

Republic of the Philippines

**Feasibility Study for
Manila-Bataan Coastal Road and
its Related Roads (C-5 & C-6) Project**

FINAL REPORT

Summary and Recommendations

March, 1980

Japan International
Cooperation Agency

Government of the Philippines
Counterpart Study Team

JICA LIBRARY



1030517[5]

Republic of the Philippines

**Feasibility Study for
Manila-Bataan Coastal Road and
its Related Roads (C-5 & C-6) Project**

FINAL REPORT

Summary and Recommendations

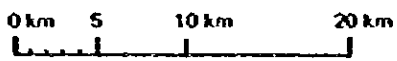
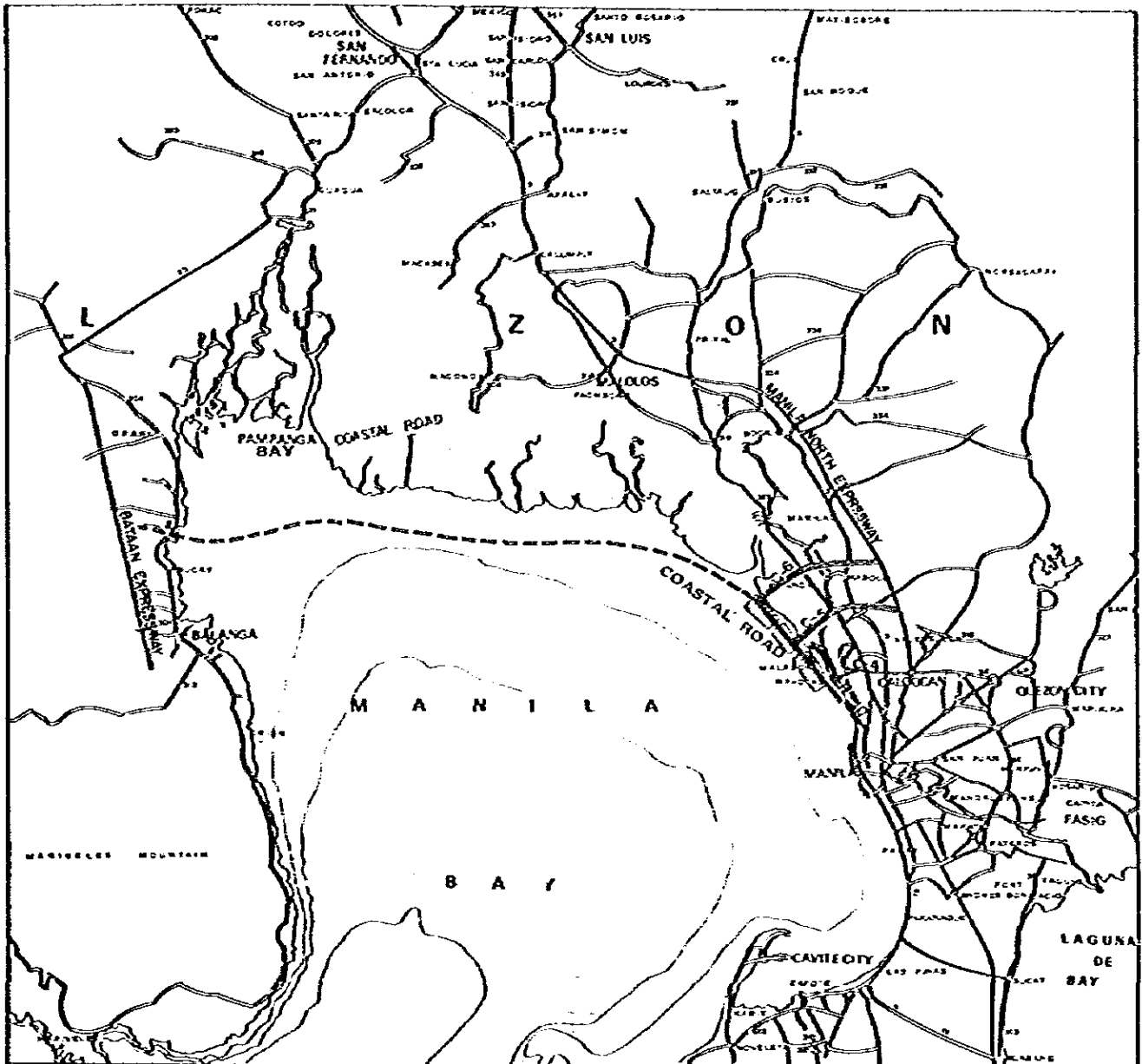
March, 1980

Japan International
Cooperation Agency



Government of the Philippines
Counterpart Study Team

国際協力事業団	
受入 月日 84.9.28	118
登録No. 09158	73.7 SDF

PROJECT LOCATION MAP



LEGEND:

-  Phase I (First Phase of Manila-Bataan Coastal Road and Its Related Roads)
-  Phase II (Future Phase of Manila-Bataan Coastal Road)

**TABLE OF CONTENTS
FOR
SUMMARY AND RECOMMENDATIONS**

	<u>Page</u>
1. INTRODUCTION	1
1.1 Purpose of the Summary	1
1.2 Project Objectives and Background	1
2. STUDY APPROACH	3
3. PRESENT SITUATION	6
3.1 Influence Area of Phase I	6
3.1.1 Physical Characteristics	6
3.1.2 Socio-Economic Conditions	8
3.1.3 Transport System	8
3.1.4 Major Problems	9
3.1.5 Future Prospects	10
3.2 Influence Area of Phase II	11
3.2.1 Physical Characteristics	11
3.2.2 Socio-Economic Conditions	11
3.2.3 Transport System	11
3.2.4 Development Prospects	12
4. FINDINGS AND RECOMMENDATIONS	13
4.1 Findings.....	13
4.2 Recommended Road and Reclamation Plan	16
4.2.1 General	16
4.2.2 Road Plan	16
4.2.3 Reclamation Plan	21
4.3 Recommended Implementation Program	25
4.3.1 Reasons of Implementation by Phases and Stages	25
4.3.2 Project Components for Each Phase and Stage	25
4.3.3 Stage Implementation for the Roads Cross Sections	27
4.3.4 Costs and Benefit Cost Analysis	27
4.3.5 Funding Requirements	29
4.3.6 Implementation Schedule	31
4.4 Other Recommendations	31
4.4.1 Limitations of the Study and Recommended Further Studies	31
4.4.2 Recommended Organization for the Reclamation Project	33
Annex "A" Scope of Work	34
Annex "B" General Flow Chart of the Study	47
Annex "C" Organization of the Study Team	48

1. INTRODUCTION

1.1 Purpose of the Summary

- (1) The purpose of this report is to summarize the main areas of study, findings and recommendations of the Feasibility Study for the Manila-Bataan Coastal Road and its Related Roads (C-5 and C-6) Project, discussed in detail in the main report which consists of two volumes: Vol. I - Main Report for the Feasibility Study of Phase I^{1/} and Vol. II - General Study of Phase II.^{2/}
- (2) The Scope of Work for the Study (Annex "A") calls for the assessment of the economic and technical viability of the Coastal Road (R-10) and its Related Circumferential Roads 5 and 6 (C-5 and C-6) as components of the major thoroughfare system of Metro Manila referred to in the Study as Phase I of the Project. The related roads to be covered by the Study are limited to segments of C-5 and C-6, starting from the contemplated Coastal Road to the existing Manila North Expressway.
- (3) The Scope of Work also calls for a general study of the northern extension of the Coastal Road from C-6 to Bataan Peninsula as a component of the regional transportation network, on the basis of general consideration of socio-economic and environmental conditions. This northern extension of the Coastal Road is referred to as Phase II of the Project.
- (4) The Study of Phase I of the Project also includes land development studies of the areas that will be reclaimed beyond what is considered necessary for the Coastal Road inasmuch as the Project is viewed also as an opportunity to alleviate socio-economic problems of the Manila Bay Region in addition to transportation problems.
- (5) The Study was conducted in close liaison with the various government agencies involved as well as other public and private agencies.

1.2 Project Objectives and Background

- (1) The Manila-Bataan Coastal Road Project was envisioned in response to the recognized need to complete the Metro Manila major thoroughfare system as identified by previous studies and to provide a direct land linkage between Metro Manila and the Bataan Peninsula as called for by the Manila Bay Region Structural Plan. Corollary to meeting the transport needs of the region, the Project was also envisioned to alleviate socio-economic problems

^{1/} Phase I denotes the first phase of Manila-Bataan Coastal Road and its Related Roads; and

^{2/} Phase II denotes the future phase of Manila Bataan Coastal Road (See Project Location Map).

(other than those arising from transport deficiency) already plaguing Metro Manila, inasmuch as an offshore alignment for the Coastal Road appears to be quite promising and its attendant reclamation could be expanded and utilized to alleviate such problems.

- (2) In an attempt to pursue the implementation of the Project the then Department of Public Highways (now Ministry of Public Highways), in 1976, invited proposals to undertake the Project on a turnkey basis to which various firms responded. The proposals were, however, found to be deficient in the necessary comprehensive supportive studies though these were required. For this reason, no acceptance was made and the need for a government-initiated and comprehensive feasibility study surfaced.
- (3) The Government of the Philippines (GOP), recognizing the need for a comprehensive feasibility study, requested the Government of Japan (GOJ) for technical assistance under its technical cooperation program. The GOJ responded favorably to the request and consequently conducted the Study in coordination with the GOP's counterpart study group.
- (4) The Study was undertaken during the period from January 1979 to March 1980 by a joint team of the GOP and GOJ thru its Japan International Cooperation Agency (JICA), an official agency responsible for the execution of technical cooperation of the Japanese Government. The GOP's involvement was made thru the representatives of the Ministry of Human Settlements and Ecology (MHSE), Ministry of Agriculture (MA), Ministry of Finance (MF), Bureau of Fisheries and Aquatic Resources (BFAR), Metropolitan Manila Commission (MNC), National Economic and Development Authority (NEDA), National Housing Authority (NHA), National Pollution Control Commission (NPCC), Philippine Port Authority (PPA), Public Estate Authority (PEA), Ministry of Public Works (MPW), Ministry of Transportation and Communication (MIC), and the Ministry of Public Highways (MPH) which served as the lead and coordinating agency to the Study's Steering Committee and Working Group which were formed to serve as the GOP's counterpart study group. JICA's involvement on the other hand was made thru the JICA's study team consisting of the Government Supervisory Group and JICA's Consultants, the Pacific Consultants International and Japan Oversea Consultants.

2. STUDY APPROACH

- (1) The composition of the Study Team being of varied disciplines made possible the employment of a multi-disciplinary team approach to the Study. With the team approach, adequate attention to all the Project's various components was ensured and an opportunity for resolving the various complex study issues in a broader manner was provided.
- (2) Since the Project's influence area is sensitive to any physical disturbance, the environmental aspects of the Project were given important consideration and were made an integral part of the planning process.
- (3) While the Project's background information defined the northern physical limits of Phase I of the Project, this was interpreted as not fixed and can be modified when warranted during the course of the Study. The study effort was therefore concentrated first at establishing these limits particularly the northern limit of the location of C-6 since the issue is very relevant to the extent the detailed field investigation had to be undertaken. The task was accomplished by studying the existing physiographic features; land uses and transportation facilities as well as the future road network and other future developments within the influence area.
- (4) The study of Phase I basically dealt with two major components; the road and reclamation components. The road component was approached in a detailed manner consistent with comprehensive feasibility studies of road projects. The reclamation component on the other hand, did not benefit from a similar comprehensive approach particularly with regard to the land utilization of the reclaimed land. The study only determined a conceptual development plan and this was used in the analyses. While the land uses were based on land demands resulting from the growth of the national economy and development of MMA, such uses have to be further studied in more detail from the viewpoint of marketing and financial aspects. The preliminary engineering aspects of the reclamation component, however, were given quite comprehensive treatment although further soil exploration at the site would be necessary primarily to confirm the quantity of acceptable borrow materials for the reclamation.
- (5) Certain basic assumptions were used in the Study, namely:
 - i) The prevailing market mechanism will not change in the future although it is anticipated that price escalation will continue as a result of the rising prices of petroleum products.
 - ii) In the traffic study, the services of PU vehicles (jeepneys and buses) were assumed not to change drastically in the future. The existing service pattern is assumed to continue in the direct influence zone of the project.

