62.5	13	61.90	54	51.92
Within Metro Manila	11	40.74	4	7.14	5	23.81	20	19.23
Outside Metro Manila (Cavite, Bulacan)	7	25.93	5	8.93	0	0	12	11.54
Others*	3	11.11	12	21.43	3	14.29	18	17.31
Base	34		49		41		124	
Assistance Needed								
Job	13	38.23	16	32.65	6	14.63	35	28.23
Own Land/Lot	2	5.88	0	0	0	0	2	1.61
Own House	11	32.35	0	0	0	0	11	8.87
Own Lot/House	7	20.59	26	63.06	27	65.85	60	48.39
Basic Services	1	2.94	6	12.25	4	9.76	11	8.87
Financial	0	0	1	2.04	4	9.76	5	4.03

Question Nos. D.6, 6.3, 7.

*Wherever the government wants; where these is work available; no idea/don't know.

Table A6-4-15
AWARENESS AND PERCEIVED EFFECT OF A PROPOSED DEVELOPMENT PROJECT

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	30		60		40		130	
	No.	%	No.	%	No.	%	No.	%
Awareness								
Yes	6	20.0	24	40.0	16	40.0	46	35.38
No	24	80.0	36	60.0	24	60.0	84	64.62
Base	27		70		32		129	
Perceived Positive Effects*								
Employment	11	40.74	29	41.23	18	56.25	58	44.96
Income	0	0	8	11.43	7	21.86	15	11.63
New Housing	2	7.41	2	2.86	1	3.13	5	3.88
Community Solidarity	1	3.70	0	0	1	3.13	2	1.55
None	6	22.22	4	5.71	1	3.13	11	8.53
Others[1]	7	25.93	11	15.71	4	12.5	22	17.05
OK (Don't know)	0	0	16	22.86	0	0	16	12.40
Base	38		111		63		212	
Perceived Negative Effects*								
Loss of residence	22	57.89	54	48.65	35	55.55	111	52.36
Loss of job	10	26.32	31	27.93	20	31.75	61	28.77
Disruption of Children's education	3	7.89	18	16.22	8	12.70	29	13.68
None	2	5.26	0	.00	0	.00	2	0.94
Others[2]	1	2.63	2	1.80	0	.00	3	1.42
OK (Don't know)	0	.00	6	5.40	0	.00	6	2.83
Base	29[3]		60		39[4]		128	
Perceived Overall Effects								
Will help a lot the community	12	41.38	28	46.67	22	56.41	62	48.44
Will be able to help but not much	8	27.59	15	25.0	7	17.95	30	23.44
Will not help at all the community	5	17.24	2	3.33	5	12.82	12	9.37
Will do no good to the community	4	13.79	12	20.0	5	12.82	21	16.41
OK (Don't know)	0	0	3	5.0	0	0	3	2.34

Question Nos. D.2, 4, 5.

[1]No more flooding, better transportation system, no more squatters
[2]No longer safe for children (risky).
[3]1 Respondent = No Answer
[4]1 Respondent = No Answer
*Multiple Responses

Table A-4-16
PERCEIVED CHANGES IN PAST 2 YEARS*

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	45		91		36		172	
	No.	%	No.	%	No.	%	No.	%
Population	3	6.67	30	32.97	20	55.56	53	30.81
Water	7	15.56	16	17.58	4	11.11	27	15.70
Electricity	8	17.77	8	8.79	0	0	16	9.30
Health	2	4.44	7	7.69	2	6.25	11	6.40
Sewerage & drainage	4	8.88	15	16.48	2	6.25	21	12.21
Resident's livelihood	0	0	0	0	4	11.11	4	2.32
Infrastructure	15	33.33	9	9.89	0	0	24	13.95
Land/Housing	0	0	0	0	0	0	0	0
Community Organization	0	0	4	4.40	1	2.77	5	2.91
Others[1]	6	13.33	2	2.20	3	8.33	11	6.40

Question No. D.1.

*Multiple Responses
[1]Cleanliness

Table A-6-17
PLANS*

	MANILA		MAKATI		PARAÑAQUE/ TAGUIG		TOTAL	
Base	37		81		46		164	
	No.	%	No.	%	No.	%	No.	%
Move to another area	9	23.32	7	8.64	1	2.17	17	10.36
Job	1	2.70	26	32.1	17	36.96	44	23.83
Children's Schooling	7	18.92	27	33.33	13	28.26	67	28.66
Secure Land Tenure	8	21.62	6	7.41	1	2.17	15	9.15
Improve housing	11	29.73	0	0	0	0	11	6.71
condition	0	0	15	18.52	11	23.91	26	15.85
Others*	1	2.70	0	0	3	6.52	4	2.44

Question No. E.1.

*Multiple Responses
[1]Just to have a better life.

INTERVIEW FORM FOR SAMPLE SURVEY OF SQUATTER POPULATION
Manila South Tollway

_____
Barangay

R's Position in Hh: _____

_____
City/Municipality

A. DEMOGRAPHIC BACKGROUND

1. Migration Background

a. Place of origin _____

b. When moved to Metro Manila _____

Where settled first _____

c. Before you settled here, where did you live? _____

Was it a squatter area? 1 Yes 2 No

Why did you leave? _____

d. Length of stay in present location _____

e. 1 Own House
2 Rent House
3 Own Lot
4 Rent Lot
5 Neither Own nor Rent Lot

If renting, how much do you pay rent for your:

1 House (per month) _____
2 Lot (per month) _____

2. Family/Household Data

a. How many persons are there in the household ? _____

b. How many families are there? _____

c. Number of children (under 15) _____

d. Number of adults (over 15) _____

e. How many are going to school? _____

3. For each member of the household, please state their age, job and educational level completed in the Table below. Use the following codes for educational level.)

0 - No schooling
1 - Some grade school
2 - Elementary graduate to some high school
3 - High school graduate to some college
4 - College graduate
5 - Graduate studies
6 - Vocational school

Code No.	Name of Hh Members (Start with Hh head)	Age of Hh Members	Job of Hh Members Working	Full-time Part-time or Seasonal	Self-Employed (Type of Business)

B. EMPLOYMENT DATA

1. What is the average household income (per month) _____

2. Who is the principal breadwinner? _____

   Type of work: _____

3. Does he/she have other source(s) of income

   1 Yes
   2 No

   3.1 Specify other source(s) of income _____

4. Place of work

   4.1 How long does it take to travel from your house to place of work? _____ (minutes)

   4.2 Mode of travel to work:

1 Bus	5 Taxi
2 Jeepney	6 Train
3 Bicycle	7 Walking
4 Motorcycle	8 Others, specify: _____

   4.3 Working hours _____

   4.4 Length of stay in present job _____

5. Do you or other members of your household own a business (e.g., a sari-sari store)?

   1 Yes
   2 No

   5.1 What kind of business? _____

   5.2 Where is it located/situated? _____

   5.3 What is the average income from this business _____ (per month)

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C. PROVISION OF BASIC AND COMMUNITY SERVICES

1. Do you have a direct water line?

   1 Yes
   2 No

   1.1 If no, where do you usually go to get water? _____

   1.2 How far is your house to the source of water you use for:

   1 drinking and cooking _____
   2 personal washing/bathing _____
   3 washing clothes _____

   1.3 Do you pay?

   1 Yes
   2 No

   If yes, how much? _____ (specify per day, week or month and size of container.)

2. Do you have a direct electrical connection?

   1 Yes
   2 No

   2.1 If no, how do you get your power supply? _____

   2.2 Do you pay?

   1 Yes
   2 No

   If yes, how much? _____ (per month)

3. How do you dispose of your wastewater (from kitchen, etc.)?

1 Septic tank
2 Stream/River
3 Canal/Gutter
4 Others, specify _____

4. What kind of toilet do you use? _____

1 Closed pit (without a water-sealed bowl and the depository is constructed usually of large circular tubes made of concrete or clay covered on top and has a small opening)
2 Open pit (same as closed pit but without covering like concrete or clay)
3 Pail system
4 Water-sealed, other depository shared with other households
5 None
6 Others, specify: _____

5. How do you dispose of garbage?

1 Dumped anywhere openly but not collected by garbage truck
2 Collected by garbage truck
3 Burned/Compost
4 Others, specify _____

6. Is there a health center in the community?

1 Yes
2 No

6.1 What services are provided?

1 Immunization
2 Pre-natal/pregnancy/maternal check-ups
3 Infant care check-ups
4 Dental care
5 Medical consultations
6 Others, specify _____

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6.2 Are there any health services provided for free?

1 Yes
2 No

If yes, specify _____

6.3 On the average, how much do you pay for health assistance you receive?

_____

7. For every child going to school in your family, please state where they go to school, how long it takes to get to the school from your house, and the school fees for each child (if any).

Child	School Name	Time to get to school	Monthly school fees (indicate if not paying)

8. Housing Material

Type of House:	1 - One storey 2 - Two storey 3 - Others, specify: _____
Structure of House:	1 - Wood 2 - Concrete block 3 - Combination Concrete and Wood 4 - Bamboo 5 - Others, specify: _____

Type of Wall:	1 - Rough Concrete 2 - Cheap Wood 3 - Finished Concrete 4 - Expensive Wood 5 - Others, specify: _____
Type of Roofing:	1 - None 2 - GI Sheet 3 - Nipa 4 - Cheap Wood 5 - Plastic and wood 6 - Others, specify _____

9. Since your stay in the area, did you ever have a problem with eviction?

1 Yes
2 No (go to 9.2)

9.1 If yes, when and why? _____

What did you do? _____

9.2 Have you availed of any government assistance for housing or land ownership?

1 Yes
2 No

If yes, where? _____

Status: _____

10. Community Services and Organizations

10.1 What other community services are provided? (Specify which ones are used) _____

_____

10.2 Are there community organizations along the PNR track?

1 Yes
2 No

10.3 Are you a member of any community organization?

1 Yes
2 No

If yes, which organizations? _____

10.4 Have you ever sought help from a community organization?

1 Yes
2 No

What kind of help did you seek? _____

10.5 Apart from the Barangay leaders, are there other persons whom you regard as leaders in your area along the track?

_____
_____
_____
_____

D. PERCEIVED CHANGES

1. In the past 2 years, have there been any developments or changes in your community in the following aspects:

1 number of people
2 water
3 electricity
4 health
5 sewerage and drainage
6 residents' livelihood
7 roads
8 land/housing
9 community organizations
10 Others, specify: _____

1.1 Describe the change/s that have occurred. (Indicate changes by letter) _____

_____
_____

government, or any of its agencies, in your area?

1 Yes (Proceed to #3)
2 No (Proceed to #4)

3. (a) Where/from whom did you hear about the project?

_____
_____
_____

(b) What did you know about it?

_____
_____
_____

4. In your opinion, what do you think will be the effects of a development project, (an infrastructure project such as a road or highway) to your community?

Positive effects:
1 employment
2 income
3 new housing
4 community solidarity
5 none
6 others, specify _____

Negative effects:
7 loss of residence
8 loss of job
9 disruption of children's education
10 none
6 others, specify _____

5. In your opinion, the proposed project

1 will help a lot the community
2 will be able to help but not much
3 will not help at all the community
4 will do no good to the community

6. If such a project is implemented and your household is among those that would have to be relocated, would you agree to relocate?

1 Yes 2 No

If No, why?

6.1 Do you like living along the railroad tracks?

1 Yes Why? _____
2 No Why? _____

6.2 Do you consider it a danger area?

1 Yes Why? _____
2 No Why? _____

6.3 If it were possible to relocate you to another place, where would you want to be relocated? _____

6.4 Why would you want to be relocated there? _____
_____
_____

7. What kind of assistance do you feel should be provided to you, if any?

_____
_____
_____

8. If your household were to be given financial assistance for your relocation, how much do you think would be a just and fair amount? _____

E. PLANS

1. Do you have plans, if any, about: (Please circle)

1 moving to another area; if any, where? _____
2 your job/job interests specify _____
3 children's schooling
4 securing land tenure
5 improving housing condition
6 other plans _____
7 training needed specify _____

2. Respondent's Occupational skills _____

Appendix A6-5
PHILIPPINE GOVERNMENT REGULATIONS ON SQUATTERS

Appendix A6-5
PHILIPPINE GOVERNMENT REGULATIONS ON SQUATTERS

H. No. 34310
S. No. 234

Republic of the Philippines
Congress of the Philippines
Metro Manila

Fifth Regular Session

Begun and held in Metro Manila, on Monday, the twenty-second day of July, nineteen hundred and ninety-one.

[REPUBLIC ACT NO. 7279]

AN ACT TO PROVIDE FOR A COMPREHENSIVE AND CONTINUING URBAN DEVELOPMENT AND HOUSING PROGRAM, ESTABLISH THE MECHANISM FOR ITS IMPLEMENTATION, AND FOR OTHER PURPOSES

Be it enacted by the Senate and House of Representatives of the Philippines in Congress assembled:

ARTICLE I

TITLE, POLICY, PROGRAM AND DEFINITION OF TERMS

SECTION 1. *Title.* - This Act shall be known as the "Urban Development and Housing Act of 1992."

SEC. 2. *Declaration of State Policy and Program Objectives.* - It shall be the policy of the State to undertake, in cooperation with the private sector, a comprehensive and continuing Urban Development and Housing Program, hereinafter referred to as the Program, which shall:

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(a) Uplift the conditions of the underprivileged and homeless citizens in urban areas and in resettlement areas by making available to them decent housing at affordable cost, basic services, and employment opportunities;

(b) Provide for the rational use and development of urban land in order to bring about the following:

(1) Equitable utilization of residential lands in urban and urbanizable areas with particular attention to the needs and requirements of the underprivileged and homeless citizens and not merely on the basis of market forces;

(2) Optimization of the use and productivity of land and urban resources;

(3) Development of urban areas conducive to commercial and industrial activities which can generate more economic opportunities for the people;

(4) Reduction in urban dysfunctions, particularly those that adversely affect public health, safety and ecology; and

(5) Access to land and housing by the underprivileged and homeless citizens;

(c) Adopt workable policies to regulate and direct urban growth and expansion towards a dispersed urban net and more balanced urban-rural interdependence;

(d) Provide for an equitable land tenure system that shall guarantee security of tenure to Program beneficiaries but shall respect the rights of small property owners and ensure the payment of just compensation;

(e) Encourage more effective people's participation in the urban development process; and

(f) Improve the capability of local government units in undertaking urban development and housing programs and projects.

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SEC. 3. *Definition of Terms.* For purposes of this Act:

(a) "Affordable cost" refers to the most reasonable price of land and shelter based on the needs and financial capability of Program beneficiaries and appropriate financing schemes;

(b) "Areas for priority development" refers to those areas declared as such under existing statutes and pertinent executive issuances.

(c) "Blighted lands" refers to the areas where the structures are dilapidated, obsolete and unsanitary, tending to depreciate the value of the land and prevent normal development and use of the area.

(d) "Consultation" refers to the constitutionally mandated process whereby the public, on their own or through people's organizations, is provided an opportunity to be heard and to participate in the decision-making process on matters involving the protection and promotion of its legitimate collective interests, which shall include appropriate documentation and feedback mechanisms;

(e) "Idle lands" refers to non-agricultural lands in urban and urbanizable areas on which no improvements, as herein defined, have been made by the owner, as certified by the city, municipal or provincial assessor;

(f) "Improvements" refers to all types of buildings and residential units, walls, fences, structures or constructions of all kinds of a fixed character or which are adhered to the soil but shall not include trees, plants and growing fruits, and other fixtures that are mere superimpositions on the land, and the value of improvements shall not be less than fifty percent (50%) of the assessed value of the property;

(g) "Joint venture" refers to the commitment or agreement by two (2) or more persons to carry out a specific or single business enterprise for their mutual benefit, for which purpose they combine their funds, land resources, facilities and services;

(h) "Land assembly or consolidation" refers to the acquisition of lots of varying ownership through purchase or expropriation for the purpose of planned and rational development and socialized housing programs without individual property boundary restrictions;

(i) "Land banking" refers to the acquisition of land at values based on existing use in advance of actual need to promote planned development and socialized housing programs;

(j) "Land swapping" refers to the process of land acquisition by exchanging land for another piece of land of equal value, or for shares of stock in a government or quasi-government corporation whose book value is of equal value to the land being exchanged, for the purpose of planned and rational development and provision for socialized housing where land values are determined based on land classification, market value and assessed value taken from existing tax declarations: *Provided*, That more valuable lands owned by private persons may be exchanged with less valuable lands to carry out the objectives of this Act;

(k) "Land use plan" refers to the rational approach of allocating available land resources as equitably as possible among competing user groups and for different functions consistent with the development plan of the area and the Program under this Act;

(l) "On-site development" refers to the process of upgrading and rehabilitation of blighted and slum urban areas with a view of minimizing displacement of dwellers in said areas, and with provisions for basic services as provided for in Section 21 hereof;

(m) "Professional squatters" refers to individuals or groups who occupy lands without the express consent of the landowner and who have sufficient income for legitimate housing. The term shall also apply to persons who have previously been awarded homelots or housing units by the Government but who sold, leased or transferred the same to settle illegally in the same place or in another urban area, and *non-bona fide* occupants and intruders of lands reserved for socialized housing. The term shall not apply to individuals or groups who simply rent land and housing from professional squatters or squatting syndicates;

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(n) "Resettlement areas" refers to areas identified by the appropriate national agency or by the local government unit with respect to areas within its jurisdiction, which shall be used for the relocation of the underprivileged and homeless citizens;

(o) "Security of tenure" refers to the degree of protection afforded to qualified Program beneficiaries against infringement or unjust, unreasonable and arbitrary eviction or disposition, by virtue of the right of ownership, lease agreement, usufruct and other contractual arrangements;

(p) "Slum Improvement and Resettlement Program or SIR" refers to the program of the National Housing Authority of upgrading and improving blighted squatter areas outside of Metro Manila pursuant to existing statutes and pertinent executive issuances;

(q) "Small property owners" refers to those whose only real property consists of residential lands not exceeding three hundred square meters (300 sq. m.) in highly urbanized cities and eight hundred square meters (800 sq. m.) in other urban areas;

(r) "Socialized housing" refers to housing programs and projects covering houses and lots or homelots only undertaken by the Government or the private sector for the underprivileged and homeless citizens which shall include sites and services development, long-term financing, liberalized terms on interest payments, and such other benefits in accordance with the provisions of this Act;

(s) "Squatting syndicates" refers to groups of persons engaged in the business of squatter housing for profit or gain;

(t) "Underprivileged and homeless citizens" refers to the beneficiaries of this Act and 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 and Development Authority and who do not own housing facilities. This shall include those who live in makeshift dwelling units and do not enjoy security of tenure;

(u) "Unregistered or abandoned lands" refers to lands in urban and urbanizable areas which are not registered with the

Register of Deeds, or with the city or municipal assessor's office concerned, or which are uninhabited by the owner and have not been developed or devoted for any useful purpose, or appears unutilized for a period of three (3) consecutive years immediately prior to the issuance and receipt or publication of notice of acquisition by the Government as provided under this Act. It does not include land which has been abandoned by reason of *force majeure* or any other fortuitous event: *Provided*, That prior to such event, such land was previously used for some useful or economic purpose;

(v) "Urban areas" refers to all cities regardless of their population density and to municipalities with a population density of at least five hundred (500) persons per square kilometer

(w) "Urbanizable areas" refers to sites and lands which, considering present characteristics and prevailing conditions, display marked and great potential of becoming urban areas within the period of five (5) years; and

(x) "Zonal Improvement Program or ZIP" refers to the program of the National Housing Authority of upgrading and improving blighted squatter areas within the cities and municipalities of Metro Manila pursuant to existing statutes and pertinent executive issuances.

ARTICLE II

COVERAGE AND EXEMPTIONS

SEC. 4. *Coverage*. – The Program shall cover all lands in urban and urbanizable areas, including existing areas for priority development, zonal improvement sites, slum improvement and resettlement sites, and in other areas that may be identified by the local government units as suitable for socialized housing.

SEC. 5. *Exemptions*. – The following lands shall be exempt from the coverage of this Act:

(a) Those included in the coverage of Republic Act No. 6657, otherwise known as the Comprehensive Agrarian Reform Law;

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(b) Those actually used for national defense and security of the State;

(c) Those used, reserved or otherwise set aside for government offices, facilities and other installations, whether owned by the National Government, its agencies and instrumentalities, including government-owned or -controlled corporations, or by the local government units: *Provided, however*, That the lands herein mentioned, or portions thereof, which have not been used for the purpose for which they have been reserved or set aside for the past ten (10) years from the effectivity of this Act, shall be covered by this Act;

(d) Those used or set aside for parks, reserves for flora and fauna, forests and watersheds, and other areas necessary to maintain ecological balance or environmental protection, as determined and certified to by the proper government agency; and

(e) Those actually and primarily used for religious, charitable, or educational purposes, cultural and historical sites, hospitals and health centers, and cemeteries or memorial parks.

The exemptions herein provided shall not apply when the use or purpose of the abovementioned lands has ceased to exist.

ARTICLE III

NATIONAL URBAN DEVELOPMENT AND HOUSING FRAMEWORK

SEC. 6. *Framework for Rational Development*. – There shall be a National Urban Development and Housing Framework to be formulated by the Housing and Land Use Regulatory Board under the direction of the Housing and Urban Development Coordinating Council in coordination with all local government units and other concerned public and private sectors within one (1) year from the effectivity of this Act.

The Framework shall refer to the comprehensive plan for urban and urbanizable areas aimed at achieving the objectives of the Program. In the formulation of the Framework, a review and

rationalization of existing town and land use plans, housing programs, and all other projects and activities of government agencies and the private sector which may substantially affect urban land use patterns, transportation and public utilities, infrastructure, environment and population movements shall be undertaken with the concurrence of the local government units concerned.

ARTICLE IV

LAND USE, INVENTORY, ACQUISITION AND DISPOSITION

SEC. 7. *Inventory of Lands.* -- Within one (1) year from the effectivity of this Act, all city and municipal governments shall conduct an inventory of all lands and improvements thereon within their respective localities. The inventory shall include the following:

(a) Residential lands;

(b) Government-owned lands, whether owned by the National Government or any of its subdivisions, instrumentalities, or agencies, including government-owned or -controlled corporations and their subsidiaries;

(c) Unregistered or abandoned and idle lands; and

(d) Other lands.

In conducting the inventory, the local government units concerned, in coordination with the Housing and Land Use Regulatory Board and with the assistance of the appropriate government agencies, shall indicate the type of land use and the degree of land utilization, and other data or information necessary to carry out the purposes of this Act.

For planning purposes, the Housing and Urban Development Coordinating Council shall be furnished by each local government unit a copy of its inventory which shall be updated every three (3) years.

SEC. 8. *Identification of Sites for Socialized Housing.* – After the inventory, the local government units, in coordination with the National Housing Authority, the Housing and Land Use Regulatory Board, the National Mapping Resource Information Authority, and the Land Management Bureau, shall identify lands for socialized housing and resettlement areas for the immediate and future needs of the underprivileged and homeless in the urban areas, taking into consideration the degree of availability of basic services and facilities, their accessibility and proximity to job sites and other economic opportunities, and the actual number of registered beneficiaries.

Government-owned lands under paragraph (b) of the preceding section which have not been used for the purpose for which they have been reserved or set aside for the past ten (10) years from the effectivity of this Act and identified as suitable for socialized housing, shall immediately be transferred to the National Housing Authority subject to the approval of the President of the Philippines or by the local government unit concerned, as the case may be, for proper disposition in accordance with this Act.

SEC. 9. *Priorities in the Acquisition of Land.* – Lands for socialized housing shall be acquired in the following order:

(a) Those owned by the Government or any of its subdivisions, instrumentalities, or agencies, including government-owned or -controlled corporations and their subsidiaries;

(b) Alienable lands of the public domain;

(c) Unregistered or abandoned and idle lands;

(d) Those within the declared Areas for Priority Development, Zonal Improvement Program sites, and Slum Improvement and Resettlement Program sites which have not yet been acquired;

(e) Bagong Lipunan Improvement of Sites and Services or BLISS sites which have not yet been acquired; and

(f) Privately-owned lands.

Where on-site development is found more practicable and advantageous to the beneficiaries, the priorities mentioned in this section shall not apply. The local government units shall give budgetary priority to on-site development of government lands.

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SEC. 10. *Modes of Land Acquisition.* – The modes of acquiring lands for purposes of this Act shall include, among others, community mortgage, land swapping, land assembly or consolidation, land banking, donation to the Government, joint-venture agreement, negotiated purchase, and expropriation: *Provided, however,* That expropriation shall be resorted to only when other modes of acquisition have been exhausted: *Provided, further,* That where expropriation is resorted to, parcels of land owned by small property owners shall be exempted for purposes of this Act: *Provided, finally,* That abandoned property, as herein defined, shall be reverted and escheated to the State in a proceeding analogous to the procedure laid down in Rule 91 of the Rules of Court.

For the purpose of socialized housing, government-owned and foreclosed properties shall be acquired by the local government units, or by the National Housing Authority primarily through negotiated purchase: *Provided,* That qualified beneficiaries who are actual occupants of the land shall be given the right of first refusal.

SEC. 11. *Expropriation of Idle Lands.* – All idle lands in urban and urbanizable areas, as defined and identified in accordance with this Act, shall be expropriated and shall form part of the public domain. These lands shall be disposed of or utilized by the Government for such purposes that conform with their land use plans. Expropriation proceedings shall be instituted if, after the lapse of one (1) year following receipt of notice of acquisition, the owner fails to introduce improvements as defined in Section 3(f) hereof, except in the case of *force majeure* and other fortuitous events. Exempted from this provision, however, are residential lands owned by small property owners or those the ownership of which is subject of a pending litigation.

SEC. 12. *Disposition of Lands for Socialized Housing.* – The National Housing Authority, with respect to lands belonging to the National Government, and the local government units with respect to other lands within their respective localities, shall coordinate with each other to formulate and make available various alternative schemes for the disposition of lands to the beneficiaries of the Program. These schemes shall not be limited to those involving transfer of ownership in fee simple but shall include lease, with option to purchase, usufruct or such other variations as the local

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government units or the National Housing Authority may deem most expedient in carrying out the purposes of this Act.

Consistent with this provision, a scheme for public rental housing may be adopted.

SEC. 13. *Valuation of Lands for Socialized Housing.* – Equitable land valuation guidelines for socialized housing shall be set by the Department of Finance on the basis of the market value reflected in the zonal valuation, or in its absence, on the latest real property tax declaration.

For sites already occupied by qualified Program beneficiaries, the Department of Finance shall factor into the valuation the blighted status of the land as certified by the local government unit or the National Housing Authority.

SEC. 14. *Limitations on the Disposition of Lands for Socialized Housing.* – No land for socialized housing, including improvements or rights thereon, shall be sold, alienated, conveyed, encumbered or leased by any beneficiary of this Program except to qualified Program beneficiaries as determined by the government agency concerned.

Should the beneficiary unlawfully sell, transfer, or otherwise dispose of his lot or any right thereon, the transaction shall be null and void. He shall also lose his right to the land, forfeit the total amortization paid thereon, and shall be barred from the benefits under this Act for a period of ten (10) years from the date of violation.

In the event the beneficiary dies before full ownership of the land is vested on him, transfer to his heirs shall take place only upon their assumption of his outstanding obligations. In case of failure by the heirs to assume such obligations, the land shall revert to the Government for disposition in accordance with this Act.

ARTICLE V

SOCIALIZED HOUSING

SEC. 15. *Policy.* – Socialized housing, as defined in Section 3 hereof, shall be the primary strategy in providing shelter for the underprivileged and homeless. However, if the tenurial arrangement in a particular socialized housing program is in the nature of leasehold or usufruct, the same shall be transitory and the beneficiaries must be encouraged to become independent from the Program within a given period of time, to be determined by the implementing agency concerned.

SEC. 16. *Eligibility Criteria for Socialized Housing Program Beneficiaries.* – To qualify for the socialized housing program, a beneficiary:

(a) Must be a Filipino citizen;

(b) Must be an underprivileged and homeless citizen, as defined in Section 3 of this Act;

(c) Must not own any real property whether in the urban or rural areas; and

(d) Must not be a professional squatter or a member of squatting syndicates.

SEC. 17. *Registration of Socialized Housing Beneficiaries.* – The Housing and Urban Development Coordinating Council, in coordination with the local government units, shall design a system for the registration of qualified Program beneficiaries in accordance with the Framework. The local government units, within one (1) year from the effectivity of this Act, shall identify and register all beneficiaries within their respective localities.

SEC. 18. *Balanced Housing Development.* – The Program shall include a system to be specified in the Framework plan whereby developers of proposed subdivision projects shall be required to develop an area for socialized housing equivalent to at least twenty percent (20%) of the total subdivision area or total subdivision project cost, at the option of the developer, within the same city or

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municipality, whenever feasible, and in accordance with the standards set by the Housing and Land Use Regulatory Board and other existing laws. The balanced housing development as herein required may also be complied with by the developers concerned in any of the following manner:

(a) Development of new settlement;

(b) Slum upgrading or renewal of areas for priority development either through zonal improvement programs or slum improvement and resettlement programs;

(c) Joint-venture projects with either the local government units or any of the housing agencies; or

(d) Participation in the community mortgage program.

SEC. 19. *Incentives for the National Housing Authority.* – The National Housing Authority, being the primary government agency in charge of providing housing for the underprivileged and homeless, shall be exempted from the payment of all fees and charges of any kind, whether local or national, such as income and real taxes. All documents or contracts executed by and in favor of the National Housing Authority shall also be exempt from the payment of documentary stamp tax and registration fees, including fees required for the issuance of transfer certificates of titles.

SEC. 20. *Incentives for Private Sector Participating in Socialized Housing.* – To encourage greater private sector participation in socialized housing and further reduce the cost of housing units for the benefit of the underprivileged and homeless, the following incentives shall be extended to the private sector:

(a) Reduction and simplification of qualification and accreditation requirements for participating private developers;

(b) Creation of one-stop offices in the different regions of the country for the processing, approval and issuance of clearances, permits and licenses: *Provided*, That clearances, permits and licenses shall be issued within ninety (90) days from the date of submission of all requirements by the participating private developers;

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(c) Simplification of financing procedures; and

(d) Exemption from the payment of the following:

(1) Project-related income taxes;

(2) Capital gains tax on raw lands used for the project;

(3) Value-added tax for the project contractor concerned;

(4) Transfer tax for both raw and completed projects; and

(5) Donor's tax for lands certified by the local government units to have been donated for socialized housing purposes.

: *Provided,* That upon application for exemption, a lien on the title of the land shall be annotated by the Register of Deeds: *Provided, further,* That the socialized housing development plan has already been approved by the appropriate government agencies concerned: *Provided, finally,* That all the savings acquired by virtue of this provision shall accrue in favor of the beneficiaries subject to the implementing guidelines to be issued by the Housing and Urban Development Coordinating Council.

Appropriate implementing guidelines shall be prepared by the Department of Finance, in consultation with the Housing and Urban Development Coordinating Council, for the proper implementation of the tax exemption mentioned in this section within one (1) year after the approval of this Act.

Property owners who voluntarily provide resettlement sites to illegal occupants of their lands shall be entitled to a tax credit equivalent to the actual non-recoverable expenses incurred in the resettlement, subject to the implementing guidelines jointly issued by the Housing and Urban Development Coordinating Council and the Department of Finance.

SEC. 21. *Basic Services.* – Socialized housing or resettlement areas sh-" be provided by the local government unit or the National Hou ; Authority in cooperation with the private developers and :erned agencies with the following basic services and facilities:

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(a) Potable water;

(b) Power and electricity and an adequate power distribution system;

(c) Sewerage facilities and an efficient and adequate solid waste disposal system; and

(d) Access to primary roads and transportation facilities.

The provision of other basic services and facilities such as health, education, communications, security, recreation, relief and welfare shall be planned and shall be given priority for implementation by the local government unit and concerned agencies in cooperation with the private sector and the beneficiaries themselves.

The local government unit, in coordination with the concerned national agencies, shall ensure that these basic services are provided at the most cost-efficient rates, and shall set a mechanism to coordinate operationally the thrusts, objectives and activities of other government agencies concerned with providing basic services to housing projects.

SEC. 22. *Livelihood Component.* – To the extent feasible, socialized housing and resettlement projects shall be located near areas where employment opportunities are accessible. The government agencies dealing with the development of livelihood programs and grant of livelihood loans shall give priority to the beneficiaries of the Program.

SEC. 23. *Participation of Beneficiaries.* – The local government units, in coordination with the Presidential Commission for the Urban Poor and concerned government agencies, shall afford Program beneficiaries or their duly designated representatives an opportunity to be heard and to participate in the decision-making process over matters involving the protection and promotion of their legitimate collective interests which shall include appropriate documentation and feedback mechanisms. They shall also be encouraged to organize themselves and undertake self-help cooperative housing and other livelihood activities. They shall assist the Government in preventing the incursions of professional squatters and members of squatting syndicates into their communities.

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In instances when the affected beneficiaries have failed to organize themselves or form an alliance within a reasonable period prior to the implementation of the program or projects affecting them, consultation between the implementing agency and the affected beneficiaries shall be conducted with the assistance of the Presidential Commission for the Urban Poor and the concerned nongovernment organization.

SEC. 24. *Consultation with Private Sector.* – Opportunities for adequate consultation shall be accorded to the private sector involved in socialized housing project pursuant to this Act.

ARTICLE VI

AREAS FOR PRIORITY DEVELOPMENT, ZONAL IMPROVEMENT PROGRAM SITES AND SLUM IMPROVEMENT AND RESETTLEMENT PROGRAM SITES

SEC. 25. *Benefits.* – In addition to the benefits provided under existing laws and other related issuances to occupants of areas for priority development, zonal improvement program sites and slum improvement and resettlement program sites, such occupants shall be entitled to priority in all government projects initiated pursuant to this Act. They shall also be entitled to the following support services:

(a) Land surveys and titling at minimal cost;

(b) Liberalized terms on credit facilities and housing loans and one hundred percent (100%) deduction from every homebuyer's gross income tax of all interest payments made on documented loans incurred for the construction or purchase of the homebuyer's house;

(c) Exemption from the payment of documentary stamp tax, registration fees, and other fees for the issuance of transfer certificate of titles;

(d) Basic services as provided for in Section 21 of this Act; and

(e) Such other benefits that may arise from the implementation of this Act.

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URBAN RENEWAL AND RESETTLEMENT

SEC. 26. *Urban Renewal and Resettlement.* – This shall include the rehabilitation and development of blighted and slum areas and the resettlement of Program beneficiaries in accordance with the provisions of this Act. On-site development shall be implemented whenever possible in order to ensure minimum movement of occupants of blighted lands and slum areas. The resettlement of the beneficiaries of the Program from their existing places of occupancy shall be undertaken only when on-site development is not feasible and after compliance with the procedures laid down in Section 28 of this Act.

SEC. 27. *Action Against Professional Squatters and Squatting Syndicates.* – The local government units, in cooperation with the Philippine National Police, the Presidential Commission for the Urban Poor (PCUP), and the PCUP-accredited urban poor organization in the area, shall adopt measures to identify and effectively curtail the nefarious and illegal activities of professional squatters and squatting syndicates, as herein defined.

Any person or group identified as such shall be summarily evicted and their dwellings or structures demolished, and shall be disqualified to avail of the benefits of the Program. A public official who tolerates or abets the commission of the abovementioned acts shall be dealt with in accordance with existing laws.

For purposes of this Act, professional squatters or members of squatting syndicates shall be imposed the penalty of six (6) years imprisonment or a fine of not less than Sixty thousand pesos (₱60,000) but not more than One hundred thousand pesos (₱100,000), or both, at the discretion of the court.

SEC. 28. *Eviction and Demolition.* – Eviction or demolition as a practice shall be discouraged. Eviction or demolition, however, may be allowed under the following situations:

(a) 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;

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(b) When government infrastructure projects with available funding are about to be implemented; or

(c) When there is a court order for eviction and demolition.

In the execution of eviction or demolition orders involving underprivileged and homeless citizens, the following shall be mandatory:

(1) Notice upon the affected persons or entities at least thirty (30) days prior to the date of eviction or demolition;

(2) Adequate consultations on the matter of resettlement with the duly designated representatives of the families to be resettled and the affected communities in the areas where they are to be relocated;

(3) Presence of local government officials or their representatives during eviction or demolition;

(4) Proper identification of all persons taking part in the demolition;

(5) Execution of eviction or demolition only during regular office hours from Mondays to Fridays and during good weather, unless the affected families consent otherwise;

(6) No use of heavy equipment for demolition except for structures that are permanent and of concrete materials;

(7) Proper uniforms for members of the Philippine National Police who shall occupy the first line of law enforcement and observe proper disturbance control procedures; and

(8) Adequate relocation, whether temporary or permanent: *Provided, however,* That in cases of eviction and demolition pursuant to a court order involving underprivileged and homeless citizens, relocation shall be undertaken by the local government unit concerned and the National Housing Authority with the assistance of other government agencies within forty-five (45) days from service of notice of final judgment by the court, after which period the said order shall be executed: *Provided, further,* That should relocation

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not be possible within the said period, financial assistance in the amount equivalent to the prevailing minimum daily wage multiplied by sixty (60) days shall be extended to the affected families by the local government unit concerned.

The Department of the Interior and Local Government and the Housing and Urban Development Coordinating Council shall jointly promulgate the necessary rules and regulations to carry out the above provision.

SEC. 29. *Resettlement.* – Within two (2) years from the effectivity of this Act, the local government units, in coordination with the National Housing Authority, shall implement the relocation and resettlement of persons living in danger areas such as *esteros*, railroad tracks, garbage dumps, riverbanks, shorelines, waterways, and in other public places such as sidewalks, roads, parks, and playgrounds. The local government unit, in coordination with the National Housing Authority, shall provide relocation or resettlement sites with basic services and facilities and access to employment and livelihood opportunities sufficient to meet the basic needs of the affected families.

SEC. 30. *Prohibition Against New Illegal Structures.* – It shall be unlawful for any person to construct any structure in areas mentioned in the preceding section.

After the effectivity of this Act, the *barangay*, municipal or city government units shall prevent the construction of any kind of illegal dwelling units or structures within their respective localities. The head of any local government unit concerned who allows, abets or otherwise tolerates the construction of any structure in violation of this section shall be liable to administrative sanctions under existing laws and to penal sanctions provided for in this Act.

ARTICLE VIII

COMMUNITY MORTGAGE PROGRAM

SEC. 31. *Definition.* – The Community Mortgage Program (CMP) is a mortgage financing program of the National Home Mortgage Finance Corporation which assists legally organized associations of underprivileged and homeless citizens to purchase

and develop a tract of land under the concept of community ownership. The primary objective of the program is to assist residents of blighted or depressed areas to own the lots they occupy, or where they choose to relocate to; and eventually improve their neighborhood and homes to the extent of their affordability.

SEC. 32. *Incentives.* – To encourage its wider implementation, participants in the CMP shall be granted with the following privileges or incentives:

(a) Government-owned or -controlled corporations and local government units, may dispose of their idle lands suitable for socialized housing under the CMP through negotiated sale at prices based on acquisition cost plus financial carrying costs;

(b) Properties sold under the CMP shall be exempted from the capital gains tax; and

(c) Beneficiaries under the CMP shall not be evicted nor dispossessed of their lands or improvements unless they have incurred arrearages in payments of amortizations for three (3) months.

SEC. 33. *Organization of Beneficiaries.* – Beneficiaries of the Program shall be responsible for their organization into associations to manage their subdivisions or places of residence, to secure housing loans under existing Community Mortgage Program and such other projects beneficial to them. Subject to such rules and regulations to be promulgated by the National Home Mortgage Finance Corporation, associations organized pursuant to this Act may collectively acquire and own lands covered by this Program. Where the beneficiaries fail to form an association by and among themselves, the National Home Mortgage Finance Corporation shall initiate the organization of the same in coordination with the Presidential Commission for the Urban Poor and the local government units concerned. No person who is not a *bona fide* resident of the area shall be a member or officer of such association.

ARTICLE IX

RELATED STRATEGIES

SEC. 34. *Promotion of Indigenous Housing Materials and Technologies.* – The local government units, in cooperation with

the National Housing Authority, Technology and Livelihood Resource Center, and other concerned agencies, shall promote the production and use of indigenous, alternative, and low-cost construction materials and technologies for socialized housing.

SEC. 35. *Transport System.* – The local government units, in coordination with the Departments of Transportation and Communications, Budget and Management, Trade and Industry, Finance, and Public Works and Highways, the Home Insurance Guaranty Corporation, and other concerned government agencies, shall device a set of mechanisms including incentives to the private sector so that a viable transport system shall evolve and develop in the urban areas. It shall also formulate standards designed to attain these objectives:

(a) Smooth flow of traffic;

(b) Safety and convenience of travel;

(c) Minimum use of land space;

(d) Minimum damage to the physical environment; and

(e) Adequate and efficient transport service to the people and goods at minimum cost.

SEC. 36. *Ecological Balance.* – The local government units shall coordinate with the Department of Environment and Natural Resources in taking measures that will plan and regulate urban activities for the conservation and protection of vital, unique and sensitive ecosystems, scenic landscapes, cultural sites and other similar resource areas.

To make the implementation of this function more effective, the active participation of the citizenry in environmental rehabilitation and in decision-making process shall be promoted and encouraged. The local government units shall recommend to the Environmental and Management Bureau the immediate closure of factories, mines and transport companies which are found to be causing massive pollution.

SEC. 37. *Population Movements.* – The local government units shall set up an effective mechanism, together with the appro-

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priate agencies like the Population Commission, the National Economic and Development Authority and the National Statistics Office, to monitor trends in the movements of population from rural to urban, urban to urban, and urban to rural areas. They shall identify measures by which such movements can be influenced to achieve balance between urban capabilities and population, to direct appropriate segments of the population into areas where they can have access to opportunities to improve their lives and to contribute to national growth and recommend proposed legislation to Congress, if necessary.

The Population Commission, the National Economic and Development Authority, and the National Statistics Office shall likewise provide advanced planning information to national and local government planners on population projections and the consequent level of services needed in particular urban and urbanizable areas. This service will include early-warning systems on expected dysfunctions in a particular urban area due to population increases, decreases, or age structure changes.

SEC. 38. *Urban-rural Interdependence.* – To minimize rural to urban migration and pursue urban decentralization, the local government units shall coordinate with the National Economic and Development Authority and other government agencies in the formulation of national development programs that will stimulate economic growth and promote socioeconomic development in the countryside.

ARTICLE X

PROGRAM IMPLEMENTATION

SEC. 39. *Role of Local Government Units.* – The local government units shall be charged with the implementation of this Act in their respective localities, in coordination with the Housing and Urban Development Coordinating Council, the national housing agencies, the Presidential Commission for the Urban Poor, the private sector and other nongovernment organizations.

They shall prepare a comprehensive land use plan for their respective localities in accordance with the provisions of this Act.

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SEC. 40. *Role of Government Housing Agencies.* – In addition to their respective existing powers and functions, and those provided for in this Act, the hereunder mentioned housing agencies shall perform the following:

(a) The Housing and Urban Development Coordinating Council shall, through the key housing agencies, provide local government units with necessary support such as:

(1) Formulation of standards and guidelines as well as providing technical support in the preparation of town and land use plans;

(2) In coordination with the National Economic and Development Authority and the National Statistics Office, provide data and information for forward-planning by the local government units in their areas, particularly on projections as to the population and development trends in their localities and the corresponding investment programs needed to provide appropriate types and levels of infrastructure, utilities, services and land use patterns; and

(3) Assistance in obtaining funds and other resources needed in the urban development and housing programs in their areas of responsibility.

(b) The National Housing Authority, upon request of local government units, shall provide technical and other forms of assistance in the implementation of their res[illegible]ive urban development and housing programs with the objective [illegible]ugmenting and enhancing local government capabilities in the [illegible]ision of housing benefits to their constituents;

(c) The National Home Mortg[illegible] Finance Corporation shall administer the Community Mortga[illegible]rogram under this Act and promulgate rules and regulations [illegible]ssary to carry out the provisions of this Act; and

(d) The Home Insurance Guaranty Corporation shall design an appropriate guarantee scheme to encourage financial institutions to go into direct lending for housing.

SEC. 41. *Annual Report.* – The Housing and Urban Development Coordinating Council and the local government units shall

submit a detailed annual report with respect to the implementation of this Act to the President and the Congress of the Republic of the Philippines.

ARTICLE XI

FUNDING

SEC. 42. *Funding.* – Funds for the urban development and housing program shall come from the following sources:

(a) A minimum of fifty percent (50%) from the annual net income of the Public Estates Authority, to be used by the National Housing Authority to carry out its programs of land acquisition for resettlement purposes under this Act;

(b) Proceeds from the disposition of ill-gotten wealth, not otherwise previously set aside for any other purpose, shall be applied to the implementation of this Act and shall be administered by the National Home Mortgage Finance Corporation;

(c) Loans, grants, bequests and donations, whether from local or foreign sources;

(d) Flotation of bonds, subject to the guidelines to be set by the Monetary Board;

(e) Proceeds from the social housing tax and, subject to the concurrence of the local government units concerned, idle lands tax as provided in Section 236 of the Local Government Code of 1991 and other existing laws;

(f) Proceeds from the sale or disposition of alienable public lands in urban areas; and

(g) Domestic and foreign investment or financing through appropriate arrangements like the build-operate-and-transfer scheme.

SEC. 43. *Socialized Housing Tax.* – Consistent with the constitutional principle that the ownership and enjoyment of property bear a social function and to raise funds for the Program, all local government units are hereby authorized to impose an additional one-half percent (0.5%) tax on the assessed value of all lands in urban areas in excess of Fifty thousand pesos (₱ 50,000).

ARTICLE XII

TRANSITORY PROVISIONS

SEC. 44. *Moratorium on Eviction and Demolition.* – There shall be a moratorium on the eviction of all program beneficiaries and on the demolition of their houses or dwelling units for a period of three (3) years from the effectivity of this Act: *Provided,* That the moratorium shall not apply to those persons who have constructed their structures after the effectivity of this Act and for cases enumerated in Section 28 hereof.

ARTICLE XIII

COMMON PROVISIONS

SEC. 45. *Penalty Clause.* – Any person who violates any provision of this Act shall be imposed the penalty of not more than six (6) years of imprisonment or a fine of not less than Five thousand pesos (₱ 5,000) but not more than One hundred thousand pesos (₱ 100,000), or both, at the discretion of the court: *Provided,* That, if the offender is a corporation, partnership, association or other juridical entity, the penalty shall be imposed on the officer or officers of said corporation, partnership, association or juridical entity who caused the violation.

SEC. 46. *Appropriations.* – The amount necessary to carry out the purposes of this Act shall be included in the annual budget of implementing agencies in the General Appropriations Act of the year following its enactment into law and every year thereafter.

SEC. 47. *Separability Clause.* – If for any reason, any provision of this Act is declared invalid or unconstitutional, the remaining provisions not affected thereby shall continue to be in full force and effect.

SEC. 48. *Repealing Clause.* – All laws, decrees, executive orders, proclamations, rules and regulations, and other issuances, or parts thereof which are inconsistent with the provisions of this Act,

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SEC. 49. *Effectivity Clause* This Act shall take effect upon its publication in at least two (2) national newspapers of general circulation.

Approved,

NEPTALI A. GONZALES
President of the Senate

RAMON V. MITRA
Speaker of the House of Representatives

This Act which is a consolidation of House Bill No. 34310 and Senate Bill No. 234 was finally passed by the House of Representatives and the Senate on February 3, 1992.

ANACLETO D. BADOY, JR.
Secretary of the Senate

CAMILO L. SABIO
Secretary General
House of Representatives

Approved: MAR 24 1992

CORAZON C. AQUINO
President of the Philippines

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Appendix A6-5
PHILIPPINE GOVERNMENT REGULATIONS ON SQUATTERS

IMPLEMENTING RULES AND REGULATIONS TO GOVERN R.A. NO. 7279
(July 21, 1992)

SECTION 3: GUIDELINES FOR IMPLEMENTATION

The following procedures and guidelines on relocation operation shall be strictly observed by the local government unit or government agency authorized to demolish.

I. PRE-RELOCATION PHASE

A. Negotiations between the proponent LGU or legally authorized government agency and the recipient LGU on the resettlement si and their corresponding roles and responsibilities.

B. PRE-CENSUS

1.0 COMPLETION OF DATA REQUIREMENTS

The LGU or government agency authorized to demolish shall ensure that the following documents are readily available prior to any conduct of demolition:

1.1 Certified Xerox Copy of Title

1.2 Tax Declaration or Tax Receipt

1.3 Location Plan or Vicinity Map showing the boundary and illegal constructions

1.4 Photo of the area (before operation)

1.5 Certification from LGU or other concerned agency that the area is included in the list of danger areas and subject for clearing, if applicable

1.6 Certification from LGU or concerned agency that the area is the site of an infrastructure project with available funding, if applicable

1.7 Copy of a Writ of Demolition, if the clearing of the area is decided by the Court

1.8 Development plan of the property

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ike the following:

2.1 Identif, and meet with the recognized resident community leaders to establish communication and rapport with them;

2.2 Hold community assemblies/meetings with the affected families to explain the following:

2.2.1 the government's shelter program for the low and marginal income families including squatters;

2.2.2 the need to relocate families from danger areas and land for infrastructure projects;

2.2.3 procedures and guidelines on relocation and resettlement;

2.2.4 objectives and schedule of the census and tagging operation; and

2.2.5 writ of demolition, if applicable.

2.3 Introduce the project team and enumerators to the Barangay Chairman and community leaders. The LGU or government agency may request NHA to provide technical assistance in the conduct of pre-census activities.

C. CENSUS

1.0 PHYSICAL SURVEY

Using the location and vicinity map, title and technical description submitted, the LGU shall determine the physical boundary of the land to be cleared of squatters.

2.0 TAGGING

The LGU shall attach the tag card with the corresponding number to every structure for identification, inventory and control of illegal construction. The LGU shall encourage participation of community leaders in this undertaking.

3.0 MAPPING AND HOUSELISTING

In coordination with the community leaders, the LGU shall make a structural map of all the structures in the area. The LGU shall also make a preliminary listing of the names of owners of the affected houses or structures.

The structural map of the area shall be used to locate the structures and identify the names of the structure owners. During the relocation operation, every dismantled structure shall be crossed-out from the structural map to prevent the possibility of new or disqualified families with their brought-in materials and belongings claiming residency on lots which have already been cleared of squatters.

4.0 CONDUCT OF CENSUS

The LGU or concerned agency shall conduct house-to-house census to determine qualified or disqualified families for government resettlement assistance, as well as, those opting for the Balik-Probinsiya Program and those going to other places. The LGU shall engage the assistance of community leaders in the conduct of census specifically in the identification and verification of affected families.

Should the affected families resist the conduct of census, the houselisting of families shall suffice. Incidence of census refusal shall be noted and attested in writing by community leaders.

In case of availability of lists of families, a census verification shall be conducted to update the list of present/actual occupants of the site.

5.0 CENSUS DATA EVALUATION/PROCESSING AND MASTERLIST PREPARATION

After the completion of census, the LGU or the concerned agency shall evaluate the data gathered based on income and tenurial status. Subsequently, an initial masterlist of affected families shall be prepared by the proponent LGU. The initial masterlist together with the accomplished census forms shall be forwarded to recipient LGU or NHA for review and pre-qualification; out of which, a final masterlist shall be prepared to be signed by the duly authorized officials.

6.0 PROCESSING OF CENSUS CLAIMS

A census committee, composition of which shall be determined by the parties involved shall be created to investigate and evaluate all census claims and recommend appropriate action to LGU or concerned agency.

Census claims, which involve cases such as "out-during census" and "mis-statement of census data," shall be considered before the issuance of notice of demolition.

All qualified and disqualified families shall be individually informed and a copy of the approved masterlist shall be posted in public places.

