REPUBLIC OF THE PHILIPPINES

FEASIBILITY STUDY REPORT

ON THE RURAL TELECOMMUNICATIONS PROJECT

IN REGIONS III (CENTRAL LUZON)

AND IV (SOUTHERN TAGALOG)

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REPUBLIC OF THE PHILIPPINES

FEASIBILITY STUDY REPORT ON THE RURAL TELECOMMUNICATIONS PROJECT IN REGIONS Ⅲ (CENTRAL LUZON) AND Ⅳ (SOUTHERN TAGALOG)

March, 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to a request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct a survey on the Rural Telecommunication Project, Regions III and IV, and entrusted the survey to the Japan International Cooperation Agency (JICA).

The JICA sent to the Philippines a survey team headed by Mr. Ryoji SASAKI, Special Advisor of International Cooperation Division, Minister's Secretariat, Ministry of Posts and Telecommunications, from October 6 to December 14, 1980.

The team had discussions with the officials concerned of the Government of the Philippines, Bureau of Telecommunications and conducted a field survey in Regions III (Central Luzon) and IV (Southern Tagalog).

After the team returned to Japan, further studies were made and the present report has been prepared.

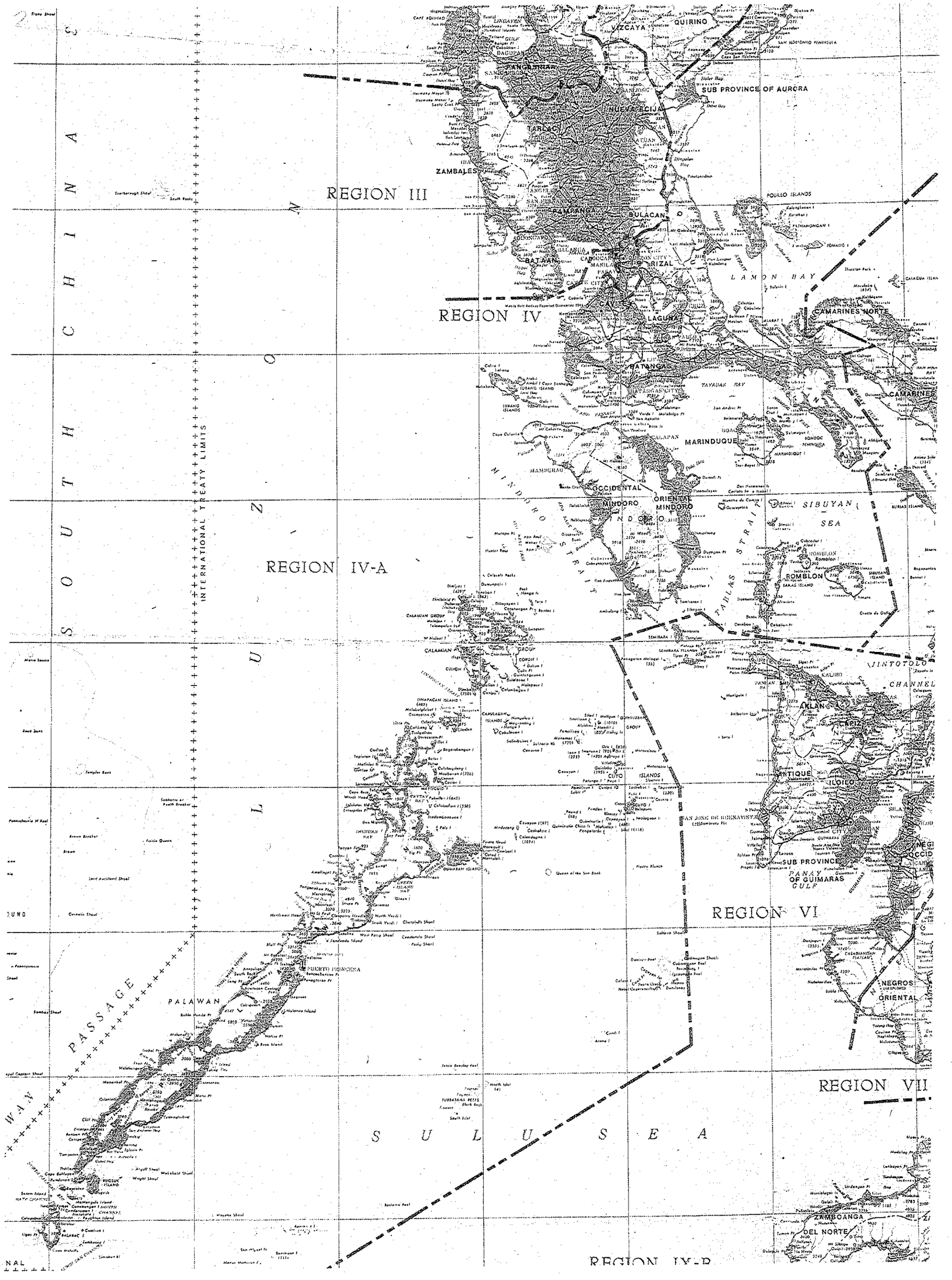
I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between the two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the team.

March 1982

Keisuke Arita sywe76vvv

Keisuke ARITA
President
Japan International Cooperation Agency


SOUTH CHINA SEA
INTERNATIONAL TREATY LIMITS
REGION III
REGION IV
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SULU SEA
MINDORO STRAIT
TABLAS STRAIT
PASSAGE
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SIBUYAN SEA
PANAY GULF
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VIZCAYA
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SUB PROVINCE OF AURORA
NUEVA ECIJA
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ZAMBALES
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POLILLO ISLANDS
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LAGUNA
CAMARINES NORTE
BATANGAS
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MARINDUQUE
MAMBURAO
OCCIDENTAL MINDORO
ORIENTAL MINDORO
ROMBLON
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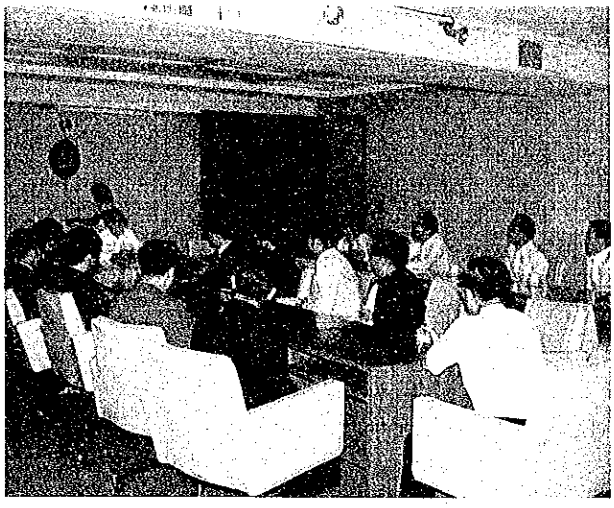
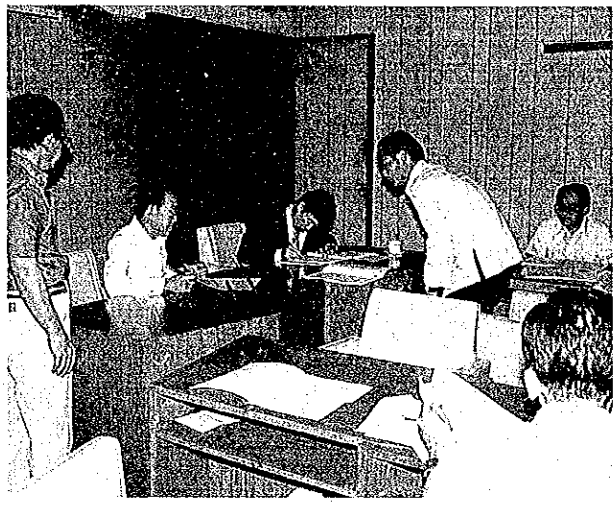


Courtesy call to
Gen. Ceferino S. Carreon,
Director of Bureau of
Telecommunications

1-2



Signing of Implementing
Arrangement

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Interview to Mayor of
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Scenery of Metro Manila

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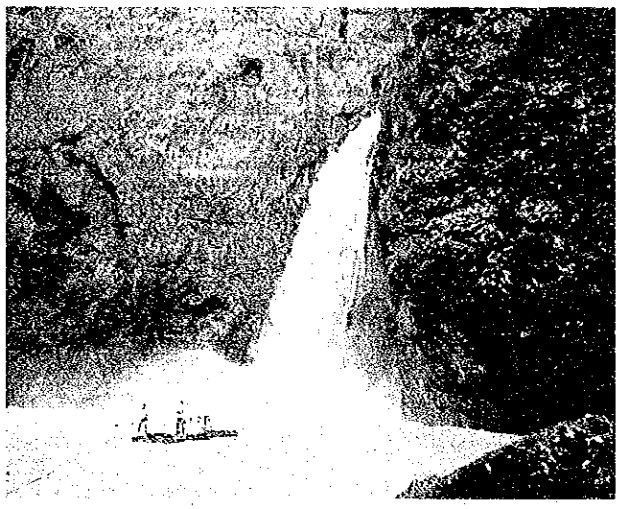

Big fall in Pagsanjan

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Scenery of southern Tagalog
(Aklan Province)

CONTENTS

SUMMARY

1. Introduction

The Government of the Philippines requested the Government of Japan to conduct a feasibility study -- first on the Rural Telecommunications Project including areas of the Northern Part of Luzon or Region I (Ilocos) and Region II (Cagayan) and then on the Rural Telecommunications Project in the Central Part of Luzon or Regions III (Central Luzon) and IV (Southern Tagalog).