- (6) Phase II being a general study was approached in a very limited manner. The Scope of Work's limitation of the Study to only a superficial one was interpreted as recognition of the considerable amount of financial resources and time which a comprehensive study for this phase will require and the impracticability of too advanced planning in an area where socio-economic conditions are liable to change significantly before the Phase is actually implemented.
- (7) Four (4) general criteria served as controlling factors in coming up with the recommendations:
- i) The project should support stated goals and policies both in the national and regional levels. Some of these goals and policies are those concerned with the improvement of standards of living; the attainment of high and sustained economic growth; the promotion of regional development; and the protection, preservation and enhancement of existing communities or settlements and their environment, particularly those that are critical to the development of the primary sector such as crops and fishponds.
 - ii) The project should be technically, economically and financially feasible.
 - iii) The project should be capable of implementation.
 - iv) The implementation program should be based on an optimum stage development.
- (8) The entire study involved the following major activities:
- i) Road Study
 - a. Study of alternative routes and alternative road plans.
 - b. Traffic forecasts
 - c. Preliminary highway engineering including other technical aspects as hydrology, soils, etc.
 - d. Cost estimates and economic evaluation
 - e. Implementation program
 - ii) Reclamation Study
 - a. Land demand analysis
 - b. Establishment of conceptual development plan
 - c. Preparation of master plan
 - d. Preliminary reclamation engineering
 - e. Cost estimates and economic and financial evaluations

f. Implementation program

iii) Integration of Road and Reclamation Plan

iv) Environment Impact Appraisal

- (9) The whole flow of the study process is shown in Annex "B", General Flow Chart. The flow chart indicates the various study's principal tasks and their interrelationships.
- (10) The organization of the Study Team is shown in Annex "C".

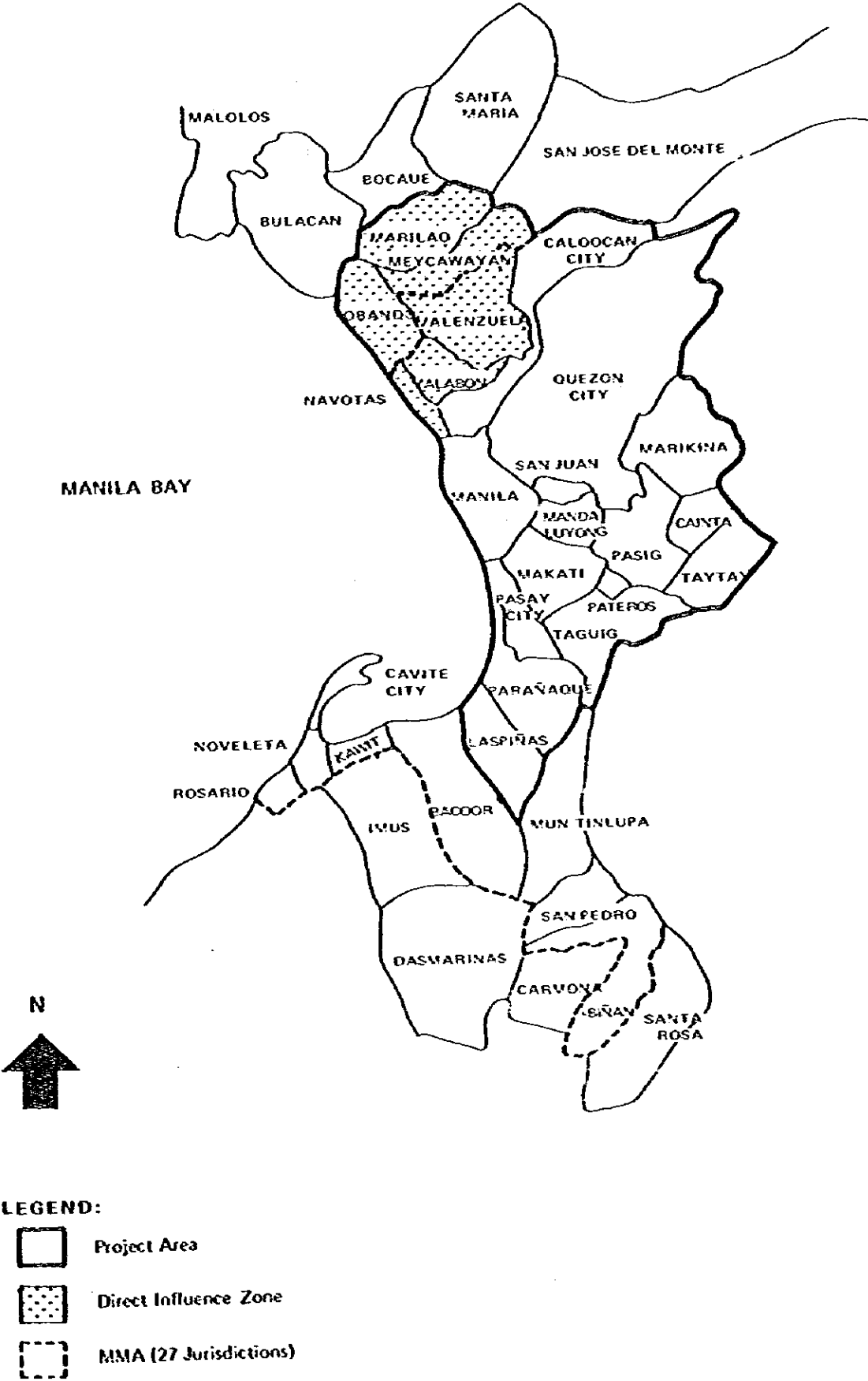
3. PRESENT SITUATION

3.1 Influence Area of Phase I

3.1.1 Physical Characteristics

- (1) The influence area of phase I is located in the central western part of Luzon. Comprising of Obando, Marilao, Meycawayan and the entire MMA except its southernmost parts, the area is bounded on the west by the Manila Bay, on the north by the Central Plains, on the east by the foothills of the Sierra Madre Mountains, and on the south by a narrow neck of flatlands (See Fig. 1).
- (2) The area is generally less exposed to typhoons than any other parts in Luzon. Its temperature is hottest during May and coldest during January. The rainy season is from June to October, while dry season from January to April.
- (3) Two river systems markedly influence the area; the Navotas and Meycawayan Rivers. Frequent overflowing of the rivers causes flooding of their contiguous areas. This is mainly due to their limited discharge capacities compared with their large catchment area and the amount of rainfall and the presence of artificial fishpond dikes and traps. A river improvement program is therefore imperative regardless of the NBCRP.
- (4) The water quality at some points in the estuaries of the rivers is suitable for the propagation of fish and other aquatic life. Excessive organic waste from industrial and municipal sources, however, is found in the upstream of the Navotas River. The portion of the river which runs through the urban area is highly polluted, some even in the septic state. In the Meycawayan River the phosphate level at some points exceeds the allowable concentration.
- (5) The land use pattern of the area indicates that urbanization has spread towards the outer surroundings of the MMA, encroaching even on fishponds and ricefields. At the southern part of Malabon, fishponds have been converted to industrial and residential sites to absorb the growth of nearby cities and municipalities in the MMA. However, fishponds are still predominant in the northern part, especially along the Meycawayan River.
- (6) Industries have moved away from the center of the MMA and have located on cheaper lands on the periphery which are served by major highways and where waterways are relied upon for transport (Pasig and Marikina Rivers). The zoning map for the area as prepared by Ministry of Human Settlements shows that considerable portion of the land in the northern intermediate area is assigned for industrial uses thereby reducing the dominance of agricultural lands.

Fig. 1 BOUNDARY OF THE PROJECT AREA



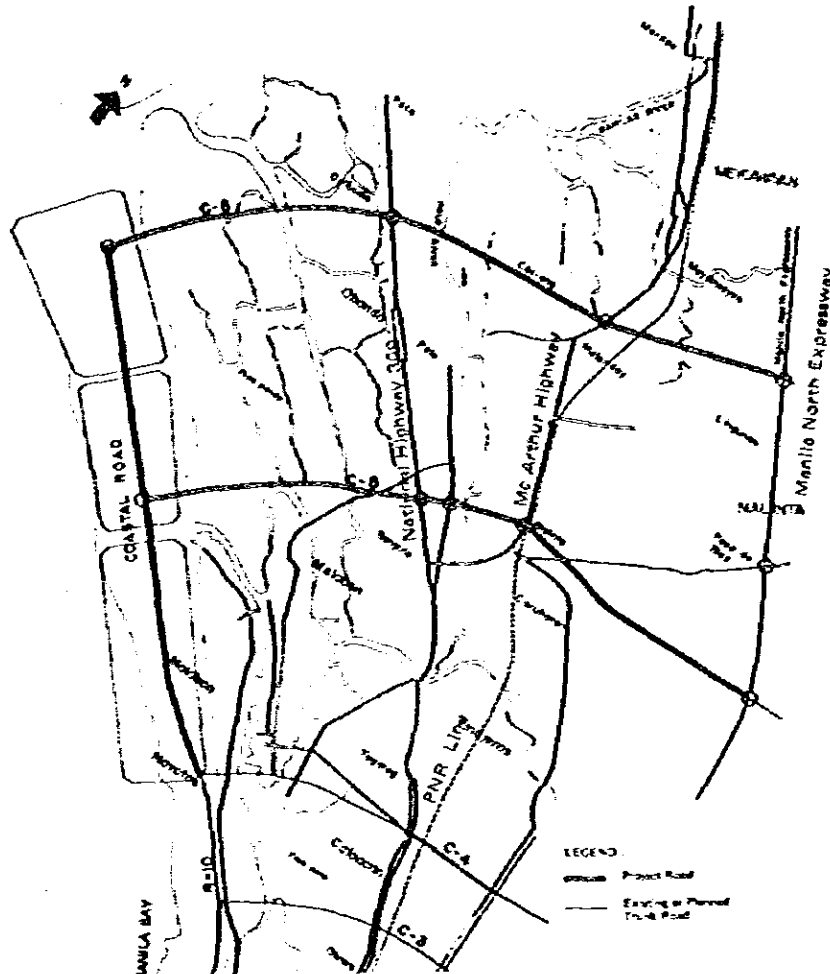
3.1.2 Socio-Economic Conditions

- (1) The influence area is home to some 14% of the nation's population. It is one of the most rapidly growing urban zones in the country, its inhabitants having increased from 2.5 million in 1960 to 4.1 million in 1970 and 5.9 million in 1979. Although the growth rate has been forecasted to taper off starting in 1980, the population is expected to continue to grow to 10.8 million by 2000.
- (2) The economy of the area is characterized by the dominance of the tertiary sector, and this pattern will prevail in the next twenty years. The primary sector, however, will experience a net decline as the people engaged in the manufacturing and service sectors will gradually increase.
- (3) Labor force was calculated to double in number by 2000, to reach 4.6 million.

3.1.3 Transport System

- (1) The transport system in the project area is basically road oriented. While the road network in the MMA will ultimately consist of ten (10) radial and six (6) circumferential roads, many of its components, especially the outer circumferential roads do not exist. The situation has caused poor accessibility in the outer part of the metropolis. There are in addition, inadequate road capacity and junction facilities, reducing the efficiency of the whole network, especially within the CBD where traffic volume is the largest.
- (2) The main roads in the direct influence zone (Navotas, Malabon, Valenzuela, Obando, Meycawayan and Marilao) are shown in Fig. 2. They serve the traffic movements between the MMA and the northern part of Luzon. The roads connecting east and west districts are less developed resulting in insufficient services.
- (3) The PNR operates a commuter train service along the north-south line which skirts the CBD. The North Harbor Line has been abandoned virtually eliminating the role of the railways as effective distributor of cargo to and from the Port of Manila. The rail service within the MMA for public transport is very minimal compared to the services of bus and jeepney.
- (4) The South Harbor, Luzon's only port for ocean-going ships, is situated in the project area. Ports in the nearby provinces such as in Batangas or Bataan or Legaspi can accommodate international ships, but they cannot be considered as real alternative ports because of their limited berthing facilities. Also located in the project area is the North Harbor, a major interisland port of Luzon, and the only one directly serving the MMA. Congestion is already manifesting without the possibility of relief because of limited space for expansion.

