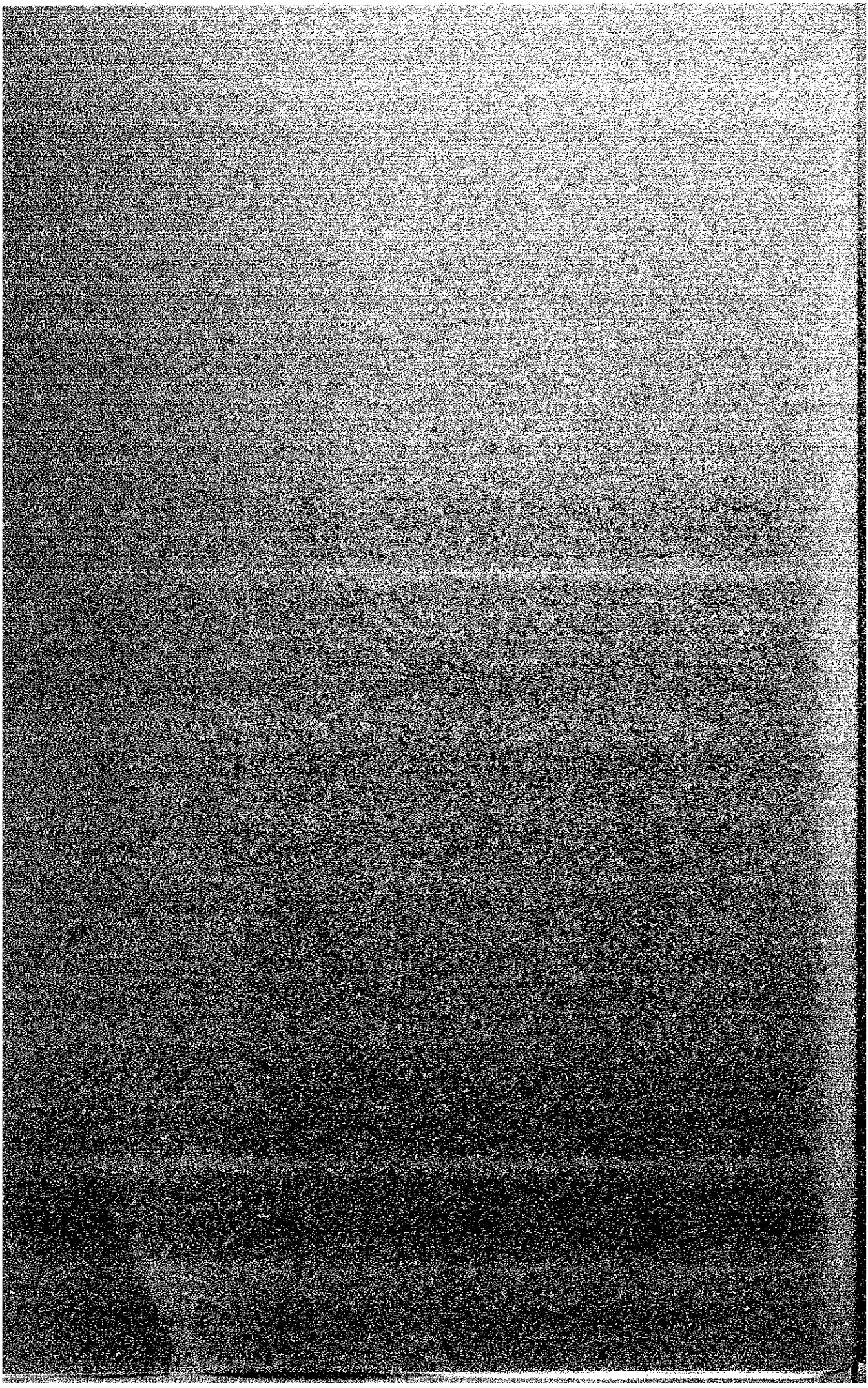
CHAPTER 6

ROAD NETWORK AND TRAFFIC ASSIGNMENT



Chapter 6 ROAD NETWORK AND TRAFFIC ASSIGNMENT

6.1 Trunk Road Network

6.1.1 Studies in the Past

A long-range transport development plan of Metro Manila Area (MMA) was studied in UTSMMA[1/]. It recommends 1) 10 radial roads (R-1 through R-10) and 6 circumferential roads (C-1 through C-6), 2) new expressways in addition to the existing North and South Expressways and 3) several new mass transit lines and improvement of the existing PNR Lines.

The proposed UTSMMA plan was reviewed in the late 1970's[2/], which confirmed the necessity of the combined development of radial and circumferential roads. The MMETROPLAN recommended short and medium range investment programs from 1977 to 1990. The programs were composed of the construction of Light Rail Transit, C-3 road, R-10 and its adjacent roads, the southern and northern road packages, improvement of a number of major intersections, etc.

The result of the 1977 study has prompted the Government to undertake feasibility studies of the recommended projects to determine their technical and economic viabilities. The feasibility study of R-10[3/]was conducted in 1975 and of C-3 and R-4[4/]in 1978. In 1980 the feasibility study of the R-10 extension together with the related sections of C-5 and C-6 were completed[5/].

There are two existing toll expressways: North Luzon Expressway (Balintawak to Angeles) and South Luzon Expressway (Nichols to Canlubang) both being operated by CDCP. CDCP conducted a study of the Metro Manila Expressway (MME) and C-5 in 1980[6/]. In the study it recommended the construction of the southern section of MME and the northern section of C-5 in the 1980's. The MME was proposed to intersect with South Luzon Expressway at Bicutan (Refer to 2.3.2 in Chapter 2).

1/ RP & OTCA of Japan, Urban Transport Study in Manila Metropolitan Area (1973)

2/ Gov't. of RP & Freeman Fox and Associate, MMETROPLAN (1977)

3/ RP & JICA, Radial Road R-10 Feasibility Study (1975)

4/ DPH & JICA, Feasibility Study on C-3 and R-4 Related Roads Project (1978)

5/ Gov't. of Philippines and JICA, Feasibility Study for Manila-Bataan Coastal Road and its Related Road (C-5 & C-6), (1980)

6/ CDCP and PHILCONSULT, Feasibility Study on Metro Manila Expressway and Circumferential Road 5 (C-5), (1980)

6.1.2 Recommended Road Network Associated with the Project Roads

By reviewing these development plans as discussed in the above section, the forecasted expansion of urbanization and the location of the Project Roads, a conceptual long-range development plan of the road network associated with the Project was formulated to cover up to the year 2000 or 2010. It is shown in Fig. 6.1-1. The following features were noticed in the network plan.

1) In the area along Manila Bay

The construction of the Imelda Avenue Extension to Rosario and the Manila-Cavite Coastal Road (R-1 Extension) was considered necessary to meet the increasing traffic demand in this corridor. The areas along the existing Quirino Avenue and its extension to National Road 25 are densely developed and widening this road to meet the traffic demand would rather be impractical and expensive.

2) In the area along Laguna de Bay

When C-Route is constructed up to Bicutan, the total capacity of South Luzon Expressway and its service roads north of Bicutan is expected to be saturated. It is recommended that C-5 should be constructed and connected with C-Route at Bicutan at the earliest time after MME is constructed up to Bicutan. If the loop road of the Project is connected with C-5 at Bicutan, there will be better distribution of traffic which would decongest the expressway north of Bicutan.

The plan proposes that MME will share the right-of-way of C-6 and the service roads of MME will function as C-6. The southward extension of C-6 along the shore of Laguna de Bay will be parallel to South Luzon Expressway and National Road No. 1 down to San Pedro. The plan aims to meet the increasing traffic demand which will exceed the capacity of the existing roads in the area.

