REPUBLIC OF THE PHILIPPINES

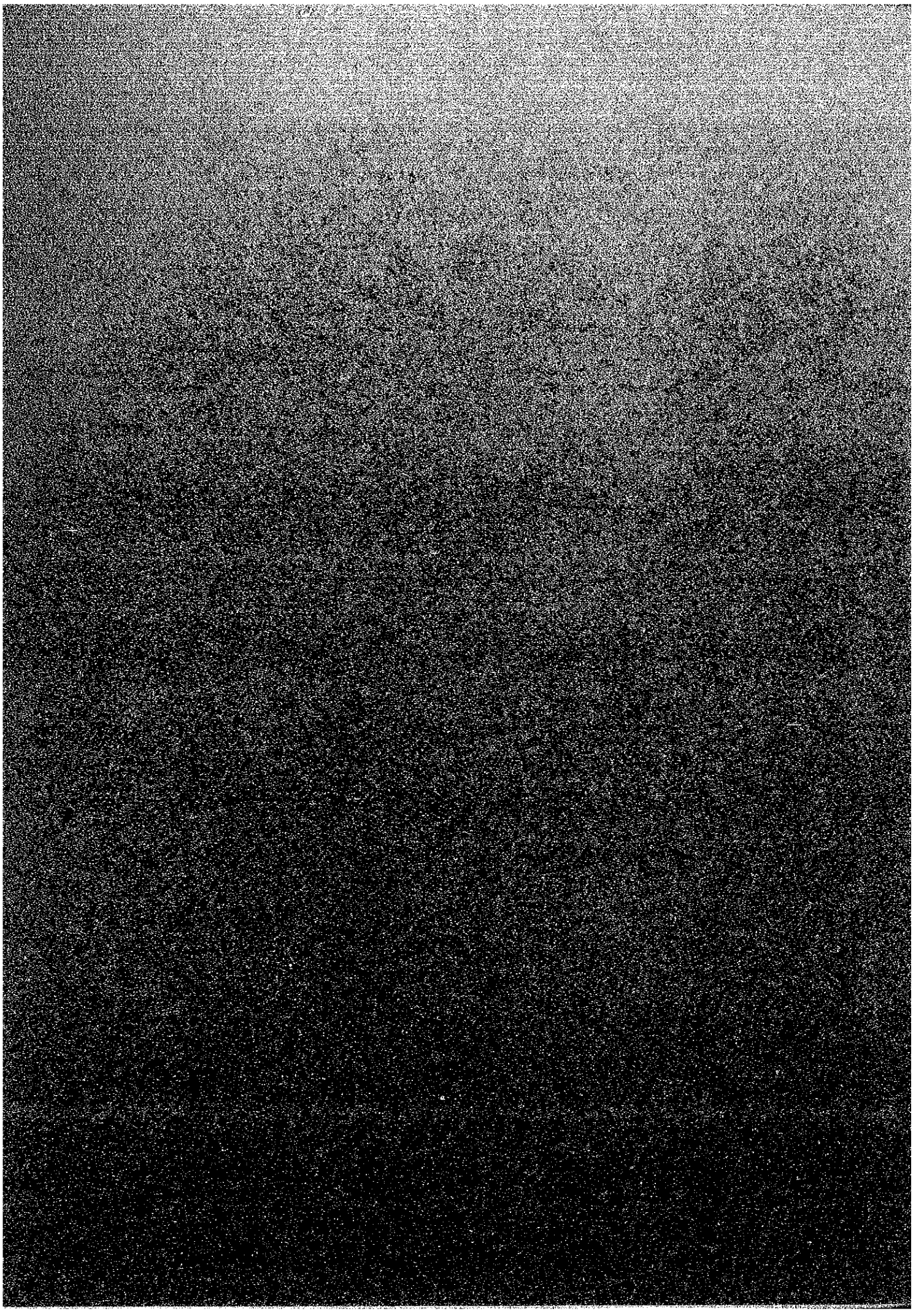
FEASIBILITY STUDY FOR THE METRO MANILA OUTER MAJOR ROADS PROJECT (SOUTHERN PACKAGE)