Fig. 2 MAIN ROADS IN DIRECT INFLUENCE ZONE



3.1.4 Major Problems

- (1) The accelerated urbanization of the MIA has posed various social and environmental problems especially in the north-western sectors. In spite of the continued and vigorous efforts of the Government to remedy the situation, congestion, deficient and sub-standard housing, inadequate basic infrastructures, poor sanitary and environmental conditions such as pollution have assumed grave proportions because of increasing pressure of population. Indiscriminate mixes and shifting of land uses, shortage of warehousing and storage spaces and land for proper garbage disposal sites continue to plague the area.
- (2) The prevalence of unemployment and underemployment makes the task of creating more job opportunities imperative. This need will be magnified further with the burgeoning of the labor force in the next twenty years.

3.1.5 Future Prospects

- (1) New developments are already discernible in the areas adjacent to the Malinta and Meycawayan interchanges of the Manila North Expressway. These are attributed to such factors as good accessibility to and from Manila, the presence of waterway for alternative transport modes and for industrial water intake, and relatively lower price of land.
- (2) Rural landscapes such as undeveloped lands, ricefields and fishponds are still predominant in the direct influence zone, but urban sprawl can in no time engulf these areas. Present trends indicate that new housing areas and industrial establishments will locate in the land between the McArthur Highway and the Manila North Expressway.
- (3) Urbanization of the area to the east beyond the Manila North Expressway will depend upon the improvement of infrastructure including the construction of the road network. Upon the completion of C-5, C-6 and the Coastal Road, the area will be accessible to and from the Port of Manila, thereby encouraging the development of industrial and residential sites.

3.2 Influence Area of Phase II

3.2.1 Physical Characteristics

- (1) The influence area of Phase II encompasses the MMA and the provinces of Bulacan, Pampanga and Bataan. It has generally flat terrain, with slopes ranging from 0-8%. Except for the MMA, it is blessed with vast tracts of forests and pasture lands, prime agricultural lands, swamps and marshes, a large part of which are awaiting development or exploitation.
- (2) A significant land mass in the area is the Pampanga Delta which extends northward from the urban outskirts of the MMA, the North Manila Bay shore and the Manila-San Fernando-Bataan Highways. The delta consists of small estuaries, brackish water marshes and wetlands, fresh water swamps and relatively high and dry flatlands crisscrossed with water courses and channels. The land itself may be tagged as the "Fish Bowl of the Philippines", having the largest agglomeration of inland fish farms in the country. It is becoming and increasingly important settlement frontier immediately north of the MMA.

3.2.2 Socio-Economic Conditions

- (1) The settlement pattern of the area is described as densely concentrated in some parts, i.e., MMA, while some are sparsely populated. For instance, in 1975, the MMA had a population density of 7,814.50 persons per sq. km. which was 41 times more than Bataan's 191.60 persons per sq. km.
- (2) Except in Bataan, which is heretofore a basically agricultural province, employment in the area is largest in the tertiary sector, followed by the primary sector. The secondary sector in Bulacan is fast developing which could be the effect of the urbanization in the MMA. Bataan, on the other hand, is gaining notice as an industrial area as demonstrated by the location therein of such major industrial sites as the Export Processing Zone in Mariveles and the nuclear power plant currently constructed in Bagac.

3.2.3 Transport System

- (1) The transport mode between Manila and Bataan is chiefly land-based. The Manila North Expressway, McArthur Highway, Olongapo-San Fernando Road and the Bataan Expressway facilitate movement of passengers, goods and services on land.
- (2) Hydrofoils ply between Manila and Bataan peninsula on the Manila Bay. However, these are not operating on a commercial scale; only passengers to and from the BASECO/EPZA utilize them.

Fig. 3 INFLUENCE AREA OF MANILA BATAAN COASTAL ROAD



3.2.4 Development Prospects

- (1) As the MMA continues to expand towards its periphery, the need for core urban land arises. Industrialization is seen to develop and strengthen in the northern part of Bulacan and Pampanga along the McArthur Highway and the Manila North Expressway, more so that industrial growth centers have been planned by the Government in San Fernando and Angeles, Pampanga. The southern parts on the other hand, will be encouraged to shift their products from rice and sugar to fresh vegetables and fruits. The province of Bataan will continue to reinforce its agriculture potentialities. The province has a plan to intensify its crops and fruits production on its 6,000 hectares of explorable lands in the next twenty years to meet the growing needs of the MMA. Industrialization will also be felt with the projected plans of the Government to establish petrochemical and steel plants in the province.

4. FINDINGS AND RECOMMENDATIONS

4.1 Findings

- (1) Among the several alternative routes for Phase I of the Manila-Bataan Coastal Road (inland and offshore routes), the proposed offshore route has the least adverse effect on the existing physical and socio-economic conditions of its immediate influence area. For this reason, the said route was chosen to be subjected to further detailed analysis and eventually led to five alternative road plans.
- (2) Evaluation of the above mentioned five alternative road plans (see Fig. 4) reveals that the most viable plan is the alternative that calls for the construction of the Coastal Road on reclaimed area and the construction of C-5 as a 4-lane divided highway with the construction of C-6 deferred, (Plans 3 & 4).
- (3) Based on the assumption that the most viable road plan is the one that runs on reclaimed land with the construction of C-6 deferred, an evaluation of three alternative reclamation plans (involving Blocks I-IV) with varying degrees of industrial and residential allocation, reveals that the alternative with higher allocation for industrial usage is the most viable.
- (4) The alternative road plan (Plan 2) which calls for the construction of the Coastal Road as a causeway (without additional reclamation for development) and the construction of C-5 only, was also found viable but its B/C value is lesser than the Plan with additional reclamation (Plans 3 & 4). The economic indicators for Plans 2, 3 & 4 and 5, are shown below:

	Total Cost in P million i = 15%	Present Worth in P million i = 15%	B/C Ratio i = 15%	IRR %
Plan 2	722.97	341.3	1.934	22.4
Plans 3 & 4	833.14	387.8	2.056	23.4
Plan 5	752.50	215.2	1.572	19.8

- (5) The following are the results of the economic and financial analysis of the most viable road and reclamation plan as integrated for the Phase I of the Project:

Total Cost <u>3/</u>	P2,977 M <u>4/</u>
Economic IRR	24.4%
Present Worth	P843.1 M at i = 15%
B/C Ratio	1.633 at i = 15%
Net Financial Surplus discounted at 15% p.a. <u>5/</u>	P713.6M
Financial IRR <u>5/</u>	more than 60%

3/ At 1979 prices

4/ Exclusive of C-6

5/ Based only on rough estimate

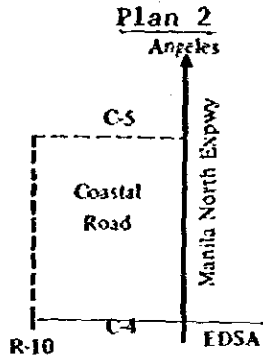
Fig. 4 ALTERNATIVE ROAD PLANS

Diagram

Description

Plan 1

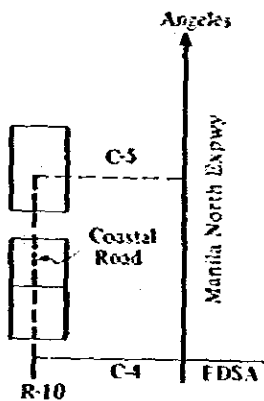
No Project Road, which is taken as the case without project.



The Project Roads are constructed into two parts: the Coastal Road as a causeway in the sea and C-5. No reclamation project is implemented simultaneously.

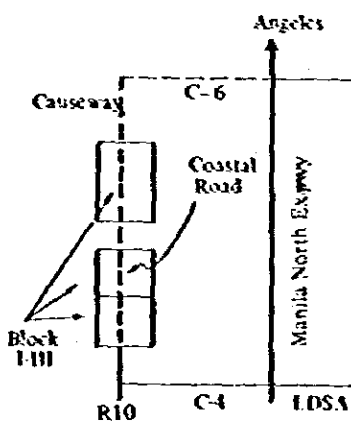
Plans 3 & 4

The Project Roads are constructed simultaneously with the reclamation work of Blocks I - III. Coastal Road is located on the reclaimed areas and linked to Manila North Expressway by C-5.



Plan 5

The Project Roads are constructed simultaneously with the reclamation work of Blocks I - III. The Project Roads are constructed into three sections: The Coastal Road on the reclaimed areas, the Coastal Road as a causeway in the sea and C-6 section.



- (6) The establishment of the northern limit of Phase I as south of the Meycawayan River was influenced mainly by the following factors:
- i) The adverse effect of the reclamation on the marine life in the Meycawayan estuary is minimized.
 - ii) The most suitable location of C-6 when its construction becomes finally warranted, is south of Meycawayan River from the viewpoint of functional spacings of circumferential roads. At this location, crossing of the Meycawayan River is also avoided.
 - iii) The construction during the initial phase of the project of a long bridge that will span a waterway required by hydrological and oceanographic considerations opposite the mouth of the Meycawayan River could be avoided.
- (7) No serious technical difficulty is expected in the construction of the viable components of Phase I. Acceptable dredge materials for reclamation can be found in the vicinity of the mouth of the Meycawayan River. However, their quantities should be confirmed by further exploration. Right-of-way acquisition for the circumferential road will not be difficult as the road alignment clears the built-up areas.
- (8) The optimum area of reclamation from the viewpoint of reclamation economics is about 900 hectares for the initial stages of Phase I. This is mainly influenced by the distance of the off-shore limit from the shore-line. Reclamation will follow a strip pattern starting from the beginning point of the Coastal Road up to C-5 and then C-6 before proceeding to areas further off-shore.
- (9) Tentative land demand and development cost/land price analyses suggest the utilization of the reclaimed area primarily for industrial purposes. Opportunities for better land and water transport facilities are among the factors that influenced the preference for this option. The development of wharves as auxiliary to the Port of Manila, assuming custom control will not be a problem, further strengthens this option.
- (10) On the basis of the study of the national and regional goals, policies, targets and identified problems as well as the particular characteristics of Metro Manila in its regional and national context, the following primary land uses have great potentials in the reclaimed areas:
- Petroleum Storage - (as a new site for POL storage facilities in Pandacan);
 - Steel Processing Industry (construction);
 - Steel Processing Industry (machinery);
 - Ship Building and Repairing Industry;

- Wood Industry (processing factory);
 - Other light Industries;
 - Commodity Distribution Center; and
 - Solid Waste Disposal Site (for the land fill of Block 1 of the reclaimed area).
- (11) While housing shortage is a problem in MMA, the extent of the residential usage of the reclaimed areas is limited only to that which can be cross-subsidized by the revenue from industrial usage in order to have a greater return of the investment from the project.
- (12) The project will have favorable impact in terms of increased transport mobility and accessibility, increased land values in the direct influence zone, increase in the value of fishes, generation of employment opportunities, promotion of urban renewal and better environment. The adverse impacts on the other hand are air and water pollution during construction, temporary water turbidity, some population displacement and loss of fishponds, and probable water and air pollution if industrial waste discharges are not properly handled and controlled.
- (13) While the extension of the Coastal Road to Bataan (Phase II) will provide a short cut between Manila and the Bataan peninsula and will effect reduction in congestion along existing routes as well as help spurring the development of Bataan, Zambales and Pampanga, the minimal observed traffic volume on this section of the coastal road does not warrant the construction of the extension in the immediate future.