The projects is in telecommunication development programs of the ten-year Development Plan (1978 ∿ 1987) formulated by the Government of the Philippines. In the projects areas, Regions I and II (hereinafter referred to as the Northern Luzon Project) has reached the stage of final preparation for tender with organized efforts made by those concerned in the two countries. For Regions III and IV (hereinafter referred to as the Central Luzon Project), a preliminary study team headed by Mr. Koichi ONOE, Special Advisor for International Cooperation, Minister's Secretariat, Ministry of Posts and Telecommunications, was sent to the Philippines for a period of March 19 to April 3, 1980. And after the completion of the preliminary study a feasibility study team, headed by Mr. Ryoji SASAKI, Special Advisor for International Cooperation, Minister's Secretariat, Ministry of Posts and Telecommunications and consisted of 13 specialists,

from the Ministry of Posts and Telecommunications, Nippon Telegraph and Telephone Public Corporation, the Nippon Telecommunications Consulting Co. Ltd. and Japan International Cooperation Agency was dispatched to the Philippines for a period from October 6 to December 14, 1980. The study team visited 108 cities/municipalities in six islands to be within Regions III and IV, prepared the "Interim Report on the Rural Telecommunications Project in Regions III and IV of the Republic of the Philippines" through site survey, and exchanged with the Bureau of Telecommunication (BUTEL) on December 10th, 1980. By accepting views and opinions from the Ministry of Transportation and Communications (hereinafter referred to as MOTC) and other related ministries and bureaus, the study team have prepared this feasibility report through a careful review over several months in Japan.

2. Study Items

The major items having been studied are as follows.

(1) General study items

1) Present status of telecommunications services and facilities in the Philippines

2) Telecommunications development program

3) Organization and management of Bureau of Telecommunication (hereinafter referred to as BUTEL)

(2) Study items concerning this particular project

1) Engineering standards for telecommunication facilities
2) Demand forecast
3) Traffic forecast
4) Circuit estimation
5) System design and amount of works
6) Estimated costs
7) Implementation plan
8) Opration and maintenance
9) Charging rates
10) Economic and overall evaluations

3. Present Status of Telecommunications Services

The total number of telephones used in the Philippines is about 629 thousands and the number of telephones per 100 inhabitants is about 1.3 (as of December, 1979). Most of these telephones are concentrated to large cities: About 454,000 telephones, which correspond to 72% of all telephones in the country, are in Metro Manila (the Capital city) and about 514,000 telephones, 82% of all telephones in the country, are in the five major cities of Metreo Manila, Cebu, Davao, Bacolod, and Iloilo. Regions III and IV to be covered by this project incorporate some considerably developed areas in the neighborhood of Manila but the total number of telephones in the use of these regions is only about 38,000

or about 0.34 telephones per 100 inhabitants. Those cities/municipalities having telephone exchange offices and providing telephone service are only about 25% of all cities/municipalities in these regions.

On the other hand, telegraph service is available in about 2/3 of all cities/municipalities in the Philippines and in almost all cities/municipalities in Regions III and IV and plays an important role as an emergency communication means for people who are behind the boon of telephone service.

The Government of the Philippines is carrying out the Five-Year Development Plan (1978 ∿ 1982). In connection with the plan, the Ten-Year Development Plan (1978 ∿ 1987) is under formulation.

In these plans made by the Government, telecommunications are taken as a great part for stimulating the social, economic development of the country and are aiming realizing its service, in both urban and rural areas. According to the Ten-Year Development Plan, the number of telephones per 100 inhabitants is calculated for increase from 1.29 to 2.18 and for this purpose 361,000 telephones are to be installed by governmental organizations and the same number of telephones by private operating companies.

It is also planned to provide telegraph service in all cities/municipalities.

4. Project Proposed by BUTEL

An outline of the project proposed by BUTEL to

the Government of Japan is as follows.

(1) Number of toll telephone exchanges: 7

(2) Number of local telephone exchanges: 36
(Number of exchanges to be replaced: 9)

(3) Number of Inter-Provincial Toll Stations (IPTSs): 19

(4) Number of telex exchanges: 2

(5) Microwave system to connect Manila - Tagaytay - Mamburao - San Jose - Romblon - Kalibo

(6) UHF and VHF spur routes to connect existing and newly constructed telephone exchanges with trunk routes

For this purpose, a total budget of 437,500,000 pesos is estimated to be raised, of which 35,000,000 dollars is estimated to be raised as the foreign exchange component.

The study team estimates that the foreign exchange component will greatly exceed the initially estimated amount of 35,000,000 dollars.

Accordingly, the study team recommends:

(1) to divide the project into two phases and implement the amount of works corresponding to the foreign exchange component of 37,000,000 dollars in order of urgency in Phase I and

(2) to implement the remaining works of the project

and, at the same time, install IPTS in all citites/ municipalities in Regions III and IV having no plan of introducing telephone service by either governmental organizations or private operating companies in Phase II.

5. Engineering Standards

The following engineering standards are applied for this project.

5-1 Traffic Standards

(1) Total loss probability

The total loss probability shall not exceed the following values.

Toll call:	10.0%
Local call:	4.0%
Special number call:	3.0%

(2) Loss probability standard

1) Loss probability standard to toll call

Loss probability of basic trunk: 0.01 per link

2) Loss probability standard in intra-office connection

Intra-office trunk loss probability: 0.02

(3) Waiting probability in semi-automatic service

Waiting probability of outgoing trunk to operator desk:	0.05
Waiting probability of offering trunk:	0.01

5-2 Transmission Standards

5-2-1 Reference Equivalent Allocation

Tertiary Center (TC) —— Secondary Center (SC): 0 dB

Secondary Center (SC) —— Primary Center (PC): 0 dB

Primary Center (PC) —— Local Exchange (LE)

LE, 2-wire system: 9.5 dB

LE, 4-wire system: 0 dB

LE —— Subscriber

Sending { LE, 2-wire system: 11.5 dB; LE, 4-wire system: 21 dB }

Receiving { LE, 2-wire system: 1.5 dB; LE, 4-wire system: 11 dB }

5-2-2 Noise Allocation

As per 2500 km circuit noise recommendation of CCITT Recommendation G222.

SC —— PC: 2,000 pW

PC —— LE: 2,000 pW

Noise within exchange office: 200 pW

5-2-3 Bit Error Rate of Digital Transmission Line

The bit error rate for the 64 K bits/s hypothetical reference digital path defined in CCIR Recommendation 556 shall not exceed the following values.

(1) 10^{-7} for more than 1% of any month

(2) 10^{-3} for more than 0.05% of any month

5-3 Network Plan

5-3-1 Telephone

Telephone offices in the Philippines are classified into the following four types.

TC

SC

PC or Toll Tandem (TT)

LE or IPTS

5-3-2 Telegraph

Telex exchange offices in the Philippines are classified into the following two types.

National Telex Center (NTC)

Regional Telex Center (RTC)

5-3-3 Charging Plan

Local calls are charged by message rate. Toll calls are charged by a detailed billing system using the originating subscriber No., destination, message duration, etc., recorded by the toll exchange. Each province is used temporarily as a message area.

5-3-4 Numbering Plan

A universal numbering system which consists of a maximum of 8 digits for a national number and a closed number for each local area is employed.

Each area code consists of 1 ~ 4 digits and each subscriber number of 4 ~ 7 digits.

5-3-5 Signaling System

For the signaling system, CCITT Signaling System R-2 is employed in conformity with the Northern Luzon Project.

6. Principles in Facility Planning

The principles introduced in planning this project are as follows.

(1) Digitalization of telecommunication network is a world-wide trend. In this project also, digital electronic switching is employed for exchange equipment and digital transmission for transmission lines.

(2) The design period of equipment is 15 years for basic one in consideration of the ultimate capacity and is five years for addition to new one. The design period of outside plant for local cables is 10 years.

(3) For IPTS, analog electronic switching is employed for switching equipment and analog transmission for transmission lines, in consideration of economy. The maximum capacity of each switching equipment is of 40 subscribers.

(4) Route protection radio systems incorporating one radio working channel plus one protection radio channel are used for the radio systems with capacities not less than of 240 telephone channels per radio channel. Radio systems with a capacity of less than 240 telephone channels per radio channel are of stand-by type.

(5) A stand-by engine generator is installed at all offices/stations. The battery capacity is of 4 hours except for radio repeater stations to be constructed atop mountains/hills and IPTS. Each battery capacity of these radio repeater stations and IPTSs is 8 hours.

7. Demand Forecast

7-1 Telephone

The forecast is conducted for all cities/municipalities in Regions III and IV, using each city/municipality as a unit and by five year intervals for twenty years from the year of start of the service under this project (1986).
The forecast is conducted by way to estimate the basic demand as of 1981 at first and then multiply this figure by the magnifying ratio upto the time of forecast.
In consideration of the state of repletion of telephones and the poor state of service under the present situation of the base rate area and the toll call connection, we use a level approximately double the number of existing telephones

for the basic demand.

The demand growth rate from the basic time to the forecast time is estimated by multiplying the magnifying ratio of the telephone demand determined from the eleasticity model (elasticity value 1.4) for the per-capita GNP increase by the population increase rate for each city/municipality.

7-2 Telegraph

The number of telex subscribers and that of gentex stations in years ranging to 2001 have been estimated respectively on the basis of the number of establishments such as manufactures and financial business firms in individual cities/municipalities and those of existing telegraph offices, in consideration of annual population increase and the degree of development in individual areas.

8. Telephone Installation Plan

In consideration of installation balancing, about 1800 or 1900 telephones are installed annually in the period of 1986 to 1991. Table IV-1-2 shows the telephone installation plan for this project.

In this case, the ratios of the number of installed main station to the number of demand are 46.5% in 1991 in Phase I and 23.3% in 1994 in Phase II.

9. Traffic Forecast

9-1 Telephone

Traffic forecast has been made in consideration of the features of individual areas,

Table IV-1-2 Telephone Installation Plan

Phase \ Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	Total
Phase I	1,840	1,840	1,840	890	890	910	-	-	-	8,210
Phase II	-	-	-	1,030	1,030	1,010	860	790	790	5,510
Total	1,840	1,840	1,840	1,920	1,920	1,920	860	790	790	13,720

relationship between cities/municipalities, the situations in various countries (by CCITT data), the past and present traffic conditions experienced in Japan, etc. Traffic forecast has been made for 1991, 1994, and 2001 in compliance with the design periods.