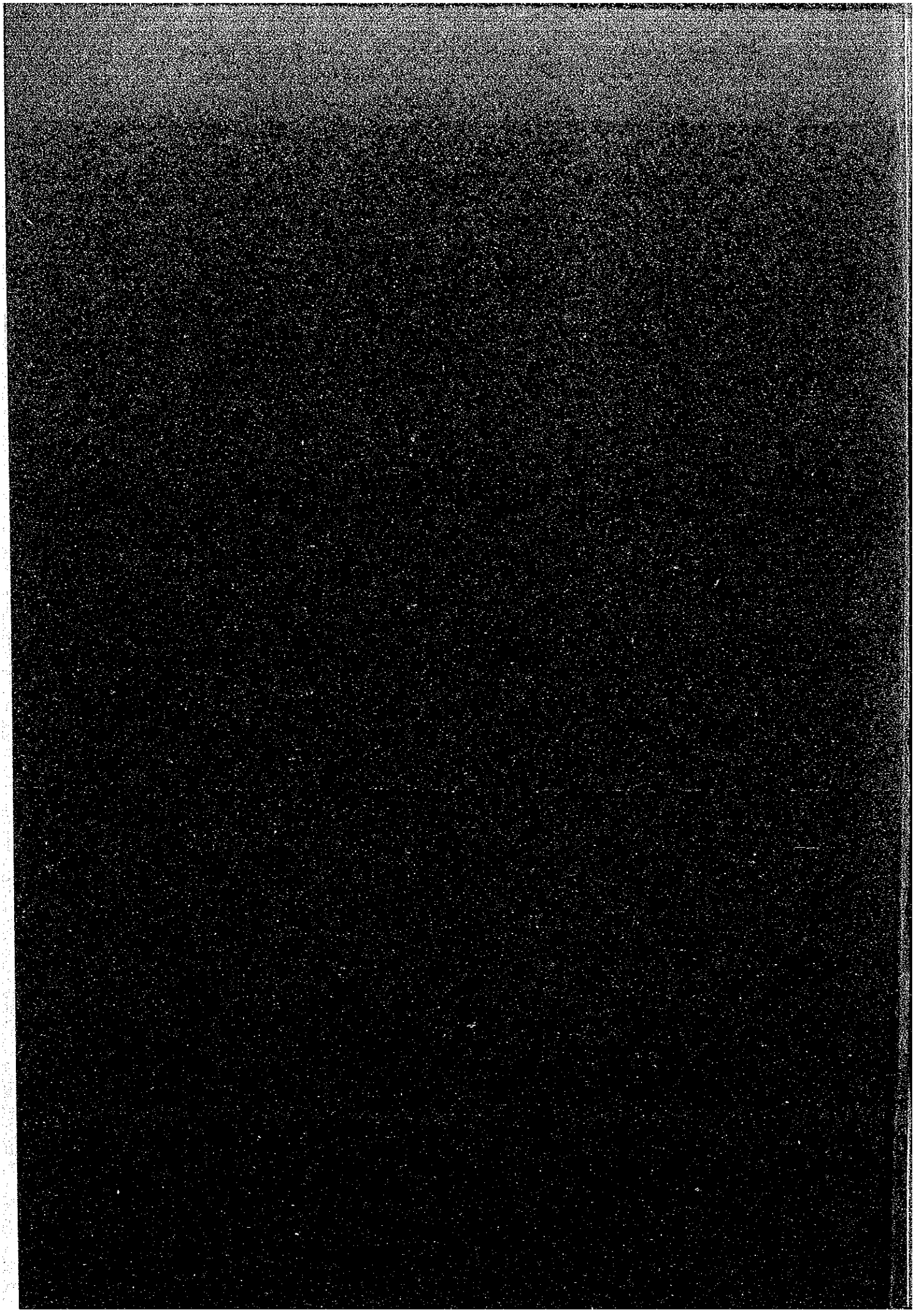
FINAL REPORT
SUMMARY

March 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

MINISTRY OF PUBLIC WORKS AND HIGHWAYS





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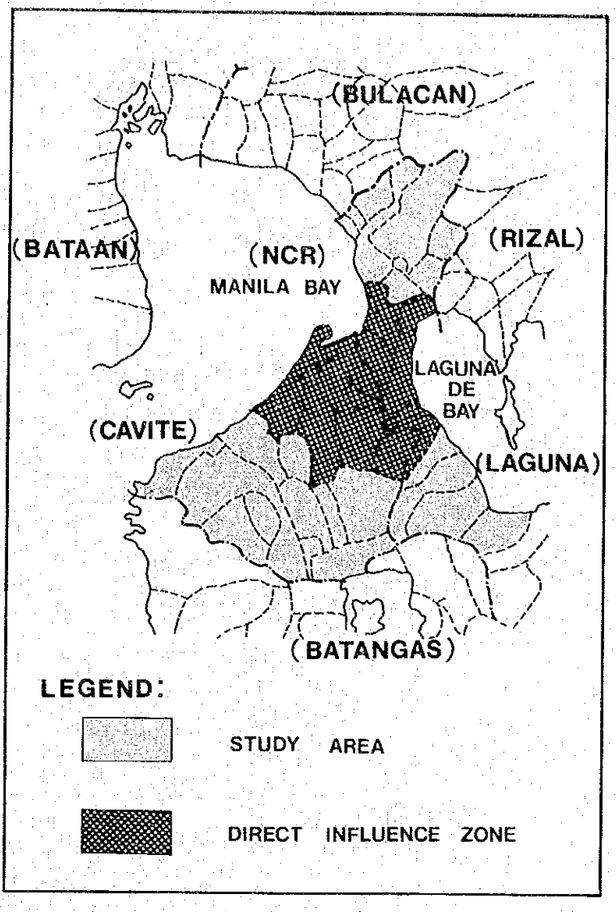
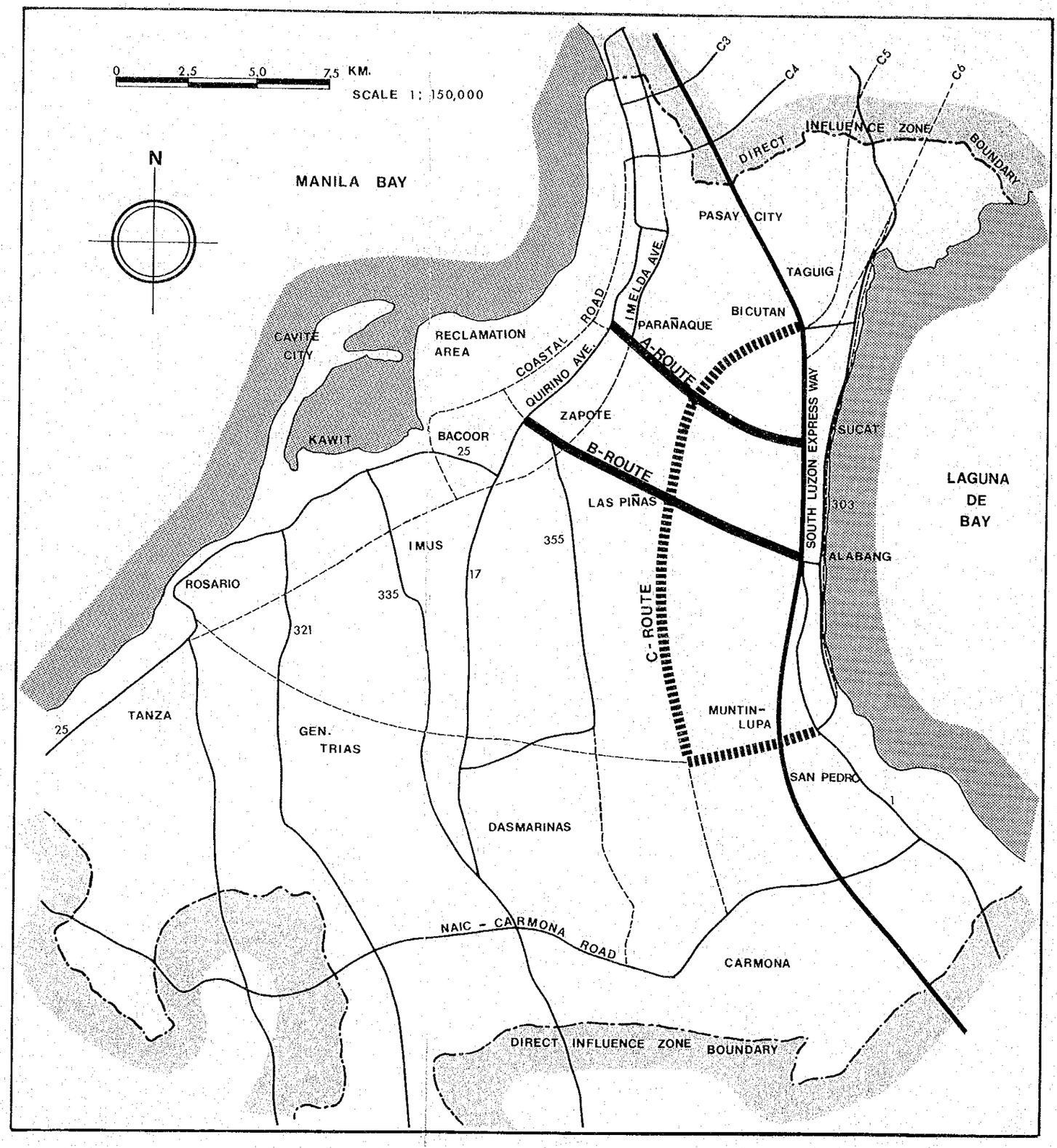
MAP OF STUDY AREA



PROJECT LOCATION MAP



LEGEND:

- ROADS TO BE STUDIED UNDER THIS PROJECT (IMPROVEMENT OF EXISTING ROADS)
  - A-ROUTE : PARAÑAQUE - SUCAT RD.
  - B-ROUTE : ALABANG - ZAPOTE RD.
- ROAD TO BE STUDIED UNDER THIS PROJECT (NEW CONSTRUCTION)
  - C-ROUTE : TAGUIG - LAS PIÑAS - MUNTINLUPA LOOP RD.
- EXISTING TRUNK ROADS
- OTHER EXPECTED TRUNK ROADS

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FOR

SUMMARY AND RECOMMENDATIONS

SUMMARY AND RECOMMENDATIONS

1. Background of the Project

Metro Manila is the largest single urban area in the Philippines with a population of six million. It produces nearly one-third of the nation's Gross National Product. Being the center of economic activity in the country, it offers better chances for higher education and cultural activities. Metro Manila has been and will continue to be the main focus of human activities, generating social and economic benefits that have multiplier effects over the rest of the country.