7.0 INFORMATION DRIVE ON RESETTLEMENT SITE

The LGU and government agency responsible for demolition shall invite the affected families to a community assembly to discuss the following among others:

7.1 facilities and services in the resettlement projects;

7.2 obligations and responsibilities of the affected families

D. ISSUANCE OF 30-DAY NOTICE

1.0 Written notice is served the affected persons or entities by the LGU or government agency legally authorized to demolish together with the representative of the Presidential Commission for the Urban Poor. It shall be issued to the addressee personally or affixed conspicuously to the addressee's dwelling.

2.0 Posters no smaller than 2" x 3" are displayed conspicuously in the community such as public markets, barangay hall, plaza and the like.

3.0 The written notices and the poster must state the reason for the demolition. Should the reason be "government infrastructure project," the notice should state the importance of the project, that it has available funds and the date of project implementation.

4.0 The actual date of demolition must not be earlier than 30 days and not later than 90 days after the notice has been issued. It shall not be conducted on Saturdays and Sundays and legal holidays, unless affected families consent otherwise. It shall be undertaken from 8:00 a.m. to 3:00 p.m.

E. CONSULTATION PROPER

1.0 The LGU or government agency authorized to demolish shall preside the consultation meetings to be attended by the affected families and/or their duly designated representatives and by the landowners or their duly designated representatives. Officials or representatives of concerned agencies shall also be invited. The following shall be discussed:

1.1 the necessity of the demolition;

1.2 available options other than resettlement;

1.3 possible relocation sites to include modes of payment, tenure, facilities and services thereat;

1.4 advantages of voluntary dismantling;

1.5 dismantling and resettlement procedures;

1.6 submission of requirements (family pictures, marriage contract, etc.)

1.7 school accommodation of children;

1.8 roles of agencies involved such as DSWD, PNP, DECS, DPWH, NHA, PCUP, CHRP, etc.

1.9 other problems and issues to ensure a peaceful and orderly relocation operation.

2.0 In every consultation meeting, attendance is recorded. If the majority of the affected families is present, the meeting proceeds. If the attendance of a majority is not attained, a second meeting is scheduled within five days. If still the majority of the residents are again not present, the consultation requirements for this particular case is considered satisfied.

3.0 The LGU or government agency summarizes the points of agreement and disagreement arrived at through the formal consultations, and provides signed copies to participating agencies. Should any party refuse to sign the agreement, the same shall be posted conspicuously in the area.

4.0 Schedules of the next meetings shall be set: including two feedback meetings within 20 days from the issuance of the notice of demolition and one final meeting before the actual demolition.

F. INTER-AGENCY MEETINGS/COORDINATION

1.0 The LGU or government agency authorized to demolish shall convene an inter-agency meeting to discuss details of the actual relocation operation and to ensure the support and assistance of the participating agencies.

The following requirements, among others, shall be ensured:

1.1 Resettlement Site - LGU or other authorized agency

1.2 Relocation/Demolition team - LGU/other authorized agency

1.3 Other logistical requirements such as trucks, tent, first-aid and communication facilities - LGU/other authorized agency

1.4 Security - PNP

1.5 Food subsidy Balik-Probinsiya - DSWD

1.6 Medical Assistance - DOH

1.7 Relocation Documentation - LGU/other authorized agency

G. COMPLETION OF RELOCATION DOCUMENTS/REQUIREMENTS

1.0 The LGU or agency authorized to demolish shall ensure the completion of the following relocation documents/requirements by the affected families:

1.1 Family Picture
1.2 Marriage Contract or Affidavit of Cohabitation
1.3 Identification papers

H. VOLUNTARY RELOCATION AND RESETTLEMENT

1.0 Volunteer families must be scheduled first for relocation prior to the date of demolition. Lots shall be allocated to them in advance.

2.0 Transportation and other manpower assistance and services shall be provided to the volunteer families.

II. RELOCATION PHASE

A. PREPARATIONS BEFORE THE DISMANTLING OF STRUCTURES

1.0 Confirmation of Actual Date of Relocation. The proponent LGU or government agency authorized to demolish shall inform the affected families on the actual schedule of relocation by issuing to them "Notices of Actual Relocation;" and shall furnish a copy of the rolling schedule, three days before relocation, to the recipient LGU or the NHA; and

2.0 Ensuring Availability of Resources and Necessary Documents

2.1 The LGU or agency authorized to demolish shall review and check the availability of resources and documents as committed by the participating agencies.

B. DISMANTLING OF STRUCTURES/MOVEMENT OF FAMILIES

1.0 During the actual relocation, the LGU or agency responsible for demolition shall:

1.1 Identify all staff and crew involved in the operation and provide them with name tags.

1.2 Ensure that members of the PNP who are in proper uniform occupy the first line of law enforcement and civil disturbance control, and ensure that the PNP personnel do not participate in the physical dismantling of any structures.

1.3 Ensure that the electricity of the affected houses has been shut off.

1.4 Give the order to commence and to stop the operation and suspend the demolition during inclement weather.

1.5 Ensure that the dismantling of structures shall be executed as carefully as possible for the maximum recovery of materials which could be reused by families to rebuild their structures in the resettlement project, and that heavy equipments are not used except for structures which are permanent and of concrete materials.

1.6 Encourage and motivate families to voluntarily and peacefully dismantle their structures and whenever requested by the families, assign a manpower team to assist the families in the dismantling.

1.7 Ensure that all structures covered by the letter-advice shall be dismantled without exception based on the rolling schedule, a[illegible] structures scheduled for the day and only th[illegible] be transported on that day are dismantled.

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1.8 Ensure that no staff or official participant in the demolition engages in looting, accepts bribes, employs unnecessary force or violence and that violators are charged administratively and criminally;

1.9 Record the names and number of families and structures affected by the relocation and resettlement.

2.0 Representatives from other concerned agencies such as the Presidential Commission for the Urban Poor and the Commission on Human Rights may also be present in the area to monitor and observe the actual operations.

C. ISSUANCE OF ENTRY PASSES

1.0 The LGU or authorized government agency shall ensure that all entry passes shall be prepared with the corresponding family pictures.

2.0 An entry pass is not transferrable and becomes invalid if there are erasures or other illegal marks.

D. LOADING AND TRANSPORTING

1.0 The LGU or government agency authorized to demolish shall ensure that:

1.1 Transportation/vehicles shall have the necessary sign board displayed in front of the windshields for proper identification and shall proceed to the area before the start of actual dismantling operations.

1.2 Before departure, the documents of the families shall be checked and their belongings properly loaded. The safety and comfort of the families particularly the children shall be ensured. The last trip shall be dispatched not later than 3:00 p.m.

E. OPERATION, MONITORING AND DOCUMENTATION

1.0 The LGU or government agency authorized to demolish shall monitor and report on the relocation operation daily and weekly using the prescribed forms.

F. WELCOME AND RECEPTION

1.0 The concerned resettlement project team together with the representatives of the resettlement community shall:

1.1 Welcome and receive the relocated families;

1.2 Offer the families hot soup in coordination with the DSWD, and allow them to sit and rest for some time;

1.3 Cause the provision by DSWD of the 10-day food subsidy to the families, and

1.4 Provide needed medical services, if necessary.

G. PROCESSING OF DOCUMENTS AND LOT ASSIGNMENT

1.0 The resettlement project team shall:

1.1 Review and process the entry passes and other documents of the resettled families;

1.2 Assign lots to the families; and

1.3 Require the families to accomplish and sign the required forms.

H. TRANSFER TO ASSIGNED LOT

1.0 THE RESETTLEMENT PROJECT TEAM SHALL:

1.1 Accompany the resettled families to their assigned lots; and

1.2 Whenever feasible, provide manpower assistance/volunteers to help the resettled families unload their materials and belongings from the truck and transfer them to their assigned lots.

III. POST RELOCATION PHASE

A. PLACE OF ORIGIN

1.0 After the relocation operation, the LGU or government agency legally authorized to demolish shall require the property owner or concerned agencies to clear and secure the area and undertake the development of the property;

2.0 To document the area that has been cleared of squatters, the LGU or government agency legally authorized to demolish shall take an after-operation photo of the area from the same angle that the before-operation picture has been taken.

3.0 A letter documenting that the area has already been cleared, with the attached pictures of the area before and after the operation shall be issued to the property owner by the LGU or government agency legally authorized to demolish.

B. RESETTLEMENT SITE

1.0 Organized community-based structures shall be strengthened so as to facilitate the delivery of services in the site. The identified leaders with the assistance of the NGOs shall be trained and equipped with proper organizational skills and attitudes necessary to effectively manage the affairs of the community.

2.0 To promote the general well-being of resettled families, adequate social services in health, nutrition, education, responsible parenthood, environmental sanitation, etc. shall be provided in the resettlement sites jointly or under the auspices of cooperating agencies such as the DECS, DOH, MMA, DSWD, and NGOs.

3.0 To generate employment and income opportunities for the resettled families the resettlement projects shall act as a conduit for the families to avail of manpower training and livelihood program through sustained networking and resource syndication activities.

SECTION 4: ORGANIZATION

To ensure the smooth and effective implementation of all relocation and resettlement operations, the LGU or the government agency legally authorized to demolish shall create a Task Force on Relocation and Resettlement:

A. PRIMARY RESPONSIBILITY

The Task Force shall be primarily responsible for ensuring that the implementing rules and regulations on the eviction of families and demolition of structures are adhered to.

B. STRUCTURE AND COMPOSITION

1.0 The Task Force shall have as its ex-officio Chairman the City/Municipal Mayor for LGUs, or the duly-designated official as Chairman for the government agency legally authorized to demolish.

2.0 The Task Force shall be composed of but not limited to the following:

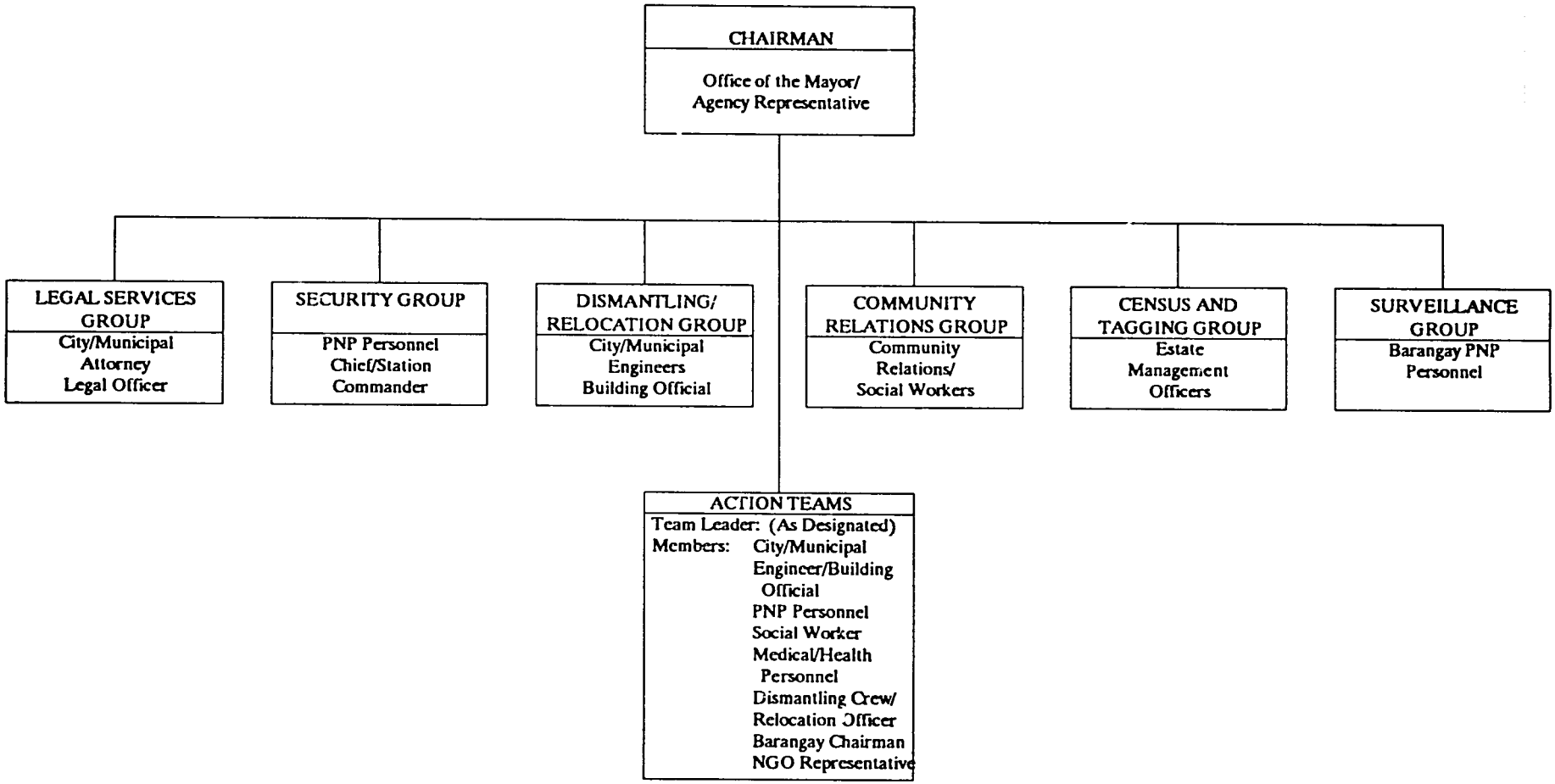
- 2.1 Legal Services Group
- 2.2 Security Group
- 2.3 Dismantling and Relocation Group
- 2.4 Community Relations Group
- 2.5 Census and Tagging Group
- 2.6 Surveillance Group

3.0 Action Teams shall be created by the Chairman for every relocation and resettlement operation to oversee/undertake actual eviction/relocation of families and dismantling of structures.

4.0 The Action Teams shall be composed of but not limited to the following:

- 4.1 City/Municipal Engineer/Building Official
- 4.2 Medical/health personnel
- 4.3 Dismantling Crew/Relocation Officer
- 4.4 Social Worker
- 4.5 Barangay Chairman
- 4.6 NGO Representative

TASK FORCE ON SQUATTER RELOCATION AND RESETTLEMENT



Appendix A6-6

MAIN FEATURES OF MST
ENVIRONMENTAL MITIGATION PLAN

Appendix A6-6
MAIN FEATURES OF MST ENVIRONMENTAL MITIGATION PLAN

An environmental mitigation plan consists of a set of measures to be taken during implementation and operation to eliminate, offset or reduce adverse environmental impacts to acceptable levels. For the MST project, the plan creates opportunities for integrating environmental concerns into infrastructure development.

A plan which enables the development of needed infrastructure without damaging both the physical and human environments not only requires coordination between government agencies but also environmental standards that are achievable. The cooperation of the agencies involved in the project is essential. Discussions regarding expropriation of lands and displacement of businesses will have to be taken in the interest of long-term benefits from an improved transport system network. It must be emphasized however, that the context for these discussions is always to safeguard environmental interests without unnecessary losses to industry, business, the economy and people.

It is unrealistic to assume that development can take place without creating direct impacts. Certain impacts are inevitable and 'judgement calls' will have to be made regarding short term 'sacrifices' for long term benefits. For the MST, the environmental mitigation plan should include the following:

1. ENHANCEMENT OF THE RELATIONSHIP BETWEEN MST AND LAND USE/ZONING PATTERNS

Urban roads are a form of land use itself and are often disruptive of existing land use and zoning patterns. The MST should enhance rather than impair the existing relationship between the SLE corridor and the land use and zoning within its influence area. Alignments to be chosen should give priority to land use patterns and trends.

2. IDENTIFICATION OF ALTERNATIVE ALIGNMENTS FOR QUIRINO, VITO CRUZ AND PASAY

The evaluation of a number of alternative alignments especially at Quirino, Vito Cruz and Pasay interchanges is necessary in order to avoid large scale displacement of businesses/industries, problems in acquiring the necessary right-of-way and public and political reaction to the project.

3. TRANSFER OF 11,215 SQUATTERS AND DEMOLITION OF SQUATTER SITE STRUCTURES IN 2-MONTH TIME PERIOD

Coordinated efforts among the lead proponent agency and other associated agencies are important to identify suitable areas for resettlement of squatters. Transfer operations should be carried out within a 2-month period just prior to the start of construction to prevent any interference by vested interests and to avoid 'new' or 'former' squatters from re-establishing and claiming relocation eligibility. Figure A6-6-1 at the end of this Appendix identifies the recommended procedures for relocating the squatters, the main considerations at each stage and the key decisions that will have to be made.

Providing cash compensation alone to squatters is discouraged in order to maximize the costs of relocation and resettlement. This is supported by the Consultant's field survey of the kind of assistance squatters indicate they would like to receive. Only 4% of the multiple responses indicated financial assistance in comparison to 48% for owning a house or lot. There should be strict conditions of eligibility for relocation/resettlement assistance and resale or transfer of the lot provided should not be permitted.

Financing of Squatter Relocation

An additional matter to deal with in this mitigation plan concerns possible sources of financing for the relocation of squatters.

A review of sectors identified for official development from leading donor organizations and agencies reveals that funding for relocation and resettlement particularly for displaced urban communities is relatively recent. Financing for relocation and resettlement, in the past, has been provided mainly for indigenous communities in rural situations.

Cognizant of the diversified and evolving needs of developing countries, donor organizations and countries have articulated, by way of policy, a commitment to expand and extend assistance necessary to meet basic human needs in view of 1) increasing poverty in developing countries and 2) the risk of impoverishment in conditions of rapid socio-economic change.

Relocation and resettlement schemes might therefore attempt to access financing:

- In the context of ensuring that a resettlement plan is undertaken to reduce the risk of further impoverishment in the case of a vulnerable subpopulation (e.g., the poor);

- As integral to and therefore part of the costs of the construction of an important civil works project where displacement is unavoidable.

Although, there has been no direct program support for such schemes, some of the sources of financing to explore for the future are cited below

- **World Bank** policy identifies the financing of resettlement plans as important due to the growing occurrence of involuntary relocation, oftentime a consequence of development projects.

- **Japan International Cooperation Agency (JICA)** has mainly provided assistance in the areas of (1) public works and utilities; (2) agriculture, forestry and fisheries; and (3) energy, among others, but has included poverty in its policy focus for development assistance.

- **Overseas Economic Cooperation Fund (OECF)** has been providing loan assistance in various areas, e.g., infrastructure, power and energy, communications. However, OECF requires counter-funding from the local agency i.e. it will provide funding for construction and infrastructure while the local agency provides counter-funding for the relocation and resettlement of displaced communities.

- **Asian Development Bank (ADB)** recently approved loan assistance for the ongoing relocation of 14,000 people in Shanghai, China as a consequence of the construction of new roads. ADB's development assistance in the Philippines has been in the areas of upland development, infrastructure, and rural development.

- **The Ford Foundation** in development assistance in the Philippines focuses on three areas: (1) population, (2) upland development, and (3) human rights.

- **United Nations Development Program (UNDP)** and other UN funding agencies have primarily provided development assistance in the areas of population, environment, women in development, and education.

- **Organization for Economic Cooperation and Development (OECD)** includes among its sources for social loans what is known as the European Resettlement Fund.

4. PUBLIC RELATIONS CAMPAIGN THROUGHOUT THE PLANNING AND IMPLEMENTATION PERIOD

Scoping sessions will need to be conducted with cities and municipalities along the alignment to include municipal officials, motorist/trucking associations, DPWH representatives, homeowners, business owners and other stakeholders. Sessions should be oriented towards open dialogue and communications between parties to promote continued and effective public relations throughout the period of project implementation.

5. LAND EXPROPRIATION COSTS TO BE ASSESSED FAIRLY AND BY INDEPENDENT ASSESSMENT TO OFFER PROPERTY OWNERS A 'JUST' VALUE

Under legislation, the 'just' compensation of property taken for public use is based on the market value appearing in the Tax Declaration prior to the investigation, survey and construction of the project. (Department Order No. 234, Series of 1990, Ministry of Public Works and Highways).[1]

Ministry Order No. 15, Series of 1983 also allows for exchange or barter instead of the money value of the lot especially if the property being taken from the owner is his only lot.

6. COMPENSATION TO OWNERS OF PRIVATE BUILDINGS ON PRIVATELY OWNED PROPERTY THAT WILL BE DISPLACED. THE BASIS SHOULD BE THE ASSESSED VALUE OF THE BUILDING

This is also covered by a number of DPWH guidelines on removal or demolition of improvements and buildings (Ministry, Order No. 65, Series of 1983 Section IV).[1]

7. COMPENSATION OF LOW-INCOME RESIDENTIAL HOMES SITUATED ON LEGALLY OWNED OR LEASED PRIVATE PROPERTY IN RESIDENTIAL AREAS TO THE VALUE OF THE HOUSE

This mitigating measure is important as one of the likely issues to be raised by homeowners is the cost of seeking alternative housing. Finding equivalent housing at the same price of their original house is potentially a major problem.

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[1]The DPWH has a number of guidelines on right-of-way acquisition to preclude delays in the prosecution of infrastructure projects: Ministry Order No. 65, Series of 1983; Department Order No. 129, Series of 1988; and Department Order No. 234, Series of 1990. When a lot owner does not agree to convey to the government a needed property, the government may authorize the Office of the Solicitor General to initiate expropriation proceedings against the refusing lot owner. Upon the filing of the complaint for expropriation and the deposit in the Philippine National Bank of 10% of the amount of the compensation, the government shall be entitled to immediate possession, control and disposition of the real property and its improvements including the power of demolition if necessary.

8. CONSIDERATION OF 'GOODWILL' COMPENSATION IN THE CASE OF DISPLACEMENT OF SMALL BUSINESS IN PRIVATELY OWNED LEASED LOCATIONS.

Small businesses that have been operating in any affected privately-owned locations for 5 years that employ 5 persons should be compensated in goodwill for business lost.

9. MINIMAL OR NO COMPENSATION FOR STRUCTURES (BUSINESS/ HOUSES) STANDING WITHIN THE PNR RIGHT-OF-WAY[2]

The project should clarify the locations of these structures that are within the PNR right-of-way and in leasing arrangements with the PNR such as along the East Service Road fronting Fort Bonifacio and perhaps other locations.

Consultations with PNR are necessary regarding acquisition of PNR right-of-way along the East Service Road between Bicutan and Nichols that is being leased out to individuals and businesses. Acquisition of these portions of the right-of-way will rely on tenure provisions in the lease agreements with PNR.

As this is public property required for a public infrastructure project, it would be incumbent upon PNR to enforce the termination clause in the lease agreement in order to clear the area of occupants and structures.

10. CLARIFICATION OF THE LEGALITIES SURROUNDING THE USE OF FORT BONIFACIO FRONTAGE IN THE CONSTRUCTION OF A BOT EXPRESSWAY

The use of the Fort Bonifacio frontage would require a Memorandum of Agreement or other kind of contract agreement.[3]

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[2] This refers to cases other than the Quirino to Bicutan squatters.

[3] A Memorandum of Agreement between Fort Bonifacio Military Reservation and Municipality of Taguig was drawn up in November 1991 for use of 5,000 sq. m. of the Bonifacio property to construct the Lower Bicutan Cooperative Service Market. The existing rules and regulations of the Camp concerning Acquisition and Management of AFP Real State/Reservation are outlined in Standard Operation Procedure (SOP) No. 7, GHQ, AFP (October 9, 1981).

Private houses or businesses located along the Fort Bonifacio frontage however, do not fall within the compensation outlined in this mitigation plan. Such structures, being on government property in 'special' arrangements with Fort Bonifacio are not within the domain of compensation normally offered to private structures on private land.

11. ENVIRONMENTAL PROTECTION OF THE RIVERS AND CREEKS CROSSED BY THE PROJECT

Siltation control measures such as the use of gabions should be undertaken during construction and monitored to prevent further clogging up of the waterways.

Figure A6-6-1
RECOMMENDED PROCEDURES FOR THE RELOCATION OF SQUATTERS
FROM PNR RIGHT-OF-WAY (Quirino to Bicutan)

PROCEDURES		KEY DECISIONS
1. FORM RELOCATION TASK FORCE	->	Core Members of Task Force DPWH, Financing Agency, LGU (receiving site)

Organizations with squatter network

- Commission on Human Rights
- Presidential Commission in Urban Poor
- Congress - 2 sectoral representatives
- Church

Agencies Needed to Implement Relocation

- DSW - provide food services for relocatees to maximum 2 months
- DOH - health workers assigned at catchment areas
- Meralco - electricity services (Depressed Area Electrification Program)
- MWSS - public faucets/wells/delivery of water
- DILG - demolition and security
- NHMFC - mortgage programs
- HIGC - designs guarantee schemes/manage trust funds
- HUDCC - has network

2. IDENTIFY AGENCY RESPONSIBLE TO ARRANGE SITE PURCHASE AND FINANCING	->	Agency Options:

HIGC	Trust agency functions only
HUDCC	Limited funds/other commitments
NHA	No funds
NHMFC	No funds
Private Developer	Possible if incentives provided

Source: Consultant's estimates based on information provided by NHA and HUDCC and Consultant's field survey.

Figure A6-6-1 (continued)
RECOMMENDED PROCEDURES FOR THE RELOCATION OF SQUATTERS
FROM PNR RIGHT-OF-WAY (Quirino to Bicutan)

PROCEDURES		KEY DECISIONS
3. DETERMINE ELIGIBILITY FOR RELOCATION IN CENSUS SURVEY	->	**2,210 Eligible Squatter Families (Quirino to Bicutan) = 9,981 persons.**[1] Basis = 11% of families previously received housing assistance

RA No. 7279 criteria:

- no previous relocation/resettlement assistance
- at/below poverty threshold (1991 level defined by NEDA is ₱ 5,821 monthly income for household of 6) = ₱ 970/person
- no land/lot ownership

MST Criteria:

- 11% have previously received housing
- 85% have a monthly household income of under ₱ 5,000 (household of 5 persons). 15% of households could be ineligible based on ₱ 5,000 + for five persons = ₱ 1,000 + per person. Legislation might overlook this since a) tracks defined as danger area b) 27% have lived over 10 years on tracks; 19% over 7 years
- 13% say they own land (this requires verification)

4. IDENTIFY SITE AND START NEGOTIATIONS FOR USE OR PURCHASE	->	**Single Site Possible**: Quirino to Bicutan squatters similar socio-economic background. But private land costs preclude single site. Development costs could be cheaper for one large site than several small sites **Several Sites Recommended**: 1) Squatters social/community affiliations based on barangay boundaries 2) cost range in sites brings cost to reasonable average. **Size Needed**[2]: 89,388 sq m (based on 36 sq m per family) **Site Options**: Present (1992) options are Cavite and Bulacan **Successful Sites**[3]: Must have access to jobs. 44% of squatters from Quirino to Bicutan presently employed

Major Considerations: Suitable Site

- Cost and Financing
- Distance to urban core
- Minimum services - water (commercial wells), drainage, power, road net
- Other services-market places, social/community
- Housing

Figure A6-6-1 (continued)
RECOMMENDED PROCEDURES FOR THE RELOCATION OF SQUATTERS
FROM PNR RIGHT-OF-WAY (Quirino to Bicutan)

4. IDENTIFY SITE (Cont'd.)

Site Selection

- Existing available government sites ₱ 100 - 200 per sq m
  a. Cavite (Molino, Imus)
  b. Bulacan
  c. Biñan, Laguna

- New sites - None in-city and in-city costly

- Other sites Bagong Silang, Cogeo (Quezon), Sapang Palay (Bulacan) General Mariano Alvarez, San Pedro are full or will be before MST ready to begin construction. NHA has 3,000 lots now but 20% committed.

- Private site but costly.
  a. Cavite - ₱ 150 - 300 per sq m
  b. Bulacan - ₱ 150
  c. Others - ₱ 500 per sq m
  d. San Jose del Monte (Bulacan)

Quirino to Bicutan Squatters

Six of site needed = 2,483 squatter families x 36 sq m = 89,388 sq m

- 57% prefer a site within Metro Manila
- 9% know of Cavite and Bulacan as resettlement sites

- 27% want site close to jobs
- 46.1% want a site where they can own lot and home

->

KEY DECISIONS

Cost to Purchase Government or Private Land

Private	₱ 13.4 - ₱ 26.8 million
Government	₱ 8.9 - ₱ 17.9 million
Difference	₱ 5.5 - ₱ 8.9 million

Cost of Land and Site Development

• Low Estimate[4]	₱ 777/sq m	₱ 18.8 million
• Moderate Estimate	₱ 483/sq m	₱ 43.2 million
• High Estimate	₱ 777/sq m	₱ 69.5 million

Housing Options and Costs

• Transport of squatter structures	₱ 2.2 million
• Construct bare minimum rowhouse 2 walls, roof, floor slabs) @ ₱ 25,000	₱ 62.1 million
• Construct rooms 10 sq m (concrete load bearing, toilet) @ ₱ 40,000	₱ 99.3 million
• Construct no housing (meets requirements of RA No. 7279)	₱ 2.2 million (transport)
• Opt into UHLP socialized housing program under RA No. 7279	₱ 150,000 per house not affordable to squatters

Monthly Amortization To Squatter

• Maximum Affordable	₱ 100 - ₱ 200
• Community Mortgage Program	Formula lending disqualifies squatters

Figure A6-6-1 (continued)
RECOMMENDED PROCEDURES FOR THE RELOCATION OF SQUATTERS
FROM PNR RIGHT-OF-WAY (Quirino to Bicutan)

PROCEDURES

5. SOLICIT INPUTS OF LOCAL GOVERNMENT ->

Main Considerations

- Consult Governor/Mayor in identified resettlement area (Barangay chairpersons also have well established ongoing relations with squatters).
- Other 'perceived' leaders are heads of CDOs along the PNR right-of-way
- Organizations with squatter networks (See 1) may intervene. Social/community association may intervene especially in Makati where 65% of squatter families are members of association and 80% regard association heads as community leaders

KEY DECISIONS

Key Parties To Consult	Mayors/Governors
Anticipated Reaction	Revival of anti-squatting in Metro Manila
	LGUs prioritize squatters in their own locales. For accommodating 'outside' squatters they could 'charge' to cover 'services' costs.(e.g. ₱3,000 per family).
Manila	Resistance - experienced previous evictions
Makati/Taguig/ Parañaque	Issue of jobs. Squatters are presently employed in industries near tracks.

Trade-Off Strategies	
Private Developer	Tax incentives
LGU	One time 'services' costs paid to LGUs with guaranteeing site
	Award funding to LGUs to construct housing
Co-Financing	Arrangements between private developer and government

Figure A6-6-1 (continued)
RECOMMENDED PROCEDURES FOR THE RELOCATION OF SQUATTERS
FROM PNR RIGHT-OF-WAY (Quirino to Bicutan)

CEDURES

KEY DECISIONS

6. CONDUCT ADEQUATE CONSULTATION/INFORMATION PROGRAM ->

Main Considerations

- Encourage voluntary relocation and resettlement
- DPWH to issue notice 30 days prior to demolition date
- Transfer families by barangays
- Network with NGOs at resettlement site
- Consult PNR re: any lease agreements with squatter businesses in the Quirino to Vito Cruz section.

Consultation/Information Program

Main activity Orientation visit to resettlement site
Voluntary resettlement program

Decisions Majority vote. Over-consultation can slow up process.

Priority Numbers[4]
670 squatter families (3,352 persons). Reduces land and site development cost by 56% - 73%.

Number For Voluntary Relocation

1,006 families (assume half of 81% who are willing to be relocated)

Demolition Schedule

Will take around 2 months to demolish and transport structures of 2,483 families

Transfer Operations Options

- Voluntary relocation in month #1, others in month #2
- Move barangays closest to resettlement site first
- Start with potentially successful group - Makati first

Number Involved with CDOs 49% = 1,222 families

[1] Although 9,981 (2,210 families) eligible under RA No. 7279, calculations for site size and costs are based on the total 2,483 families
[2] 32 sq m is the minimum lot size that can be titled individually. NHA uses a lot size of 36 sq m per family.
[3] Other relocation examples indicate that schools, market places, access to regular transportation are key to successful sites. But Quirino to Bicutan squatters prioritize jobs.
[4] Identification and prioritization of longtime residents (10 years+) for relocation is accepted procedure by NHA. Quirino to Bicutan priority numbers = 670.41 squatter families x 5 = 3,352 squatters = basis of low estimate.

APPENDICES TO CHAPTER 7

Appendix A7-1

OPERATING AND MAINTENANCE COST FOR THE MST AND SLE

Appendix A7-1
OPERATING AND MAINTENANCE COST FOR THE MST AND SLE

1. SUMMARY OF ANNUAL OPERATING AND MAINTENANCE COST

Table A7-1-1 summarizes the annual operating and maintenance cost for the MST and the SLE. The salaries and related benefits for the maintenance staff are based on the proposed engineering and maintenance staffing organization and staffing presented in Chapter 3. The basis for estimating the cost of salaries and related benefits for operations is discussed in detail in the succeeding section. The other components of the operating and maintenance costs are based on PNCC's experience in operating the SLE and which is discussed in Appendix A7-2.

The derived unit cost for 1992 covers the PNCC portion of the SLE which is in a rural area and has four lanes and much lower traffic volumes than the urban sections of this expressway. Since the MST and SLE are planned urban expressways with higher volumes of traffic and six lanes, the PNCC unit costs were assumed to be 50% higher. The average annual maintenance cost is estimated at ₱1.179 million per km while the average operating cost is estimated at ₱1.487 million per km. General and administrative expenses are estimated at 10% of total operating and maintenance expenses.

Based on 1992 prices, the total annual maintenance and operating expenses including general and administrative expenses for the combined MST and SLE system is estimated to be ₱97.0 million. This estimate is based on an open toll collection system for the MST and a closed toll collection system for the SLE.

Table A7-1-1
ESTIMATED ANNUAL OPERATING AND MAINTENANCE COSTS
(In Thousand Pesos)

EXPENSES	ANNUAL COSTS	
	CASE 1	CASE 2
Maintenance Expenses		
Salaries and benefits	₱ 3,870	₱ 3,870
Materials and supplies	16,032	16,032
Equipment rental	9,269	9,269
Utilities and other expenses	9,018	9,018
Subtotal	38,189	38,189

Table A7-1-1 (continued)
ESTIMATED ANNUAL OPERATING AND MAINTENANCE COSTS
(In Thousand Pesos)

EXPENSES	ANNUAL COSTS	
	CASE 1	CASE 2
Operating Expenses		
Salaries and benefits	25,800	18,480
Other operating expenses	9,018	9,018
Field operating and administrative expenses	15,030	15,030
Subtotal	49,848	42,528
Total Maintenance and Operating Cost	88,037	80,717
General and Administrative Expenses	9,000	8,000
TOTAL ANNUAL EXPENSES	₱ 97,037	₱ 88,717

Note: Case 1 - Open system of collection for MST and closed system for SLE.
Case 2 - Open system of collection for both MST and SLE

Source: The Consultant's Estimates.

2. SALARIES AND WAGES

This section analyzes the manning requirement for the operations of the MST and South Luzon Expressway (SLE), the portion of the SLE from Magallanes to Alabang based on the concept used by Wilbur Smith Associates (WSA). The manning levels are based on data in the Expressway System Planning Study contained in the Toll Systems and Interchange Options and Recommended Organizational Structure Report prepared by Wilbur Smith Associates (WSA) in 1991 for the Asian Development Bank. This report estimated the staffing requirement for typical expressway operations in India.

For the 200 kilometer interurban expressway analyzed by WSA, a staff of 425 personnel was deemed necessary. Out of the 425 personnel, 90 personnel were classified as fixed, that is, this is required number of personnel regardless of the length of the expressway. The other 335 personnel were found to be contingent upon the some variables such as the length of the expressway and the number of interchanges. The fixed and variable personnel requirements by each department of a hypothetical BOT company are shown in Table A7-1-2 based on information gathered from the WSA report.

Table A7-1-2
VARIABILITY OF PERSONNEL REQUIREMENTS
FOR A 200 KILOMETER TOLL ROAD [1/]

DEPARTMENT	PERSONNEL LEVEL	
	FIXED	VARIABLE
Administration	61	9
Maintenance	8	114
Operations	5	176
Communications and Security	16	36
TOTAL	90	335

Source: [1/] WSA, Expressway System Planning Study.
[2/] The Consultant's Estimate.

The estimated number of fixed personnel of 90 persons was based on a four-lane expressway. The size of the management and supervisory staffs are expected to increase with the scale of the project (number of lanes). If the expressway has only two lanes, this number will be reduced by as much as 25%. The number of personnel previously designated as fixed is estimated to increase by 15% if the expressway is increased to six lanes.

2.1 Variables Affecting Staffing Levels

The staffing levels are affected by the configuration of the expressway. The physical and operating characteristics of the MST and SLE expressways are listed in Table A7-1-3. Such variables include the length of the facility, number of toll plazas and toll gates, number of toll gates, and type of toll system to be implemented.

Table A7-1-3
ASSIGNED VALUES OF INDEPENDENT VARIABLES
MST AND SLE EXPRESSWAY

VARIABLES	CASE 1		CASE 2	
	MST	SLE	MST	SLE
Length of facility	19 kms	14.4 kms	19 kms	14.4 kms
No. of Plaza/gates	1 plaza/20 gates	1 plaza/18 gates	1 plaza/20 gates	1 plaza/18 gates
No. of Interchanges/toll lanes	n.a.	3 /37 booths	n.a.	n.a
Toll System	Barrier	Closed	Barrier	Barrier

Note : n.a. - not applicable.
Source: The Consultant's Estimates.

The number of toll plazas/gates and the length of the expressway are important variables that affect the staffing level. Another important consideration is the relative use of each toll plaza. The type of toll system to be implemented is also a critical factor to consider in estimating the labor needed by this project. If the number of lanes is increased or decreased, maintenance, communications and security staffing levels would need to be adjusted in a similar fashion.

The variables for the proposed MST and SLE expressway are as follows:

- Number of Toll Plaza and Toll Gates: The MST and the SLE will have their separate toll plazas. The SLE will have three interchanges (Alabang, Sucat and Bicutan) with varying numbers of toll lanes. Each toll lane is assumed to have one booth each.

- Length of Expressway: The MST will be 19 kilometers in length while the SLE for, Magallanes to Alabang will be 14.4 kms.

- Toll System: Chapter 3 recommended the barrier toll collection system for the MST. The SLE would have the option of using the barrier system or the closed system of toll collection. The different staffing levels assuming the following combinations were estimated.

  (i) Case 1 - Assumes a barrier system for the MST and a closed system for the SLE.

  (ii) Case 2 - Assumes the barrier system for both the MST and SLE.

The following relationship of the variables established are considered.

- Management and Administrative Staff: This department consists mostly of fixed personnel staff. The staffing level would vary only slightly with the size of the project.

- Maintenance Staff: Only a small number of maintenance staff is considered as fixed, around 8 staff. The level of maintenance staff would vary directly with the length of the facility requiring maintenance.

- Operations Staff: Only five personnel are considered fixed. The operations staff would consist mostly of toll collectors and the plaza operations staff (supervisors and auditors). The number of toll collectors would vary with the number of toll plazas and toll gates.

- Communications Staff: The number of communications and security staff would vary with the length of the expressway. The dominant share of the staff would consist of the security enforcers.

2.2 Relative Staff Levels

As shown in Table A7-1-4, a staff of 379 would be required for the proposed combined MST and SLE systems. This assumes that the MST would utilize the barrier system of toll collection while the SLE would use the closed system. Implementing the barrier system of collection for both the MST and the SLE would reduce the personnel requirement to almost half.

Table A7-1-4
STAFFING LEVEL
MST AND SLE OPERATIONS

DEPARTMENT	STAFFING LEVEL				
	FIXED	VARIABLE		TOTAL	
		CASE 1	CASE 2	CASE 1	CASE 2
Administration	70	8	4	78	74
Maintenance	8	19	19	28	28
Operations	6	248	140	254	146
Communications and Security	18	14	8	32	36
TOTAL	103	289	171	392	274

Source: The Consultant's Estimates.

2.3 Total Salaries and Wages

Table A7-1-5 shows the estimated annual salaries and wages by department for both the MST and the SLE for the two cases. To determine the annual salaries and wages, the monthly salary is multiplied by the respective staff complement for each department. The assumed monthly salary includes the related benefits paid by the employer such as the 13th month bonus, SSS/Medicare/ECC contribution, dental and medical, rice subsidy. etc. These benefits are estimated to be 25% of the basic monthly salary.

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Table A7-1-5
ESTIMATED MONTHLY AND ANNUAL SALARIES AND WAGES
(In Thousand Pesos)

DEPARTMENT	AVERAGE MONTHLY SALARY PER PERSON (Pesos)	TOTAL ANNUAL SALARY AND BENEFITS(₱000)	
		CASE 1	CASE 2
Administrative	₱ 10,000	₱ 9,360	₱ 8,880
Maintenance	5,625	1,890	1,890
Operations	5,000	15,240	8,760
Communications	5,000	720	720
Security	5,000	1,200	840
TOTAL		₱ 28,410	₱ 21,090

Source: The Consultant's Estimates.

3. ENGINEERING AND MAINTENANCE STAFF REQUIREMENT

Table A7-1-6 presents the total annual salaries and related benefits based on the engineering and maintenance organization proposed by the Consultant in Chapter 3 of this report. The Table presents the maintenance personnel required to perform routine and preventive maintenance for the SLE and MST and their corresponding salaries.

Table A7-1-6
ENGINEERING AND MAINTENANCE STAFFING LEVEL
MST AND SLE OPERATIONS

	NUMBER	AVERAGE MONTHLY SALARY	TOTAL ANNUAL SALARY
Supervisor Rank			
Engineering and Maintenance Supervisor	1	₱ 12,500	₱ 150,000
Maintenance Area Supervisor	2	10,000	240,000
Building Maintenance Supervisor	1	7,500	90,000
Communications Supervisor	1	7,500	90,000
Toll Equipment Supervisor	1	7,500	90,000
Engineering Services Supervisor	1	7,500	90,000
Subtotal	7		750,000
Rank and File			
Roadway Maintenance	28	5,000	1,680,000
Building Maintenance Unit	11	5,000	660,000
Communications Unit	4	5,000	240,000
Toll Equipment Unit	2	5,000	120,000
Engineering Services Unit	5	5,000	300,000
Clerical	2	5,000	120,000
Subtotal	52		3,120,000
TOTAL	**59**		**₱3,870,000**

Source: The Consultant's Esiimates.

Appendix A7-2

OPERATING AND MAINTENANCE COST - PHILIPPINE NATIONAL CONSTRUCTION CORPORATION EXPERIENCE

Appendix A7-2
OPERATING AND MAINTENANCE COST
PHILIPPINE NATIONAL CONSTRUCTION CORPORATION EXPERIENCE

1. BACKGROUND

The Philippine National Construction Corporation (PNCC) was granted a franchise under Presidential Decree No. 1113 to operate, contract and maintain toll facilities in the North and the South Luzon Expressway for a period of thirty (30) years from May 1, 1977. As a franchise holder, PNCC is responsible for the construction, maintenance, improvements, repair and rehabilitation of the toll facilities. PNCC was given the right to collect toll fees as may be fixed and/or authorized by the Toll Regulatory Board (TRB) for the use of the expressways.

In consideration of the franchise, PNCC shall pay the Philippine Government through the TRB a total concession fee of ₱912.0 million over a thirty year period. The concession fee represents the expenditures of the government in the construction of the North and South Luzon Expressways including the extensions of the North Luzon Expressway (NLE) to Angeles City in Pampanga and the South Luzon Expressway (SLE) to Calamba in Laguna.

At present, PNCC operates only the portion of the NLE from Sta. Rita, Bulacan to Sta. Ines, Pampanga covering 49.72 kms. with seven interchanges and the SLE from Susana Heights in Muntinlupa to Calamba, Laguna covering 23.92 kms. with 6 interchanges. The portions of the NLE from Balintawak to Sta.Ines and the SLE from Nichols to Alabang are toll free and are under the jurisdiction of the Department of Public Works and Highway.

2. TOTAL COST AND EXPENSES

The financial statements of PNCC were analyzed to determine the probable cost of operating and maintaining a toll road/expressway in the Philippines. The financial data was based on the unaudited financial statements submitted by PNCC to TRB for the years 1989 and 1990, and the period January to November 25, 1991 and the January to March 25, 1992. The income statements of the Tollways Division of PNCC are presented in Table A7-2-1.

The Table also shows that in 1989 and 1990, the operations of both the SLE and NLE were profitable. In September 27, 1991, PNCC was ordered by the court to stop collecting tolls for certain portions of the SLE and the NLE. As a result, profits from SLE operations declined to ₱3.8 million in 1991 from ₱36.3 million; NLE operations incurred a loss of ₱27.9 million in 1991 from a profit of ₱8.3 million. The eruption of Mt. Pinatubo may also have affected

Table A7-2-1
PHILIPPINE NATIONAL CONSTRUCTION CORPORATION
TOLLWAYS DIVISION
INCOME STATEMENTS FOR 1989 TO 1992
(In Thousand Pesos)

	JANUARY – MARCH 25,			JANUARY – NOVEMBER 25,1991			1990			1989		
	SLE	NLE	Total	SLE	NLE	Total	SLE	NLE	Total	SLE	NLE	Total
REVENUES	19,878	23,570	43,448	122,437	143,989	266,426	162,808	195,944	358,752	155,012	193,101	348,113
LESS:							a/	a/				
CONCESSION FEE	3,708	3,900	7,608	11,996	14,718	26,714	15,550	19,078	34,628	11,492	14,627	26,119
FRANCHISE COST	312	351	663	1,056	1,294	2,350	1,092	1,339	2,431	1,031	1,312	2,343
TRB SUBSIDY										12	13	25
NET REVENUES	15,858	19,319	35,177	109,385	127,977	237,362	146,166	175,527	321,693	142,477	177,149	319,626
COST AND EXPENSES												
MAINTENANCE COST												
Salaries and related benefits	5,176	6,132	11,308	21,604	24,549	46,153	21,117	23,905	45,023	16,162	18,459	34,621
Light and water	129	160	289	702	962	1,664	590	897	1,487	471	793	1,264
Security and janitorial	637	620	1,257	3,229	4,305	7,534	4,232	5,657	9,889	2,156	4,010	6,166
Materials and supplies	1,735	2,555	4,290	8,003	11,062	19,065	11,779	15,796	27,575	7,369	9,877	17,246
Equipment rental	690	1,626	2,316	4,749	8,546	13,295	3,932	9,761	13,693	2,921	6,413	9,334
POL expenses	315	364	679	2,275	2,313	4,588	2,430	2,373	4,803	1,747	1,857	3,604
Other maintenance cost	223	272	495	223	101	324						0
Total Maintenance Cost	8,905	11,729	20,634	40,785	51,838	92,623	44,080	58,389	102,470	30,826	41,409	72,[illegible]
OPERATING COST												
Salaries and related benefits	5,684	6,885	12,569	36,300	40,708	77,008	35,483	39,641	75,123	26,760	30,609	57,369
Toll tickets used	157	95	252	1,774	1,110	2,884	2,248	1,597	3,845	933	538	1,471
Materials and supplies	122	64	186	671	588	1,259						0
Depreciation – Utilities/Equipment	685	924	1,609	2,659	4,068	6,727	2,868	4,150	7,018	3,441	4,892	8,333
Amortization Expressways improv.	1,419	10,608	12,027	7,351	41,885	49,236	8,377	46,655	55,032	8,190	43,829	52,019
Other operating cost	713	685	1,398	3,792	3,849	7,641	3,135	3,489	6,624	2,310	2,620	4,930
Field operation and admin. cost	1,607	1,499	3,106	5,717	6,030	11,747	5,490	5,712	11,202	3,839	3,840	7,679
Total Operating Cost	10,387	20,760	31,147	58,264	98,238	156,502	57,601	101,244	158,844	45,473	86,328	131,801
TOTAL COST AND EXPENSES	19,292	32,489	51,781	99,049	150,076	249,125	101,681	159,633	261,314	76,299	127,737	204,036
GROSS MARGIN	(3,434)	(13,170)	(16,604)	10,336	(22,099)	(11,763)	44,485	15,894	60,379	66,178	49,412	115,590
DIVISION OVERHEAD	370	371	741	4,717	4,721	9,438	4,965	4,969	9,934	3,416	3,428	6,844
NET INCOME AFTER OVERHEAD COST	(3,804)	(13,541)	(17,345)	5,619	(26,820)	(21,201)	39,520	10,925	50,445	62,762	45,984	108,746
OTHER INCOME EXPENSES	405	809	1,214	975	1,401	2,376	1,266	1,820	3,086	1,606	1,558	3,164
NET INCOME BEFORE SHARE IN CORP. OH	(3,399)	(12,732)	(16,131)	6,594	(25,419)	(18,825)	40,786	12,745	53,531	64,368	47,542	111,910
SHARE IN CORPORATE OVERHEAD	1,100	1,100	2,200	4,026	4,037	8,063	4,392	4,404	8,796	4,392	4,404	8,796
NET INCOME AFTER SHARE IN CORP. OH	(4,499)	(13,832)	(18,331)	2,568	(29,456)	(26,888)	36,394	8,341	44,735	59,976	43,138	103,114
PRIOR PRIOR ADJUSTMENT	0	0	0	1,277	1,562	2,839				(593)	(227)	(820)
NET INCOME	(4,499)	(13,832)	(18,331)	3,845	(27,894)	(24,049)	36,394	8,341	44,735	59,383	42,911	102,294

Notes: Based on the lastest unaudited financial statements submitted to TRB by PNCC is for the period ending November 25, 1991.

Source: PNCC unaudited financial statements

NO. OF DAYS
LENGTH IN KILOMETERS

the level of revenues for NLE in 1991. As of the first quarter of 1992, the tollways division of PNCC already incurred a net loss of ₱18.0 million.

The total direct costs incurred by PNCC in operating and maintaining the NLE and SLE are summarized in Table A7-2-2. The financial results of the operations showed that on the average the significant portion of the revenues for the period under review were used for the following: direct labor - 40%, amortization of expressways improvement - 19%, repairs and maintenance - 8%, equipment rental - 4%, field operations and general administrative expenses - 4% and division and corporate overhead expenses - 6%. Likewise, approximately 38% of the total cost was incurred for the SLE while the rest was used for the NLE.

Table A7-2-2
PNCC TOLLWAYS DIVISION
SUMMARY OF MAJOR COSTS AND EXPENSES
(In Thousand Pesos)

ACCOUNTS	JANUARY - MARCH 25,1992			JANUARY - NOVEMBER 25,1991		
	SLE	NLE	TOTAL	SLE	NLE	TOTAL
Salaries and benefits	₱ 10,860	₱ 13,017	₱ 23,877	₱ 57,904	₱ 65,257	₱ 123,161
Toll tickets used	157	95	252	1,774	1,110	2,884
Equipment rental	690	1,626	2,316	4,749	8,546	13,295
Repairs and maintenance	1,958	2,827	4,785	8,226	11,163	19,389
Other direct cost	1,916	1,893	3,809	10,669	12,017	22,686
Field operations and administrative cost	1,607	1,499	3,106	5,717	6,030	11,747
Division Overhead	370	371	741	4,717	4,721	9,438
Share in Corporate Overhead	1,100	1,100	2,200	4,026	4,037	8,063
Total Costs and Expenses	₱ 18,658	₱ 22,428	₱ 41,086	₱ 97,782	₱112,881	₱210,663
Total Cost per Kilometer per Day (In Pesos)	₱ 9,177	₱ 5,307	₱ 6,564	₱ 9,159	₱ 4,593	₱ 5,948

Note: Total Direct Cost = Total Costs - Amortization and Depreciation expenses.
Source: PNCC unaudited financial statements.

The preceding table also shows that in general, the SLE was more expensive to operate and maintain than the NLE on a per kilometer basis. For the first quarter of 1992, the PNCC spent ₱9,177 per kilometer per day for the SLE as compared to ₱5,307 per kilometer per day for the NLE. Considering only the direct expenses (excluding the overhead expenses) incurred for each expressway, the expenses for SLE of ₱8,454 per kilometer per day was almost double that incurred for the NLE which amounted ₱4,950 per kilometer per day.