9-2 Telegraph

Traffic forecast of telex subscribers has been made from the busy-hour traffic volume of telex subscribers (0.08 erlang), the average holding time of one telex message (100 seconds), and the estimated number of telex subscribers obtained through demand forecast. For gentex stations, traffic forecast has been made up to 2001 in consideration of the amount of telegrams having been handled by BUTEL and by private operating companies, annual population increase, and telephone density.

10. Circuit Estimation

10-1 Telephone

The loss probability of each route is 0.01. A high-usage circuit is established between toll switches (TSs) with a traffic exceeding a given value (in principle, 10 erlang in total for incoming and outgoing), and overflow traffic is to be transferred to an alternative route.

10-2 Telegraph

Telex trunk line estimation is made for a loss probability of 0.01, and the number of trunk lines demanded until the year 2001 has been obtained.

11. System Design and Amount of Works

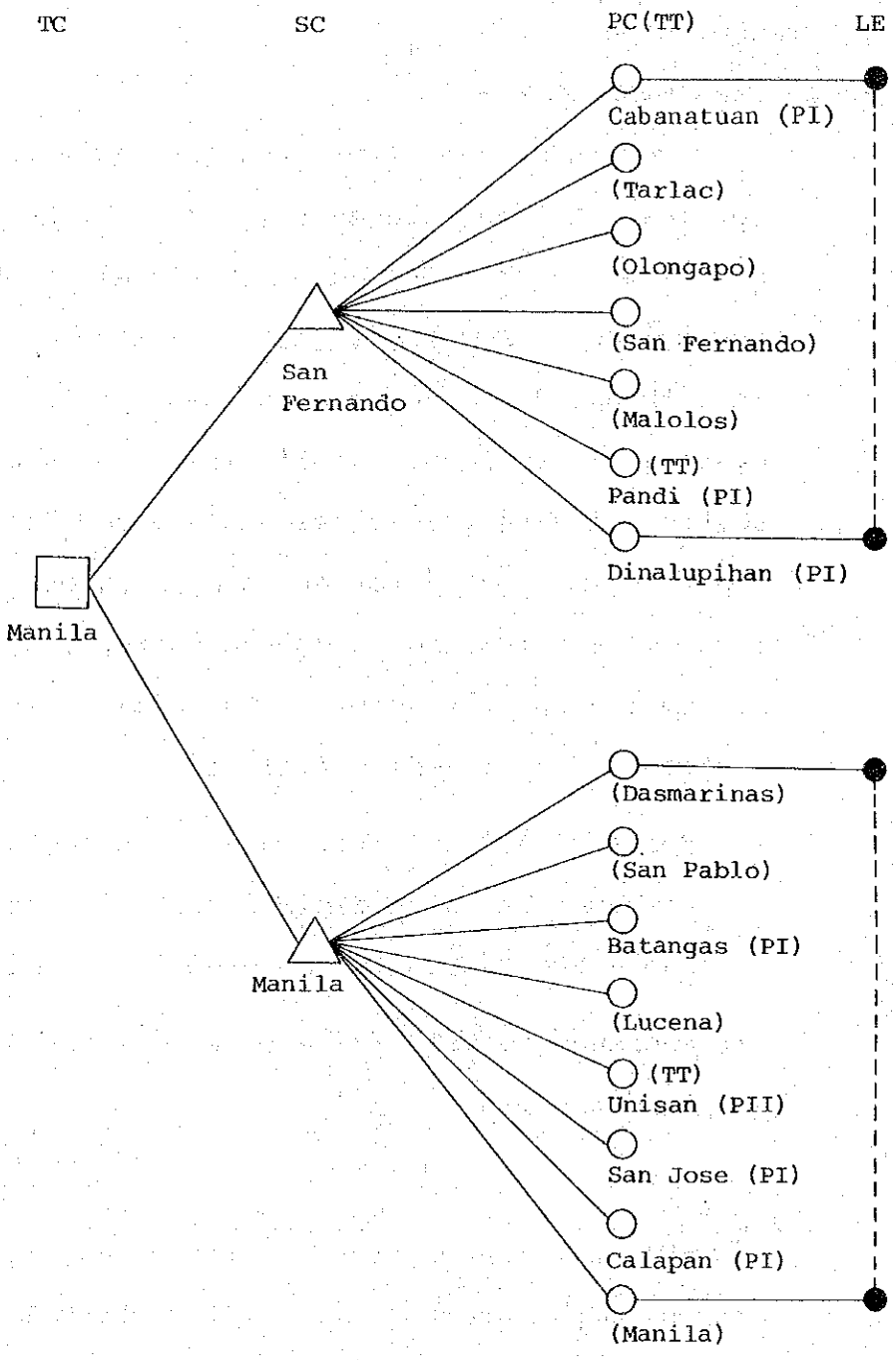
11-1 Switching

The switching equipments are installed by the following schedule.

In Phase I the network foundation is constructed by installing toll switching equipment and local switching equipment. In Phase II IPTS is installed in cities/municipalities having no telephone so as to spread telephone service.

Phase / Type of Switch	Phase I	Phase II	Total
TS (including TS and LE)	6	1	7
LE	28	4	32
IPTS	10	103	113

Fig. II-3-1-1 shows the telephone network plan proposed for this project.



Legend

PI: Phase I

PII: Phase II

( ): To be installed by Private Operating Company

Fig. II-3-1-1 Telephone Network Plan

11-2 Transmission

11-2-1 Transmission Plan

For such radio links that are expected to have not less than 500 channels in the year 2001 or that are expected to relay color TV signal, a SHF system is employed. For links that are expected to have less than 500 channels in the same year, UHF or VHF systems are employed in principle. However, for sections having transmission distances of less than about 10 km (mostly for entrance between radio repeater station and telephone office), cable systems are employed in principle. The application of cable system is determined as follows.

(1) For entrance to a telephone exchange office to be furnished with digital switching equipment, cable PCM system is employed in principle.

(2) Entrance to IPTS is made by toll cable system in principle.

Fig. VII-2-2-1 shows the SHF route plan for the Central Luzon and Fig. VIII-2-2-3 the UHF/VHF route plan for the Central Luzon.