4.2 Recommended Road and Reclamation Plan

4.2.1 General

On the basis of the technical and economic evaluations, it is recommended that the Coastal Road shall be constructed on the reclaimed off-shore areas in Navotas and Malabon. Circumferential roads 5 and 6 (C-5 and C-6) shall be constructed to link the Coastal Road to the Manila North Expressway. However, C-6 shall be implemented at a much later time when traffic demand warrant its construction.

4.2.2 Road Plan

- (1) The 7.0 km. Coastal Road, which shall function initially as a principal arterial road, will ultimately be a 4-lane divided highway with a one-way, two lane frontage road and sidewalk on each sides and shall ultimately be a portion of the expressway which will comprise the R-10 (from C-2 to C-4), Coastal Road, and the whole of C-6. At the initial stage, the segment that runs through the reclaimed block I shall be a 27 m. causeway that will be laid on a 70 m. R.O.W. The causeway shall consist of a

4-lane carriageway, a median strip and sidewalk. The segment from block II up to C-5 at block III shall be the same as that of the ultimate stage while that portion that runs through block III from C-5 up to the northern edge of the block shall consist of a two-lane roadway with frontage road and sidewalk.

(2) C-5, an 8.6 km. principal arterial road, shall also be a 4-lane divided highway with a one-way, two lane frontage road and sidewalk. Initially, the segment from the Coastal Road to the National Highway 369 and from McArthur Highway to the Manila North Expressway shall be a 27 m. roadway, consisting of a 4-lane carriageway and a median strip. The initial stage of the segment from the National Highway 369 to McArthur Highway shall be the same as that of the ultimate stage.

(3) The 10.2 km. C-6, which shall function as an expressway, shall be a 4-lane divided highway with a two-lane frontage road on the sides. Initially, it may only be a 2-lane carriageway with shoulders on the sides.

The frontage road shall be treated as an independent facility for inter-local traffic and is separated from the expressway.

(4) The following are the design elements of the roads:

Design Element	Unit	Coastal Road	C-5	C-6
Design Speed	Km/hr	80	80	100
R.O.W.	m	70	50	70
Lane Width	m	3.50	3.50	3.65
Shoulder Width				
Left	m	0.75	0.75	1.25
Right	m	2.50	2.50	3.00
			(Undeveloped Area)	
			1.50	
			(Developed Area)	
Median Width	m	4.50	4.50	7.50
Outer Separator Width	m	11.0	3.00	10.45
Frontage Road Width	m	6.50	6.50	7.25
Pavement Type	-	Flexible	Flexible (Coastal Road to McArthur Highway)	Flexible (McArthur Highway to MNE)
			Rigid (McArthur Highway to MNE)	Rigid

Fig. 5 TYPICAL CROSS SECTION
 MANILA-BATAAN COASTAL ROAD (C-4 TO C-6)
 ULTIMATE STAGE

R.O.W. = 70 m

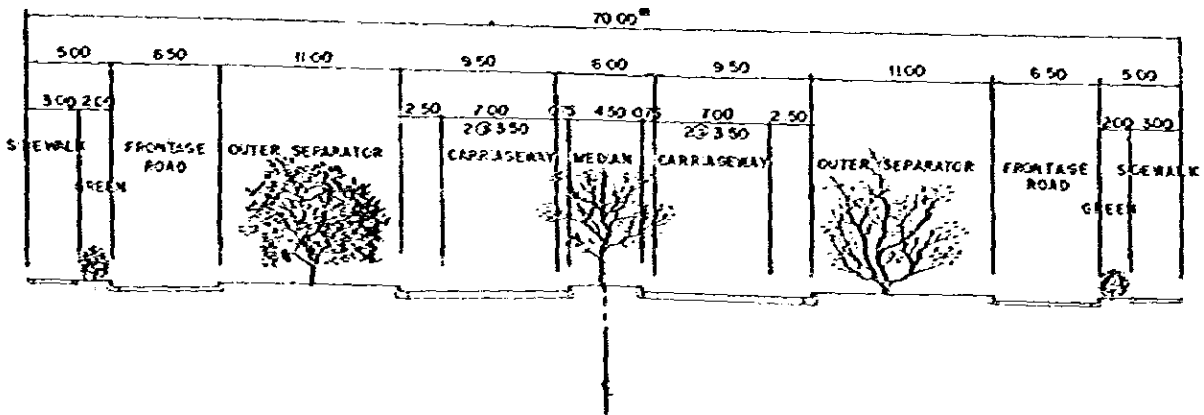


Fig. 6 TYPICAL CROSS SECTION
 MANILA-BATAAN COASTAL ROAD (C-4 TO C-6)
 INITIAL STAGE

R.O.W. = 70 m

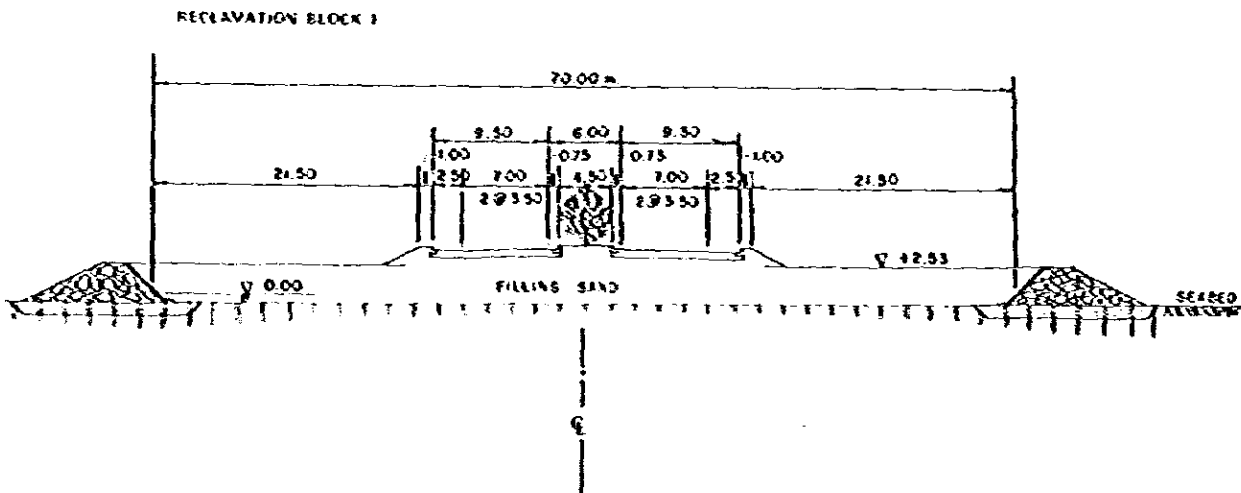
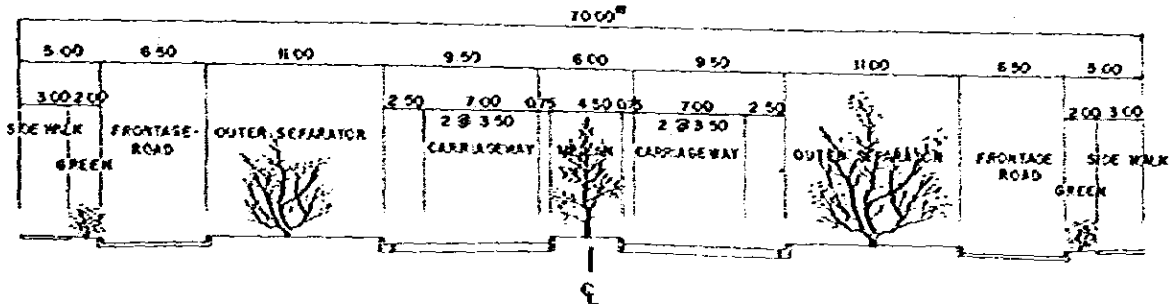


Fig. 7 TYPICAL CROSS SECTION
MANILA-BATAAN COASTAL ROAD (C-4 TO C-6)
INITIAL STAGE

R.O.W. = 70m

RECLAMATION BLOCK II



RECLAMATION BLOCK III

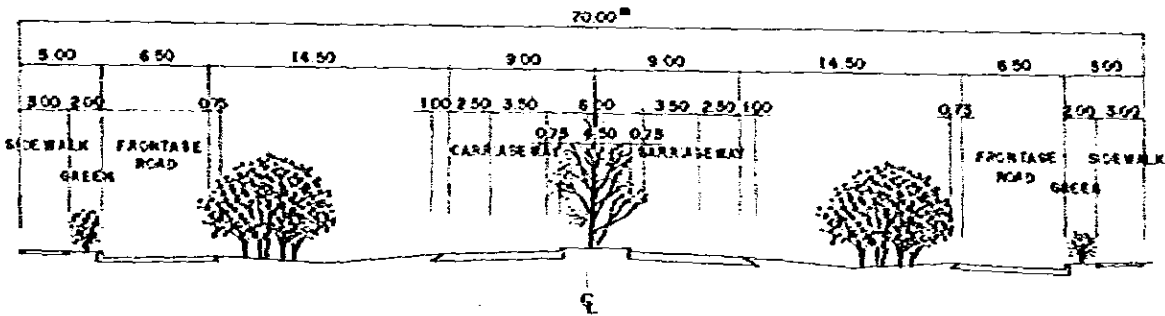
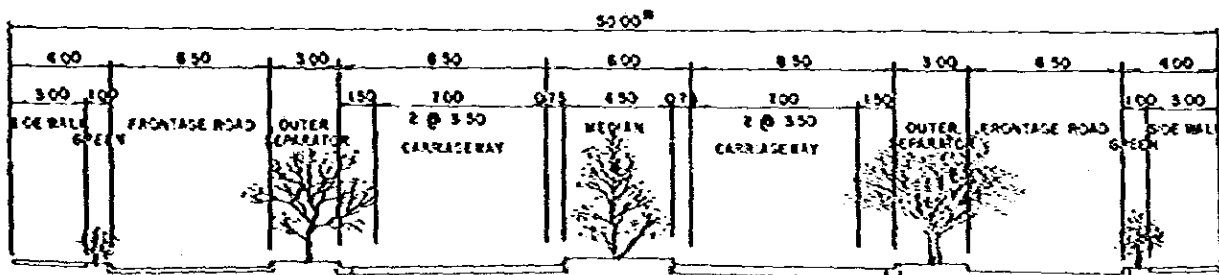