On top of the direct costs shouldered by the Tollways Division of PNCC for the operations of the SLE and the NLE, the division overhead and the portion of the corporate overhead of PNCC charged to the Tollways Division is allocated to each expressway. In 1991, division overhead amounted to approximately ₱9.4 million while share in the corporate overhead of PNCC amounted to ₱8 million per year.

Table A7-2-3
PERCENTAGE OF MAJOR COSTS ACCOUNT TO TOTAL
(In Percent)

ACCOUNTS	JANUARY - MARCH 25,1992			JANUARY - NOVEMBER 25,1991		
	SLE	NLE	TOTAL	SLE	NLE	TOTAL
Salaries and benefits	58.2%	58.1%	58.1%	59.2%	57.8%	58.5%
Toll tickets used	0.8	0.4	0.6	1.8	1.0	1.4
Equipment rental	3.7	7.2	5.6	4.9	7.6	6.3
Repairs and maintenance	10.5	12.6	11.6	8.4	9.9	9.2
Other direct cost	10.3	8.4	9.3	10.9	10.6	10.8
Field operations and administrative cost	8.6	6.7	7.6	5.8	5.3	5.6
Division Overhead	2.0	1.7	1.8	4.8	4.2	4.5
Share in Corporate Overhead	5.9	4.9	5.4	4.1	3.6	3.7
Total Cost and Expenses	100.0	100.0	100.0	100.0	100.0	100.0

Source: PNCC unaudited financial statements.

Salaries and related benefits was the major expense in operating the tollway (See Table A7-2-3). Salaries and related benefits incurred for the SLE and the NLE accounted for approximately 58% of the respective total expenses. The higher salary expenses incurred for the SLE are due to the fact that the SLE is an urban expressway which services the subdivisions in the South, resulting in more toll gates and personnel required to service the higher volume of traffic. Likewise, the cost of repairs and maintenance for the SLE was slightly higher than that of NLE. A major expense item for the NLE is the amortization of the expressway improvements (a non-cash expense) which accounted for approximately 30% of the total expenses.

3. MAINTENANCE EXPENSES

Total cost and expenses were segregated into maintenance and operating expenses. Maintenance expenses consist of salaries and related benefits, materials and supplies, light and water, equipment rental, petroleum, oil and lubricants (POL) expenses, and other maintenance cost. Other maintenance costs covers insurance premiums, taxes and licenses, tools and equipment

expenses, office supplies and the cost of retired/obsolete assets. In 1991, maintenance expenses accounted for approximately 37% of the total operating and maintenance expenses and 43% of the total direct cash expenses. The major component of the maintenance expenses was salaries which averaged at 55% of total maintenance cost for the SLE and 50% for the NLE. The second largest maintenance expense was materials and supplies (20%), followed by equipment rental (20%). Table A7-2-4 shows the breakdown of the maintenance expenses for the North and South Luzon Expressway.

Table A7-2-4
BREAKDOWN OF MAINTENANCE EXPENSES
(In Thousand Pesos)

ACCOUNTS	JANUARY - MARCH 1992			JANUARY - NOVEMBER 25, 1991		
	SLE	NLE	TOTAL	SLE	NLE	TOTAL
Salaries and benefits	₱ 5,176	₱ 6,132	₱ 11,308	₱ 21,604	₱ 24,549	₱ 46,153
Light and water	129	160	289	702	962	1,664
Security and janitorial	637	620	1,257	3,229	4,305	7,534
Materials and supplies	1,735	2,555	4,290	8,003	11,062	19,065
Equipment rental	690	1,626	2,316	4,749	8,546	13,295
POL expenses	315	364	679	2,275	2,313	4,588
Other maintenance cost	223	272	495	223	101	324
Total Maintenance Expenses	₱ 8,905	₱ 11,729	₱ 20,634	₱ 40,785	₱ 51,838	₱ 92,623

Source: PNCC unaudited financial statements.

Equipment are rented from a subsidiary of PNCC or other companies whenever the required equipment for a project is not available. Equipment rental includes salary of the equipment operator, petroleum, oil and lubricants. The NLE operations resorted to more equipment rental for their operations in 1991 and 1992 because of the massive maintenance requirements on the expressway due to the eruption of the Mt. Pinatubo. The equipment rental for the NLE was 135% higher than the SLE for the first quarter of 1992 and 80% higher for 1991.

The estimated annual maintenance expense for SLE for the first quarter of 1992 amounted to ₱1.6 million per kilometer while that for NLE amounted to ₱1.0 million per kilometer (See Table A7-2-5). The annual maintenance expense for SLE was higher than that for NLE by 58% in 1992 and 78% in 1991.

Table A7-2-5
ESTIMATED ANNUAL MAINTENANCE EXPENSE PER KILOMETER
(In Thousand Pesos)

ACCOUNTS	1992			1991		
	SLE[a]	NLE[b]	TOTAL	SLE[c]	NLE[d]	TOTAL
Salaries and benefits	₱ 929	₱ 530	₱ 659	₱ 727	₱ 365	₱ 476
Light and water	23	14	17	24	14	17
Security and janitorial	114	54	73	109	64	78
Materials and supplies	311	221	250	269	164	196
Equipment rental	124	140	135	160	127	137
POL expenses	57	31	48	77	34	47
Other maintenance cost	40	23	29	8	2	4
Total Maintenance Expenses/km.	₱1,599	₱1,013	₱1,203	₱1,374	₱ 770	₱ 955

Notes:

a/ Maintenance expenses incurred by the PNCC Tollways Division for the period January 1-March 25,1992 was annualized and divided by 23.92 kms.

b/ Maintenance expenses incurred by PNCC Tollways Division for the period January 1 - March 5, 1992 was annualized and divided by 49.72 kms.

c/ Maintenance expenses incurred by the PNCC Tollways Division for the period January 1 - November 25,1991 was annualized and divided by 32.95 kms.

d/ Maintenance expenses incurred by PNCC Tollways Division for the period January 1 - November 25, 1991 was annualized and divided by 74.72 kms.

Source: PNCC unaudited financial statements.

Total Annual maintenance cost per kilometer is a function of a fixed cost which is independent of traffic and is largely due to the natural deterioration of the facility. The second component of these maintenance costs is due to the wear and tear caused by the volume of traffic utilizing the facility.

The maintenance cost per kilometer for the SLE and NLE was evaluated in terms of the impact of volume of traffic utilizing the expressways using the 1989 and 1991 data from PNCC. The traffic volume on the SLE represents mainly intra-urban traffic and therefore serviced a higher traffic volume with a shorter length. Table A7-2-6 (showing maintenance cost per kilometer and the estimated traffic volume for SLE and NLE) clearly demonstrates that there is a relationship between maintenance cost and traffic volume. The higher the traffic volume, the higher the maintenance cost. Comparing the 1989 and 1991 data for SLE and NLE, an incremental maintenance cost of ₱ 0.02 per kilometer per vehicle is required for SLE.

Table A7-2-6
TRAFFIC VOLUME AND MAINTENANCE COST
(In Thousand)

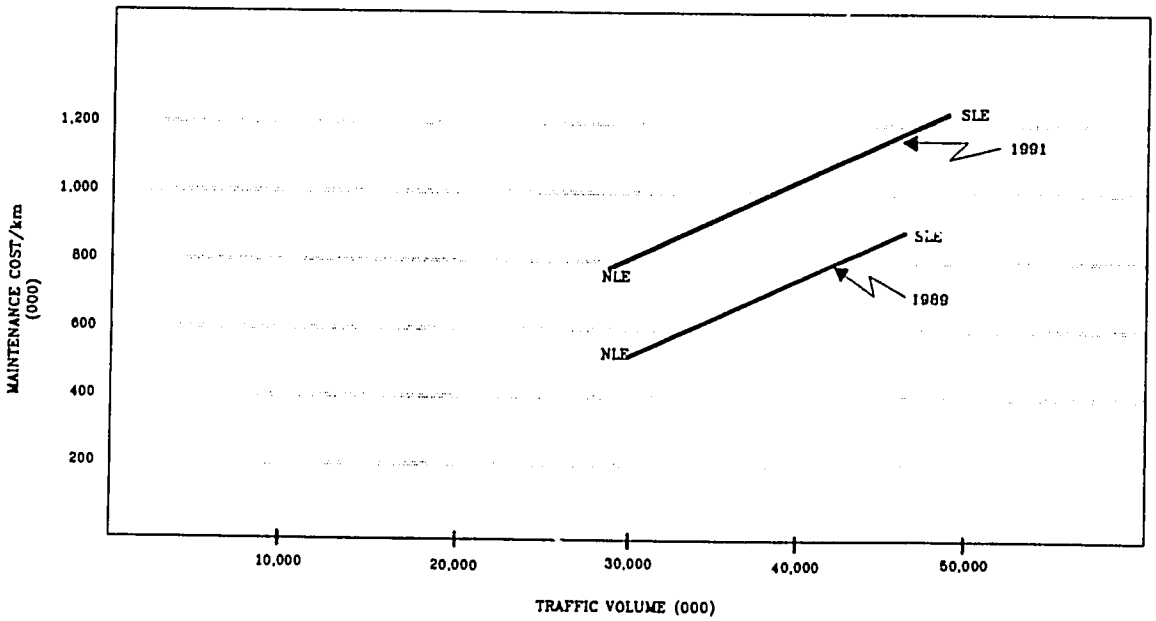
	1991		1989	
	SLE	NLE	SLE	NLE
Traffic Volume [a]	49,230	29,390	46,590	29,902
Maintenance Cost/km.	₱ 1,374	₱ 770	₱ 882	₱ 513

Notes: [a] Traffic Volume was calculated based on the estimated traffic count of PNCC for March 1991 and May 1989. The ADT was calculated by dividing count by 31 days and multiplying ADT by 365 days.

Source: Traffic count for March 1991 and May 1989 submitted to TRB by PNCC.

Figure A7-2-1 shows that the relationship between maintenance cost and traffic volume is relatively stable for the two years under review.

Figure A7-2-1
TRAFFIC VOLUME AND MAINTENANCE COST



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4. OPERATING EXPENSES

Operating expenses consist of salaries and related benefits, materials and supplies, toll tickets used, depreciation of utilities and equipment, amortization of expressway improvement and other operating costs. Other operating costs cover office supplies, tools and equipment expenses, and POL. For the first three months of 1992, operating expenses accounted for approximately 63% of total operating and maintenance expenses and 48% of total expenses. The major expense item of operating expense was salaries and related benefits which averaged at 58% of total operating cost for SLE and 36% for NLE. Table A7-2-7 shows the breakdown of the operating expenses for the SLE and NLE.

Table A7-2-7
BREAKDOWN OF DIRECT OPERATING EXPENSES
(In Thousand Pesos)

ACCOUNTS	JANUARY 1 - MARCH 25, 1992			JANUARY 1 - NOVEMBER 25,1991		
	SLE	NLE	TOTAL	SLE	NLE	TOTAL
Salaries and benefits	₱ 5,684	₱ 6,885	₱ 12,569	₱ 36,300	₱ 40,708	₱ 77,008
Toll tickets used	157	95	252	1,774	1,110	2,884
Materials and supplies	122	64	186	671	588	1,259
Other operating expenses	713	685	1,398	3,792	3,849	7,641
Field and administrative cost	1,607	1,499	3,106	5,717	6,030	11,747
Total Direct Operating Expenses	₱ 8,283	₱ 9,228	₱ 17,511	₱ 48,254	₱100,509	₱158,502

Source: PNCC unaudited financial statements.

Table A7-2-8 shows that in 1991, the estimated annual operating cost per kilometer amounted to ₱1.8 million. The cost of operating the SLE was slightly higher than the NLE, ₱1.86 million per kilometer for SLE against ₱1.79 million per kilometer for NLE. However for 1991, the cost of operating the SLE was more than double that for NLE, ₱1.6 million against ₱0.78 million.

Table A7-2-8
ESTIMATED ANNUAL OPERATING EXPENSES PER KILOMETER
(In Thousand Pesos)

ACCOUNTS	1992			1991		
	SLE[a]	NLE[b]	TOTAL	SLE[c]	NLE[d]	TOTAL
Salaries and benefits	₱ 1,020	₱ 595	₱ 733	₱1,222	₱ 605	₱ 794
Toll tickets used	28	8	15	60	16	30
Materials and supplies	23	6	11	23	9	13
Other operating and	128	59	82	128	51	79
Field operating and administrative cost	288	129	181	193	90	120
Total Operating Expenses per km.	₱ 1,865	₱1,793	₱1,816	₱1,626	₱ 777	₱1,036

Notes:

a/ Maintenance expenses incurred by the PNCC Tollways Division for the period January 1-March 25,1992 was annualized and divided by 23.92 kms.

b/ Maintenance expenses incurred by PNCC Tollways Division for the period January 1 - March 5, 1992 was annualized and divided by 49.72 kms.

c/ Maintenance expenses incurred by the PNCC Tollways Division for the period January 1 - November 25,1991 was annualized and divided by 32.95 kms.

d/ Maintenance expenses incurred by PNCC Tollways Division for the period January 1 - November 25, 1991 was annualized and divided by 74.72 kms.

Source: PNCC unaudited financial statements.

5. SALARIES AND WAGES

As of June 30, 1991, the Tollways Division of PNCC has a total of 1,627 employees with a total basic monthly salary of ₱8.732 million. The majority of the employees are rank and file. The number of employees per classification and the monthly salary are given in Table A7-2-9 as follows:

Table A7-2-9
AVERAGE MONTHLY BASIC SALARY
(In Pesos)

RANK	NUMBER OF PERSONNEL	TOTAL MONTHLY BASIC SALARY	AVERAGE MONTHLY BASIC SALARY
Managers and executives	33	₱ 394,365	₱ 11,950
Supervisors and equivalent	135	953,800	7,065
Rank and File	1,459	7,384,134	5,061
Total	1,627	₱ 8,732,799	₱ 24,076

Source: TRB Rate Audit Report

Aside from their basic salaries, the tollways employees enjoy benefits covered under their Collective Bargaining Agreement (CBA). Such benefits include vacation and sick leaves, bonuses (13th month, midyear, and signing bonuses), employees welfare, SSS/ Medicare/ECC, and medical, dental and rice subsidies. Employee benefits are estimated at approximately 25% of basic salaries.

Appendix A7-3

BOARD OF INVESTMENTS PRIVILEGES AND TAX CONSIDERATIONS

Appendix A7-3
BOARD OF INVESTMENTS PRIVILEGES AND TAX CONSIDERATIONS

1. BOARD OF INVESTMENTS INCENTIVES

Executive Order No. 226 known as the Omnibus Investments Code of 1987 grants preferential tax and other benefits to enterprises registered in the preferred areas of investments with the Board of Investments (BOI). The Build-Operate-Transfer Project falls under Sec. VIII (7) - other infrastructure projects as determined by BOI in consultation with concerned agencies in accordance with R.A. 6957 as a pioneer/non-pioneer preferred activity in the Investment Priorities Plan (IPP) of 1992. Since this is the first year it was listed in the IPP, the BOI would still have to formulate the implementing guidelines in close coordination with DPWH. The specific incentives a BOT registered enterprise avails of are not yet defined.

1.1 BOI Standard Incentives

Under the present Omnibus Investment Code, enterprises registered with the BOI are entitled to the following standard incentives. Any amendments to these incentives would require legislation.

- **Income Tax Holiday**

  A new registered enterprise is fully exempt from payment of income tax for the following periods: six years from start of commercial operations for pioneer enterprises and four years for non-pioneer enterprises.

  Considering the capital intensiveness of the tollway infrastructure project, the long construction period which normally takes over five years and the fact that the project would likely incur losses during the initial years of operations due to low traffic volume, the BOT enterprise may not be able to take full advantage of this incentive.

- **Tax and Duty Free Importation of Capital Equipment**

  Under E.O. No. 226, the importation of machinery and equipment by the registered enterprises are exempted to the extent of 100% of the customs duties and National Internal Revenue taxes. This incentive can be availed of by a registered enterprise until August 13, 1992. With the passage of Republic Act No. 7369 (An Act Granting Tax and Duty Exemption and Tax Credit on Capital

Equipment) in 1992, a registered enterprise may avail of the tax and duty free importation of capital equipment incentive until December 31, 1994 or within five years from date of registration whichever comes first.

The equipment to be imported by the BOT registered enterprise for use in the project which are duly approved by the BOI and the DPWH may be exempted from import taxes and customs duties. However, there is a small chance that the BOT registered contractor would be able to avail of this incentive since the construction is expected to commence only in 1994. This incentive would expire that year. The exemption should take effect for five years from the date of the BOI approval.

- **Exemption from Contractor's tax**

Enterprises registered under this Code are exempted from the contractors's tax, now equated with the value added tax (VAT). A BOT registered enterprise may be exempted or zero rated.

- **Additional Labor Expense Deduction**

For the first five years from registration, a registered enterprise is allowed additional deduction from its taxable income, an amount equivalent to 50% of the wages corresponding to the incremental direct labor for skilled and unskilled workers.

The proponents would not be able to benefit from this incentive, if ever granted to them, because of the long construction period. However, if the project is granted the benefit of the income tax holiday, it should also be entitled to an additional deduction of 100% of the wages given to the incremental skilled and unskilled direct labor worker after the expiration of the income tax holiday. This incentive should not be given simultaneous with the income tax holiday. Availment of the benefit is subject to the provision that the project must meet the prescribed ratio of capital equipment to the number of workers set by the BOI for the sector.

1.2 Recent Developments

The Government, under the Ramos administration, plans to review the Omnibus Investment Code of 1987 in the next few months because of the policies and laws adopted in the past six years and the proposed amendments to be introduced by the present administration. Recently, two laws were passed to encourage foreign investment in the country, namely: the Foreign Investments Act of 1992 (R.A. No. 7042), which now allows 100% foreign equity participation except for investment areas reserved for Philippine nationals (Foreign Investment Negative).

Some of the proposed amendments to the Code are the inclusion of the following incentives.

- **Accelerated Depreciation**

  Depreciation rates are prescribed in Bulletin F (The Depreciation Rate Tables) which is being used as the guideline by the Bureau of Internal Revenues. However, the rates of depreciation for an expressway do not exist.

  Certain types of roads, however, are being depreciated for tax purposes. They are part of private manufacturing plants. The depreciation rates used for these roads, though, may not be the appropriate for expressways. This is because the design standards and usage of expressways require that they have longer lives, usually understood as 20 years. The basis of this assumption, regardless of the differences in the actual life span of an expressway relative to manufacturing plant roadways, is that depreciation rates for tax purposes are highly negotiable. PNCC depreciates all its expressways account on a straight line method over the estimated useful lives of the asset or the franchise period which is 30 years, whichever is shorter.

  To ease the liquidity pressures during the initial years of operations, the BOT registered enterprise should also be allowed to deduct one form of accelerated depreciation. The National Internal Revenue Code (NIRC) allows either the sum of the years' digit or the double declining balance method. In line with the generally accepted principles, the financial effect of the initial change would have to be footnoted in the firm's audited financial statements.

- **Net Operating Loss Carryover**

  The net operating loss carry-over was one of the incentives included in the previous BOI guidelines. The net operating loss incurred in any of the first ten years of operations may be carried as a deduction from taxable income for six years following the year of such loss. The entire amount of the loss may be carried over to the first of the six taxable years following the loss. Any portion

of such loss which exceeds the taxable income of such first year shall be deducted from the taxable income incurring within the next five years.

During the early years of its operations, when the traffic is just starting to build-up, the BOT contractor will likely incur losses. This incentive would ease the liquidity problem of the BOT contractor during the initial years of operations. The use of operating losses as a tax shield could be fully utilized and be therefore very relevant. The net loss carryover incentive should be carefully studied as this would have a significant impact on the viability of the proposed BOT project.

2. TAX CONSIDERATIONS

The objective of this section is to identify the taxes to which the BOT contractor will be subject as an operator of the Manila South Tollway from President Quirino to Alabang. The BOT contractor will build, operate and maintain the expressway as a private domestic company. To date, there is only one company, the Philippine National Construction Company (PNCC) a government controlled company, which is franchised to operate the North Luzon Expressway (NLE) and the South Luzon Expressway (SLE). As a government corporation, applicable taxes may differ.

2.1 Income Tax

Under the National Internal Revenue Code, all domestic corporations are taxed on their annual taxable income from all worldwide sources at the rate of 35%. Foreign corporations are taxed only on their income from Philippine sources. Likewise, a resident foreign corporation is taxed in the same manner and at the same rate as a domestic corporation.

Income from all sources within the Philippines includes such items as (1) dividends from domestic corporations and in certain cases, foreign corporations, (2) compensation for services rendered in the Philippines, (3) gains, profits and income either from sale of real property located in the Philippines, and (4) rent or royalties from properties located in the Philippines.

2.2 Value Added Tax

The value added tax (VAT) system, which was introduced by Executive Order No. 273, took effect on January 1, 1988. In general, the 10% VAT shall apply to all businesses engaged in selling goods and services in the Philippines. The VAT base is the gross receipts of payments which include not only cash but also constructive receipts of payments. The gross receipts refer

to the total amount of money or its equivalent representation of the contract price, compensation or service fee. The VAT taxpayer may bill the VAT to the buyer of the product or services. It is not required that the VAT be billed separately in the invoice.

In the case of PNCC, the exemption from VAT was granted in the franchise agreement. The PNCC is exempt from VAT on its direct services for the construction and maintenance of the North and South Expressways by virtue of P.D. 1113 and Sec. 103(u) of the Tax Code.

In the study, the toll rates used are assumed to be net of the VAT. Exemption from VAT is one of the incentives available to a BOT registered concessionaire. Likewise, any value added tax collected from the users will be passed on to the government. However, the inclusion of the VAT on the toll rates would be counterproductive since the toll rates are already set at a maximum levels.

2.3 Real Estate Tax

Under the Local Government Code of 1991, owners of land, buildings and machineries are required to pay real property taxes on these properties to the local government.. Improvements made on these properties are likewise subject to tax. The rates are based on the sound value of the property. In cities and municipalities in Metro Manila, the basic rate is 2% of the assessed value. A uniform annual tax of 1% of the assessed value is also levied in addition to the regular (basic) real property tax. The assessment level is generally 50% of the market value for commercial and industrial lands, and 40% for agricultural land. The assessment level for improvements ranges from 30% to 80% depending on the market value.

It also states the real estate owned by the Republic of the Philippines or any of its political subdivisions are exempt from the payment real estate property except when the beneficial use thereof has been granted, for consideration or otherwise to a taxable person or entity.

As provided by the franchise agreement, PNCC is exempted from payment of all taxes except income tax and real estate tax. PNCC does not pay real estate tax on the roadways since the land is owned by the Government. However, PNCC pays the real estate taxes on PNCC owned land, buildings, and improvements. In the study, it was assumed that the Philippine Government will procure and retain all rights to the lands as well as the improvements on it. Therefore, no taxes on roadways and improvements would be due the local government in which the expressway passes. In the event that the BOT contractor will not be exempted from payment of real property tax, the financial viability of the project will be affected unless recovered by charging higher toll rates.

2.4 Withholding Tax

Interest on Philippine peso savings and time deposits and on yields from deposit substitutes and trust funds received by an investor corporation are subject to 20% withholding tax. This withholding tax is a final tax. In this study, interest income from short-term investments are assumed to be net of the 20% withholding taxes and is therefore excluded from taxable income.

2.5 Local Taxes

The Local Government Code of the Philippines empowers the provinces, municipalities and cities to levy fees and taxes. Although they are empowered to collect/impose additional fees and local taxes, these should be uniform across each local government unit. Examples of local taxes are:

- Community tax which is a basic fee of ₱500 payable by any corporation engaged or doing business in the Philippines plus additional tax based on the value of property and amount of gross receipts or earnings;
- Other business taxes and licenses to do business in the area which is usually based on gross receipts. This varies with the type of business and the rates would range from 50% of one percent to two percent of gross receipts;
- Real estate tax which is being collected by the local government unit.

The taxes currently imposed by the local government units are minimal. The BOT concessionaire should be exempted from any additional or new taxes to be imposed by the local government units as these might affect the profitability of the proposed BOT project.

3. RECOMMENDATIONS

The Government should look into granting operating incentives to improve the liquidity during the formative years of the project and the financial viability to the prospective BOT contractor. In order for the BOT project proponents to avail themselves of the BOI incentives, the Department of Public Works and Highways should support a position paper that would:

- Grant the BOT contractor the benefits of net operating loss carryover and accelerated depreciation;

- Amend the deadline for availment of tax and duty free importation of capital equipment from a fixed period ending December 31, 1994 or five years from date of registration whichever comes first, to a five year period starting from the date of registration;

- Endorse that the BOT contractor of the expressway be exempted from payment of the VAT, real property tax, and any future taxes that the national or local government may impose.

Appendix A7-4

MST FINANCIAL MODEL - BASE CASE

(Full Length)

Appendix A7-4
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers		SLE	14.5
		MST	19.0
Number of Lanes Constructed		MST	6
Construction (Months)			36
Opening Year:		SLE	1997
		MST	1999
Length of Concession (Years)			20 to 35
Average Cost/Kilometer(P million)	Rehabilitation	SLE	73
(Pesos Million)	New Construction	MST	575
(Dollars Million)			$23
Pre-concession or contract cost(Pesos million)			1,166
Operating expenses(Pesos million)			50
Maintenance (Pesos million)			38
General and administrative expenses			9
Periodic Maintenance (Resurfacing)	Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs +	Every 6 Yrs	MST	910
Land Cost & Access Roads			NA
Revenue Sharing & Concession Income			-

FINANCIAL

Initial Debt: Equity Ratio	3:1	75%	25%
Exchange Rate - Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate - See Schedule below			
Repayment period - See Schedule below			
Front End Fee			0.5%
Interest Rate - Cash & Reserves			14.0%
Interest Rate - Short Term Investments			-
Interest Rate - Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy			40.0%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	19.0 Kms @ MPesos 575/km	MST	3,277	3,277	4,370	10,924		
(Constant Pesos July 1992 Value)		SLE	1,060	-	-	1,060		
	Plus Inflation		1,785	1,765	2,959	6,509		
Total	Current Pesos		6,122	5,043	7,328	18,493	$551	100%
Government Share	40%		2,449	2,017	2,931	7,397	$221	40%
Private Share	60%		3,673	3,026	4,397	11,096	$331	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	18,493	$551
Interest During Construction	3,163	$92
Initial Working Capital	89	$3
Reserve Fund - Debt Service	2,000	$56
Reserve Fund - Operating Losses	4,000	$113
Total	27,745	$815

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		7,397	$221	26.7%
Long-Term Debt		15,261	$446	55.0%
Equity - Construction	2,774			
Equity - Startup	1,725			
Cash from Operations	588	5,087	$149	18.3%
Total		27,745	$815	100.0%

LONG TERM DEBT - TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	6,104	40.00%	10.75%	10 years, inclusive of 1 year grace period
Foreign Commercial Banks	6,867	45.00%	9.50%	10 years, inclusive of 2 year grace period
Development/Local Commercial Banks	2,289	15.00%	18.70%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity

	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	0.0%	9.4%	12.6%	14.3%
Constant Dollar	-5.3%	3.6%	6.6%	8.1%

FIRR/Project

	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	9.4%	12.5%	14.2%	15.2%
Constant Dollar	4.5%	7.2%	8.7%	9.6%

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Appendix A7–4 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED INCOME STATMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011–2015	TOTAL 2016–2020	TOTAL 2021–2025	TOTAL 2026–2030
TOLL REVENUES																			
MST OPERATIONS																			
CARS	–	–	–	282	323	370	423	484	554	635	726	831	952	1,089	1,247	9,250	17,385	31,426	55,619
TRUCKS	–	–	–	53	61	71	82	94	108	125	144	165	191	220	253	1,899	3,636	6,632	11,782
SUBTOTAL	–	–	–	335	384	440	505	578	663	759	870	997	1,142	1,309	1,500	11,149	21,021	38,058	67,401
SLE OPERATIONS																			
CARS	–	416	467	260	301	348	402	465	537	621	718	830	959	1,109	1,281	9,626	18,444	33,707	60,044
TRUCKS	–	78	91	49	58	67	79	92	107	125	146	171	199	233	272	2,088	4,146	7,695	13,777
JEEPNEYS	–	68	76	86	97	110	124	141	160	181	205	232	263	298	338	2,451	4,446	7,879	13,785
BUSES		166	194	225	256	290	328	372	421	477	541	613	694	787	891	6,460	11,718	20,764	36,327
SUBTOTAL	–	728	828	621	711	815	933	1,069	1,225	1,405	1,610	1,846	2,116	2,426	2,782	20,626	38,754	70,045	123,932
TOTAL REVENUES	–	728	828	956	1,096	1,255	1,438	1,648	1,888	2,164	2,480	2,842	3,258	3,735	4,282	31,774	59,774	108,103	191,333
OPERATING EXPENSES																			
OPERATING EXPENSES	–	51	55	91	100	109	118	129	141	153	167	182	199	216	236	1,539	2,367	3,642	5,604
ANNUAL MAINTENANCE EXPENSES	–	26	29	69	76	83	90	98	107	117	127	138	151	164	179	1,169	1,799	2,768	4,259
GENERAL AND ADMINISTRATIVE EXPENSES	–	14	15	16	18	20	21	23	25	28	30	33	36	39	42	277	426	656	1,009
LAND RENTAL (GOP)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL OPERATING EXPENSES	–	91	99	177	193	211	230	250	273	297	324	353	385	420	458	2,985	4,593	7,066	10,872
NET OPERATING INCOME	–	637	729	779	902	1,044	1,208	1,397	1,615	1,866	2,156	2,492	2,873	3,315	3,825	28,789	55,182	101,037	180,461
DEPRECIATION (–)	–	(53)	(53)	(1,083)	(1,083)	(1,083)	(1,083)	(1,083)	(1,105)	(1,105)	(1,105)	(1,105)	(1,105)	(1,105)	(1,120)	(5,956)	(4,081)	(1,430)	(1,136)
INTEREST EXPENSE (–)	–	–	–	(1,892)	(1,898)	(1,856)	(1,840)	(1,895)	(1,936)	(1,944)	(1,941)	(1,884)	(1,831)	(1,788)	(1,559)	(3,288)	–	–	–
FOREIGN EXCHANGE LOSS (–)	–	–	–	–	(84)	(294)	(403)	(520)	(643)	(774)	(913)	(1,060)	(1,215)	–	–	–	–	–	–
NET PROFIT BEFORE TAXES	–	584	676	(2,195)	(2,163)	(2,188)	(2,118)	(2,100)	(2,068)	(1,956)	(1,803)	(1,559)	(1,278)	423	1,146	19,545	51,101	99,607	179,324
INCOME TAXES (–)	–	–	–	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt	–	–	–	–	(148)	(401)	(6,841)	(17,885)	(34,862)	(62,763)
INTEREST INCOME NET OF 20% TAX (+)	–	–	2	343	639	573	463	346	278	203	148	103	77	79	81	188	247	379	584
NET PROFIT (LOSS)	–	584	678	(1,352)	(1,523)	(1,616)	(1,655)	(1,754)	(1,791)	(1,753)	(1,655)	(1,456)	(1,201)	353	825	12,892	33,462	65,124	117,144
Constant Dollars (July 1992 Value)	–	17	19	(49)	(38)	(38)	(37)	(37)	(36)	(33)	(29)	(24)	(19)	5	12	148	289	424	569

Appendix A7-4 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED CASH FLOW STATEMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
SOURCES OF FUNDS																			
NET PROFIT	–	584	678	(1,852)	(1,523)	(1,616)	(1,655)	(1,754)	(1,791)	(1,753)	(1,655)	(1,456)	(1,201)	353	825	12,892	33,462	65,124	117,144
ADD: DEPRECIATION	–	53	53	1,083	1,083	1,083	1,083	1,083	1,105	1,105	1,105	1,105	1,105	1,105	1,120	5,956	4,081	1,430	1,136
CASH FROM OPERATIONS	–	637	731	(769)	(441)	(533)	(572)	(671)	(685)	(648)	(550)	(351)	(96)	1,458	1,946	18,849	37,543	66,554	118,281
GOP ADVANCES:																			
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS	2,449	2,017	2,931	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DEBT FUNDING																			
CONSTRUCTION LOANS	3,086	3,262	3,412	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LONG TERM DEBT 75 %	–	–	15,261	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EQUITY 25 %	918	756	2,825	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SHORT TERM LOANS	–	–	–	–	–	460	2,007	3,689	5,467	7,564	9,394	11,527	13,406	12,419	10,223	16,750	–	–	–
TOTAL SOURCES	**6,453**	**6,673**	**25,161**	**(769)**	**(441)**	**(73)**	**1,436**	**3,018**	**4,781**	**6,916**	**8,844**	**11,176**	**13,310**	**13,878**	**12,169**	**35,599**	**37,543**	**66,554**	**118,281**
USES OF FUNDS																			
LAND ACQUISITION	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS (GOI)	2,449	2,017	2,931	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITAL EXPENDITURES – SLE & MST	3,673	3,026	4,397	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITALIZED INTEREST	331	993	1,840	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PERIODIC MAINTENANCE – SLE	–	–	–	–	–	–	–	134	–	–	–	–	–	224	–	376	–	630	1,057
PERIODIC MAINTENANCE – MST	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	533	895	1,500	2,516
LONG-TERM DEBT (PRINCIPAL REPAYMENT)				–	678	1,537	1,537	1,537	1,766	1,766	1,766	1,766	1,766	229	229	687	–	–	–
RESERVE FUNDING (DEBT SERVICE)			2,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
RESERVE FUNDING (LOSS RESERVE)			4,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
REPAYMENT SHORT-TERM LOANS			9,760	–	–	–	460	2,007	3,689	5,467	7,564	9,394	11,527	13,406	12,419	26,973	–	–	–
TOTAL USES	**6,453**	**6,036**	**24,928**	**–**	**678**	**1,537**	**1,997**	**3,678**	**5,454**	**7,232**	**9,330**	**11,160**	**13,293**	**13,859**	**12,648**	**28,569**	**895**	**2,130**	**3,573**
NET CASH INFLOW (OUTFLOW)	**–**	**637**	**232**	**(769)**	**(1,119)**	**(1,609)**	**(561)**	**(660)**	**(673)**	**(316)**	**(485)**	**16**	**17**	**19**	**(479)**	**7,030**	**36,648**	**64,424**	**114,708**
FINANCIAL INTERNAL RATES OF RETURN																			
FIRR ON EQUITY																			
NET CASH FLOW	–	637	232	(769)	(1,119)	(1,609)	(561)	(660)	(673)	(316)	(485)	16	17	19	(479)	7,030	36,648	64,424	114,708
LESS: MAINTENANCE RESERVES	–	–	–	(67)	(67)	(67)	(67)	(82)	(82)	(82)	(82)	(82)	(82)	(107)	(107)	(1,101)	(1,674)	(2,639)	(2,977)
LESS: EQUITY CONTRIBUTION	(918)	(756)	(2,825)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NET CASH FLOW (OUTFLOWS)	**(918)**	**(119)**	**(2,592)**	**(835)**	**(1,186)**	**(1,676)**	**(628)**	**(741)**	**(755)**	**(398)**	**(567)**	**(66)**	**(64)**	**(88)**	**(586)**	**5,929**	**34,974**	**61,785**	**111,731**
CONSTANT Dollars(July 1992 value)	(26)	(3)	(62)	(22)	(30)	(40)	(14)	(16)	(15)	(7)	(10)	(1)	(1)	(1)	(8)	62	304	401	543
	20 Year	25 Year	30 Year	35 Year															
FIRR/E Current Pesos	0.0%	9.4%	12.6%	14.3%															
Constant (P/$)	-5.3%	3.6%	6.6%	[illegible]															
FIRR ON PROJECT																			
NET OPERATING INCOME	–	637	729	779	902	1,044	1,208	1,397	1,615	1,866	2,156	2,489	2,873	3,315	3,825	28,789	55,182	101,037	180,461
LESS: CAPITAL EXPENDITURES	(6,122)	(5,043)	(7,328)	–	–	–	–	(134)	–	–	–	–	–	(224)	–	(909)	(895)	(2,130)	(3,573)
NET CASH INFLOWS(OUTFLOWS)	**(6,122)**	**(4,405)**	**(6,600)**	**779**	**902**	**1,044**	**1,208**	**1,264**	**1,615**	**1,866**	**2,156**	**2,489**	**2,873**	**3,091**	**3,825**	**27,880**	**54,287**	**98,907**	**176,888**
CONSTANT Dollars(July 1992 value)	(173)	(115)	(157)	21	23	25	27	27	32	35	38	42	45	46	54	324	471	643	860
	20 Year	25 Year	30 Year	35 Year															
FIRR/P Current Pesos	9.4%	12.5%	14.2%	15.2%															
Constant (P/$)	4.5%	7.2%	8.7%	9.6%															

Appendix A7–4 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
ASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED BALANCE SHEET

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020	2025	2030
ASSETS																			
MINIMUM CASH & RESERVES	–	49	6,089	5,328	4,896	3,372	2,811	2,151	1,478	1,162	677	693	710	729	249	384	590	908	1,492
EXCESS CASH	–	588	781	773	86	–	–	–	–	–	–	–	–	–	–	6,895	43,337	107,442	221,566
FIXED ASSETS																			
BUILDINGS & EQUIPMENT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
COMPLETED EXPRESSWAY	6,122	11,165	18,493	21,657	21,657	21,657	21,657	21,790	21,790	21,790	21,790	21,790	21,790	22,014	22,014	22,923	23,818	25,948	29,521
(+)CAPITALIZED INTEREST	331	1,324	3,163																
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL FIXED ASSETS	6,453	12,488	21,657	21,657	21,657	21,657	21,657	21,790	21,790	21,790	21,790	21,790	21,790	22,014	22,014	22,923	23,818	25,948	29,521
LESS ACCUM. DEPRECIATION	–	(53)	(106)	(1,189)	(2,272)	(3,354)	(4,437)	(5,520)	(6,625)	(7,730)	(8,835)	(9,940)	(11,046)	(12,151)	(13,271)	(19,227)	(23,308)	(24,738)	(25,874)
NET FIXED ASSETS	6,453	12,435	21,551	20,468	19,385	18,302	17,219	16,270	15,165	14,060	12,955	11,850	10,745	9,863	8,743	3,696	510	1,210	3,647
TOTAL ASSETS	6,453	13,072	28,420	26,568	24,367	21,675	20,030	18,421	16,643	15,222	13,631	12,542	11,454	10,592	8,993	10,975	44,437	109,561	226,706
LIABILITIES AND EQUITY																			
CURRENT LIABILITIES																			
ACCOUNTS PAYABLE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION/SHORT TERM LOANS	3,086	6,348	–	–	–	460	2,007	3,689	5,467	7,564	9,394	11,527	13,406	12,419	10,223	–	–	–	–
LONG-TERM DEBT	–	–	15,261	15,261	14,583	13,046	11,509	9,973	8,207	6,441	4,676	2,910	1,145	916	687	–	–	–	–
GOVERNMENT ADVANCE	2,449	4,466	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397
SHAREHOLDERS' EQUITY																			
PAID IN CAPITAL	918	1,675	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499
MAINTENANCE RESERVE	–	–	–	67	133	200	267	215	297	379	460	542	624	507	614	806	1,586	2,094	1,499
RETAINED EARNINGS	–	584	1,262	(656)	(2,246)	(3,928)	(5,650)	(7,352)	(9,224)	(11,059)	(12,796)	(14,334)	(15,617)	(15,146)	(14,428)	(1,728)	30,955	95,570	213,310
TOTAL SHAREHOLDERS' EQUITY	918	2,259	5,762	3,910	2,387	771	(883)	(2,637)	(4,428)	(6,181)	(7,836)	(9,292)	(10,493)	(10,143)	(9,315)	3,578	37,040	102,164	219,308
TOTAL LIABILITIES AND EQUITY	6,453	13,072	28,420	26,568	24,367	21,675	20,030	18,421	16,643	15,222	13,631	12,542	11,454	10,592	8,993	10,975	44,437	109,561	226,706

SELECTED FINANCIAL INDICATORS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
LIQUIDITY															
DEBT EQUITY RATIO		–	2.6	3.9	6.1	16.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
DEBT SERVICE RATIO		–	–	0.4	0.4	0.3	0.4	0.5	0.5	0.7	0.8	1.0	1.3	6.9	10.0
LIQUIDITY RATIOS (TIMES)		–	–	4.0	2.6	1.9	1.5	1.5	1.3	1.2	1.3	1.3	1.6	11.3	222.1
PROFITABILITY															
OPERATING MARGIN		87.5%	88.0%	81.5%	82.4%	83.2%	84.0%	84.8%	85.6%	86.3%	86.9%	87.6%	88.2%	88.8%	89.3%
RETURN ON REVENUES		80.2%	82.0%	−194%	−139%	−129%	−115%	−106%	−95%	−81%	−67%	−51%	−37%	9%	19%
RETURN ON TOTAL EQUITY		9.2%	4.2%	−9.6%	−12.1%	−25.6%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	−0.9%	−2.1%
RETURN ON TOTAL ASSETS		1.5%	0.8%	−1.7%	−1.5%	−1.8%	−2.0%	−2.3%	−2.6%	−2.8%	−2.9%	−2.8%	−2.5%	0.8%	2.1%

Appendix A7-4 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Constant 1992 Million Pesos)

SCHEDULE OF ANNUAL TOLL REVENUES

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
TOLL REVENUES (FROM APPENDIX A4-3)																		
MST																		
CARS	-	-	154											264		394		522
TRUCKS	-	-	29											54		83		111
SUBTOTAL	-	-	184	-	-	-	-	-	-	-	-	-	-	318		477		633
SLE																		
CARS			142											272		421		565
TRUCKS			27											58		96		130
JEEPNEYS			47											72		100		129
BUSES			123											189		263		339
SUBTOTAL	-	-	340	-	-	-	-	-	-	-	-	-	-	590		879		3,205
GROWTH RATES																		
MST																		
CARS				5.02%											4.08%	4.08%	2.84%	2.84%
TRUCKS				5.68%											4.47%	4.47%	2.92%	2.92%
SLE																		
CARS	3.00%	3.00%	3.00%	6.04%											4.49%	4.49%	2.97%	2.97%
TRUCKS	6.90%	6.90%	6.90%	7.11%											5.23%	5.23%	3.08%	3.08%
JEEPNEYS	3.00%	3.00%	3.00%	3.95%											3.34%	3.34%	2.60%	2.60%
BUSES	6.90%	6.90%	6.90%	3.95%											3.34%	3.34%	2.60%	2.60%
ANNUAL TOLL REVENUES																		
MST																		
CARS	-	-	154	162	170	179	188	197	207	217	228	240	252	264	1,493	1,823	2,147	2,469
TRUCKS	-	-	29	31	33	34	36	38	41	43	45	48	51	54	306	381	453	523
SUBTOTAL	-	-	184	193	203	213	224	236	248	260	274	288	302	318	1,799	2,204	2,600	2,992
SLE																		
CARS	270	278	142	151	160	170	180	191	203	215	228	242	256	272	1,552	1,933	2,302	2,665
TRUCKS	51	54	27	29	31	33	36	38	41	44	47	50	54	58	336	434	525	611
JEEPNEYS	44	45	47	49	51	53	55	57	59	61	64	66	69	72	396	467	538	612
BUSES	108	115	123	128	133	139	144	150	156	162	168	175	182	189	1,044	1,230	1,419	1,613
SUBTOTAL	473	493	340	357	375	394	414	436	458	482	507	533	561	590	3,329	4,065	4,785	5,502
TOTAL REVENUES (CONSTANT 1992 PRICES)	473	493	523	550	578	607	639	671	706	742	780	821	863	908	5,128	6,269	7,384	8,494

Appendix A7–4 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

	Constant Pesos	CONSTRUCTION PHASE 1996 30%	1997 30%	1998 40%	Yr Zero	TOTAL (Current) Pesos	(Dollars)	Per Cent
SCHEDULE OF TOTAL START–UP COSTS								
MST 19.0 Kms @ MPesos 575/km	10,924							
SLE 14.5 Kms @ MPesos 73/km	1,060							
CONSTRUCTION COSTS (ALL IN)		6,122	5,043	7,328		18,493	(551)	
GOVT SHARE – PESOS		2,449	2,017	2,931		7,397		
(Dollars)		(78)	(60)	(83)			(221)	27.1%
PRIVATE SHARE – PESOS		3,673	3,026	4,397		11,096		
(Dollars)		(116)	(90)	(124)			(331)	40.6%
CAPITALIZED INTEREST		331	993	1,840		3,163		
		(10)	(30)	(52)			(92)	11.3%
LAND ACQUISITION		–	–	–		–	–	–
ACCESS ROADS		–	–	–		–		
INITIAL WORKING CAPITAL					89	89	(3)	0.3%
RESERVE FUND (DEBT SERVICE)					2,000	2,000	(56)	6.9%
RESERVE FUND (LOSS RESERVE)					4,000	4,000	(113)	13.8%
TOTAL COSTS PESOS		6,453	6,036	9,168	6,089	27,745		
TOTAL COSTS DOLLARS		(204)	(180)	(259)	(172)		(815)	100.0%

SCHEDULE OF INITIAL CAPITALIZATION		Private	Per Cent	GOVT OF PHIL Pesos	Dlrs	Per Cent
CONSTRUCTION COSTS		11,096	40.0%	7,397	(221)	27.1%
DEBT	8,322					
EQUITY	2,774					
CAPITALIZED INTEREST		3,163	11.4%	–	–	–
LAND COSTS		–	–	–	–	–
ACCESS ROADS		–	–	–	–	–
INITIAL WORKING CAPITAL		89	0.3%	–		–
RESERVE FUND (DEBT SERVICE)		2,000	7.2%	–		–
RESERVE FUND (LOSS RESERVE)		4,000	14.4%	–		–
TOTAL CAPITALIZATION		20,348	73.3%	7,397	(221)	27.1%

	Years	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SCHEDULE OF DEPRECIATION																			
BALANCES OF FIXED ASSET ACCOUNTS																			
CONSTRUCTION COSTS & CAPITALIZED INTEREST		1,060	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597
PERIODIC MAINTENANCE – SLE				–	–	–	–	134	–	–	–	–	–	224	–	–	–	–	–
PERIODIC MAINTENANCE – MST				–	–	–	–	–	–	–	–	–	–	–	–	533	–	–	–
FIXED ASSETS – ENDING BALANCE				20,597	20,597	20,597	–	20,730	20,597	20,597	20,597	20,597	20,597	20,821	20,597	21,130	20,597	20,597	20,597
ANNUAL DEPRECIATION																			
DN–CONSTRUCTION COSTS MST–(YRS):	20			1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030
DN–CONSTRUCTION COSTS –SLE (YRS):		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
DN–PM SLE 2003	6								22	22	22	22	22	22	–				
DN–PM SLE 2009	6														37	37	37	37	37
DN–PM SLE 2015	6																		
DN–PM SLE 2021	6																		
DN–PM SLE 2027	6																		
DN–PM MST 2011	6																		
DN–PM MST 2017	6																89	89	89
DN–PM MST 2023	6																		
DN–PM MST 2030	6																		
TOTAL ANNUAL DEPRECIATION		53	53	1,083	1,083	1,083	1,083	1,083	1,105	1,105	1,105	1,105	1,105	1,105	1,120	1,120	1,209	1,209	1,209

Appendix A7–4 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

SCHEDULE OF LOAN AMORTIZATIONS/INTEREST INCOME& EXPENSE

			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AMORTIZATION SCHEDULE		15,261																		
IFC/ADB/EXIMBANK/SUPPLIERS CREDIT		40.00%																		
BEGINNING BALANCE					6,104	6,104	5,426	4,748	4,070	3,391	2,713	2,035	1,357	678						
PRINCIPAL PAYMENT	TERM	10			–	678	678	678	678	678	678	678	678	678						
ENDING BALANCE	GRACE	1			6,104	5,426	4,748	4,070	3,391	2,713	2,035	1,357	678	(0)						
INTEREST PAYMENT		10.75%			656	656	547	474	401	328	255	182	109	36	–					
DEVELOPMENT/LOCAL COMMERCIAL BANKS		15.00%																		
BEGINNING BALANCE					2,289	2,289	2,289	2,289	2,289	2,289	2,060	1,831	1,602	1,373	1,145	916	687	458	229	0
PRINCIPAL PAYMENT	TERM	15			–	–	–	–	–	229	229	229	229	229	229	229	229	229	229	(0)
ENDING BALANCE	GRACE	5			2,289	2,289	2,289	2,289	2,289	2,060	1,831	1,602	1,373	1,145	916	687	458	229	0	0
INTEREST PAYMENT		18.70%			428	428	428	428	428	428	407	364	321	278	235	193	150	107	64	
FOREIGN COMMERCIAL BANKS		45.00%																		
BEGINNING BALANCE					6,867	6,867	6,867	6,009	5,151	4,292	3,434	2,575	1,717	858	(0)	(0)	(0)	–		
PRINCIPAL PAYMENT	TERM	10			–	–	858	858	858	858	858	858	858	858	–					
ENDING BALANCE	GRACE	2			6,867	6,867	6,009	5,151	4,292	3,434	2,575	1,717	858	(0)	(0)	(0)				
INTEREST PAYMENT(2% OVER LIBOR)		9.50%			652	652	652	612	530	449	367	285	204	122	41					
TOTAL																				
WITHOUT DEVALUATION																				
BEGINNING BALANCE					15,261	15,261	14,583	13,046	11,509	9,973	8,207	6,441	4,676	2,910	1,145	916	687	458	229	0
PRINCIPAL PAYMENT					–	678	1,537	1,537	1,537	1,766	1,766	1,766	1,766	1,766	229	229	229	229	229	(0)
ENDING BALANCE				15,261	15,261	14,583	13,046	11,509	9,973	8,207	6,441	4,676	2,910	1,145	916	687	458	229	0	0
INTEREST PAYMENT					1,737	1,737	1,627	1,514	1,359	1,205	1,029	832	634	437	276	193	150	107	64	–
ADJUSTED FOR DEVALUATION ON ABD/FOREIGN LOANS																				
PRINCIPAL REPAYMENTS					–	762	1,830	1,940	2,056	2,409	2,540	2,678	2,825	2,981	229	229	229	229	229	(0)
INTEREST EXPENSES					1,815	1,898	1,856	1,799	1,674	1,530	1,342	1,109	850	563	313	193	150	107	64	–
ADJUSTEMENTS TO:																				
INCOME STATEMENTS (FX LOSS)																				
PRINCIPAL REPAYMENTS(FOREIGN EXCHANGE LOSS)					–	84	294	403	520	643	774	913	1,060	1,215	–	–	–	–	–	–
ADDITIONAL INTEREST					79	162	229	285	315	325	313	278	216	126	37	–	–	–	–	–
SCHEDULE OF EXCESS CASH/SHORT TERM LOANS																				
BEG. BALANCE – EXCESS CASH			–	588	781	773	86	–	–	–	–	–	–	–	–	–	–	–	–	–
CASH INFLOW (NET INC MIN CASH/ST AVAILMENT)			588	193	(8)	(687)	(546)	(2,007)	(3,689)	(5,467)	(7,564)	(9,394)	(11,527)	(13,406)	(12,419)	(10,223)	(8,556)	(5,808)	(2,386)	2,065
END. BAL. – EXCESS CASH(SHORT TERM LOAN)			588	781	773	86	(460)	(2,007)	(3,689)	(5,467)	(7,564)	(9,394)	(11,527)	(13,406)	(12,419)	(10,223)	(8,556)	(5,808)	(2,386)	2,065
INTEREST EXPENSE ON SHORT TERM LOAN			–	–	–	–	(41)	(221)	(406)	(601)	(832)	(1,033)	(1,268)	(1,475)	(1,366)	(1,125)	(941)	(639)	(262)	–
INTEREST INCOME(MIN CASH & RESERVES)			3	430	799	716	579	433	347	254	185	129	96	98	101	68	36	40	43	47