11-2-2 Radio

(1) SHF system

A transmission system with a maximum

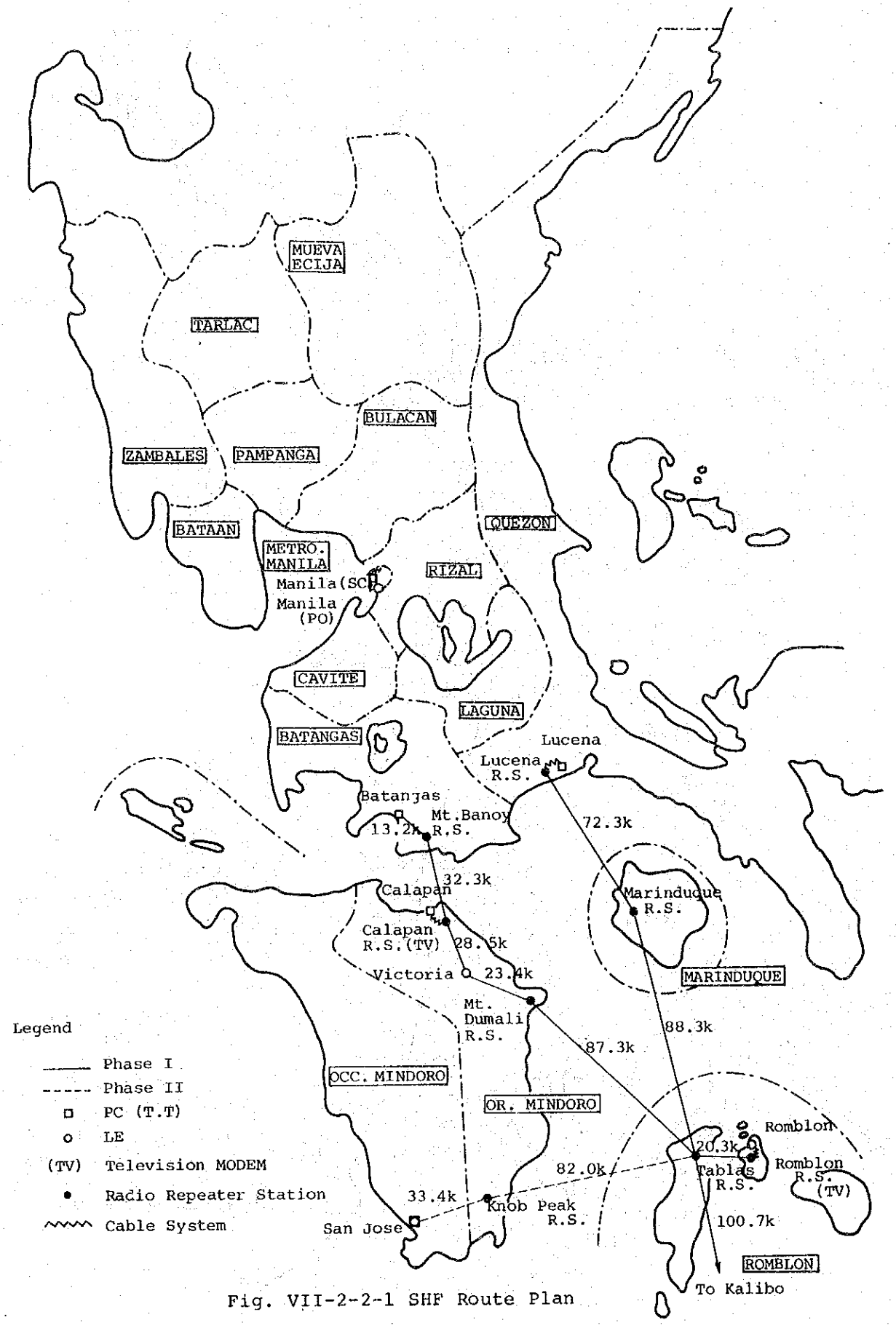


Fig. VII-2-2-1 SHF Route Plan

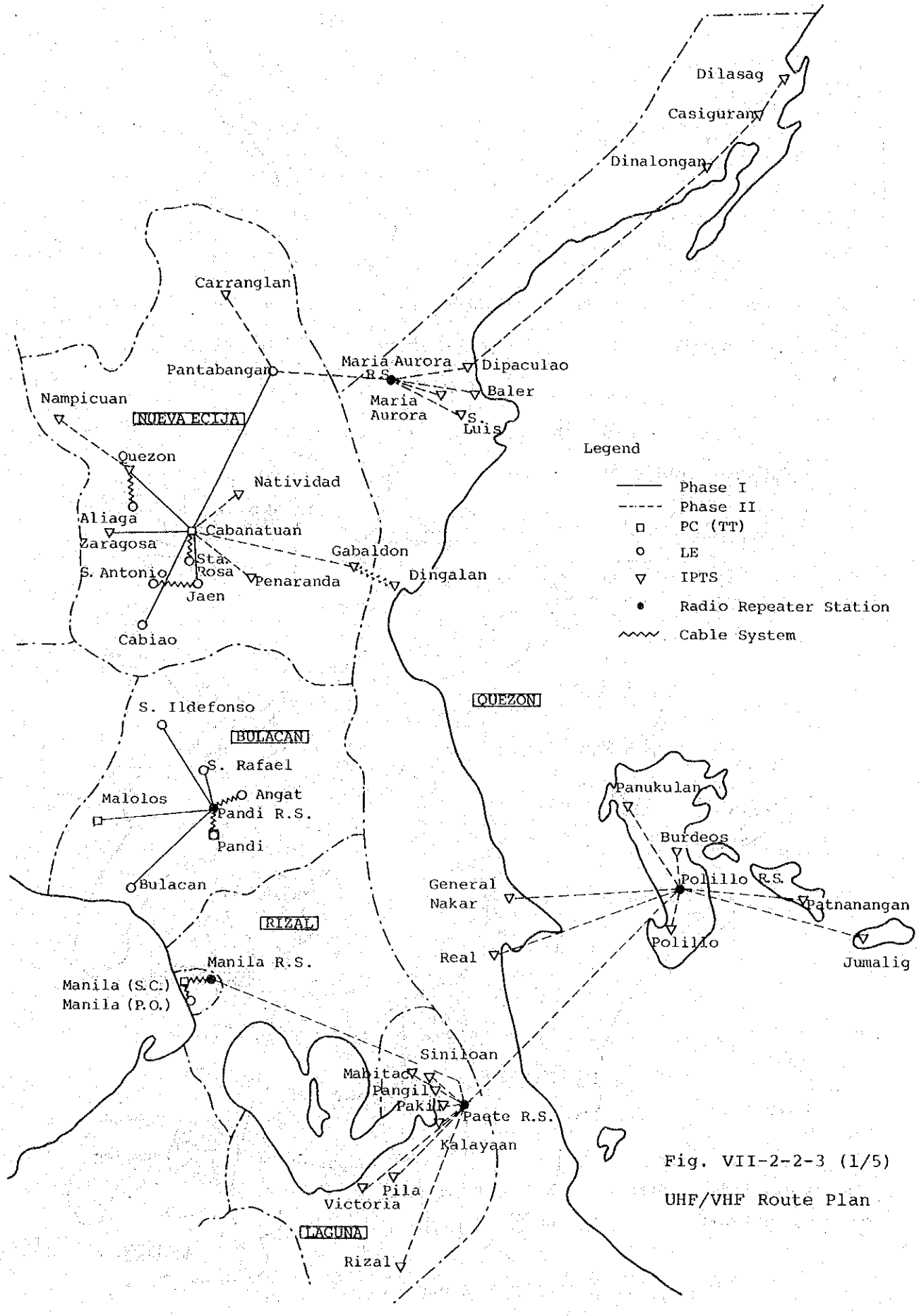


Fig. VII-2-2-3 (1/5)