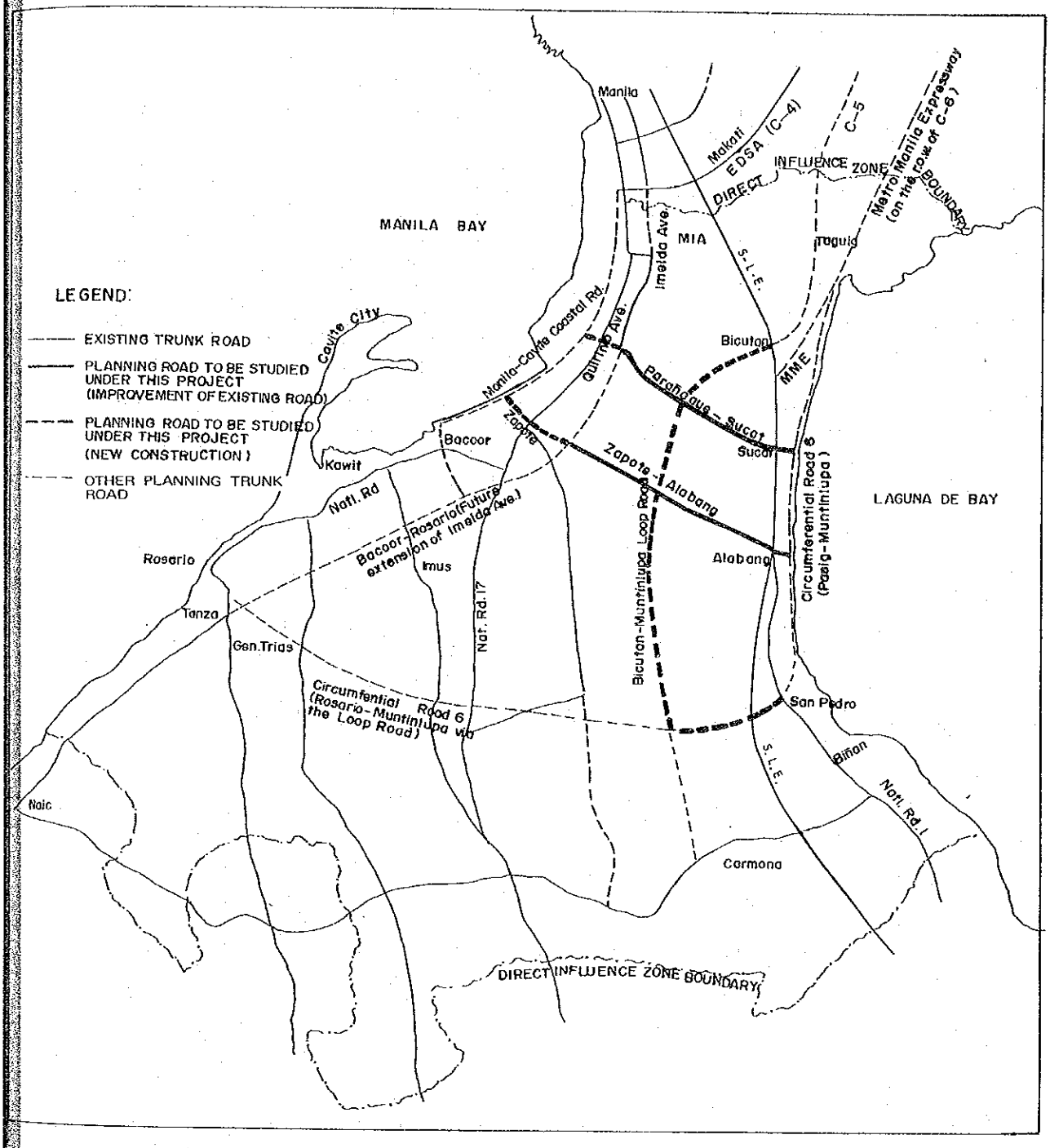
3) In the mid-land of the DIZ

Although the southern part of the DIZ will be reserved for agricultural use, an additional east to west link is considered necessary as an extension of Circumferential Road 6 (C-6) towards Rosario. Since an industrial zone is being planned in Rosario, this road will facilitate the transport of goods to and from the industrial zone.

4) The Project Roads

The Government recognized recent development of urbanization in the DIZ and has been preparing a long-range development policy of the Metropolis in which the DIZ is considered to have potential of future urbanization. For the development of the road network in the DIZ, a number of construction and improvement projects were identified, through which the Project Roads were taken up for the Study. The Roads are the

FIG. 6.1-1 MAP OF EXPECTED TRUNK ROAD NETWORK, YEAR 2000-2010



trunk roads located in the midst of the urbanizing DIZ.

The Study Team examined the existing road network and traffic volume together with the forecasted volume to establish a long-range development plan of the road network in the DIZ.

The existing Paranaque-Sucat (A-Route) and Zapote-Alabang (B-Route) Roads, east-west connectors in this area, are congested with their traffic. Adverse effect will affect the roadside residents along these roads in the future, thus the roads being under strenuous need for the improvement. Both Quirino Avenue and South Luzon Expressway link the north and the south. However, the traffic volume of the former road has already exceeded its capacity and part of the latter is reaching its full capacity. A new north-south connector (C-Route) is to be required to alleviate the congested traffic on these roads. With provision of other new trunk roads which is also urgently required, the Project Roads would contribute to the economic development of the DIZ.

Technical reasons which support the formation of the Project are stated in Chapters 7 and 8. The important features of the Project are summarized in Chapter 12. The following section presents the alternative plans of the Project subject to evaluation.

6.2 Alternative Plans of the Project

The Roads under the study are composed of three sections, two of which are existing roads for improvement while the other is for new construction. They are briefly enumerated below:

A-Route: Paranaque-Sucat Road (Dr. A. Santos Avenue), 7.5 km in length. Widening with some realignment.

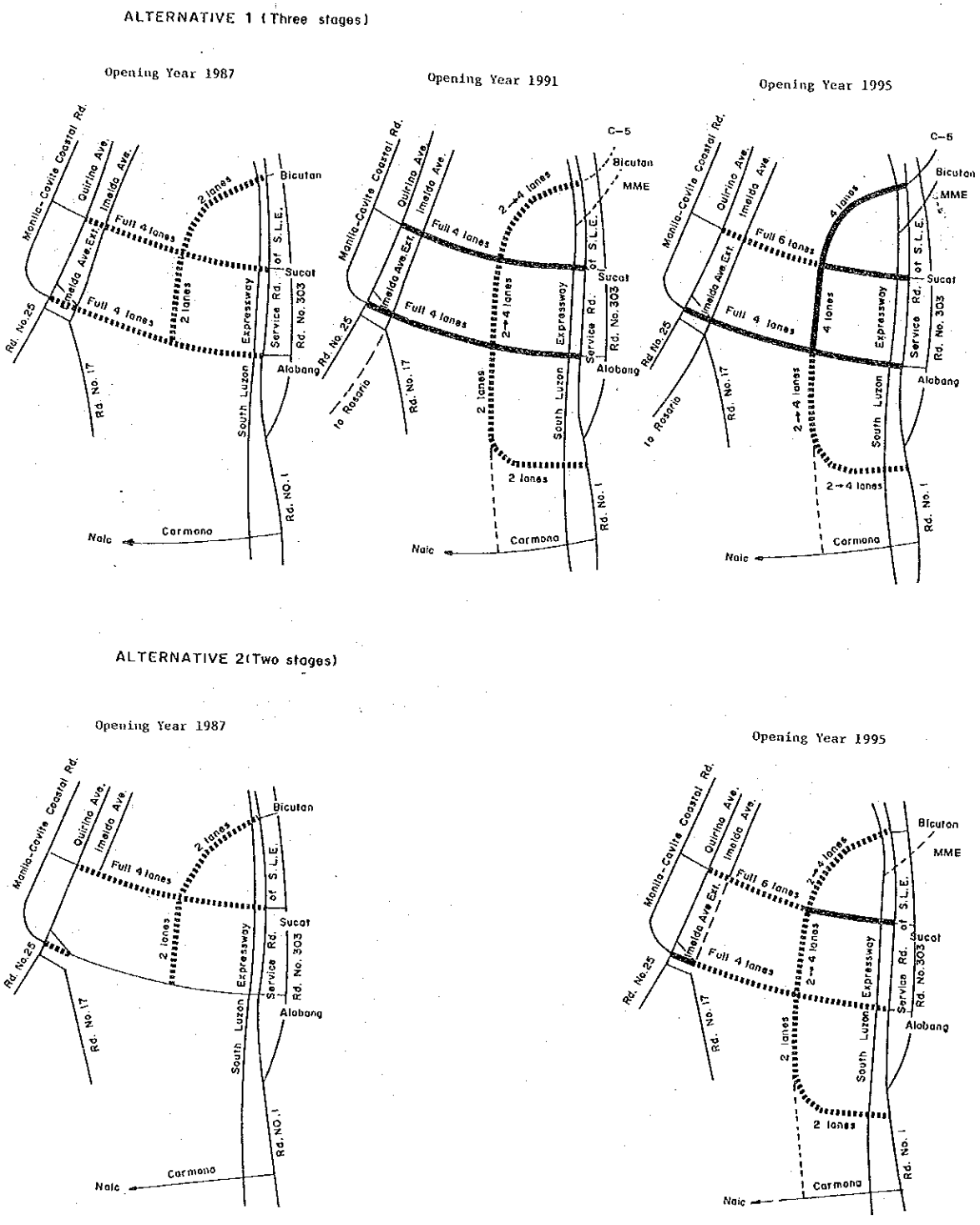
B-Route: Zapote-Alabang Road (Manila South Road), 10.3 km in length. Widening and realignment.