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Appendix A7-5

MST FINANCIAL MODEL - CORPORATE BOND

(Full Length)

Appendix A7-5
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers	SLE	14.5
	MST	19.0
Number of Lanes Constructed	MST	6
Construction (Months)		36
Opening Year:	SLE	1997
	MST	1999
Length of Concession (Years)		20 to 35
Average Cost/Kilometer(P million) Rehabilitation	SLE	73
(Pesos Million) New Construction	MST	575
(Dollars Million)		$23
Pre-concession or contract cost(Pesos million)		1,166
Operating expenses(Pesos million)		50
Maintenance (Pesos million)		38
General and Administrative Expenses(Pesos million)		9
Periodic Maintenance (Resurfacing) Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs + Every 6 Yrs	MST	910
Land Cost & Access Roads		NA
Revenue Sharing & Concession Income		-

FINANCIAL

Initial Debt: Equity Ratio	2.33:1	70%	30%
Exchange Rate - Base July 1992	Pesos/US$		25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate - See Schedule below			
Repayment period - See Schedule below			
Front End Fee			0.5%
Interest Rate - Cash & Reserves			14.0%
Interest Rate - Short Term Investments			-
Interest Rate - Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy			40.0%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	19.0 Kms @ MPesos 575/km	MST	3,277	3,277	4,370	10,924		
(Constant Pesos July 1992 Value)		SLE	1,060	-	-	1,060		
	Plus Inflation		1,785	1,765	2,959	6,509		
Total	Current Pesos		6,122	5,043	7,328	18,493	$551	100%
Government Share	40%		2,449	2,017	2,931	7,397	$221	40%
Private Share	60%		3,673	3,026	4,397	11,096	$331	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	18,493	$551
Interest During Construction	3,163	$92
Initial Working Capital	89	$3
Reserve Fund - Debt Service	2,000	$56
Reserve Fund - Operating Losses	4,000	$113
Total	27,745	$815

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		7,397	$221	26.7%
Long-Term Debt		14,244	$416	51.3%
Equity - Construction	3,329			
Equity - Startup	2,188			
Cash from Operations	588	6,104	$178	22.0%
Total		27,745	$815	100.0%

LONG TERM DEBT - TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	-	-	-	-
Corporate Bonds	12,209	60.00%	17.00%	15 years, inclusive of 15 year grace period
Development/Local Commercial Banks	2,035	10.00%	24.00%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	-15.9%	6.4%	10.5%	12.6%
Constant Dollar	-20.5%	0.7%	4.6%	6.6%

FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	9.4%	12.5%	14.2%	15.2%
Constant Dollar	4.5%	7.2%	8.7%	9.6%

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Appendix A7-5 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED INCOME STATMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011–2015	TOTAL 2016–2020	TOTAL 2021–2025	TOTAL 2026–2030
TOLL REVENUES																			
MST OPERATIONS																			
CARS	–	–	–	282	323	370	423	484	554	635	726	831	952	1,089	1,247	9,250	17,385	31,426	55,619
TRUCKS	–	–	–	53	61	71	82	94	108	125	144	165	191	220	253	1,899	3,636	6,632	11,782
SUBTOTAL	–	–	–	335	384	440	505	578	663	759	870	997	1,142	1,309	1,500	11,149	21,021	38,058	67,401
SLE OPERATIONS																			
CARS	–	416	467	260	301	348	402	465	537	621	718	830	959	1,109	1,281	9,626	18,444	33,707	60,044
TRUCKS	–	78	91	49	58	67	79	92	107	125	146	171	199	233	272	2,088	4,146	7,695	13,777
JEEPNEYS	–	68	76	86	97	110	124	141	160	181	205	232	263	298	338	2,451	4,446	7,879	13,785
BUSES		166	194	225	256	290	328	372	421	477	541	613	694	787	891	6,460	11,718	20,764	36,327
SUBTOTAL	–	728	828	621	711	815	933	1,069	1,225	1,405	1,610	1,846	2,116	2,426	2,782	20,626	38,754	70,045	123,932
TOTAL REVENUES	–	728	828	956	1,096	1,255	1,438	1,648	1,888	2,164	2,480	2,842	3,258	3,735	4,282	31,774	59,774	108,103	191,333
OPERATING EXPENSES																			
OPERATING EXPENSES	–	51	55	91	100	109	118	129	141	153	167	182	199	216	236	1,539	2,367	3,642	5,604
ANNUAL MAINTENANCE EXPENSES	–	26	29	69	76	83	90	98	107	117	127	138	151	164	179	1,169	1,799	2,768	4,259
GENERAL AND ADMINISTRATIVE EXPENSES	–	14	15	16	18	20	21	23	25	28	30	33	36	39	42	277	426	656	1,009
LAND RENTAL (GOP)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL OPERATING EXPENSES	–	91	99	177	193	211	230	250	273	297	324	353	385	420	458	2,985	4,593	7,066	10,872
NET OPERATING INCOME	–	637	729	779	902	1,044	1,208	1,397	1,615	1,866	2,156	2,489	2,873	3,315	3,825	28,789	55,182	101,037	180,461
DEPRECIATION (–)		(53)	(53)	(1,083)	(1,083)	(1,083)	(1,083)	(1,083)	(1,105)	(1,105)	(1,105)	(1,105)	(1,105)	(1,105)	(1,120)	(5,956)	(4,081)	(1,430)	(2,158)
INTEREST EXPENSE (–)	–	–	–	(2,574)	(2,564)	(2,564)	(2,564)	(2,564)	(2,643)	(2,638)	(2,677)	(2,695)	(2,679)	(2,619)	(2,417)	(7,219)	–	–	–
NET PROFIT BEFORE TAXES	–	584	676	(2,878)	(2,744)	(2,602)	(2,438)	(2,249)	(2,133)	(1,876)	(1,626)	(1,311)	(911)	(408)	287	15,614	51,101	99,607	178,303
INCOME TAXES (–)	–	–	–	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt	–	–	–	–	–	(101)	(5,465)	(17,885)	(34,862)	(62,406)
INTEREST INCOME NET OF 20% TAX (+)	–	–	3	344	601	461	344	262	239	184	129	131	133	135	81	155	–	–	–
NET PROFIT (LOSS)	–	584	678	(2,534)	(2,143)	(2,141)	(2,095)	(1,988)	(1,895)	(1,692)	(1,497)	(1,180)	(778)	(274)	267	10,310	33,462	65,124	116,480
Constant Dollars (July 1992 Value)	–	17	19	(67)	(54)	(51)	(47)	(42)	(38)	(32)	(26)	(20)	(12)	(4)	4	116	289	424	566

Appendix A7-5 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED CASH FLOW STATEMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
SOURCES OF FUNDS																			
NET PROFIT	–	584	678	(2,534)	(2,143)	(2,141)	(2,095)	(1,988)	(1,895)	(1,692)	(1,497)	(1,180)	(778)	(274)	267	10,310	33,462	65,124	116,480
ADD: DEPRECIATION	–	53	53	1,083	1,083	1,083	1,083	1,083	1,105	1,105	1,105	1,105	1,105	1,105	1,120	5,956	4,081	1,430	2,158
CASH FROM OPERATIONS	–	637	731	(1,451)	(1,060)	(1,058)	(1,012)	(905)	(790)	(587)	(392)	(75)	327	831	1,387	16,266	37,543	66,554	118,638
GOP ADVANCES:																			
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS	2,449	2,017	2,931	–	–	–	–	–	–	–	–	–	–	–	–				
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–				
DEBT FUNDING																			
CONSTRUCTION LOANS	2,902	3,111	2,730	–	–	–	–	–	–	–	–	–	–	–	–				
LONG TERM DEBT 70 %			14,244	–	–	–	–	–	–	–	–	–	–	–	–				
EQUITY 30 %	1,102	908	3,507	–	–	–	–	–	–	–	–	–	–	–	–				
SHORT TERM LOANS	–	–	–	–	–	–	–	887	892	1,696	2,306	2,601	2,495	1,110	–	8,802	–	–	–
TOTAL SOURCES	6,453	6,673	24,143	(1,451)	(1,060)	(1,058)	(1,012)	(18)	103	1,109	1,914	2,526	2,822	1,941	1,387	25,069	37,543	66,554	118,638
USES OF FUNDS																			
LAND ACQUISITION	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS (GOI)	2,449	2,017	2,931	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITAL EXPENDITURES – SLE & MST	3,673	3,026	4,397	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITALIZED INTEREST	331	993	1,840	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PERIODIC MAINTENANCE – SLE	–	–	–	–	–	–	–	134	–	–	–	–	–	224	–	376	–	630	1,057
PERIODIC MAINTENANCE – MST	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	533	895	1,500	2,516
LONG-TERM DEBT (PRINCIPAL REPAYMENT)				–	–	–	–	–	203	203	203	203	203	203	203	12,819	–	–	–
RESERVE FUNDING (DEBT SERVICE)			2,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
RESERVE FUNDING (LOSS RESERVE)			4,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
REPAYMENT SHORT-TERM LOANS			8,742	–	–	–	–	–	887	892	1,696	2,306	2,601	2,495	1,110	8,802	–	–	–
TOTAL USES	6,453	6,036	23,911	–	–	–	–	134	1,090	1,096	1,900	2,510	2,804	2,922	1,313	22,531	895	2,130	3,573
NET CASH INFLOW (OUTFLOW)	–	637	232	(1,451)	(1,060)	(1,058)	(1,012)	(152)	(988)	13	15	16	17	(981)	74	2,538	36,648	64,424	115,066
FINANCIAL INTERNAL RATES OF RETURN																			
FIRR ON EQUITY																			
NET CASH FLOW	–	637	232	(1,451)	(1,060)	(1,058)	(1,012)	(152)	(988)	13	15	16	17	(981)	74	2,538	36,648	64,424	115,066
LESS: MAINTENANCE RESERVES	–	–	–	(67)	(67)	(67)	(67)	(82)	(82)	(82)	(82)	(82)	(82)	(107)	(107)	(1,101)	(1,674)	(2,639)	(2,977)
LESS: EQUITY CONTRIBUTION	(1,102)	(908)	(3,507)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NET CASH FLOW (OUTFLOWS)	(1,102)	(271)	(3,275)	(1,518)	(1,127)	(1,125)	(1,078)	(234)	(1,070)	(68)	(67)	(66)	(64)	(1,088)	(33)	1,437	34,974	61,785	112,088
CONSTANT Dollars (July 1992 value)	(31)	(7)	(78)	(40)	(28)	(27)	(24)	(5)	(21)	(1)	(1)	(1)	(1)	(16)	(0)	17	304	401	545
	20 Years	25 Years	30 Years	35 Years															
FIRR/E Current Pesos	-15.9%	6.4%	10.5%	12.6%															
Constant (P/$)	-20.5%	0.7%	4.6%	6.6%															
FIRR ON PROJECT																			
NET OPERATING INCOME	–	637	729	779	902	1,044	1,208	1,397	1,615	1,866	2,156	2,489	2,873	3,315	3,825	28,789	55,182	101,037	180,461
LESS: CAPITAL EXPENDITURES	(6,122)	(5,043)	(7,328)	–	–	–	–	(134)	–	–	–	–	–	(224)	–	(909)	(895)	(2,130)	(3,573)
NET CASH INFLOWS(OUTFLOWS)	(6,122)	(4,405)	(6,600)	779	902	1,044	1,208	1,264	1,615	1,866	2,156	2,489	2,873	3,091	3,825	27,880	54,287	98,907	176,888
CONSTANT Dollars (July 1992 value)	(173)	(115)	(157)	21	23	25	27	27	32	35	38	42	45	46	54	324	471	643	860
	20 Years	25 Years	30 Years	35 Years															
FIRR/P Current Pesos	9.4%	12.5%	14.2%	15.2%															
Constant (P/$)	4.5%	7.2%	8.7%	9.6%															

Appendix A7-5 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED BALANCE SHEET

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020	2025	2030
ASSETS																			
MINIMUM CASH & RESERVES	–	49	6,089	4,645	3,594	2,545	2,125	2,136	1,149	1,162	1,177	1,193	1,210	229	249	4,296	3,533	5,436	–
EXCESS CASH	–	588	781	773	764	755	163	–	–	–	–	–	–	–	54	2,457	38,899	103,004	217,486
FIXED ASSETS																			
BUILDINGS & EQUIPMENT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
COMPLETED EXPRESSWAY	6,122	11,165	18,493	21,657	21,657	21,657	21,657	21,790	21,790	21,790	21,790	21,790	21,790	22,014	22,014	22,923	23,818	25,948	29,521
(+)CAPITALIZED INTEREST	331	1,324	3,163																
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL FIXED ASSETS	6,453	12,488	21,657	21,657	21,657	21,657	21,657	21,790	21,790	21,790	21,790	21,790	21,790	22,014	22,014	22,923	23,818	25,948	29,521
LESS ACCUM. DEPRECIATION	–	(53)	(106)	(1,189)	(2,272)	(3,354)	(4,437)	(5,520)	(6,625)	(7,730)	(8,835)	(9,940)	(11,046)	(12,151)	(13,271)	(19,227)	(23,308)	(24,738)	(26,896)
NET FIXED ASSETS	6,453	12,435	21,551	20,468	19,385	18,302	17,219	16,270	15,165	14,060	12,955	11,850	10,745	9,863	8,743	3,696	510	1,210	2,625
TOTAL ASSETS	**6,453**	**13,072**	**28,420**	**25,886**	**23,743**	**21,602**	**19,507**	**18,406**	**16,314**	**15,222**	**14,131**	**13,042**	**11,954**	**10,092**	**9,046**	**6,537**	**39,999**	**105,123**	**221,603**
LIABILITIES AND EQUITY																			
CURRENT LIABILITIES																			
ACCOUNTS PAYABLE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION/SHORT TERM LOANS	2,902	6,013	–	–	–	–	–	887	892	1,696	2,306	2,601	2,495	1,110	–	–	–	–	–
LONG-TERM DEBT	–	–	14,244	14,244	14,244	14,244	14,244	14,244	14,040	13,837	13,633	13,430	13,226	13,023	12,819	0	0	0	0
GOVERNMENT ADVANCE /SUBSIDY	2,449	4,466	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397	7,397
SHAREHOLDERS' EQUITY																			
PAID IN CAPITAL	1,102	2,010	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517	5,517
MAINTENANCE RESERVE	–	–	–	67	133	200	267	215	297	379	460	542	624	507	614	806	1,586	2,094	1,499
RETAINED EARNINGS	–	584	1,262	(1,338)	(3,548)	(5,756)	(7,917)	(9,853)	(11,829)	(13,603)	(15,182)	(16,445)	(17,305)	(17,461)	(17,301)	(7,183)	25,499	90,115	207,190
TOTAL SHAREHOLDERS' EQUITY	1,102	2,594	6,779	4,245	2,102	(39)	(2,133)	(4,121)	(6,016)	(7,708)	(9,205)	(10,386)	(11,164)	(11,437)	(11,170)	(861)	32,602	97,725	214,206
TOTAL LIABILITIES AND EQUITY	**6,453**	**13,072**	**28,420**	**25,886**	**23,743**	**21,602**	**19,507**	**18,406**	**16,314**	**15,222**	**14,131**	**13,042**	**11,954**	**10,092**	**9,046**	**6,537**	**39,999**	**105,123**	**221,603**

SELECTED FINANCIAL INDICATORS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
LIQUIDITY															
DEBT EQUITY RATIO		–	2.1	3.4	6.8	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
DEBT SERVICE RATIO		–	–	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.1	1.3	1.6
LIQUIDITY RATIOS (TIMES)		–	–	2.7	2.2	1.8	1.5	1.4	1.4	1.1	1.2	1.4	1.6	1.8	1.7
PROFITABILITY															
OPERATING MARGIN		87.5%	88.0%	81.5%	82.4%	83.2%	84.0%	84.8%	85.6%	86.3%	86.9%	87.6%	88.2%	88.8%	89.3%
RETURN ON REVENUES		80.2%	82.0%	−265%	−196%	−171%	−146%	−121%	−100%	−78.2%	−60.4%	−41.5%	−23.9%	−7.3%	6.2%
RETURN ON TOTAL EQUITY		7.9%	3.6%	−11.5%	−16.9%	−51.9%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	−0.6%
RETURN ON TOTAL ASSETS		1.5%	0.8%	−2.3%	−2.2%	−2.4%	−2.5%	−2.6%	−2.7%	−2.7%	−2.6%	−2.2%	−1.6%	−0.6%	0.7%

Appendix A7-5 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Constant 1992 Million Pesos)

SCHEDULE OF ANNUAL TOLL REVENUES

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
TOLL REVENUES (APPENDIX A4-3)																		
MST																		
CARS	-	-	154											264		394		522
TRUCKS	-	-	29											54		83		111
SUBTOTAL	-	-	184	-	-	-	-	-	-	-	-	-	-	318		477		633
SLB																		
CARS			142											272		421		565
TRUCKS			27											58		96		130
JEEPNEYS			47											72		100		129
BUSES			123											189		263		339
SUBTOTAL	-	-	340	-	-	-	-	-	-	-	-	-	-	590		879		3,205
GROWTH RATES																		
MST																		
CARS				5.02%											4.08%	4.08%	2.84%	2.84%
TRUCKS				5.68%											4.47%	4.47%	2.92%	2.92%
SLB																		
CARS	3.00%	3.00%	3.00%	6.04%											4.49%	4.49%	2.97%	2.97%
TRUCKS	6.90%	6.90%	6.90%	7.11%											5.23%	5.23%	3.08%	3.08%
JEEPNEYS	3.00%	3.00%	3.00%	3.95%											3.34%			
BUSES	6.90%	6.90%	6.90%	3.95%											3.34%			
ANNUAL TOLL REVENUES																		
MST																		
CARS	-	-	154	162	170	179	188	197	207	217	228	240	252	264	1,493	1,823	2,147	2,469
TRUCKS	-	-	29	31	33	34	36	38	41	43	45	48	51	54	306	381	453	523
SUBTOTAL	-	-	184	193	203	213	224	236	248	260	274	288	302	318	1,799	2,204	2,600	2,992
SLB																		
CARS	270	278	142	151	160	170	180	191	203	215	228	242	256	272	1,552	1,933	2,302	2,665
TRUCKS	51	54	27	29	31	33	36	38	41	44	47	50	54	58	336	434	525	611
JEEPNEYS	44	45	47	49	51	53	55	57	59	61	64	66	69	72	396	467	538	612
BUSES	108	115	123	128	133	139	144	150	156	162	168	175	182	189	1,044	1,230	1,419	1,613
SUBTOTAL	473	493	340	357	375	394	414	436	458	482	507	533	561	590	3,329	4,065	4,785	5,502
TOTAL REVENUES (CONSTANT 1992 PRICES)	473	493	523	550	578	607	639	671	706	742	780	821	863	908	5,128	6,269	7,384	8,494

Appendix A7-5 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

CONSTRUCTION PHASE

	Constant Pesos	1996 30%	1997 30%	1998 40%	Yr Zero	TOTAL (Current) Pesos	(Dollars)	Per Cent
SCHEDULE OF TOTAL START-UP COSTS								
MST 14.5 Kms @ MPesos 575/km	10,924							
SLE 14.5 Kms @ MPesos 75/km	1,060							
CONSTRUCTION COSTS (ALL IN)		6,122	5,043	7,328		18,493	(551)	
GOVT SHARE - PESOS		2,449	2,017	2,931		7,397		
(Dollars)		(78)	(60)	(83)			(221)	27.1%
PRIVATE SHARE - PESOS		3,673	3,026	4,397		11,096		
(Dollars)		(116)	(90)	(124)			(331)	40.6%
CAPITALIZED INTEREST		331	993	1,840		3,163		
		(10)	(30)	(52)			(92)	11.3%
LAND ACQUISITION		-	-	-		-	-	-
ACCESS ROADS		-	-	-		-		
INITIAL WORKING CAPITAL					89	89	(3)	0.3%
RESERVE FUND (DEBT SERVICE)					2,000	2,000	(56)	6.9%
RESERVE FUND (LOSS RESERVE)					4,000	4,000	(113)	13.8%
TOTAL COSTS PESOS		6,453	6,036	9,168	6,089	27,745		
TOTAL COSTS DOLLARS		(204)	(180)	(259)	(172)		(815)	100.0%

SCHEDULE OF INITIAL CAPITALIZATI(		Private	Per Cent	GOVT OF PHIL Pesos	Dlrs	Per Cent
CONSTRUCTION COSTS		11,096	40.0%	7,397	(221)	27.1%
DEBT	7,767					
EQUITY	3,329					
CAPITALIZED INTEREST		3,163	11.4%	-	-	-
LAND COSTS		-	-	-	-	-
ACCESS ROADS		-	-	-	-	-
INITIAL WORKING CAPITAL		89	0.3%	-		-
RESERVE FUND (DEBT SERVICE)		2,000	7.2%	-	-	-
RESERVE FUND (LOSS RESERVE)		4,000	14.4%	-	-	-
TOTAL CAPITALIZATION		20,348	73.3%	7,397	(221)	27.1%

	Years	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SCHEDULE OF DEPRECIATION																			
BALANCES OF FIXED ASSET ACCOUNTS																			
CONSTRUCTION COSTS + CAPITALIZED INTEREST - I		1,060	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597	20,597
PERIODIC MAINTENANCE - SLE				-	-	-	-	134	-	-	-	-	-	224	-	-	-	-	-
PERIODIC MAINTENANCE - MST				-	-	-	-	-	-	-	-	-	-	-	-	533	-	-	-
FIXED ASSETS - ENDING BALANCE				20,597	20,597	20,597	-	20,730	20,597	20,597	20,597	20,597	20,597	20,821	20,597	21,130	20,597	20,597	20,597
ANNUAL DEPRECIATION																			
DN-CONSTRUCTION COSTS MST-(Y	20			1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030
DN-CONSTRUCTION COSTS -SLE (YRS):		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
DN-PM SLE 2003	6								22	22	22	22	22	22	-				
DN-PM SLE 2009	6														37	37	37	37	37
DN-PM SLE 2015	6																		
DN-PM SLE 2021	6																		
DN-PM SLE 2027	6																		
DN-PM MST 2011	6																		
DN-PM MST 2017	6																89	89	89
DN-PM MST 2023	6																		
DN-PM MST 2030	6																		
TOTAL ANNUAL DEPRECIATION		53	53	1,083	1,083	1,083	1,083	1,083	1,105	1,105	1,105	1,105	1,105	1,105	1,120	1,120	1,209	1,209	1,209

Appendix A7-5 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

SCHEDULE OF LOAN AMORTIZATION/INTEREST INCOME & EXPENSES

			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AMORTIZATION SCHEDULE		14,244																		
IFC/ADB/EXIMBANK/SUPPLIERS CREDIT		–																		
BEGINNING BALANCE					–	–	–	–	–	–	–	–	–	–						
PRINCIPAL PAYMENT	TERM	10			–	–	–	–	–	–	–	–	–	–						
ENDING BALANCE	GRACE	1			–	–	–	–	–	–	–	–	–	–						
INTEREST PAYMENT		–			–	–	–	–	–	–	–	–	–	–						
DEVELOPMENT/LOCAL COMML BANKS		10.00%																		
BEGINNING BALANCE					2,035	2,035	2,035	2,035	2,035	2,035	1,831	1,628	1,424	1,221	1,017	814	610	407	203	
PRINCIPAL PAYMENT	TERM	15			–	–	–	–	–	203	203	203	203	203	203	203	203	203	203	
ENDING BALANCE	GRACE	5			2,035	2,035	2,035	2,035	2,035	1,831	1,628	1,424	1,221	1,017	814	610	407	203	0	
INTEREST PAYMENT		24.00%			488	488	488	488	488	488	464	415	366	317	269	220	171	122	73	
CORPORATE BONDS		60.00%																		
BEGINNING BALANCE					12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	
PRINCIPAL PAYMENT	TERM	15			–	–	–	–	–	–	–	–	–	–	–	–	–	–	12,209	
ENDING BALANCE	GRACE	15			12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	12,209	–	
BOND YIELD PER ANNUM		17.00%			2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075	
TOTAL																				
BEGINNING BALANCE					14,244	14,244	14,244	14,244	14,244	14,244	14,040	13,837	13,633	13,430	13,226	13,023	12,819	12,616	12,412	–
PRINCIPAL PAYMENT					–	–	–	–	–	203	203	203	203	203	203	203	203	203	12,412	–
ENDING BALANCE					14,244	14,244	14,244	14,244	14,244	14,040	13,837	13,633	13,430	13,226	13,023	12,819	12,616	12,412	0	–
INTEREST PAYMENT					2,564	2,564	2,564	2,564	2,564	2,564	2,539	2,491	2,442	2,393	2,344	2,295	2,246	2,198	2,149	–
SCHEDULE OF EXCESS CASH/SHORT TERM LOANS																				
BEG. BALANCE – EXCESS CASH			–	588	781	773	764	755	163	–	–	–	–	–	–	–	54	1,087	3,112	–
CASH INFLOW (NET INC MIN CASH/ST AVAILMENT)			588	193	(8)	(9)	(9)	(592)	(1,050)	(892)	(1,696)	(2,306)	(2,601)	(2,495)	(1,110)	54	1,033	2,026	(9,700)	(2,215)
END. BAL. – EXCESS CASH/(SHORT TERM LOAN)			588	781	773	764	755	163	(887)	(892)	(1,696)	(2,306)	(2,601)	(2,495)	(1,110)	54	1,087	3,112	(6,588)	(2,215)
INTEREST EXPENSE ON SHORT TERM LOAN			–	–	–	–	–	–	(80)	(98)	(187)	(254)	(286)	(274)	(122)	–	–	–	(382)	(244)
INTEREST INCOME(MIN CASH & RESERVES)			3	430	751	577	430	327	298	230	162	164	166	168	101	33	36	40	43	47

Appendix A7-6

MST FINANCIAL MODEL - BASE CASE

(Partial Length)

Appendix A7-6
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO PRES. QUIRINO)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers		SLE	14.5
		MST	14.5
Number of Lanes Constructed		MST	6
Construction (Months)			36
Opening Year:		SLE	1997
		MST	1999
Length of Concession (Years)			20 to 35
Average Cost/Kilometer(P million)	Rehabilitation	SLE	73
(Pesos Million)	New Construction	MST	603
(Dollars Million)			$24
Pre-concession or contract cost(Pesos million)			737
Operating expenses(Pesos million)			47
Maintenance (Pesos million)			34
General and Administrative Expenses(Pesos million)			9
Periodic Maintenance (Resurfacing)	Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs +	Every 6 Yrs	MST	910
Land Cost & Access Roads			NA
Revenue Sharing & Concession Income			-

FINANCIAL

Initial Debt: Equity Ratio	3:1	75%	25%
Cash Shortfall Made up by:	3:1	75%	25%
Exchange Rate - Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate - See Schedule below			
Repayment period - See Schedule below			
Front End Fee			0.5%
Interest Rate - Cash & Reserves			14.0%
Interest Rate - Short Term Investments			-
Interest Rate - Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1 25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	14.5 Kms @ MPesos 603/km	MST	2,622	2,622	3,496	8,741		
(Constant Pesos July 1992 Value)		SLE	1,060	-	-	1,060		
	Plus Inflation		1,515	1,412	2,367	5,295		
Total	Current Pesos		5,197	4,035	5,864	15,096	$451	100%
Government Share	40%		2,079	1,614	2,345	6,038	$180	40%
Private Share	60%		3,118	2,421	3,518	9,057	$270	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	15,096	$451
Interest During Construction	2,624	$76
Initial Working Capital	82	$2
Reserve Fund - Debt Service	2,000	$56
Reserve Fund - Operating Losses	4,000	$113
Total	23,802	$699

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		6,038	$180	25.4%
Long-Term Debt		13,323	$389	56.0%
Equity - Construction	2,264			
Equity - Startup	1,589			
Cash from Operations	588	4,441	$130	18.7%
Total		23,802	$699	100.0%

LONG TERM DEBT - TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	5,329	40.00%	10.75%	10 years, inclusive of 1 year grace period
Foreign Commercial Banks	5,995	45.00%	9.50%	10 years, inclusive of 2 year grace period
Development/Local Commercial Banks	1,998	15.00%	18.70%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	4.6%	11.8%	14.4%	15.8%
Constant Dollar	-0.9%	5.9%	8.4%	9.7%

FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	11.0%	13.9%	15.5%	16.4%
Constant Dollar	6.1%	8.6%	10.0%	10.8%

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Appendix A7–6 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

PROJECTED INCOME STATEMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011–2015	TOTAL 2016–2020	TOTAL 2021–2025	TOTAL 2026–2030
TOLL REVENUES																			
MST OPERATIONS																			
CARS	–	–	–	254	291	333	382	438	502	576	660	757	867	994	1,140	8,380	15,539	27,7[illegible]	48,766
TRUCKS	–	–	–	47	55	63	73	84	97	112	129	148	171	197	228	1,691	3,185	5,755	10,169
SUBTOTAL	–	–	–	301	346	396	455	522	599	687	789	905	1,038	1,191	1,367	10,070	18,724	33,554	58,935
SLE OPERATIONS																			
CARS	–	416	467	246	284	327	378	436	503	580	669	772	891	1,028	1,187	8,963	17,316	31,908	57,317
TRUCKS	–	78	91	47	55	64	75	87	102	119	139	162	189	220	256	1,983	3,973	7,421	13,3[illegible]9
JEEPNEYS	–	68	76	86	97	110	124	141	160	181	205	232	263	298	338	2,451	4,446	7,879	13,785
BUSES		166	194	225	256	290	328	372	421	477	541	613	694	787	891	6,460	11,718	20,764	36,327
SUBTOTAL	–	728	828	604	691	791	905	1,036	1,186	1,357	1,554	1,779	2,037	2,333	2,673	19,858	37,453	67,972	120,778
TOTAL REVENUES	–	728	828	905	1,037	1,187	1,360	1,558	1,785	2,045	2,343	2,684	3,076	3,525	4,040	29,928	56,176	101,526	179,713
OPERATING EXPENSES																			
OPERATING EXPENSES	–	51	55	86	94	102	111	121	132	144	157	171	187	203	222	1,446	2,225	3,424	5,268
MAINTENANCE–ANNUAL	–	26	29	62	68	74	80	88	96	104	114	124	135	147	160	1,046	1,610	2,477	3,811
GENERAL AND ADMINISTRATIVE EXPENSES	–	14	15	16	18	20	21	23	25	28	30	33	36	39	42	277	426	656	1,009
LAND RENTAL (GOP)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL OPERATING EXPENSES	–	91	99	165	179	195	213	232	253	276	301	328	357	389	425	2,769	4,261	6,556	10,088
NET OPERATING INCOME	–	637	729	741	857	992	1,147	1,326	1,531	1,769	2,042	2,356	2,718	3,135	3,615	27,159	51,915	94,970	169,625
DEPRECIATION (–)	–	(53)	(53)	(886)	(886)	(886)	(886)	(886)	(908)	(908)	(908)	(908)	(908)	(908)	(923)	(4,888)	(3,342)	(1,206)	(959)
INTEREST EXPENSE (–)	–	–	–	(1,651)	(1,657)	(1,621)	(1,571)	(1,630)	(1,667)	(1,674)	(1,642)	(1,537)	(1,434)	(1,332)	(1,080)	(1,368)	–	–	–
FOREIGN EXCHANGE LOSS (–)	–	–	–	–	(73)	(256)	(352)	(454)	(561)	(676)	(797)	(925)	(1,061)	–	–	–	–	–	–
NET PROFIT BEFORE TAXES	–	584	676	(1,797)	(1,759)	(1,771)	(1,662)	(1,644)	(1,605)	(1,489)	(1,305)	(1,014)	(685)	895	1,612	20,903	48,573	93,764	168,666
INCOME TAXES (–)	–	–	–	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt	–	–	–	–	(313)	(564)	(7,316)	(17,001)	(32,817)	(59,033)
INTEREST INCOME NET OF 20% TAX (+)	–	–	3	343	650	606	523	439	408	375	348	310	284	286	288	1,220	1,273	1,396	1,585
NET PROFIT (LOSS)	–	584	678	(1,453)	(1,109)	(1,165)	(1,138)	(1,205)	(1,198)	(1,114)	(956)	(703)	(401)	868	1,335	14,807	32,845	62,342	111,219
Constant Dollars (July 1992 Value)	–	17	19	(39)	(28)	(28)	(25)	(25)	(24)	(21)	(17)	(12)	(6)	13	19	171	284	406	540

Appendix A7-6 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

PROJECTED CASH FLOW STATEMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
SOURCES OF FUNDS																			
NET PROFIT	–	584	678	(1,453)	(1,109)	(1,165)	(1,138)	(1,205)	(1,198)	(1,114)	(956)	(703)	(401)	868	1,335	14,807	32,845	62,342	111,219
ADD: DEPRECIATION	–	53	53	886	886	886	886	886	908	908	908	908	908	908	923	4,888	3,342	1,206	959
CASH FROM OPERATIONS	–	637	731	(567)	(223)	(279)	(252)	(319)	(289)	(206)	(48)	205	507	1,776	2,259	19,695	36,187	63,548	112,177
GOP ADVANCES:																			
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS	2,079	1,614	2,345	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–																
DEBT FUNDING																			
CONSTRUCTION LOANS	2,620	2,645	2,563	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LONG TERM DEBT 75 %	–	–	13,323	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EQUITY 25 %	780	605	2,469	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SHORT TERM LOANS	–	–	–	–	–	177	1,528	3,014	4,567	6,120	7,223	8,575	9,625	8,290	5,751	4,136	–	–	–
TOTAL SOURCES	**5,478**	**5,501**	**21,431**	**(567)**	**(223)**	**(102)**	**1,276**	**2,695**	**4,277**	**5,914**	**7,175**	**8,779**	**10,132**	**10,066**	**8,009**	**23,831**	**36,187**	**63,548**	**112,177**
USES OF FUNDS																			
LAND ACQUISITION	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS (GOI)	2,079	1,614	2,345	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITAL EXPENDITURES – SLE & MST	3,118	2,421	3,518	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITALIZED INTEREST	281	830	1,514	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PERIODIC MAINTENANCE – SLE	–	–	–					134						224		376	–	630	1,057
PERIODIC MAINTENANCE – MST	–	–	–													407	683	1,145	1,920
LONG-TERM DEBT (PRINCIPAL REPAYMENT)				–	592	1,342	1,342	1,342	1,541	1,541	1,541	1,541	1,541	200	200	600	–	–	–
RESERVE FUNDING (DEBT SERVICE)			2,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
RESERVE FUNDING (LOSS RESERVE)			4,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
REPAYMENT SHORT-TERM LOANS			7,828	–	–	–	177	1,528	3,014	4,567	6,120	7,223	8,575	9,625	8,290	9,887	–	–	–
TOTAL USES	**5,478**	**4,864**	**21,205**	**–**	**592**	**1,342**	**1,519**	**3,003**	**4,555**	**6,108**	**7,662**	**8,765**	**10,116**	**10,049**	**8,490**	**11,269**	**683**	**1,775**	**2,977**
NET CASH INFLOW (OUTFLOW)	**–**	**637**	**226**	**(567)**	**(815)**	**(1,443)**	**(243)**	**(309)**	**(278)**	**(194)**	**(486)**	**15**	**16**	**18**	**(481)**	**12,562**	**35,505**	**61,773**	**109,200**
FINANCIAL INTERNAL RATES OF RETURN																			
FIRR ON EQUITY																			
NET CASH FLOW	–	637	226	(567)	(815)	(1,443)	(243)	(309)	(278)	(194)	(486)	15	16	18	(481)	12,562	35,505	61,773	109,200
LESS: MAINTENANCE RESERVES	–	–	–	(56)	(56)	(56)	(56)	(71)	(71)	(71)	(71)	(71)	(71)	(97)	(97)	(924)	(1,402)	(2,222)	(2,481)
LESS: EQUITY CONTRIBUTION	(780)	(605)	(2,469)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NET CASH FLOW (OUTFLOWS)	**(780)**	**(0)**	**(2,242)**	**(623)**	**(872)**	**(1,499)**	**(299)**	**(380)**	**(349)**	**(265)**	**(558)**	**(57)**	**(55)**	**(79)**	**(577)**	**11,638**	**34,102**	**59,551**	**106,719**
CONSTANT Dollars(July 1992 value)	(22)	(0)	(53)	(17)	(22)	(35)	(7)	(8)	(7)	(5)	(10)	(1)	(1)	(1)	(8)	128	297	387	519
	20 Year	25 Year	30 Year	35 Year															
FIRR/E Current Pesos	4.6%	11.8%	14.4%	15.8%															
Constant (P/$)	-0.9%	5.9%	8.4%	9.7%															
FIRR ON PROJECT																			
NET OPERATING INCOME	–	637	729	741	857	992	1,147	1,326	1,531	1,769	2,042	2,356	2,718	3,135	3,615	27,159	51,915	94,970	169,625
LESS: CAPITAL EXPENDITURES	(5,197)	(4,035)	(5,864)	–	–	–	–	(134)	–	–	–	–	–	(224)	–	(783)	(683)	(1,775)	(2,977)
NET CASH INFLOWS(OUTFLOWS)	**(5,197)**	**(3,398)**	**(5,135)**	**741**	**857**	**992**	**1,147**	**1,192**	**1,531**	**1,769**	**2,042**	**2,356**	**2,718**	**2,911**	**3,615**	**26,376**	**51,233**	**93,195**	**166,648**
CONSTANT Dollars(July 1992 value)	(147)	(88)	(122)	20	22	23	26	25	30	33	36	39	43	42	51	307	445	606	810
	20 Year	25 Year	30 Year	35 Year															
FIRR/P Current Pesos	11.0%	13.9%	15.5%	16.4%															
Constant (P/$)	6.1%	8.6%	10.0%	10.3%															

Appendix A7–6 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

PROJECTED BALANCE SHEET

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020	2025	2030
ASSETS																			
MINIMUM CASH & RESERVES	–	49	6,082	5,522	5,307	4,037	3,795	3,486	3,208	3,014	2,526	2,542	2,559	2,576	2,095	2,220	2,412	2,707	3,249
EXCESS CASH	–	588	781	773	173	–	–	–	–	–	–	–	–	–	–	12,438	47,750	109,228	217,887
FIXED ASSETS																			
BUILDINGS & EQUIPMENT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
COMPLETED EXPRESSWAY	5,197	9,232	15,096	17,720	17,720	17,720	17,720	17,853	17,853	17,853	17,853	17,853	17,853	18,077	18,077	18,860	19,543	21,318	24,295
(+)CAPITALIZED INTEREST	281	1,110	2,624																
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL FIXED ASSETS	5,478	10,343	17,720	17,720	17,720	17,720	17,720	17,853	17,853	17,853	17,853	17,853	17,853	18,077	18,077	18,860	19,543	21,318	24,295
LESS ACCUM. DEPRECIATION	–	(53)	(106)	(992)	(1,878)	(2,764)	(3,650)	(4,536)	(5,444)	(6,352)	(7,261)	(8,169)	(9,077)	(9,985)	(10,909)	(15,797)	(19,139)	(20,345)	(21,303)
NET FIXED ASSETS	5,478	10,290	17,614	16,728	15,842	14,956	14,070	13,317	12,409	11,501	10,593	9,684	8,776	8,092	7,169	3,063	404	973	2,992
TOTAL ASSETS	5,478	10,927	24,477	23,024	21,322	18,993	17,864	16,803	15,617	14,515	13,120	12,227	11,335	10,668	9,264	17,721	50,566	112,908	224,127
LIABILITIES AND EQUITY																			
CURRENT LIABILITIES																			
ACCOUNTS PAYABLE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SHORT TERM LOANS	2,620	5,265	–	–	–	177	1,528	3,014	4,567	6,120	7,223	8,575	9,625	8,290	5,751	–	–	–	–
LONG-TERM DEBT	–	–	13,323	13,323	12,731	11,389	10,048	8,706	7,165	5,623	4,082	2,541	999	799	600	–	–	–	–
GOVERNMENT ADVANCE	2,079	3,693	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038
SHAREHOLDERS' EQUITY																			
PAID IN CAPITAL	780	1,385	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853
MAINTENANCE RESERVE	–	–	–	56	112	169	225	162	234	305	376	447	519	391	488	629	1,349	1,796	1,300
RETAINED EARNINGS	–	584	1,262	(247)	(1,412)	(2,633)	(3,828)	(4,971)	(6,239)	(7,425)	(8,453)	(9,227)	(9,700)	(8,705)	(7,466)	7,200	39,325	101,220	212,935
TOTAL SHAREHOLDERS' EQUITY	780	1,969	5,116	3,663	2,553	1,389	250	(955)	(2,152)	(3,267)	(4,223)	(4,927)	(5,328)	(4,460)	(3,125)	11,683	44,528	106,870	218,068
TOTAL LIABILITIES AND EQUITY	5,478	10,927	24,477	23,024	21,322	18,993	17,864	16,803	15,617	14,515	13,120	12,227	11,335	10,668	9,264	17,721	50,566	112,908	224,127

SELECTED FINANCIAL INDICATORS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
LIQUIDITY															
DEBT EQUITY RATIO		–	2.6	3.6	5.0	8.2	40.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
DEBT SERVICE RATIO		–	–	0.5	0.4	0.4	0.4	0.5	0.6	0.7	0.9	1.1	1.4	7.8	11.4
LIQUIDITY RATIOS (TIMES)		–	–	4.5	3.0	2.3	1.9	2.0	1.9	2.0	2.2	2.3	2.7	44.6	–
PROFITABILITY															
OPERATING MARGIN		87.5%	88.0%	81.8%	82.7%	83.5%	84.3%	85.1%	85.8%	86.5%	87.2%	87.8%	88.4%	89.0%	89.5%
RETURN ON REVENUES		80.2%	82.0%	−161%	−107%	−98%	−84%	−77%	−67%	−55%	−41%	−26%	−13%	25%	33%
RETURN ON TOTAL EQUITY		10.6%	4.8%	−8.3%	−8.9%	−14.8%	−34.7%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	−4.4%	−8.8%
RETURN ON TOTAL ASSETS		1.8%	1.0%	−1.5%	−1.3%	−1.4%	−1.5%	−1.7%	−1.8%	−1.8%	−1.7%	−1.4%	−0.9%	2.0%	3.3%

Appendix A7-6 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Constant 1992 Million Pesos)

SCHEDULE OF ANNUAL TOLL REVENUES

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
TOLL REVENUES (APPENDIX A4-3)																		
MST																		
CARS	-	-	139											242		351		456
TRUCKS	-	-	26											48		72		95
SUBTOTAL	-	-	165	-	-	-	-	-	-	-	-	-	-	290		423		552
SLE																		
CARS			134											252		397		541
TRUCKS			26											54		92		126
JEEPNEYS			47											72		100		129
BUSES			123											189		263		339
SUBTOTAL	-	-	330	-	-	-	-	-	-	-	-	-	-	567		851		3,121
GROWTH RATES																		
MST																		
CARS				5.17%											3.80%	3.80%	2.66%	2.66%
TRUCKS				5.81%											4.13%	4.13%	2.81%	2.81%
SLE																		
CARS	3.00%	3.00%	3.00%	5.86%											4.66%	4.66%	3.15%	3.15%
TRUCKS	6.90%	6.90%	6.90%	6.99%											5.42%	5.42%	3.17%	3.17%
JEEPNEYS	3.00%	3.00%	3.00%	3.95%											3.34%	3.34%	2.60%	2.60%
BUSES	6.90%	6.90%	6.90%	3.95%											3.34%	3.34%	2.60%	2.60%
ANNUAL TOLL REVENUES(CONSTANT 1992 PRICES)																		
MST																		
CARS	-	-	139	146	154	161	170	179	188	197	208	218	230	242	1,353	1,631	1,899	2,166
TRUCKS	-	-	26	27	29	31	32	34	36	38	41	43	46	48	273	334	393	451
SUBTOTAL	-	-	165	173	183	192	202	213	224	236	248	262	275	290	1,626	1,965	2,293	2,617
SLE																		
CARS	270	278	134	142	151	159	169	179	189	200	212	224	238	252	1,445	1,814	2,178	2,543
TRUCKS	51	54	26	28	30	32	34	36	39	41	44	47	51	54	319	416	507	592
JEEPNEYS	44	45	47	49	51	53	55	57	59	61	64	66	69	72	396	467	538	612
BUSES	108	115	123	128	133	139	144	150	156	162	168	175	182	189	1,044	1,230	1,419	1,613
SUBTOTAL	473	493	330	347	364	382	401	422	443	465	488	513	539	567	3,204	3,928	4,642	5,361
TOTAL REVENUES (CONSTANT 1992 PRICES)	473	493	495	520	547	574	604	634	667	701	737	775	815	856	4,830	5,892	6,935	7,978

Appendix A7–6 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

CONSTRUCTION PHASE

	Constant Pesos	1996 30%	1997 30%	1998 40%	Yr Zero	TOTAL (Current) Pesos	(Dollars)	Per Cent
SCHEDULE OF TOTAL START–UP COSTS								
MST 14.5 Kms @ MPesos 603/km	8,741							
SLE 14.5 Kms @ MPesos 73/km	1,060							
CONSTRUCTION COSTS (ALL IN)		5,197	4,035	5,864		15,096	(451)	
GOVT SHARE – PESOS		2,079	1,614	2,345		6,038		
(Dollars)		(66)	(48)	(66)			(180)	25.8%
PRIVATE SHARE – PESOS		3,118	2,421	3,518		9,057		
(Dollars)		(99)	(72)	(99)			(270)	38.7%
CAPITALIZED INTEREST		281	830	1,514		2,624		
		(9)	(25)	(43)			(76)	10.9%
LAND ACQUISITION		–	–	–		–	–	–
ACCESS ROADS		–	–	–		–		
INITIAL WORKING CAPITAL					89	89	(3)	0.4%
RESERVE FUND (DEBT SERVICE)					2,000	2,000	(56)	8.1%
RESERVE FUND (LOSS RESERVE)					4,000	4,000	(113)	16.1%
TOTAL COSTS PESOS		5,478	4,864	7,377	6,089	23,808	(699)	100.0%
TOTAL COSTS DOLLARS		(174)	(145)	(208)	(172)		(699)	100.0%

SCHEDULE OF INITIAL CAPITALIZATION		Private	Per Cent	GOVT OF PHIL Pesos	Dlrs	Per Cent
CONSTRUCTION COSTS		9,057	38.0%	6,038	(177)	25.4%
DEBT	6,793					
EQUITY	2,264					
CAPITALIZED INTEREST		2,624	11.0%	–	–	–
LAND COSTS		–	–	–	–	–
ACCESS ROADS		–	–	–	–	–
INITIAL WORKING CAPITAL		89	0.4%	–		–
RESERVE FUND (DEBT SERVICE)		2,000	8.4%	–		–
RESERVE FUND (LOSS RESERVE)		4,000	16.8%	–		–
TOTAL CAPITALIZATION		17,770	74.6%	6,038	(177)	25.4%

	Years	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SCHEDULE OF DEPRECIATION																			
BALANCES OF FIXED ASSET ACCOUNTS																			
CONSTRUCTION COSTS & CAPITALIZED INTEREST		1,060	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660
PERIODIC MAINTENANCE – SLE				–	–	–	–	134	–	–	–	–	–	224	–	–	–	–	–
PERIODIC MAINTENANCE – MST				–	–	–	–	–	–	–	–	–	–	–	–	407	–	–	–
FIXED ASSETS – ENDING BALANCE				16,660	16,660	16,660	–	16,794	16,660	16,660	16,660	16,660	16,660	16,884	16,660	17,067	16,660	16,660	16,660
ANNUAL DEPRECIATION																			
DN–CONSTRUCTION COSTS MST–(YRS):	20			833	833	833	833	833	833	833	833	833	833	833	833	833	833	833	833
DN–CONSTRUCTION COSTS –SLE (YRS):		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
DN–PM SLE 2003	6								22	22	22	22	22	22	–				
DN–PM SLE 2009	6														37	37	37	37	37
DN–PM SLE 2015	6																		
DN–PM SLE 2021	6																		
DN–PM SLE 2027	6																		
DN–PM MST 2011	6																		
DN–PM MST 2017	6																68	68	68
DN–PM MST 2023	6																		
DN–PM MST 2030	6																		
TOTAL ANNUAL DEPRECIATION		53	53	886	886	886	886	886	908	908	908	908	908	908	923	923	991	991	991

Appendix A7-6 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(BASE CASE, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

SCHEDULE OF LOAN AMORTIZATIONS/INTEREST INCOME& EXPENSE

			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AMORTIZATION SCHEDULE	13,323																			
IFC/ADB/EXIMBANK/SUPPLIERS CREDIT	40.00%																			
BEGINNING BALANCE					5,329	5,329	4,737	4,145	3,553	2,961	2,368	1,776	1,184	592						
PRINCIPAL PAYMENT		TERM	10		–	592	592	592	592	592	592	592	592	592						
ENDING BALANCE		GRACE	1		5,329	4,737	4,145	3,553	2,961	2,368	1,776	1,184	592	–						
INTEREST PAYMENT	10.75%				573	573	477	414	350	286	223	159	95	32	–					
DEVELOPMENT/LOCAL COMMERCIAL BANKS	15.00%																			
BEGINNING BALANCE					1,998	1,998	1,998	1,998	1,998	1,998	1,799	1,599	1,399	1,199	999	799	600	400	200	(0)
PRINCIPAL PAYMENT		TERM	15		–	–	–	–	–	200	200	200	200	200	200	200	200	200	200	0
ENDING BALANCE		GRACE	5		1,998	1,998	1,998	1,998	1,998	1,799	1,599	1,399	1,199	999	799	600	400	200	(0)	(0)
INTEREST PAYMENT	18.70%				374	374	374	374	374	374	355	318	280	243	206	168	131	93	56	
FOREIGN COMMERCIAL BANKS	45.00%																			
BEGINNING BALANCE					5,995	5,995	5,995	5,246	4,496	3,747	2,998	2,248	1,499	749	0	0	0	–		
PRINCIPAL PAYMENT		TERM	10		–	–	749	749	749	749	749	749	749	749	–					
ENDING BALANCE		GRACE	2		5,995	5,995	5,246	4,496	3,747	2,998	2,248	1,499	749	0	0	0				
INTEREST PAYMENT(1 3/4 OVER LIBOR)	9.50%				570	570	570	534	463	392	320	249	178	107	36					
TOTAL																				
WITHOUT DEVALUATION																				
BEGINNING BALANCE					13,323	13,323	12,731	11,389	10,048	8,706	7,165	5,623	4,082	2,541	999	799	600	400	200	(0)
PRINCIPAL PAYMENT					–	592	1,342	1,342	1,342	1,541	1,541	1,541	1,541	1,541	200	200	200	200	200	0
ENDING BALANCE				13,323	13,323	12,731	11,389	10,048	8,706	7,165	5,623	4,082	2,541	999	799	600	400	200	(0)	(0)
INTEREST PAYMENT					1,516	1,516	1,421	1,321	1,187	1,052	898	726	554	382	241	168	131	93	56	–
ADJUSTED FOR DEVALUATION ON ADB/FOREIGN LOANS																				
PRINCIPAL REPAYMENTS					–	665	1,598	1,694	1,795	2,103	2,217	2,338	2,466	2,602	200	200	200	200	200	0
INTEREST					1,585	1,657	1,621	1,570	1,461	1,335	1,172	968	742	491	273	168	131	93	56	–
ADJUSTEMENTS TO:																				
INCOME STATEMENTS																				
PRINCIPAL REPAYMENTS(FOREIGN EXCHANGE LOSS)					–	73	256	352	454	561	676	797	925	1,061	–	–	–	–	–	–
ADDITIONAL INTEREST EXPENSE					69	141	200	249	275	284	274	242	189	110	32	–	–	–	–	–
SCHEDULE OF SHORT TERM INVESTMENT INCOME																				
BEGINNING BALANCE – EXCESS CASH(DEFICIT)			–	588	781	773	173	–	–	–	–	–	–	–	–	–	–	–	–	3,236
CASH INFLOW (NET INC MIN CASH/ST AVAILMENT)			588	193	(7)	(600)	(350)	(1,528)	(3,014)	(4,567)	(6,120)	(7,223)	(8,575)	(9,625)	(8,290)	(5,751)	(3,613)	(523)	3,236	4,515
END. BAL. – EXCESS CASH/(SHORT TERM LOAN)			588	781	773	173	(177)	(1,528)	(3,014)	(4,567)	(6,120)	(7,223)	(8,575)	(9,625)	(8,290)	(5,751)	(3,613)	(523)	3,236	7,751
INTEREST EXPENSE ON SHORT TERM LOANS			–	–	–	–	(0)	(168)	(332)	(502)	(673)	(795)	(943)	(1,059)	(912)	(633)	(397)	(58)	–	–
INTEREST INCOME(MIN CASH & RESERVES)			3	429	812	758	654	548	510	469	436	388	355	357	359	327	295	298	301	305