Fig. 8 TYPICAL CROSS SECTION C-5

R.O.W. = 50m

ULTIMATE STAGE

SECTION: COASTAL ROAD TO NATIONAL HIGHWAY 369
AND MCARTHUR HIGHWAY TO MANILA NORTH EXPRESSWAY



INITIAL STAGE

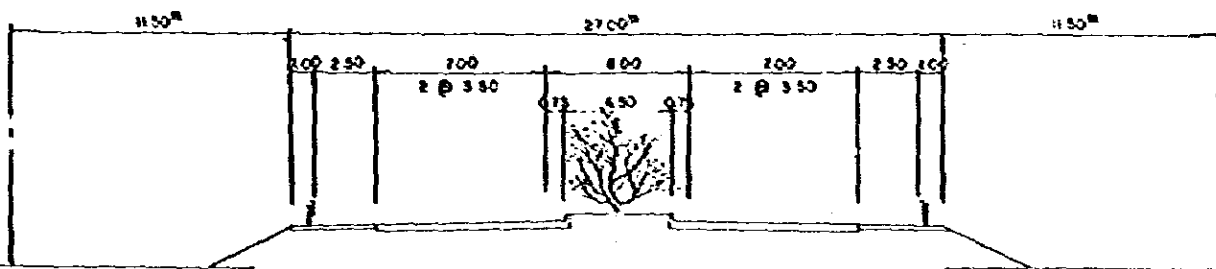


Fig. 9 TYPICAL CROSS SECTION C-5
INITIAL AND ULTIMATE STAGE

R.O.W. = 50^m

SECTION: NATIONAL HIGHWAY 359 TO MCARTHUR HIGHWAY

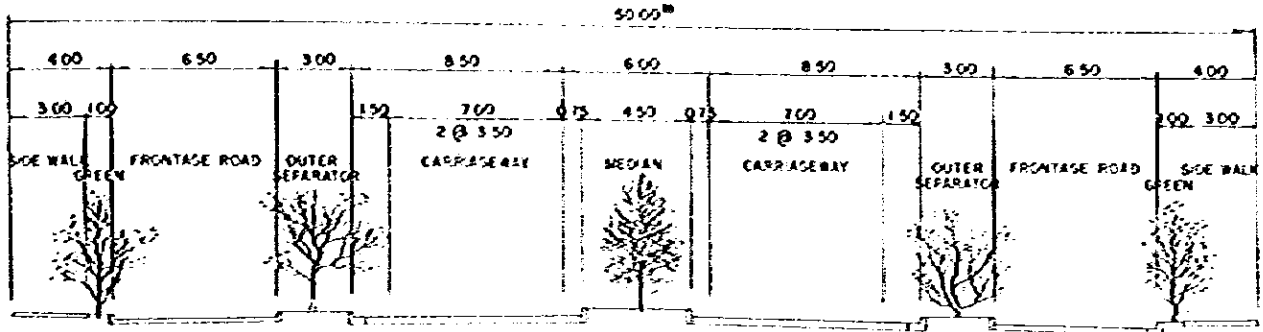
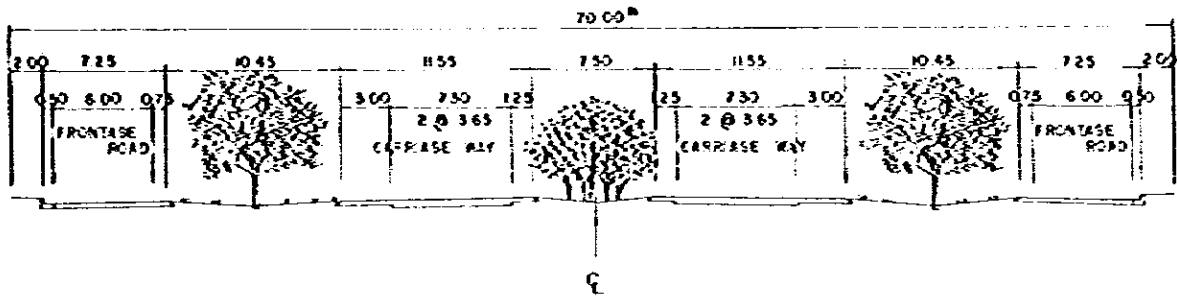


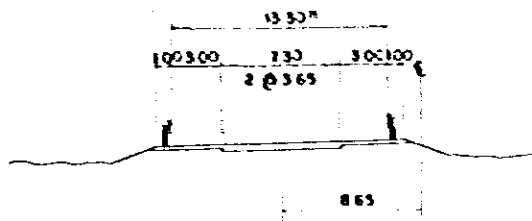
Fig. 10 TYPICAL CROSS SECTION C-6

R.O.W. = 70^m

ULTIMATE STAGE



INITIAL STAGE



(5) Intersections

Twelve (12) intersections were planned for the Project Roads. Except for the C-5/McArthur Highway, the San Roque-Malinta Road intersections and Manila-North Expressway Interchange, all the others shall be at-grade during the initial stage of construction. Seven interchanges shall be built on the Project Roads; two each along the Coastal Road and C-5 and three along C-6.

<u>Intersections</u>	<u>Interchange Type</u>
Coastal Road /C-5	Directional type
Coastal Road/Arterial street at Block II	Modified diamond
C-5/Manila North Expressway	Cloverleaf
C-5/McArthur Highway	Half cloverleaf
C-6/National Road 369	Diamond
C-6/McArthur Highway	Diamond
C-6/Manila North Expressway	Cloverleaf

(6) Bridges and Culverts

A total of 37 bridges shall be constructed on the Project Roads; three (3) along the Coastal Road, 15 at C-5 and 19 at C-6. Culverts shall be provided at some 28 locations along C-5 and C-6 to drain flood and storm waters and to supply brackish water to fishponds in the traversed area.

4.2.3 Reclamation Plan

- (1) It is recommended that the northern limit of the reclamation shall be at the south bank of the Meycawayan River with any further northward expansion reserved for a future project.
- (2) Strip development shall be adopted as the development pattern of the reclaimed area, i.e., development shall start at the shallow water zone in the entire stretch from the starting point of the Coastal Road up to C-6 and proceed later with the area further off-shore.
- (3) The most suitable initial size for the reclaimed area shall be approximately 900 hectares.
- (4) On the basis of the financial and economic evaluations, it is recommended that the reclamation area shall cater mainly for industries, although some portions shall also be utilized for other purposes such as solid waste disposal area, residential area, etc. The industries to be established shall be export-oriented, labor intensive and non-pollutive (see Fig. 11).
- (5) The reclaimed area shall be composed of seven blocks; four of which shall be initially developed. The finished ground level shall be 3.0 meters above MLLW. A waterway shall be provided

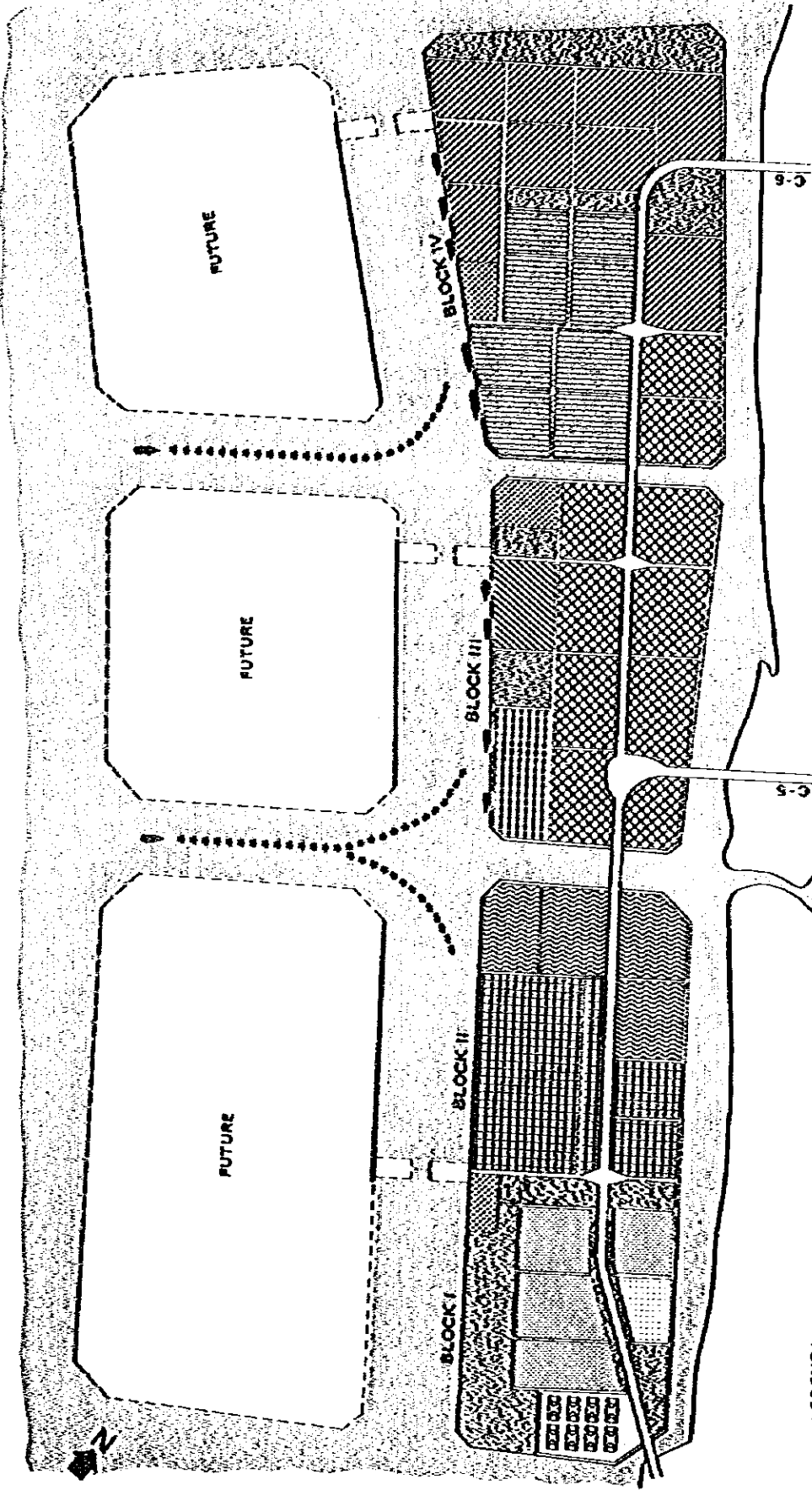
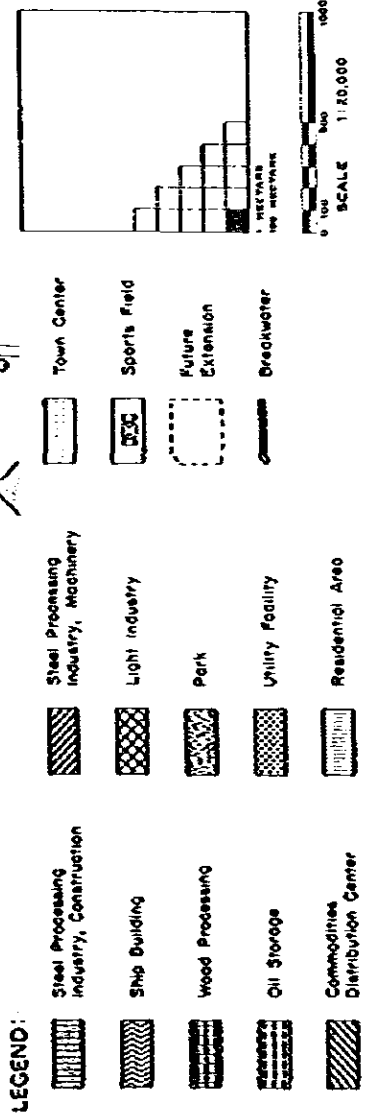


Fig. 11
**DEVELOPMENT PLAN
 ALTERNATIVE I**
 (HIGH PROJECTION
 FOR INDUSTRIAL LAND USE)



between the reclaimed blocks and the mainland and between each of the blocks, except Blocks I and II which shall be contiguous. The waterway at the extension of the Navotas River, between blocks II and III, shall have a width of 200 meters, and a bottom elevation of -2.5 meters. The waterway between blocks III and IV shall have a width of 100 meters.

- (6) Block I shall have an area of 165 hectares. Initially a solid waste disposal area, it shall eventually be transformed into a park, residential site, town center, recreational area, etc. Block II and III, with areas of 185 hectares and 215 hectares, respectively, shall be mainly utilized by light industries, shipyard, wood industry and storage areas like oil tank yard and commodities distribution center and will contain relatively light weight structures. Block IV, with an area of 325 hectares shall mainly accommodate steel processing plants and will handle heavy materials and products.

Ports and wharves shall be put up in blocks II, III and IV. At block II and III, small barges and interisland vessels shall be considered while the large ships shall dock at block IV.

- (7) The road network in the reclamation area shall consist of the primary road network (i.e., Coastal Road and C-5 and C-6) and street network, comprising of the arterial street and service road.

Arterial streets shall be 4-lane divided highways with sidewalks. The service roads shall have two lanes with parking lanes and sidewalks on the sides. The design elements are as follows:

Design Element	Unit	Arterial Streets	Service Roads
Design Speed	Km/hr	40	30
R.O.W.	m	40 (Residential and town center)	20
		30 (Industrial and commodities distribution center)	
Lane Width	m	3.35	3.00
Shoulder Width	m	0.50	-
Median Width	m	2.00	-
Pavement Type	-	Flexible	Flexible
Sedewalk Width	m	5.00 (Residential and town center)	3.00
		3.00 (Industrial and commodities distribution center)	

Arterial streets shall serve all reclamation blocks and shall be densely located adjacent to industrial sites which are potential traffic generators. Service roads shall serve all development units. Frontage roads of the Coastal Road shall be considered as service roads.

