21. PROJECT IMPLEMENTATION AND RECOMMENDATIONS

Financing

- The total project cost is roughly estimated to be P55 billion for 150 kms of MMUES, therefore, investment requirement is a little more than P3 billion per year for 16 to 18 years.

- Considering the intensive investment required for the project, the combined public/private sector funding system would be recommended.

- Private participation in form of BOT or similar shall be encouraged at the maximum extent providing that public interest is protected. The full utilization of soft loan from international lending institutions shall be positively pursued.

Organization

- A single and exclusive body attached to the Government would be preferred to ensure uniform operation and efficient traffic management (an example is shown in Figure 21.1).

- A body shall be capable of planning, design and construction supervision and R.O.W. acquisition as well as BOT type project implementation.

- A body shall be responsible for preparing a basic plan which shall clearly show the basic concept of requirements including minimum level of facilities needed, major design elements, expected construction timing as well as minimum requirements for financial arrangements. Particularly for sections where private sector funding are planned, such basic plan shall be prepared so that interesting tenderers can offer their tender proposal based on the plan.

ROW Acquisition

- Relocation of households affected by the project is a significant social impact which can be traumatic for those affected. The effect of R.O.W. acquisition is mainly financial in view of the high cost of private land along commercial and residential areas affected.

- To ensure the smooth implementation of the project, a new and drastic system for R.O.W. acquisition shall be developed. For example, private land valuation for R.O.W. acquisition shall be based on prevailing market prices, and also the Government shall be solely responsible for arranging new relocation sites for those affected.

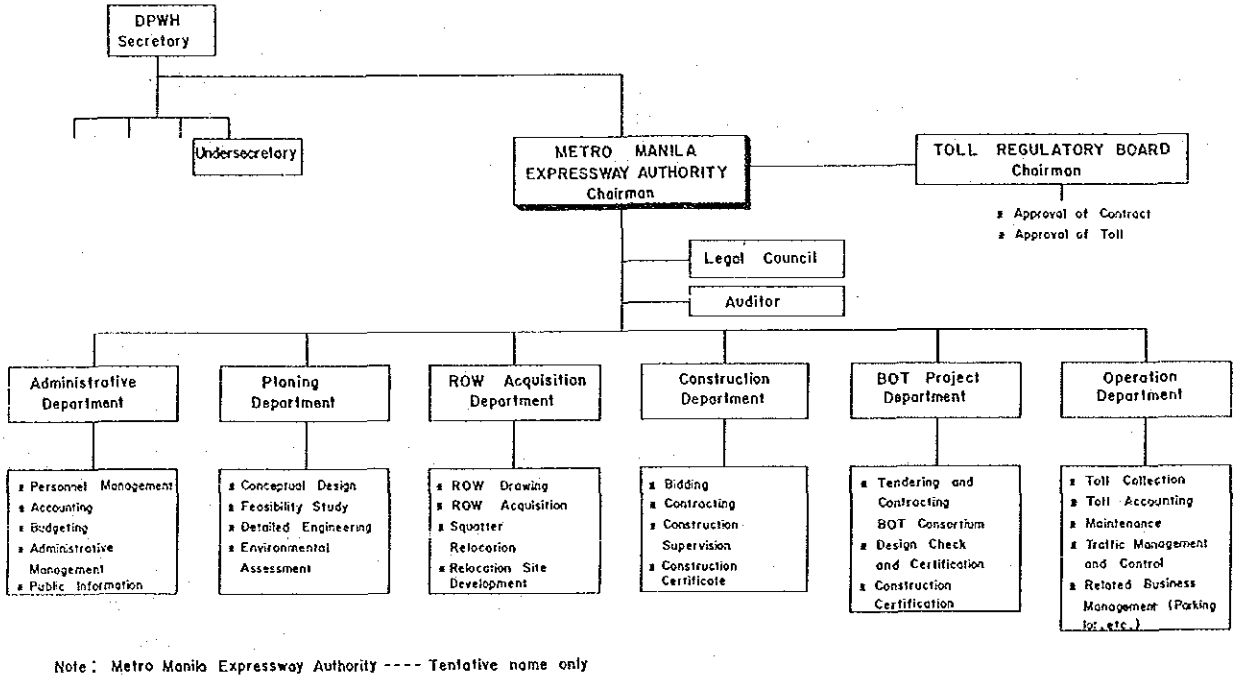
- Though pain of affected households can not be compensated, the Government should make every possible effort to compensate them to a maximum extent possible in terms of monetary form.

Improvement of At-Grade Roads

- The planned at-grade roads projects shall be timely implemented well ahead of construction of related expressways. Particularly, these includes missing sections of C-2, C-3 and C-5, and additional distributor roads outside EDSA, among others.

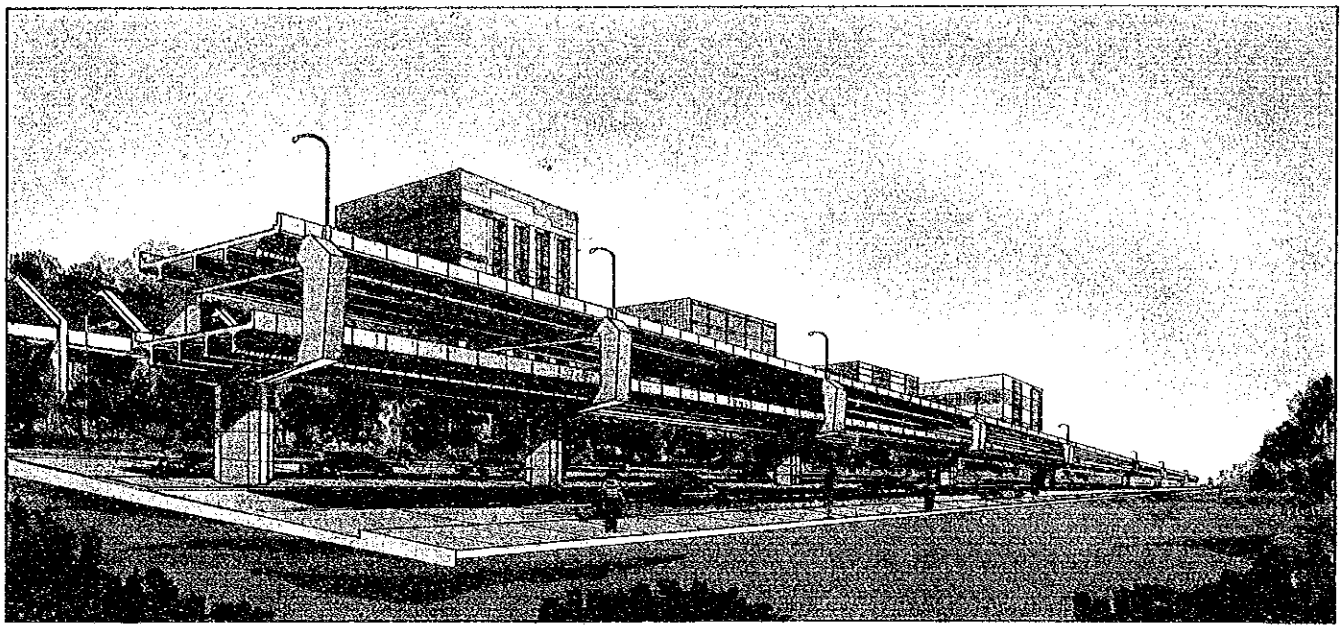
- Construction of at-grade roads along R-2 and C-6 alignments is suggested. At least, proposed alignments shall be fixed and R.O.W. shall be acquired.

- Grade separations at intersections shall be designed to be compatible with proposed expressways.

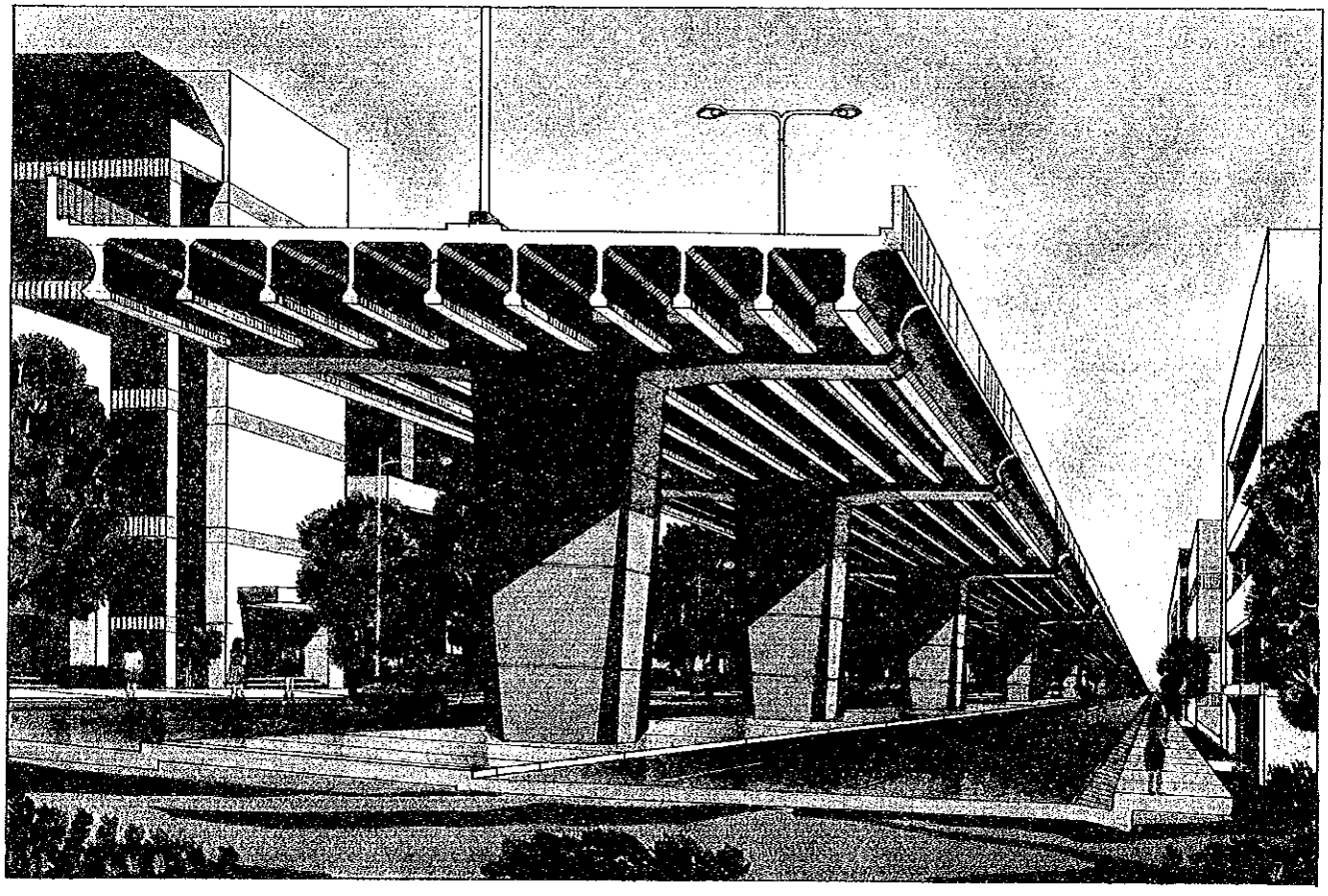


Note : Metro Manila Expressway Authority ---- Tentative name only

FIGURE 21.1 PROPOSED ORGANIZATION FOR METRO MANILA EXPRESSWAY AUTHORITY



VIEW OF DOUBLE DECK TYPE EXPRESSWAY



TYPICAL VIEW OF ELEVATED EXPRESSWAY

B. FEASIBILITY STUDY

1. INTRODUCTION

1.1 METRO MANILA URBAN EXPRESSWAY SYSTEM (MMUES)

Metro Manila Urban Expressway System (MMUES) is composed of two (2) circumferential expressways, namely Route C-3 and Route C-5, and 11 radial expressways. Routes C-3 and C-5 are located 6 to 8 km. apart and are connected with each other by six (6) radial expressways at an interval of 4 to 8 kms. In the area inside Route C-3, three (3) radial expressways are extended towards Manila CBD. In the area outside Route C-5, eight (8) radial expressways are extended towards the outer area of Metro Manila, three (3) in the south, two (2) in the east and three (3) in the north.