Appendix A7-7

MST FINANCIAL MODEL - CORPORATE BOND

(Partial Length)

Appendix A7--7
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers	SLE	14.5
	MST	14.5
Number of Lanes Constructed	MST	6
Construction (Months)		36
Opening Year:	SLE	1997
	MST	1999
Length of Concession (Years)		20 to 35
Average Cost/Kilometer(P million) Rehabilitation	SLE	73
(Pesos Million) New Construction	MST	603
(Dollars Million)		$24
Pre-concession or contract cost(Pesos million)		737
Operating expenses(Pesos million)		47
Maintenance (Pesos million)		34
General and administrative expenses(Pesos million)		9
Maintenance (Resurfacing) Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs + Every 6 Yrs	MST	910
Land Cost & Access Roads		NA
Revenue Sharing & Concession Income		-

FINANCIAL

Initial Debt: Equity Ratio	2.33:1	70%	30%
Exchange Rate - Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			18.0%
Long-term Debt			
Interest Rate - See Schedule below			
Repayment period - See Schedule below			
Front End Fee			0.5%
Interest Rate - Cash & Reserves			14.0%
Interest Rate - Short Term Investments			-
Interest Rate - Short Term Borrowing			22.0%
Corporate Income Tax Rate			35.0%
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy			40.0%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	14.5 Kms @ MPesos 603/km	MST	2,622	2,622	3,496	8,741		
(Constant Pesos July 1992 Value)		SLE	1,060	-	-	1,060		
	Plus Inflation		1,515	1,412	2,367	5,295		
Total	Current Pesos		5,197	4,035	5,864	15,096	$451	100%
Government Share	40%		2,079	1,614	2,345	6,038	$180	40%
Private Share	60%		3,118	2,421	3,518	9,057	$270	60%

CAPITALIZATION OF CONCESSIONAIRE (Current Millions)

Assets	Pesos	Dollars
Construction Costs	15,096	$451
Interest During Construction	2,624	$76
Initial Working Capital	82	$2
Reserve Fund - Debt Service	2,000	$56
Reserve Fund - Operating Losses	4,000	$113
Total	23,802	$699

Liabilities/Equity		Pesos	Dollars	Percent
Government Advance		6,038	$180	25.4%
Long-Term Debt		12,435	$363	52.2%
Equity - Construction	2,717			
Equity - Startup	2,024			
Cash from Operations	588	5,329	$155	22.4%
Total		23,802	$699	100.0%

LONG TERM DEBT - TERMS

	Amount	Percent	Interest	Repayment Period
Foreign (ADB/IFC/EXIM Banks)	-	-	-	-
Corporate Bonds	10,658	60.00%	17.00%	15 years, inclusive of 15 year grace period
Development/Local Commercial Banks	1,776	10.00%	24.00%	15 years, inclusive of 5 years grace period

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	-3.5%	8.6%	12.1%	13.9%
Constant Dollar	-8.6%	2.9%	6.2%	7.8%

FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	11.0%	13.9%	15.5%	16.4%
Constant Dollar	6.1%	8.6%	10.0%	10.8%

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Appendix A7-7 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

PROJECTED INCOME STATMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011–2015	TOTAL 2016–2020	TOTAL 2021–2025	TOTAL 2026–2030
TOLL REVENUES																			
MST OPERATIONS																			
CARS	–	–	–	254	291	333	382	438	502	576	660	757	867	994	1,140	8,380	15,539	27,799	48,766
TRUCKS	–	–	–	47	55	63	73	84	97	112	129	148	171	197	228	1,691	3,185	5,755	10,169
SUBTOTAL	–	–	–	[illegible]	345	396	455	522	599	687	789	905	1,038	1,191	1,367	10,070	18,724	33,554	58,935
SLE OPERATIONS																			
CARS	–	416	467	246	284	327	378	436	503	580	669	772	891	1,028	1,187	8,963	17,316	31,908	57,317
TRUCKS	–	78	91	47	55	64	75	87	102	119	139	162	189	220	256	1,983	3,973	7,421	13,349
JEEPNEYS	–	68	76	86	97	110	124	141	160	181	205	232	263	298	338	2,451	4,446	7,879	13,785
BUSES		166	194	225	256	290	328	372	421	477	541	613	694	787	891	6,460	11,718	20,764	36,327
SUBTOTAL	–	728	828	604	691	791	905	1,036	1,186	1,357	1,554	1,779	2,037	2,333	2,673	19,858	37,453	67,972	120,778
TOTAL REVENUES	–	728	828	905	1,037	1,187	1,360	1,558	1,785	2,045	2,343	2,684	3,076	3,525	4,040	29,928	56,176	101,526	179,713
OPERATING EXPENSES																			
OPERATING EXPENSES	–	51	55	86	94	102	111	121	132	144	157	171	187	203	222	1,446	2,225	3,424	5,268
ANNUAL MAINTENANCE EXPENSES	–	26	29	62	68	74	80	88	96	104	114	124	135	147	160	1,046	1,610	2,477	3,811
GENERAL AND ADMINISTRATIVE EXPENSE	–	14	15	16	18	20	21	23	25	28	30	33	36	39	42	277	426	656	1,009
LAND RENTAL (GOP)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL OPERATING EXPENSES	–	91	99	165	179	195	213	232	253	276	301	328	357	389	425	2,769	4,261	6,556	10,088
NET OPERATING INCOME	–	637	729	741	857	992	1,147	1,326	1,531	1,769	2,042	2,356	2,718	3,135	3,615	27,159	51,915	94,970	169,625
DEPRECIATION (–)		(53)	(53)	(886)	(886)	(886)	(886)	(886)	(908)	(908)	(908)	(908)	(908)	(908)	(923)	(4,888)	(3,342)	(1,206)	(1,822)
INTEREST EXPENSE (–)	–	–	–	(2,247)	(2,238)	(2,238)	(2,238)	(2,238)	(2,238)	(2,217)	(2,174)	(2,132)	(2,089)	(2,046)	(2,004)	(5,755)	–	–	–
NET PROFIT BEFORE TAXES	–	584	676	(2,392)	(2,267)	(2,132)	(1,977)	(1,799)	(1,615)	(1,357)	(1,041)	(684)	(279)	181	688	16,515	48,573	93,764	167,803
INCOME TAXES (–)	–	–	–	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt	–	–	–	–	(63)	(241)	(5,780)	(17,001)	(32,817)	(58,731)
INTEREST INCOME NET OF 20% TAX (+)	–	–	3	343	616	509	426	349	313	258	203	205	206	208	154	219	–	–	–
NET PROFIT (LOSS)	–	584	678	(2,049)	(1,650)	(1,623)	(1,551)	(1,450)	(1,302)	(1,099)	(837)	(479)	(72)	326	601	11,259	32,177	61,674	109,989
Constant Dollars (July 1992 Value)	–	17	19	(55)	(41)	(38)	(35)	(31)	(26)	(21)	(15)	(8)	(1)	5	8	127	279	401	535

Appendix A7-7 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

PROJECTED CASH FLOW STATEMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
SOURCES OF FUNDS																			
NET PROFIT	–	584	678	(2,049)	(1,650)	(1,623)	(1,551)	(1,450)	(1,302)	(1,099)	(837)	(479)	(72)	326	601	11,259	32,177	61,674	109,989
ADD: DEPRECIATION	–	53	53	886	886	886	886	886	908	908	908	908	908	908	923	4,888	3,342	1,206	1,822
CASH FROM OPERATIONS	–	637	731	(1,163)	(764)	(737)	(665)	(564)	(394)	(190)	71	429	836	1,234	1,525	16,147	35,519	62,880	111,811
GOP ADVANCES:																			
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS	2,079	1,614	2,345	–	–	–	–	–	–	–	–	–	–	–	–				
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–				
DEBT FUNDING																			
CONSTRUCTION LOANS	2,464	2,524	1,952	–	–	–	–	–	–	–	–	–	–	–	–				
LONG TERM DEBT 70 %			12,435	–	–	–	–	–	–	–	–	–	–	–	–				
EQUITY 30 %	936	726	3,080	–	–	–	–	–	–	–	–	–	–	–	–				
SHORT TERM LOANS	–	–	–	–	–	–	–	–	–	–	45	–	–	–	–	909	–	–	–
TOTAL SOURCES	5,478	5,501	20,543	(1,163)	(764)	(737)	(665)	(564)	(394)	(190)	116	429	836	1,234	1,525	17,056	35,519	62,880	111,811
USES OF FUNDS																			
LAND ACQUISITION	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS (GOI)	2,079	1,614	2,345	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITAL EXPENDITURES – SLE & MST	3,118	2,421	3,518	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITALIZED INTEREST	281	830	1,514													–	–	–	–
PERIODIC MAINTENANCE – SLE	–	–	–					134						224		376	–	630	1,057
PERIODIC MAINTENANCE – MST	–	–	–													407	683	1,145	1,920
LONG-TERM DEBT (PRINCIPAL REPAYMENT)				–	–	–	–	–	178	178	178	178	178	178	178	11,191	–	–	–
RESERVE FUNDING (DEBT SERVICE)			2,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
RESERVE FUNDING (LOSS RESERVE)			4,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
REPAYMENT SHORT-TERM LOANS			6,940	–	–	–	–	–	–	–	–	45	–	–	–	909	–	–	–
TOTAL USES	5,478	4,864	20,317	–	–	–	–	134	178	178	178	222	178	402	178	12,883	683	1,775	2,977
NET CASH INFLOW (OUTFLOW)	–	637	226	(1,163)	(764)	(737)	(665)	(697)	(572)	(368)	(62)	207	658	832	1,347	4,173	34,836	61,105	108,834
FINANCIAL INTERNAL RATES OF RETURN																			
FIRR ON EQUITY																			
NET CASH FLOW	–	637	226	(1,163)	(764)	(737)	(665)	(697)	(572)	(368)	(62)	207	658	832	1,347	4,173	34,836	61,105	108,834
LESS: MAINTENANCE RESERVES	–	–	–	(56)	(56)	(56)	(56)	(71)	(71)	(71)	(71)	(71)	(71)	(97)	(97)	(924)	(1,402)	(2,222)	(2,481)
LESS: EQUITY CONTRIBUTION	(936)	(726)	(3,080)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NET CASH FLOW (OUTFLOWS)	(936)	(89)	(2,854)	(1,219)	(821)	(793)	(721)	(769)	(643)	(439)	(133)	136	587	736	1,250	3,249	33,434	58,882	106,353
CONSTANT Dollars (July 1992 value)	(27)	(2)	(68)	(32)	(21)	(19)	(16)	(16)	(13)	(8)	(2)	2	9	11	18	33	291	382	517
	20 Years	25 Years	30 Years	35 Years															
FIRR/E Current Pesos	-3.5%	8.6%	12.1%	13.9%															
Constant (P/$)	-8.6%	2.9%	6.2%	7.8%															
FIRR ON PROJECT																			
NET OPERATING INCOME	–	637	729	741	857	992	1,147	1,326	1,531	1,769	2,042	2,356	2,718	3,135	3,615	27,159	51,915	94,970	169,625
LESS: CAPITAL EXPENDITURES	(5,197)	(4,035)	(5,864)	–	–	–	–	(134)	–	–	–	–	–	(224)	–	(783)	(683)	(1,775)	(2,977)
NET CASH INFLOWS(OUTFLOWS)	(5,197)	(3,398)	(5,135)	741	857	992	1,147	1,192	1,531	1,769	2,042	2,356	2,718	2,911	3,615	26,376	51,233	93,195	166,648
CONSTANT Dollars (July 1992 value)	(147)	(88)	(122)	20	22	23	26	25	30	33	36	39	43	43	51	307	445	606	810
	20 Years	25 Years	30 Years	35 Years															
FIRR/P Current Pesos	11.0%	13.9%	15.5%	16.4%															
Constant (P/$)	6.1%	8.6%	10.0%	10.8%															

Appendix A7–7 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

PROJECTED BALANCE SHEET

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020	2025	2030
ASSETS																			
MINIMUM CASH & RESERVES	–	49	6,082	4,92[illegible]	4,170	3,442	2,787	2,797	1,809	1,821	1,835	1,849	1,865	883	902	4,131	3,278	5,044	–
EXCESS CASH	–	588	781	773	765	757	747	39	456	76	–	192	834	2,649	3,977	8,025	42,670	103,480	211,772
FIXED ASSETS																			
BUILDINGS & EQUIPMENT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
COMPLETED EXPRESSWAY	5,197	9,232	15,096	17,720	17,720	17,720	17,720	17,853	17,853	17,853	17,853	17,853	17,853	18,077	18,077	18,860	19,543	21,318	24,295
(+)CAPITALIZED INTEREST	281	1,110	2,624																
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL FIXED ASSETS	5,478	10,343	17,720	17,720	17,720	17,720	17,720	17,853	17,853	17,853	17,853	17,853	17,853	18,077	18,077	18,860	19,543	21,318	24,295
LESS ACCUM. DEPRECIATION	–	(53)	(106)	(992)	(1,878)	(2,764)	(3,650)	(4,536)	(5,444)	(6,352)	(7,261)	(8,169)	(9,077)	(9,985)	(10,909)	(15,797)	(19,139)	(20,345)	(22,166)
NET FIXED ASSETS	5,478	10,290	17,614	16,728	15,842	14,956	14,070	13,317	12,409	11,501	10,593	9,684	8,776	8,092	7,169	3,063	404	973	2,129
TOTAL ASSETS	**5,478**	**10,927**	**24,477**	**22,428**	**20,778**	**19,155**	**17,604**	**16,154**	**14,674**	**13,398**	**12,427**	**11,726**	**11,476**	**11,624**	**12,047**	**12,115**	**44,292**	**105,966**	**215,956**
LIABILITIES AND EQUITY																			
CURRENT LIABILITIES																			
ACCOUNTS PAYABLE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION/SHORT TERM LOANS	2,464	4,988	–	–	–	–	–	–	–	–	45	–	–	–	–	–	–	–	–
LONG-TERM DEBT																			
GOVERNMENT ADVANCE /SUBSIDY	–	–	12,435	12,435	12,435	12,435	12,455	12,435	12,257	12,079	11,902	11,724	11,546	11,369	11,191	0	0	0	0
	2,079	3,693	6,038	6,038	6,038	6,038	6,0[illegible]	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038
SHAREHOLDERS' EQUITY																			
PAID IN CAPITAL	936	1,662	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742	4,742
MAINTENANCE RESERVE	–	–	–	56	112	169	225	162	234	305	376	447	519	391	488	629	1,349	1,796	1,300
RETAINED EARNINGS	–	584	1,262	(843)	(2,549)	(4,228)	(5,836)	(7,223)	(8,597)	(9,767)	(10,675)	(11,225)	(11,369)	(10,916)	(10,411)	706	32,164	93,390	203,876
TOTAL SHAREHOLDERS' EQUITY	936	2,246	6,004	3,955	2,305	682	(869)	(2,319)	(3,621)	(4,720)	(5,558)	(6,036)	(6,109)	(5,783)	(5,182)	6,077	38,254	99,928	209,917
TOTAL LIABILITIES AND EQUITY	**5,478**	**10,927**	**24,477**	**22,428**	**20,778**	**19,155**	**17,604**	**16,154**	**14,674**	**13,398**	**12,427**	**11,726**	**11,476**	**11,624**	**12,047**	**12,115**	**44,292**	**105,966**	**215,956**

SELECTED FINANCIAL INDICATORS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
LIQUIDITY															
DEBT EQUITY RATIO		–	2.1	3.1	5.4	18.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
DEBT SERVICE RATIO		–	–	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.9	1.0	1.2	1.4	1.8
LIQUIDITY RATIOS (TIMES)		–	–	3.0	2.6	2.3	2.1	1.8	1.8	1.5	1.6	1.8	2.0	2.3	2.3
PROFITABILITY															
OPERATING MARGIN		87.5%	88.0%	81.8%	82.7%	83.5%	84.3%	85.1%	85.8%	86.5%	87.2%	87.8%	88.4%	89.0%	89.5%
RETURN ON REVENUES		80.2%	82.0%	−226%	−159%	−137%	−114%	−93%	−73%	−53.7%	−35.8%	−17.8%	−2.4%	9.2%	14.9%
RETURN ON TOTAL EQUITY		9.2%	4.1%	−10.3%	−13.2%	−27.2%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	−1.4%	−2.7%
RETURN ON TOTAL ASSETS		1.8%	1.0%	−2.2%	−1.9%	−2.0%	−2.1%	−2.1%	−2.1%	−2.0%	−1.6%	−1.0%	−0.2%	0.7%	1.3%

Appendix A7-7 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Constant 1992 Million Pesos)

SCHEDULE OF ANNUAL TOLL REVENUES

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
TOLL REVENUES (APPENDIX A4-3)																			
MST																			
CARS	-	-	-	139											242		351		456
TRUCKS	-	-	-	26											48		72		95
SUBTOTAL	-	-	-	165	-	-	-	-	-	-	-	-	-	-	290		423		552
SLE																			
CARS	-			134											252		397		541
TRUCKS	-			26											54		92		126
JEEPNEYS	-			47											72		100		129
BUSES	-			123											189		263		339
SUBTOTAL	-	-	-	330	-	-	-	-	-	-	-	-	-	-	567		851		3,121
GROWTH RATES																			
MST																			
CARS					5.17%											3.80%	3.80%	2.66%	2.66%
TRUCKS					5.81%											4.13%	4.13%	2.81%	2.81%
SLE																			
CARS		3.00%	3.00%	3.00%	5.86%											4.66%	4.66%	3.15%	3.15%
TRUCKS		6.90%	6.90%	6.90%	6.99%											5.42%	5.42%	3.17%	3.17%
JEEPNEYS		3.00%	3.00%	3.00%	3.95%											3.34%			
BUSES		6.90%	6.90%	6.90%	3.95%											3.34%			
ANNUAL TOLL REVENUES																			
MST																			
CARS	-	-	-	139	146	154	161	170	179	188	197	208	218	230	242	1,353	1,631	1,899	2,166
TRUCKS	-	-	-	26	27	29	31	32	34	36	38	41	43	46	48	273	334	393	451
SUBTOTAL	-	-	-	165	173	183	192	202	213	224	236	248	262	275	290	1,626	1,965	2,293	2,617
SLE																			
CARS	-	270	278	134	142	151	159	169	179	189	200	212	224	238	252	1,445	1,814	2,178	2,543
TRUCKS	-	51	54	26	28	30	32	34	36	39	41	44	47	51	54	319	416	507	592
JEEPNEYS	-	44	45	47	49	51	53	55	57	59	61	64	66	69	72	396	467	538	612
BUSES	-	108	115	123	128	133	139	144	150	156	162	168	175	182	189	1,044	1,230	1,419	1,613
SUBTOTAL	-	473	493	330	347	364	382	401	422	443	465	488	513	539	567	3,204	3,928	4,642	5,361
TOTAL REVENUES (CONSTANT 1992 PRICES)	-	473	493	495	520	547	574	604	634	667	701	737	775	815	856	4,830	5,892	6,935	7,978

Appendix A7-7 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

	Constant Pesos	CONSTRUCTION PHASE 1996 30%	1997 30%	1998 40%	Yr Zero	TOTAL (Current) Pesos	(Dollars)	Per Cent
SCHEDULE OF TOTAL START-UP COSTS								
MST 14.5 Kms @ MPesos 603/km	8,741							
SLE 14.5 Kms @ MPesos 73/km	1,060							
CONSTRUCTION COSTS (ALL IN)		5,197	4,035	5,864		15,096	(451)	
GOVT SHARE - PESOS		2,079	1,614	2,345		6,038		
(Dollars)		(66)	(48)	(66)			(180)	25.8%
PRIVATE SHARE - PESOS		3,118	2,421	3,518		9,057		
(Dollars)		(99)	(72)	(99)			(270)	38.7%
CAPITALIZED INTEREST		281	830	1,514		2,624		
		(9)	(25)	(43)			(76)	10.9%
LAND ACQUISITION		-	-	-		-	-	-
ACCESS ROADS		-	-	-		-		
INITIAL WORKING CAPITAL					82	82	(2)	0.3%
RESERVE FUND (DEBT SERVICE)					2,000	2,000	(56)	8.1%
RESERVE FUND (LOSS RESERVE)					4,000	4,000	(113)	16.1%
TOTAL COSTS PESOS		5,478	4,864	7,377	6,082	23,802		
TOTAL COSTS DOLLARS		(174)	(145)	(208)	(172)		(699)	100.0%

SCHEDULE OF INITIAL CAPITALIZATI(		Private	Per Cent	GOVT OF PHIL Pesos	Dlrs	Per Cent
CONSTRUCTION COSTS		9,057	38.1%	6,038	(180)	25.8%
DEBT	6,340					
EQUITY	2,717					
CAPITALIZED INTEREST		2,624	11.0%	-	-	-
LAND COSTS		-	-	-	-	-
ACCESS ROADS		-	-	-	-	-
INITIAL WORKING CAPITAL		82	0.3%	-		-
RESERVE FUND (DEBT SERVICE)		2,000	8.4%	-	-	-
RESERVE FUND (LOSS RESERVE)		4,000	16.8%	-	-	-
TOTAL CAPITALIZATION		17,764	74.6%	6,038	(180)	25.8%

	Years	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SCHEDULE OF DEPRECIATION																			
BALANCES OF FIXED ASSET ACCOUNTS																			
CONSTRUCTION COSTS + CAPITALIZED INTEREST		1,060	16,660	16,650	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660	16,660
PERIODIC MAINTENANCE - SLE				-	-	-	-	134	-	-	-	-	-	224	-	-	-	-	-
PERIODIC MAINTENANCE - MST				-	-	-	-	-	-	-	-	-	-	-	-	407	-	-	-
FIXED ASSETS - ENDING BALANCE				16,660	16,660	16,660	-	16,794	16,660	16,660	16,660	16,660	16,660	16,884	16,660	17,067	16,660	16,660	16,660
ANNUAL DEPRECIATION																			
DN-CONSTRUCTION COSTS MST-(Y	20			833	833	833	833	833	833	833	833	833	833	833	833	833	833	833	833
DN-CONSTRUCTION COSTS -SLE (YRS):		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
DN-PM SLE 2003	6								22	22	22	22	22	22	-				
DN-PM SLE 2009	6														37	37	37	37	37
DN-PM SLE 2015	6																		
DN-PM SLE 2021	6																		
DN-PM SLE 2027	6																		
DN-PM MST 2011	6																		
DN-PM MST 2017	6																68	68	68
DN-PM MST 2023	6																		
DN-PM MST 2030	6																		
TOTAL ANNUAL DEPRECIATION		53	53	886	886	886	886	886	908	908	908	908	908	908	923	923	991	991	991

Appendix A7–7 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(CORPORATE BOND, PARTIAL LENGTH FROM ALABANG TO MAGALLANES)
(In Current Million Pesos)

SCHEDULE OF LOAN AMORTIZATION/INTEREST INCOME & EXPENSES

			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AMORTIZATION SCHEDULE		12,435																		
IFC/ADB/EXIMBANK/SUPPLIERS CREDIT		–																		
BEGINNING BALANCE					–	–	–	–	–	–	–	–	–	–						
PRINCIPAL PAYMENT	TERM	10			–	–	–	–	–	–	–	–	–	–						
ENDING BALANCE	GRACE	1			–	–	–	–	–	–	–	–	–	–						
INTEREST PAYMENT		–			–	–	–	–	–	–	–	–	–	–						
DEVELOPMENT/LOCAL COMML BANKS		10.00%																		
BEGINNING BALANCE					1,776	1,776	1,776	1,776	1,776	1,776	1,599	1,421	1,243	1,066	888	711	533	355	178	
PRINCIPAL PAYMENT	TERM	15			–	–	–	–	–	178	178	178	178	178	178	178	178	178	178	
ENDING BALANCE	GRACE	5			1,776	1,776	1,776	1,776	1,776	1,599	1,421	1,243	1,066	888	711	533	355	178	–0	
INTEREST PAYMENT		24.00%			426	426	426	426	426	426	405	362	320	277	234	192	149	107	64	
CORPORATE BONDS		60.00%																		
BEGINNING BALANCE					10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	
PRINCIPAL PAYMENT	TERM	15			–	–	–	–	–	–	–	–	–	–	–	–	–	–	10,658	
ENDING BALANCE	GRACE	15			10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	10,658	–	
BOND YIELD PER ANNUM		17.00%			1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	1,812	
TOTAL																				
BEGINNING BALANCE					12,435	12,435	12,435	12,435	12,435	12,435	12,257	12,079	11,902	11,724	11,546	11,369	11,191	11,013	10,836	–
PRINCIPAL PAYMENT					–	–	–	–	–	178	178	178	178	178	178	178	178	178	10,836	–
ENDING BALANCE					12,435	12,435	12,435	12,435	12,435	12,257	12,079	11,902	11,724	11,546	11,369	11,191	11,013	10,836	(0)	–
INTEREST PAYMENT					2,238	2,238	2,238	2,238	2,238	2,238	2,217	2,174	2,132	2,089	2,046	2,004	1,961	1,918	1,876	–
SCHEDULE OF SHORT TERM INVESTMENT INCOME																				
BEGINNING BALANCE – SHORT TERM INVESTMENT			–	588	781	773	765	757	747	39	456	76	–	192	834	2,649	3,977	5,197	7,247	–
CASH INFLOW (NET INC MIN CASH/ST AVAILMENT)			588	193	(7)	(8)	(9)	(10)	(708)	417	(380)	(120)	192	642	1,815	1,328	1,220	2,051	(8,156)	3,472
END. BAL. –SHORT TERM INVESTMENT/(LOAN)			588	781	773	765	757	747	39	456	76	(45)	192	834	2,649	3,977	5,197	7,247	(909)	3,472
INTEREST INCOME (EXPENSE)			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
INTEREST INCOME(MIN CASH & RESERVES)			3	429	771	637	533	436	391	322	254	256	258	260	192	125	128	131	134	138

Appendix A7-8

MST FINANCIAL MODEL - TOLLWAY AUTHORITY

(Full Length)

Appendix A7-8
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
PROJECT SUMMARY

KEY ASSUMPTIONS

PHYSICAL

Length in Kilometers		SLE	14.5
		MST	19.0
Number of Lanes Constructed		MST	6
Construction (Months)			36
Opening Year:		SLE	1997
		MST	1999
Length of Concession (Years)			20 to 35
Average Cost/Kilometer(P million) Rehabilitation		SLE	73
(Pesos Million) New Construction		MST	575
(Dollars Million)			$23
Pre-concession or contract cost(Pesos million)			1,166
Operating expenses(Pesos million)			50
Maintenance (Pesos million)			38
Maintenance (Resurfacing)	Every 6 Yrs	SLE	595
(Pesos(000)/Lane/Km) 12 Yrs +	Every 6 Yrs	MST	910
Land Cost & Access Roads			NA
Revenue Sharing & Concession Income			-

FINANCIAL

Initial Debt: Equity Ratio	3:1	100%	-
Exchange Rate - Base July 1992 Pesos/US$			25.0
Annual Devaluation			6.0%
Annual Inflation			9.0%
Interest on Construction Loan			10.5%
Long-term Debt			
Interest Rate - See Schedule below			
Repayment period - See Schedule below			
Front End Fee			0.5%
Interest Rate - Cash & Reserves			14.0%
Interest Rate - Short Term Investments			-
Interest Rate - Short Term Borrowing			22.0%
Corporate Income Tax Rate			-
Tax Holiday (Years)			6
Depreciation: Years, Method	20		Straight Line
Government Subsidy(% of construction cost)			40%

TOLL RATES PER KILOMETER (Constant Pesos)

Year	1999	2000	2010	2020	2030
Cars	1.25	1.25	1.50	1.75	2.00
Trucks	2.50	2.50	3.00	3.50	4.00
Buses	2.50	2.50	3.00	3.50	4.00
Jeepneys	1.25	1.25	1.50	1.75	2.00

TOLL RATES PER KILOMETER (Constant Dollars)

Year	1999	2000	2010	2020	2030
Cars	0.050	0.050	0.060	0.070	0.080
Trucks	0.100	0.100	0.120	0.140	0.160
Buses	0.100	0.100	0.120	0.140	0.160
Jeepneys	0.050	0.050	0.060	0.070	0.080

SUMMARY OF CONSTRUCTION COSTS (Current Millions)

			1996	1997	1998	Pesos	Dollars	Percent
Construction Schedule			30%	30%	40%			
Construction Costs	19.0 Kms @ MPesos 575/km	MST	3,277	3,277	4,370	10,924		
(Constant Pesos July 1992 Value)		SLE	1,060	-	-	1,060		
	Plus Inflation		1,785	1,765	2,959	6,509		
Total	Current Pesos		6,122	5,043	7,328	18,493	$551	100%
Government Share	40%		2,449	2,017	2,931	7,397	$221	40%
Private Share	60%		3,673	3,026	4,397	11,096	$331	60%

CAPITALIZATION OF TOLLWAY AUTHORITY (Current Millions)

Assets	Pesos	Dollars
Construction Costs	18,493	$551
Interest During Construction	1,771	$52
Initial Working Capital	89	$3
Reserve Fund - Debt Service	2,000	$56
Reserve Fund - Operating Losses	4,000	$113
Total	26,353	$775

Liabilities/Equity	Pesos	Dollars	Percent
Government Advance/Equity	10,541	$222	40.0%
Long-Term Debt	15,812	$554	60.0%
Total	26,353	$776	100.0%

LONG TERM DEBT - TERMS

	Amount	Percent	Interest	Repayment Period
Asian Development Bank	2,635	16.67%	6.50%	25 years, inclusive of 5 years grace period
World Bank	7,906	50.00%	7.65%	30 years, inclusive of 5 years grace period
Local Financial Markets(Bonds)	5,271	33.33%	17.00%	10 year bond, tax free

FINANCIAL RATES OF RETURN (From Start of Construction)

FIRR/Equity	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	4.9%	10.5%	13.2%	14.7%
Constant Dollar	-0.4%	4.9%	7.4%	8.7%

FIRR/Project	20 Yrs	25 Yrs	30 Yrs	35 Yrs
Current Pesos	9.4%	12.5%	14.2%	15.2%
Constant Dollar	4.5%	7.2%	8.7%	9.6%

Appendix A7-8 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED INCOME STATMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
TOLL REVENUES																			
MST OPERATIONS																			
CARS	-	-	-	282	323	370	423	484	554	635	726	831	952	1,089	1,247	9,250	17,385	31,426	55,619
TRUCKS	-	-	-	53	61	71	82	94	108	125	144	165	191	220	253	1,899	3,636	6,632	11,782
SUBTOTAL	-	-	-	335	384	440	505	578	663	759	870	997	1,142	1,309	1,500	11,149	21,021	38,058	67,401
SLE OPERATIONS																			
CARS	-	416	467	260	301	348	402	465	537	621	718	830	959	1,109	1,281	9,626	18,444	33,707	60,044
TRUCKS	-	78	91	49	58	67	79	92	107	125	146	171	199	233	272	2,088	4,146	7,695	13,777
JEEPNEYS	-	68	76	86	97	110	124	141	160	181	205	232	263	298	338	2,451	4,446	7,879	13,785
BUSES		166	194	225	256	290	328	372	421	477	541	613	694	787	891	6,460	11,718	20,764	36,327
SUBTOTAL	-	728	828	621	711	815	933	1,069	1,225	1,405	1,610	1,846	2,116	2,426	2,782	20,626	38,754	70,045	123,932
TOTAL REVENUES	-	728	828	956	1,096	1,255	1,438	1,648	1,888	2,164	2,480	2,842	3,258	3,735	4,282	31,774	59,774	108,103	191,333
OPERATING EXPENSES																			
OPERATING EXPENSES	-	51	55	91	100	109	118	129	141	153	167	182	199	216	236	1,539	2,367	3,642	5,604
GENERAL MAINTENANCE EXPENSES	-	26	29	69	76	83	90	98	107	117	127	138	151	164	179	1,169	1,799	2,768	4,259
GENERAL AND ADMINISTRATIVE EXPENSES	-	14	15	16	18	20	21	23	25	28	30	33	36	39	42	277	426	656	1,009
LAND RENTAL (GOP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATING EXPENSES	-	91	99	177	193	211	230	250	273	297	324	353	385	420	458	2,985	4,593	7,066	10,872
NET OPERATING INCOME	-	637	729	779	902	1,044	1,208	1,397	1,615	1,866	2,156	2,489	2,873	3,315	3,825	28,789	55,182	101,037	180,461
DEPRECIATION (-)	-	(53)	(53)	(1,013)	(1,013)	(1,013)	(1,013)	(1,013)	(1,035)	(1,035)	(1,035)	(1,035)	(1,035)	(1,035)	(1,051)	(5,608)	(3,872)	(1,430)	(1,136)
INTEREST EXPENSE (-)	-	-	-	(1,798)	(1,768)	(1,820)	(1,876)	(1,935)	(1,991)	(2,025)	(2,041)	(2,054)	(2,065)	(1,361)	(1,409)	(5,835)	(5,173)	(3,478)	(969)
FOREIGN EXCHANGE LOSS (-)	-	-	-	-	-	-	-	-	(187)	(226)	(266)	(309)	(354)	(402)	(453)	(3,147)	(4,968)	(6,435)	(4,198)
NET PROFIT BEFORE TAXES	-	584	676	(2,032)	(1,879)	(1,789)	(1,681)	(1,550)	(1,599)	(1,420)	(1,187)	(910)	(582)	517	912	14,200	41,168	89,694	174,158
INCOME TAXES (-)	-	-	-	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt	-	-	-	-	-	-	-	-	-	-
INTEREST INCOME NET OF 20% TAX (+)	-	-	3	344	645	595	518	444	432	421	417	393	366	368	370	1,637	1,695	1,828	2,032
NET PROFIT (LOSS)	-	584	678	(1,688)	(1,234)	(1,194)	(1,163)	(1,106)	(1,166)	(999)	(770)	(517)	(216)	885	1,282	15,836	42,863	91,522	176,190
Constant Dollars (July 1992 Value)	-	17	19	(45)	(31)	(28)	(26)	(23)	(23)	(19)	(14)	(9)	(3)	13	18	182	370	594	854

Appendix A7-8 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED CASH FLOW STATEMENTS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
SOURCES OF FUNDS																			
NET PROFIT	–	584	678	(1,688)	(1,234)	(1,194)	(1,163)	(1,106)	(1,166)	(999)	(770)	(517)	(216)	885	1,282	15,836	42,863	91,522	176,190
ADD: DEPRECIATION	–	53	53	1,013	1,013	1,013	1,013	1,013	1,055	1,035	1,035	1,035	1,035	1,035	1,051	5,608	3,872	1,430	1,136
CASH FROM OPERATIONS	–	637	731	(675)	(221)	(181)	(150)	(93)	(131)	36	266	518	820	1,920	2,333	21,445	46,735	92,952	177,326
GOP SUBSIDY																			
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONSTRUCTION COSTS	2,449	2,017	2,931	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
WORKING CAPITAL/RESERVES)	–	–	3,144																
DEBT FUNDING																			
CONSTRUCTION LOANS	3,866	3,590	5,411	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LONG TERM DEBT 100 %	–	–	15,812	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EQUITY 0 %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SHORT TERM LOANS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL SOURCES	**6,315**	**6,244**	**28,030**	**(675)**	**(221)**	**(181)**	**(150)**	**(93)**	**(131)**	**36**	**266**	**518**	**3,293**	**2,064**	**–**	**–**	**–**	**–**	**–**
													4,113	**3,964**	**2,333**	**21,445**	**46,735**	**92,952**	**177,326**
USES OF FUNDS																			
LAND ACQUISITION	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITAL EXPENDITURES – SLE & MST	6,122	5,043	7,328	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAPITALIZED INTEREST	193	565	1,014	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PERIODIC MAINTENANCE – SLE	–	–	–	–	–	–	–	134	–	–	–	–	–	224	–	376	–	630	1,057
PERIODIC MAINTENANCE – MST	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	533	895	1,500	2,516
LONG-TERM DEBT (PRINCIPAL REPAYMENT)				–	–	–	–	–	448	448	448	448	5,719	448	448	2,240	2,240	1,976	949
RESERVE FUNDING (DEBT SERVICE)			2,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
RESERVE FUNDING (LOSS RESERVE)			4,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
REPAYMENT SHORT-TERM LOANS			12,867	–	–	–	–	–	–	–	–	–	–	3,293	2,064	–	–	–	–
TOTAL USES	**6,315**	**5,607**	**27,210**	**–**	**–**	**–**	**–**	**134**	**448**	**448**	**448**	**448**	**5,719**	**3,965**	**2,512**	**3,149**	**3,135**	**4,107**	**4,522**
NET CASH INFLOW (OUTFLOW)	**–**	**637**	**820**	**(675)**	**(221)**	**(181)**	**(150)**	**(226)**	**(579)**	**(412)**	**(182)**	**70**	**(1,606)**	**19**	**(179)**	**18,295**	**43,600**	**88,845**	**172,804**
FINANCIAL INTERNAL RATES OF RETURN																			
FIRR ON EQUITY																			
NET CASH FLOW	–	637	820	(675)	(221)	(181)	(150)	(226)	(579)	(412)	(182)	70	(1,606)	19	(179)	18,295	43,600	88,845	172,804
LESS: MAINTENANCE RESERVES	–	–	–	(67)	(67)	(67)	(67)	(82)	(82)	(82)	(82)	(82)	(82)	(107)	(107)	(1,101)	(1,674)	(2,639)	(2,977)
LESS: EQUITY CONTRIBUTION	(2,449)	(2,017)	(6,075)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NET CASH FLOW (OUTFLOWS)	**(2,449)**	**(1,380)**	**(5,255)**	**(742)**	**(288)**	**(247)**	**(216)**	**(308)**	**(661)**	**(494)**	**(264)**	**(11)**	**(1,688)**	**(88)**	**(286)**	**17,194**	**41,926**	**86,206**	**169,827**
CONSTANT Dollars(July 1992 value)	(69)	(36)	(125)	(20)	(7)	(6)	(5)	(6)	(13)	(9)	(5)	(0)	(27)	(1)	(4)	198	362	558	823
	20 Year	25 Year	30 Year	35 Year															
FIRR/E Current Pesos	4.9%	10.5%	13.2%	14.7%															
Constant (P/$)	-0.4%	4.9%	7.4%	8.7%															
FIRR ON PROJECT																			
NET OPERATING INCOME	–	637	729	779	902	1,044	1,208	1,397	1,615	1,866	2,156	2,489	2,873	3,315	3,825	28,789	55,182	101,037	180,461
LESS: CAPITAL EXPENDITURES	(6,122)	(5,043)	(7,328)	–	–	–	–	(134)	–	–	–	–	–	(224)	–	(909)	(895)	(2,130)	(3,573)
NET CASH INFLOWS(OUTFLOWS)	**(6,122)**	**(4,405)**	**(6,600)**	**779**	**902**	**1,944**	**1,208**	**1,264**	**1,615**	**1,866**	**2,156**	**2,489**	**2,873**	**3,091**	**3,825**	**27,880**	**54,287**	**98,907**	**176,888**
CONSTANT Dollars(July 1992 value)	(173)	(115)	(157)	21	23	25	27	27	32	35	38	42	45	46	54	324	471	643	860
	20 Year	25 Year	30 Year	35 Year															
FIRR/P Current Pesos	9.4%	12.5%	14.2%	15.2%															
Constant (P/$)	4.5%	7.2%	8.7%	9.6%															

Appendix A7-8 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

PROJECTED BALANCE SHEET

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020	2025	2030
ASSETS																			
MINIMUM CASH & RESERVES	–	49	6,089	5,422	5,209	4,038	3,899	3,817	3,699	3,748	3,263	3,279	3,296	3,315	2,836	2,970	3,177	3,494	4,079
EXCESS CASH	–	588	1,368	1,360	1,352	2,342	2,332	2,187	1,727	1,265	1,56[illegible]	1,623	–	–	300	18,462	61,855	150,382	322,603
FIXED ASSETS																			
BUILDINGS & EQUIPMENT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
COMPLETED EXPRESSWAY	6,122	11,165	18,493	20,265	20,265	20,265	20,265	20,398	20,398	20,398	20,398	20,398	20,398	20,622	20,622	21,531	22,426	24,556	28,129
(+)CAPITALIZED INTEREST	193	758	1,771																
ACCESS ROADS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LAND	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL FIXED ASSETS	6,315	11,922	20,265	20,265	20,265	20,265	20,265	20,398	20,398	20,398	20,398	20,398	20,398	20,622	20,622	21,531	22,426	24,556	28,129
LESS ACCUM. DEPRECIATION	–	(53)	(106)	(1,119)	(2,132)	(3,146)	(4,159)	(5,172)	(6,208)	(7,243)	(8,279)	(9,314)	(10,350)	(11,385)	(12,436)	(18,044)	(21,916)	(23,346)	(24,482)
NET FIXED ASSETS	6,315	11,869	20,159	19,145	18,132	17,119	16,106	15,226	14,191	13,155	12,120	11,084	10,049	9,237	8,187	3,487	510	1,210	3,647
TOTAL ASSETS	6,315	12,506	27,616	25,928	24,693	23,499	22,336	21,230	19,616	18,169	16,951	15,986	13,345	12,552	11,323	24,919	65,542	155,087	330,328
LIABILITIES AND EQUITY																			
CURRENT LIABILITIES																			
ACCOUNTS PAYABLE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SHORT TERM LOANS	3,866	7,456	–	–	–	–	–	–	–	–	–	–	3,293	2,064	–	–	–	–	–
LONG-TERM DEBT	–	–	15,812	15,812	15,812	15,812	15,812	15,812	15,364	14,916	14,468	14,020	8,301	7,853	7,405	5,165	2,925	949	–
SHAREHOLDERS' EQUITY																			
GOVERNMENT SUBSIDY/EQUITY	2,449	4,466	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541	10,541
MAINTENANCE RESERVE	–	–	–	67	133	200	267	215	297	379	460	542	624	507	614	806	1,586	2,094	1,499
RETAINED EARNINGS	–	584	1,262	(492)	(1,794)	(3,054)	(4,284)	(5,338)	(6,586)	(7,667)	(8,519)	(9,117)	(9,415)	(8,413)	(7,238)	8,406	50,489	141,503	318,288
TOTAL SHAREHOLDERS' EQUITY	2,449	5,050	11,804	10,116	8,881	7,687	6,525	5,419	4,252	3,253	2,483	1,966	1,750	2,635	3,917	19,753	62,616	154,138	330,328
TOTAL LIABILITIES AND EQUITY	6,315	12,506	27,616	25,928	24,693	23,499	22,336	21,230	19,616	18,169	16,951	15,986	13,345	12,552	11,323	24,919	65,542	155,087	330,328

SELECTED FINANCIAL INDICATORS

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
LIQUIDITY															
DEBT EQUITY RATIO		–	1.3	1.6	1.8	2.1	2.4	2.9	3.6	4.6	5.8	7.1	4.7	3.0	1.9
DEBT SERVICE RATIO		–	–	0.5	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.2	0.4	3.1	3.7
LIQUIDITY RATIOS (TIMES)		–	–	4.1	3.8	3.7	3.1	3.2	2.6	2.7	2.9	2.8	0.8	6.2	6.9
PROFITABILITY															
OPERATING MARGIN		87.5%	88.0%	81.5%	82.4%	83.2%	84.0%	84.8%	85.6%	86.3%	86.9%	87.6%	88.2%	88.8%	89.3%
RETURN ON REVENUES		80.2%	82.0%	-177%	-113%	-95%	-81%	-67%	-62%	-46%	-31%	-18%	-7%	24%	30%
RETURN ON TOTAL EQUITY		3.9%	2.0%	-3.9%	-3.2%	-3.6%	-4.1%	-4.6%	-6.0%	-6.7%	-6.7%	-5.8%	-2.9%	10.1%	9.8%
RETURN ON TOTAL ASSETS		1.6%	0.8%	-1.6%	-1.2%	-1.2%	-1.3%	-1.3%	-1.4%	-1.3%	-1.1%	-0.8%	-0.4%	1.7%	2.7%

Appendix A7-8 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Constant 1992 Million Pesos)

SCHEDULE OF ANNUAL TOLL REVENUES
(FULL LENGTH FROM ALABANG TO PRES. QUIRINO, LOANS)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL 2011-2015	TOTAL 2016-2020	TOTAL 2021-2025	TOTAL 2026-2030
TOLL REVENUES (APPENDIX A4-3)																			
MST																			
CARS	-	-	-	154											264		394		522
TRUCKS	-	-	-	29											54		83		111
SUBTOTAL	-	-	-	184	-	-	-	-	-	-	-	-	-	-	318		477		633
SLE																			
CARS	-			142											272		421		565
TRUCKS	-			27											58		96		130
JEEPNEYS	-			47											72		100		129
BUSES	-			123											189		263		339
SUBTOTAL	-	-	-	340	-	-	-	-	-	-	-	-	-	-	590		879		3,205
GROWTH RATES																			
MST																			
CARS					5.02%											4.08%	4.08%	2.84%	2.84%
TRUCKS					5.68%											4.47%	4.47%	2.92%	2.92%
SLE																			
CARS		3.00%	3.00%	3.00%	6.04%											4.49%	4.49%	2.97%	2.97%
TRUCKS		6.90%	6.90%	6.90%	7.11%											5.23%	5.23%	3.08%	3.08%
JEEPNEYS		3.00%	3.00%	3.00%	3.95%											3.34%	3.34%	2.60%	2.60%
BUSES		6.90%	6.90%	6.90%	3.95%											3.34%	3.34%	2.60%	2.60%
ANNUAL TOLL REVENUES																			
MST																			
CARS	-	-	-	154	162	170	179	188	197	207	217	228	240	252	264	1,493	1,823	2,147	2,469
TRUCKS	-	-	-	29	31	33	34	36	38	41	43	45	48	51	54	306	381	453	523
SUBTOTAL	-	-	-	184	193	203	213	224	236	248	260	274	288	302	318	1,799	2,204	2,600	2,992
SLE																			
CARS	-	270	278	142	151	160	170	180	191	203	215	228	242	256	272	1,552	1,933	2,302	2,665
TRUCKS	-	51	54	27	29	31	33	36	38	41	44	47	50	54	58	336	434	525	611
JEEPNEYS	-	44	45	47	49	51	53	55	57	59	61	64	66	69	72	396	467	538	612
BUSES	-	108	115	123	128	133	139	144	150	156	162	168	175	182	189	1,044	1,230	1,419	1,613
SUBTOTAL	-	473	493	340	357	375	394	414	436	458	482	507	533	561	590	3,329	4,065	4,785	5,502
TOTAL REVENUES (CONSTANT 1992 PRICES)	-	473	493	523	550	578	607	639	671	706	742	780	821	863	908	5,128	6,269	7,384	8,494

Appendix A7–8 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

CONSTRUCTION PHASE

SCHEDULE OF TOTAL START–UP COSTS	Constant Pesos	1996 30%	1997 30%	1998 40%	Yr Zero	TOTAL (Current) Pesos	(Dollars)	Per Cent
MST 19.0 Kms @ MPesos 575/km	10,924							
SLE 14.5 Kms @ MPesos 73/km	1,060							
CONSTRUCTION COSTS (ALL IN)		6,122	5,043	7,328		18,493	(551)	
GOVT SHARE – PESOS		2,449	2,017	2,931		7,397		
(Dollars)		(78)	(60)	(83)			(221)	28.5%
PRIVATE SHARE – PESOS		3,673	3,026	4,397		11,096		
(Dollars)		(116)	(90)	(124)			(331)	42.7%
CAPITALIZED INTEREST		193	565	1,014		1,771		
		(6)	(17)	(29)			(52)	6.7%
LAND ACQUISITION		–	–	–		–	–	–
ACCESS ROADS		–	–	–		–		
INITIAL WORKING CAPITAL					89	89	(3)	0.3%
RESERVE FUND (DEBT SERVICE)					2,000	2,000	(56)	7.3%
RESERVE FUND (LOSS RESERVE)					4,000	4,000	(113)	14.6%
TOTAL COSTS PESOS		6,315	5,607	8,342	6,089	26,353		
TOTAL COSTS DOLLARS		(200)	(168)	(235)	(172)		(775)	100.0%

SCHEDULE OF INITIAL CAPITALIZATION		Private	Per Cent	GOVT OF PHIL Pesos	Dlrs	Per Cent
CONSTRUCTION COSTS		–	–	18,493	(544)	70.2%
DEBT	–					
EQUITY	–					
CAPITALIZED INTEREST		–	–	1,771	(52)	6.7%
LAND COSTS		–	–	–	–	–
ACCESS ROADS		–	–	–	–	–
INITIAL WORKING CAPITAL				89	(3)	0.3%
RESERVE FUND (DEBT SERVICE)		–		2,000	(59)	7.6%
RESERVE FUND (LOSS RESERVE)		–		4,000	(118)	15.2%
TOTAL CAPITALIZATION		–	–	26,353	(775)	100.0%

	Years	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SCHEDULE OF DEPRECIATION																			
BALANCES OF FIXED ASSET ACCOUNTS																			
CONSTRUCTION COSTS & CAPITALIZED INTEREST		1,060	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205	19,205
PERIODIC MAINTENANCE – SLE				–	–	–	–	134	–	–	–	–	–	224	–	–	–	–	–
PERIODIC MAINTENANCE – MST				–	–	–	–	–	–	–	–	–	–	–	–	533	–	–	–
FIXED ASSETS – ENDING BALANCE				19,205	19,205	19,205	–	19,338	19,205	19,205	19,205	19,205	19,205	19,429	19,205	19,738	19,205	19,205	19,205
ANNUAL DEPRECIATION																			
DN–CONSTRUCTION COSTS MST–(YRS):	20			960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960
DN–CONSTRUCTION COSTS –SLE (YRS):		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
DN–PM SLE 2003	6								22	22	22	22	22	22	–				
DN–PM SLE 2009	6														37	37	37	37	37
DN–PM SLE 2015	6																		
DN–PM SLE 2021	6																		
DN–PM SLE 2027	6																		
DN–PM MST 2011	6																		
DN–PM MST 2017	6																89	89	89
DN–PM MST 2023	6																		
DN–PM MST 2030	6																		
TOTAL ANNUAL DEPRECIATION		53	53	1,013	1,013	1,013	1,013	1,013	1,035	1,035	1,035	1,035	1,035	1,035	1,051	1,051	1,139	1,139	1,139

Appendix A7-8 (continued)
MANILA SOUTH TOLLWAY FINANCIAL MODEL
(TOLLWAY AUTHORITY,FULL LENGTH FROM ALABANG TO PRES. QUIRINO)
(In Current Million Pesos)

SCHEDULE OF LOAN AMORTIZATIONS/INTEREST INCOME& EXPENSE

			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AMORTIZATION SCHEDULE		15,812																		
ASIAN DEVELOPMENT BANK		16.67%																		
BEGINNING BALANCE					2,635	2,635	2,635	2,635	2,635	2,635	2,504	2,372	2,240	2,108	1,976	1,845	1,713	1,581	1,449	1,318
PRINCIPAL PAYMENT	TERM	25			–	–	–	–	–	132	132	132	132	132	132	132	132	132	132	132
ENDING BALANCE	GRACE	5			2,635	2,635	2,635	2,635	2,635	2,504	2,372	2,240	2,108	1,976	1,845	1,713	1,581	1,449	1,318	1,186
INTEREST PAYMENT		6.50%			171	171	171	171	171	167	158	150	141	133	124	116	107	98	90	81
WORLD BANK LOAN		50.00%																		
BEGINNING BALANCE					7,906	7,906	7,906	7,906	7,906	7,906	7,590	7,273	6,957	6,641	6,325	6,009	5,692	5,376	5,060	4,744
PRINCIPAL PAYMENT	TERM	30			–	–	–	–	–	316	316	316	316	316	316	316	316	316	316	316
ENDING BALANCE	GRACE	5			7,906	7,906	7,906	7,906	7,906	7,590	7,273	6,957	6,641	6,325	6,009	5,692	5,376	5,060	4,744	4,427
INTEREST PAYMENT(1 3/4 OVER LIBOR)		7.65%			605	605	605	605	605	605	593	569	544	520	496	472	448	423	399	375
LOCAL FINANCIAL MARKETS(Tax free bonds)		33.33%																		
BEGINNING BALANCE					5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	–	–	–	–	–	–
PRINCIPAL PAYMENT	TERM	10			–	–	–	–	–	–	–	–	–	5,271	–	–	–	–	–	–
ENDING BALANCE	GRACE	10			5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	–	–	–	–	–	–	–
INTEREST PAYMENT		17.00%			896	896	896	896	896	896	896	896	896	896	–	–	–	–	–	
TOTAL																				
WITHOUT DEVALUATION																				
BEGINNING BALANCE					15,812	15,812	15,812	15,812	15,812	15,812	15,364	14,916	14,468	14,020	8,301	7,853	7,405	6,957	6,509	6,061
PRINCIPAL PAYMENT					–	–	–	–	–	448	448	448	448	5,719	448	448	448	448	448	448
ENDING BALANCE				15,812	15,812	15,812	15,812	15,812	15,812	15,364	14,916	14,468	14,020	8,301	7,853	7,405	6,957	6,509	6,061	5,613
INTEREST PAYMENT					1,672	1,672	1,672	1,672	1,672	1,668	1,647	1,614	1,582	1,549	620	587	555	522	489	456
ADJUSTED FOR DEVALUATION ON ABD/FOREIGN LOANS																				
PRINCIPAL REPAYMENTS					–	–	–	–	–	636	674	714	757	6,073	850	901	956	1,013	1,074	1,138
INTEREST EXPENSES					1,719	1,768	1,820	1,876	1,935	1,991	2,025	2,041	2,054	2,065	1,177	1,182	1,183	1,180	1,172	1,159
ADJUSTEMENTS TO:																				
INCOME STATEMENTS (FX LOSS)																				
PRINCIPAL REPAYMENTS(FOREIGN EXCHANGE LOSS)					–	–	–	–	–	187	226	266	305	354	402	453	508	565	626	690
ADDITIONAL INTEREST					47	96	148	204	262	323	378	427	473	516	557	595	628	658	683	703
SCHEDULE OF SHORT TERM INVESTMENT INCOME/LOANS																				
BEG. BALANCE – EXCESS CASH(SHORT TERM LOANS)			–	588	1,368	1,360	1,352	2,342	2,332	2,187	1,727	1,265	1,569	1,623	–	–	300	2,310	5,381	9,092
CASH INFLOW (NET INC MIN CASH/ST AVAILMENT)			588	781	(8)	(9)	991	(10)	(145)	(460)	(461)	303	55	(4,916)	(2,064)	300	2,010	3,070	3,711	4,449
END. BAL. – EXCESS CASH(SHORT TERM LOAN)			588	1,368	1,360	1,352	2,342	2,332	2,187	1,727	1,265	1,569	1,623	(3,293)	(2,064)	300	2,310	5,381	9,092	13,540
INTEREST INCOME (EXPENSE)			–	–	–	–	–	–	–	–	–	–	–	(184)	(227)	–	–	–	–	–
INTEREST INCOME(MIN CASH & RESERVES)			3	430	806	744	647	556	540	526	521	491	458	460	463	431	399	402	405	409

Appendix A7-9

DETERMINATION OF OPTIMUM OPENING YEAR BY THE FIRST YEAR BENEFIT/COST RATIO

Appendix A7-9
DETERMINATION OF OPTIMUM OPENING YEAR BY THE FIRST YEAR BENEFIT/COST RATIO

Consider the question of project timing from the point of view of a private investor.