- (8) The reclaimed area shall have the following utilities; a water supply system, a sewerage and sewage treatment system, a storm drainage system, an electrical power system and a telecommunication system.

1) Water Supply System

The estimated water consumption of each land use are:

<u>Land Use</u>	<u>Consumption</u>
Industrial areas and commodities distribution center	250 kiloliters/ha/day
Residential areas	130 liters/capita/day
Town center and institutional areas	200 kiloliters/ha/day

An emergency storage shall be provided with a capacity of 16,000 cubic meters with MWS as the main water sources.

ii) Sewerage and Sewage Treatment System

The sewerage and sewage treatment system is proposed to consist of two string systems, domestic and industrial. However, only the former is included in the development of the reclaimed area with providing also the sewage treatment plant based on activated sludge method. Nevertheless, the possibility of a central treatment plant for each block to take care of pre-treated industrial effluents may be considered.

iii) Storm Drainage System

Channels shall slope towards the southwest shore side. The system shall consist of adobe open channels with RC box culverts at road crossings.

iv) Electrical Power Supply

Transmission lines shall be installed alongside the Coastal Road and feeder lines on the arterial streets and service roads. Electricity shall be supplied by the MERALCO.

v) Telecommunication System

The main cables shall be installed along the Coastal Road and pair cables from over head lines and pair cables on the arterial streets and service roads. The telecommunication

network shall be installed by the Philippine Long Distance Telephone Company.

4.3 Recommended Implementation Program

4.3.1 Reasons of Implementation by Phases and Stages

It is recommended that the entire project shall be implemented by phases and stages; for the following reasons:

- i) Long period of implementation will inevitably give rise to uncertain factors beyond the extent of the sensitivity test;
- ii) Implementation by phases and stages would facilitate implementation of the project since the investment cost that will be needed at a particular time is lesser.

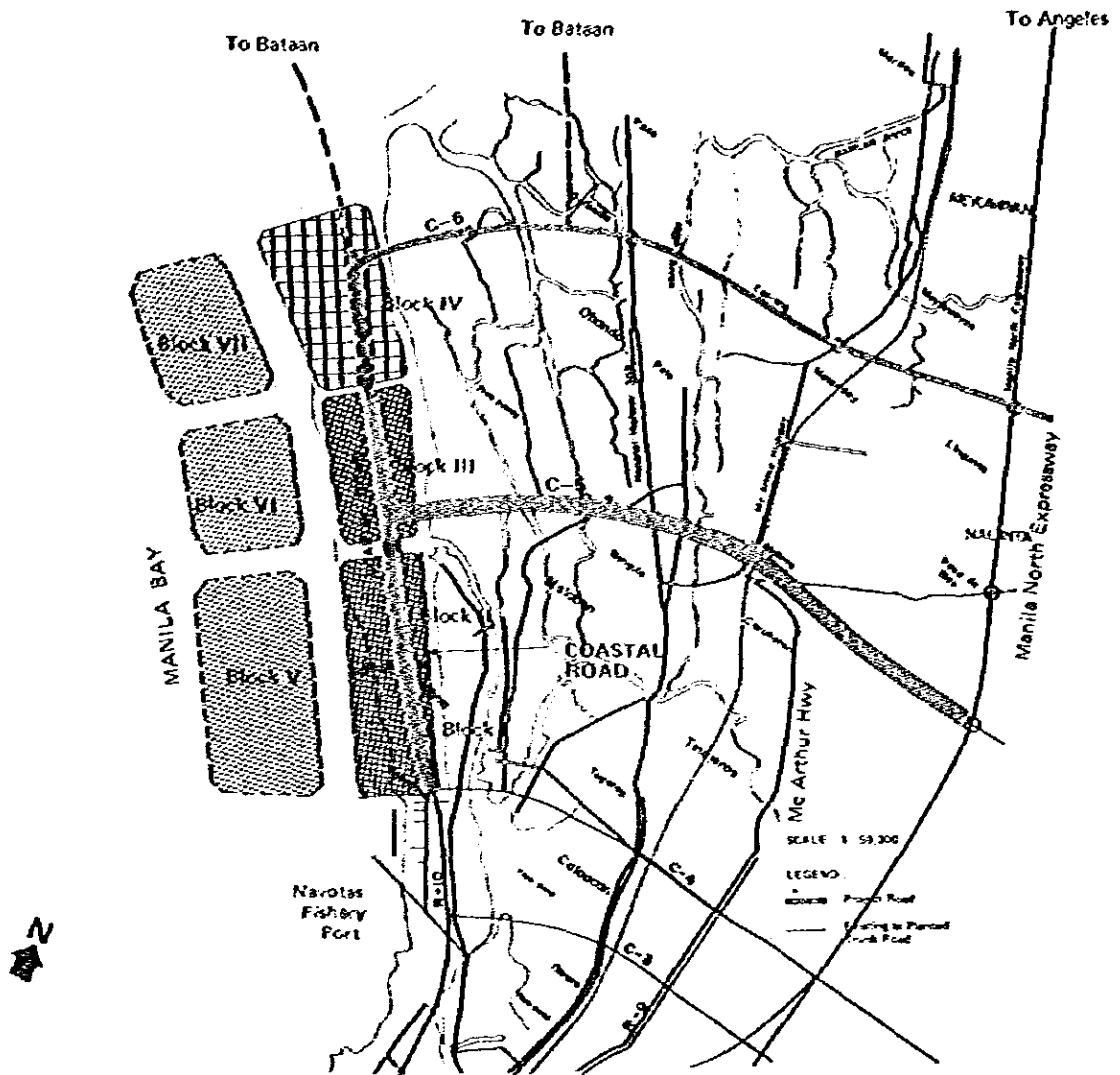
4.3.2 Project Implementation for Each Phase and Stage

The phases and stages shall consist of the following construction components (see also Fig. 12):




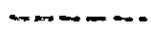


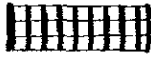

Phase	Stage	Construction components	Implementing Schedule	
I	I	a) Construction of the Coastal Road and C-5 -----	1984 - 1987	
		b) Development of the reclamation blocks II & III (including bulkhead construction of block I) -----	1983 - 1987	
		c) Development of block I -----	1994 - 1995	
		d) Construction of the grade separation and overlay for the Coastal Road and C-5 -----	1995 - 1997	
	II		a) Construction of the extension of the Coastal Road to block IV -----	After 1994
			b) Development of block IV -----	After 1988
II		a) Construction of C-6 -----	To be determined by further studies	
		b) Development of reclaimed blocks V - VII -----	- do -	
		c) Construction of the extension of the Coastal Road to Bataan -----	- do -	

- Notes: 1. The timing of the Stage II implementation should be finalized at a later time by reviewing the progress of the Stage I program.
2. Contrary to the Project Location Map which shows C-6 as a component of Phase I, it is recommended that C-6 shall be implemented as a component of Phase II, since the traffic demand does not warrant its construction at this time.

Fig. 12 PROJECT PHASING



LEGEND :

-  Construction of Project Roads, Stage I of Phase I
-  Construction of Project Road, Stage II of Phase I
-  Construction of Project Road, Phase II
-  Alternative Routes of the Phase II Manila-Bataan Coastal Road
-  Existing or Planned Trunk Road
-  Development of the Reclamation Area, Stage I of Phase I
-  Development of the Reclamation Area, Stage II of Phase I
-  Development of the Reclamation Area, Phase II

4.3.3 Stage Implementation for the Roads Cross Sections

A stage implementation shall also be applied to the cross sections of the roads. Since the initial stages are designed to accommodate traffic demands twenty years after the opening of the road in 1988, there will be no widening up to year 2008. The ultimate stage in certain road sections are therefore beyond the scope of this project.

4.3.4 Costs and Benefit Cost Analysis

i) Phase I

The total cost in 1979 prices of Phase I Project (Stages I and II) is P2,977 million.^{6/}

Project Component	Foreign Currency Component	Local Currency Component	Taxes	Total
Road Project	392	344	98	834
Reclamation Project	1,248	608	287	2,143
Total	1,640	952	385	2,977

The benefit cost analysis produced the following economic indicators:

IRR = 24.4%

PW = P843.1 million in 1979 prices at $i = 15\%$

B/C = 1.633 at $i = 15\%$

The financial consequence of the reclamation project were also found to be:

Net surplus discounted at 15% p.a. = P 713.6 million

Internal Rate of Return = more than 60%

ii) Stage I

The costs and benefit cost indicators of Stage I, which is recommended for immediate implementation, are summarized as follows:

^{6/} Exclusive of C-6 and Blocks V - VII

a. Project Costs

(P million in 1979 prices)

Project Component	Foreign Currency Component	Local Currency Component	Taxes	Total
Coastal Road & C-5:				
1979 Prices	329	290	80	699
Escalated Prices	607	534	148	1,289
Development of Reclaimed Blocks I - III:				
1979 Prices	793	392	182	1,367
Escalated Prices	1,498	740	344	2,582
Grade Separation & Overlay of Coastal & C-5 Roads:				
1979 Prices	63	54	17	134
Escalated Prices	227	194	61	482
Total in 1979 Prices	1,185	736	279	2,200
Total in Escalated Prices	2,332	1,468	553	4,353

(The price escalation is assumed at 10% p.a. up to 1989 and at 5% p.a. thereafter.)

b. Results of Economic Analysis

The economic indicators of the Integrated Implementation Program for Stage I are as follows (i = 15% p.a.):

- Present Worth (in P Million) 582.3
- Benefit Cost Ratio 1.52
- IRR 22.6%

The sensitivity test of the Internal Rate of Return was examined for the assumed conditions and obtained the following figures:

1. If the cost is increased by 20%, IRR = 19.0%
2. If the benefit is reduced by 20%, IRR = 18.3%
3. If the benefit is reduced by 33%, IRR = 15.3%

4. The combination of 1. and 2. IRR = 15.2%
5. The combination of 1. and 3. IRR = 12.4%

c. Results of Financial Analysis

A financial analysis with sensitivity test was also performed and the favorable results are as follows:

<u>Description</u>	<u>Net Surplus in P Million Discounted by 15%</u>	<u>Internal Rate Rate of Return</u>
Integrated Program	453.4	More than 60%

The net surplus and the IRR will vary according to the following assumptions:

1. If the cost is increased by 20%
PW = 164.8 IRR = 33.3%
2. If the benefit is reduced by 20%
PW = 74.1 IRR = 24.2%
3. If the benefit is reduced by 33%
PW = -172.5 IRR = 0.2%
4. The combination of 1. and 2.
PW = -214.6 IRR = -0.4%
5. The combination of 1. and 3.
PW = -461.2 IRR = -16.7%

The results of the sensitivity test indicate that the financial performance of the reclamation project is easily affected by the change in the program of the operation.

4.3.5 Funding Requirements

Funds that will be used to finance the implementation of Stage I will be obtained from normal appropriations from the Governmental budget, borrowings from foreign countries through either bilateral or multilateral government agreement, borrowing from domestic and commercial sectors, bonds issued by the corporation that shall manage the reclamation project, etc.

COST OF PROGRAM IMPLEMENTATION
- STAGE I -

(P million in 1979 prices)

Project Component	Foreign Currency Component	Local Currency Component	Taxes	Total
Coastal Road	166.2	104.0	39.4	309.6
C-5	162.7	186.1	40.9	389.7
Reclamation of Blocks II-III (including bulk-head construction of Block I)	677.4	245.2	146.7	1,069.3
Infrastructure for Blocks II & III	79.6	105.6	24.8	210.0
Infrastructure for Block I	36.1	41.0	10.9	88.0
Grade Separation and Overlay	62.7	53.6	17.5	133.8
Total of Stage I	1,184.7	735.5	280.2	2,200.4

- i) Contributions from Government Agencies through an Appropriation from Governmental Income and/or borrowings from Foreign Sources.