C-Route: Bicutan-Muntinlupa Loop Road, 20.7 km in length. New road construction.

For purposes of preparing investment programs, three different development plans of the road network were studied. Plan 1 is an extensive road development program with three stages of construction up to 1995 while Plan 2 is a modest program with two stages up to 1995. It is noted that Plan 2 includes the construction of the approach section (1.6 km) of B-Route to the Manila-Cavite Coastal Road in the first stage. The remaining sections of B-Route are programmed in the second stage. Plan 3 is the intermediate plan between Plans 1 and 2. The difference between Plans 2 and 3 is construction timing: Plan 3 involves larger investment in the earlier stage.

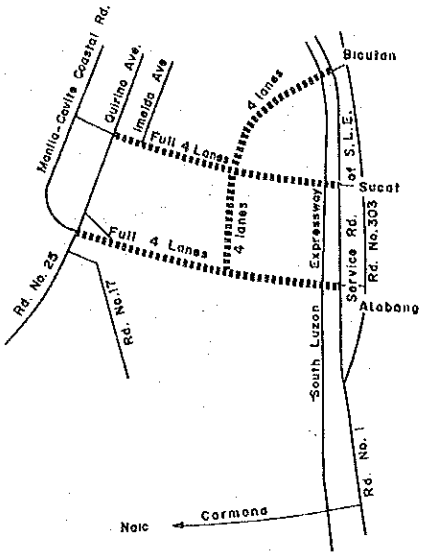
There are other roads in the DIZ which are programmed for implementation in the next 10 to 15 years. Some of these roads are committed projects with funds already allocated while others are still in the planning stage. The timing of implementation of these associated

FIG. 6.2–1 ALTERNATIVE PLANS OF THE PROJECT
(Including the plans of the associated roads)

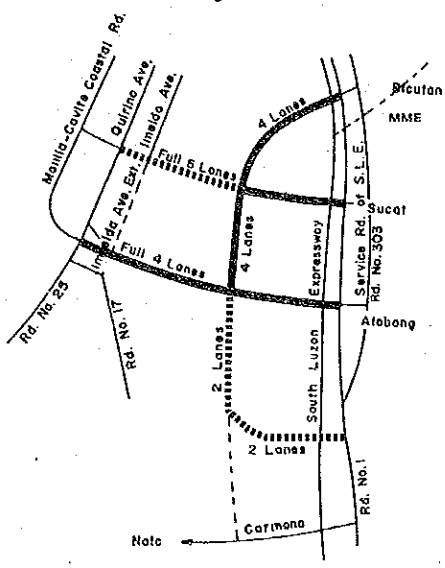


ALTERNATIVE 3 (Two stages)

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

TABLE 6.2–1 ROAD CONSTRUCTION PLANS

Alternatives	Plan 1		Plan 2		Plan 3	
Road Section	Expected Year Completed	Remarks	Expected Year Completed	Remarks	Expected Year Completed	Remarks
1. Parañaque-Sucat	1986	Widening of 4 lanes with auxiliary lanes	1986	Same as Plan 1	1986	Same as Plan 1
	1994	Improvement to 6 lanes with auxiliary lanes for the western section	1994	–	1994	–
2. Zapote-Alabang	1986	Widening of 4 lanes with auxiliary lanes	1986	Construction of the access to Manila-Cavite Road	1986	Same as Plan 1
	1994	–	1994	Addition of auxiliary lanes	1994	–
3. Bicutan-Muntinlupa Loop Road	1986	Construction of the northern section to 2 lanes	1986	Construction of the northern section to 2 lanes	1986	Construction of the northern section to 4 lanes
	1990	Construction of the southern section 2 lanes and widening the northern section to 4 lanes	1990	–	1990	–
	1994	Widening the southern section to 4 lanes	1994	Widening the northern section to 4 lanes and the construction of the southern section to 2 lanes	1994	Construction of the southern section to 2 lanes
4. Manila-Cavite Coastal Road	1983	Two lanes in both directions in initial stage	1983	Same as Plan 1	1983	Same as Plan 1
	1986	Additing 2 lanes	1986	Same as Plan 1	1986	Same as Plan 1
5. Imelda Avenue	1983	MIA Access Road	1983	Same as Plan 1	1983	Same as Plan 1
	1985	Section Extending to Zapote-Alabang Road				
		–	1994	Extension to Zapote-Alabang Road	1994	Same as Plan 2
6. Circumferential Road 5 (Pasig-South Luzon Expressway)	1990	Feasibility Study not undertaken yet	–	Beyond 1995	–	Same as Plan 2
7. Circumferential Road 6 (Rosario-Muntinlupa via the Loop Road)	–	Beyond 1995	–	Beyond 1995	–	Same as Plan 2
8. Baccor-Rosario (Future extension of Imelda Avenue)	1990	Feasibility Study not undertaken yet	–	Beyond 1995	–	Same as Plan 2
9. Circumferential Road 6 (Pasig-Muntinlupa)	–	Beyond 1995	–	Beyond 1995	–	Same as Plan 2
10. Metro Manila Expressway	1990	Pasig-South Luzon Expressway in initial stage	1994	Pasig-South Luzon Expressway in initial stage	1994	Same as Plan 2
11. The loop road to Carmona	1990	Feasibility Study not undertaken yet	1994	Feasibility Study not undertaken yet	1994	Same as Plane 2
	1994	Widening to 4 lanes				

roads will invariably affect the results of the traffic assignment and the subsequent economic assessment. These associated roads were incorporated in the network of the alternative plans, Plan 1 through Plan 3. An extensive construction program of the associated roads was assumed in Plan 1 while a modest program was proposed in Plan 2 and Plan 3.

The plans of construction timing of the Project Roads and the associated roads for Plan 1 through Plan 3 are shown in Fig. 6.2-1 and Table 6.2-1.

6.3 Traffic Assignment

6.3.1 Methodology

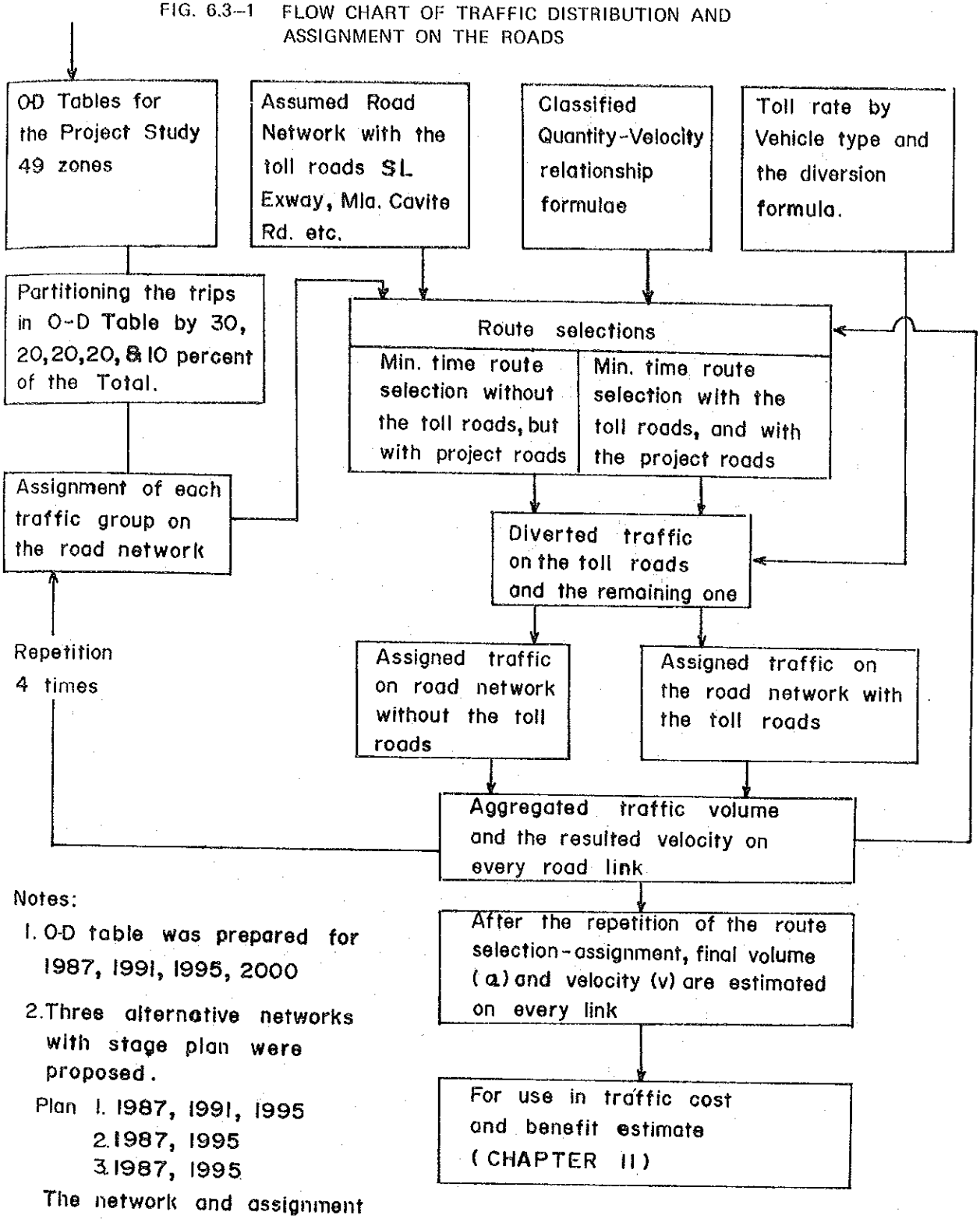
The traffic distribution and assignment simulation on the road network was conducted to forecast the traffic volume on the sections of the future road network including the Project and the associated roads. The method of simulation is basically the same as stated in Subsection 4.3.3. The overall process of the simulation is shown in the flow chart of Fig. 6.3-1. The simulation model using the computer, is composed of three elements: quantity-velocity (Q-V) relationship curves, a diversion curve to the toll expressway and minimum route selection by travel time.