Bigger opportunities for social and economic advancement in Manila tend to attract rural dwellers to Manila, and the population increase of Metro Manila indicates a continuing trend towards the intensification of residential development and densities within the main built-up area and in the rapidly growing suburbs. Expansion of the urban area is occurring all over Metro Manila - on the north, the east and the south. The Project Roads under the study are expected to augment the efficiency of the road system in the area which is most likely to expand.

The Government of the Philippines (GOP), recognizing the need for a feasibility study, requested the Government of Japan (GOJ) for technical assistance under its technical cooperation program. The Study was undertaken during the period from March 1981 to March 1982 by a joint team of the GOP and Japan International Cooperation Agency (JICA), the official agency responsible for the execution of technical cooperation of the Japanese Government. The GOP's involvement was made through the MPWH's study team consisting of a Steering Committee Group and a counterpart Working Group. JICA's involvement, on the other hand, was made through the JICA's study team consisting of the Government Supervisory Group and JICA's Consultant, Pacific Consultants International.

2. Importance of the Project

Caused by the increasing traffic demand by the development of the Metropolis, the roads south of Metro Manila have been under strenuous need for the improvement. The traffic volume of Quirino Avenue has already exceeded its capacity and part of South Luzon Expressway is reaching its full capacity. The traffic is expected to increase steadily in the future. The Project Roads will certainly alleviate the congested traffic on these roads, and play an important role to expedite the effects of the major public projects under construction and/or under study, resulting in the economic development of the south of Metro Manila.

The development in the area where the Project Roads are located is expected to continue in the future since the area is designated for systematical future urban development. Earlier development of these three Project Roads is very important to cope with the increasing traffic demand. In addition, provision of relevant trunk roads are

also urgently needed, since the overall development of Metro Manila will partly depend on the provision of trunk road network in this area.

3. Study Approach

The purpose of the Study is to assess the technical and economic viability for the improvement and development of the Metro Manila Outer Major Roads Project, Southern Package. The road sections and junctions covered by the Scope of Work were as follows:

Road Section:

- Paranaque-Sucat Road (Existing)	7.5 km.
- Zapote-Alabang Road (Existing)	10.3 km.
- Taguig-Las Pinas-Muntinlupa Loop Road (New)	20.7 km.
Total Length: Approximately	38.5 km.

Major Junctions:

- Bicutan Interchange of Manila South Expressway
- Paranaque-Sucat and Loop Road Intersection
- Zapote-Alabang and Loop Road Intersection
- Imelda Avenue Extension and Paranaque-Sucat Road Intersection
- Zapote Junction along the Manila South Road
- Paranaque Junction along the Manila South Road
- Manila South Road and Loop Road Intersection

From the characteristics of the Study, the work was carried out in two phases. Phase I consisted of: field investigations, data collection, preparation of mosaic aerial photographs, traffic survey, soils and materials survey, hydrological survey, analyses of socio-economic data, land use planning, review of trunk road network, and the study of alternative routes. Phase II covered: population projection, estimate of future traffic, alternative route study, selection of the best routes, soils and materials survey, topographical survey, supplemental surveys, preliminary design of the best routes, environmental impacts, estimates of construction cost and land acquisition cost, economic analysis and implementation plans.

The Study was conducted in the MPWH from March 15, 1981 to December 25, 1981 in close cooperation of the MPWH counterparts.

4. Urbanization

4.1 National Capital Region

The National Capital Region (NCR) has a population of approximately 6 million in 1980. The annual growth rate of the population

in the NCR registered 3.6% p.a. during the period 1975-1980, which was higher than the national average rate of 2.6% p.a. in the same period. The increase in population which has accompanied the spatial expansion of Metro Manila is expected to continue in the future, and is estimated to reach 11 million in the year 2000.

4.2 The Direct Influence Zone

The southern part of the NCR around Las Pinas, Paranaque, Muntinlupa, etc. is an area where new locations for industrial enterprises, commercial shops and residential houses are likely to increase more in the near future. It is a target area which will systematically be developed into an urbanized area that should be integrated into the system of the Metropolis. This Southern Road Package Project is situated in the area, and the Roads are part of the trunk road network covering the area. For the study of the Project, the cities and municipalities adjacent to the Roads were delineated as the Direct Influence Zone (DIZ) which was further divided into 33 traffic zones. Fig. 1 indicates the DIZ and the other parts of Metro Manila associated with the Project study.

Urbanization Development in the DIZ, shown by the growth of population, increased from 891,000 in 1970 to 1,582,000 in 1980 with an average growth rate of 5.9% p.a. However, there are different tendencies among the municipalities and cities. In the northern area of the DIZ such as in Pasay, the land is mostly used for urban activities. The census indicated that the population in the city increased at a rate of 2.5% p.a. during the period 1975-1980, while it was 4.3% p.a. in the previous five years.

In the area covering the central plateau and the eastern part, such as in Muntinlupa and Binan, the growth of population was high. It registered an average rate of 7.8% p.a. and 4.4% p.a., respectively, during the period 1975-1980. It indicated a larger rate of increase in population and enterprises. In the western part of the DIZ along the coast of Manila Bay in Kawit, Noveleta, etc., a narrow stretch area along the trunk roads is already developed into a densely populated area. Spatial expansion of urbanization outside the stretch is moderate in scale. In the southern mid-land of the DIZ, such as in Imus and Dasmarinas, the land is extensively used for agricultural produce: palay, sugar cane, corn, etc. There are a number of investment and supporting projects to improve the productivity in the agricultural sector of the area.

5. Existing Roads

5.1 Roads in the DIZ

The main road network in the DIZ is shown in Fig. 2. Presently the roads linking the DIZ with the central part of the Metro Manila Area are Quirino Avenue, Imelda Avenue and South Luzon