MMUES includes about 150 kms. of expressways, 17 interchanges, and 61 each of on-ramps and off-ramps.

1.2 EXPRESSWAY CORRIDORS SELECTED FOR F/S

Three alternatives of stage development were studied during the Master Plan Stage. Recommended was the traffic demand oriented plan comprising three stages as shown in Figure 1.1. The First Stage of MMUES is composed of the following six expressways:

First Stage Expressways

- Expressway Route C-3 ..... 15.9 km
- Expressway Route R-3 ..... 20.2 km
- Expressway Route R-4
  from Expressway C-3 to Makati Access Ramp ..... 2.4 km
- Expressway Route R-7 ..... 12.3 km
- Expressway Route R-9 ..... 4.5 km
- Expressway Route R-10
  from Moriones Street to Expressway Route C-3 ..... 3.3 km

  Total 58.6 km

All expressways included in the First Stage were evaluated as the high priority corridors and were subjected to a feasibility study.

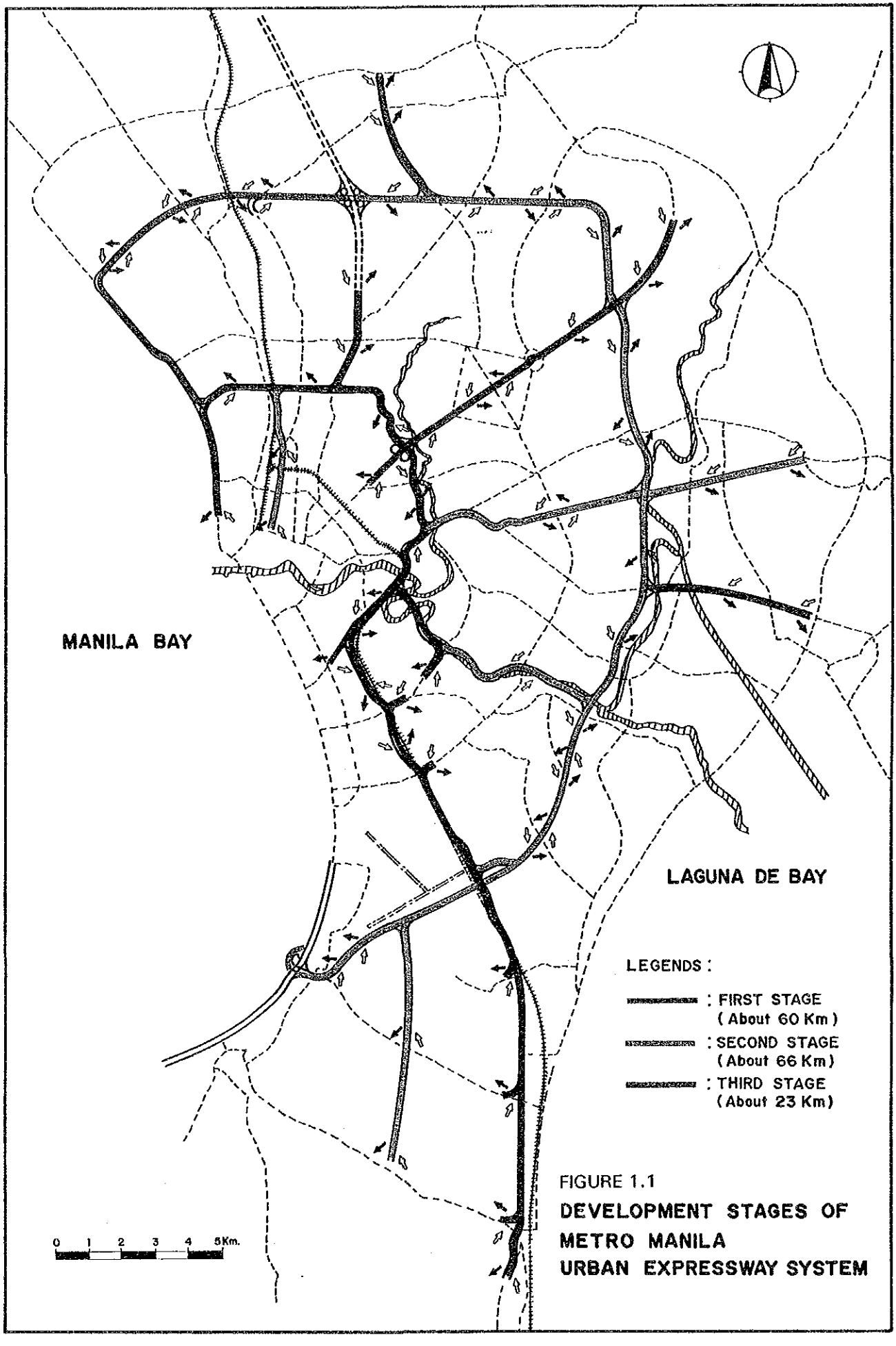


FIGURE 1.1
DEVELOPMENT STAGES OF METRO MANILA URBAN EXPRESSWAY SYSTEM

2. EXPRESSWAY ROUTE C-3

2.1 FUNCTION

Expressway Route C-3 constitutes an inner circumferential expressway. To be connected with this expressway are six (6) radial expressways extending towards suburban areas and three (3) towards the inner urban core (Manila CBD).

This route functions as the important distributor of traffic to/from radial expressways as well as traffic to/from Manila CBD. This route also functions as one of the north-south transport axes and connects the existing inter-city expressways of North and South Luzon Expressways via Expressways Route R-3 and R-9.

At the first stage of implementation, this inner circumferential expressway is to be connected with radial expressways R-3, R-4 (about 2 kms. section only), R-7, R-9 and R-10 (inner section only).

2.2 ALIGNMENT

The route starts at Quirino Ave./Adriatico intersection, then follows over Quirino Ave. up to about 0.5 km. east of Paco Station of PNR. From there, it goes towards the north-east direction to reach at the Aurora Blvd./Araneta Ave. intersection, partially utilizing PNR right-of-way and the private land, then extends towards the north passing over Araneta Avenue up to the end of Araneta Avenue where it turns toward the west utilizing at-grade C-3 right-of-way, and ends at R-10.

The route has an extension of 15.9 km, and whole stretch is an elevated viaduct.

2.3 CRITICAL SECTION FOR IMPLEMENTATION

- A 0.4 km section from PNR right-of-way to R. Magsaysay Blvd. in Sta. Mesa where new right-of-way must be acquired.
- Six interchange sites where new right-of-way acquisition is required.
- Relocation of squatters within PNR right-of-way.
- Progress of at-grade C-3 construction from Rizal Avenue Extension to A. Mabini Street where implementation is being delayed due to right-of-way acquisition problems.

2.4 ESTIMATED CONSTRUCTION COST AND ROW ACQUISITION COST

Construction Cost	7,076 Million Pesos
ROW Acquisition Cost	926 Million Pesos
T o t a l	8,002 Million Pesos

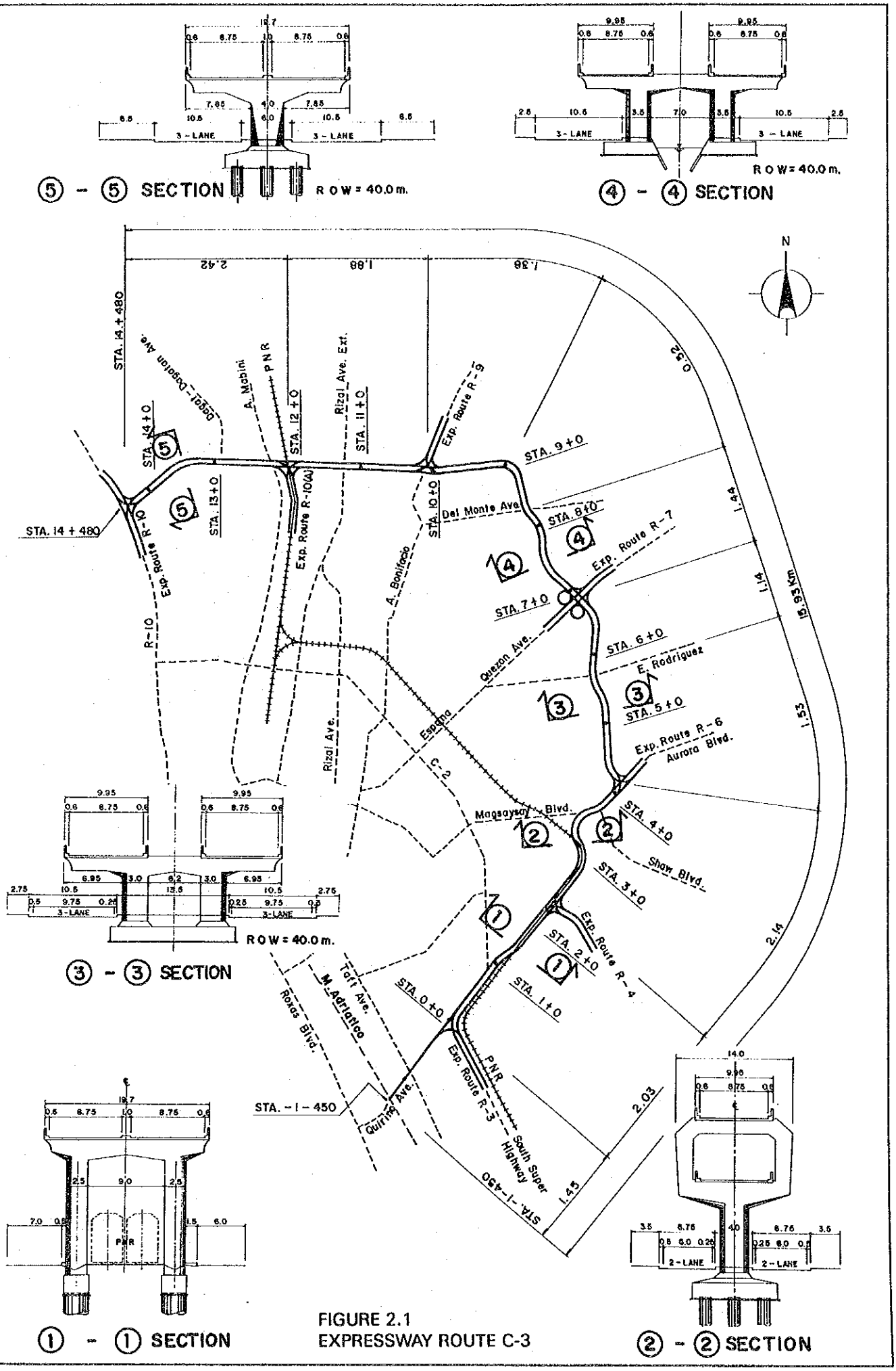


FIGURE 2.1
EXPRESSWAY ROUTE C-3

3. EXPRESSWAY ROUTE R-3

3.1 FUNCTION

Expressway Route R-3 is also called as "Manila South Tollway (MST)". The route serves traffic from the southern area where urbanization is rapidly progressing to Manila CBD, Makati CBD and other urban centers scattered within EDSA. At present, South Luzon Expressway (SLE) carries about 100,000 veh/day at the section near EDSA and is suffering serious traffic congestion daily. In view of rapid urbanization in the southern area, traffic condition of SLE will be further worsened, therefore, this route will greatly contribute to mitigation of traffic congestion along this corridor. This route also functions as one of the north-south transport axes.

