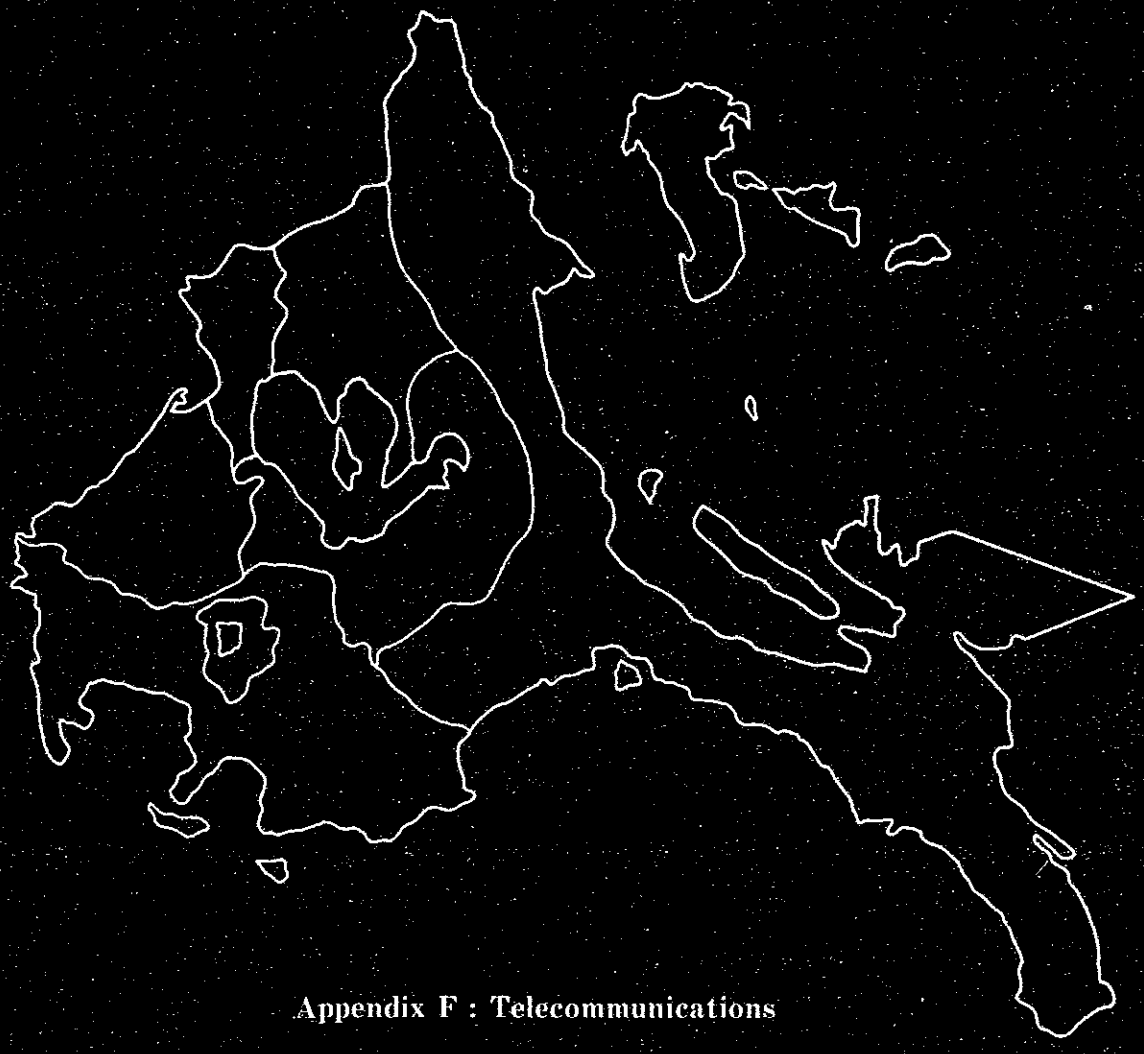
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF TRADE AND INDUSTRY