Suppose that

- all project costs occur in the year before opening and are independent of the year of opening;
- project net revenues in each year are independent of the year of opening;
- the investor wants to maximize the project's net present value (NPV) over a fixed number of years of operation.

Let
- C be the project cost;
- R_i be the project net revenues in year i;
- d be the discount rate; and
- n be the fixed number of years of operation of the project.

If the project opened in year i then its NPV, taking the year before opening as the base for the present value calculations, would be

$$NPV_i = -C + \frac{R_i}{1+d} + \frac{R_{i+1}}{(1+d)^2} + \cdots + \frac{R_{i+n-1}}{(1+d)^n}$$

If the investor put off opening the project by one year, its NPV with respect to the same base year would change as follows:

- the project's present cost would be discounted by one year;
- the first year (year i) of revenues would be lost;
- an additional year of revenues would be gained at the end of the analysis period, although these revenues would be heavily discounted.

The NPV in this case would be:

$$NPV_{i+1} = \frac{-C}{1+d} + \frac{R_{i+1}}{(1+d)^2} + \cdots + \frac{R_{i+n-1}}{(1+d)^n} + \frac{R_{i+n}}{(1+d)^{n+1}}$$

The difference between the two NPVs (ie, the gain or loss in NPV as a result of deferring the investment by a year) is then

$$NPV_{i+1} - NPV_i = \frac{-C}{1+d} + \frac{R_{i+n}}{(1+d)^{n+1}} + C - \frac{R_i}{1+d}$$

$$= C\frac{d}{1+d} - \frac{R_i}{1+d} + \frac{R_{i+n}}{(1+d)^{n+1}}$$

The last term can normally be neglected since

$$\frac{1}{(1+d)^{n+1}}$$

is normally very small. (Alternatively, the term could be included in the following calculation with only minor additional effort.)

If NPV_{i+1} is greater than NPV_i, there is an advantage to putting off the investment. Thus, the investor should defer the investment by a year if

$$C\frac{d}{1+d} - \frac{R_i}{1+d} > 0$$

or equivalently if

$$d > \frac{R_i}{C}$$

A symmetrical argument can be made to determine if the investor should advance the investment by a year. The project's present cost would be higher, but the project would return an additional year of revenues up front while losing the heavily discounted final year of revenues. The result would be that the investor should advance the project by a year if

$$\frac{R_i}{C} > d$$

Since the optimum (ie, net present value maximizing) year occurs when the investor should neither defer nor advance the project timing, it follows that the project should open in the year i such that

$$\frac{R_i}{C} = d$$

In practice, given a stream of projected annual revenues R_i over time and an estimated project cost, the ratios R_i/C (called first year benefit/cost ratios or FYBCR) are calculated for each possible opening year i. The earliest year for which the FYBCR equals or exceeds the discount rate is the optimum opening year.

The above argument has not considered the effect of inflation on the time stream of costs and revenues. It can be seen, however, that if inflation affects costs and revenues in the same way, the only change to the above argument would be to replace the nominal discount rate by the effective discount rate (net of inflation).

APPENDIX TO CHAPTER 8

Appendix A8-1
BOT-PMO ORGANIZATION CHART

Appendix A8-1
BOT-PMO ORGANIZATION CHART

Figure A8-1-1
Republic of the Philippines
Department of Public Works and Highways
BUILD-OPERATE-TRANSFER PROJECT MANAGEMENT OFFICE

POSITION CHART
CY 1992

UNDERSECRETARY
FOR FIELD OPERATIONS "B"

PROJECT DIRECTOR
(CLUSTER HEAD, URBAN INFRASTRUCTURE PROJECT)

PROJECT MANAGER

CERTIFIED TRUE COPY
Marie Grace O. Melocoton
MARIE GRACE O. MELOCOTON
HUMAN RESOURCE MGT. OFFICER II

ADMINISTRATIVE DIVISION

1	ADMINISTRATIVE OFFICER V	0-24
1	INFO. TECH OFFICER II	0-22
1	ACCOUNTANT III	0-18
1	BUDGET OFFICER II	0-15
1	SUPPLY OFFICER II	0-14
1	SECRETARY II	0-9
1	CLERK IV	0-9
1	COMPUTER OPERATOR II	0-9
1	CLERK III	0-6
4	DRIVER II	0-4
1	REPRO. MACHINE OPERATOR	0-4
2	UTILITY WORKER II	0-3

TECHNICAL EVALUATION DIVISION

1	ENGINEER V	(CE)	0-24
2	ENGINEER IV	(CE)	0-22
1	FINANCIAL ANALYST IV		0-22
2	ENGINEER III	(ICE, HWE)	0-19
1	ECONOMIST III		0-18
1	ENGINEER II	(CE)	0-16
1	ENVIRONMENTAL MGT. SPECIALIST II		0-15
1	COMPUTER PROGRAMMER II		0-15
1	COMPUTER OPERATOR II		0-9
1	DRAFTSMAN II		0-8
1	ENGINEERING ASSISTANT		0-8

CONTRACT MANAGEMENT DIV.

1	ENGINEER V	(CE)	0-24
2	ENGINEER IV	(CE)	0-22
1	LEGAL OFFICER III		0-20
2	ENGINEER III	(CE)	0-19
1	ENGINEER II	(CE)	0-16
1	COMPUTER OPERATOR II		0-9
1	ENGINEERING ASSISTANT		0-8

PREPARED BY:
GODOFREDO Z. GALANO
PROJECT MANAGER

SUBMITTED BY:
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DIRECTOR II, URIO - PMO
CLUSTER HEAD, UIP

RECOMMENDING APPROVAL:
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UNDERSECRETARY

APPROVED:
JOSE P. DE JESUS
SECRETARY

MGM/wab/lag

Figure A8–1–2
Republic of the Philippines
Department of Public Works and Highways
BUILD–OPERATE–TRANSFER PROJECT MANAGEMENT OFFICE

FUNCTIONAL CHART

UNDERSECRETARY
For Field Operations

PROJECT DIRECTOR
(Cluster Head, Urban Infrastructure Projects)

Assists the Undersecretary in directing controlling, supervising, coordinating and monitoring all activities pertaining to the execution of all projects being implemented thru the BOT–PMO.

Develops, recommends and effectively communicates all pre–construction and construction engineering and all management policies, systems and criteria to be met by the BOT–PMO.

Assists the BOT–PMO in their work program and budget developments and guide them in critical program/activity decisions.

Monitors preconstruction and construction program executions by the BOT–PMO; identifies improvement needs, develops and recommends improvement programs and measures to meet these needs, and guide the BOT–PMO in the application of these prograns and measures.

Assists the Undersecretary in meeting, peak work load requirements by evaluating BOT–PMOs work load and staffing.

Assists the BOT–PMO in solving unusually difficult project implementation and mangement problems.

Assists the Undersecretary in setting objectives and evaluating performance of the BOT–PMO and recommends appropriate actions/measures aimed towards their improvement.

Convenes the BOT–PMO to review status/ progress of works in all projects and identifies/resolves operational problems and issues for purposes of submitting reports and/or discussions thereon during executive meetings, one–on–one, among others.

PROJECT MANAGER

Reports directly to, and is under the immediate control and supervision of the cluster head. He is responsible to the undersecretary thru the cluster head, for the efficient and cost– effective management of the BOT–PMO and the successful completion of all BOT projects.

Directs, controls and coordinates all administrative and technical activities of identifying and selecting eligible BOT projects and checking inclusion of such projects in the DPWH infras–tructural programs as well as conducts preliminary assessment of BOT potential programs.

Reviews and recommends for approval the detailed engineering designs and plans prepared by the contractor.

Recommends the "automatic granting" to the winning contractor the franchise to operate and maintain the facility, including the collection of tolls, fees, rentals and charges.

Supervises works of BOT contractors in accordance with the contract conditions up to completion of the projects.

Recommends acceptance of constructed facility before operation.

Monitors the operation and maintenance works of the BOT contractor and recommend remedial and corrective measures to be undertaken.

A B C

Figure A8–1–2 (continued)

A — ADMINISTRATIVE DIVISION

Provides administrative support necessary in the administration and execution of projects particularly clerical, messengerial, janitorial and transportation services.

Directs administrative activities of the office such as personnel management, budgeting procurement and disbursement of supplies and materials.

Maker recommendations on the day to day operation of the office that will make it a more effective and responsive organization.

Prepares and reviews correspondence and reports that may be required by the cluster head and the project manager.

Maintains/supervises a data bank system of all project data for purposes of monitoring needs by other agencies/offices.

Performs various executive functions including human resources development, public relations, secretarial jobs and other related works.

Prepares budget and financial report, keeps records of project fund expenditures, maintains a recording and filing system for all office papers and documents.

Institutionalizes effective liasoning works with line offices concerned and with other government agencies as well.

Maintains book of account for accounting and control purposes.

Operates and maintains office machines and equipment.

B — TECHNICAL EVALUATION DIVISION

Shall be responsible for the inclusion in the infrastructure program priority projects that may be financed, constructed, operated and maintained by the private sector and give wide publicity to all such projects; also to give official notification to the contractors registered with the agency including the concerned chapters of the PCA, the National Confederation of Contractors Association of the Philippines and the PCCI, of the list of such projects at least once every six (6) months.

See to it that the list of all such national projects mut be part of the medium–term infrastructure programs of the agency and must be duly approved by congress prior to the call for bids for their implementation.

Prescribes the minimum design and performance standards and specifications, as well as economic parameters which shall be observed by the bidder/contractor in preparing its bids.

Indicates the facilities associated with the subject project which are to be provided by the government which may include but not be limited to right–of–way.

Causes to be published a notice inviting all prequalified infrastructure contractors to participate in the bidding for the project as approved by congress.

Shall prepare the bidding documents for the project to guide the prospective bidder in preparing and submitting its prequalification application and bid proposal.

Specifies the needed experience of the key personnel needed in the relevant aspects of schemes similar or related to the project and adopt a quantitative rating system for the technical and managerial and financial criteria.

Specifies the minimum operation and maintenance equipment requirement (owned/ leased by the BOT contractor)

Sets–up environmental standards for the proposed project design and technology to be used in the BOT project same standards of which shall be acceptable to the Department of Environment and Natural Resources (DENR).

Conducts pre–bid conference.

Evaluates the submitted feasibility study including preliminary engineering design of each bidder.

Recommends for approval the fairness and equity of the tolls, fees, rentals and charges except in the case of tolls for national highways, roads, bridges and public thoroughfares which shall be approved by the Transportation Regulatory Board (TRB).

Acquires and provides to the contractor the required right–of–way and other associated facilities for the project.

C — CONTRACT MANAGEMENT DIVISION

Reviews program and conducts evaluation of actual performance against programmed plan and specifications.

Identifies implementing problems and recommends and/or takes appropriate remedial measures to enable expeditious and economical prosecution of projects.

Monitors progress of the implementaion and execution of the projects.

Assists in program administration and execution particularly legal matters, specifically problems on the acquisiton of right–of–way needed in the prosecution of the project, which may incur during planning and implementation.

Prepares physical and financial status reports of the projects as required.

Exercises "Technical Supervision" over the project activities by inspecting and checking whether the project is "constructed, operated and maintained in accordance with plans, specifications, standards and cost approved by the Department.

Assures compliance by the contractor with the performance targets or milestones – both physical and financial – set out in the contract.

Recommends revocation, cancellation or termination of the contract in case of force majeure such as war, rebellion, major calamities or extraordinary economic upheaval or in case of failure of the office to provide the required right–of–way and other facilities which the Government is obliged to provide under the project or major revisions therein which substantially affect the original design and feasibility of the project.

CERTIFIED TRUE COPY

Marie Grace O. Melocoton

MARIE GRACE O. MELOCOTON
HUMAN RESOURCE MGT. OFFICER II

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APPENDICES TO CHAPTER 9

Appendix A9-1
PREQUALIFICATION OF PROPOSED BIDDERS

Appendix A9-1
MANILA SOUTH TOLLWAY PROJECT
PREQUALIFICATION OF PROPOSED BIDDERS

1. BACKGROUND

Metro Manila, also known as the National Capital Region (NCR) is comprised of four cities (Manila, Caloocan, Pasay, & Quezon) and thirteen municipalities (Las Piñas, Makati, Malabon, Mandaluyong, Marikina, Muntinlupa, Navotas, Parañaque, Pasig, Pateros, San Juan del Monte, Taguig, & Valenzuela). Based on projections issued by the National Statistics and Census Office, the permanent population of Metro Manila was estimated at 7.9 million in 1990. Growth rate from 1980 to 1990 was more than 30%. Population density is estimated at 12,400 persons per sq km.

Data from the Land Transportation Office indicates for 1990 a total of 588,238 vehicles registered in the NCR (43% of all vehicles registered in the Philippines). Total road length in the Region is 4,912 km of which 720 km (15%) is classified as National Roads. The remaining roads are municipal, city or private. Vehicle density is 817 vehicles per km of National (or primary) Roads.

Two existing expressways (North Luzon and South Luzon) are the primary links connecting Metro Manila with two of the most economically developed regions in the country (Region III Central Luzon in the North and Region IV Southern Tagalog in the South). These expressways also serve as the gateways to Regions I and II (Ilocos and Cagayan Valley) in the North and Region V (Bicol) in the South. The North Luzon Expressway (NLE) has a length of 90 km to Mabalacat Pampanga and the South Luzon Expressway (SLE) has a length of 42 km to Calamba, Laguna.

The development of an expressway to interlink the North and South Luzon Expressways is intended to address the need to improve the transportation network in Metro Manila. With this objective, the Department of Public Works and Highways has determined that a **MANILA SOUTH TOLLWAY** would be able to generate sufficient private sector interest as a Build Operate and Transfer (BOT) Project.

The **MANILA SOUTH TOLLWAY PROJECT** (the "PROJECT") consists of two components: 1) the construction of the Manila South Tollway and 2) the rehabilitation, operation and maintenance of the South Luzon Expressway (SLE) between Magallanes Interchange and Alabang. Both these components will operate as a Build-Operate and Transfer (BOT) Scheme and as a single system under one concession agreement contractor.

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The Manila South Tollway is envisioned as a six-lane elevated viaduct structure following the alignment of the existing South Luzon Expressway (SLE) corridor. It starts at President Quirino Avenue in the North and ends at Alabang in the South. Between President Quirino Avenue and Bicutan, the Manila South Tollway runs as a single elevated roadway structure over the Philippine National Railways (PNR), diverting slightly eastward for about 1 km to the general alignment of the East Service Road where it drops to ground level to meet the vertical clearance requirements imposed by the runway of the Ninoy Aquino International Airport (NAIA). At Bicutan, the Manila South Tollway no longer follows the alignment of the PNR but bifurcates into two separate elevated roadway structures over the SLE and East Service Road and terminates at Alabang.

Over the PNR, the Manila South Tollway is designed to have a minimum vertical clearance of 6.365 m and a horizontal clearance of at least 1.57 m from the centerline of each track. Over the SLE, the minimum vertical clearance is 6.88 m.

The length between President Quirino Avenue and Alabang is about 19 km. Interchanges and ramp connections have a total length of about 15 km. The total width of the cross section is 27.3 m for six lanes. This includes 3.5 m lane width, the 3 m median, the 1.2 m shoulders and New Jersey barriers along the sides of the expressway. The interchange ramps vary from one to three lanes. A three lane interchange ramp is 13.8 m wide.

The **MANILA SOUTH TOLLWAY PROJECT** will therefore include:

- Construction of about 18 km of a six-lane elevated roadway which is supported by column piers.

- Construction of about 1 km of six-lane expressway at grade. This is required to meet NAIA clearance requirements and to accommodate Circumferential Road C-5 whose construction is planned for completion by 1994.

- Construction of interchanges and ramps for 7 (seven) interchanges:

  (i) President Quirino Avenue
  (ii) Vito Cruz
  (iii) Pasay Road
  (iv) Magallanes (EDSA)
  (v) Bicutan (Doña Soledad Avenue)
  (vi) Sucat (Sucat-Parañaque Road)
  (vii) Alabang (Alabang-Zapote Road)

  Modifications to the existing Magallanes interchange will have to be considered including widening ramps off EDSA and the SLE and the creation of new elevated loop ramps to connect the Manila South Tollway and the SLE or to carry through traffic.

- A barrier toll plaza (or toll gate) would be located along the Manila South Tollway at ground level near Nichols toll plaza on the SLE.

- As noted, improvements to the SLE are also being considered between the Magallanes Interchange and Alabang whose length is approximately 14.4 km. The scope of the rehabilitation work needed includes correction of road elevations, improvements to the drainage system, repair of damaged pavements and shoulders and overlaying the entire road with asphalt concrete, reinstallation of security fencing, and provision of new toll collection facilities.

The following definitions apply throughout the remainder of this document.

2. DEFINITIONS

- "BIDDER"

  Any entity (Corporation, Sole Proprietorship, Partnership, Joint Venture) or other form of Ownership structure which is qualified (under the terms of BOT Law and its IRR) by the Prequalification, Bids and Awards Committee (PBAC) of the Department (DPWH) to submit a Bid for the Project.

- "BOT LAW"

  Republic Act No. 6957 "An Act authorizing the financing, construction, operation and maintenance of infrastructure projects by the private sector and for other purposes" .

- "CONTRACTOR"

  The successful "Bidder". The entity that will sign the contract or concession agreement with the Government of the Philippines.

- "CONSTRUCTOR"

  The entity (or entities) responsible for the construction phase of the Project. The Constructor may be the Contractor or may be a separate entity (or entities) performing the Design and/or Construction work under the terms of contractual arrangement(s) with the Contractor.

- "DEPARTMENT" or "DPWH"

  The Department of Public Works and Highways of the Government of the Philippines.

- "DESIGNER"

  The entity (or entities) responsible for the design of the Project and its component parts including the production of the detailed technical specifications and the working drawings. The DESIGNER may be the CONTRACTOR or may be a separate entity (or entities) working under the terms of contractual arrangement(s) with the Contractor.

- "FINANCIER"

  The entity (or entities) that will provide debt financing to the Contractor for the purpose of the Project.

- "IRR"

  The Implementing Rules and Regulations issued pursuant to the BOT Law and duly approved for implementation on April 3, 1991.

- "OPERATOR"

  The entity (or entities) that will be responsible for the Operation, Management and Maintenance of the completed facility. It may be the **CONTRACTOR** or it may be separate entity (or entities) performing the operational, management and maintenance functions under the terms of contractual arrangement(s) with the **CONTRACTOR.**

- "PARTICIPANT"

  An entity that will participate in the Project under the terms of an agreement or contract between the Bidder (or Proposed Bidder) and the entity. Participants can generally be classified as participating as "Financier", "Designer", "Constructor", "Sub-constructor", or "Operator".

- "PBAC"

  "PREQUALIFICATION,BIDS AND AWARDS COMMITTEE" (PBAC)

  In accordance with Section 7 of the IRR, the Prequalification, Bids and Awards Committee shall be formed by the Secretary of the DPWH and shall have the following minimum composition:

  (i) a second ranking officer of the DPWH.....Chairman
  (ii) a Legal officer.....Member/Sec.
  (iii) a Technical Officer.....Member

(iv) a Financial Officer.....Member
(v) Two representatives of the facility users and/or the contracting sector.....Observers

- "PROJECT"

  The financing, construction, operation and maintenance of the MANILA SOUTH TOLLWAY and the rehabilitation, operation and maintenance of the SOUTH LUZON EXPRESSWAY between Magallanes Interchange and Alabang.

- "PROPOSED BIDDER"

  An entity of any ownership structure (Corporation, Sole Proprietorship, Partnership, Joint Venture or Other) which is applying for Prequalification to bid the Project under the terms of RA No. 6957, its IRR, and this document.

- "SUB-CONSTRUCTOR"

  Any entity (or entities) of any tier working under a contract agreement(s) with the Constructor(s).

3. REQUEST FOR PREQUALIFICATION OF PROPOSED BIDDERS

The Department of Public Works and Highways (DPWH) intends to request bids for the financing, construction, operation and maintenance of the **MANILA SOUTH TOLLWAY PROJECT** as a BOT scheme in accordance with Republic Act No. 6957 and the Implementing Rules and Regulations thereof ("AN ACT AUTHORIZING THE FINANCING, CONSTRUCTION, OPERATION AND MAINTENANCE OF INFRASTRUCTURE PROJECTS BY THE PRIVATE SECTOR, AND FOR OTHER PURPOSES" otherwise known as the "BOT LAW") and is now requesting interested PROPOSED BIDDERS to prequalify in accordance with the requirements of RA No. 6957.

Bids will only be received from BIDDERS that have been PREQUALIFIED in accordance with RA No. 6957 and the Implementing Rules and Regulations for RA No. 6957 as issued April 3, 1991. In order to be considered for PREQUALIFICATION, interested PROPOSED BIDDERS are invited to submit their prequalification data in accordance with the following guidelines. PROPOSED BIDDERS are reminded that they may qualify on the basis of the PROPOSED BIDDER'S qualifications alone or on the basis of the individual participants proposed to provide the services necessary to complete the Contract. Prequalification data is required from **EACH** of the proposed participants or entities.

Prequalification data is to be submitted in three copies in a sealed opaque envelope addressed to:

Office of the Secretary
Department of Public Works and Highways
Bonifacio Drive, Port Area Manila

Prequalification data should be submitted under the following headings and in the format and detail prescribed in the following paragraphs and the Annexes to this document. Failure to follow the form and content of these guidelines may result in rejection of the prequalification application.

4. ORGANIZATION OF PREQUALIFICATION DATA

ORGANIZATION OF PRE-QUALIFICATION DATA

SECTION 1.0	**LEGAL REQUIREMENTS**	
1.1	OWNERSHIP	Annex 1 and 2
1.2	JOINT VENTURE AGREEMENTS	
SECTION 2.0	**EXPERIENCE**	
2.1	FINANCIAL	Annex 3
2.2	DESIGN	Annex 4
2.3	CONSTRUCTION	Annex 5
2.4	OPERATIONS & MAINTENANCE	Annex 6
SECTION 3.0	**CAPABILITY**	
3.1	ORGANIZATION CAPABILITY	
	(i) Summary of Key Personnel	Annex 7
	(ii) Key Personnel Bio-Data	Annex 8
3.2	EQUIPMENT AND PLANT	Annex 9
3.3	FINANCIAL CAPABILITY	
SECTION 4.0	**OTHER CONSIDERATIONS**	

ORGANIZATION OF PRE-QUALIFICATION DATA

CHECKLIST OF DATA TO BE SUBMITTED

1.	Corporate ownership information:	Annex 1
	(i) Articles of Incorporation	
	(ii) By laws	
	(iii) List of officers	
	(iv) List of directors	
	(v) List of persons controlling more than 3% of stock	
	(vi) If foreign based, certification of accreditation	
	(vii) Copies of membership in Contractor's organizations	
2.	Partnership Ownership information	Annex 2
3.	For Joint Ventures, outline of scope of each member of the Joint Venture	
4.	Joint Venture Agreement	
5.	Financial Experience Statement	Annex 3
6.	Design Experience Statement	Annex 4
7.	Construction Experience Statement	Annex 5
8.	Operations and Maintenance Experience Statement	Annex 6
9.	Organization Chart	
	3.1 Brief narrative description of Organization	
	3.2 Job Descriptions for Key Positions	
10.	Summary of Key Personnel	Annex 7
11.	Key Personnel Bio-Data	Annex 8
12.	List of equipment and plant that will be available for the execution of the project	Annex 9
13.	Financial Statement for last five fiscal years	
14.	Statements from financial institutions establishing credit lines	
15.	List of source of funds for initial operations	

Each envelope must be clearly marked:

"PREQUALIFICATION DATA
MANILA SOUTH TOLLWAY PROJECT

SUBMITTED BY:_____"

Prequalification data must be received by the Office of the Secretary of DPWH not later than 3:00 P.M. _____199_.

Incomplete data or data submitted in a format not complying with the above headings, format defined in the annexes to this document, and the following explanations will NOT be considered.

The following is intended to explain and clarify the requirements of each section of the prequalification requirements.

SECTION 1.0 LEGAL REQUIREMENTS

1.1 Ownership

The PROPOSED BIDDER shall provide full details of the Ownership Structure of each of the participants. In the case of Corporations, copies of the incorporation documents and bylaws shall be provided.

For Joint Ventures, Partnerships or other Ownership Structures, all pertinent documents such as the Joint Venture Agreement In draft or final form) or Partnership Agreement shall be provided.

Ownership information is to be submitted in the format required by ANNEXES 1 and 2 to this document.

All entities owning or controlling more than three per cent of the individual components shall be listed.

The **CONTRACTOR** may be a Filipino and/or foreign owned entity.

If Filipino, the **CONTRACTOR** must be duly registered by the Security Exchange Commission (SEC) for the purposes of undertaking component activities of BOT projects.

If foreign owned, the **CONTRACTOR** must be duly accredited by its government to undertake component activities of BOT projects and be certified as such by its embassy in the Philippines, or by the Philippine Consular Office located in the **CONTRACTOR'S** domicile/head office location.

1.2 Joint Venture Agreements

In the case of Joint Ventures, each participant in the venture must comply with the data required and the participants shall submit a written commitment that, if awarded the contract, they shall immediately formalize their joint venture agreement which shall jointly and severally make them responsible for the obligations of the **CONTRACTOR** under the contract. This shall apply to all joint ventures whether presented as **CONTRACTOR** or as **FINANCIER** or as **CONSTRUCTOR** or as **OPERATOR.** Copies of all Joint Venture Agreements will be required to be submitted to the DPWH as a condition precedent for the issuance of a "Notice to Proceed" to the successful BIDDER.

SECTION 2.0 EXPERIENCE

PROPOSED BIDDERS must possess adequate experience in organizing, managing, constructing, and operating projects of similar type and size. Such experience can be demonstrated either through the PROPOSED BIDDER itself or through the individual participants of joint ventures whether presented as CONTRACTOR or FINANCIER or DESIGNER or CONSTRUCTOR (or sub-constructors) or OPERATOR.

Experience must be demonstrated in terms of the following:

2.1 FINANCIAL.....(FINANCIER).....ANNEX 3
2.2 DESIGN.....(DESIGNER).....ANNEX 4
2.3 CONSTRUCTION.....(CONSTRUCTOR).....ANNEX 5
2.4 OPERATIONS AND MAINTENANCE.....(OPERATOR).....ANNEX 6

PROPOSED BIDDERS must have successfully undertaken a project(s) similar in nature to the Manila South Tollway and of a capital cost equal (in terms of present value) to at least US $ 200,000,000 (US dollars two hundred million). Experience shall be demonstrated by supplying the following minimal information for **EACH** project.

Owner:

Individuals in the Owner's organization used as references must have held a position of responsibility for Project Management during the period of Project execution. (include individual references and current contact addresses, phone numbers and facsimile numbers).

PROPOSED BIDDERS should note that it is the intent of the DPWH to contact each and every reference for the purpose of determining the PROPOSED BIDDER'S past performance particularly with regard to the ability to achieve cost and schedule objectives.

Project Description:

A brief technical description of the Project including total cost, location and any other pertinent information to assist the evaluators in assessing the validity of the firm's experience. In assessing the PROPOSED BIDDER"S qualification to bid this Project, greater weight will be given to Projects started or completed within the last 60 months.

Contractor's (or participant's) Scope:

A complete description of the firm's contract responsibility to the Owner. Specifically, the contract responsibility should be defined under the headings of: financing, design, construction, operation, and maintenance in the format required by the appropriate Annexes. PROPOSED BIDDERS should clearly define their specific role (whether prime contractor, constructor, sub-contractor, sub-constructor, etc) and their actual participation in terms of per cent of the total project.

Project Status:

The current status of the Project should be described along with the schedule for completion of uncompleted phases of the Project.

SECTION 3.0 CAPABILITY

The organization of the PROPOSED BIDDER should be included in the form of an organization chart clearly showing the relationship between the Contractor, the Financier, the Constructor and the Operator and the key personnel positions for each.

3.1 Organizational Capability

The PROPOSED BIDDER should include a complete description of his operational (or proposed) organization under the headings:

- Financial
- Design,(including detail engineering)
- Construction, (including Quality Control & Quality Assurance)
- Operations (including maintenance), and
- Support Departments (accounting/finance, purchasing, administration, personnel, etc.)

The description should include an organization chart with a brief job description for key positions such as department or unit heads along with the classified listing of personnel (clerks, engineers, etc.)

A summary listing of all Management, Technical, and Supervisory personnel shall be submitted in the format prescribed by ANNEX 7.

Summarized bio-data of each person proposed for a key position on the organization chart should be included. Bio-data should be submitted in the format prescribed by ANNEX 8 and include but not be limited to:

- Position or Title proposed
- Name
- Nationality
- Education
- Current Position
- Specific Positions demonstrating experience directly relative to the proposed position on this PROJECT.
- Chronological listing of previously held positions including employer and brief description of responsibilities and duties.
- Any other pertinent information relative to the proposed assignment.

3.2 Equipment and Plant

The PROPOSED BIDDER should submit a complete listing of the equipment and plant that will be available for the execution of the PROJECT. The listing shall be separated into two sections "Presently Owned" and "Leased" and each section shall identify construction equipment and operation and maintenance equipment. Data shall be submitted in the format prescribed by ANNEX 9.

3.3 Financing Capability

The PROPOSED BIDDER should submit the following documents:

- Financial Statements for the last five fiscal years. These statements should clearly show the contractor's net worth and debt position. The PROPOSED BIDDER 's net worth must be at least equal to US $ 60,000,000 (US DOLLARS sixty million).

- A statement from a reputable financial institution committing to extend a credit line(s) to it in an amount equal to

A listing of sources of other funds to sustain the initial operating expenses of the completed facility.

SECTION 4.0 OTHER CONSIDERATIONS

PROPOSED BIDDERS should include any additional factors or information that they wish to be considered by the PBAC committee.

5. EVALUATION CRITERIA FOR PREQUALIFICATION OF PROPOSED BIDDERS

Minimum points required in each category of evaluation to be considered as a Qualified Bidder:

5.1	**Ownership**		1 point
5.2	**Experience**		
	5.2.1 Financial		1 point
	5.2.2 Design		3 points
	5.2.3 Construction		3 points
	5.2.4 Operations		2 points
	5.2.5 Maintenance		2 points
5.3	**Capability**		
	5.3.1 Organization		
	5.3.1.1	Organization Chart	1 point
	5.3.1.2	Key Personnel	2 points
	5.3.2 Equipment		1 point
	5.3.3 Financial		
	5.3.3.1	Net worth	1 point
	5.3.3.2	Credit line	1 point
	5.3.3.3	Other funds	1 point

Proposed Bidders that do not meet the minimum point requirements detailed above will NOT be accepted as qualified Bidders.

DETAILS OF POINT ASSIGNMENTS

5.1	Ownership	
	Existing entity (Corporation, Joint Venture, Partnership or other form of ownership) with more than 90% (ninety percent) Filipino Ownership.	5 points
	Existing entity (Corporation, Joint Venture, Partnership or other form of ownership) with more than 60% but less than 90% Filipino Ownership.	3 points
	Existing entity (Corporation, Joint Venture, Partnership or other form of ownership) with less than 60% (sixty percent) Filipino Ownership.	0 points
	Proposed entity (Corporation, Joint Venture, Partnership or other form of ownership) with more than 90% (ninety percent)Filipino Ownership.	3 points
	Proposed entity (Corporation, Joint Venture, Partnership or other form of ownership) with more than 60% but less than 90% Filipino Ownership.	1 point
	Proposed entity (Corporation, Joint Venture, Partnership or other form of ownership) less than 60% (sixty percent) Filipino Ownership.	0 points

5.2 Experience

Experience (or "track record") will be evaluated in five separate areas; Financial, Design, Construction, Operations, and Maintenance.

Individual experience of component entities of the Proposed Bidder will be considered in aggregate to determine the overall rating of the Proposed Bidder. For purposes of evaluating the proposed bidders experience level, any particular contract used to demonstrate experience can only be counted once in any one category.

5.2.1 Financial

Direct equity participation in a Build Operate and Transfer Scheme where the participation was more than US$ 400 million.	5 points
Direct equity participation in a Build Operate and Transfer Scheme where the participation was more than US$ 300 million but less than US$ 400 million.	4 points
Direct equity participation in a Build Operate and Transfer Scheme where the participation was more than US$ 200 million but less than US$ 300 million.	3 points
Direct equity participation in a Build Operate and Transfer Scheme where the participation was more than US$ 20 million but less than US$ 200 million.	2 points
Direct equity participation in a Build Operate and Transfer Scheme where the participation was less than US$ 20 million.	1 point

5.2.2 Design

Design responsibility for multi-lane highways constructed after August 1987 and whose constructed cost is more than US$ 400 million. Responsibility must include bridges, interchanges and pavement designs to be included as a valid experience under this heading. 5 points

If responsibility does not include bridges or interchanges or pavement, then point allocation to be reduced by 2 points for each category missing.

Design responsibility for multi-lane highways constructed after August 1987 and whose constructed value is more than US$ 300 million and less than US$ 400 Million. Responsibility must include bridges, interchanges and pavement designs to be included as a valid experience under this heading. 4 points

If responsibility does not include bridges or interchanges or pavement, then point allocation to be reduced by 2 points for each category missing.

Design responsibility for multi-lane highways constructed after August 1987 and whose constructed value is more than US$ 150 million and less than US$ 300 Million. Responsibility must include bridges, interchanges and pavement designs to be included as a valid experience under this heading. 3 points

If responsibility does not include bridges or interchanges or pavement, then point allocation to be reduced by 2 points for each category missing.

Design responsibility for multi-lane highways where construction was started prior to August 1987 but after Jan 1972 and whose constructed value was more than US$ 150 million. Responsibility must include bridges, interchanges and pavement designs to be included as a valid experience under this heading. 1 point

5.2.3 Construction

Construction contracts for multi-lane expressway type highways including structures and pavements where total value of contract exceeds US$ 400 million and construction has been started after August 1987.	5 points
Construction contracts for multi-lane expressway type highways including structures and pavements where total value of contract exceeds US$ 200 million but does not exceed US$ 400 million and construction has been started after August 1987.	4 points
Construction contracts for multi-lane expressway type highways including structures and pavements where total value of contract exceeds US$ 400 million and construction has been started prior to August 1987 but after January 1972.	3 points
Construction contracts for multi-lane expressway type highways including structures and pavements where total value of contract exceeds US$ 200 million but does not exceed US$ 400 million and construction has been started prior to August 1987 but after January 1972.	1 point

5.2.4 Operations

Existing contracts or agreements to operate expressways (toll roads multi-lane high speed) where length of road exceeds 50 km.	5 points
Existing contracts or agreements to operate expressways (toll roads multi-lane high speed) where length of road exceeds 20 km but does not exceed 50 km.	4 points
Completed contracts or agreements to operate expressways (toll roads multi-lane high speed) where length of road exceeded 20 km.	2 points

5.2.5 Maintenance

Existing contracts or agreements to maintain expressways (toll roads multi-lane high speed) where length of road exceeds 50 km. 5 points

Existing contracts or agreements to maintain expressways (toll roads multi-lane high speed) where length of road exceeds 20 km but does not exceed 50 km. 4 points

Completed contracts or agreements to maintain expressways (toll roads multi-lane high speed) where length of road exceeded 20 km. 2 points

5.3 **Capability**

Capability will be evaluated in six areas: organization, key personnel, equipment, net worth, credit line, and other funds.

5.3.1 Organization

5.3.1.1 Organization Chart

Submittal of an organization chart showing clear relationships between all groups or departments including Management, Operations and Administrative (or support). 1 point

5.3.1.2 Key Personnel

Aggregate value of key personnel bio-data exceeds 60.	3 points
Aggregate value of bio-data of key personnel exceeds 40 but is less than 60.	2 points
Aggregate value of key personnel bio-data less than 40.	0 points

Basis for Evaluating Bio-Data of Key Personnel

Total years related experience	
(i) less than 10	0 points
(ii) 10 to 15	1 point
(iii) more than 15	2 point
Years experience specific to proposed position	
(i) less than 5	0 points
(ii) 5 to 10	3 points
(iii) more than 10	5 points
Education - University Degree	1 point
Registered Professional	1 point
Years with firm	
(i) less than 5	0 points
(ii) more than 5 less than 10	1 point
(iii) more than 10	2 points

5.3.2 Equipment

Available equipment for elevated roadway construction including pre-cast and other support facilities exceeds $ US 50 million in terms of present value.	2 points
Available equipment for elevated roadway construction including pre-cast and other support facilities exceeds $ US 20 million but does not exceed $US 50 million in terms of present value.	1 point

5.3.3 <u>Financial</u>

5.3.3.1. Net Worth

Contractor's net worth in excess of US$ 100 million as evidenced by audited financial statements.	3 points
Contractor's net worth in excess of US$ 70 million but less than US$ 100 million as evidenced by audited financial statements.	2 points
Contractor's net worth in excess of US$ 50 million but less than US$ 70 million as evidenced by audited financial statements.	1 point

5.3.3.2 Credit Line

Total credit line available more than US$ 100 million as evidenced by statements from acceptable financial institutions.	3 points
Total credit line available more than US$ 70 million but less than US$ 100 million as evidenced by statements from acceptable financial institutions.	2 points
Total credit line available more than US$ 50 million but less than US$ 70 million as evidenced by statements from acceptable financial institutions.	1 point

5.3.3.3 Other Funds

Satisfactory listing of other funds to sustain the initial operating expenses of the facility.	1 point

PREQUALIFICATION OF PROPOSED BIDDERS
LIST OF ANNEXES

Annex 1	Corporate Ownership Data
Annex 2	Partnership Ownership Data
Annex 3	Financial Experience Data
Annex 4	Design Experience Data
Annex 5	Construction Experience Data
Annex 6	Operation and Maintenance Experience Data
Annex 7	Summary of Key Personnel
Annex 8	Key Personnel Bio-Data
Annex 9	Equipment List

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Annex 1
MANILA SOUTH TOLLWAY PREQUALIFICATION OF PROPOSED BIDDERS CORPORATE OWNERSHIP DATA

The following data is to be submitted for each Corporation which is proposed to participate in the Project regardless of its level of involvement.

A.1.1 Full legal name.

A.1.2 Date and place of incorporation.

A.1.3 Judicial nationality.

A.1.4 Authorized capital.

A.1.5 Paid up capital.

A.1.6 Subscribed capital

A.1.7 Complete list of Officers including name, date of appointment, and term of office.

A.1.8 Directors including date of election to the Board, term elected for, and Board Position.

A.1.9 List of all judicial entities owning (or controlling through proxy, voting trust, power of attorney, or other instrument) more than three percent (3.0%) of the voting stock.

A.1.10 Certified true copies of the Articles of Incorporation and the By-Laws.

A.1.11 Proposed participation in Proposed bidder's organization (Contractor, Financier, Constructor, Operator, Sub-constructor or Other (specify).

Attached Documents:

- Articles of Incorporation
- By-laws
- If foreign based, certification or accreditation of home country government confirming the Corporation's accreditation to undertake the component activities of a BOT scheme. Such certification to be authenticated by the foreign embassy in the Philippines or by the Philippine Consular Office in the Head Office location.
- Other (specify)

Annex 2
MANILA SOUTH TOLLWAY PREQUALIFICATION OF PROPOSED BIDDERS PARTNERSHIP OWNERSHIP DATA

The following data is to be submitted for each Partnership which is proposed to participate in the Project regardless of its level of involvement.

A.2.1 Full legal name.

A.2.2 Date and place of formation of Partnership.

A.2.3 Form of Partnership.

A.2.4 Complete list of Partners.

A.2.5 Certified true copies of the Partnership Agreement.

Attached Documents

- Certified true copy of Partnership Agreement
- If foreign based, certification or accreditation of home country government confirming the Partnership's accreditation to undertake the component activities of a BOT scheme. Such certification to be authenticated by the foreign embassy in the Philippines or by the Philippine Consular Office in the Head Office location.
- Other (specify)

Annex 3

MANILA SOUTH TOLLWAY PRE-QUALIFICATION DATA EXPERIENCE STATEMENT

FINANCIAL EXPERIENCE DATA

PROPOSED BIDDER: _____

EXPERIENCE STATEMENT OF: _____
PROPOSED AS: _____

SECTION 3.1 - PROJECT DATA

PAGE ___ OF ___

NAME OF PROJECT:	PROJECT OWNER:
LOCATION OF PROJECT: CITY: STATE (PROVINCE): COUNTRY:	PROJECT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
PROJECT VALUE: (1992 US$)	PROJECT START DATE: FORECAST (ACTUAL) COMPLETION DATE: % COMPLETE AUGUST 1992:

SECTION 3.2 - CONTRACT OR PARTICIPATION DATA FOR THE ABOVE PROJECT: (USE ONE SHEET FOR EACH CONTRACT)

CONTRACT OWNER:	CONTRACT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
CONTRACT VALUE: (1992 US$)	CONTRACT START DATE: FORECAST COMPLETION DATE: % COMPLETE BY AUGUST 1992:
SCOPE OF SERVICES PROVIDED: (USE ADDITIONAL SHEETS IF NECESSARY)	

Annex 4
MANILA SOUTH TOLLWAY PRE-QUALIFICATION DATA EXPERIENCE STATEMENT

DESIGN EXPERIENCE DATA

PROPOSED BIDDER: _____

EXPERIENCE STATEMENT OF: _____
PROPOSED AS: _____

SECTION 4.1 - PROJECT DATA

PAGE ___ OF ___

NAME OF PROJECT:	PROJECT OWNER:
LOCATION OF PROJECT: CITY: STATE (PROVINCE): COUNTRY:	PROJECT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
PROJECT VALUE: (1992 US$)	PROJECT START DATE: FORECAST (ACTUAL) COMPLETION DATE: % COMPLETE AUGUST 1992:

SECTION 4.2 - CONTRACT OR PARTICIPATION DATA FOR THE ABOVE PROJECT: (USE ONE SHEET FOR EACH CONTRACT)

CONTRACT OWNER:	CONTRACT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
CONTRACT VALUE: (1992 US$)	CONTRACT START DATE: FORECAST COMPLETION DATE: % COMPLETE BY AUGUST 1992:
SCOPE OF SERVICES PROVIDED: (USE ADDITIONAL SHEETS IF NECESSARY)	

Annex 5
MANILA SOUTH TOLLWAY PRE-QUALIFICATION DATA EXPERIENCE STATEMENT

CONSTRUCTION EXPERIENCE DATA

PROPOSED BIDDER: _____

EXPERIENCE STATEMENT OF: _____
PROPOSED AS: _____

SECTION 5.1 - PROJECT DATA

PAGE ___ OF ___

NAME OF PROJECT:	PROJECT OWNER:
LOCATION OF PROJECT: CITY: STATE (PROVINCE): COUNTRY:	PROJECT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
PROJECT VALUE: (1992 US$)	PROJECT START DATE: FORECAST (ACTUAL) COMPLETION DATE: % COMPLETE AUGUST 1992:

SECTION 5.2 - CONTRACT OR PARTICIPATION DATA FOR THE ABOVE PROJECT: (USE ONE SHEET FOR EACH CONTRACT)

CONTRACT OWNER:	CONTRACT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
CONTRACT VALUE: (1992 US$)	CONTRACT START DATE: FORECAST COMPLETION DATE: % COMPLETE BY AUGUST 1992:

SCOPE OF SERVICES PROVIDED:

(USE ADDITIONAL SHEETS IF NECESSARY)

Annex 6
MANILA SOUTH TOLLWAY PRE-QUALIFICATION DATA EXPERIENCE STATEMENT

OPERATIONS AND MAINTENANCE EXPERIENCE DATA

PROPOSED BIDDER: _____

EXPERIENCE STATEMENT OF: _____
PROPOSED AS: _____

SECTION 6.1 - PROJECT DATA

PAGE ___ OF ___

NAME OF PROJECT:	PROJECT OWNER:
LOCATION OF PROJECT: CITY: STATE (PROVINCE): COUNTRY:	PROJECT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
PROJECT VALUE: (1992 US$)	PROJECT START DATE: FORECAST (ACTUAL) COMPLETION DATE: % COMPLETE AUGUST 1992:

SECTION 6.2 - CONTRACT OR PARTICIPATION DATA FOR THE ABOVE PROJECT: (USE ONE SHEET FOR EACH CONTRACT)

CONTRACT OWNER:	CONTRACT OWNER REPRESENTATIVE: NAME: POSITION: ADDRESS: TELEPHONE: FAX:
CONTRACT VALUE: (1992 US$)	CONTRACT START DATE: FORECAST COMPLETION DATE: % COMPLETE BY AUGUST 1992:
SCOPE OF SERVICES PROVIDED: (USE ADDITIONAL SHEETS IF NECESSARY)	

Annex 7

MANILA SOUTH TOLLWAY PRE-QUALIFICATION DATA EXPERIENCE STATEMENT

SUMMARY OF KEY PERSONNEL

POSITION	NAME	DEGREE	AGE	CURRENT POSITION	YEARS IN CURRENT POSITION	YEARS WITH FIRM	POSITION RELATED EXPERIENCE	TOTAL YEARS EXPERIENCE
MANAGEMENT								
TECHNICAL								
SUPERVISORY								

Annex 8
MANILA SOUTH TOLLWAY PRE-QUALIFICATION DATA EXPERIENCE STATEMENT

KEY PERSONNEL BIO-DATA

PROPOSED POSITION:	BIRTHDATE: AGE: CITIZENSHIP:
NAME:	EDUCATION:
CURRENT POSITION: COMPANY: ADDRESS: JOB TITLE: TIME IN JOB: ____ YEARS ____ MONTHS TIME IN COMPANY: ____ YEARS ____ MONTHS	SPECIAL TRAINING: SPECIAL QUALIFICATIONS/SKILLS:

PREVIOUSLY HELD POSITIONS DIRECTLY RELATED TO PROPOSED POSITION.

FROM: _____ TO _____ _____ YEARS _____ MONTHS

PROJECT: _____ EMPLOYER: _____

POSITION: _____

SUMMARY OF DUTIES & RESPONSIBILITIES:

(USE ADDITIONAL SHEETS IF NECESSARY

Annex 9

MANILA SOUTH TOLLWAY PRE-QUALIFICATION DATA

EQUIPMENT LIST

UNIT	UNIT DESCRIPTION	MAKE	MODEL	CAPACITY	CURRENT LOCATION	AGE	CURRENT VALUE	OWNER

Appendix A9-2

INVITATION TO BID INCLUDING INSTRUCTIONS TO BIDDERS

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Appendix A9-2
MANILA SOUTH TOLLWAY PROJECT
INVITATION TO BID
INCLUDING INSTRUCTIONS TO BIDDERS

1. BACKGROUND

Metro Manila, also known as the National Capital Region (NCR) is comprised of four cities (Manila, Caloocan, Pasay, & Quezon) and thirteen municipalities (Las Piñas, Makati, Malabon, Mandaluyong, Marikina, Muntinlupa, Navotas, Parañaque, Pasig, Pateros, San Juan del Monte, Taguig, & Valenzuela). Based on projections issued by the National Statistics and Census Office, the permanent population of Metro Manila was estimated at 7.9 million in 1990. Growth rate from 1980 to 1990 was more than 30%. Population density is estimated at 12,400 persons per sq km.