3.2 ALIGNMENT

Physical constraints along this route are as follows:

- Existing MSDR Interchange (EDSA/SSH)
- Committed interchange project between the at-grade C-5 and South Luzon Expressway
- Existing overpass bridge at SSH/Buendia intersection
- Air navigational clearance at Ninoy Aquino International Airport

The route starts at Quirino Avenue, then runs along South Super Highway (SSH) and South Luzon Expressway (SLE) towards the south up to about 1.3 km south of Alabang Interchange, where it merges with South Luzon Expressway, and extends for 20.2 km. The route is all elevated except for the 1.5 km at-grade section near NAIA.

The route utilizes the right-of-way of SSH and SLE for the most of section as well as the PNR right-of-way for the section near Buendia Avenue and the section between C-5 and Bicutan Interchange.

3.3 CRITICAL SECTION FOR IMPLEMENTATION

- A 1.3 km section from Alabang Interchange to South Luzon Expressway where new right-of-way is required, however, land is mostly owned by the government.
- Relocation of squatters within PNR right-of-way.
- Bicutan, Sucat and Alabang Access Ramps where new right-of-way acquisition is required.
- Government land will be encroached for a 1.5 km section near NAIA

3.4 CONSTRUCTION COST AND ROW ACQUISITION COST

Construction Cost	7,998 Million Pesos
ROW Acquisition Cost	826 Million Pesos
T o t a l	8,824 Million Pesos

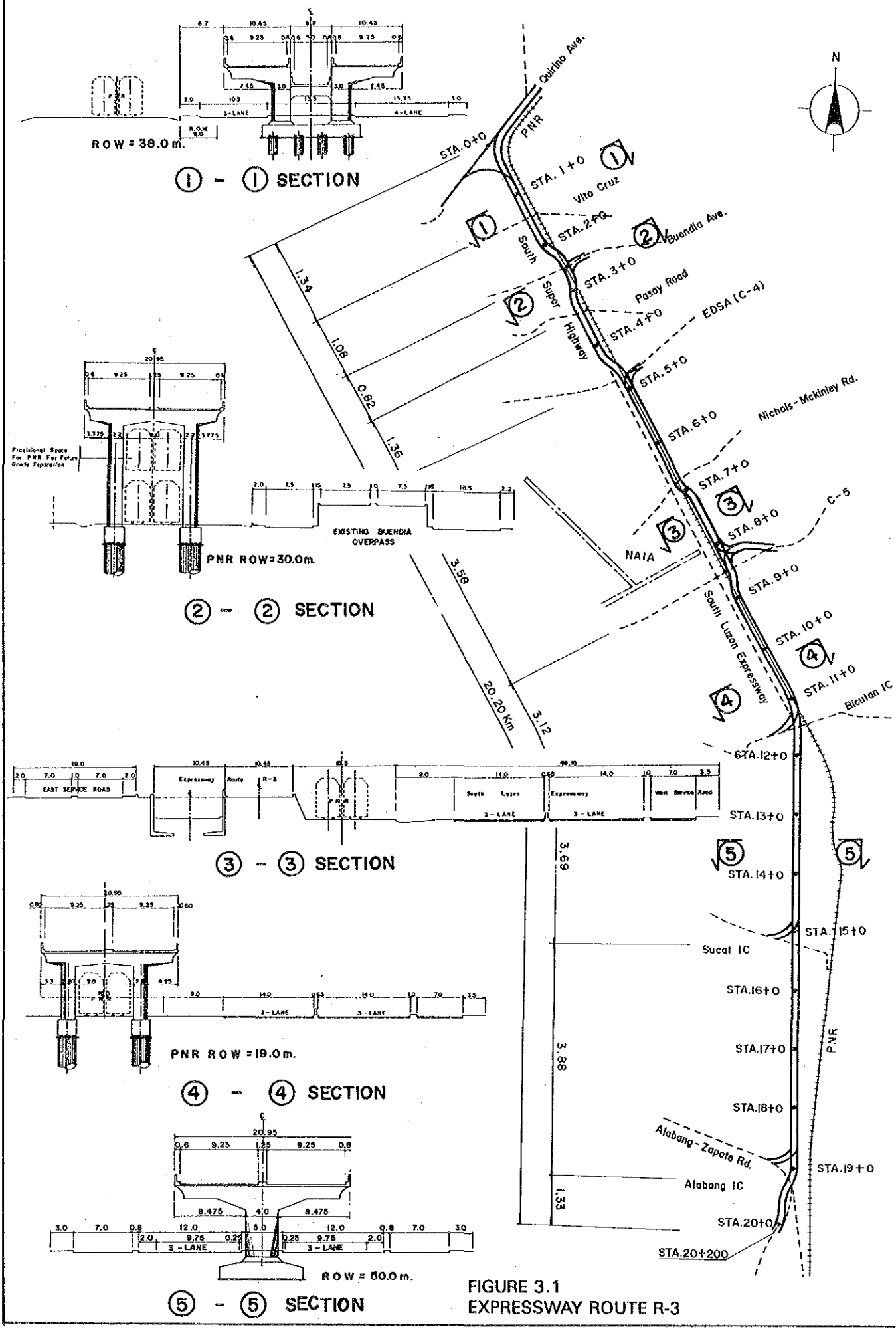


FIGURE 3.1
EXPRESSWAY ROUTE R-3

4. EXPRESSWAY ROUTE R-4

4.1 FUNCTION

Expressway Route R-4 connects two circumferential expressways Route C-3 and Route C-5 and provides vital access to Makati CBD for traffic to/from Quezon City, the northern area as well as the southern area.

Included in the First Stage is the section from Expressway Route C-3 to Makati Access Ramp for an extension of about 2.4 kms. The rest of the section of this expressway is proposed to be implemented in the Second Stage.

Access ramp to Makati CBD from this route will be a very important link, which branches off at about Sta. Ana Race Track, then goes over the proposed at-grade C-3 and is extended close to Buendia Avenue.

4.2 ALIGNMENT

The route branches off from Expressway Route C-3 at about PNR Pandacan Station, goes over Estero de Pandacan, crosses Pasig River, goes over the land in Punta Sta. Ana, then crosses Pasig River again, goes over the land in Sta. Ana, then passes over the south bank of Pasig River up to the proposed at-grade C-3. All stretch of the route is elevated.

4.3 CRITICAL SECTION FOR IMPLEMENTATION

The following sections require acquisition of new right-of-way:

- A 0.2 km section along Estero de Pandacan
- A 0.3 km section in Punta Sta. Ana
- A 0.5 km section in Sta. Ana
- A 0.9 km section along Pasig River

4.4 CONSTRUCTION COST AND ROW ACQUISITION COST

Construction Cost	1,343 Million Pesos
ROW Acquisition Cost	442 Million Pesos
T o t a l	1,785 Million Pesos

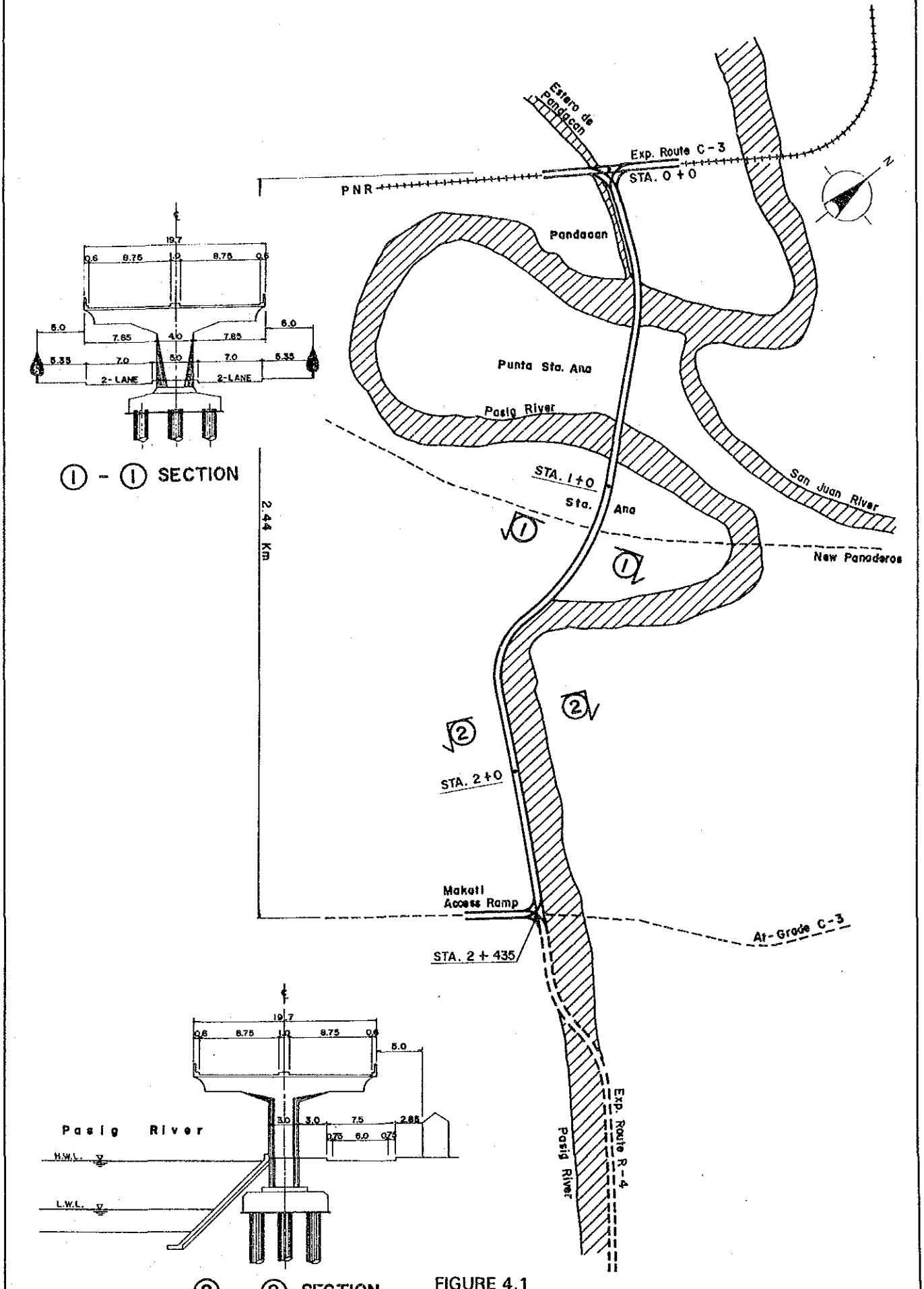


FIGURE 4.1
EXPRESSWAY ROUTE R-4

5. EXRESSWAY ROUTE R-7

5.1 FUNCTION

This route passes along one of the most heavily traffic loaded corridors in Metro Manila. Particularly, private trip demand is expected to increase sharply along this corridor where middle and high-class residential subdivisions are being developed. Traffic between Quezon City and Makati CBD is presently served by EDSA. This route and Expressway Route C-3 will provide a strong alternative route to EDSA. The route is also important to provide transport access to Batasang Pambansa.