If the cost of the construction of the Roads and infrastructure are to be covered by their contribution, the amount that will be pumped into the project is:

(P million in 1979 prices)

<u>Foreign Currency Component</u>	<u>Local Currency Component</u>	<u>Taxes</u>	<u>Total</u>
507.3	490.3	133.5	1,131.1

- ii) Borrowings from Foreign and Domestic Sources of the Private Sector

If the cost of the reclamation for Blocks I - III is to be covered by these borrowings, the amount that would be needed is:

(P million in 1979 prices)

<u>Foreign Currency Component</u>	<u>Local Currency Component</u>	<u>Taxes</u>	<u>Total</u>
677.4	245.2	146.7	1,069.3

The extent of price escalation during the years of implementation is hard to forecast since it is affected by fluctuating international and domestic economies. The cost including price escalation for Stage I (shown in 4.3.4. ii) is approximately two times of 1979 prices, under the assumption described therewith. It is suggested that the funds required in actual disbursement should be determined by considering price escalations in the coming decade. These projections should also be reviewed periodically by examination of the changes in price level.

4.3.6 Implementation Schedule

Considering the length of time and the huge amount that will be involved in completing the project, it is recommended that the Government consider the implementation of the Stage I of Phase I as soon as possible. The schedule shall be as follows:

<u>Project Component</u>	<u>Inclusive Period</u>
Coastal Road and C-5, development of Block II - III (including bulkhead construction of block I)	1981 - 1987
Construction of street network and utilities of Block I and grade separation and overlay for the Coastal Road and C-5	1993 - 1997

The detailed time schedule is shown in Fig. 13.

4.4 Other Recommendations

4.4.1 Limitations of the Study and Recommended Future Studies

i) Land Demand Analysis

As stated earlier, the land demand analysis was based on case studies only. The case studies are limited to the basic factors since a detailed study would involve numerous variables which require thorough and lengthy studies and which the direct users of reclaimed land are in a better position and capacity to perform. Among others, the selection factors and the location demand of entrepreneurs must be studied in order to grasp the scale of the area they demand, the timing of lot purchases and others.

ii) Market Price of Lots

The market price of lots was estimated based on an overall average; however, there will actually be a range of prices due to the differences in position, scale, etc. The price will also be influenced by the land use zoning policy and regulations of the Metro Manila Commission and the Ministry of Human Settlements. The price differentiation and influ-

Fig. 13 TIME SCHEDULE OF THE STAGE I CONSTRUCTION

Description	1980	1981	1982	1983	1984	1985	1986	1987	1988
Review of the study and detailed engineering design		—							
Land acquisition and compensation			—						
Bidding process			—						
Construction of road components:									
Earthworks				—	—	—	—	—	—
Bridges and drainage structures				—	—	—	—	—	—
Paving work					—	—	—	—	—
Miscellaneous work						—	—	—	—
Grade separation structures							—	—	—
Overlay of pavement								—	—
Development of reclamation area:									
Piling and rock mound construction				—					
Dredging and filling					—	—	—	—	—
Breakwater construction						—	—	—	—
Construction of street network								—	—
Utilities									—

Note: The schedule in the years from 1993 - 1998 is for the construction of the street network and utilities on Block I, and grade separation and overlay for the Project Roads.

ences should be reviewed.

iii) Reclamation Engineering

Reclamation engineering, particularly dredging planning and soil stabilization of the reclaimed land should be reviewed based on the results of more detailed soil investigations.

iv) Environmental Studies

One item that requires careful examination is the adverse effects on the inland fishponds which would be caused by insufficient planning of the water strips between the shoreline and the reclamation area. It is recommended that extensive investigations of the water quality and salinity as well as the hydraulic study should be completed before the final land configuration is established.

v) Studies on Financial Aspect

Further studies on the financial aspects are necessary before the land use zoning and land prices are finalized prior to the start of the detailed engineering.

4.4.2 Recommended Organization for the Reclamation Project

It is recommended that the reclamation project be managed by a public corporation like the Public Estate Authority. Financial resources of the corporation should be tapped from direct users of reclaimed land (both private and public enterprises) as well as from the Government.

SCOPE OF WORK

IMPLEMENTING ARRANGEMENT ON THE TECHNICAL
COOPERATION BETWEEN THE JAPAN INTERNATIONAL
COOPERATION AGENCY AND THE MINISTRY OF PUBLIC
HIGHWAYS FOR THE FEASIBILITY STUDY OF THE
MANILA-BATAAN COASTAL ROAD AND ITS RELATED
ROAD PROJECT

AGREED

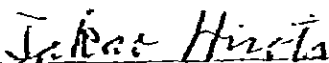
BETWEEN:

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

MINISTRY OF PUBLIC HIGHWAYS

DATED:



TAKAO HIROTA
Director of
Social Development
Cooperation Department,
Japan International
Cooperation Agency.


BALTAZAR AQUINO

Minister
Ministry of Public Highways

IMPLEMENTING ARRANGEMENT ON THE TECHNICAL
COOPERATION BETWEEN THE JAPAN INTERNATIONAL
COOPERATION AGENCY AND THE MINISTRY OF PUBLIC
HIGHWAYS FOR THE FEASIBILITY STUDY OF THE
MANILA-BATAAN COASTAL ROAD AND ITS RELATED
ROAD PROJECT

I. INTRODUCTION

In response to the request of the Government of the Republic of the Philippines, the Government of Japan despatched a preliminary survey team to the Philippines in August, 1978 prior to a feasibility study of the Manila-Bataan Coastal Road and Its Related Road Project (hereinafter to be referred to "The Study").

Based on the report of the above survey team, the Government of Japan decided to undertake the Study in accordance with laws and regulations in force in Japan with regard to the technical assistance programs, and exchanged the Note Verbales on the Study with the Government of the Republic of the Philippines.

The Japan International Cooperation Agency (hereinafter to be referred as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will carry out the works necessary for the Study.

The Ministry of Public Highways (hereinafter to be referred as "MPH") shall as counterpart to the Japanese study teams and also as coordinating body to other concerned governmental and non-governmental organiz-

ations for the smooth implementation of the Study.

The present document sets forth the Implementing Arrangement agreed between JICA and MPH for the Study which is to be implemented by JICA in close collaboration with MPH and other RP agencies concerned.

II. IMPLEMENTATION OF THE STUDY

1. The JICA shall provide technical cooperation to the MPH for the implementation of the Feasibility Study of the Manila-Bataan Coastal Road and Its Related Road Project. (See APPENDIX I)
2. The Study shall be implemented in accordance with the work plan which is given in detail in the Scope of Work (ANNEX A).
3. The Study shall be undertaken in accordance with the Study Schedule (APPENDIX II) which was formulated on the basis of the Scope of Work.

III. DISPATCH OF JAPANESE STUDY TEAMS

The JICA shall, at its own expense, dispatch Japanese study teams in accordance with the schedule mutually agreed upon by both JICA and MPH.

IV. PROVISION OF MACHINERY EQUIPMENT AND OTHER MATERIALS

The JICA shall, at its own expense, provide machineries, equipments and other materials, necessary for the implementation of the Study.

V. CHARTERED TRAINING OF PHILIPPINE COUNTERPARTS
IN JAPAN

The JICA shall, at its own expense, receive Philippine Government personnel connected with the Study for technical training in Japan in accordance with the normal procedures under the Colombo Plan Technical Cooperation Scheme.

VI. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE
PHILIPPINES

1. The Government of the Philippines, in accordance with the Note Verbale exchanged between the Government of the Philippines, shall be responsible for dealing with claims which may be brought by third parties against the Japanese survey team members, and shall hold them harmless in respect of claims or liabilities arising in the course of or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims or liabilities arise from the gross negligence or wilful misconduct of the above-mentioned individuals.

Should any question arise in connection with the foregoing, both Governments shall immediately consult with each other.

2. The NPH shall, at its own expense, provide the following:
 - 1) Available data and information related to the Study.

- 2) A preliminary inventory survey of existing land uses within the study area.
 - 3) Counterparts of the Government of the Philippines consisting of a Study Coordinator and technical men as found necessary.
 - 4) Credentials or Identification (ID) cards to the members of the Study team who shall be working in the Philippines for the execution of the Study.
 - 5) Suitable office space in the MPH office.
 - 6) Appropriate number of vehicles with drivers.
3. The MPH shall make the necessary arrangements for the following:
- 1) Recommendation of local consultant firm for survey and boring if necessary.
 - 2) Secure permission for entry into private properties and restricted areas.
 - 3) Hiring of laborers as needed, but wages shall be chargeable against JICA funds allotted for the Study.
 - 4) Availability of medical facilities when needed but medical expenses shall be chargeable to JICA funds allotted for the Study.
4. The MPH shall make the necessary arrangements with proper agencies concerned:
- 1) To ensure the safety of the study team.
 - 2) To provide the necessary facilities to the Japanese study teams for the remittances as well as utilization of funds introduced into

the Philippines from Japan in connection with the implementation of the Study.

- 3) To exempt the Japanese study team members from taxes, duties, fees and other charges on machinery, equipment and other materials brought into the Philippines for the conduct of the Study.
- 4) To secure clearance for the release of the aerial photography.

ANNEX A.

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY OF THE MANILA - BATAAN COASTAL ROAD
AND ITS RELATED ROAD PROJECT

I. OBJECTIVE OF THE STUDY

This study will assess the economic and technical viability of the Manila-Bataan Coastal Road and its related roads (C-5, C-6) project.

II. PROJECT ROADS

2.1 The project will cover the following segments of Manila-Bataan Coastal Road and its related roads (C-5, C-6).

2.1.1 Manila-Bataan Coastal Road segment starting from C-4 and ending at C-6 with length of approximately 12 kms

2.1.2 Segments of related roads (C-5, C-6) starting from the coastal road to the existing Manila North Expressway with length about 9 and 13 kms respectively.

III. SCOPE OF THE STUDY

3.1 The study includes the following components.

a) data collection and analysis

- b) land development studies
- c) traffic studies
- d) environmental and social impact studies
- e) selection of the route
- f) design standards and preliminary engineering
- g) cost estimation
- h) economic evaluation
- i) financing study
- j) implementation program
- k) additionally, the study of the Manila Bay Region Structure Plan will be carried out.

3.2 In the conduct of the study, the following work items shall be undertaken.

3.2.1 Data collection and Analysis

- a) social condition data
- b) economic data
- c) financial data
- d) institutional data
- e) administrative and managerial data
- f) engineering data
- g) other data necessary for the study

3.2.2 Land Development Studies

Land development studies of the reclaimed area and environs will be undertaken if the reclamation is deemed necessary.

- a) land use study

- b) cost estimation of reclamation works
- c) other related studies

3.2.3 Traffic Studies

- a) population distribution and land use plan
- b) analysis and estimation of the traffic demand
- c) traffic assignment
- d) traffic surveys

3.2.4 Environment and Social Impact Studies

- a) environment impacts
- b) social and economic impacts
- c) other related impacts

3.2.5 Selection of the Route

An investigation will be undertaken for the purpose of selecting the best route among some alternative routes.

3.2.6 Design Standards and Preliminary Engineering

- a) design standards
- b) construction methods
- c) preliminary design
- d) field survey necessary for the preliminary design

3.2.7 Cost Estimation

- a) right-of-way acquisition cost
- b) construction cost
- c) maintenance cost

3.2.8 Economic Evaluation

- a) estimation of benefits

- b) N.P.V., IRR, B/C
- c) sensitivity analysis

3.2.9 Study of Financing

A study of financing means relevant to the Project shall be made.

3.2.10 Implementation Program

An implementation program will be prepared based on the construction program and the study of financing.

3.2.11 Study of the Manila Bay Region Structure Plan

The study of the coastal road from C-6 to Bataan will be limited to the study of the same as a component of the transportation network as embodied in the Manila Bay Region Structure Plan as required by socio-economic and environmental considerations.