FIG. 1 MAP OF THE STUDY AREA AND THE DIRECT INFLUENCE ZONE

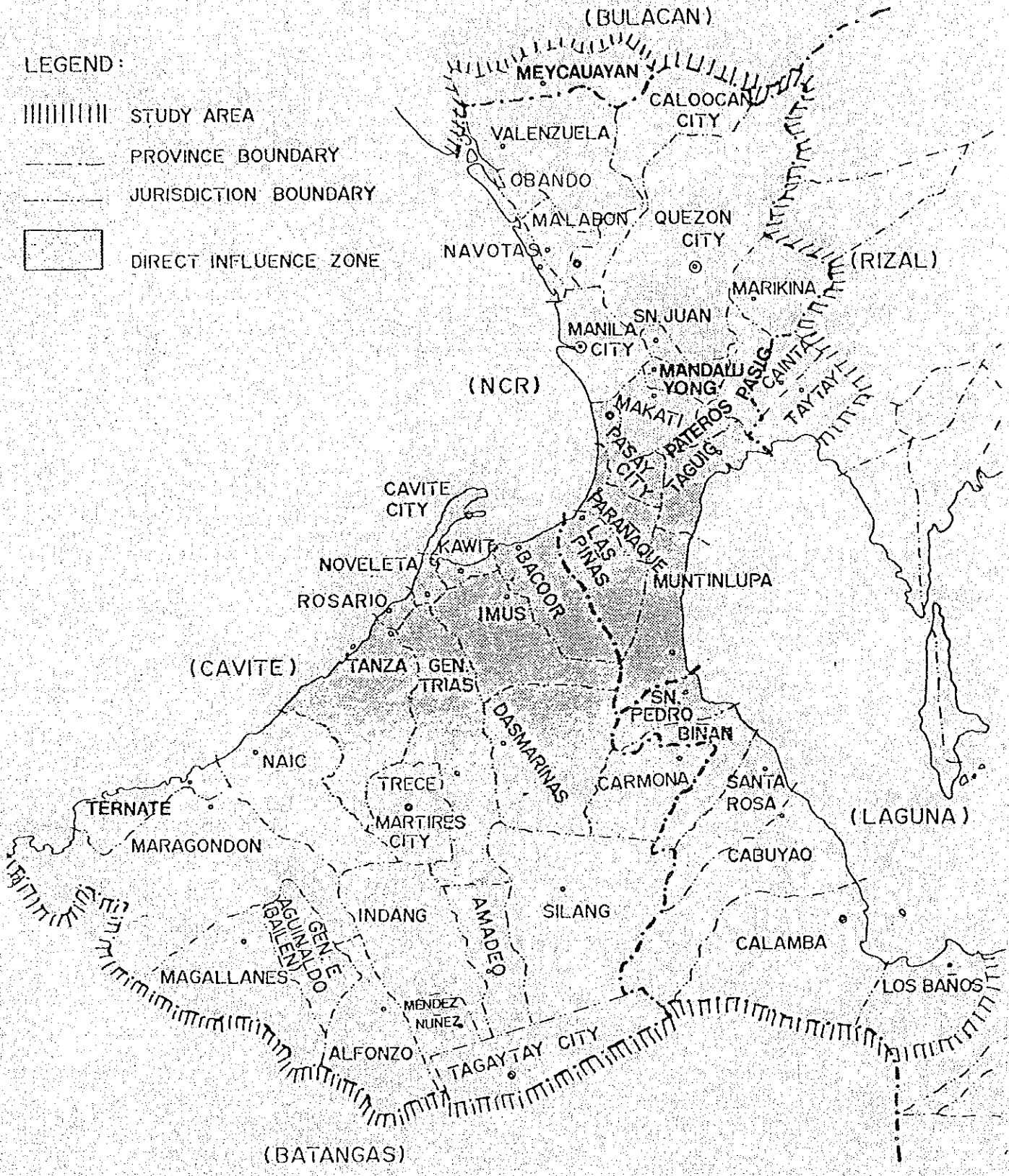
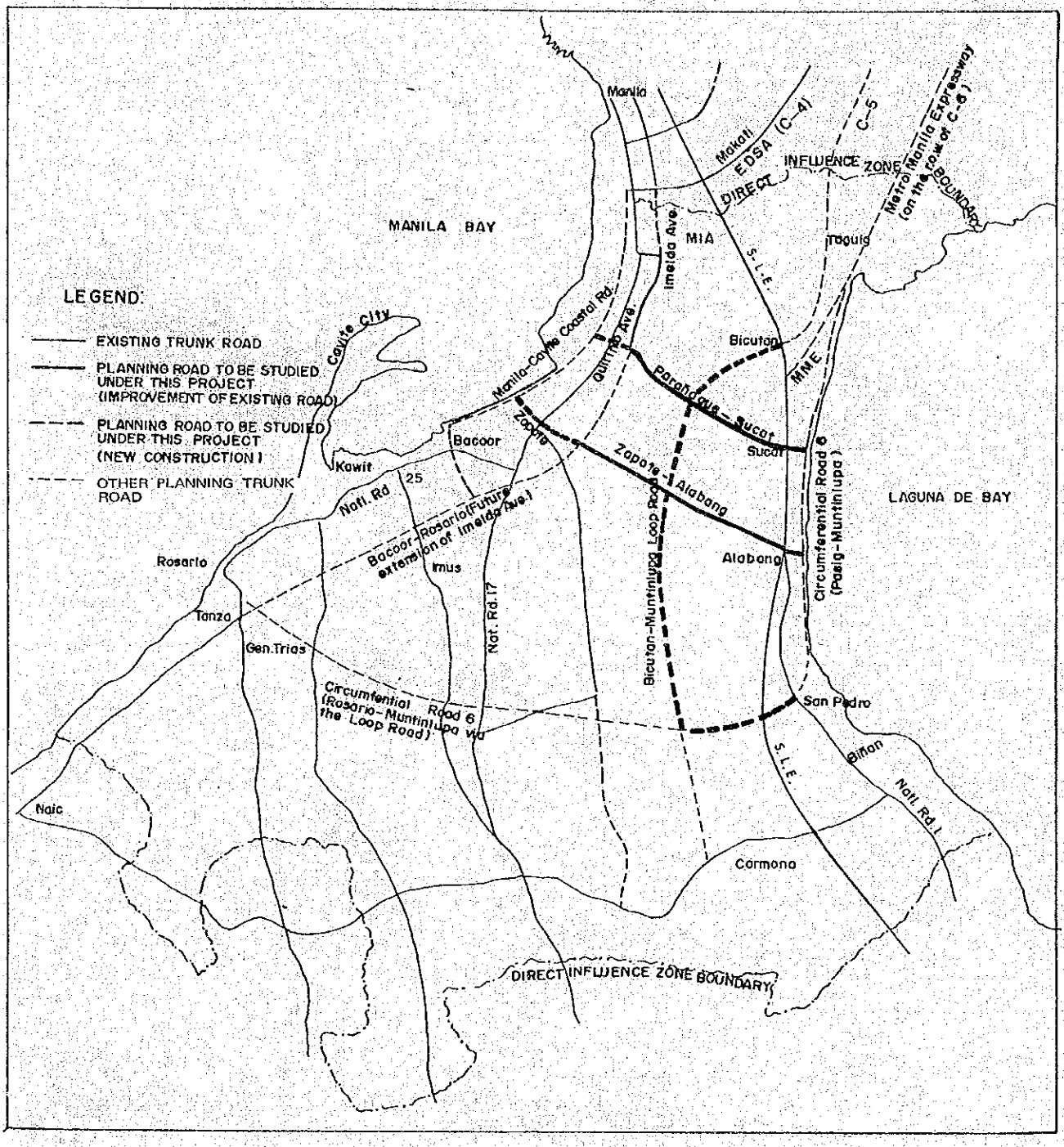


FIG. 2 MAP OF EXPECTED TRUNK ROAD NETWORK, YEAR 2000–2010



Expressway with its service roads. Imelda Avenue is under construction for widening which will mitigate the heavy traffic congestion on the adjacent Quirino Avenue.

5.2 Conditions of the Project Roads

There are two parallel trunk roads running from west to east crossing the plateau of the mid-DIZ: Paranaque-Sucat Road of 7.5 km length and Zapote-Alabang Road of 10.3 km length. The distance between these roads is approximately 5 km. Paranaque-Sucat Road has an average right-of-way width of 13 m with a 7 m wide concrete paved carriageway and unsurfaced shoulders of 1.5 to 4.5 m width on both sides. The vertical and horizontal alignments except a few portions are good with one major bridge of 48.8 meters length.

Zapote-Alabang Road has an average right-of-way width of 17 m with a 6 m wide concrete paved carriageway and unsurfaced shoulders of 3 to 5 m width on both sides. No steep gradient nor sharp curves are found on the road. There are two bridges with lengths of 9.5 m and 13.6 m, respectively, and five box culverts. To improve the traffic condition on the road, the MPWH has just started to widen the whole section of it into a four-lane concrete paved carriageway on the existing right-of-way. The completion date is by the end of 1983.