5.2 ALIGNMENT

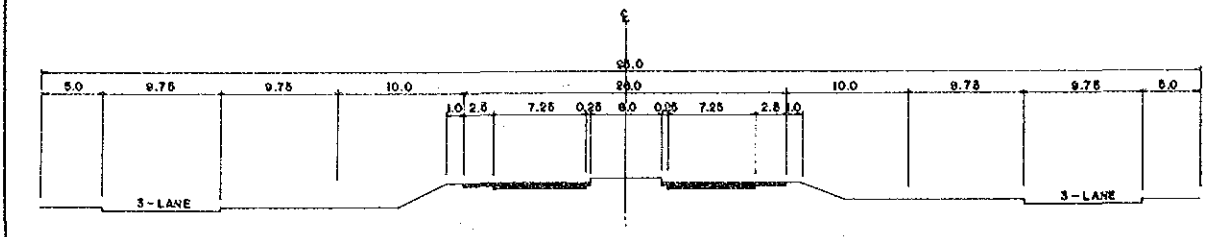
The route starts at Welcome Rotonda, goes over Quezon Avenue up to Quezon Memorial Circle (QMC) where it goes underground. From QMC to the end, it goes along Commonwealth Avenue as an at-grade expressway with viaducts at intersections with cross roads. Total extension is 12.3 km, composing of 7.2 km of elevated structure, 0.8 km of depressed structure and 4.3 km of at-grade section.

5.3 CRITICAL SECTION FOR IMPLEMENTATION

There is practically no critical section along this route, except for the interchange site. To be noted is that Commonwealth Avenue has the 95-meter right-of-way, in which, many squatters have settled. It was assumed that they will be relocated under an at-grade road improvement project, but not by this project.

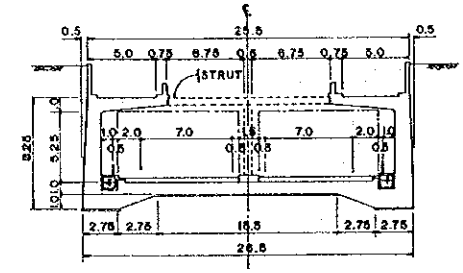
5.4 CONSTRUCTION COST AND ROW ACQUISITION COST

Construction Cost	3,231 Million Pesos
ROW Acquisition Cost	19 Million Pesos
T o t a l	3,250 Million Pesos

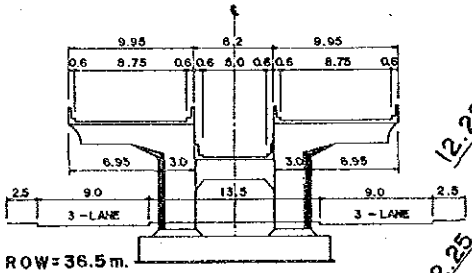


④ - ④ SECTION

ROW = 95.0 m.



③ - ③ SECTION



ROW = 36.5 m.

② - ② SECTION

ROW = 36.5 m.

① - ① SECTION

FIGURE 5.1
EXPRESSWAY ROUTE R-7

6. EXRESSWAY ROUTE R-9

6.1 FUNCTION

The route is connected with North Luzon Expressway (NLE) and serves as a vital link to distribute traffic from NLE to the inner core areas of Metro Manila or vis-a-vis. The route constitutes a part of the north-south transport axis.

6.2 ALIGNMENT

The route starts at Expressway Route C-3, goes over A. Bonifacio Avenue and NLE and ends at about 1.3 km north of NLE Toll Plaza. It has a length of about 4.5 kms. All sections are elevated. A. Bonifacio Avenue has rather narrow right-of-way (28 meters), therefore, a double deck type of structure was proposed.

6.3 CRITICAL SECTION FOR IMPLEMENTATION

There is no critical section along this route, except for the interchange site.

As A. Bonifacio Avenue is rather narrow, efficient traffic management during construction must be planned and implemented.

6.4 CONSTRUCTION COST AND ROW ACQUISITION COST

Construction Cost	1,498 Million Pesos
ROW Acquisition Cost	-
T o t a l	1,498 Million Pesos

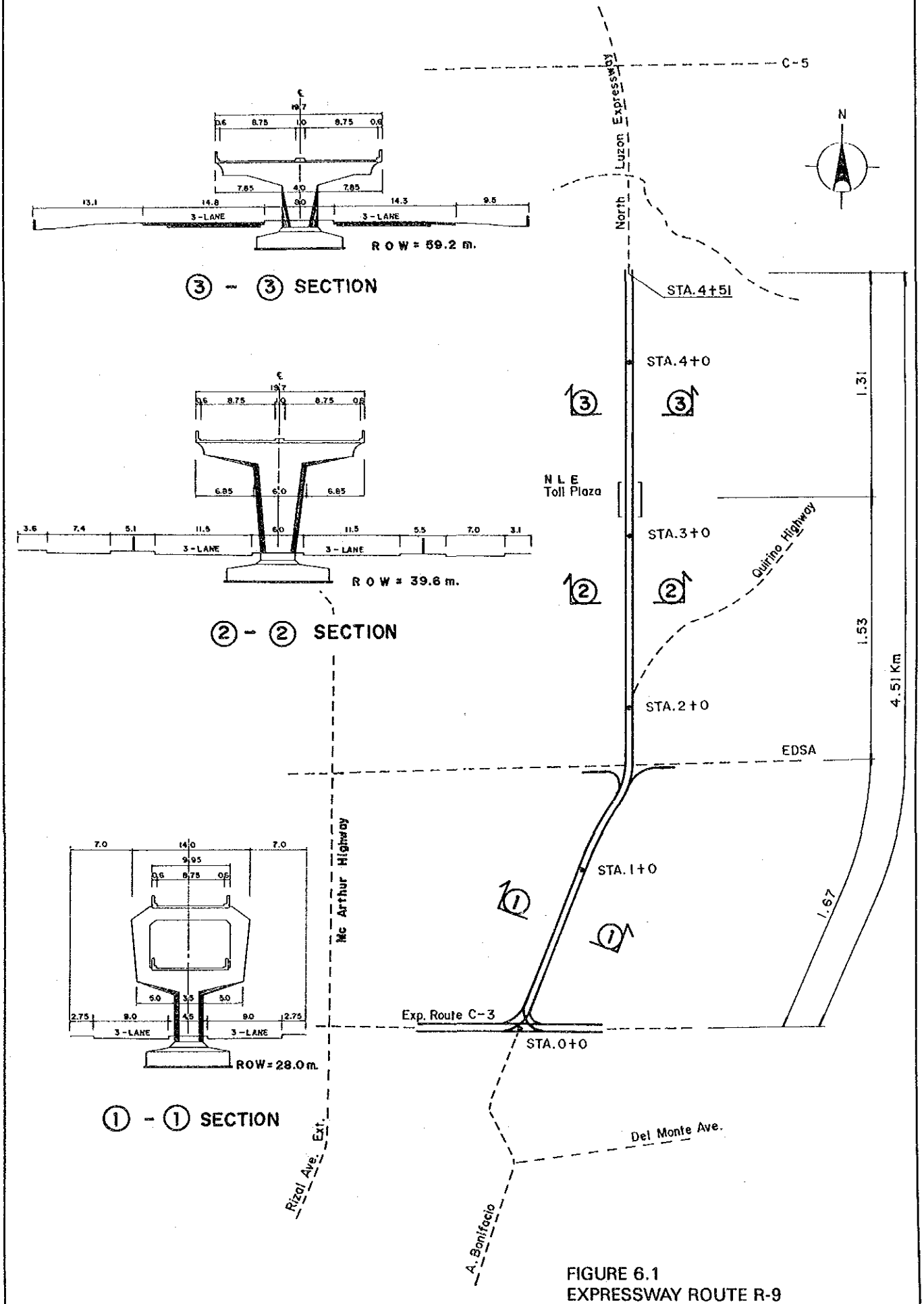


FIGURE 6.1
EXPRESSWAY ROUTE R-9

7. EXPRESSWAY ROUTE R-10

7.1 FUNCTION

The route is a vital link to serve for traffic to/from Manila International/Domestic Harbors. Transport linkage between the harbors and industrial areas developed along North Luzon Expressway and South Luzon Expressway will be greatly improved upon completion of the First Stage Expressways.

7.2 ALIGNMENT

The route will be constructed over the at-grade R-10 road from Moriones Avenue to C-3 (3.3 km) in the First Stage and from C-3 to C-5 (5.3 km) in the Third Stage.

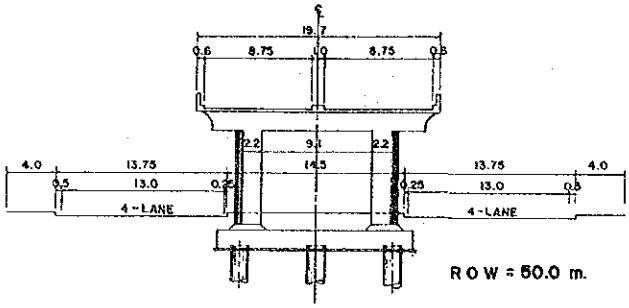
7.3 CRITICAL SECTION FOR IMPLEMENTATION

The at-grade R-10 road has a wide right-of-way of 50 meters, however, a 25-meter portion of the right-of-way is still incomplete and a lot of squatters have settled in that portion. The widening of the at-grade R-10 road to 50-meter section is planned to be implemented between years 2000 and 2010. It is hoped that the widening be completed around the year 2000.