UHF/VHF Route Plan

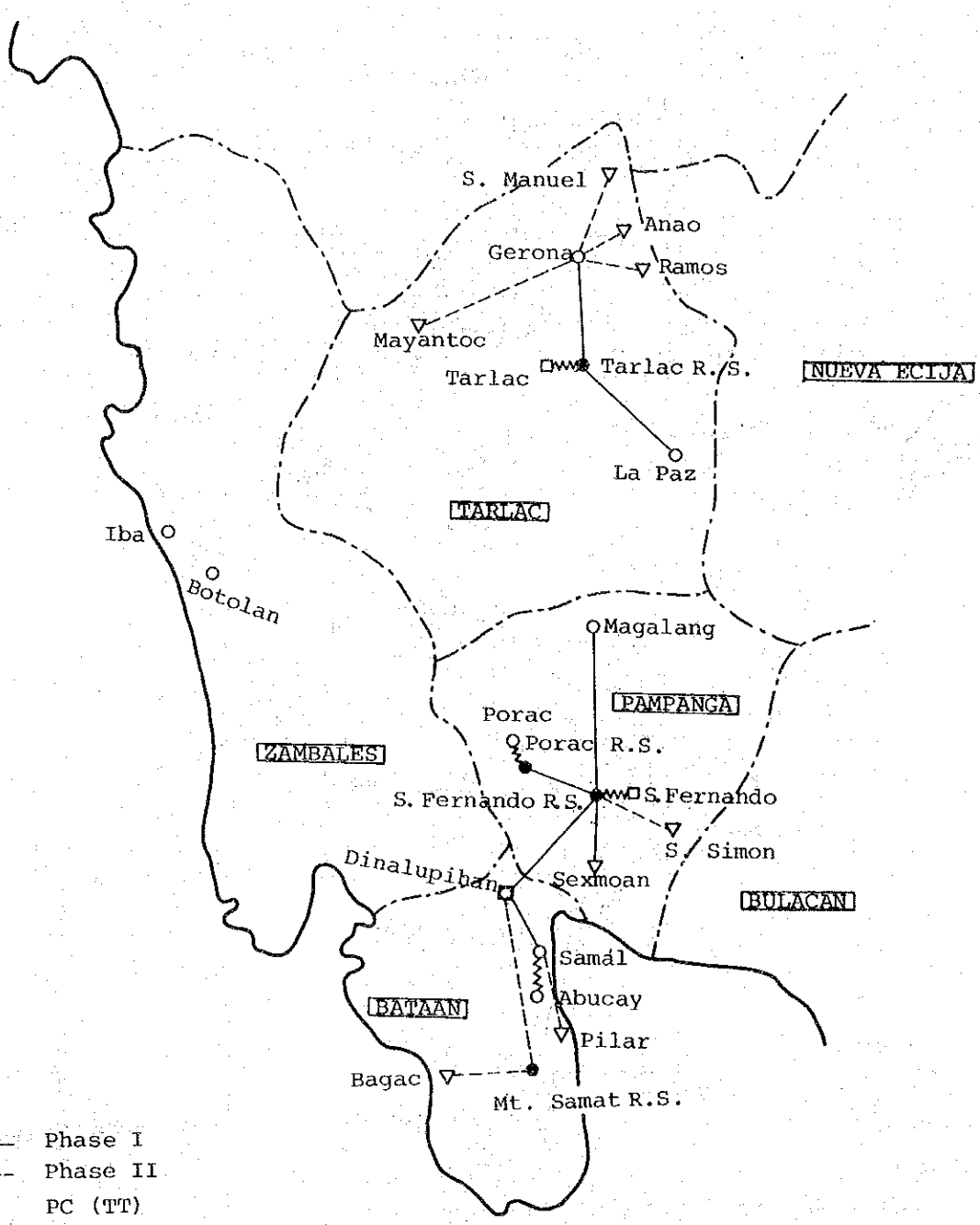


Fig. VII-2-2-3 (2/5) UHF/VHF Route Plan

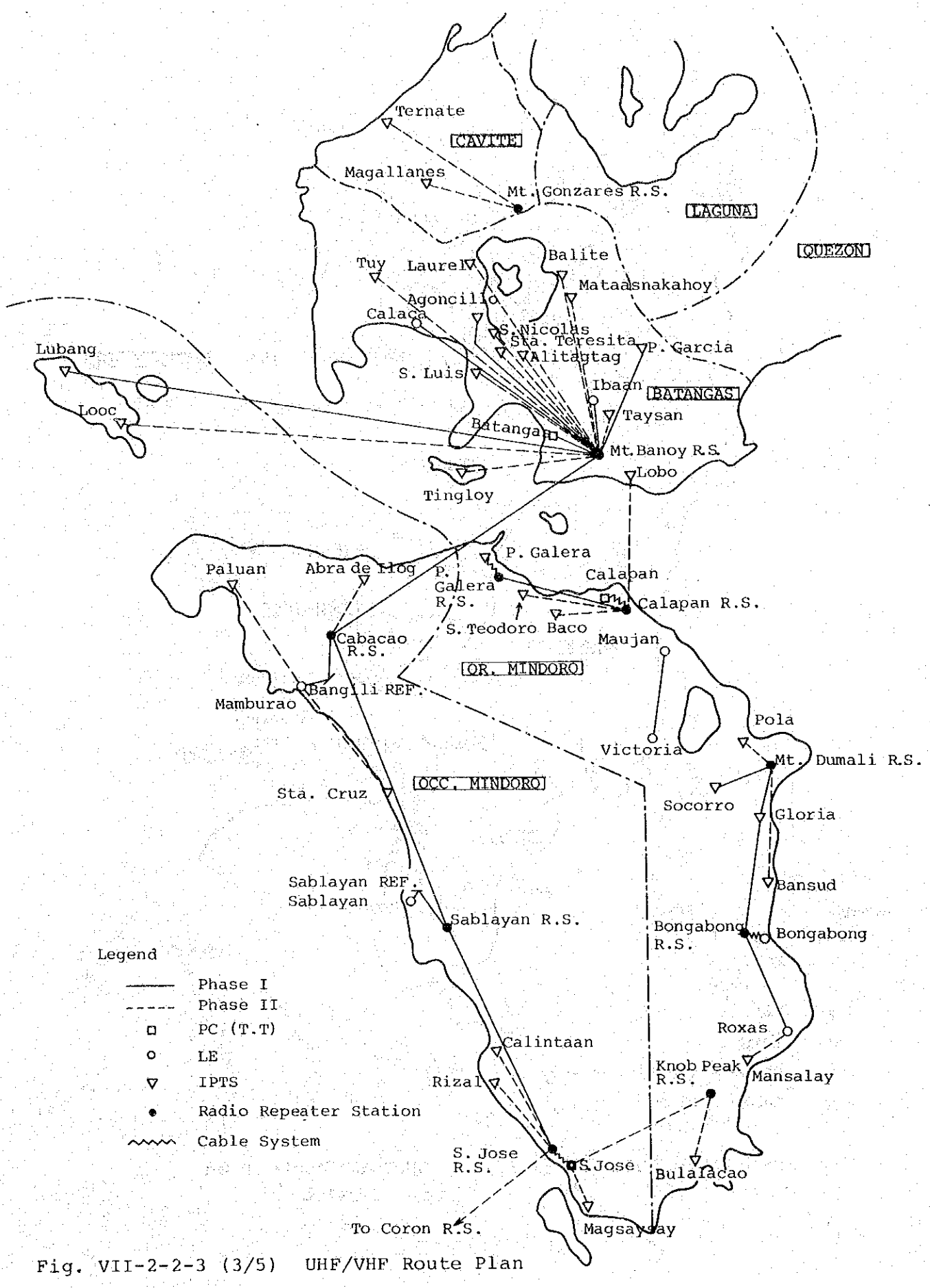


Fig. VII-2-2-3 (3/5) UHF/VHF Route Plan

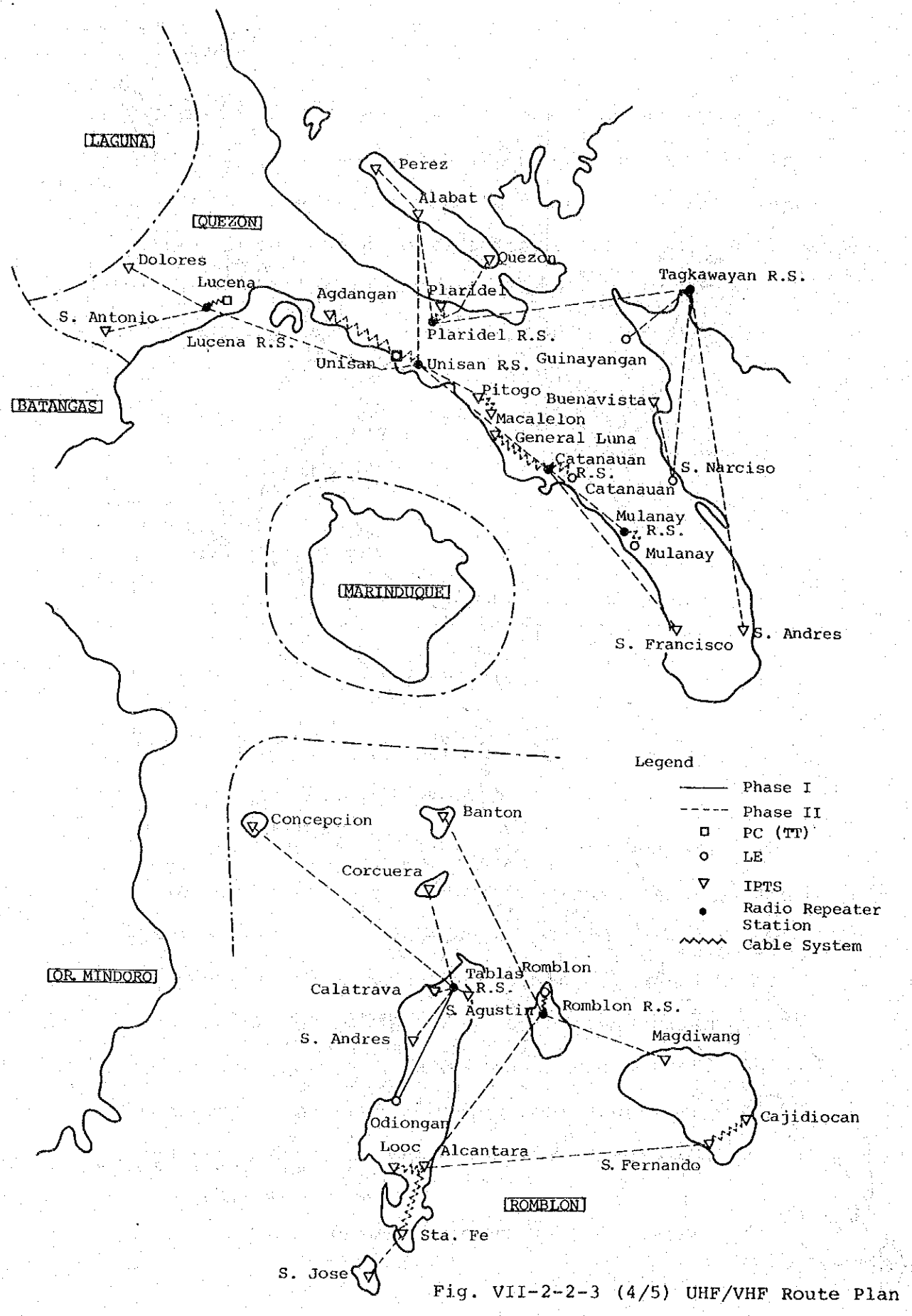


Fig. VII-2-2-3 (4/5) UHF/VHF Route Plan

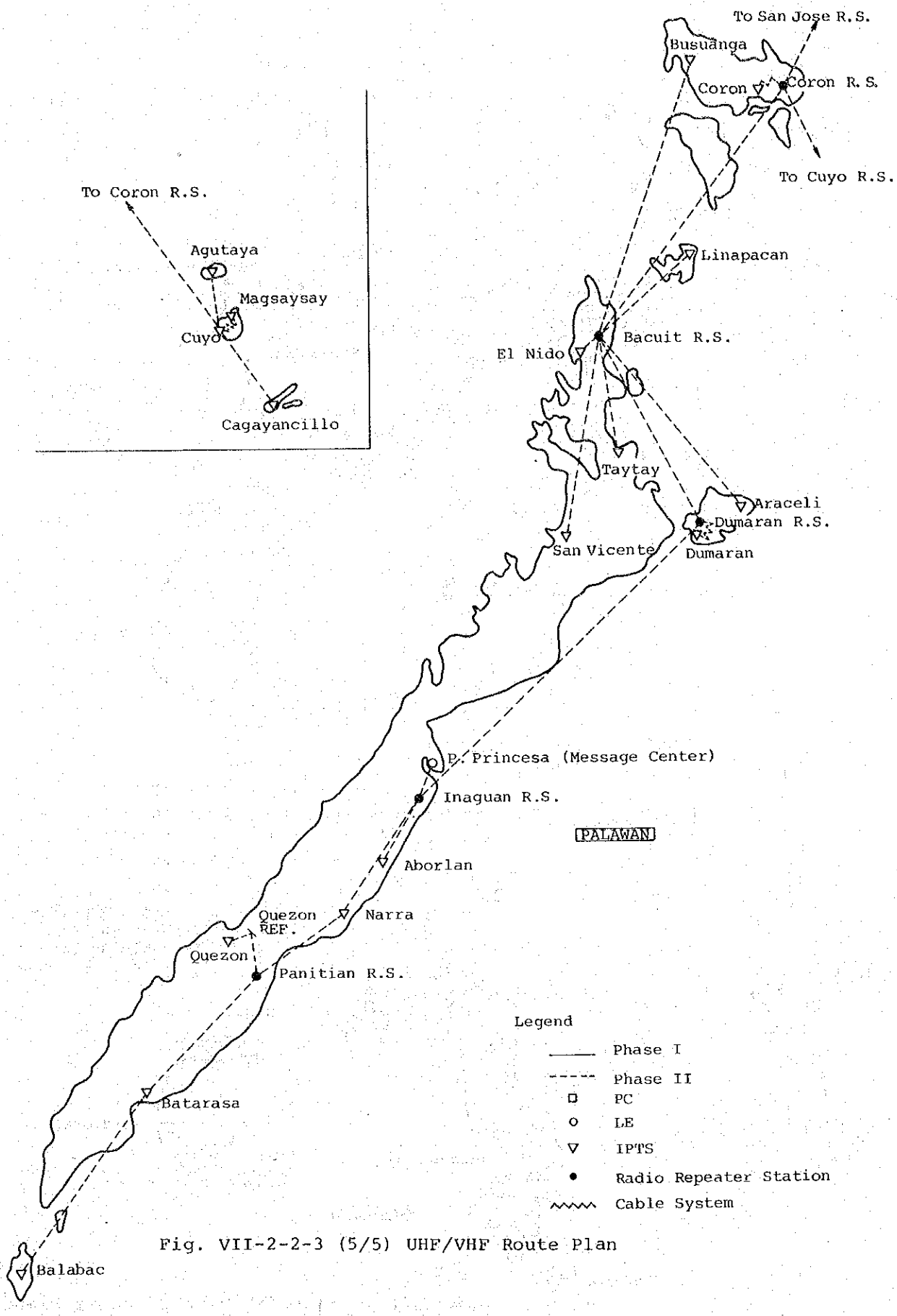


Fig. VII-2-2-3 (5/5) UHF/VHF Route Plan

capacity of 960 channels is installed by using the SHF frequency band for radio links expected to have the ultimate capacity of more than 500 telephone channels, sections between primary centers, and sections expected to send a color TV signal. The color TV signal is transmitted on a protection channel which is not used in normal operating condition.