The Q-V curve shown in Fig. 6.3-2 indicates that the vehicle running speed on a road section decreases as the traffic volume increases. Increases in traffic volume were simulated by the aggregation of trips on the section by repeating the traffic assignment using the minimum time route selection method. All zone pair trips in the O-D Table were sub-divided into five groups of 30, 20, 20, 20 and 10 percent.

For all zone pairs in the first group, the minimum time route was searched with a speed under free flow conditions. Trips accumulated on each section were used to determine the corresponding travel speed by referring it to the Q-V curve shown in Fig. 6.3-2. The determined speed is in turn used in the selection of the time minimum path for the second group. Accumulated trips and the resulted speed were again used, applying the same procedure, for the succeeding group. After the five groups had been subjected to the traffic assignment, the results indicate the daily traffic and corresponding speeds by section of the road network. The parameters of the Q-V relationship used are shown in Appendix Tables 6.3-1 and 6.3-2 and Appendix Fig. 6.3-1.

In cases where part of the trips from zone i to j will be diverted to the toll expressway, the diversion ratio was determined by using the diversion curve shown in Fig. 6.3-3. In using the diversion curve, the travel time was searched in the minimum time selection method for the two networks with and without the toll road. The existing toll fare was taken into account to determine the diverting traffic. This process was repeated in each of the five groups, and the aggregation of the trips results in the daily traffic volume on the

FIG. 6.3-1 FLOW CHART OF TRAFFIC DISTRIBUTION AND ASSIGNMENT ON THE ROADS



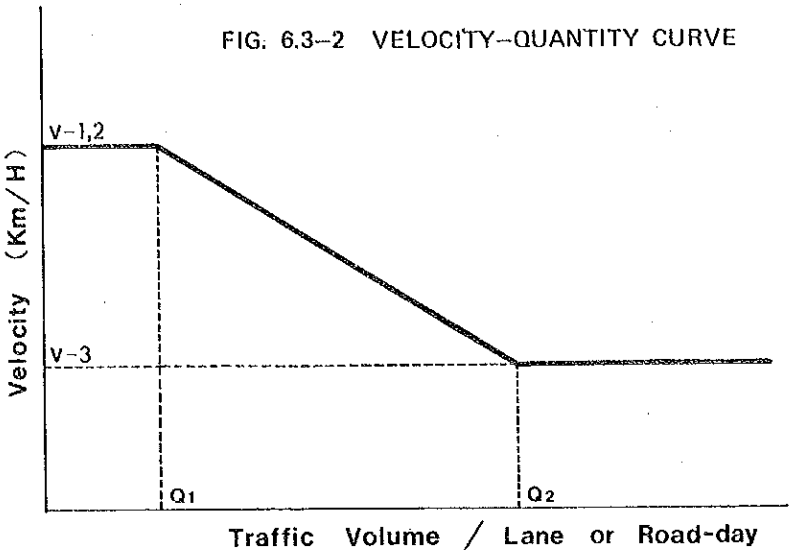
Notes:

1. O-D table was prepared for 1987, 1991, 1995, 2000
2. Three alternative networks with stage plan were proposed.

   Plan 1. 1987, 1991, 1995
   2. 1987, 1995
   3. 1987, 1995

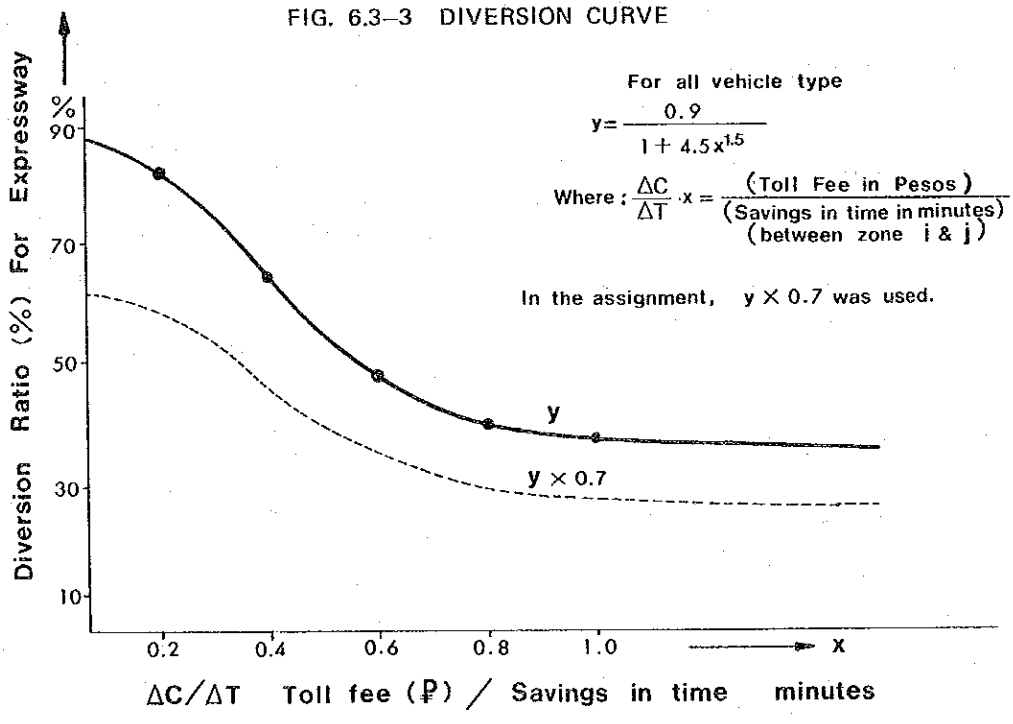
   The network and assignment without project were also simulated for the corresponding years.

FIG. 6.3–2 VELOCITY–QUANTITY CURVE



Remarks: The parameters are shown in Appendix Fig. 6.3-1 and Appendix Table 6.3-1.

FIG. 6.3–3 DIVERSION CURVE



road network including the expressway.

6.3.2 Results

The results of the assignment for future years are shown in Figs. 6.3-4 through 6.3-6 and Appendix Table 6.3-3. Appendix Table 6.3-4 presents the percent share by vehicle type on the Project Roads in 1987 and 1995.

The figures indicate the resultant traffic movement on the networks with different staged development. There are several cordon screens on which the estimated daily traffic and the road capacities are compared. For example, the screen b1b1 has two roads, each having the capacity of 58,400, while the daily traffic volume is 33,000 and 39,800 in Plan 1 of Fig. 6.3-4. The volume capacity ratio of the cordon screen is calculated as follows: (33,000 + 39,800)/(58,400 x 2) = 0.623.

Similar comparison was conducted and shown in the figures. Generally the volume-capacity ratios are less for Plan 1 and higher for Plan 2, since Plan 1 is based on the assumption that the associated roads will be constructed at earlier stages than the other plans.

The assigned traffic volume on the sections of the Project Roads in 1987 (the year after the first stage completion) is shown below referring to Appendix Table 6.3-3.