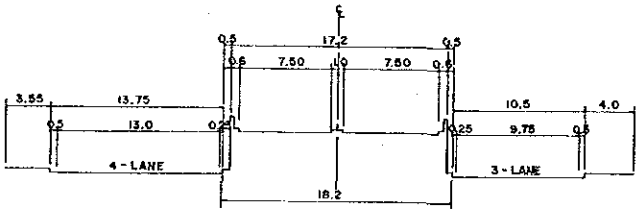
It was assumed that relocation of squatters is implemented during the implementation of at-grade R-10 road widening Project.

7.4 CONSTRUCTION COST AND ROW ACQUISITION COST

Construction Cost	1,215 Million Pesos
ROW Acquisition Cost	-
T o t a l	1,215 Million Pesos



① - ① SECTION



② - ② SECTION

ROW = 50.0 m.

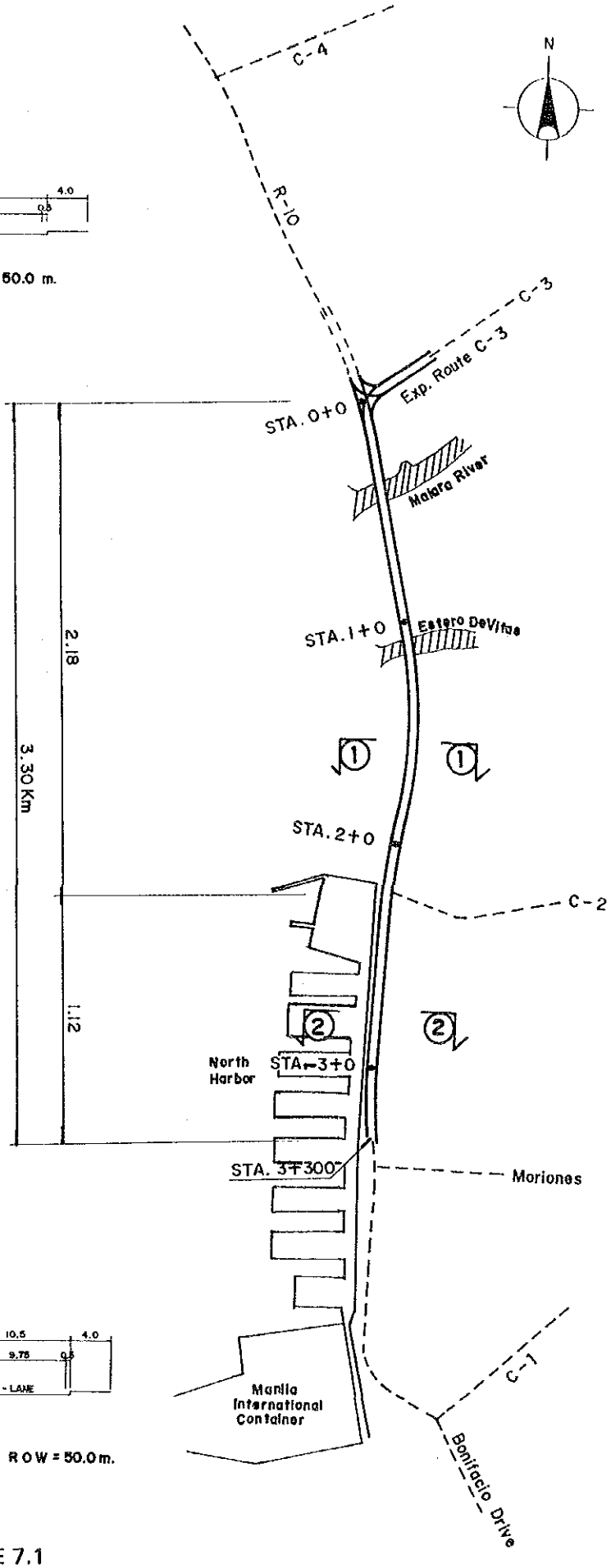


FIGURE 7.1
EXPRESSWAY ROUTE R-10

8. TRAFFIC FORECAST

Traffic forecast for the selected route basically followed the methodology given in the Master Plan Study. Furthermore, OD tables were prepared for the opening years of Phase I (2002) and Phase 2 (2006) of the project. The traffic assignment was carried out using the TRANPLAN software package wherein speed-flow relationships were set for the various road types. Public transport vehicles were preloaded based on the present and estimated public transport traffic distribution pattern. Private vehicles on the other hand were assigned. The base road network assumed is the planned network specified in the Master Plan Report.

8.1 ESTIMATED EXPRESSWAY TRAFFIC

Traffic volumes on the expressway were tested using three flat rate levels, P10, P20, and P30. The results show that the optimum toll level is P20, basing on toll users and toll revenue. Under this level, expressway traffic will be about 53,000 pcus, 137,000 pcus and 196,000 pcus for the years 2002, 2006, 2010, respectively. All subsequent analyses were made using the said toll rate.

The highest projected link traffic occurs in the section between Route R-4 and Route R-7 of Expressway Route C-3 which are about 49,000, 81,000 and 87,000 pcus for the years 2002, 2006 and 2010, respectively.

The highest ramp traffic will be expected at the Alabang Access Ramp of Expressway Route R-3 which is about 46,000 pcus in 2006 and 56,000 pcus in 2010 for total of both directions, followed by the SSH/Vito Cruz Ramp of Expressway Route R-3 which is estimated to be 32,000 pcus in 2006 and 38,000 pcus in 2010.

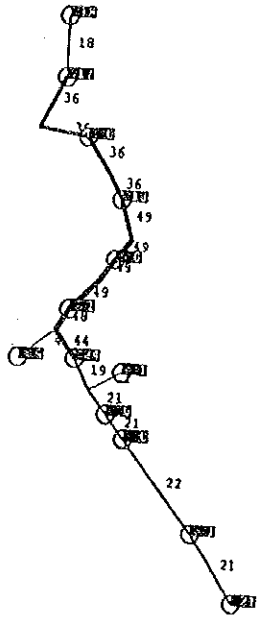
8.2 AT-GRADE ROAD TRAFFIC VOLUMES

Significant reductions in traffic volume were reflected on at-grade roads directly under the proposed expressways and the highest percentage decrease was about 53% for the year 2010 along the Sucat-Alabang section of the South Luzon Expressway. Increase in traffic volume was also manifested, but these were generally minimal.

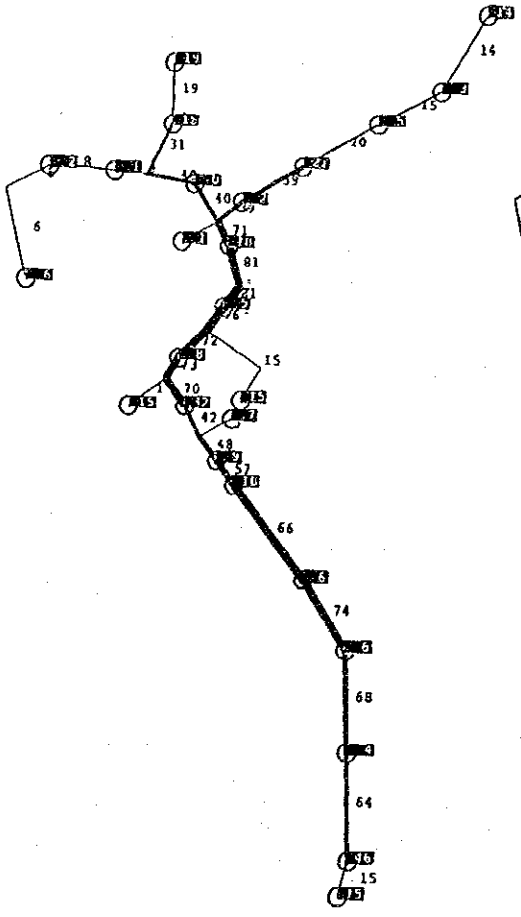
TABLE 8.1 EXPRESSWAY TRAFFIC VOLUME BY TOLL LEVEL

(000 pcu)

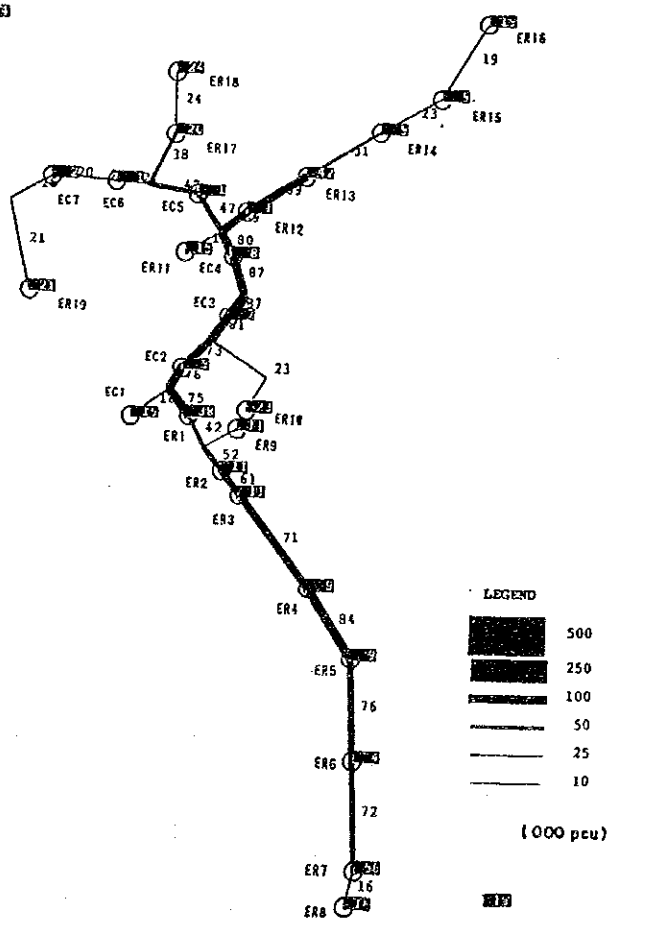
Toll Level (Flat Rate)	FIRST STAGE		
	Phase 1 (2002)	Phase 2 (2006)	2010
₱10	88	186	244
₱20	53	137	196
₱30	16	108	147



Phase-1 : Year 2002
TOLL 20 Pesos



Phase-2 : Year 2006
TOLL 20 Pesos



Year 2010
TOLL 20 Pesos

FIGURE 8.1 EXPRESSWAY TRAFFIC VOLUME

9. PRELIMINARY DESIGN

9.1 DESIGN STANDARDS

Geometric design standards for expressway segments and standard cross-sections are shown in Table 9.1 and Figure 9.1, respectively. Expressway Route R-3 was classified as the Class-A (design speed: 80 km/hour) and the rest of expressways in the First Stage were classified as Class-B (design speed: 60 km/hour).

9.2 EXPRESSWAY TRAFFIC AND LEVEL OF SERVICE

Expressways are proposed to be a 4-lane divided road. In the year 2010, the section between Route R-4 and Route R-7 of Expressway Route C-3 will have traffic volume of 87,000 pcu/day and its level of service will be E. The section between Bicutan I/C and EDSA of Expressway Route R-3 will also have heavy traffic volume (84,000 pcu/day) and its level of service will be E. Level of service of the rest of expressway sections will be D or C.

The most critical ramp section and the interchange will be at the Vito Cruz Ramp on Expressway Route R-3 and the interchange between Routes C-3/R-7 where level of service would be F in year 2010.