Data from the Land Transportation Office indicates for 1990 a total of 588,238 vehicles registered in the NCR (43% of all vehicles registered in the Philippines). Total road length in the Region is 4,912 km of which 720 km (15%) is classified as National Roads. The remaining roads are municipal, city or private. Vehicle density is 817 vehicles per km of National (or primary) Roads.

Two existing expressways (North Luzon and South Luzon) are the primary links connecting Metro Manila with two of the most economically developed regions in the country (Region III Central Luzon in the North and Region IV Southern Tagalog in the South). These expressways also serve as the gateways to Regions I and II (Ilocos and Cagayan Valley) in the North and Region V (Bicol) in the South. The North Luzon Expressway (NLE) has a length of 90 km to Mabalacat Pampanga and the South Luzon Expressway (SLE) has a length of 42 km to Calamba, Laguna.

The development of an expressway to interlink the North and South Luzon Expressways is intended to address the need to improve the transportation network in Metro Manila. With this objective, the Department of Public Works and Highways has determined that a **MANILA SOUTH TOLLWAY** would be able to generate sufficient private sector interest as a Build Operate and Transfer (BOT) Project.

The **MANILA SOUTH TOLLWAY PROJECT** (the "PROJECT") consists of two components: 1) the construction of the Manila South Tollway and 2) the rehabilitation, operation and maintenance of the South Luzon Expressway (SLE) between Magallanes Interchange and Alabang. Both these components will operate as a Build-Operate and Transfer (BOT) Scheme and as a single system under one concession agreement contractor.

The Manila South Tollway is envisioned as a six-lane elevated viaduct structure following the alignment of the existing South Luzon Expressway (SLE) corridor. It starts at President Quirino Avenue in the North and ends at Alabang in the South. Between President Quirino Avenue and Bicutan, the Manila South Tollway runs as a single elevated roadway structure over the Philippine National Railways (PNR), diverting slightly eastward for about 1 km to the general alignment of the East Service Road where it drops to ground level to meet the vertical clearance requirements imposed by the runway of the Ninoy Aquino International Airport (NAIA). At Bicutan, the Manila South Tollway no longer follows the alignment of the PNR but bifurcates into two separate elevated roadway structures over the SLE and East Service Road and terminates at Alabang.

Over the PNR, the Manila South Tollway is designed to have a minimum vertical clearance of 6.365 m and a horizontal clearance of at least 1.57 m from the centerline of each track. Over the SLE, the minimum vertical clearance is 6.88 m.

The length between President Quirino Avenue and Alabang is about 19 km. Interchanges and ramp connections have a total length of about 15 km. The total width of the cross section is 27.3 m for six lanes. This includes 3.5 m lane width, the 3 m median, the 1.2 m shoulders and New Jersey barriers along the sides of the expressway. The interchange ramps vary from one to three lanes. A three lane interchange ramp is 13.8 m wide.

The **MANILA SOUTH TOLLWAY PROJECT** will therefore include:

- Construction of about 18 km of a six-lane elevated roadway which is supported by column piers.

- Construction of about 1 km of six-lane expressway at grade. This is required to meet NAIA clearance requirements and to accommodate Circumferential Road C-5 whose construction is planned for completion by 1994.

- Construction of interchanges and ramps for 7 (seven) interchanges:

  (i) President Quirino Avenue
  (ii) Vito Cruz
  (iii) Pasay Road
  (iv) Magallanes (EDSA)
  (v) Bicutan (Doña Soledad Avenue)
  (vi) Sucat (Sucat-Parañaque Road)
  (vii) Alabang (Alabang-Zapote Road)

  Modifications to the existing Magallanes interchange will have to be considered including widening ramps off EDSA and the SLE and the creation of new elevated loop ramps to connect the Manila South Tollway and the SLE or to carry through traffic.

- A barrier toll plaza (or toll gate) would be located along the Manila South Tollway at ground level near Nichols toll plaza on the SLE.

- As noted, improvements to the SLE are also being considered between the Magallanes Interchange and Alabang whose length is approximately 14.4 km. The scope of the rehabilitation work needed includes correction of road elevations, improvements to the drainage system, repair of damaged pavements and shoulders and overlaying the entire road with asphalt concrete, reinstallation of security fencing, and provision of new toll collection facilities.

The following definitions apply throughout the remainder of this document.

2. DEFINITIONS

- "BIDDER"

  Any entity (Corporation, Sole Proprietorship, Partnership, Joint Venture) or other form of Ownership structure which is qualified (under the terms of BOT Law and its IRR) by the Prequalification, Bids and Awards Committee (PBAC) of the Department (DPWH) to submit a Bid for the Project.

- "BOT LAW"

  Republic Act No. 6957 "An Act authorizing the financing, construction, operation and maintenance of infrastructure projects by the private sector and for other purposes" .

- "CONTRACTOR"

  The successful "Bidder". The entity that will sign the contract or concession arrangement(s) with the Government of the Philippines.

- "CONSTRUCTOR"

  The entity (or entities) responsible for the construction phase of the Project. The Constructor may be the Contractor or may be a separate entity (or entities) performing the Design and/or Construction work under the terms of contractual arrangement(s) with the Contractor.

- "DEPARTMENT" or "DPWH"

  The Department of Public Works and Highways of the Government of the Philippines.

- "DESIGNER"

  The entity (or entities) responsible for the design of the Project and its component parts including the production of the detailed technical specifications and the working drawings. The DESIGNER may be the CONTRACTOR or may be a separate entity (or entities) working under the terms of contractual arrangement(s) with the Contractor.

- "FINANCIER"

  The entity (or entities) that will provide debt financing to the Contractor for the purpose of the Project.

- "IRR"

  The Implementing Rules and Regulations issued pursuant to the BOT Law and duly approved for implementation on April 3, 1991.

- "OPERATOR"

  The entity (or entities) that will be responsible for the Operation, Management and Maintenance of the completed facility. It may be the **CONTRACTOR** or it may be separate entity (or entities) performing the operational, management and maintenance functions under the terms of contractual arrangement(s) with the **CONTRACTOR**.

- "PARTICIPANT"

  An entity that will participate in the Project under the terms of an agreement or contract between the Bidder (or Proposed Bidder) and the entity. Participants can generally be classified as participating as "Financier", "Designer", "Constructor", "Sub-constructor", or "Operator".

- "PBAC"

  "PREQUALIFICATION,BIDS AND AWARDS COMMITTEE" (PBAC)

  In accordance with Section 7 of the IRR, the Prequalification, Bids and Awards Committee shall be formed by the Secretary of the DPWH and shall have the following minimum composition:

  (i) a second ranking officer of the DPWH.....Chairman
  (ii) a Legal officer.....Member/Sec.
  (iii) a Technical Officer.....Member

(iv) a Financial Officer.....Member
(v) Two representatives of the facility users and/or the contracting sector.....Observers

- "PROJECT"

  The financing, construction, operation and maintenance of the MANILA SOUTH TOLLWAY and the rehabilitation, operation and maintenance of the SOUTH LUZON EXPRESSWAY between Magallanes Interchange and Alabang.

- "PROPOSED BIDDER"

  An entity of any ownership structure (Corporation, Sole Proprietorship, Partnership, Joint Venture or Other) which is applying for Prequalification to bid the Project under the terms of RA No. 6957, its IRR, and this document.

- "SUB-CONSTRUCTOR"

  Any entity (or entities) of any tier working under a contract agreement(s) with the Constructor(s).

3. PROJECT PHILOSOPHY

The Government of the Philippines through its Department of Public Works and Highways ("the Department" or "DPWH") in accordance with RA No. 6957 (AN ACT AUTHORIZING THE FINANCING, CONSTRUCTION, OPERATION AND MAINTENANCE OF INFRASTRUCTURE PROJECTS BY THE PRIVATE SECTOR, AND FOR OTHER PURPOSES) and its Implementing Rules and Regulations ("IRR") intends to enter into a contract to Build, Operate and Transfer (BOT) the Manila South Tollway (MST) and rehabilitate, operate and maintain the South Luzon Expressway (SLE) referred to as the **MANILA SOUTH TOLLWAY PROJECT** in accordance with the following project philosophy:

- The Bidder will acquire and interpret sufficient site data to enable design to take place to the standards specified in the technical section of these bid documents. Quality of design will be checked independently by the Independent Design Checker to be appointed by the DPWH with the approval of the Contractor. Costs of the Independent Design Checker are to be assumed by the Contractor.

- The cost of all information not provided as part of this bid document must be paid by the successful bidder.

- The cost of acquiring all the right-of-way and land (including necessary surveys) and the transfer and resettlement of all squatters on this land is borne by the Government of the Philippines. Ownership of all such land will remain with the Government of the Philippines.

- The cost of all construction activities including public utility and road alterations and ancillary works must be met by the successful Bidder as a project cost.

- The costs of the services to be provided by the Independent Design Checker (IDC) and the Independent Certification Engineer (ICE) are to be met by the successful Bidder as a Project cost.

- Bidders are required to present a project that derives its financial viability with 100% input from the private sector and no financial input (including loan guarantees) from the Government of the Philippines.

- The tolls charged must not be of such a level as to increase the proportion of heavy vehicles using alternative routes. Indexation of tolls in accordance with predetermined economic indices will be allowed.

- Income recovered from toll collection by the successful bidder has to be clearly identified and the level of such income will be a risk borne solely by the Bidder.

- The successful Bidder will be responsible for the operation and maintenance of the Project for a long term period as proposed and agreed and will have a Quality Assurance responsibility to the DPWH during the operation and maintenance period.

- The length of the Operational period of the Project will be 35 years. Bidders are required to prepare all financial projections and calculation on this basis. DPWH will look favourably on any proposal to reduce this period and Bidder are encouraged to submit alternate proposals.

- At the conclusion of the agreed Operation and Maintenance period, the possession of the Project and all associated assets will revert to the Government of the Philippines.

4. GENERAL INSTRUCTIONS TO BIDDERS

The Government of the Philippines through its Department of Public Works and Highways hereby invites prequalified Bidders to submit their firm offers for the financing, design, construction, operation and maintenance of the **MANILA SOUTH TOLLWAY PROJECT**

including the rehabilitation, repair, operation and maintenance of the South Luzon Expressway between Nichols and Alabang in accordance with BOT Law and the Implementing Rules and Regulations for the Act.

Bids shall be prepared in accordance with the BOT Law, its IRR and these instructions and as set out in the accompanying bid documents as listed below. It is intended that the submitted bids and resultant documentation shall provide for:

- The planning of the Manila South Tollway, including survey as required, and the rehabilitation and repair of the South Luzon Expressway.
- The design and construction of the Manila South Tollway and the design and construction work necessary for the rehabilitation and repair of the South Luzon Expressway.
- The relocation of utilities affected by the PROJECT to standards required by the relevant utility authorities.
- Arrangements necessary for the raising of all required finance to enable design, construction, and the ongoing operation and maintenance of the PROJECT.
- The operation and maintenance of the Tollway and the South Luzon Expressway between Nichols and Alabang.
- The setting and collection of tolls in compliance with the requirements of the Toll Regulatory Board.
- Identification of any legislation necessary for the project to proceed.

These Instructions to Bidders are arranged in Sections as follows:

1.0 Documents
2.0 Disclaimer
3.0 Submittal
4.0 Bonds
5.0 Pre-bid Conference
6.0 Inquiries
7.0 Bid Addendums
8.0 Organization of the Bid Response
9.0 Project Structure
10.0 Financial Structure
11.0 Bid Evaluation Criteria

SECTION 1.0 DOCUMENTS

The following documents constitute the information accompanying this Invitation to Bid:

1.1 **Design Standards and Criteria**
Appendix A3-1

1.2 **Technical Investigations, Studies & Conceptual Design**
Appendix A3 and Volume III

1.2.1 Interchange and Alignment Drawings
Volume III

1.2.2 Geotechnical Report
Appendix A3-2

1.2.3 Structural Design Studies
Appendix A3-3 and Volume III

1.2.4 Traffic Studies
Appendix A4

1.3 **RA 6957 (BOT Law)**
Appendix A2-1

1.4 **Implementing Rules and Regulations for RA 6957**
Appendix A2-2

1.5 **DPWH Feasibility Study**
(Not included in this Report.)

1.6 **Draft Concessionaire Agreement**
Appendix A9-3

1.7 **Other Drawings**
Volume III

1.8 **Monetary Regulations**
(Not included in this Report.)

1.9 **Environmental Assessment**
Chapter 6

Note: The Chapter, Appendix and Volume references above refer to information presented in this study.

All documents and information are offered for the evaluation and use of the Bidder as he sees fit. The Government of the Philippines does not warrant the correctness, completeness or applicability of any information, data, or reports provided. All such information, data and reports are offered for the information of the bidder only. It shall be the sole responsibility of the bidder to determine the accuracy, completeness, correctness and applicability of all such information.

Documents are available from the Office of the Secretary, DPWH. A charge of ten thousand pesos (₱ 10,000 non-refundable) will be made for each set of bid documents.

SECTION 2.0 DISCLAIMER

2.1 **Neither the DPWH nor any of its agents or servants shall be liable whether in contract, negligence or otherwise for any incorrect or misleading statement given or made to any bidder whether in response to any inquiry or otherwise nor for any omission to disclose information. Each Bidder must make its own investigations and inquiries and satisfy itself in relation to all aspects of the Project.**

2.2 **No advice, opinion or representation by any consultant or agent of the DPWH (past or present) made to any proponent whether or not in response to any inquiry, shall be binding on the DPWH unless such statement is made to the Bidder in writing by the Department itself. The record of any meeting between a Bidder and the DPWH will not constitute a statement in writing.**

SECTION 3.0 SUBMITTAL

3.1 **Bids are due to be received before 3:00 P.M., _____, 199__.**

3.2 **Bids are to be delivered to:**

Office of the Secretary
Department of Public Works and Highways
Bonifacio Drive, Port Area Manila

3.3 **Bids are to be delivered in four physically separate volumes with one original and three copies of each volume. Copies are to be certified as to authenticity.**

- Volume I - Executive Summary
- Volume II - Financial Structure and Plan

- Volume III - Project Management Structure and Program
- Volume IV - Technical Proposal for Design, Construction and Operation

3.4 **Bids are to be delivered in opaque, sealed envelopes:**

"BID DOCUMENTS
MANILA SOUTH TOLLWAY PROJECT

SUBMITTED BY: _____"

VOLUME _____ COPY # _____

DATE SUBMITTED: _____ TIME: _____

RECEIVED BY: _____ TIME: _____

3.5 **The Department at its sole discretion may refuse to consider any offer that does not comply with the requirements of this invitation. If no complying bids are received, the DPWH may declare the bidding a failure.**

The DPWH, at its sole discretion, may reject any or all bids, waive any defects therein, and accept the offer most advantageous to the government.

3.6 **All costs associated with the preparation of a bid or response to this invitation and subsequent consultations and discussions which may or may not lead to the execution of a contract shall be borne entirely and exclusively by the Bidder.**

3.7 **Bids may contain proprietary or technical or other data the public disclosure of which, may cause substantial injury to the Bidder's competitive position. To protect this data from disclosure, the bidder should identify the parts of its offer which contain such data by properly marking the applicable pages and inserting the following notice in the front of each volume of the bid:**

To protect this data from disclosure, the bidder should identify the parts of its offer which contain such data by properly marking the applicable pages and inserting the following notice in the front of each volume of the bid:

"The data on pages_____ of this volume identified by an asterisk (*) or marked along the margin with a vertical line contain information that is a trade secret disclosure of which may cause substantial injury to the Bidder's competitive position. The Bidder requests that such data be used only for evaluation of the Bid but understands that disclosure may be made to the extent that the DPWH determines is proper and subject to disclosure requirements of the applicable law."

3.8 **Bids will not be returned and may be retained by the DPWH for official record purposes.**

3.9 **Bids are to remain fixed and valid for a period of 180 (one hundred eighty days) from date of submission.**

3.10 **Modifications to the Technical Standards will be considered provided that there is no reduction in the minimums specified. Full details of alternate proposals must be provided including cost/benefit analysis of the alternative and the effect on traffic flows.**

3.11 **The DPWH may enter into discussions or negotiations with any Bidder for the purposes of clarifying or improving its offer.**

The DPWH may, at its sole discretion, conduct simultaneous discussions to clarify or improve offers with more than one Bidder.

In the event there is only one complying bid received from a prequalified bidder, DPWH may at its sole discretion, enter into negotiations with the single qualified, complying bidder.

SECTION 4.0 BONDS

Bids are to be accompanied by a bid bond in the amount of one million pesos (₱1,000,000) issued by a bonding company accredited by the Government of the Philippines. Bonds are to be submitted in the form acceptable to DPWH valid for 180 days after the date set for receipt of bids.

The successful Bidders will be required to submit a Performance Bond equal to 50% of the estimated project construction cost.

SECTION 5.0 PRE-BID CONFERENCE

A pre-bid conference will be held on _____ 199_ at 3:00 P.M. at the office of the _____ located at:

_____

_____.

SECTION 6.0 INQUIRIES

All inquiries are to be in writing and directed to:

Office of the Secretary
Department of Public Works and Highways
Bonifacio.Drive, Port Area
Manila

Telephone:
Facsimile:

In the interest of time, inquiries may be submitted by facsimile but must be followed up by delivery of the original document to the above address.

All inquiries will be answered in writing and all inquiries and responses will be communicated to all bidders in the form of a bid addendum. In the interest of time, the Department may elect to transmit information and/or responses to bidders by facsimile. All such transmissions will be followed by delivery of the original document to the address of record of the bidders.

SECTION 7.0 BID ADDENDUMS

The Department may issue Bid Addendums from time to time to clarify certain items in the bid documents, add, delete or otherwise modify bid information, respond to inquiries from bidders, or for other pertinent reasons.

All bidders shall be advised of the issue of such bid addendums at their address of record as supplied during the prequalification stage.

No bid addendum will be issued within 72 hours of the closing time for receipt of bids.

SECTION 8.0 ORGANIZATION OF THE BID RESPONSE

Bids must be prepared in accordance with the requirements of the BOT Law, the Implementing Rules and Regulations and these instruction. Any discrepancies, conflicts or queries are to be brought to the attention of the "Secretary, DPWH" for clarification and/or explanation.

8.1 VOLUME I: Executive Summary

Volume I must summarize in concise language, the information contained in the other volumes of the Bid. All documentation is to be presented in the English language.

Volume I should not include any data that the Bidder considers to be confidential in nature.

At least one copy of Volume I of each bid must be accompanied by an original cover letter committing the Bidder and its Financier, if the Bidder is selected, to carrying out the provisions of the bid. The letter must further state that: 1) all information submitted in support of the Bid is accurate and factual, 2) all representations made regarding the bidder's willingness to make the required financial and performance commitments are accurate and 3) the Bidder's concurrence with the proposed business and management arrangements are correct. The cover letter must designate the individuals who will comprise the Bidder's negotiating team and the person to whom all correspondence should be directed.

The cover letter must be signed if the Bidder is a corporation by a director, or if the Bidder is an unincorporated Joint Venture by each entity constituting the Bidder.

The cover letter must be accompanied by an original letter from the Bidder's Financier acknowledging that it has reviewed and accepts all provisions of this invitation and the Bid and commits, whether on behalf of itself alone or itself and others, to provide the financing detailed by the Bid and in accordance to the statements made in the proposal by the bidder.

In the case of Joint Ventures, Partnerships or other forms of Ownership involving more than one entity, the cover letter must be accompanied by the originals of letters from each of the proposed entities addressed to the lead entity (or BIDDER) stating each entity's intent to enter into the necessary agreements and contracts to fulfill the scope assigned to them by way of the Bid package.

8.2 VOLUME II: Financial Structure and Plan

Volume II must describe in detail the financial capabilities of the Bidder and each entity the Bidder intends to involve in the Project and describe in detail how the Project will be financed.

Volume II must include diagrammatic representations of the financing structure and flow of funds contemplated for each year of the Project.

Volume II must include a statement of the levels of debt and equity funding proposed and include the details required by Section 10 "Financial Structure" of this document.

Volume II must include statement and explanation of the proposed Toll Rate Structure and the formula or mechanism for adjusting the Tolls during the period of the Contract. Toll rates are to be expressed in term of "present value" in accord with economic parameters provided below.

Volume II must clearly demonstrate the economic viability of THE PROJECT. Economic parameters to be used in demonstrating the economic viability are:

♦ Inflation Rate	-	9% per annum upon the CPI[1] for Manila.
♦ Discount Rate	-	15% per annum.
♦ Foreign Exchange Rate	-	₱ 25 = 1.00 US
♦ Deflation of the Peso	-	5% per annum.
♦ Maximum Construction Period	-	54 months.
♦ Maximum Period of Operation	-	35 years from notice to proceed.
♦ Interest Rates	-	10% LIBOR[2] for foreign currency
	-	17% per annum based on the Treasury Bill offered by the Central Bank of the Philippines.

The project should yield an economic internal rate of return which is at least equal to 15%. It should conform with established and accepted criteria set by the Investment Coordination Committee of the NEDA Board.

8.3 VOLUME III: Project Management Structure and Program

Volume III must include detailed descriptions of:

- The contractual arrangements for delivery of design services and design related services.

- A discussion of the project management arrangement to be used during the design and construction phases. The Bidder's plan for staffing, meeting management requirements and implementing management controls must be included.

- The contractual arrangement for delivery of constructor services including Constructor and Sub-Constructor services.

- Complete details of the Bidder's proposed Quality Control and Quality Assurance programs.

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[1] CPI = Consumer Price Index for Manila published by NEDA, National Statistics Office

[2] LIBOR = London Interbank Offering Rate.

- A discussion of the Bidder's program to comply with environmental considerations.

- A discussion of the Bidder's proposed Traffic Management Program during construction.

- The contractual arrangements for the operation and maintenance phase. Volume III must discuss the management structure and submit a preliminary plan for the operation and routine as well as long term maintenance requirements for the Tollway and a discussion of the Bidder's program to comply with the maintenance standards set out in the draft Concessionaire Agreement.

8.4 VOLUME IV: Technical Proposal for Design, Construction, and Operation Phases

Volume IV must describe in detail the proposed design, construction, and operation/maintenance phases. This Volume must provide sufficient information to demonstrate that the Tollway will, at a minimum, satisfy the Design Criteria included with this document as Section 1.1. It must outline by narrative descriptions, drawings, diagrams, and schedules the various elements comprising the Project and state the standards and specifications to which the Tollway will be constructed. The major sections of Volume IV will be:

8.4.1 Feasibility Study for the Project Showing Anticipated Traffic Flows and Loads.

The feasibility study must be undertaken according to acceptable standards an must conclusively demonstrate the feasibility/viability of THE PROJECT in the following term:

8.4.1.1 Marketability

The need for THE PROJECT based on traffic volumes and anticipated growth rates must be clearly defined and justified.

8.4.1.2 Technical Soundness

The basic (or preliminary) design of THE PROJECT including (but not limited to) alignment, proposed interchange structures, preliminary design calculations and drawings should conform to the minimum design of performance specifications of Section 1.1 of this document. The preliminary design presented here will be the basis of the detailed engineering to be prepared

or part of this Contract.[3] Engineering quantities should be accurate within ± 20% of final quantities.

8.4.1.3 Economic Feasibility

The benefits to the national and regional economy must be defined and quantified to the maximum extent possible. Savings and travel time and transport cost are to be demonstrated.

8.4.1.4 Operational Feasibility

The proposed organization methods, procedures and plan for Operating and Maintaining the completed Project must be well defined and conform to acceptable standards for Tollway operation. Wherever possible, technology transfer is to be used.

Details of equipment,manpower and other resources is to be included in this section.

8.4.2 Environmental Assessment Report

Information on the environmental requirements and regulations, and the assessment based on the conceptual designs would be provided to the bidder as Section 1.9 of this document.[4]

The bidder's report would outline any difference in environmental assessment of the proposed design and any differences in design that might have other impacts.

8.4.3 Construction Execution Plan including but not limited to:

- Construction operation organization plan identifying all individuals in key positions, all entities (subcontractors, designers, etc.).
- Job descriptions outlining duties and responsibilities for all key positions (including within subcontractor organizations).
- Bio-data for all personnel proposed to be assigned to key positio
- Alternate or backup personnel for all key positions.

[3]The preliminary designs have not been prepared. The Consultant recommends that bidding commences only after they have been completed.

[4]The environmental assessment should probably be updated based upon the preliminary designs.

- Listing and proposed layout of all temporary facilities (including pre-cast yard, equipment maintenance facilities and the like) intended to be used during the construction phase.

- Complete construction schedule developed using PERT/CPM scheduling techniques and a PC driven scheduling program acceptable to DPWH. Bidder's attention is drawn to Section 9.7 of this document which sets out certain key dates.

- Complete manpower curves for the construction period showing the total required manpower delineated by craft or trade.

- "S-Curve".

- Narrative outline of the construction methodology to be used.

- Complete list of all construction equipment to be utilized. The listing must include the source of the equipment, present location, condition and ownership and which will be imported for use on this Project.

- Complete listing of all sub-constructors proposed for the works. For any work not designated as subcontracted, it will be assumed that the contractor intends to perform the work with directly employed forces. For subcontracts exceeding a value of ₱ 10,000,000 (Ten Million) pesos, complete data on the proposed subcontractors shall be included. Such data will include ownership, statement of abilities, current work load, bio-data of proposed contract manager.

- Safety Program to be implemented during the Construction Phase of the Project.

- Security Program to be implemented during the Construction Phase of the Project.

SECTION 9.0 PROJECT STRUCTURE

The DPWH will enter into an agreement with the successful Bidder for the design, construction, operation and maintenance of the Manila South Tollway. A draft of the proposed Concession Agreement is included as Section 1.6 in this document.

9.1 Land Usage

The Contract documents will include a right for the Bidder to occupy the areas over and through which the MST will pass and as may be required for the purposes of the project.

9.2 Term

The term for the Project after which the facilities will revert to the Government of the Philippines is 35 years. Bidders must present all calculations on this basis. Alternate proposals using a shorter period are encouraged.

9.3 Tolls

Bids must be submitted on the basis that the initial toll shall be as low as possible and not higher than economically justified in the Bid. The BOT Law states that the Contractor is "allowed to charge facility users appropriate tolls, fees, rentals and charges sufficient to enable the contractor to recover its operating and maintenance expenses and its investment in the project plus a reasonable rate of return thereon."

The toll structure should not be such as to significantly alter the proportional representation of heavy vehicles.

Initial tolls may be indexed to economic parameters. These indices might include those located outside the Philippines such as the London Interbank Offering Rate (LIBOR).

Actual tolls charged will be based on a rate or formula proposed by the Bidder and approved by the Department.

The Project may be opened and placed in service on a phase by phase basis. Bidders to propose any phased operation. However, the maximum length of construct would remain 54 months.

For the bid comparison, tolls are to be presented as "present value" using the economic parameters defined in Section 8.2.

9.4 Quality Assurance

The DPWH will enter into a separate contract with an independent consultant to provide design checking services during the design and construction phases. The Independent Design Checker (IDC) will review all designs prepared by the Contractor for compliance with the technical criteria, applicable codes, the contract agreement and generally accepted good practice. Any modification to the design made during the process of construction will be reviewed and approved by the IDC. The cost of the Independent Design Checker is to be included in the Bid.

The DPWH will enter into a separate contract agreement with an independent consultant to provide Independent Certification Engineer (ICE) services during the construction phase. The ICE will independently inspect all work to ensure strict compliance with the approved drawings and specifications, all applicable codes and generally accepted good practice. The cost of the Independent Certification Engineer is to be included in the Bid.

During the Operation and Maintenance phase, the DPWH will enter into a separate Quality Assurance contract with an Independent Certification Engineer to provide inspection services and to ensure that routine and long term maintenance of the Tollway is being performed in accordance with the contract agreement.

9.5 Commercial Services

The Bidder shall indicate any modification in the proposed locations of service plazas, toll collection stations and other ancillary facilities. Operation of the Service Plazas, billboard advertising and the like will be subject to prior approval of the DPWH. Land acquired by the DPWH for the purposes of the Project cannot be used for Service Plazas or other commercial uses (such as billboard advertising) without the approval of the Department.

9.6 Environmental Considerations

The Bidder shall be solely responsible to ensure that his design complies with all environmental laws, regulations, rules of the Government of the Philippines and the requirements of the applicable regulatory agencies. Based on the designs, the Department will prepare the Environmental Impact Statement for obtaining all necessary clearances and permits.

9.7 Project Schedule

Key dates for the Project Implementation are as follows:

ISSUE INVITATION TO BID .....
RECEIVE BIDS .....
NOTICE TO PROCEED .....
DESIGN START .....
CONSTRUCTION START .....
SLE REHABILITATION START.....
INITIAL OPERATION MST .....
SLE REHABILITATION COMPLETE.....
MST IN FULL OPERATION .....

SECTION 10.0 FINANCIAL STRUCTURE

The Bid must demonstrate to the DPWH that the Bidder has the technical, management and financial capacity to complete the Project.

10.1 **Bidders are required to arrange for the necessary finance for the design, construction, operation and maintenance of the Project. Bidders shall provide full details of the financial structure proposed to enable detailed assessment by the DPWH.**

10.2 **Bidders are required to provide a complete financial plan including as a minimum, the following information:**

- details of the costs of design, and construction on which its offer is based.
- details of the total expenditure (including interest during construction) which will require funding.
- details of the estimated annual operating cost on which its offer is based.
- details of the estimated annual revenue based on the proposed toll structure and traffic forecasts developed by the Bidder.
- details of cash flow, profit and loss statement, balance sheet and all key assumptions.

10.3 **Diagrams setting out the proposed financial structure and source and application of funds must be included in the Bid.**

The Bid must include the levels of debt and equity funding to be provided and identify the parties with commitments to provide such funds. The Bid must also specify the nature of the debt and equity funding and the timing of the contributions including installments if applicable.

If the total equity funding is not to be contributed on or before execution of the Contract Agreement, then there must be commitments in terms acceptable to the DPWH that the total amount of equity funding will be contributed in the amounts and at the times specified in the Bid.

The identity of the parties with commitments to make equity or debt funding and the terms of such funding must be fully disclosed in the Bid. Where any such commitment is made subject to a condition precedent or is liable to be withdrawn on the happening of any subsequent event, details of such conditions or subsequent events must be fully disclosed in the Bid.

In preparation of their financial plans, bidders are cautioned to observe strictly the requirements of the BOT Law Section 2 a). In particular, the BOT Law Stipulates that:

> "financing of a foreign or foreign controlled contractor from Philippine government financing institutions shall not exceed

twenty percent (20%) of the total cost of the infrastructure facility or project."

AND

"financing from foreign sources shall not require a guarantee by the Government or by government owned or controlled corporation."

SECTION 11.0 BID EVALUATION CRITERIA

The Bid Evaluation Criteria are based on the following:

11.1 Feasibility Study.
11.2 Environmental Assessment.
11.3 Construction Execution Plan.
11.4 Financial.

Minimum points required in each category of evaluation to be considered as a complying bid.

11.1	**Feasibility Study**		
	11.1.1	Traffic Studies	1 point
	11.1.2	Load Projection	1 point
	11.1.3	Economic Feasibility	1 point
	11.1.4	Operational Feasibility	1 point
	11.1.5	Design Review	1 point
	11.1.6	Construction Cost Estimate	1 point
11.2	**Enviromental Assessment**		
11.3	**Construction Execution Plan**		
	11.3.1	Schedule	1 point
	11.3.2	Methodology	1 point
	11.3.3	Key Personnel	1 point
	11.3.4	Organization Chart	1 point
11.4	**Financial**		
	11.4.1	Debt Equity	2 points
	11.4.2	Financial Plan	1 points
	11.4.3	Rate of Return	1 points
	11.4.4	Financial Institution	1 points

Bids not achieving the minimum point requirements detailed above will be considered non complying.

DETAILS OF POINT ASSIGNMENTS

11.1 Feasibility Study

The Feasibility Study will be evaluated in six major areas; traffic studies, load growth and traffic patterns, economic feasibility, operational feasibility, design, and construction cost estimate.

11.1.1 Traffic Studies

Complete additional traffic studies.	3 points
Existing traffic data checked on "spot" basis".	1 point

11.1.2 Load Projection and Traffic Patterns

Independent projection of load growth and traffic pattern.	3 points
Existing projections reviewed and accepted.	1 point

11.1.3 Economic Feasibility

Complete statement of economic feasibility including analysis of possible vehicle operation savings.	1 point

11.1.4 Operational Feasibility

Complete statement of operational feasibility.	1 point

11.1.5 Design

Proposed new design or detailed review conducted to value engineer existing design supported by full documentation.	4 points
Proposed new design or detailed review conducted to value engineer existing design supported by limited documentation.	2 points
Existing design reviewed and accepted.	1 point

11.1.6 Construction Cost Estimate

Complete detailed cost estimate with quantity breakdown and detailed unit cost supported by full documentation.	2 points
Detailed cost estimate with quantities and unit costs supported with limited documentation.	1 point

11.2 Environmental Assessment

Independent study prepared.	2 points
Existing study reviewed and accepted.	1 point

11.3 Construction Execution Plan

The construction execution plan will be evaluated in four areas; schedule, methodology, key personnel, and organization.

11.3.1 Detailed Construction Schedule

Complete construction schedule including temporary facilities prepared using PERT/CPM Techniques submitted with network, bar chart, and early/late start-finish listing. 1 point

11.3.2 Methodology

Complete description of methodology to be used to achieve all project Objectives. 1 point

11.3.3 Key Personnel

Bio-data analysis for key personnel aggregate value exceeds 60. 3 points

Bio-data analysis for key personnel aggregate value exceeds 40 but less than 60. 3 points

Bio-data analysis for key personnel aggregate value less than 40. 1 point

See Section 5.3 of Prequalification for criteria to rate personnel.

11.3.4 Organization

Complete organizational chart with job descriptions for all key positions and unit heads. 1 point

11.4 Financial

Financial will be evaluated in four major areas: debt-equity, financial plan, rate of return, quality of financial institutions.

11.4.1 Debt-Equity Ratio

Debt/Equity ratio < 3:1	3 points
Debt/Equity ratio > 3:1	2 points

11.4.2 Financial Plan

Complete financial plan with all sources of financing, diagrammatic explanation, toll structure and cash flows.	3 points
Adequate financial plan lacking in details and/or explanation.	1 point
Inadequate financial plan, lack of detail and/or unrealistic assumptions.	0 points

11.4.3 Rate of Return

Rates of Return - adequate (> 15%)	2 points
Rates of Return - inadequate (< 15%)	1 point

11.4.4 Quality of Financial Institutions

Quality of Financial Institutions

♦ AAA rating	3 points
♦ Aab rating	2 points
♦ BBb rating	1 points

Use lowest rating of proposed institutions.

Appendix A9-3

THE CONCESSION AGREEMENT

Appendix A9-3
CONTRACTOR CONCESSION AGREEMENT FOR THE MANILA SOUTH TOLLWAY BOT PROJECT

KNOW ALL MEN BY THESE PRESENTS:

This CONTRACTOR CONCESSION AGREEMENT, made and entered into thi _____ day of _____ 199__ at Metro Manila, Philippines, by and between:

The DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS, an executive Departmen of the Republic of the Philippines, with principal office located at Bonifacio Drive, Port Area Manila, Philippines, represented herein by its Honorable Secretary, Jose P. de Jesus, an hereinafter referred to as the DPWH.

- and -

_____, a corporation duly organized and existing under the laws of th Philippines, with principal office located at _____, Metro Manila, Philippines represented herein by its President, _____, and hereinafter referred to as th CONCESSIONAIRE.

WITNESSETH:

WHEREAS, the growth and development of the Luzon Islands will be enhanced anc further accelerated through the construction of a complementary and efficient expressway lin between Metro Manila and the fast developing Southern Luzon industrial region;

WHEREAS, the Manila South Tollway BOT Project consists of 1) the construction, operation and maintenance of a six-lane elevated viaduct structure, nineteen (19) kilometers, more or less, from President Quirino Avenue, Manila, in the North to Alabang, Muntinlupa in the South, following the alignment of the existing South Luzon Expressway, and 2) the rehabilitation, operation and maintenance of the portions of the South Luzon Expressway from Magallanes Interchange to Alabang;

WHEREAS, Republic Act No. 6957, otherwise known as the Build-Operate-and-Transfer Law, declares the policy of the state to recognize the indispensable role of the private sector as the main engine for national growth and development and provide the most appropriate favorable incentives to mobilize private resources for the purpose;

WHEREAS, the DPWH is a national government agency authorized to enter into Build-Operate-Transfer contracts, and the Manila South Tollway BOT Project is an eligible infrastructure project under the BOT law;

WHEREAS, after approval of the Manila South Tollway BOT Project by the National Economic and Development Authority, and proper observance of the tendering process where the CONCESSIONAIRE was found to be duly pre-qualified, the DPWH declared the CONCESSIONAIRE the lowest complying bidder and, accordingly awarded it the contract to build-operate-and-transfer the Manila South Tollway BOT Project, which award the CONCESSIONAIRE accepted.

NOW THEREFORE, for and in consideration of the foregoing premises and the stipulations and covenants hereinafter provided, the parties hereto agree as follows:

CLAUSE 1.0 DEFINITION OF TERMS

1.01 In this Agreement, unless the contract otherwise require, the following terms have the following meaning:

- Agreement - This Contractor Concession Agreement for the Manila South Tollway BOT Project;
- BOT - Build-Operate-and-Transfer;
- BOT Law - Republic Act No. 6957, entitled "An Act Authorizing the Financing Construction, Operation and Maintenance of Infrastructure Projects by the Private Sector and for Other Purposes";
- Completion Date - The end of the original franchise period. It also refers to the end of the original term of this Agreement;
- Effective Date - The date of the parties' joint certification that this Agreement is no longer conditional because the conditions precedent have been met;
- Facility - The MST BOT Project;
- Government - The Republic of the Philippines;
- MST BOT Project - The Manila South Tollway BOT Project described in Clause 2.0;
- MST Project - The Manila South Tollway Project described in Clause 2.02;
- NEDA - National Economic and Development Authority;
- PNCC - Philippine National Construction Corporation;

- PNR - Philippine National Railways
- Project - MST BOT Project;
- ROM - Rehabilitate-Operate-and-Maintain;
- Site - Location where construction of the MST BOT Project will be undertaken. Project site of the MST BOT Project;
- SLE - South Luzon Expressway;
- Target Completion Date - completion of MST;
- Transfer Date - date the parties sign the certification that the MST BOT Project is completed and ready for transfer to the DPWH;
- Works - the start-up phase works and/or the construction phase of the MST BOT Project

CLAUSE 2.0 THE MST BOT PROJECT

2.01 This Agreement covers the Build-Operate-and-Transfer (BOT) implementation of the Manila South Tollway (MST) Project and of the Rehabilitation-Operation-and-Maintenance (ROM) of the reverted portions (Magallanes Interchange to Alabang) of the South Luzon Expressway (SLE), both of which shall be operated by the CONCESSIONAIRE.

2.02 The Manila South Tollway (MST) Project is a six-lane elevated viaduct structure following the alignment of the existing SLE corridor. It starts at President Quirino Avenue in the North and ends at Alabang in the South, with a total length of about 19 kilometers (Km). Between President Quirino Avenue and Bicutan, the MST runs a single elevated roadway structure ever the PNR, diverting slightly eastward for about one kilometer to the general alignment of the present East Service Road where it drops to ground level. At Bicutan, the MST bifurcates into two separate elevated roadway structures over the median of the SLE and at the edge of the East Service Road and terminates at Alabang. The technical description of the MST is set out in Annex A.

2.03 The Rehabilitation-Operation-and-Maintenance (ROM) component refers to the portions (Magallanes Interchange to Alabang) of the SLE reverted to the DPWH by the PNCC. It includes the correction of road elevation, improvement of the drainage system, repair of damaged pavements and shoulders and overlying the entire road with asphalt concrete, reinstallation of security fencing, and provision of new toll collection facilities. The technical description of the ROM component for the SLE is set out in Annex B.

CLAUSE 3.0 CONDITIONS PRECEDENT AND NON-FULFILLMENT THEREOF

3.01 It is a condition precedent for this Agreement to take effect that the CONCESSIONAIRE submits to the DPWH on or before _____, 199__, or such later date as the parties may subsequently agree in writing, the following documents, or proof that the submission thereof has been waived by the DPWH, each in such form and substance satisfactory to the DPWH:

(a) Copies of the CONCESSIONAIRE's Articles of Incorporation duly certified by its corporate secretary;

(b) Copies of the resolution of the CONCESSIONAIRE's Board of Directors authorizing the execution, delivery and performance by the CONCESSIONAIRE of this Agreement, duly certified by its corporate secretary; and

(c) A performance bond issued by a financial institution acceptable to the DPWH in the amount of United States Dollars _____ US$ _____), effective up to the completion date, and conditioned upon the faithful compliance by the CONCESSIONAIRE with its obligations under this Agreement;

3.02 It is also a condition precedent for this Agreement to take effect that the DPWH submits to the CONCESSIONAIRE on or before _____, 199__, or such later date as the parties may subsequently agree in writing, the following documents, or proof that the submission thereof has been waived by the CONCESSIONAIRE, each in such form and substance satisfactory to the the CONCESSIONAIRE:

(a) A legal opinion of the Department of Justice on the validity and binding effect of this Agreement on the Republic of the Philippines; and

(b) A certification of the DPWH that funds for the acquisition of the right-of-way requirements for the Project have been appropriated and are immediately available, and that the DPWH shall acquire and provide the CONCESSIONAIRE the required right-of-way in accordance with the timetable of the Project contained in Annex D and free of any third party rights which will prevent or hamper its implementation and operation.

3.03 When the conditions specified in Clauses 3.01 and 3.02 have been met, the parties shall jointly certify that this Agreement is no longer conditional and that the effective date hereof has occurred.

3.04 If the conditions specified in Clause 3.01 remains unfulfilled upon the expiry of the period mentioned therein, the DPWH may, upon prior written notice to the CONCESSIONAIRE, revoke, cancel or terminate this Agreement, in which case the

latter shall not be entitled to any expenses or compensations, whatsoever, from the former, whether they be pre-cancellation costs or other expenses allowable in accordance with any laws. The DPWH shall, however, be entitled to a lump sum liquidated damages in the amount of _____ US Dollars (US$ _____).

3.05 If the conditions specified in Clause 3.02 remains unfulfilled upon the expiry of the period mentioned therein, the CONCESSIONAIRE may, upon prior written notice to the DPWH, revoke, cancel or terminate this Agreement, in which case the latter shall compensate the former for its actual pre-cancellation expenses in the project incurred with the prior written approval of the DPWH plus a rate of return thereon not exceeding _____% as of the date of such revocation, cancellation or termination, and the DPWH shall no longer be liable for any other damages or compensation in respect thereof whatever. The DPWH shall insure with the Government Service Insurance System or any other insurance entity duly accredited by the Office of the Insurance Commission its interest for such eventuality and the cost of the insurance shall be included in the total Project costs. All properties the costs of which were reimbursed the CONCESSIONAIRE shall become property of and be turned over to the DPWH.

CLAUSE 4.0 RIGHT-OF-WAY ACQUISITION

4.01 The DPWH shall, in accordance with the right-of-way acquisition timetable set out in Annex D, acquire and provide the CONCESSIONAIRE, free of any third-party rights which will prevent or hamper the implementation and operation of the MST, and clear of all structures, buildings and impediments hindering construction:

(a) For the construction of the elevated viaduct structures, the about one kilometer of six-lane expressway at grade at the East Service Road where vertical clearance requirements of the NAIA will have to be observed, toll plazas and toll gates, all rights-of-way, possession and occupancy of, and rights to build in the necessary air space sufficient to lay down a roadway over the Philippines National Railway (PNR) right-of-way between President Quirino Avenue and Bicutan, and over the median of the South Luzon Expressway (SLE) and East Service Road right-of-way between Bicutan and Alabang, and the right thereafter to retain such structures in such air space as well as all the rights-of-way to the corresponding portions of PNR, SLE and East Service Road right-of-way itself and immediate surrounding areas where the columns and other structures will be constructed or which may be needed during the construction period, and for purposes of such construction;

(b) For the construction of interchanges and ramps as per specifications and drawings, all rights-of-way over, possession and occupancy of, and rights to build on, a strip of road or space sufficient to lay down the ramps over the various

proposed interchanges as well as all the rights-of-way to the corresponding portions of said roads immediately surrounding areas where the catenary posts and supports will be constructed and the rights thereafter to retain the part of the MST thereon.

4.02 Should the DPWH fail to provide the timely delivery of the right-of-way and other facilities under this Clause, the CONCESSIONAIRE, upon prior written notice to the former, revoke, cancel or terminate this Agreement, in which case the DPWH shall compensate the CONCESSIONAIRE for its actual pre-cancellation expenses in the project plus a rate of return thereon not exceeding _____%[1] as of the date of such revocation, cancellation or termination. The DPWH shall insure with the Government Service Insurance System or any other insurance entity duly accredited by the Office of the Insurance Commission its interest for such eventually and the costs of insurance shall be included in the total Project costs. All properties whose costs were reimbursed the CONCESSIONAIRE shall become property of and be turned over to the DPWH.

4.03 The CONCESSIONAIRE shall be exempt from the payment of all taxes, charges or fees which may be imposed, build or collected by the government, its instrumentalities or any political subdivision thereof in connection with the exercise of this franchise.

CLAUSE 5.0 FRANCHISE

5.01 The DPWH hereby grants the CONCESSIONAIRE the franchise to construct, operate and maintain the facility covered by the MST BOT Project as described in Clause 2.0, including the collection of tolls, fees, rentals and other charges therein at the rates provided in Clause 6.0.

5.02 The period of the franchise is 35 years[2] from the effective date of this Agreement as contained in the parties' joint certification of full compliance with the conditions precedent referred to in Clause 3.03. The DPWH may, upon application by the CONCESSIONAIRE, extend the life of the franchise for another period through an amendment to this Agreement provided that the total life of the franchise shall not exceed fifty (50) years.

5.03 During the life of the franchise, the CONCESSIONAIRE shall operate the facility and undertake the necessary maintenance and repair thereof in accordance with the design criteria and standards, performance standards, and specifications described in Annex C and the preliminary engineering designs and plans set out in Annex E.

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[1]To be filled in by the bidder.

[2]The Bidder is encouraged to submit a proposal for a shorter period of time.

5.04 Maintenance work for which the CONCESSIONAIRE shall be responsible includes but is not limited to maintenance of road surfaces, shoulders, disches, drainage structures, viaducts and bridges, traffic services, right-of-way, fences, toll facilities, lighting, removal of debris, rubbish, and obstructions, roadside clearing, providing toll road security and police deputies, ambulances, and doing such other things and providing such other appurtenant, equipment and facilities as are necessary for the safety of facility users.

5.05 The CONCESSIONAIRE shall undertake all works of repair, amendment, reconstruction, rectification and making good such defects, imperfections, shrinkage or other faults that may develop or become apparent in the works or services or any part thereof during the maintenance period and arising out of the design, execution, completion, commissioning and maintenance of the works, or from any act or omission on the part of the CONCESSIONAIRE or persons under its responsibility.

5.06 The CONCESSIONAIRE shall be responsible for traffic management and rescue operations in the facility subject to applicable national laws and regulations of the Republic of the Philippines.

5.07 The CONCESSIONAIRE shall not lease, transfer, grant the usufruct of, sell or assign this franchise nor the rights or privileges acquired hereunder, to any person, firm, company, corporation or other commercial or legal entity, nor merge with any other company or corporation without the prior approval of the President of the Philippines.

5.08 If during the life of the franchise, the DPWH puts into effect any arrangements for the construction or substantial improvement of any road or highway of an expressway standard within 5 kilometers of the facility and the construction or improvement of any such road has the effect of materially reducing the actual volume of traffic using the facility or the revenues arising therefrom, the DPWH shall agree with the CONCESSIONAIRE a suitable means of compensating the CONCESSIONAIRE for the loss of revenues to the CONCESSIONAIRE over the unexpired term of the franchise as a result thereof and if such revenues subsequently return to the previous or better level, the parties shall consider making an appropriate adjustment.

5.09 The franchise is issued subject to the condition that it may be amended or altered by the DPWH when public interest so demands and upon payment of just compensation. Should the CONCESSIONAIRE violate any of the terms and conditions of this Agreement during the construction, operation and maintenance of the toll facility, the DPWH shall have the right to cancel and terminate the franchise and this Agreement in which case the CONCESSIONAIRE shall immediately turn over the facilities to the DPWH without entitlement to compensation or any amount whatsoever.

CLAUSE 6.0 TOLLS

6.01 The CONCESSIONAIRE shall be entitled to collect tolls, fees, rentals and charges on users of the facility based on the rates initially fixed in Annex F and approved by the Toll Regulatory Board without the necessity of any notice and hearing.

6.02 Any adjustments in the tolls, fees, rentals and charges fixed in Annex F must be based on the formula related to government and other price indices and described in Annex G, and can be implemented only after approval by the Toll Regulatory Board which must act within thirty (30) days on petitions for toll increase, otherwise the petition is automatically approved. This approval is final and unappealable. Appropriate adjustments shall also be made to compensate for opportunity costs to the CONCESSIONAIRE caused by any undue delay on the part of the DPWH in delivering the right-of-way or other facilities as provided in Clause 4.02.

6.03 The Collection of tolls, fees, rental and charges for the use of the facility by the public for the recovery of this cost plus reasonable rate of return on investment is if public interest. To ascertain that such tolls/fees/rentals/charges are properly collected and recorded according to established rules and procedures, the Commission on Audit shall, after consultation with the DPWH, audit the pertinent books and records of the CONCESSIONAIRE in accordance with the existing auditing rules and regulations.

CLAUSE 7.0 DETAILED ENGINEERING

7.01 The CONCESSIONAIRE shall prepare and submit to the DPWH the detailed engineering designs and plans based on the preliminary engineering design submitted as part of its bid and in conformance with the design criteria and standards, performance standards, and specifications prepared by the DPWH and set out in Annex C.

7.02 The DPWH shall review the submitted detailed engineering design and plans and, if satisfied with its compliance with the prescribed standards and specifications, shall approve the same with reasonable dispatch. The approval by the DPWH shall not reduce the responsibility of the CONCESSIONAIRE over the integrity of the design and plans and, and shall not shift to the former any part of that responsibility.

CLAUSE 8.0 CONSTRUCTION

8.01 The CONCESSIONAIRE shall undertake the design and construction in accordance with the design criteria and standards, performance standards, and specifications set out in Annex C and with the detailed plans prepared by it and approved by the DPWH.

8.02 The CONCESSIONAIRE shall be responsible for, and the DPWH shall exert its best efforts in assisting the CONCESSIONAIRE in, obtaining all permits, licenses, consents, authorizations, approvals, exemptions from appropriate authorities, and for compliance with all government regulations including the payment of all fees and costs thereof, as are necessary for carrying out the construction and other works.

8.03 The DPWH shall ensure that all necessary access to and from the project site is made available to the CONCESSIONAIRE, its employees, constructors, sub-contractors, suppliers and advisors as well as their tolls, plants and equipment, and shall assist the CONCESSIONAIRE to ensure that timely and sufficient arrangements for the provision of all necessary utilities have been made and will be available at the project site as may be necessary for the construction, operation and maintenance of the facility.

8.04 The CONCESSIONAIRE shall, where possible, award contracts to Philippine constructors and suppliers of materials and service provided that the quality, delivery times, costs, reliability and other terms are comparable to those offered by foreign constructors and/or suppliers.

CLAUSE 9.0 IMPORTATION OF EQUIPMENT/MATERIALS AND CONTRACTING OF FOREIGN NATIONALS

9.01 The CONCESSIONAIRE will be responsible for the importation and transport of equipment to the project site, including obtaining permits, licenses, and approvals for such equipment, and for the securing of work permits for foreign personnel, the recruitment of local labor and compliance with all government regulations, including the payment of all fees and costs thereof. The DPWH shall secure from the appropriate government agencies exemption from import taxes, levies and duties to assure tax/duty free importation of equipment, materials and supplies to be used/consumed exclusively for the project.