5.3 Economy and Traffic

In general, there are no major differences in the land use in the adjacent area along the two roads. The area close to the roads has been developed into industrial enterprises, commercial and service shops in most places. Inner areas are developed into subdivisions and residential uses. A number of streets were constructed to connect these developed units with the main roads. It is to be noted that there remain land and open space which are likely to be converted into urban uses.

The average daily traffic (AADT) in 1981 on the respective roads was obtained through traffic simulation,

Paranaque-Sucat : 19,600 vehicles for the western section and 18,800 for the eastern section.

Zapote-Alabang : 13,600 vehicles for the western section and 18,500 for the eastern section.

The average vehicle composition was 8% for trucks, one percent for buses, 45% for jeepneys and 46% for small vehicles.

6. Development of the DIZ

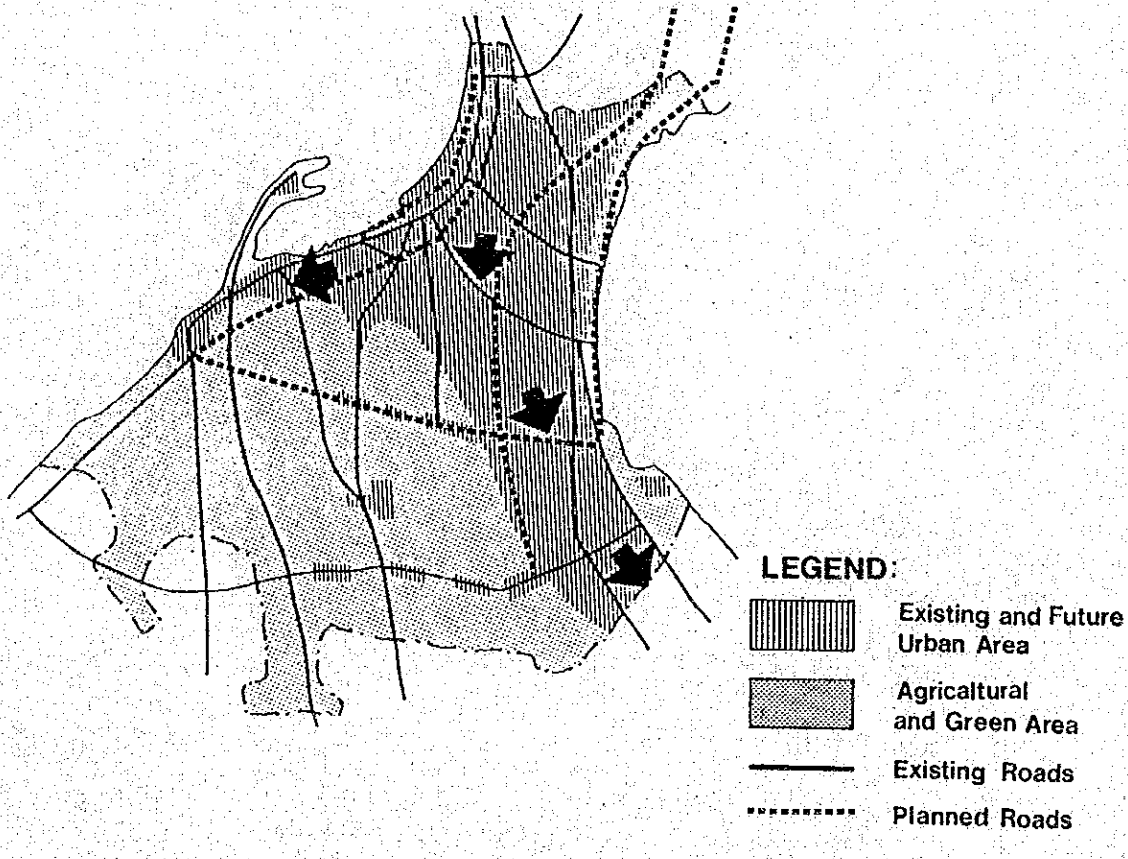
In the northern half of the DIZ, urbanization will proceed further in

the future since the area is closer to the CBDs of the MMA and is designated by the Metro Manila Commission as a suitable zone for urban expansion of the Metropolis. To support the development, the Government has prepared a number of transport projects besides the Southern Package in the DIZ.

In the Southern half of the DIZ, the land will be mostly maintained for agricultural uses. The Government has invested in a number of programs to improve the productivity in the agricultural sector in the region. The Cavite Friar Land Development Project is an example which is under construction. Spatial expansion of the Metropolis may encroach into the area to some extent. However, the study found that a policy to maintain an agricultural area in such scale adjacent to the Metropolis should be encouraged.

Fig. 3 presents a conceptual plan of urban development in the DIZ, on which the land use, structural plan, population forecast and the traffic estimate were conducted. The population in the DIZ was forecast at 1.6 million in 1980, 2.5 million in 1990 and 3.5 million in 2000. The overall average rate of increase was forecast at 4.0% p.a. for the next 20 years. Employment opportunities estimated in the DIZ registered a higher growth rate of 4.3% p.a. for the same period. The zones adjacent to the Project Roads were forecast to have more than 5% p.a. population growth rate in the period.

FIG. 3 FUTURE DEVELOPMENT IN THE DIZ



7. A Long-Range Road Development Plan

There had been a number of studies conducted for the improvement of roads and transport system in the Metropolis, through which a number of projects are under preparation and implementation beside the Southern Package in the DIZ; i.e., the improvement of Manila International Airport (MIA) facilities, the construction of Manila-Cavite Coastal Road, the improvement of Imelda Avenue from MIA to Paranaque-Sucat Road, the construction of Metro Manila Expressway from Bicutan to Marikina and the improvement of the commuter service of the Philippine National Railways.

In addition, the construction of other roads are considered necessary to meet the increasing traffic demand in the DIZ for the coming 20 or 30 years. A long-range road development plan is proposed including all these plans and the Southern Package for the year 2000, as shown in Fig. 2. On this basis, alternative road development plans were established for comparative study.

8. Alternative Road Plans

Fig. 4 shows the established alternative road development plans to attain the long-range road network in the DIZ. Each plan incorporates different timing of construction and improvement of associated roads together with the construction stages of the Project Roads.