Above forecast suggests that the Second Stage of MMUES should be implemented as proposed.

9.3 STRUCTURAL DESIGN

AASHTO I-type girder was recommended for the superstructure in consideration of easy erection and familiarity of local contractors except for Pasig River Bridges and curbed sections in small radius at interchanges where a PC box girder type was recommended. Various types of substructures were required. Selection of type was made giving priority on the factor that existing number of lanes of at-grade roads be maintained as much as possible. As very complicated substructures are required at interchange sites, the use of steel materials may have to be studied to reduce construction period and traffic disturbance during construction. Bored piles were recommended for the type of foundation in order to avoid adverse impacts to environment.

Aesthetic consideration for structural design was stressed to keep the expressway corridors more attractive.

9.4 AT-GRADE ROAD DESIGN

With an introduction of an expressway over an at-grade road, necessary improvement must be simultaneously implemented. At-grade road design was so undertaken that existing number of lanes and sidewalk width be maintained as much as possible, even though lane width is sacrificed.

9.5 MEASURES FOR PROTECTION OF ENVIRONMENT

Various measures for protection of environment were planned such as installation of noise barriers, laying asphalt surface course on the deck slab of viaduct which is not practiced in the Philippines at present, adoption of continuous span system which will lessen number of expansion joints, etc., all of which are effective for reducing noise level.

TABLE 9.1 GEOMETRIC DESIGN STANDARDS FOR AN EXPRESSWAY

DESCRIPTION		UNIT	CLASS-A (OUTSIDE EDSA)	CLASS-B (INSIDE EDSA)
Design Speed		km/h	80	60
Lane Width		m	3.50	3.25
Inner Shoulder Width		m	0.75	0.75
Outer Shoulder Width		m	2.00	2.00
Median Width		m	2.25	2.00
Median Island Width		m	1.25	1.00
Horizontal Alignment	Minimum Radius	m	280 (230)	150 (130)
	Minimum Curve Length	m	140	100
	Maximum Superelevation	%	10.0	10.0
	Minimum Transition Length	m	70	50
Vertical Alignment	Maximum Gradient	%	4.0	5.0
	Minimum Radius of Vertical Curve (Crest)	m	5,000 (3,000)	2,000 (1,400)
	Minimum Radius of Vertical Curve (Sag)	m	3,000 (2,000)	1,500 (1,000)
	Minimum Vertical Curve Length	m	70	50
Minimum Stopping Sight Distance		m	140 (110)	85 (75)
Pavement Cross Fall		%	2.0	2.0
Composite Gradient		%	10.5	10.5
Vertical Clearance		m	4.7	4.7

Note: The figure in ( ) shows absolute minimum value to be used only when the conditions necessitate.

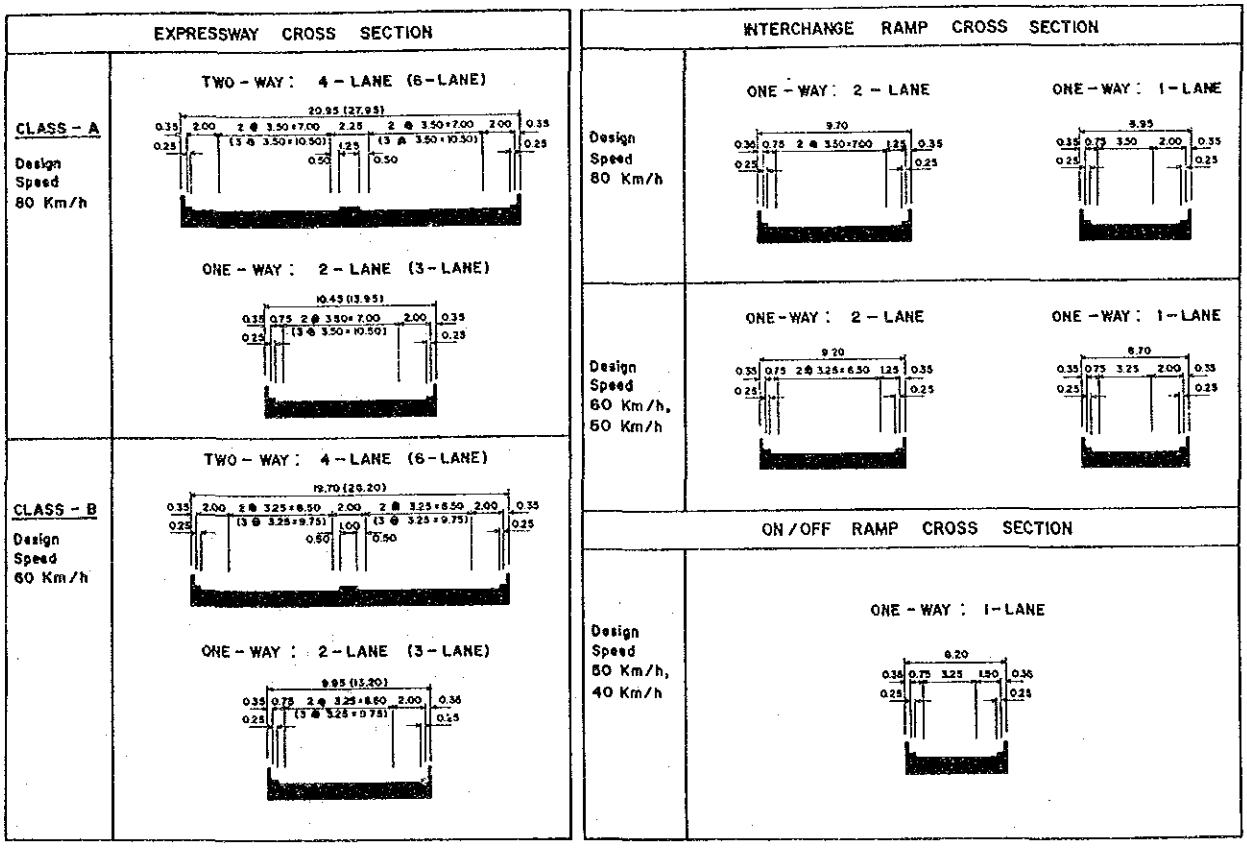


FIGURE 9.1 STANDARD CROSS SECTION

10. CONSTRUCTION PHASING AND INVESTMENT COST

10.1 CONSTRUCTION PHASING

The First Stage Expressways were planned to be implemented in two phases. Three alternatives were prepared to select expressways to be implemented in Phase-1 (see Figure 10.1), based on the following principles:

- The most essential part of the inner core (or backbone) of MMUES.
- These expressway sections which attract higher expressway traffic and their traffic impact on at-grade roads spreads in the wide range of areas.
- These expressway sections of which implementation is easier in terms of right-of-way acquisition and social environment impact.
- These expressway sections which effectively complement insufficiency of the at-grade road network.
- These expressway sections which support urban development.

Alternative-1 was recommended due to the following reasons:

- Alternative-1 will realize to form the north-south transport axis which corresponds to the direction of urban expansion, and connect the existing North and South Luzon Expressways, thus nationwide expressway network is greatly strengthened.
- Once Alternative-1 is completed, succeeding expansion of urban expressway network will be relatively easier by just adding radial expressways and a short section of Route C-3.
- Traffic on the existing North and South Luzon Expressways is currently distributed through EDSA. Upon completion of Alternative-1, these traffics will have direct access to Manila and Makati CBDs through urban expressways. Alternative-1 will provide a strong alternative route of EDSA, thus effectively complement insufficiency of the at-grade road network.

Phase-1 involves construction of the following expressway sections:

Route C-3	:	From Route R-3 to Route R-9	11.6 km
Route R-3	:	From Quirino Avenue to Bicutan I/C	11.3 km
Route R-9	:	Full Stretch	4.5 km
Total			27.4 km

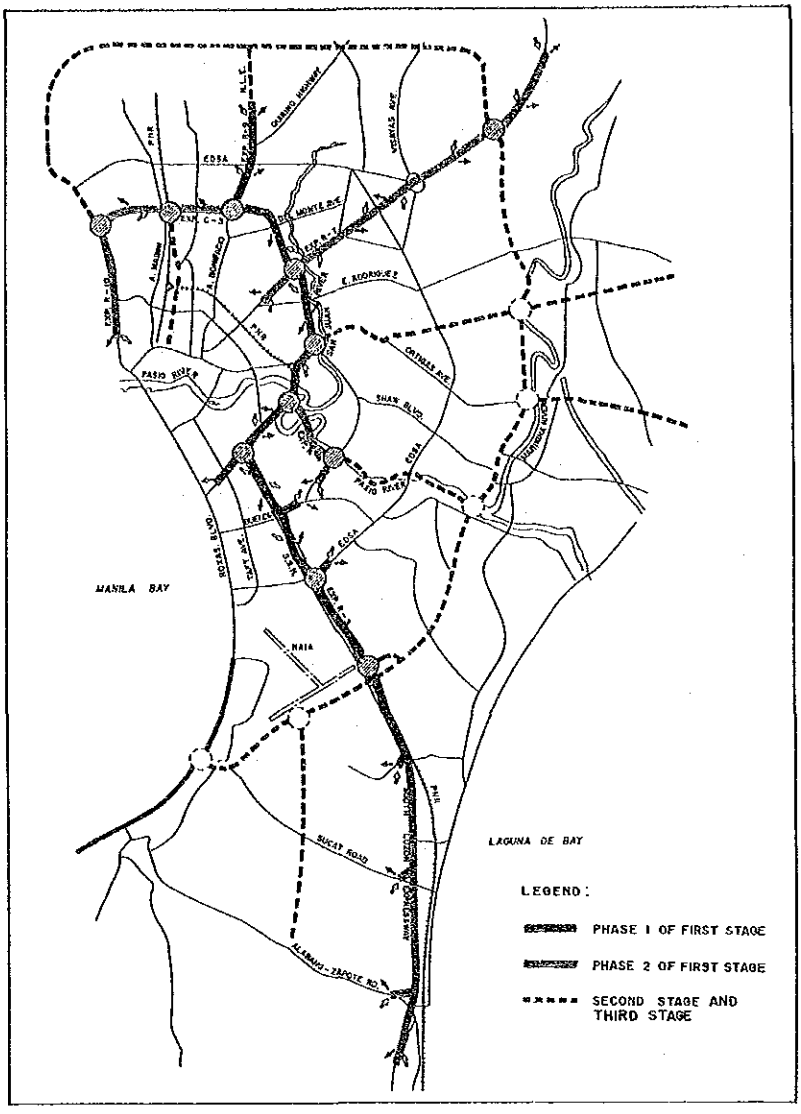
The rest of expressway sections (31.2 km) in the First Stage will be constructed in Phase-2.