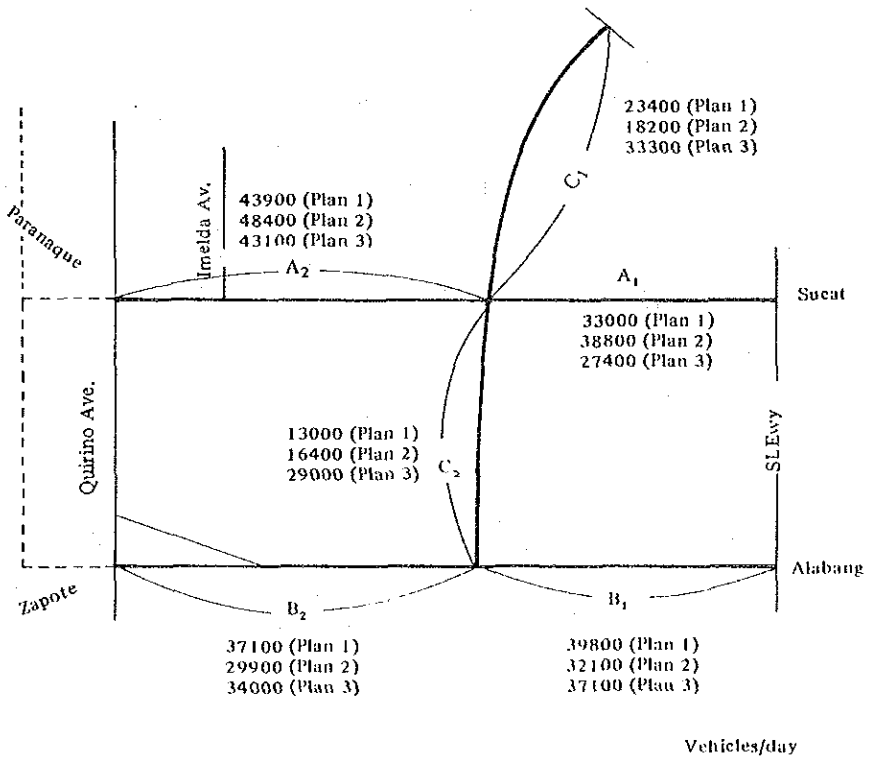


FIG. 6.3–4
FUTURE TRAFFIC VOLUME

– ALTERNATIVE 1 –

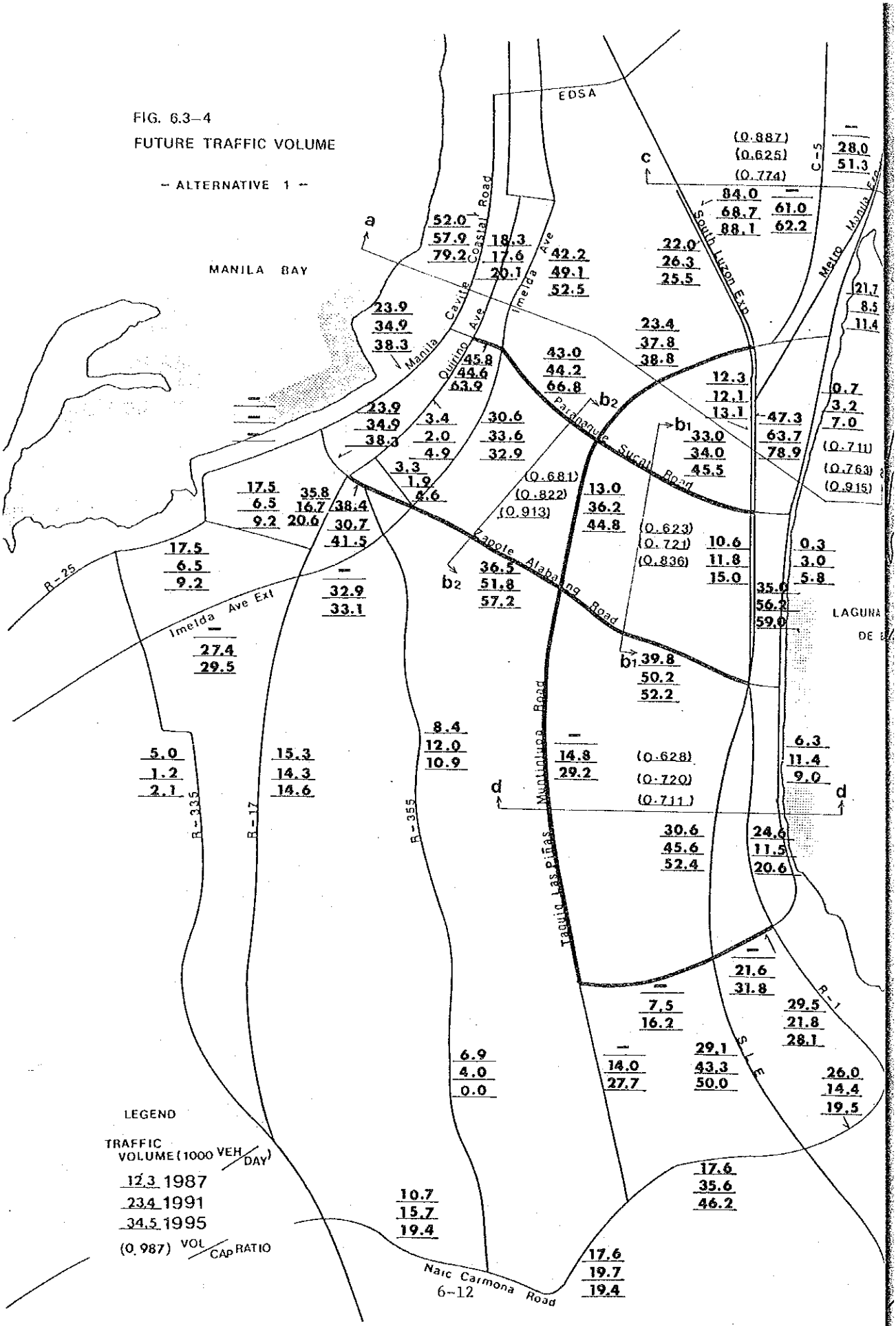


FIG. 6.3– 5
FUTURE TRAFIC VOLUME

– ALTERNATIVE 2 –

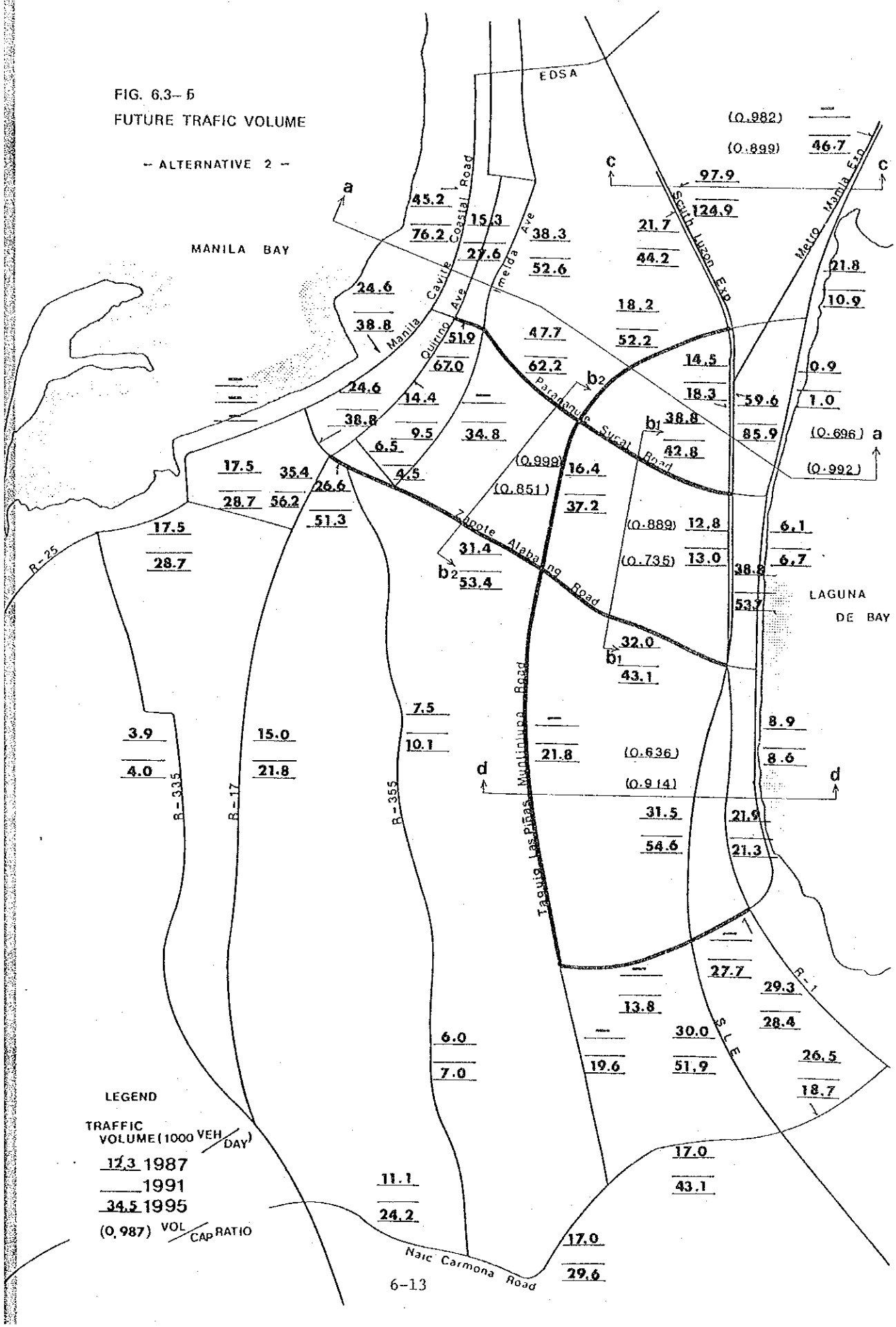
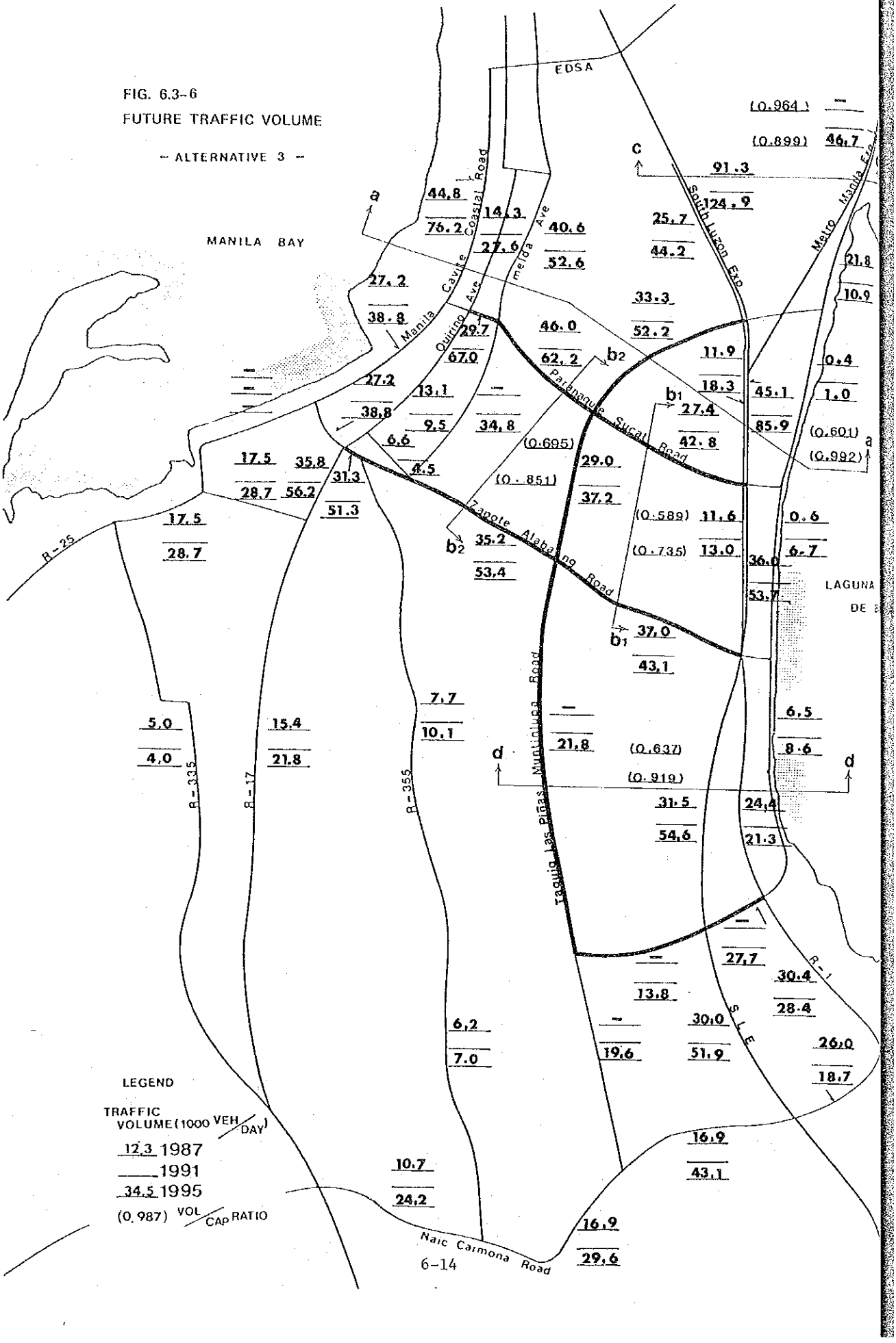


FIG. 6.3-6
FUTURE TRAFFIC VOLUME

– ALTERNATIVE 3 –



Plan 3 is a plan to improve all these sections the most extensively in the first stage. Plan 1 differs from Plan 3 only in terms of lesser number of lanes and capacity on C_1 and C_2. The traffic on C_1 of 33,300 and on C_2 of 29,000 in Plan 3 decreases to 23,400 on C_1 and 13,000 on C_2 in Plan 1. Differences in the volumes are distributed to others A_1, A_2 and B_1 resulting in larger volume on these sections in Plan 1 than Plan 3.