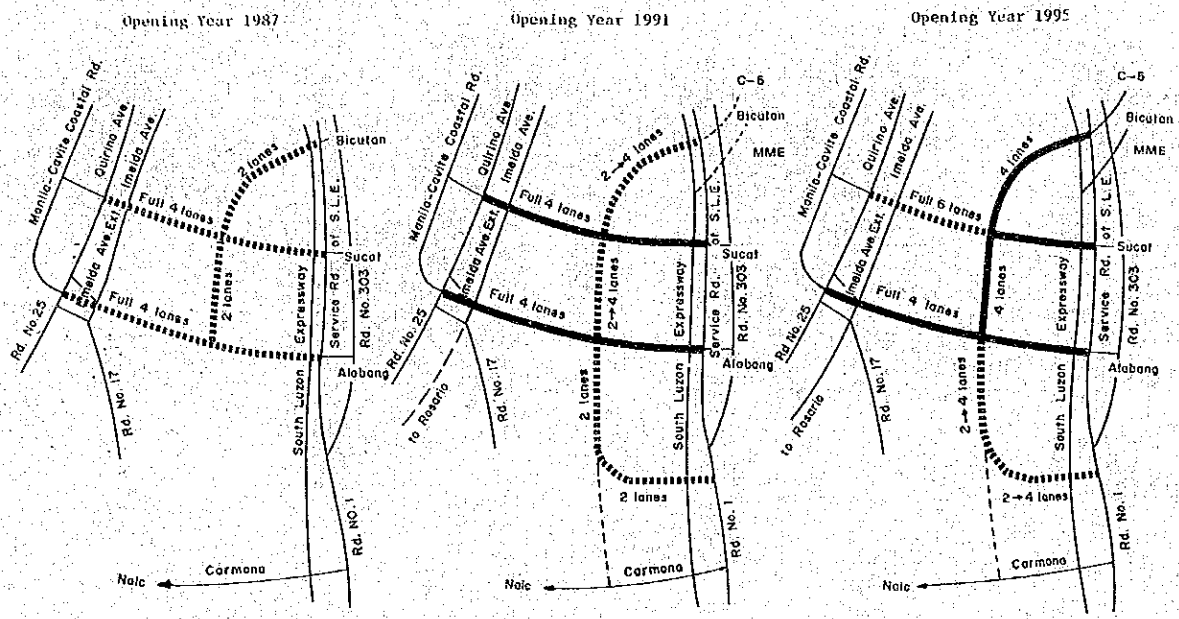
Plan 1 is an extensive road development plan in the DIZ with three stages of construction for the period 1983-1994. In the first stage, it proposes to improve A-Route and B-Route to a divided four-lane road with auxiliary lanes on a wider right-of-way of 35 m. The northern section (about 7.8 km long) of C-Route will be constructed to a carriageway of 12.25 m. In the second stage, the southern section of C-Route will be constructed up to Muntinlupa with a 12.25 m carriageway, while the northern section will be widened to its ultimate section. Simultaneous with the Project Roads, an extensive construction of the associated roads are assumed. In the third stage, additional improvement is proposed for the southern section of C-Route and the western section of A-Route.

Plan 2 is a modest road development plan with two stages of construction for the same period. In the first stage, it proposes to improve A-Route similar to Plan 1. B-Route will be improved only at the westernmost section, about 1.6 km in a new alignment connecting directly to the Manila-Cavite Coastal Road. C-Route will be constructed as in Plan 1. In the second stage, the remaining section of B-Route will be widened to have auxiliary lanes. The southern section of C-Route will be extended to Muntinlupa, while the northern section will be widened to a divided four-lane road with auxiliary lanes. The western section of A-Route will be improved to full six-lanes divided. The construction of the associated roads would be less extensive than in Plan 1 and its completion would be in the first half of the 1990's.

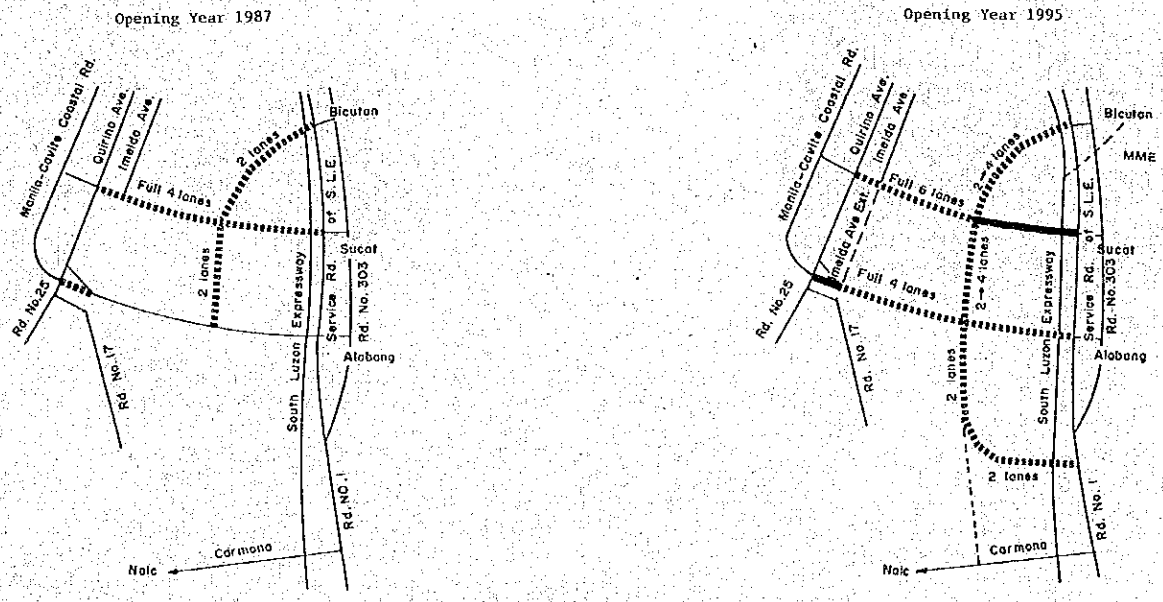
Plan 3 is an intermediate program between Plan 1 and Plan 2, having two stages of construction for the same period. However, in the

FIG. 4 ALTERNATIVE PLANS OF THE PROJECT (Including the plans of the associated roads)

ALTERNATIVE 1 (Three stages)

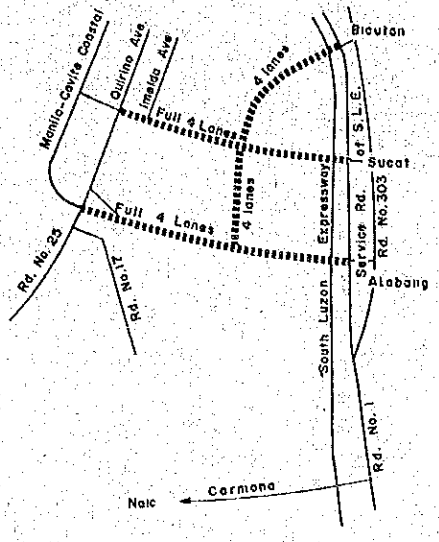


ALTERNATIVE 2(Two stages)

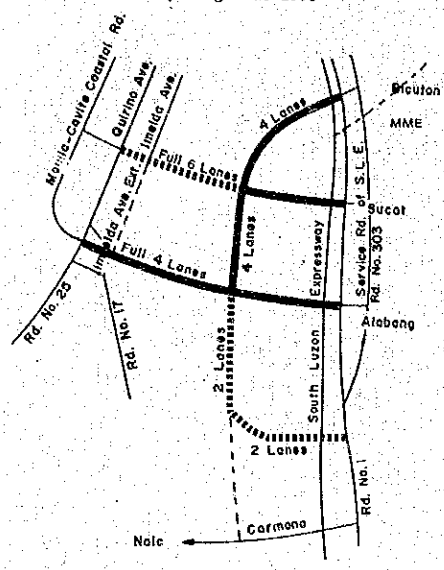


ALTERNATIVE 3 (Two stages)

Opening Year 1987



Opening Year 1995



Legend: Opening year means the section is to be constructed by the end of the previous year and fully serving the traffic from this year

- Associated roads to be opened
- Project roads to be opened
- Associated Roads completed in the previous stages and Existing Road
- Project Roads completed in the previous stages

project, per se, it proposes the largest investment in the first stage: A-Route and B-Route are improved and the northern section of C-Route is constructed to a divided four-lane road with auxiliary lanes. In the second stage, the southern extension of C-Route will be completed with a carriageway of 12.25 m, and the western section of A-Route will be widened. The completion of the associated roads is assumed the same as in Plan 2.