10.2 INVESTMENT COST

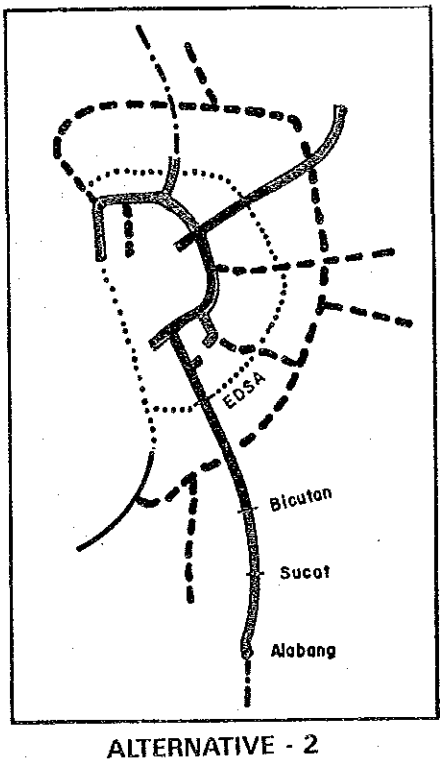
The investment cost was estimated in April 1993 prices as follows:

UNIT: Million Pesos

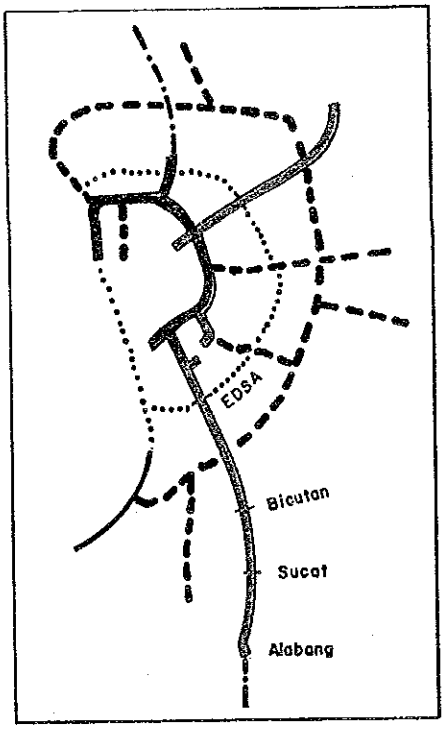
	Phase-1	Phase-2	Total
Detailed Engineering Cost	290	280	570
ROW Acquisition/Compensation Cost	1,040	1,173	2,213
Construction Cost	11,571	10,789	22,360
Construction Supervision Cost	470	430	900
Total	13,371	12,672	26,043



ALTERNATIVE - 1



ALTERNATIVE - 2



ALTERNATIVE - 3

FIGURE 10.1

11. EXPRESSWAY OPERATION AND MANAGEMENT

11.1 TOLL RATE SYSTEM AND TOLL COLLECTION SYSTEM

Flat toll rate system was recommended in view of the following:

- To minimize vehicle stoppage at a toll booth to handle heavy traffic smoothly and effectively.
- To lessen provision of toll collection facilities. Under the flat toll rate system, a toll plaza can be provided only at an entrance of an expressway.
- To lessen toll collection cost. A large number of personnel who are required for issuing tickets under the distance-proportional toll rate system are not required under the flat toll rate system.
- To attract traffic with longer trip length to encourage functional complement between expressway and surface street

As the flat toll rate system was recommended, the toll collection system to be adopted is the so-called "open system" in which toll fee is collected as an expressway user enters the toll booth and receipt is issued. Toll collection is made manually and is registered by means of an electronic cash register (ECR) equipped in each toll booth. Amount of tolls collected and number of receipt issued is compared with actual vehicle traffic volume counted with an automatic traffic counter equipped at each toll booth. Figure 11.1 shows the organization of toll operation offices.

11.2 TRAFFIC MANAGEMENT

To always maintain smooth and safe flow of traffic, an appropriate traffic control and management system must be developed. Major causes of traffic congestion on an expressway are traffic accidents, broken-down vehicles, and heavy traffic and another area of traffic congestion is at an exit where expressway traffic merges with at-grade street traffic. At the beginning of expressway operation, traffic accident and broken-down vehicles management and enforcement of traffic rules and regulations will be important. Later years (say after 5 years), efficient traffic control and development of the traffic information system will be required. Figure 11.2 shows conceptual organization for traffic management.

11.3 EXPRESSWAY MAINTENANCE

Expressway facilities must be always maintained in good condition to ensure safety and comfort of expressway users and to prolong economic life of facilities. As MMUES is mostly elevated structures, maintenance efforts for the first 5 years will be addressed to inspection and routine maintenance works. During the second 5 years, periodic maintenance work, particularly pavement repair and overlay will increase. Repair works for structure will be increasingly required in the third 5 years and thereafter. Figure 11.3 shows proposed organization for maintenance division.

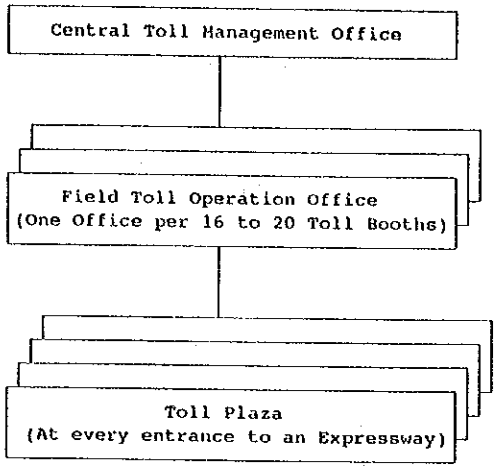


FIGURE 11.1 TOLL OPERATIONS OFFICES

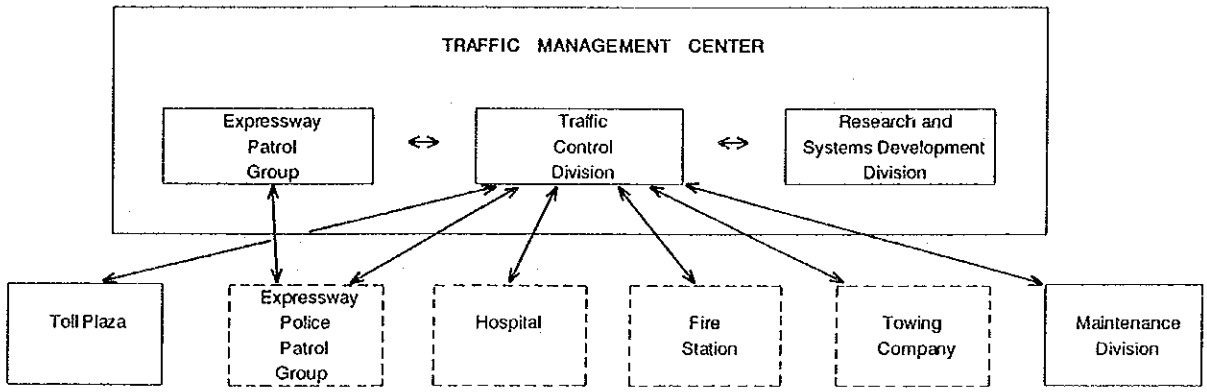


FIGURE 11.2 CONCEPTUAL ORGANIZATION FOR TRAFFIC MANAGEMENT

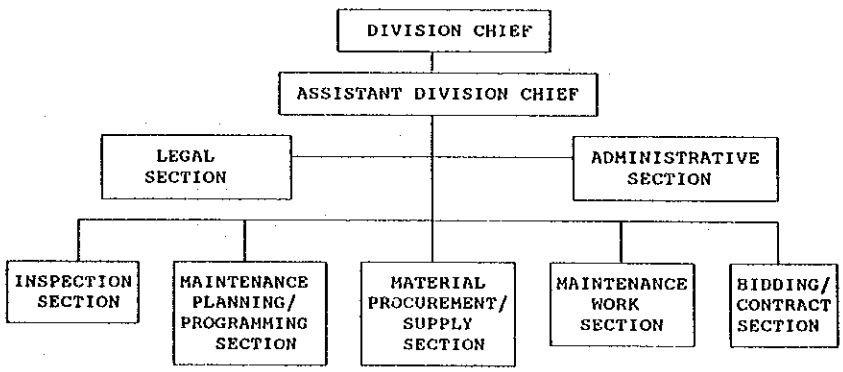


FIGURE 11.3 PROPOSED ORGANIZATION FOR MAINTENANCE DIVISION

12. PROJECT EVALUATION

On the basis of the analysis and assessment made on the First Stage of MMUES, it was concluded that the Project should be implemented to cope up with growing traffic demand, and rapid urbanization in the areas outside EDSA. At-grade road development is increasingly difficult due to right-of-way problem, particularly in the inner core area inside EDSA, therefore, construction of the First Stage of MMUES which fully utilizes the existing public spaces is one of the drastic measures that the Government should pursue. Evaluation results are summarized as follows:

(1) Economic Feasibility

The Project is economically feasible. Economic internal rate of return (EIRR) was estimated to be 24.0%, which is well above the opportunity cost of capital (15%) in the Philippines. Even in the case of 30% increase in cost and 30% decrease in benefits, EIRR was 18.7% (See Table 12.1).

(2) Financial Feasibility

When the Project is implemented utilizing funds with low interest rate (say about 3.0% per annum), the Project is financially viable (See Table 12.2). It implies that if the Project is implemented with the participation of only private sector funding, the project is very difficult to be justified from the financial viewpoint.

(3) Toll Level, Economic/Financial Viability and Expressway Traffic Volume

Impacts of toll fee to economic and financial viability as well as expressway traffic volume are illustrated in Figure 12.1. When toll rate becomes high, FIRR is improved, and EIRR maintains the level of more than 15%, but expressway traffic volume significantly decreases. The Government should decide toll rate in due consideration of above relations and other factors such as transport policies, impacts on expressway users, transport charges on other transport modes, and political considerations.

(4) Technical Feasibility

The Project was evaluated technically feasible. Local contractors can be extensively involved in construction of MMUES.

(5) Environmental Impacts

No significant adverse impacts on environment were observed except for relocation of squatters and right-of-way acquisition. The Government has to make every effort to mitigate social impact.

(6) Traffic Impact

The First Stage Expressways greatly contribute to mitigation of at-grade road traffic congestion. Significant reduction (30 to 50%) in traffic volume was observed for roads directly under an expressway. Reduction in traffic volume was observed in the wide range of areas, especially on roads in Manila CBD.