Plan 2 proposes not to improve B-Route, except the western access to the Manila-Cavite Coastal Road. Accordingly, the capacity of B-Route is smaller than in Plan 1 and Plan 3, resulting in less traffic as of 30,800 on B-Route. (30,800 is the average traffic of B_1 and B_2 in Plan 2). Part of the balance of the traffic would use C_2, and spread over A_1 and A_2, indicating a larger traffic volume on these sections in Plan 2 than those in Plan 1.

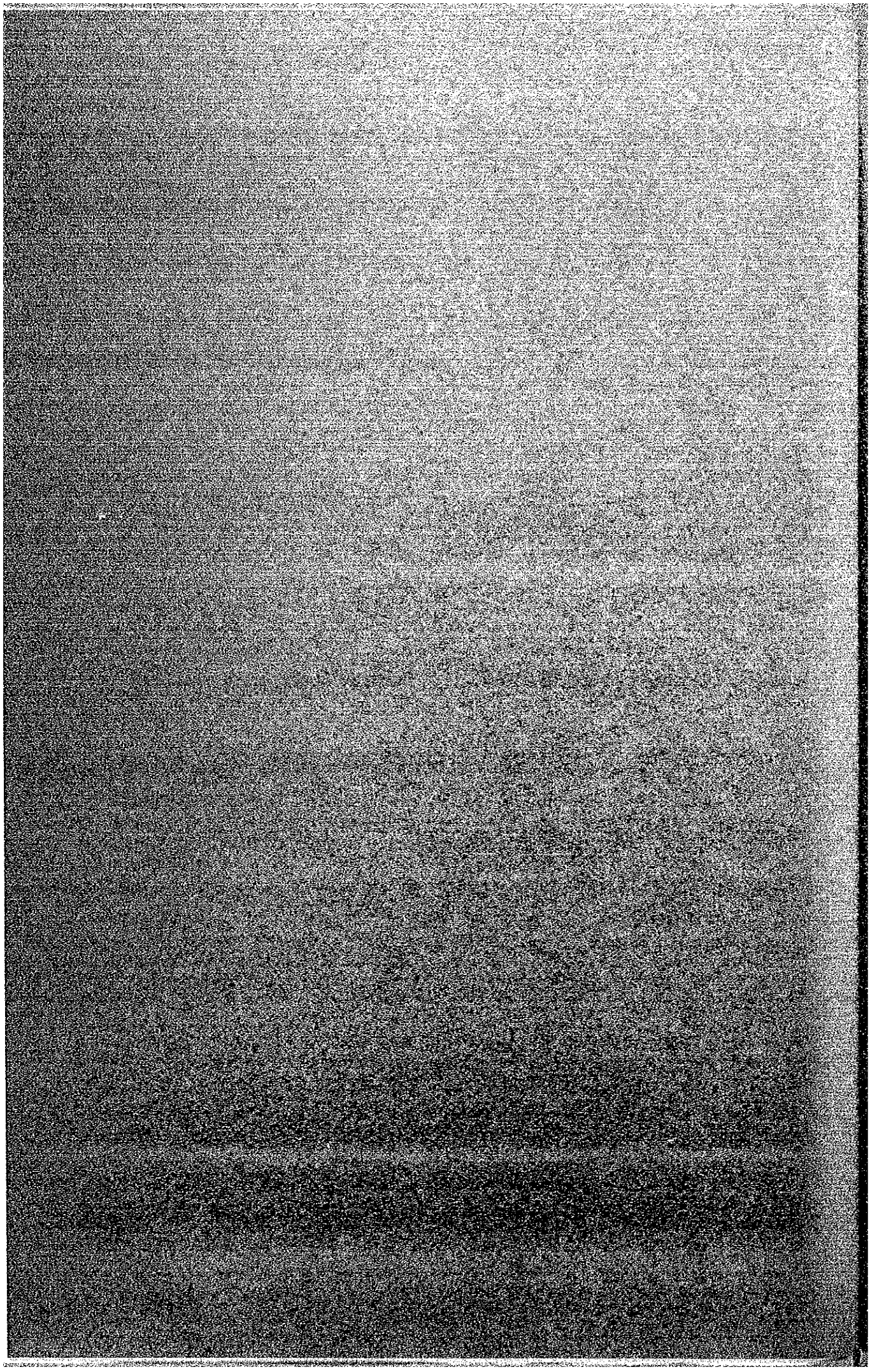
Traffic movements in 1991 and 1995 as shown in the figures present generally the result simulated by the same principle: if the capacity is improved, there will be more traffic because of the better serviceability of the road.