IV. STUDY SCHEDULE.

The whole work will be conducted in accordance with the study schedule. (See Appendix II)

V. SUBMISSION OF THE REPORT

The JICA shall prepare and submit the following reports.

- 5.1 50 copies of the inception report shall be submitted at the beginning of the study.
- 5.2 50 copies of the progress report shall be submitted at the end of the field survey.
- 5.3 50 copies of the tentative draft final report shall

be submitted at the end of the study in Philippine. The MPH will submit to the JICA its comments within one month after the receipt of the tentative draft final report.

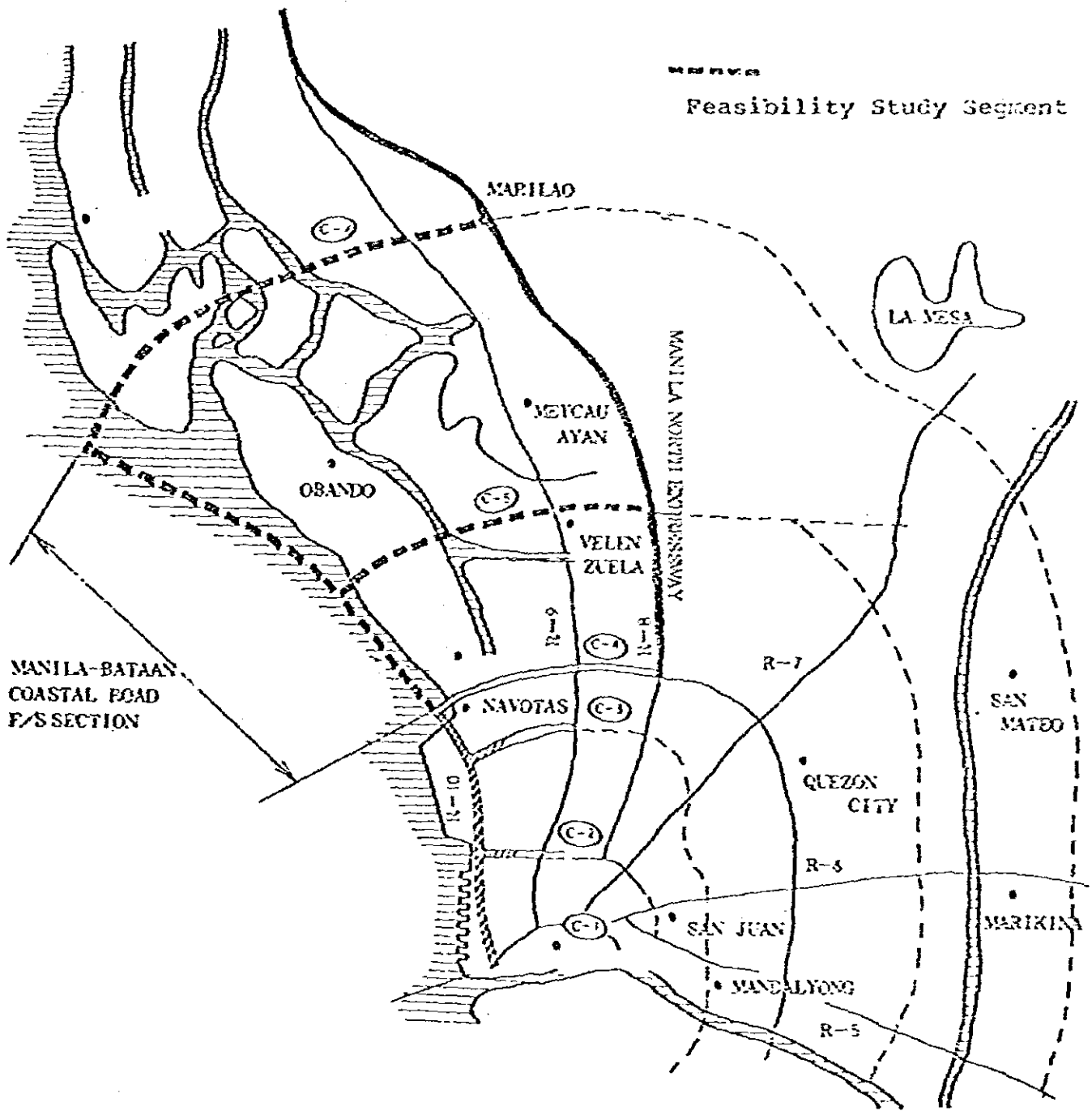
5.4 50 copies of the draft final report shall be submitted within one month after the GOP's comments on the tentative draft final report.

5.5 100 copies of the final report shall be submitted within 1.5 months after the receipt of the MPH's comments on the draft final report.

VI. MODIFICATION OF THE SCOPE OF WORK

During the execution of the Study, changes can be made in the text of the Scope of Work by mutual agreement considered useful by both parties in facilitating the work to be performed.

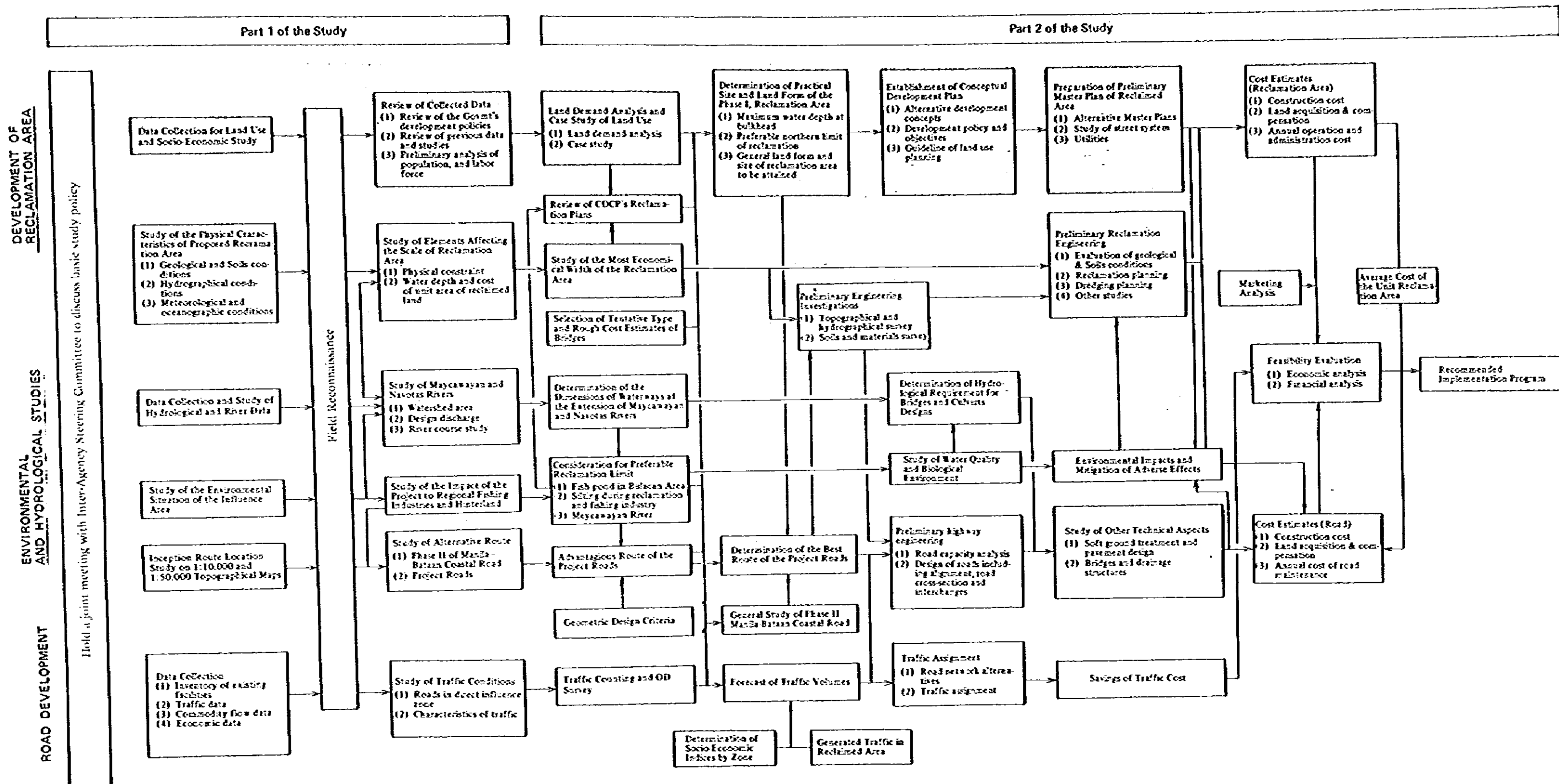
APPENDIX I.



STUDY SCHEDULE

ITEMS	'79		'80												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
PREPARATION															
SUBMISSION OF INCEPTION REPORT		X													
FIELD SURVEY															
PROGRESS REPORT			X												
REVIEW OF FIELD SURVEY															
STUDY IN THE PHILIPPINES															
SUBMISSION OF TENTATIVE DRAFT FINAL REPORT										X					
COMMENTS ON TENTATIVE DRAFT FINAL REPORT											X				
PREPARATION OF DRAFT FINAL REPORT															
SUBMISSION OF DRAFT FINAL REPORT													X		
COMMENTS ON DRAFT FINAL REPORT														X	
PREPARATION OF FINAL REPORT															
SUBMISSION OF FINAL REPORT															X

GENERAL FLOW CHART OF THE STUDY



ORGANIZATION OF THE STUDY TEAM

A. Supervisory Committee Members of the Japanese Government

Shoji Miyazaki (Chairman)	Ministry of Construction, Japan
Akio Namiki (Chairman)	Ministry of Construction, Japan
Keiichi Tanaka	Ministry of Construction, Japan
Masahiro Yabe	Ministry of Construction, Japan
Takayuki Inoue	Ministry of Construction, Japan
Hiroshi Yamano	Ministry of Construction, Japan
Ichiro Kubota	Japan International Cooperation Agency

B. Steering Group of the Government of the Philippines

Antonio I. Goco	Ministry of Public Highways (MPH)
Jesus Sunga	National Economic and Development Authority (NEDA)
Jose R. Valdecanas	Ministry of Public Works, Transportation & Communication (MPWTC)
Nathaniel Von Einsidel	Ministry of Human Settlements
Theron V. Lacson	Public Estate Authority
Francisco D. Corona	Ministry of Finance
Pedro P. Viray	National Pollution Control Commission
Rouel Lanche	Ministry of Agriculture
Honorate Santos	Bureau of Fisheries and Aquatic Resources
Cireneo Punzalan	National Housing Authority

C. JICA Study Team

Pacific Consultants International

Akira Shikichi	Project Manager (Highway Planner)
Teruhiko Horie	Transport Planner/Economist
Seiji Hozma	Regional Economist
Hideroto Nojima	Highway Engineer
Masayuki Hasegawa	Structural Engineer
Hiroyuki Shiraiwa	Hydrological Engineer
Hiroaki Furuya	Reclamation Engineer
Kunio Taniguchi	Utilities Engineer/Cost Estimates Engineer
Isamu Watanabe	Fishery Planner

Japan Overseas Consultants

Toshio Kimura	Asst. Project Manager (Urban Planner/Environment)
Seiichi Horie	Traffic Engineer
Yoshihiro Daicho	Soils and Materials Engineer
Iehiro Noda	Surveyor

D. Counterpart Staff

Teodulo M. Kasala	Project Manager (MPH)
Hilardo D. Salvador	Asst. Project Manager (MPH)
Edgardo Semilla	Location Engineer (MPH)

Teofilo Landicho
Virgilio Alagar
Ignacio Gallego
Bienvenida Firmalino
Dominator Pajela
Codofredo Galano
Generoso Crisostomo

Reclamation & Location Engineer (MPH)
Highway Engineer (MPH)
Structural Engineer (MPH)
Structural Engineer (MPH)
Hydrological & Drainage Engineer (MPWTC)
Transport Planner (MPH)
Civil Engineer (MPH)