9. Traffic Forecast

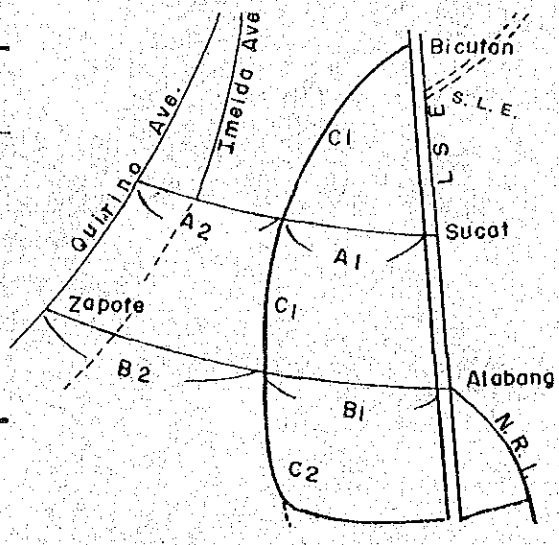
The traffic distribution pattern in 1981 was formulated into an OD table by using the source data of MMETROPLAN, roadside OD interview, etc. The growth of the traffic volume was studied from trends in population, car ownership, average trip rate per person, gross domestic product, etc. The following rates of growth were used to determine the control total of the overall traffic volume.

	1981-1990	'90/'81	1990-2000	'00/'90
Cars & small vehicles	6.7% p.a.	1.80	4.9% p.a.	1.61
Jeepneys	3.0% p.a.	1.30	1.9% p.a.	1.21
Buses	3.0% p.a.	1.30	1.9% p.a.	1.21
Trucks	6.0% p.a.	1.69	4.2% p.a.	1.50
Average	5.8% p.a.	1.66	4.3% p.a.	1.53

The growth rate of traffic in each zone was determined by the growth of population and employment opportunity in the zone, subject to restraint under the above overall traffic growth. The estimated traffic volumes in OD Table for future years were simulated for the assignment on the road networks in the DIZ. Based on the future development of the DIZ, three alternative road networks, each having different plans of staged construction, were established for comparative study. The resultant traffic volume on the sections of the Southern Package under Plan 2 is shown below.

(Vehicles per day)

Road Section (Length)	1987	1991	1995
A_1 (3.5 km)	38300	40600	42800
A_2 (4.0 km)	48400	52000	63000
B_1 (4.4 km)	32100	37400	43100
B_2 (5.9 km)	29900	35300	52800
C_1 (7.8 km)	17300	22300	44900
C_2 (13.0 km)	-	-	19600



10. Preliminary Engineering and Cost Estimate

10.1 Alternative Route Study and Selection of the Best Route

Based on the results of the data analysis, the field investigation and the trunk road network study, possible alignments were located taking into consideration environmental effects, high-density residential area, community cohesiveness, open space, location of intersections, engineering requirements, conservation of public facilities, future development plans, etc. One single route was selected for A-Route, three alternatives for B-Route and six for C-Route.

The alternative routes were evaluated and the respective best routes were selected on the basis of environmental impact, length of route, alignment conditions, present and future land use, location of intersections, buildings affected, cost of right-of-way acquisition, construction cost and relationship with other trunk roads.

10.2 Preliminary Engineering

The preliminary engineering studies of the Roads were conducted based on the prepared aerial photo mosaics and the established design standards. The design elements used for the Roads are shown in Table 1.

The minimum right-of-way width of 35 meters was adopted. The following types of typical cross-sections were recommended according to the traffic demand: for the ultimate stage, a section of 4-lane divided carriageway with 2 service lanes and a section of 6-lane divided carriageway with 2 service lanes as shown in Fig. 5, and for the initial stage, a section of 4-lane divided carriageway with 2 service lanes and a section of 2-way undivided carriageway with 2 auxiliary lanes on one half of the right-of-way as shown in Fig. 6.

Capacity was analyzed for the design of the roads and intersections, preliminary design of the roadways was prepared taking into consideration the horizontal and vertical control points, pavement structure was designed from the estimated traffic volumes, and preliminary design of bridge and drainage structures and other structures was undertaken based on the traffic and hydrological studies in which 13 bridges, 10 grade separation structures, 25 box culverts and 13 pedestrian overpasses were proposed. The location of these structures is shown in Fig. 7.

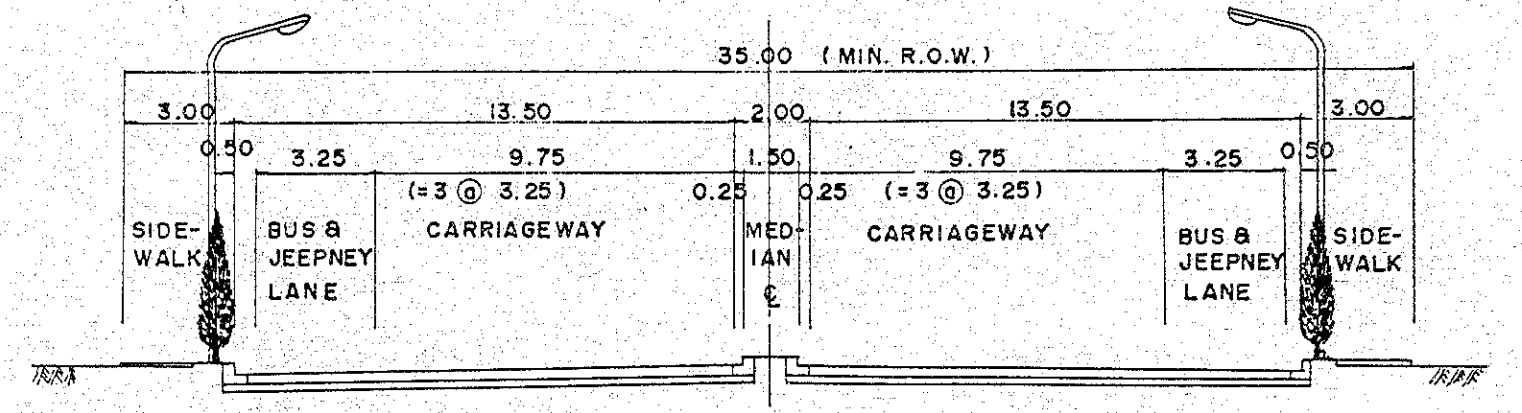
TABLE 1 GEOMETRIC DESIGN STANDARDS

Item	Unit	Recommended Standards	Common Use Standard of Philippines	Japanese Standards
Road Class	-		Categories III	
Terrain	-	Flat	Flat	Flat
Design Speed	KPH	60	60	60
Min. R.O.W. Width	m	35	-	-
Lane Width	m	3.5, 3.25*	3.5	3.25
Median Width	m	1.5 with barrier	greater or equal to 3.00 (1.50 with barrier)	1.75
Inner Shoulder Width	m	0.25	-	0.25
Outer Shoulder Width	m	1.5, 0.50*	3.25 or 3.00 or 2.75	0.75
Crossfall of Carriageway	%	1.5 for cement concrete pavement 2.0 to 3.0 for bituminous concrete pavement	2.5	2.0
Crossfall of Shoulder	%	same as above	5.0	-
Maximum Super-elevation Rate	%	8	8	10
Minimum Radius	m	120	120	150
Maximum Gradient	%	7	7	5
Sidewalk Width	m	4.50, 3.00* (1.25)	1.25 (1.00)	1.5 (0.75)
Bus and Jeepney Lane	m	3.50, 3.25*	-	-