The expected amounts of works to be implemented in the respective phases are as follows.

	Number of Spans	Total Length (km)
Phase I	9	466.3
Phase II	2	115.4

(2) UHF and VHF systems

For other radio links than those which are expected to apply SHF system to, radio systems with maximum transmission capacity of 240 channels to 24 channels are installed by using frequencies in the UHF or VHF bands. For radio links of which the terminal is an IPTS, a 6-channel radio system is employed. The number of sections constructed by UHF and VHF systems in the respective phases are as follows.

	Number of Spans
Phase I	34
Phase II	110

11-2-3 Multiplex Equipment

Multiplex equipment, PCM/FDM translating equipment (transmultiplexer), etc., are adopted depending on the transmission system to be employed and the number of channels to be transmitted in the section.

	Phase I	Phase II	Total
Multiplex Equipment	Corresponds to about 1300 channels	Corresponds to about 750 channels	Corresponds to about 2050 channels

11-3 Telegraph

Telex exchanges, telex concentrators, telex subscriber equipment, and gentex station equipment are constructed on the basis of engineering standards and principles in facility planning.

Types of Telex center/station	Phase I	Phase II	Total
Telex exchange	2 (112 lines)	(Capacity expansion: 435 lines)	2 (547 lines)
Telex concentrator	9	5	14
Telex and gentex equipment	38	84	122

Fig. SUM-11-1 shows the telegraph network plan of this project.

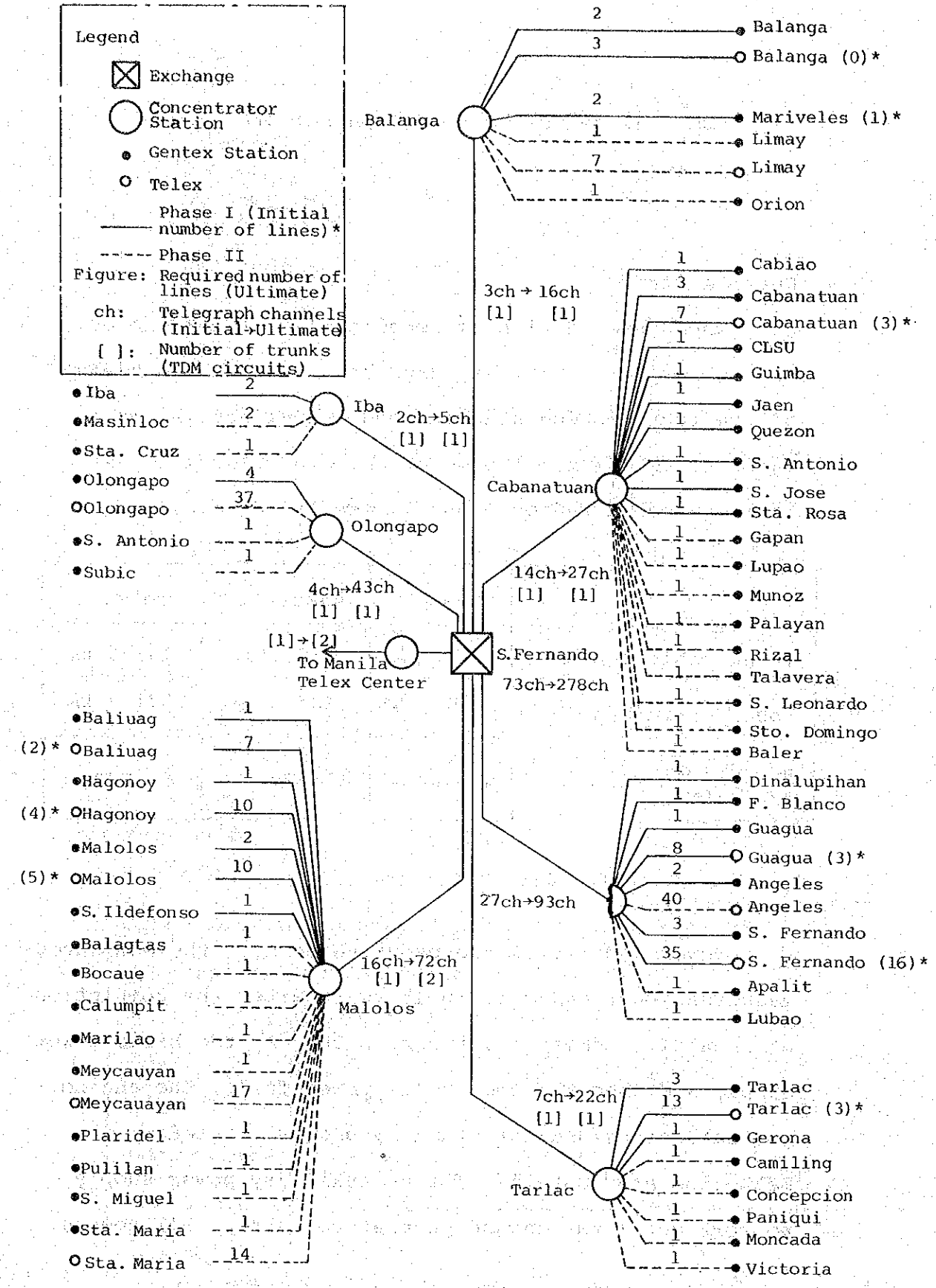
11-4 Outside Plants

The system design of local cables, trunk cables, and subscriber's facility has been made on the basis of the transmission standard and the principles in facility planning. The major amounts of work to be implemented in Phases I and II are as follows.

Item	Phase I	Phase II	Total
Trunk cable length	78.2 km	113.5 km	191.7 km
Local cable length	238 km	133 km	371 km
Subscriber's facility	8,210	5,510	13,720

11-5 Power Plants

Power facilities are provided to meet the estimated required power capacity in 15 years after the completion of Phase I. Commercial power is used as the basic power supply and when the commercial power fails, the engine generator provided for stand-by use is started. Batteries are installed for an auxiliary power supply to work until the engine generator starts. All powers



* Ultimate capacity is to be different from initial capacity.

Fig. SUM-11-1 (1/2) Telegraph Network Plan

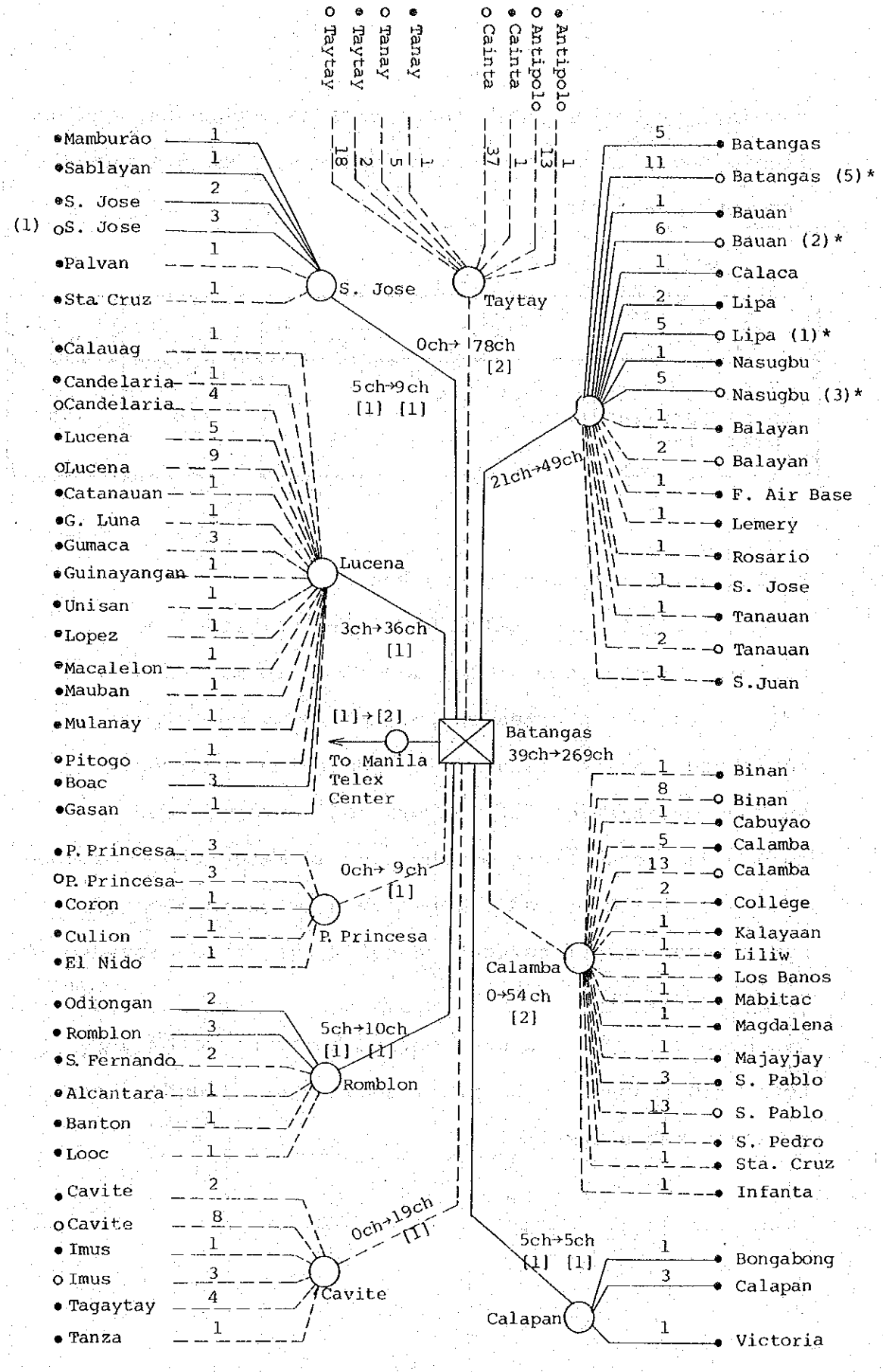


Fig. SUM-11-1 (2/2) Telegraph Network Plan

required by various such facilities as exchanges, radios, lines, etc., installed at one office/station are supplied from one power plant.