These estimates were used to determine the level of improvements for Alternative Plans 1 through 3. Since the traffic forecast is based on assumptions of economic indexes which are likely to change, the estimated traffic is subject to variation.

Using these estimates together with "the basic road traffic cost" and "dl factors", traffic cost and the subsequent economic savings are estimated as discussed in Chapter 11. The range of variation will be studied in the sensitivity test of the benefit and cost analysis.

CHAPTER 7

ALTERNATIVE ROUTE STUDY AND SELECTION OF THE BEST ROUTE



Chapter 7 ALTERNATIVE ROUTE STUDY AND SELECTION OF THE BEST ROUTE

7.1 Characteristics of the Project Roads

The general conditions within the DIZ were studied based on the data gathered from field investigations and the aerial-photos collected. The aerial-photos were first examined and the sites were investigated for verification. On these aerial-photos taken some years ago (1976-1978) discrepancies were corrected to reflect the present situation.

The northern and central areas of the DIZ have developed, being occupied by residential, commercial and industrial establishments. The southern area is developing, which includes arable as well as uncultivated lands.

The general topography of the Project Area can be classified as flat and hilly terrains. The northeastern part is flat terrain, but since the land approaches Laguna de Bay, the elevation drops steeply. The northwestern part has a low elevation compared with the northeastern. Many small waterways cut off the land, and fishponds and salt-fields lie near the coast of Manila Bay.

The areas in the central part of the Project area near Laguna de Bay and Manila Bay are classified as very flat, but inland is of intermediate terrain between flat and hilly, having steep up-and-down slopes with no significant big streams. The southern part, which is far from Laguna de Bay, is classified as hilly. Investigation revealed varied topography with deep valleys and relatively small waterways.

7.1.1 Paranaque-Sucat Road (A-Route)

The existing Paranaque-Sucat Road is a 2-lane highway with 7 meter wide concrete cement pavement. It is one of the trunk roads of the southern part of Manila. Most parts of A-Route involve improvement of the existing Paranaque-Sucat Road.

Its eastern terminal is the Sucat Interchange along South Luzon Expressway, which connects Manila with the southern parts of Luzon Island. The western terminal is at its intersection with Quirino Avenue which is a very important but congested existing trunk road. The extension of this route to the reclamation is included in the R-1 Extension being undertaken by CDCP.

The characteristic of A-Route will be as a trunk east-west link connecting north-south major trunk roads. This route will serve the commercial, industrial and residential areas along the route and will function as traffic distributor to nearby areas.

7.1.2 Zapote-Alabang Road (B-Route)

This existing road is a 2-lane highway with 6-meter wide cement concrete pavement already in bad condition. The MPWH is reconstructing this road to 4-lane concrete highway to be completed in 1983. It is an east-west trunk road traversing the middle part of the DIZ similar to the existing Paranaque-Sucat Road.

The eastern terminal of B-Route is the Alabang Intersection along South Luzon Expressway, while its western terminal is the junction with Quirino Avenue. B-Route will also be connected with the proposed R-1 Extension.

The characteristic of this road will be the same as A-Route as mentioned above.

7.1.3 Taguig-Las Pinas-Muntinlupa Loop Road (C-Route)

C-Route will be a new north-south trunk road passing the middle part of the DIZ between South Luzon Expressway and Quirino Avenue. This new road will start at the Bicutan Interchange along South Luzon Expressway and will end at National Road No. 1 in San Pedro, Laguna. The southern segment of this road will form part of the proposed Circumferential Road 6 (C-6).

The characteristic of C-Route will be as a major trunk road to complement the existing north-south major trunk roads in the area. This route will also serve as the main access road of residential and industrial areas in its vicinity.

7.2 Alternative Route Study

The Study Team carried out alternative route study for the three routes in two steps, taking into consideration the future road network in the DIZ.

7.2.1 Tentative Alternative Routes (Step 1)

Based on the general information gathered from the examination of the aerial-photo mosaic and site investigation, the Study Team determined all possible alternative routes for each Project Road, paying special attention to the socio-economic, environmental and technical conditions of the area. The following are the basic requirements used in the alignment study:

1) Land Use

For an alignment that would pass through open spaces or commercial areas, due attention was paid to effective land use and environmental impacts, and at the same time their future function as probable residential areas.

2) Topography

In setting alignments, the following locations were avoided as much as possible:

- deep valleys
- wide weak ground
- waterways with a very sharp angle.

3) Control Points

The following were considered as the major control points in the alignment study and location of interchange/intersection:

- permanent building with more than 3 storeys
- public facilities and buildings
- electric pylons
- crossing points and angles of intersections with rivers and canals
- crossing points and angles of intersections with roads and railways
- important buildings and good residential areas
- military facilities
- planned roads, railways, canals, public utilities, etc.

4) Horizontal and Vertical Alignments

Horizontal and vertical alignments were considered so as to satisfy the established geometric design standards for vehicle safety and comfort. Aesthetics for the road was also considered.

5) Location of Interchange and Intersection

A larger area is needed for an interchange or an intersection. A sparsely populated area with few control points was considered the most suitable location without sacrificing functionality.

6) Land Acquisition and Compensation

The route with the minimum land acquisition and compensation was taken up, avoiding passing through existing commercial centers and with the least destruction to existing roads and railways.

7) Length of Route

The shortest possible route was considered.

7.2.2 Selection of Alternative Routes (Step 2)

In this step, the selection of alternatives for each route was narrowed down to a few plans with careful field reconnaissance survey and examination to meet the following requirements:

- High Density Residential Area

  Except in special cases, running through high-density residential area was avoided as much as possible.

- Community Cohesiveness

  The routes that would have the least adverse impact on community cohesiveness.

- Agricultural Land and Open Space

  Routes traversing agricultural lands and idle open spaces.

- Location of Intersection

  Major intersections having adequate open space.

- Design Standards

  Routes that would meet the established design standards.

- Conservation of Public Facilities

  Routes that would avoid affecting important landmarks and public facilities, such as, schools, churches, cemeteries, hospitals, military institutions, reservations, etc.

- Future Development Plans

  The route that would contribute to future land use and other development projects.

- Other Trunk Roads

  The route that would function as a system complimentary with other major roads in the area.

- Consideration of Environmental Impact

From the above requirements, alternative routes were selected. Detailed description on each alternative is presented in Appendix Note 7.2.

7.3 Selection of the Best Route

7.3.1 Selection Method

1) General Procedure

Alternative routes considered, as discussed in Section 7.2, were evaluated to determine the best route through the following procedure.

The environmental impact of the different alternative routes was also studied. However, no remarkable difference among the alternatives was found. Detailed comparison is described in "Environmental Impact Statement."

- Length of route
- Alignment
- Present and future land uses

- Location of intersection/interchange
- Number of buildings affected
- Costs of land and property acquisition
- Construction cost
- Relationship with other trunk roads in the network.

In the evaluation, the following ratings were used:

- A: Excellent
- B: Good
- C: Normal
- D: Inferior

2) Existing Roads

At present, A-Route has an average right-of-way width of 13 meters, while B-Route has an average width of 17 meters. Based on future traffic demand and the minimum standards to be adopted the minimum right-of-way width of 35 meters was proposed for both roads, resulting in an additional width of about 22 meters for A-Route and about 18 meters for B-Route.