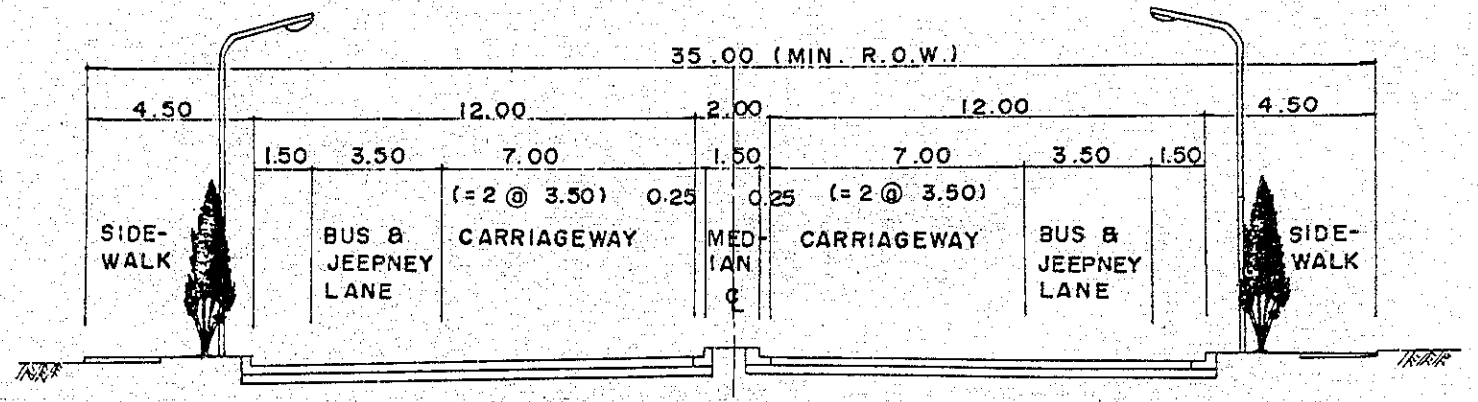
* Asterisks indicate values for use of the western part of A-Route in the ultimate stage.

( ) Brackets indicate values for bridge sections.

FIG. 5 TYPICAL CROSS SECTION (ULTIMATE STAGE) SCALE 1:200



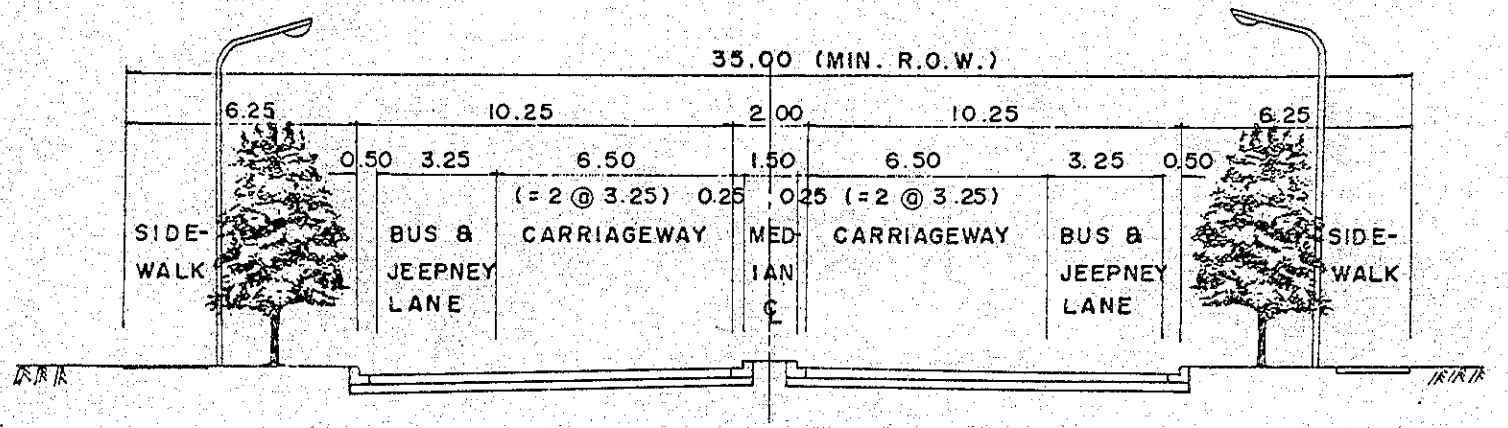
WESTERN PART OF A–ROUTE



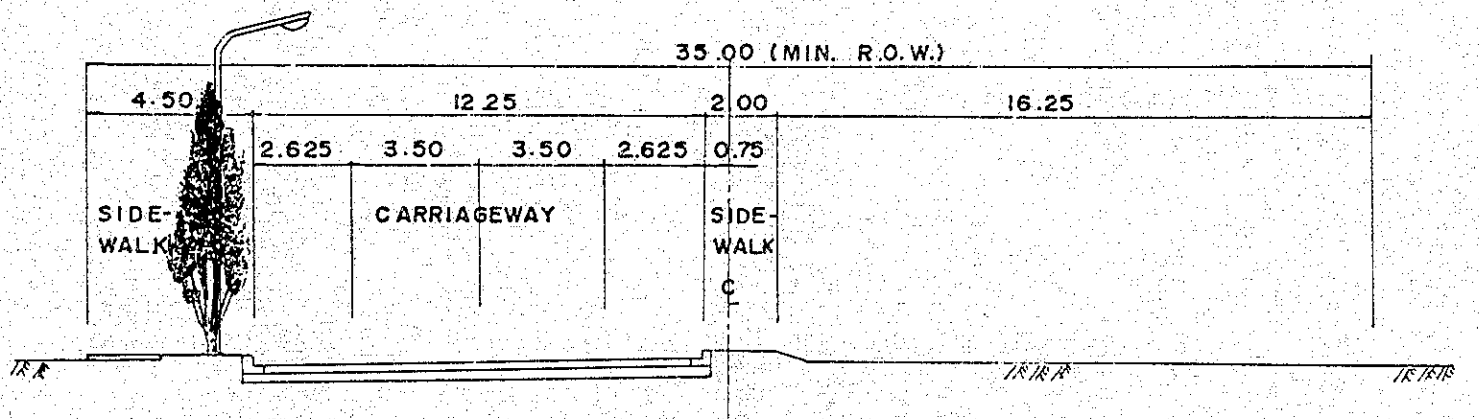
EASTERN PART OF A–ROUTE, B–ROUTE AND C–ROUTE

FIG. 6 TYPICAL CROSS SECTION (STAGE CONSTRUCTION)

SCALE 1 : 200



WESTERN PART OF A–ROUTE (FIRST STAGE)



C–ROUTE (FIRST STAGE)

FIG. 7 LOCATION OF PROPOSED BRIDGES, GRADE SEPARATIONS, BOX CULVERTS AND PEDESTRIAN OVERPASS STRUCTURES