	Phase I	Phase II	Total
Number of offices/stations to be furnished with power plant	67	128	195

11-6 Buildings, Towers and Access Roads

Office/station buildings are to comprise the equipment room, power room, and store room. When the office/station is attended, office room, conference room, and service yeard will be added as required.
In consideration of the network configuration and maintenance conditions of the area in which the telephone exchange office or radio repeater station is located, seven types of office/station buildings are employed properly selected.
The number of offices/stations to be constructed and total floor space to be provided in Phase I and II are given in Table Sum-11-1.

Table Sum-11-1 Number of Offices/Stations and Total Floor Space

Type of Office/Sation	Phase I		Phase II	
	Number of Offices/Stations	Total Floor Space (m^2)	Number of Offices/Stations	Total Floor Space (m^2)
Telephone Office + Radio Repeater Station	17	4,056	2	480
Telephone Office	10	1,896	3	672
IPTS + Radio Repeater Station	9	945	76	7,227
IPTS	1	63	27	1,701
Radio Repeater Station	15	1,116	15	900
Telephone Office + Radio Repeater Station + Telex Exchange	1	288	-	-
Radio Repeater Station + Telex Exchange	1	252	-	-
Total	54	8,616	123	11,295

Three types of steel towers are employed:
Selfsupporting tower, guyed tower, and steel pole.
The number of each type of steel tower to be employed in this project is given below.

Type of Steel Tower	Phase I	Phase II
Selfsupporting tower	29 sets	24 sets
Guyed tower	13 sets	6 sets
Steel pole	6 sets	81 sets

For roads, the following access roads to radio repeater stations to be constructed atop mountains/hills are constructed in this project.

Item	Number of Stations	Access Road Length
Phase I	9	32.5 km
Phase II	15	55.7 km

11-7 Connection with Private Operating Companies

Although BUTEL is expected to provide facilities necessary for direct distance dialing (hereinafter referred to as DDD) calls not only between BUTEL offices but between a BUTEL office and a private operating company's office as seen in Manila, the transmission line between

the TS and LE offices is constructed by the organization franchising the LE office.

12. Cost Estimation

12-1 Terms/Conditions of Estimation

Required costs have been estimated on condition that the project is implemented by the turn-key basis and consultants are employed.

12-2 Estimated Costs

The estimated costs for individual types of communication equipment are given in Table VIII-3-1 and the total of the estimated costs for Phase I and that for Phase II are as follows.

Phase	Foreign Exchange Component (Million Yen)	Local Currency Component (Million Pesos)
Phase I	7,222	102.7
Phase II	8,731	137.0

Table VIII-3-1 Construction Costs

	Item	Phase I		Phase II	
		Foreign currency (million yen)	Local currency (million pesos)	Foreign currency (million yen)	Local currency (million pesos)
A	Exchange	1,617 (1)*	4.6	907 (8)*	2.2
B	Radio and transmission	2,270 (32)	10.0	3,000 (75)	13.4
C	Telegraph	323 (41)	1.7	292 (45)	1.6
D	Local cable and subscriber facilities	440 (275)	24.6	465 (219)	19.2
E	Power plant	941 (23)	1.9	1,333 (65)	4.5
F	Buildings, access roads, towers, etc.	505 (450)	28.6	618 (570)	19.9
G	Others	——	4.1	——	9.2
H	Sub-total	6,096 (822)	75.5	6,615 (982)	70.0
I	Consultant fee	460	3.7	443	3.6
J	Sub-total	6,556 (822)	79.2	7,058 (982)	73.6
K	Contingency (including price rise)	666	23.5	1,673	63.4
L	Grand total	7,222 (822)	102.7	8,731 (982)	137.0

( ) shows the foreign currency requiring portions of the products and services supplied in the Philippines.

13. Implementation Plan

13-1 Implementation Systems

The project is implemented over a wide area of Regions III and IV by using such up-to-date technical methods as digital electronic switching and digital transmission and in association with overseas companies and other operating companies than BUTEL. The following items should be considered upon project implementation.

(1) The implementation headquarters of the Northern Luzon Part is expanded in function to control the Central Luzon Part.

(2) The study team suggests that the foreign fund currency of this project can be conducted on the turn-key basis in consideration of the present situation of BUTEL. In this case it is desirable that a great number of personnel participates in the implementation of the project to improve their ability to carry out the field work.

(3) It is recommendable to request, when necessary, a consulting company in order to make detailed design, preparation of specifications, examination of tenders, supervising in installation work, tests and inspections, etc. In this case, it is desirable that some works are accomplished under the direct management of BUTEL.

13-2 Installation Schedule

The installation schedule is as shown in Fig. IX-2-1. In Phase I, detailed design is finished in 1982, tendering business in 1983, the manufacture of equipment in 1984, and the completion of the project in 1985 ∿ 1986 so as to inaugurate the service in May 1986.

For civil works, it is important for the Government of the Philippines to appropriate the required budget for procuring sites and the construction of office/station buildings and access roads for telecommunication installation work.

For Phase II, the service is expected to inaugurate in 1989 or 1990, elapsed about three years after the completion of Phase I.

14. Maintenance and Operation

In order to operate smoothly the telegraph and telephone facilities to be introduced by this project and maintain them with high performance, it is necessary to perform smooth and effective maintenance and operation with higher technical level than that in conventional systems.

Accordingly, it is recommendable that regional offices, which are expected to provide the field organizations with guidance and assistance, have sections

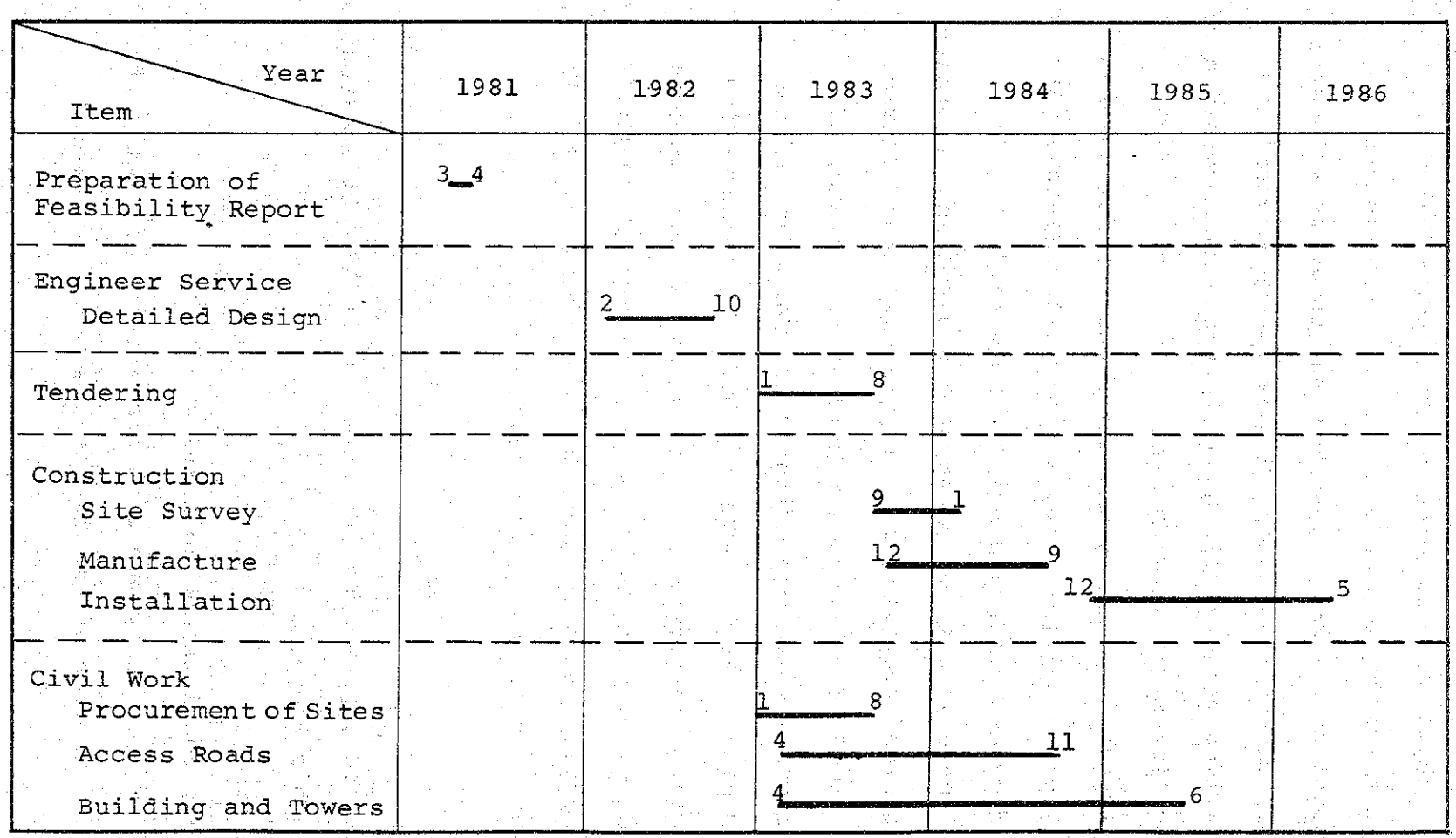


Fig. IX-2-1 Project Implementation Schedule

in charge of such works as exchange, outside plant, radio, and telegraph. For maintenance and operation in the field, maintenance areas are set in the respective fields and maintenance centers are provided for controlling maintenance and operation of facilities within each area.