TABLE 12.1 EIRR SENSITIVITY TEST OF THE PROJECT

EIRR (%)

		BENEFIT				
		−30%	−20%	−10%	Base Case	+10%
COST	+30%	18.5	19.6	20.7	21.6	22.5
	+20%	19.2	20.3	21.4	22.4	23.3
	+10%	19.9	21.1	22.2	23.2	24.1
	Base Case	20.8	22.0	23.1	[24.1]	25.1
	−10%	21.7	23.0	24.1	25.2	26.2

TABLE 12.2 SENSITIVITY OF FINANCIAL VIABILITY OF THE PROJECT

FIRR (%)

Cost	Revenue				
	−20%	−10%	Base Case	+10%	+20%
+30%	0.8	1.5	2.2	2.9	3.5
+20%	1.2	2.0	2.7	3.4	4.0
+10%	1.8	2.6	3.3	3.9	4.5
Base Case	2.3	3.1	[3.9]	4.6	5.2
−10%	3.0	3.8	4.6	5.2	5.9

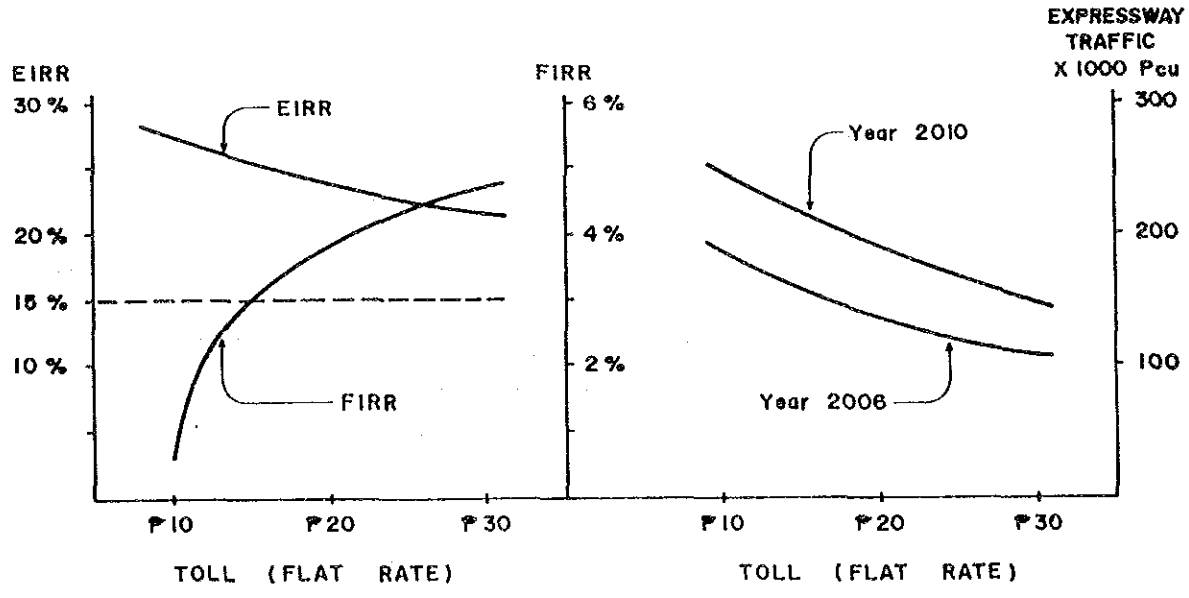


FIGURE 12.1 TOLL LEVEL, ECONOMIC/FINANCIAL VIABILITY AND EXPRESSWAY TRAFFIC VOLUME

13. IMPLEMENTATION SCHEDULE AND PROGRAM

13.1 OVERALL IMPLEMENTATION SCHEDULE

Overall implementation schedule is shown in Figure 13.1. First Stage Expressways will be implemented as follows:

	FIRST STAGE (58.6 km)	
	Phase-1 (27.4 km)	Phase-2 (31.2 km)
Detailed Design	1995-1996 (2 years)	1998-2001 (3.5 years)
ROW Acquisition	1996-2000 (4 years)	1999-2004 (5.5 years)
Construction	1997-2001 (4.5 years)	2000-2005 (5.5 years)
TOTAL	1995-2001 (7 years)	1998-2005 (8 years)
Opening Year	2002	2006

13.2 INVESTMENT REQUIREMENT

Investment requirement for each phase and stage is summarized below:

	LENGTH (KM)	PROJECT COST (MP)	YEARS REQUIRED
First Stage Phase-1	27.4	13,371.0	7
Phase-2	31.4	12,671.0	8
Total	58.7	26,047.0	11
Second Stage	66.1	20,750.0	10
Third Stage	23.4	8,425.0	7
Total	148.2	63,217.0	19

Note: Second and Third Stages are based only on preliminary rough estimates, not on Feasibility Study.

13.3 ANNUAL INVESTMENT REQUIREMENT

The annual investment requirement covering detailed design, R.O.W. acquisition, civil works and construction supervision costs were estimated in compliance with the proposed implementation schedule. Table 13.1 summarizes the annual investment requirement for the First Stage with the breakdown for Phase 1 and Phase 2. The maximum annual requirement of 3,322 million pesos for Phase-1 may occur in the years of 1998 and 1999 and 3,541 million pesos for Phase-2 in 2003. As a whole for First Stage, the maximum requirement will be 3,936 million pesos in the year of 2000.

FIGURE 13.1 OVERALL IMPLEMENTATION SCHEDULE

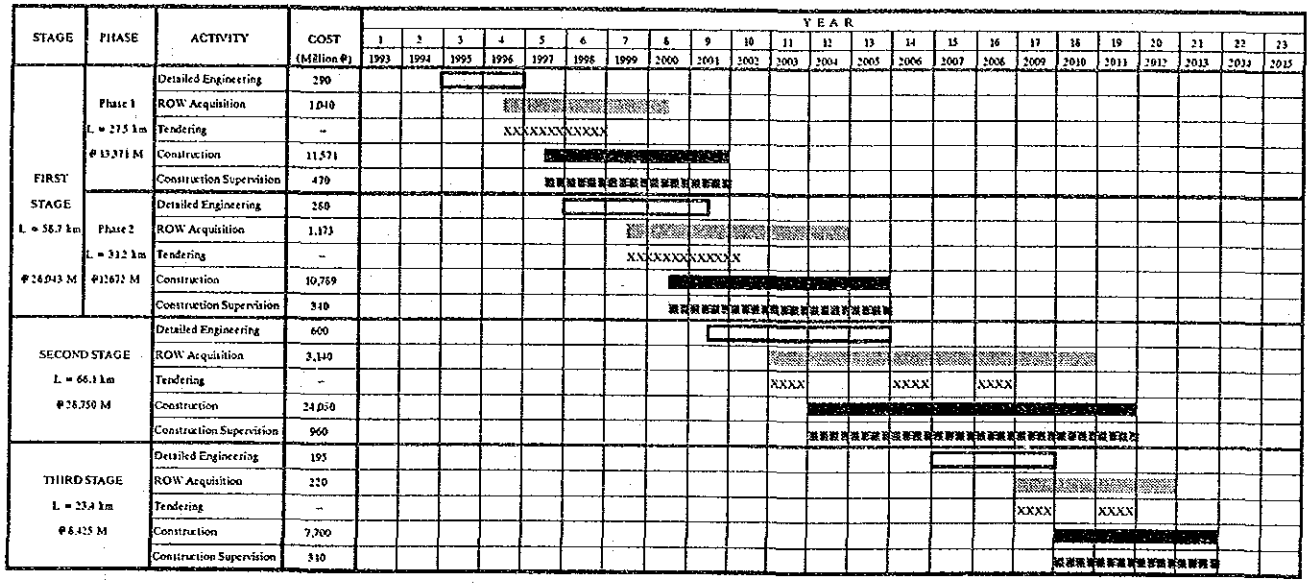


TABLE 13.1 SUMMARY OF ANNUAL INVESTMENT REQUIREMENT FOR FIRST STAGE

Project Cost — Unit: MP in April 1993 Prices

	TOTAL	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Phase – 1	13,371.0	145.0	197.0	1,516.0	3,322.25	3,322.25	3,062.2	1,806.15				
Phase – 2	12,671.0				84.0	89.50	874.0	1,984.25	2,577.85	3,541.85	1,822.85	1,697.10
Total	26,042.0	145.0	197.0	1,516.0	3,406.25	3,411.7	3,936.95	3,790.40	2,577.85	3,541.85	1,822.85	1,697.10

Note: 1) Figures show only the project cost consisting of detailed engineering fee, R.O.W. acquisition, civil works and construction supervision. No contingency and *escalation cost were included.*

2) Annual operating and maintenance costs were estimated as follows.

These annual operating and maintenance costs will be required after 2002 for Phase – 1 and after 2006 for Phase – 2.

Unit: MP in April 1993 Price

	Phase – 1 (27.4 km)	Phase – 2 (31.2 km)
Operating Cost (1.36 MP/Km/year)	37.3	42.4
Maintenance Cost (1.02 MP/Km/year)	27.9	31.8
Total	65.2	74.2

14. PROJECT IMPLEMENTATION AND RECOMMENDATIONS

14.1 FINANCING OPTIONS AND IMPLEMENTING BODY

The First Stage of MMUES (58.6 km in length) alone requires huge investment of 26,042 million pesos within 11 years, calling for the maximum annual investment of 3,937 million pesos in year 2000. There is a need to consider more extensive use of alternative funding sources in the implementation of the Project which is planned to be operated as a toll road. MMUES can be built, owned and operated by the Government or Government agency, or a private company with the Government permission, or by a joint venture involving both. These options may include the following:

- Option 1: Government Fund Financing (Implementation by the Government)
- Option 2: Government Subsidy Financing (Implementation by the Public Corporation)
- Option 3: Private Financing (Implementation by Private Sector in the form of Build-Operate-Transfer or Build-Transfer)

Option 2 was prefered. Since the public corporation will be a state-owned corporation, equity investment and loans required for the project can be expected from the central and local governments, local banking companies and foreign lending institutions. By adding function of supervising and managing BOT or BT type of implementation to the public corporation, the private sector participation in the implementation of the Project will become possible.

The Government should create a public corporation with the special objectives of financing, constructing, and operating MMUES, which is tentatively named "Metro Manila Expressway Public Corporation (MMEPC)".

14.2 RECOMMENDATIONS

1) Implementation Strategy

In order to reduce the Government's financial burden, the private investors should be invited for the Project. While doing so, the Government should start to create the public corporation. In case that the private sector participation could not be successful, the project can be implemented by the public corporation. To decide the implementing body is one of the most important decisions to be made by the Government at the earliest possible time.

2) ROW Acquisition

The Government should implement or experiment the following approaches:

- Purchase the land and facilities at the prevailing market value.
- Arrange relocation sites for affected families and business owners and provide loans to affected families for additional cost incurred in connection with moving and building new facilities.

- Utilize space under expressways for relocation sites.

- Experiment urban development scheme at interchange sites.

3) At-grade Road Development

At-grade roads project over which expressway will be built should be timely implemented. At-grade roads which are closely related to MMUES such as distributor roads in the areas outside EDSA should be planned and developed in due time.

4) Coordination with other Agencies

The following matters should be coordinated with respective agencies:

PNR: Utilization of PNR right-of-way for an expressway
DOTC: Future LRT projects should be coordinated with MMUES plan
LGUs: Development control within the proposed expressway right-of-way
National/Local Traffic Police: Creation of Expressway Patrol Group
DENR: Issuance of ECC and monitoring of environmental impacts of MMUES

5) Revenue Pooling System for Repayment

To avoid the following problems under the individual route based system for repayment, it is recommended to adopt the revenue pooling system for repayment:

- Implementation of less profitable routes would be delayed, or would not be realized, although these routes are highly desired to be constructed from the viewpoints of forming an effective expressway network as well as promoting and guiding sound urban expansion.

- Urban expressways will be expanded year by year while forming a single network. The routes constructed earlier would have lower tolls and would become toll-free sooner in the shorter period than those constructed later. This implies a mixture of different tolls and a mixture of toll and toll-free routes within a single unit of a network, which results in inconvenience for expressway users and much difficult operation of expressways.