Ways of widening existing roads are as follows:

(a) widening the road on one side only

(b) widening on both sides

(c) combination of (a) and (b).

Method (a) could be adopted where the roadside developments are comparatively equal on both sides of the road. Method (b) is used where the roadsides are undeveloped. Method (c) is the combination of the other two. However, the horizontal alignment of the existing road was examined to see whether it would satisfy the established design standard.

Based on the above, land acquisition in Method (a) was found the most economical considering the present roadside development on A- and B-Routes. Other factors considered were the following:

- open spaces available
- public facilities
- number of permanent 3 or more storey buildings affected.

7.3.2 Route Selection Study

1) A-Route

Only one alignment was considered for A-Route because this road is existing and its extension to R-1 has very limited choice to consider. In order to determine which side of the road the additional area to widen, the following

existing major structures or control points along A-Route were taken into account:

South Side

- Olivares General Hospital
- Olivares College
- Saint CYR Academy
- Iglesia ni Kristo (church), about 70 meters away from the route
- Manila Memorial Park Cemetery
- Loyola Memorial Park Cemetery

North Side

- Paranaque Municipal High School, about 50 meters away from the route
- San Isidro Church at the midpoint of the route about 15 meters away from the route
- Elorde Sports Complex
- Medical Center Hospital, about 50 meters away from the route.

As seen in Fig. 7.3-1 there are more restictions on the south side. Furthermore, the control points on the north side are located at a distance from the road. On this basis, widening was recommended on the north side.

2) B-Route

a. Existing Section

Similar to A-Route, buildings and establishments are the common sights along B-Route. The control points on each side of the route are as follows:

South Side

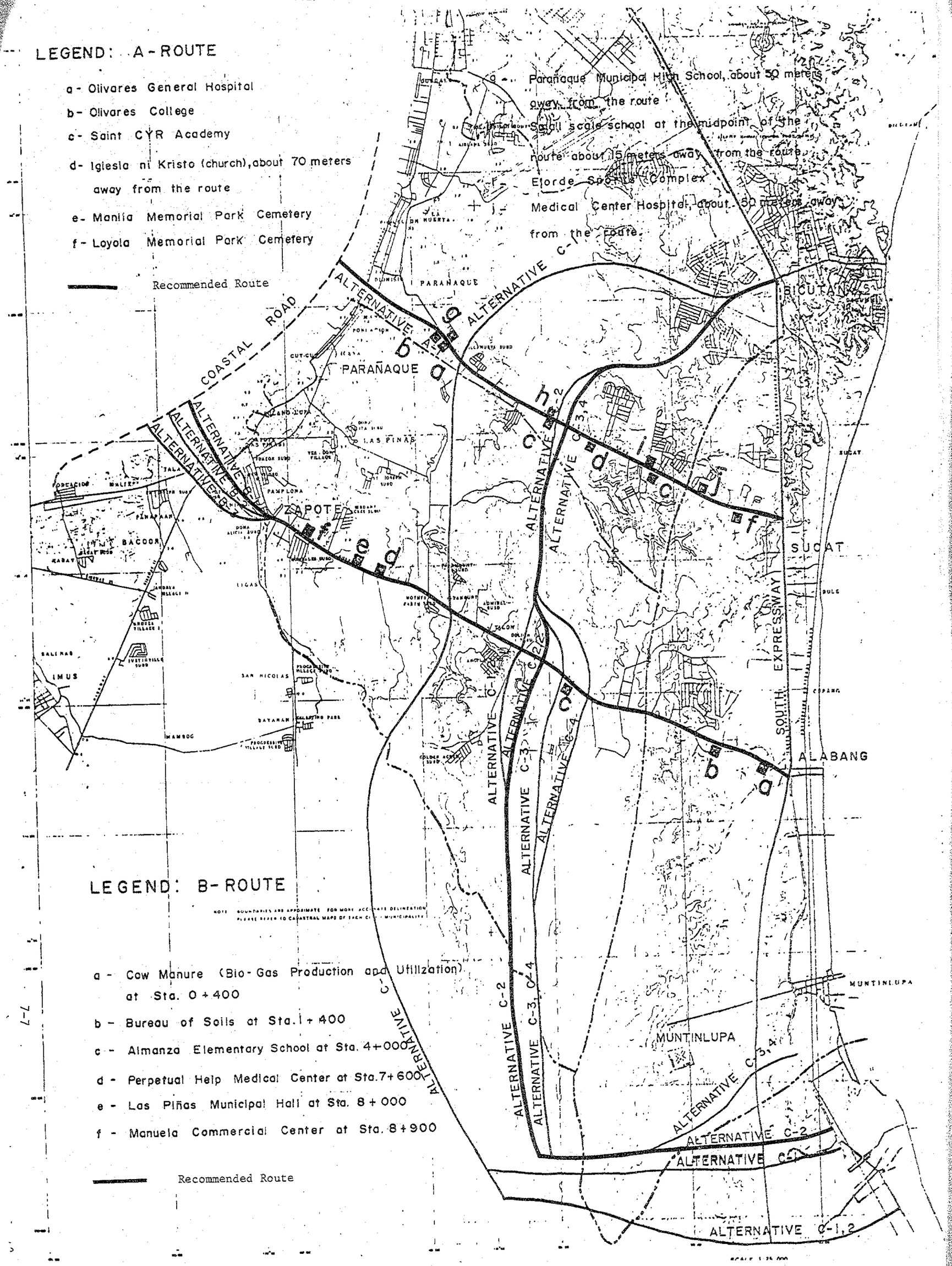
- Cow Manure (Bio-Gas Production and utilization)
- Bureau of Soils
- Almanza Elementary School

North Side

- Perpetual Help Medical Center
- Las Pinas Municipal Hall
- Manuela Commercial Center

Fig. 7.3-1 shows the location of the above control points. On the western section of the route up to Sta. 4+000, there are more control points on the north side while on its eastern section there are more control points on the south side. The Team therefore proposed that the widening will be on the south side of the western section of the route and on the north side of the eastern section. The shifting from the south to

FIG. 7.3–1 LOCATION OF CONTROL POINTS



the north side of the route is in the vicinity of Sta. 3+600 utilizing the curve of the existing road.

b. New Construction Section

The three alternatives: B-1, B-2 and B-3, discussed in Appendix Note 7.2.2 were evaluated through the use of eight check items and given overall assessment to select the best route as tabulated in Appendix Table 7.3-1.

As a result, Route B-2 was found unfavorable in terms of number of structures affected, land acquisition cost, construction cost, etc.

Routes B-1 and B-3 were both found better in most of the factors used in the screening. Route B-1 is the same alignment used by the CDCP for connection with the Manila-Cavite Coastal Road Project (R-1). The Team, therefore, recommended Route B-1, inasmuch as it is in conformity with the CDCP's alignment, and in view of lower construction cost, less land acquisition, etc.

3) C-Route

There are six (6) alternative routes considered for this route and each involves new construction of about 20 kilometers as described in Appendix Note 7.2.3. Aside from these alternatives, many more combinations can be made, but would rather render the selection process more complicated. For simpler and more effective selection, the entire stretch was subdivided into two segments, i.e., the northern and the southern parts as shown in Appendix Fig. 7.2-1.

a. Northern Part

Three alternatives, namely: C-1, C-2 and combined C-3,4 are considered in the northern segments. The advantages and disadvantages of each alternative route are tabulated in Appendix Table 7.3-2. From the tabulation, Route C-1 has more favorable as well as unfavorable points, thus was eliminated from the selection process. Route C-2, on the other hand, has neither favorable nor unfavorable points while C-3,4 has favorable points but few undesirable ones. The Team recommended Route C-3,4 as the best route for the northern segment of C-Route.

b. Southern Part

For this segment of C-Route, six (6) alternative routes, namely: C-1, C-2-1, C-2-2, C-3, C-4 and C-1-2 were selected as shown in Appendix Fig. 7.2-1. Merits/demerits of each route are presented in Appendix Table 7.3-3. Although Route C-1 has some favorable points, it is far outweighed by the unfavorable points, while Route C-2-2 shows favorable points on all the check points used in the selection.

Route C-3, being almost the same as Route C-2-1, is short of favorable points. It will have higher land acquisition cost since it affects more residential areas. Route C-4 has more favorable points following Route C-2-2. However, due to numerous residential and industrial areas affected, land and property acquisition cost is the highest among the alternatives. Furthermore, it does not function effectively with the other major roads in the area as it is located in the easternmost part of the corridor under study.

Route C-1-2, the longest among the alternatives considered, has favorable and unfavorable points. Moreover, its connection with National Road No. 1 is too close to the existing Carmona-Naic Road which would result to an uneven east-west road network.

The Team recommended Route C-2-2 as the best route.