In Phase I, about 40 engineers and a total of about 680 personnel including assistant engineers, operators and management personnel are required.

In Phase II a total of about 600 personnel including technical and nontechnical personnel are required.

In order to secure these personnel, training of personnel will be inevitable and for this purpose training to be performed at the Telecommunication Training Institute (TTI) to be established in 1981 and training through installation work may be considered. Necessary training plans have been made for the latter type of training in this project.

15. Service Improvements Expected to be Made by Implementation of This Project

15-1 Phase I

(1) Local telephone service

Telephone exchange offices are set up to provide automatic local service in a total

of 22 cities/municipalities in Luzon Is., Mindoro Is., Tablas Is., Romblon Is., Lubang Is., in Regions III and IV where no telephone service has been available. In nine cities/municipalities the existing automatic and manual exchange equipment which have deteriorated in function and do not have sufficient capacities today are replaced with new automatic exchange equipment with sufficient capacity. As a result new or improved local telephone service is offered in a total of 31 cities/ municipalities.

IPTS is installed in ten cities/municipalities. Each IPTS, which can cover 40 subscribers in the neighborhood of the IPTS, will provide automatic local telephone service. The total number of telephones to be installed by 1991 is estimated to be about 10,250 sets (8,200 subscribers), provided that each IPTS is provided with the maximum capacity and each LE is to meet all demands.

(2) Toll telephone service

By setting up six PC/TT offices and 31 LE offices and constructing SHF, UHF and VHF systems for connecting these offices, DDD service among BUTEL offices and the following toll telephone services are established.

1) By constructing a transmission line between a private exchange office and a BUTEL exchange office to be set up in this project, automatic or

Semi-automatic service is provided between these telephone offices.

2) Private exchange offices are connected to the national telephone network through BUTEL offices or transmission lines to be constructed in this project. Sufficient TS and transmission capacity for handling calls to/from private exchange offices are provided.

3) By connecting BUTEL offices to be set up in this project with private exchange offices or transmission lines with sufficient capacities, toll service to/from the national telephone network can be opened.

4) DDD service is available with telephone exchange offices to be set up by the Northern Luzon Project through TC in Manila.

5) Semi-automatic service is available at all IPTSs to be set up in this project.

(3) Telegraph service

Telex exchange offices are installed in San Fernando and Batangas and 26 concentrators and 107 sets of gentex/telex station/subscriber equipment are installed in Regions III and IV. Then, by setting up circuits between the telex exchanges and gentex stations, the handling of approximately 45% of all telegram messages (which corresponds

to 20% of BUTEL telegram offices) is changed from manual operation by using Morse telecommunication to automatic processing by using electronic switching system and, at the same time, all telex subscribers can be accommodated to telex exchanges as desired.
By the connection of gentex station equipment to the telex exchange, delay and errors in telegram handling due to relaying will be improved extremely. This means that accurate and rapid telegraph service will be given to major cities/municipalities in Regions III and IV.

15-2 Phase II

(1) Local telephone service

In addition to service provided by Phase I, local telephone service by this project is introduced to Quezon and Palawan Provinces. Four LEs are installed in these provinces and IPTS is installed in 103 cities/municipalities where there has been no telephone service planned by either governmental organizations or private operating companies in Regions III and IV.
By addition of plans to be implemented by private operating companies, telephone service is available in all cities/municipalities in Regions III and IV. The total number of telephones to be

installed by 1994 in Phase II in this project is estimated to be about 6,900 sets (5,500 subscribers). For meeting all demands by the ultimate year 2001, the estimated number of telephones to be installed in Phases I and II in this project is about 30,000 sets (24,400 subscribers).

(2) Toll telephone service

In Phase II, TT is set up at Unisan and DDD service is introduced to the southern area of Quezon. In addition, IPTS is installed in 105 remote cities/ municipalities such as Quezon and Palawan to provide semi-automatic service. By this, toll telephone service is available in all cities/municipalities in Regions III and IV.

(3) Telegraph service

In addition to the equipment installation to be made in Phase I, 20 concentrators and 143 sets of gentex station and telex subscriber equipments are installed so as to handle approximately 89 % of telegram communication (58% of BUTEL telegram offices) by electronic switching system and, at the same time, as many telex subscribers as desired can be connected to the telex exchanges in Regions III and IV by the implementation of Phase I and II.

16. Revenue and Expenditure of BUTEL

The BUTEL runs an annual deficit of about 60,000,000 pesos and its rate of revenue and expenditure as of 1979 is about 700%.

For the revenue, incoming from both telegraph and telephone are decreasing and that achieved in 1979 was only 57% of the expected amount. This is due to the frequent occurrence of troubles and incompleteness of projects, etc.

For the expenditure of BUTEL, personnel expenses are increasing year after year and covers 3/4 of the total expenditure. The productivity which indicates the efficiency of personnel resources seems to be lowering lately and in 1979 it is 1,350 pesos per personnel. The telegraph and telephone revenue of BUTEL in 1979 was 10,790,000 pesos and the expenditure in the year was 75,400,000 pesos

17. Charging System

17-1 Current Charging System of BUTEL

The rate of ordinary telegram is 3.80 pesos per 10 words and 0.35 pesos for each additional one word. Urgent telegram is rated twice as high as the ordinary telegram rate.

Telephone charges are:

Rental	For residential telephone:	41 pesos/month
	For business telephone:	54 pesos/month

Connection charge	20 pesos
Deposit	140 pesos + Rental for 2 months

Local call charge is included in the rental equipment and does not vary with the number of local calls made in the month. Toll calls are charged by the 2 minutes - 1 minute system and toll calls made during the nighttime or on holidays are discounted. Charges of private operating companies are considerably high in both equipment installation charge and rental when compared with BUTEL's charge.

17-2 Charging System of This Project

The telephone charging system of this project is as follows.

(1) Local calls

A message rate system of 0.40 pesos per call (rate) is adopted.

(2) Toll calls

A detailed billing system based on the time differences for separate distances is adopted and the rate is 0.40 pesos per following durations.

Intra-provincial call:	30 seconds
Inter-provintial call:	as detailed hereunder

Distance	Unit Duration
Less than 80 km	20 seconds
80 km ~ 150 km	12 seconds
150 km ~ 250 km	8 seconds
250 km ~ 450 km	6 seconds
450 km ~ 750 km	4.5 seconds
More than 750 km	4 seconds

18. Economic Evaluation

18-1 Financial Analysis

It has been calculated through the estimation of the revenue and expenditure of this project from the standpoint of a service organization.
The discount rate based on the method of rate of profit of Phase I and that of the entire project are as follows, achieving a considerable profitability.

Phase I : 7.26 %
Entire project: 6.89 %

18-2 Economic Analysis

The estimated effects of this project have been analyzed from the nationwide standpoint on the

basis of the estimated revenue and expenditure obtained through financial analysis and in consideration of benefits such as network effects. The estimated IPR in phase I and entire project which may properly represent these effects of the project is 12.53% and 11.75% respectively.

This means that the project can be determined to be highly profitable and influential in providing social and economic effects.

In addition, the implementation of this project is expected to bring about the following indirect effects.

(1) Development in administrative efficiency and enhancement of timely administration (effective also for the establishment of protection against disasters and calamities).

(2) Progress of regional industries and regional development

(3) Contribution to tourism and tourist industry

(4) Development in living environment in rural areas

(5) Development of reliability of telecommunication and spread of demands for telecommunication

19. Conclusion and Recommendations

19-1 Conclusion

Through careful study of the Rural Telecommunications Project in Regions III and IV from both technical

and economic standpoints, the feasibility study team has concluded that this project is feasible in condition, as noted in the following recommendations.

19-2 Recommendations

(1) In such provinces as Tarlac and Pampanga, incoming and outgoing calls at BUTEL's LE will be connected to the national telephone network through private operating companies' TS or transmission line.
The number of toll circuits to be set up between Manila TC and local TSs in only phase I will amount to about 500. Private operating companies' facilities to be connected with the BUTEL facilities of this project should be arranged to meet DDD service requirements required for BUTEL before the commencement of the service.
For this purpose, arrangement should be made by both BUTEL and private operating companies in how to connect each facility, charging, etc.

(2) Reservation of radio frequencies

In this project the 6 GHz, 2 GHz, 800 MHz, 400 MHz, and 250 MHz frequency bands are used and it is necessary that BUTEL be granted the permission for the use of these frequency bands by the applicable governmental organization in the Philippines.

(3) Implementation of works corresponding to local currency

The procurement of sites for each facility of the project should be determined prior to commencing works to be implemented by the local currenty component. The Government of the Philippines should appropriate a necessary budget for the construction of office/station buildings, access roads, etc., which are essential for the installation of telecommunication equipment, by the local currency component and should complete these construction works on schedule.

(4) Reservation of personnel

Since such latest equipment as digital electronic switching equipment and digital transmission equipment and so many IPTS and gentex station equipment, etc., are introduced in this project, a number of skilled personnel in handling and operating these equipment will be necessary for the installation, maintenance and operation of these equipment. The training of the personnel to be engaged in equipment installation, maintenance and operation are required by contract between the Philippines and Japan and by training programs to be provided by TTI.

BUTEL is required to provide as many such personnel as having high technical levels for these purposes by assigning personnel from other sections or newly employing personnel for the project.

(5) Provision of coordinators

At present a coordinator team is set at the headquarters of the Northern Luzon Project for implementation. This project is not only range to wide areas on the map but also be related to many technical fields. It is also associated with non-BUTEL operating companies and overseas companies.

In order to maintain the smooth enhancement of work of the headquarters for implementation and progress, the project as scheduled, it is necessary to continue and extend the current coordinator scheme as well as to be assisted by the Government of Japan.