CLAUSE 10.0 PROJECT SUPERVISION

10.01 The DPWH shall exercise technical supervision over project activities. It shall inspect and check whether the construction, operation and maintenance of the project follows the plans, specifications, standards and cost approved by it. The DPWH shall immediately bring to the CONCESSIONAIRE's attention for necessary corrective actions any deviation from or non-compliance with the approved plans, specification and standards. The DPWH's supervision shall not diminish the singular responsibility of the CONCESSIONAIRE for the proper construction, operation and maintenance of the facilities nor shall it transfer any part of that responsibility to the DPWH.

10.02 To ensure faithful discharge of their respective obligations under this Agreement, the parties following the procedure outlined in Annex H, shall jointly appoint consulting firms as Independent Design Checker and Independent Certification Engineer whose scope of services, powers and responsibilities are specified also in Annex H. The costs and expenses relating to the work of the Independent and the Design Checker Independent Certification Engineer shall be borne entirely by the CONCESSIONAIRE although the Independent Design Checker and Independent Certification Engineer will be reporting directly to the DPWH. In the event that such costs and expenses are paid by the DPWH, the CONCESSIONAIRE shall forthwith reimburse the DPWH therefor. After completion of the project, the Independent Certification Engineer shall be appointed as and when necessary (and for such period of time as may be necessary) from time to time.

10.03 The DPWH shall be entitled to consult with the Independent Design Checker and the Independent Certification Engineer on any matter relating to the project. The DPWH will inform the CONCESSIONAIRE in advance of each such consultation (except in the case of an emergency) and the CONCESSIONAIRE shall be entitled to have sight of and to comment on all reports and information to be supplied by the Independent Design Checker or Independent Certification Engineer before such reports and information are sent to the DPWH but, after having made such comment, the CONCESSIONAIRE shall not be entitled to prohibit the Independent Certification Engineer or the Independent Design Checker from submitting such reports and information to the DPWH. The CONCESSIONAIRE shall have the right only to submit to the DPWH in writing its observation on such reports and information at the same time as the same are submitted to the DPWH by the Independent Design Checker or the Independent Certification Engineer. Diagrams illustrating the approval and reporting functions of the Independent Certification Engineer and Independent Design Checker are contained in Annex H.

10.04 The DPWH and the CONCESSIONAIRE shall establish a Coordination Committee under the chairmanship of the DPWH's representative and vice-chairmanship of the CONCESSIONAIRE's representative, and composed of such other persons and advisors, including a representative from the Toll Regulatory Board, as the DPWH and the CONCESSIONAIRE may agree to invite from time to time to attend any committee meeting. The Coordination Committees shall meet at least once a month during the period of the works to assist in resolving any problem related to the carrying out of the works and shall meet thereafter as it deems appropriate when any problem or necessity related to construction or operation of the MST arises. Meetings of the Coordination Committee may be convened by either the chairman or vice-chairman thereof. The Coordination Committee's actions are merely recommendatory. The appointment of the Coordination Committee shall not relieve the DPWH or the CONCESSIONAIRE from any of its obligations hereunder.

CLAUSE 11.0 TRANSFER OF FACILITY TO THE DPWH

11.01 On the transfer date, the CONCESSIONAIRE shall transfer to the DPWH, free from any lien or encumbrance created by the CONCESSIONAIRE and without the payment of any compensation, all its right, title and interest in and to the structures, toll plazas, toll gates, fixtures, fittings, plant and equipment (including test equipment and special tools) and all improvements, accessories and accessions comprising the project.

11.02 Six months prior to the transfer date, the DPWH and the CONCESSIONAIRE shall meet and agree on the inventories involved, the mechanics of transfer, and security arrangements but the CONCESSIONAIRE shall not be liable for any discrepancies between such inventories and the actual fixtures, fittings, plant and equipment transferred provided that the CONCESSIONAIRE shall exercise the same care regarding the fixtures, fittings, plant and equipment and all improvements therein as it did prior to agreeing to the same and provided further that the DPWH shall be entitled to provide a security unit within the site.

11.03 All equipment transferred pursuant to this Clause shall be transferred on an "as is" basis and any warranties which would otherwise be implied by status or otherwise, including without limitations, warranties as to title, fitness for the purpose, the absence of patent of inherent defects, description or otherwise of whatsoever nature will be excluded and after the transfer date, the CONCESSIONAIRE shall be under no liability whatsoever to the DPWH in respect of the operation or otherwise of the project. The DPWH or a person designated by the DPWH shall indemnify and keep indemnified the CONCESSIONAIRE against any liability to any person arising from the use or operation of the facility after the transfer date. Provided however that the CONCESSIONAIRE shall subrogate or assign to the DPWH any and all rights and benefits which it is able to subrogate such as any unexpired warranties in respect of the building, plant and equipment of the facility under applicable laws or otherwise.

11.04 The DPWH shall be responsible for all costs and expenses (including legal fees and taxes or duties) incurred in connection with the transfer referred in this Clause and shall at its own cost obtain or effect all governmental and other approvals, licenses, registrations and filings and take such other action as may be necessary for the transfer contemplated in this Clause, and reimburse the CONCESSIONAIRE on demand for all such costs and expenses incurred by the CONCESSIONAIRE in respect of such transfer.

CLAUSE 12.0 WARRANTIES AND REPRESENTATIONS

12.01 The DPWH represents and warrants that:

(a) It has all requisite legal authority and right to execute and deliver this Agreement and to perform the obligation provided for herein;

(b) The execution, delivery and performance of this Agreement by it does not and will not (i) violate any law, decree, regulation, order or other governmental directive having the force of law which is applicable to it; (ii) conflict with, or result in the breach of, or result in the imposition of any security, interest, encumbrance, lien or charge under any agreement or instrument to which it is a party or by which its assets are bound; or (iii) constitute a default or an event that, with the passing of time or giving of notice or other condition, would constitute a default under any such agreement or instrument;

(c) This Agreement constitutes its legal, valid and binding obligations, enforceable in accordance with its terms;

(d) Its obligations under this Agreement constitute, its direct, unconditional and general obligations and rank and will at all times rank at least pari passu in priority of payment security and in all other respects with all its other obligations, other than obligations in respect of which a statutory preference or lien is established solely by operation of law;

(e) In all cases where financial obligation is imposed on it by way of reimbursement of actual expenses or compensation for damages or any other pecuniary liability, it shall settle its obligation to the CONCESSIONAIRE within thirty (30) days from the due date thereof failure to do so of which shall entitle the CONCESSIONAIRE to interest payments of 15% of the principal amount from the due date. If the DPWH still fails to settle its obligation in full within sixty (60) days from the due date thereof, it shall pay the CONCESSIONAIRE liquidated damages in the amount of ½% of the amount due for every day of delay until the full payment of the obligation in addition to the interest penalty just mentioned.

12.02 **CONCESSIONAIRE Represents and Warrants that:**

(a) It possesses all the qualifications required under the BOT Law and the tender documents for it to be pre-qualified as a contractor including but not limited to its compliance with the constitutional and statutory citizenship requirements on equity, experience requirements on all phases of the BOT scheme, and financial capability to sustain the financing requirements for the engineering, construction and operation phases of the project.

CLAUSE 13.0 CONSTRUCTION TIMETABLE

13.01 The parties shall work together in order to achieve the timely completion of the Project in accordance with the following timetable:

Stage	Completion Date
Completion of Conditions Precedent	
Delivery of Land for	
MST Phase I by the DPWH	
MST Phase II by the DPWH	
Completion of	
SLE Phase I	
SLE Phase II	
MST Phase I	
MST Phase II	

13.02 In the event that any breach by the DPWH of the terms of this Agreement causes a delay in any stage of construction there shall be corresponding adjustments in the periods set out Clause 13.01. In the event that the CONCESSIONAIRE does not complete the MST Phase II within four (4) weeks from the Target Completion Date by reason of any omission or act of the DPWH, the DPWH shall pay the CONCESSIONAIRE a sum equal to the costs additionally incurred by the CONCESSIONAIRE by reason of such act or omission payable in full on the Completion Date upon submission of proof thereof.

13.03 If due to its own fault, the CONCESSIONAIRE fails to complete MST Phase II within four (4) weeks from the Target Completion Date, it shall on the actual Completion Date pay the DPWH for each day of delay a penalty of United States Dollars Fifty Thousand (US$ 50,000) until the Completion Date, up to the total amount payable under Clause 13.04.

13.04 If due to the fault of the CONCESSIONAIRE the Completion Date does not occur within three hundred (300) calendar days from the Target Completion Date as provided in Clause 13.01, the CONCESSIONAIRE shall pay the DPWH the sum of United States Dollars Fifteen Million (US$ 15,000,000), less any amount paid under Clause 13.03 by way of liquidated damages plus the confiscation of the CONCESSIONAIRE's performance bond. However, the CONCESSIONAIRE shall not have other liability or obligations in respect of such failure to complete the MST Phase II.

13.05 Upon substantial completion of the MST Phase II, the CONCESSIONAIRE and the DPWH shall jointly certify that the MST Phase II has successfully been completed and that the Completion Date has accordingly occurred.

13.06 The DPWH, by itself and through no fault of the CONCESSIONAIRE or by agreement with the latter, may revoke, cancel or terminate this Agreement in case of Force Majeure, or through no fault of the CONCESSIONAIRE and by mutual agreement with the latter, may revoke, cancel or terminate the agreement in case of failure of the DPWH to provide the required right-of-way and other facilities, or in case of changes in

government plans and policies that require stoppage of the Project or major revisions therein which substantially affect the original design and feasibility of the Project. In any of the aforestated cases, the DPWH is right to revoke, cancel or terminate this Agreement is subject to the CONCESSIONAIRE receipt from the DPWH of the amount mentioned in Clause 4.02. After such payment, all the Works done by the CONCESSIONAIRE including its designs and detailed drawings, materials, equipment, spare parts shall belong to the DPWH. The interest of the government in the aforementioned instances shall be duly insured by the DPWH with any acceptable insurance Agency accredited by the Office of the Insurance Commissioner; provided that the costs of the insurance shall be charged to project cost.

CLAUSE 14.0 VARIATION ORDER

14.01 The DPWH, on its own or upon request of the CONCESSIONAIRE, may issue orders requiring a variation, change modification or alteration in or of the design criteria and standards, performance standards, and specifications as set out in Annex C, or the sequence of the construction timetable as set out in Clause 13.01 provided that such orders do not involve material changes in the scope and nature of the Project, that the variation does not result in any increase in the cost of carrying out the Project, and that the procedures specified in Clauses 14.02 and 14.03 are complied with.

14.02 In the event that the DPWH proposes to issue a Variation Order, it shall give written notice thereof to the CONCESSIONAIRE who shall indicate, as soon as reasonably practicable after receipt of the notice from the CONCESSIONAIRE.

(a) the requirements as to the adjustments to the Target Completion Date and Target Cost which the CONCESSIONAIRE then considers appropriate as a result of such variation;

(b) whether the said variation may lead to a defective design which may prevent the CONCESSIONAIRE from complying with his duties, obligations and warranties hereunder and proposing a modification or modifications to the proposed variation which it considers necessary in order to enable it to comply with its duties, obligations and warranties.

If the DPWH agrees with CONCESSIONAIRE's modifications, it shall give notice thereof and the Variation shall take effect subject to CONCESSIONAIRE's modifications, or withdraw its proposed modifications or if it does not agree to the CONCESSIONAIRE's modifications, shall give to the CONCESSIONAIRE notice to that effect giving its reasons and the CONCESSIONAIRE shall either propose a revised CONCESSIONAIRE's modification or withdraw the proposed modification, in which case the variation shall take effect as originally proposed by the DPWH.

If the it CONCESSIONAIRE is of opinion that the revised modification may result in defective design or prevent it from complying with its duties, obligations and warranties hereunder, it may give notice to the DPWH to that effect and if the DPWH nevertheless issues a Variation Order, the relevant provisions of Clause 14.05 shall apply accordingly.

14.03 If the CONCESSIONAIRE proposes a variation, it shall give written notice thereof to the DPWH.

On receipt of above proposal, the DPWH shall indicate in writing within 14 days whether or not it has any objection to the proposed variation and in case the DPWH has no objection, it shall follow the variation procedure, but the Concessionaire shall not be entitled to the variation and the same shall not take effect unless and until the DPWH gives a written permission that it approves the proposed variation.

14.05 CONCESSIONAIRE shall comply with any Variation Order duly made in accordance with this Clause and CONCESSIONAIRE's warranties given pursuant to Clause 12.02 shall not be released, diminished or affected in any way by reason of any variation made pursuant to a Variation order or otherwise, except where the CONCESSIONAIRE has notified the DPWH in its operation the relevant Variation Order would (notwithstanding the exercise of all due skill and care by the CONCESSIONAIRE) result in defective design or construction, in which case the CONCESSIONAIRE shall be released from the said warranties to the extent that the Variation Order in fact impinges upon them and results in defective design or construction.

14.06 Both parties agree that in the event that any part of the MST Project may need to be enhanced from time to time, for instance, the expansion of any part or parts to a three lane dual carriageway and the CONCESSIONAIRE, wishes to implement any such enhancements thereto, it shall have the right to carry out the same, subject to the DPWH's prior approval.

CLAUSE 15.0 CONTRACT TERMINATION

15.01 By reason of Force Majeure or Exceptional Event.

(a) If Force Majeure or exceptional Event (other than those dealt with under Clause 13.06 causes the performance of this Agreement to be impossible for such a consecutive period of time that either party is unable any longer to perform its fundamental obligations hereunder, then the party so affected may make a proposal in writing to the other for the early termination of this Agreement. If the other party does not accept such proposal and the parties cannot reach a mutually acceptable resolution within 50 days of the proposal being received, the matter may be referred by either partly to an arbitral tribunal established pursuant to Clause 17.0 which shall be entitled to resolve the matter in such manner as it deems most reasonable to both parties under the circumstances (but subject to (b) below).

(b) If this Agreement is terminated pursuant to (a) above, or if the result of the arbitral tribunal's decision pursuant to (a) above is substantially to deprive the CONCESSIONAIRE of the benefits of this Agreement and/or the Contract Rights, the pertinent provision of Clause 13.06 shall apply.

(c) The amount of compensation, expenses and other payments due to the parties as referred to in this Clause shall be determined by the Independent Certification Engineer (acting as expert and not as arbitrator) in the light of an audit to be carried out forthwith as of the date of termination (or as from the decision of the arbitral tribunal) by a firm of auditors of international repute appointed by the Independent Certification Engineer for the purpose the services of the which shall be paid by the DPWH.

15.02 **Termination by the DPWH**

(a) The DPWH shall have the right to terminate this Agreement in the following circumstances;

(1) the registration of the dissolution and liquidation of the CONCESSIONAIRE except for the purposes of amalgamation or reconstruction on terms approved in advance by the DPWH in writing; or

(2) the CONCESSIONAIRE receives a Court order to be under absolute receivership; or

(3) the CONCESSIONAIRE has intentionally been committing a material breach in respect of performance of its obligations hereunder; or

(4) the CONCESSIONAIRE deliberately or with gross negligence and without good cause ceasing to construct or operate the MST.

(b) Rules on Notice

(1) The DPWH shall, prior to exercising its rights to terminate the Agreement under this Clause, send a written notice to the CONCESSIONAIRE requesting it to remedy the cause of any such termination within a period prescribed by the DPWH, which shall not be less than 6 months.

(2) If the said circumstances are not remedied by the CONCESSIONAIRE by the expiry of the said period, the DPWH shall have the right to terminate this Agreement forthwith by notice in writing to the CONCESSIONAIRE.

(c) Upon any termination pursuant to (a) above, the CONCESSIONAIRE shall pay the DPWH liquidated damages and confiscation of performance bond as specified in Clause 13.04.

15.03 Termination by the CONCESSIONAIRE

(a) The CONCESSIONAIRE shall have the right to terminate this Agreement in the following circumstances;

(1) the DPWH intentionally commits a material breach in complying within its obligations under this Agreement,

(2) any governmental compulsory acquisition or expropriation of any part(s) of the site, the right-of-way and/or the MST from the DPWH or the CONCESSIONAIRE, or

(3) the toll rates fixed under this Agreement not being in effect throughout the MST BOT Project, or

(4) the DPWH being dissolved or ceasing to have the powers or authority to perform its obligations under this Agreement without any other agency or authority taking over its rights and obligations in accordance with applicable laws.

(b) Rules of Notice. The CONCESSIONAIRE shall, before exercising its right to terminate this Agreement, send a written notice to the DPWH requesting it to remedy the default and other circumstances. The DPWH shall use its best endeavors to remedy the same within a period of time to be prescribed by the CONCESSIONAIRE which shall not be less than 6 months. If the said circumstances are not remedied before the expiry of the specified period, the CONCESSIONAIRE may thereupon terminate this Agreement.

(c) Upon the termination pursuant to (b) above, the DPWH shall pay the CONCESSIONAIRE the following compensation: the costs and expenses incurred directly in or in connection with the project legally recordable in the books (including Pre-Cancellation Costs) and financing costs together with the costs, losses and expenses incurred or sustained by the CONCESSIONAIRE and the loss of toll revenue to the CONCESSIONAIRE over the unexpired term of the franchise as a result of the early termination. The amount of compensation including the costs, losses and expenses shall be determined by the Independent Certification Engineer (acting as expert and not as arbitrator) in the light of an audit to be carried out forthwith as of the date of termination by a firm of auditors of international repute appointed by the Independent Certification Engineer for the purpose the services of which shall be paid by the DPWH. The amount of lost toll revenues shall be determined by the Independent Certification Engineer (with the assistance (if necessary) of the firm of auditors).

15.04 **Effect of Termination**

(a) On the expiry or termination of this Agreement and/or the Contract Period for whatever reason and without prejudice to any rights of the parties hereto (subject as herein provided):

(1). this Agreement shall cease to have effect, subject to all rights and obligations of the parties existing prior to such termination; and

(2) the Contract Rights shall terminate; and

(3) the rights of the CONCESSIONAIRE over the Site and all other immovable property thereon shall terminate; and

(4) The DPWH shall purchase from the CONCESSIONAIRE at their value in the books and free of any security interest all assets, materials, plant, machinery, equipment, vehicles, spare rights and other movable property owned by the CONCESSIONAIRE in connection with the Works or the operation of the MST; and

(5) Any compensation payable by the DPWH to the CONCESSIONAIRE shall be paid directly into a designated bank account in the name of the CONCESSIONAIRE to be notified to the DPWH by the CONCESSIONAIRE hereafter.

(6) The DPWH shall have the right to refuse to pay any compensation, including the expenses and the loss of toll revenues, to the CONCESSIONAIRE until the DPWH has taken over all the relevant areas and the MST and received from the CONCESSIONAIRE all operation-and accounting-documents, including construction and design documents necessary for the continuing operation and maintenance of the MST.

CLAUSE 16.0 FORCE MAJEURE

16.01 No failure or omission to carry out or observe any of the terms, provisions or conditions of this Agreement shall give rise to any claim by either party hereto against the other party or be deemed to be a breach of this Agreement if the same shall be caused by or arise out of:

(a) Other than as referred to in paragraph (b) below, any war, declared or not, or hostilities, or belligerence, blockade, revolution, insurrection, coup d'etat, riot, public disorder, sabotage, expropriation, requisition, confiscation or

nationalization, export or import restrictions by any governmental authorities, closing of harbours, docks, canals, other assistance to or adjuncts of shipping or navigation of or within any place, rationing or allocation, whether imposed by law, decree or regulation by, or by compliance of industry at the insistence of any government authority or fire, or any natural calamity such as flood, earthquake, volcanic eruption, storm, typhoon, lightning, unusual tide, perils of the sea, tidal wave, accidents of navigation or breakdown or injury of vessels, accidents to harbours, docks, canal or other assistance to or adjuncts of shipping or navigation, epidemic, quarantine, strikes or combination of workmen, lockouts or other labor disturbances, or any other event, matter or thing, wherever occurring, which shall not be within the reasonable control of the party affected thereby; or

(b) Expropriation, confiscation, requisition or nationalization by or involving the Republic of the Philippines, export or import restrictions by any governmental authorities, whether national or local, of or within the Republic of the Philippines, closing of harbours, docks, canal, or other assistance to or other assistance to or adjuncts of shipping or navigation of or within the Republic of the Philippines, rationing or allocation, whether imposed by law, decree or regulation by, or by compliance of industry at the insistence of, any governmental authority of or within the Republic of the Philippines, or any other event, matter or things, wherever occurring, which is attributable to DOTC or the government of the Republic of the Philippines, or any agency or national or local authority thereof.

Each of the foregoing events, matter or things being called "Force Majeure" in this Agreement.

16.02 The DPWH shall not entitled to claim for itself Force Majeure in respect to events of any Force Majeure mentioned in sub-paragraph (b) of Clause 16.01.

16.03 The party invoking Force Majeure shall:

(a) Notify in writing the other party as soon as reasonably possible of the nature of the Force Majeure and the extent to which the Force Majeure suspends the affected party's obligations under this Agreement; and

(b) Resume performance of its obligations as soon as Force Majeure ceases to exists.

16.04 If Force Majeure occurs during the Construction Period, the parties shall meet to discuss a revised timetable for the completion of project, if such completion is still feasible; provided always that in any event, the CONCESSIONAIRE shall be entitled to an extension of time in which to complete its obligations hereunder equal to the period of delay caused by such Force Majeure.

16.05 The parties hereto will consult with each other and take all reasonable steps to minimize the losses of wither party resulting from Force Majeure.

CLAUSE 17.0 ASSIGNMENT AND DELEGATION

17.01 The DPWH may assign, transfer, or charge its rights under this Agreement to any government agency or corporation without CONCESSIONAIRE's consent or to any other person to whom the CONCESSIONAIRE may give its prior written approval.

17.02 The CONCESSIONAIRE may assign or charge his rights to receive money under this Agreement to or in favor of the CONCESSIONAIRE's bankers without the DPWH's prior written consent, or at option to any other person to whom the DPWH may give its prior written approval.

17.03 CONCESSIONAIRE may assign its rights and transfer its obligations under this Agreement to any person if the same is at the instance of and with the prior written consent of the DPWH, whereupon CONCESSIONAIRE's rights and liabilities under this Agreement shall cease, but without prejudice to the then accrued rights or remedies of the parties.

17.04 CONCESSIONAIRE shall not delegate or sub-let the performance of the services in whole or in any material part, without the prior written consent of the DPWH.

17.05 No delegation or sub-letting by the CONCESSIONAIRE shall relieve the CONCESSIONAIRE of any of its responsibilities hereunder.

CLAUSE 18.0 DISPUTE RESOLUTION

18.01 The parties hereto agree that in the event that there is any dispute or difference between them arising out of this Agreement or in the interpretation of any of the provisions hereof, they shall meet in an effort to resolve such dispute by discussion between them but failing such resolution, the Coordination Committee created pursuant to Clause 10.04 shall meet to resolve such dispute or difference and the decision shall be binding upon the parties hereto.

18.02 In the event that no resolution of the dispute or difference is reached by the Coordination Committee, either party may refer the matter to arbitration.

18.03 Arbitration under this Agreement shall be governed by the Rules on Arbitration of the Construction Industry Arbitration Commission under the Department of Trade and Industry.

18.04 To the extent that the DPWH has or hereafter may acquire any immunity (sovereign or otherwise) from any legal action, suit or proceeding, from jurisdiction of any court or from set-off or any legal process (whether service of notice, attachment prior to judgement, attachment in aid of execution of judgement, execution of judgement or otherwise) with respect to itself or any of its property. The DPWH hereby irrevocably and unconditionally waives and agrees not to plead or claim such immunity in respect of its obligations under this Agreement.

CLAUSE 19.0 EFFECTIVITY

19.01 Subject to the provisions of Clause 3.0, this Agreement shall become effective upon the approval by the President of the Philippines pursuant to existing law. It shall remain in full force and effect for a period of _____ years from the issuance of the joint certification under Clause 3.03. It may be extended for another term provided the total period does not exceed fifty (50) years.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be signed on the date and place written above.

DEPARTMENT OF PUBLIC WORKS & HIGHWAYS

By:

JOSE P. DE JESUS
Secretary

CONCESSIONAIRE

By:

_____
President

SIGNED IN THE PRESENCE OF:

_____ _____

Annex A

TECHNICAL DESCRIPTION OF THE MANILA SOUTH TOLLWAY PROJECT

Annex B

TECHNICAL DESCRIPTION OF THE REHABILITATE-OPERATE-AND-MAINTAIN THE REVERTED PORTIONS OF THE SOUTH LUZON EXPRESSWAY

Annex C
DESIGN CRITERIA AND STANDARDS, PERFORMANCE STANDARDS, AND SPECIFICATIONS

See Appendix A3-1.

Annex D
MST BOT PROJECT TIMETABLE

Annex E

PRELIMINARY ENGINEERING DESIGNS AND PLANS - MST

Annex F
TOLL RATES

Annex G
TOLL RATES ADJUSTMENT FORMULA

Annex H
SCOPE OF WORK
FOR THE SERVICES OF THE INDEPENDENT CERTIFICATION ENGINEER

The Scope of Work of the Independent Certification Engineer are those functions to be done by the Independent Certification Engineer as specified in the MST BOT Project Agreement.

SECTION 1: GENERAL REQUIREMENTS

The Independent Certification Engineer is required to plan his staffing and undertake his certification in a timely manner to suit the best interests of the MST BOT Project. The Independent Certification Engineer will be required to provide monthly progress reports on his work and attend such meetings as may be called by DPWH, the Concessionaire and/or the Project Manager selected by the Concessionaire in connection with this Project.

SECTION 2: DELIVERY OF LAND

The Independent Certification Engineer shall certify that the land or Site on which the project facilities Works are to be constructed and which is indicated in the MST BOT Project Agreement is delivered free of all encumbrances to the Concessionaire:

SECTION 2.1: Provision of Utilities

The Independent Certification Engineer shall confirm whether the relevant public utilities have made timely and sufficient arrangements for the provision of utilities for the parts of the Site delivered to concessionaire by DPWH, on fair and reasonable terms and rates.

SECTION 2.2: Clearance of Sites

The Independent Certification Engineer shall confirm whether DPWH has procured the removal of all structures, buildings and impediments hindering construction, other than utilities on the relevant parts of the Site delivered to the Concessionaire. He shall confirm whether DPWH has used its best endeavors to procure the closure of any roads, and/or taken such other actions as may be necessary to ensure the unimpeded and uninterrupted construction of the Works, provided that structures, buildings and other impediments to construction below ground level or not more than 50 cm above ground level, need not have been removed by DPWH.

SECTION 2.3: Delays in the Delivery of Land

In the event that DPWH delivers any part(s) of the Site after _____199__,[3] the Independent Certification Engineer shall determine the period of time within which concessionaire shall be obliged to complete the Works on those parts and if any compensation, owed by the DPWH to the Concessionaire for delays in the delivery of land according to the MST BOT concession agreement, is due.

Section 3: Consultation With DPWH

The Independent Certification Engineer shall confer with DPWH on any matter relating to the works, and shall inform the Concessionaire in advance of any such consultation. Concessionaire shall be entitled to have sight of and to express comment on any report or information before it is submitted by the Independent Certification Engineer to DPWH.

SECTION 4: MATERIALS TESTING AND QUALITY CONTROL

The Concessionaire shall ensure that the Independent Certification Engineer is provided with advance notices of all tests and examinations of materials, plant and equipment and that certified copies of all certificates and test results are provided to the Independent Certification Engineer by the Project Manager selected by the Concessionaire.

The Independent Certification Engineer, shall at such times and in such manner as he considers appropriate, observe tests of materials and equipment and confirm whether adequate and proper quality control procedures are being implemented. He shall forward copies of any certificates issued by the Project Manager selected by the Concessionaire and confirmed by the Independent Certification Engineer, in respect of the quality of the works.

[3] A date must be specified.

SECTION 5: INSPECTIONS

The Independent Certification Engineer shall carry out periodic inspections of the construction of the MST BOT Project as it proceeds to confirm whether it complies with the Approved Designs, the relevant specifications, regulations, standards and construction codes applicable thereto, and with the relevant obligations of the Concessionaire pursuant to the MST BOT Project Agreement, and to generally monitor progress of the Construction Stage of the Works.

The Independent Certification Engineer shall convene monthly meetings for the purpose of discussing and examining particular issues and difficulties concerning the construction of the MST.

SECTION 6: CONSTRUCTION METHODS

The Independent Certification Engineer shall confirm whether the methods of construction employed on the MST BOT Project are in accordance with sound engineering practice and are not likely to endanger the permanent works, adjacent property or the safety of the public.

SECTION 7: COMPLETION CERTIFICATES

Before opening any section of the Works to the public, the CONCESSIONAIRE shall give notice to the Independent Certification Engineer, who shall confirm in writing within 14 days whether or not the section is ready for use as a public highway on the grounds of safety.

SECTION 8: FORCE MAJEURE

In the event of a Force Majeure, the Independent Certification Engineer shall certify the occurrence of the same, and also certify the effect on the party seeking relief under the MST BOT Project agreement, including any extension to the date of Completion of construction.

SECTION 9: TERMINATION OF THE MST BOT PROJECT AGREEMENT

In the event of termination of the MST BOT Project Agreement, the Independent Certification Engineer shall determine the amount of compensation payable to either DPWH or the CONCESSIONAIRE.

SECTION 10: AMENDMENTS TO THE MST BOT PROJECT OR CONCESSION AGREEMENT

In the event that DPWH or the Concessionaire wishes to amend, Design Criteria and other general characteristics of the MST BOT Project or Concession Agreement, the agreement of DPWH and the Concessionaire shall be obtained before the change is adopted. The views of the Independent Certification Engineer in relation to any such amendment may be sought by DPWH and Concessionaire but DPWH retains the right (provided the prior written approval of Concessionaire has been obtained) to alter, vary or amend the Design Criteria or other general characteristics of the MST BOT Project without the need to obtain the Independent Certification Engineer's consent.

SECTION 11: OBLIGATIONS

The Independent Certification Engineer shall act fairly and impartially as between the Concessionaire and the DPWH and at all times in accordance with the terms of the MST BOT Project Agreement.

SECTION 12: INSTRUCTIONS

The Independent Certification Engineer will only accept instructions which have been signed by both the Concessionaire and the DPWH.

SECTION 13: REPORTS

The Independent Certification Engineer shall report to the Concessionaire, the DPWH and the Lenders' Representative.

SECTION 13.1: Monthly Reports

The Independent Certification Engineer shall submit to the DPWH and the Concessionaire a monthly report covering progress and quality of the Works.

SECTION 13.2: Quarterly Report

The Independent Certification Engineer shall submit to the DPWH and the Concessionaire quarterly reports covering progress being made, identification of problems and solutions, financial status of the project and the quality of the Works.

SECTION 14: AS-BUILT DRAWINGS

Upon Completion of construction, the Project Manager selected by the Concessionaire will submit to the Independent Certification Engineer drawings indicating the as-built details of the Works. The Independent Certification Engineer shall check the drawings and if appropriate indicate his agreement by completing four copies of a Check Certificate and sending them to DPWH, Concessionaire and the Project Manager.

APPENDIX TO CHAPTER 10

Appendix A10-1
TERMS OF REFERENCE FOR THE PRELIMINARY ENGINEERING DESIGN

Appendix A10-1
MANILA SOUTH TOLLWAY PROJECT
TERMS OF REFERENCE FOR THE PRELIMINARY ENGINEERING DESIGN

I. INTRODUCTION

The need for additional highway traffic capacity in the corridor proceeding south from Metro Manila along the existing South Luzon Expressway has become quite evident in recent years. The Government of the Philippines(GOP) has placed a high priority on creating improvements in this corridor to alleviate the increasing congestion caused by the growth of commercial and commuting traffic.

In this light, the Government has identified a project called the Manila South Tollway Project(MST) which is intended to address two major issues: 1) To create new capacity, minimizing congestion, improving level of service, and utilizing Government-owned right of way as much as possible, and 2) Providing rehabilitation and improvements to the existing South Luzon Expressway between Alabang and President Quirino Avenue in Manila. Due to the scarcity of public funds available to undertake this project and also to recent efforts of the Government to involve the private sector in public infrastructure development, the Government of the Philippines' Coordinating Council of the Philippine Assistance Program (CCPAP) has placed the Manila South Tollway project on its list of projects approved for private sector investment, ie. the Build-Operate-Transfer(BOT) concept.

II. DESCRIPTION OF PROJECT

The Manila South Tollway Project is comprised of two major components: 1) The construction, operation, and maintenance of a new, mostly elevated, limited access toll expressway, and 2) The rehabilitation, operation and maintenance of the existing South Luzon Expressway. These Terms of Reference pertain to the Preliminary Engineering Design of the works to become the basis for accurately describing and evaluating the work to eventually be financed and undertaken by a BOT concessionaire.

The Manila South Tollway is envisioned as a six-lane, limited access, elevated viaduct structure following the alignment of the existing South Luzon Expressway corridor. This project is approximately 19 kms. in length beginning at President Quirino Avenue in the north and ending at Alabang in the south. Between President Quirino Avenue and Bicutan, the MST runs as a single elevated roadway structure within and over the Philippine National Railways(PNR) right of way, diverting slightly for about one kilometer to the general alignment of the East Service

Road where it lowers to ground level to meet vertical clearance requirements imposed by the existing runway of the Ninoy Aquino International Airport (NAIA). At Bicutan, the MST no longer follows the alignment of the PNR but bifurcates into two separate elevated roadway structures over the median of the SLE and at the edge of the East Service Road, terminating at Alabang.

The MST Project will therefore consist of:

- Preliminary design of a six-lane elevated expressway approximately 18 kms. in length,
- Preliminary design of about 1 km. of six-lane expressway at grade to accommodate runway clearance at NAIA and to coordinate with the proposed C-5 expressway,
- Analysis and design of interchanges and ramps at seven(7) locations,
- Specification and design of a computerized toll collection system and related facilities,
- Planning of the upgrade and maintenance program for the existing SLE, and
- Preparation and compilation of final bidding documents for the selection of a concessionaire.

III. OBJECTIVE

The Urban Road Projects Office(URPO) of the Department of Public Works and Highways(DPWH) intends to seek the services of qualified consulting engineering firms(hereinafter referred to as the Consultants) to undertake the Preliminary Engineering Design for the Manila South Tollway Project (hereinafter referred to as the MST). These Terms of Reference describe the major services required to carry out the project described hereinabove.

IV. SCOPE OF SERVICES

A. Surveys

The Consultant shall be responsible for obtaining all necessary data and field information required to conduct the preliminary design and right of way acquisition drawings for this project. Anticipated surveys to be conducted and data to be acquired include topographic surveys, aerial photography, property surveys and title searches, traffic surveys, geotechnical investigations, utility surveys, and environmental surveys.

1. Topographic Surveys - The Consultants shall conduct all topographic surveys required for the preliminary design of the MST. Permanent field references, trig points, and bench marks shall be established in adequate numbers so as to facilitate relocation or re-establishment of key points and eventual establishment of important geometric points. Survey plans shall clearly illustrate all existing topographical detail, spot elevations, contours at 0.20 m intervals, grid lines at 100 m intervals, coordinates and elevations of permanent bench marks, traverse monuments, and other important reference points.

   Closed main traverses and triangulations shall be at minimum class II, second order, with error of closure of not greater than 1:20,000. Main traverse points and supplementary traverse points shall be made and secured on solid concrete poles, either circular or square in section. Permanent reference points shall, to the extent possible, be established outside the anticipated zone of construction.

   Cross sections of existing ground elevations shall be taken at not more than 25 m intervals and at critical points in between where features change substantially.

   Field books, survey records, and plotted original hard copy shall be preserved and be turned over to the Client at the conclusion of this project.

2. Aerial Photography - In conjunction with physical ground surveys, contour and topo maps shall be prepared utilizing up to date aerial photography taken at a scale conducive to the works or as regulated by law. The Consultants will be responsible for establishing and confirming all photogrammetric target reference points, conducting all aerial photography, monitoring all aerial data reduction and the preparation of resulting topographical mapping at a scale of 1:1,000.

3. Property Surveys - The Consultant will conduct title and deed searches as well as property surveys as necessary to reasonably establish the property corners of all properties adjacent to the corridor right of way and in the areas likely to be affected by interchange and ramp requirements or utility easements.

4. Traffic Surveys - Manual classified traffic counts will be taken on the existing SLE between Alabang and Pres. Quirino Avenue including the main line, interchange ramps, service roads, and major at grade intersections to develop baseline traffic data. Counts will be over a representative three-day period and will include morning and evening peak periods. Adequate supervision and/or verification must be provided to ensure accuracy of the collected data. Data will be reduced into a form showing baseline 24-hour and peak volumes, traffic composition, and on/off and turning movements.

5. Geotechnical Investigations - The Consultant shall conduct preliminary soils, materials, and foundation investigations for the purposes of water table determination, materials locations, subgrade evaluation, pavement design, foundation design, and dewatering requirements. These investigations shall include but not necessarily be limited to: collection of existing maps, data, and information; hand auger borings and test pits at appropriate frequencies to a minimum depth of 2 m; power borings at bridge sites and interchange foundation locations to bedrock or auger refusal, and ; visual field investigation of the proposed sights.

   All standard and applicable tests required to adequately classify and identify the in situ soils and their characteristics shall be carried out in an approved laboratory by qualified professionals in accordance with DPWH standard requirements and recognized international standards.

6. Utilities Surveys - The Consultants shall be responsible for obtaining and spot verifying the type, size, and locations of the various utilities crossing over, under or through the proposed project sites. These investigations shall include field views, existing plan and data acquisition from various responsible authorities, field surveys and test trenches as necessary to adequately locate and identify all existing(and planned) utilities within the influence area of the proposed design.

   Such utilities would include but not necessarily be limited to water, sewer, electric, communications, CATV, drainage, irrigation and possible military usage. Facilities related to the nearby Ninoy Aquino International Airport must also be considered.

7. Rehabilitation of SLE Survey - In conjunction with the data collected in the topographic survey, a visual field inspection by qualified engineer(s) must be performed to collect the base data for evaluation of existing pavements, structures, and appurtenances of the SLE. Both written and photographic record shall be taken of pavement slab cracking, potholes, joint failure, spalling and ravelling of concrete, uneven settlement of pavement slabs, ruts, broken curbs, guard rail, parapets, and other safety structures, failed or failing drainage structures, damaged, deteriorated, or missing signs, and all items of work necessary to the rehabilitation, repaving, restoration and/or reconstruction of the SLE between Magallanes Interchange and Alabang Viaduct.

8. Environmental Surveys - Surveys must be conducted in support of an environmentally sound design as well as in preparation of an Environmental Impact Study (EIS)/Environmental Assessment (EA) with the goal of assisting DPWH obtain an Environmental Clearance Certificate (ECC) for the MST Project. Such surveys would include noise, air quality, water quality, perception studies or data surveys for sociological evaluation, test pits for archeological analysis, and Flora, fauna, and soils studies as may be required. In particular, with respect to sociological studies, a squatter census must be conducted in all areas to be affected by construction.

B. Traffic Engineering Analysis

The Consultant will undertake the development of a traffic model calibrated using up-to-date traffic data, and will apply the model to prepare traffic forecasts needed for the preliminary engineering design.

1. Calibration of the Traffic Model - Collected traffic data will be used as a basis for adjusting an existing traffic network model to be selected from those currently in use by Philippine Government agencies. The selected model will be calibrated so that it can satisfactorily replicate observed baseline data. Coordination will be maintained with ongoing transportation modeling work in the Metro Manila area.

2. Traffic Growth Projections - Traffic demand forecasts will be prepared for a 30 year time horizon based on historical growth rates and expected socioeconomic development in the areas of influence. Major assumptions regarding value of time, toll structures, choice criteria, etc. will be developed in close coordination with DPWH.

3. MST Design Requirements - MST design characteristics will be determined based on traffic forecasts of the calibrated model. Directional peak hour volumes will be identified for the mainline and ramp sections for the expected 1999 opening year as well as for the 30 year project study period.

4. Re-examination of Financial Analysis - Based on the recent and more reliable traffic data, the Consultant shall re-evaluate the financial analysis of the project utilizing more detailed construction costs and various toll structure scenarios. This re-examination of the financial analysis should result in a clearer, more up to date, picture of the financial viability of the project taking into account the current status of the capital markets in the country.

C. Preliminary Engineering Design

The basis for preliminary engineering design shall be the Conceptual Design Analysis which will be provided to the Consultant by DPWH/BOT-PMO. The Preliminary Engineering Design drawings and documents to be prepared under this project should be roughly about 35% of the effort required to produce final detailed engineering design and will be used as a control to guide the eventual design by a contractor or BOT concessionaire. Other guidelines for the preliminary design are listed in the following subsections.

1. Alignments - Horizontal and vertical geometric alignments of the elevated and at grade portions of the tollway shall be designed in accordance with DPWH practice and acceptable international standards, taking into consideration all of the physical controls regarding the existing PNR, South Luzon Expressway and other facilities affected by this design. Plan and profile shall be drawn to appropriate metric scales on the order of 1:1,000 for horizontal 1:100 vertical.

2. Typical Sections - Typical cross sections shall be prepared for each different location of design. These shall include at grade and elevated sections of the expressway, on-off ramps at interchange areas, access and service roads, intersecting arterial roads scheduled for improvements or widening, and drainage ditches and related improvements. Typical sections should be identified by base line station limits and name of road or facility.

3. Pavement Design - Recommended pavement sections shall be determined using relevant DPWH criteria supplemented where necessary by American Association of State Highway and Transportation Officials(AASHTO) design methods, or other internationally recognized design procedures acceptable to DPWH. Pavement design should be based on the cost and availability of locally available materials and suppliers as well as traffic volumes and axle loadings resulting from the associated traffic studies.

4. Interchange/Intersection Design - Locations of interchanges on the MST with existing arterials must be studied for the purpose of maximizing effective traffic handling as well as optimizing revenue capture. Types of interchanges and size and locations of ramps will be determined by traffic requirements as well as adjacent existing physical constraints.

   Intersections between the existing South Luzon Expressway and the crossing arterials will be improved as necessary for the rehabilitation and operation of the SLE.

5. Structural Design - The structural design of the typical elevated viaduct and ramp structures has already been completed to the preliminary design stage as part of the previously mentioned Conceptual Design Study, which will be provided to the Consultant. Very little further work need be done in this area, particularly in view of the likelihood that the Concessionaire will adopt a different structural system.

Additional structural design may be necessary at locations where right of way(ROW) acquisition plans need to be prepared prior to the awarding of a BOT contract. Such locations could include, but not be limited to, abutment/retaining wall designs at ramp terminals, retaining wall and tunnel roof designs where MST goes beneath C-5, and the termination of MST on/at the Alabang viaduct.

Preliminary foundation design will need to be performed based on the geotechnical investigations which are part of this project. The Conceptual Designs and corresponding costs may need adjustment based on this task.

6. Drainage Design - The integrated drainage requirements of the MST, the SLE, the service roads, existing intersecting arterials, as well as proposed projects and development impacting this corridor need to be determined and addressed as part of this preliminary design effort. Failsafe flood prevention methods need to be investigated particularly for areas of depressed expressway sections in the vicinity of the NAIA airport runway.

   Drainage design shall be in accordance with the DPWH Design Guidelines Criteria and Standards supplemented by Highway Drainage Guidelines, 1987, published by AASHTO.

7. Materials and Specifications - Specifications for quality of materials and control of construction shall be the *DPWH Standard Specifications*. Materials shall meet relevant AASHTO and ASTM Standards.

   The Standard Specification shall be augmented or modified as deemed necessary during the design stage by Supplementary Specifications or Special Provisions.

8. Electrical, Mechanical, Traffic Control and Surveillance - Expressway lighting and other electrical requirements of the project Shall be in conformity with the Philippine Electrical Code 1988, and with other recognized international standards where necessary. Traffic control and maintenance of traffic during construction shall be in accordance with the Manual on Pavement Markings, Republic of the Philippines, 1980 and supplemented by the Manual on Uniform Traffic Control Devices, USDOT/FHWA, 1988. A state of the art expressway surveillance system shall be required to monitor highway safety, traffic congestion, roadway conditions, and to assist in maintaining law and order. Fire protection shall be in accordance with the National Fire Code 1980 and all local codes and ordinances.

9. Toll Plaza and Automated Toll Facilities - A barrier toll plaza must be designed based on traffic projections and must provide a generous approach paving with smooth, safe geometrics for easy maneuvering of vehicles in the toll plaza area. Capacity of toll gates, structural design, drainage design, ventilation and mechanical design, and utilities must be in accordance with accepted international procedures. An automatic toll collection and monitoring facility must be described but detailed specification of the system shall be at the discretion of the Constructor/ Concessionaire.

10. Right-Of-Way Drawings - When sufficient detail of the preliminary engineering design is available, the Consultant shall prepare drawings clearly indicating and defining those properties or portions of properties which need to be acquired. All distances and offsets should be based on the same precise survey baseline utilizing the same set of permanent markers and bench marks as for the preliminary design. All points should be reproducible in the field from at least three different locations.

All property takes, utility and construction easements or other required property acquisitions should be shown clearly on the plans, numbered, and with name of owner(s). Separate property plats shall be prepared in A4 or A3 size as appropriate for each individual property with full descriptions of deed information for the purpose of land acquisition negotiations between the Government and the land owners. These property plats should clearly depict the location of Right-Of-Way lines and indicate the area(s) to be taken, in square meters or in hectares.

11. Construction Cost Estimates - Estimates of the cost to construct the Manila South Tollway, ancillary construction, and rehabilitation of the South Luzon Expressway shall be prepared based on quantities of the Preliminary Engineering Design and determined by individually computed unit prices. Said unit prices will be derived both from previous recent Department experience and from calculations of the cost of labor, materials, equipment, hauling, and other costs particular to each item of construction work anticipated, including utility relocation costs and maintenance and protection of traffic.

These construction cost estimates shall be held confidential in nature for the use of the Department and shall take on even greater significance should the construction be funded by other than private investment(i.e. public funds, ODA funds, bonds, etc.).

12. Rehabilitation of SLE - A set of detailed drawings and criteria must be prepared to adequately describe the amount and extent of rehabilitation work which needs to be done on the existing portions of the SLE within the Alabang to Magallanes limits of work. The drawings shall include, but not be limited to: correction of road levels due to flooding; repair of damaged pavements and shoulders; reinstallation of security fencing; provision of appropriate traffic signs, signals and monitoring systems; and, and efficient overall traffic management plan.

D. Environmental Impact Statement

The Consultant must prepare a Draft and Final Environmental Impact Statement(EIS) for use by the Department in applying for an Environmental Clearance Certificate (ECC) necessary for further prosecution of the construction of the project. The EIS must be carried out in conformance with guidelines established by Philippine Presidential Decree No. 1586 and the most recent requirements of the Environmental Management Bureau(EMB), Department of Environment and Natural Resources(DENR).

Cumulative impacts on specific resources of plan proposals and other scheduled projects in the surrounding area must be identified. The document must address the following topics: earth; air; water quality; vegetation; wildlife; noise; public safety; population; housing; transportation/circulation; public services and utilities; energy impacts; scenic resources/aesthetics; historical/archaeological resources; cultural/socioeconomic conditions; and construction impact.

V. THE CONSULTANT'S RESPONSIBILITIES

The Consultant shall carry out the work as described in Section IV, Scope of Services, contained herein.

The Consultant shall be responsible for all engineering and related project works required to carry out the preliminary engineering design. Execution of the design shall be in close cooperation with the DPWH Urban Roads Project Office and the DPWH BOT-PMO. The work shall be performed in conformity with the expressway standards developed for this project in conjunction with existing DPWH and other internationally recognized expressway design and construction criteria. An original version of any international design standard utilized for this project shall be supplied to the DPWH/BOT-PMO.

The international system(SI) of weights and measures shall be used by the consultants in their designs, studies, and reports.

The Consultants shall be responsible for the conduct of its expatriate employees in ensuring that they follow and abide by the civil rules and regulations of the Republic of the Philippines, to the extent for which exemption has not been granted by the Government.

VI. INFORMATION TO BE PROVIDED BY DPWH

The DPWH shall provide the Consultants with all locally available data and reports relevant to their work. The DPWH will assist and sponsor the Consultants in their attempts to acquire data, plans, maps, aerial photography, licenses, clearances and other such project necessities from other Government of the Philippines agencies. Provision of these items, such as aerial photography or maps, will not necessarily be free of cost.

The DPWH shall also share historical pricing and bidding data with the Consultant for the purpose of deriving appropriate unit prices. Detailed designs, plans, reports, and studies of adjacent or intersecting construction projects shall be provided to the Consultant.

DPWH shall assist the Consultant in verifying to the Department of Justice, the Department of Foreign Affairs, and the Commission on Immigration and Deportation, the need for the Consultant, its employees, and the employees' legal dependents to be in country for the duration of the work described herein.

VII. ADMINISTRATION OF THE PROJECT

This preliminary engineering design shall be carried out under the supervision of the DPWH/BOT-PMO or such other office as DPWH may designate. DPWH will nominate one senior representative as Project Director and delegate to that representative the authority and responsibility to approve and administer this contract on behalf of the DPWH.

The DPWH will assign qualified senior engineers to assist the Consultants and liaise between the Consultants and concerned Government agencies.

VIII. DESIGN CRITERIA

Design criteria to be used for the design of the expressway and ancillary facilities shall be that approved for used by the DPWH and as described briefly in Section C above. Any design criteria or standards not presently part of those in used by the DPWH shall be first submitted for review and approval by the Consultant to the DPWH/BOT-PMO. Design criteria and materials standards submitted for consideration should be of proven and recognizable international standards.

IX. PROJECT SCHEDULE

The total duration of this project shall not exceed 18 months, including all traffic surveys, analysis, preliminary engineering design and Right-Of-Way drawings. The project schedule should include periodic reviews or briefings to evaluate concepts and check progress at not more than three month intervals.

X. PROJECT DELIVERABLES

The following items are to be considered the deliverable products of this effort:

A. Status Reports

A status report shall be prepared for each month of the project and shall be submitted no later than the 15th day of the following month. Monthly reports shall be submitted to the DPWH and other agencies as agreed in a total of 15 copies.

B. Traffic Report

A traffic analysis report shall be prepared and submitted in draft form 5 months after the Notice To Proceed(NTP). Ten(10) copies shall be submitted for review and comment, after which comments will be responded to and/or incorporated into the report, after which the final traffic report will be prepared and submitted in a total of 15 copies.

C. Preliminary Engineering Drawings and Specifications

Preliminary drawings including, but not limited to, a reference map, location map, plans, profiles, drainage plans, construction details, utility relocation drawings, structural drawings, and maintenance of traffic plans shall be prepared, along with Supplementary Specifications and Special Provisions, and submitted for review within 16 months of NTP. Minor changes and corrections, if any, shall be incorporated and the completed submission made in the 18th month after NTP.

Twenty-five (25) copies of the plans and specifications shall be submitted to DPWH and other agencies as designated by DPWH.

D. Right-of-Way Drawings

Ten (10) sets of ROW plans, along with individual property plats, shall be submitted to the DPWH within 14 months of the receipt of NTP. It will be the Department's desire to receive partial submissions on a section by section basis prior to that time as they become available, in order to expedite ROW acquisition.

E. Drainage Design Report

A special report dealing with the integrated drainage design for the MST and the existing SLE shall be prepared and submitted in ten(10) copies at a time suitable to the prosecution of the preliminary engineering design, but not later than month 12 of the project.

F. Foundation Design Report

A foundation design report incorporating all of the results and analyses of the geotechnical investigations and preliminary foundation designs shall be prepared and submitted in ten(10) copies not later than month 9 after receipt of NTP.

G. Environmental Impact Statement

An environmental impact analysis and report, constituting the Environmental Impact Statement, shall be prepared and submitted in accordance with established EMB procedure in fifteen(15) copies no later than month 13 after NTP.