# THE MASTER PLAN STUDY ON THE PROJECT CALABARZON

# FINAL REPORT



Appendix F : Telecommunications

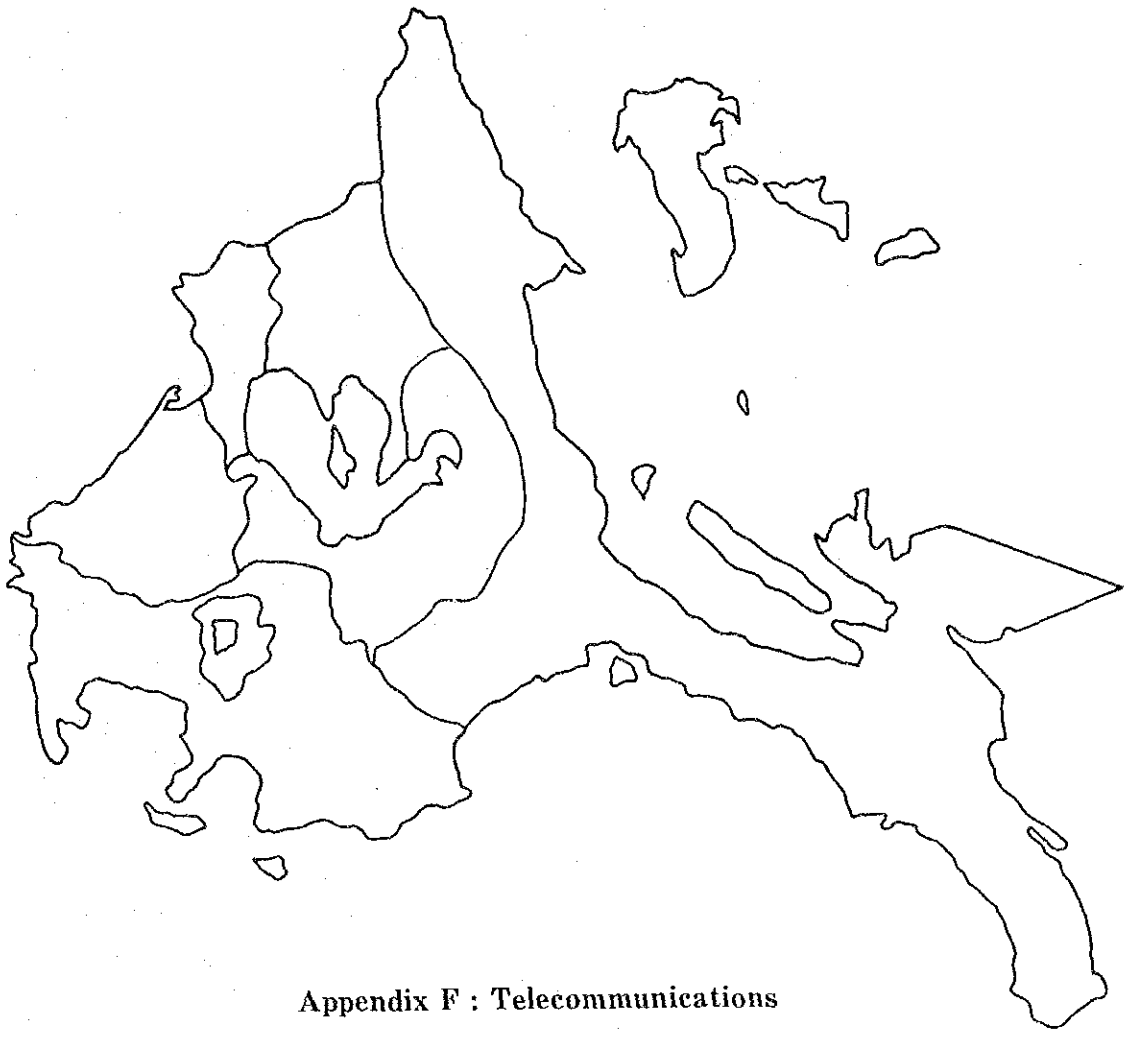
October, 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF TRADE AND INDUSTRY

# THE MASTER PLAN STUDY ON THE PROJECT CALABARZON

# FINAL REPORT



Appendix F : Telecommunications

October, 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

# LIST OF REPORTS

1. Executive Summary Report

2. Master Plan Report

3. Appendix A : Agriculture

4. Appendix B : Industry

5. Appendix C : Tourism

6. Appendix D : Water Resources

7. Appendix E : Transportation

8. Appendix F : Telecommunications

9. Appendix G : Energy

10. Appendix H : Urban and Spatial Development

11. Appendix I : Social Development

12. Appendix J : Environment

13. Appendix K : Project Profiles

# Appendix F TELECOMMUNICATIONS

## Table of Contents

## List of Tables



## List of Figures

# Appendix F: TELECOMMUNICATIONS

## F.1 Present Telecommunication Services and Institutions

### F.1.1 Present telecommunication policies and institutions

#### (1) Overview

Telecommunication services in the Philippines are provided by a state-owned enterprise TELOF, some 61 telephone companies, seven domestic record carriers, four international record carriers and two satellite systems. The Philippine Long Distance Telephone Company (PLDT) owns the nationwide backbone network for long distance calls and about 94% of the total main telephones. TELOF provides complementary backbone network in Regions I and II.

The Government policy in telecommunications is to maximize the role of the private sector for efficient service delivery and rapid growth of the sector, with the Government acting as a facilitator not a competitor (National Telecommunications Development Plan (1991-2010). The Government encourages moderate competition to activate the market environment and conduce to service improvement.

#### (2) Related institutions

The Government involvement in the telecommunications sector is primarily through three agencies: the Department of Transportation and Communications (DOTC), TELOF and the National Telecommunications Commission (NTC). DOTC is a government agency responsible for the planning and policy formulation related to telecommunications development. TELOF, formerly the Bureau of Telecommunications (Butel), is the DOTC's operating arm, which provides telephone and telegraph services in areas not currently served by private carriers. NTC is the regulatory body mandated to monitor and enforce quality of service performance.

#### (3) Policy framework for telecommunications

The Government has formulated development strategy for telecommunication in the National Telecommunications Development Plan (NTDP). The following constitute the general framework for the telecommunications development according to NTDP.

(a) Reliance on the private sector as the engine of growth

(b) Financial self-sufficiency
(c) Intra-sectoral cross subsidy
(d) Efficiency as a delineator of sector structure
(e) Network interconnection

F.1.2 Telephone services

(1) Local and national telephone services

Local and national telephone services in the Philippines are provided by 61 telephone operating companies and TELOF. In CALABARZON, telephone services are available in 66 out of 142 municipalities.

| Province | Total number of municipalities | Number of municipalities served | Number of unserved municipalities |
|---|---|---|---|
| Cavite | 23 | 12 | 11 |
| Laguna | 30 | 18 | 12 |
| Batangas | 34 | 14 | 20 |
| Rizal | 14 | 12 | 2 |
| Quezon | 41 | 10 | 31 |
| Total | 142 | 66 | 76 |

Source: Rural Telephone Service Plan 1989, DOTC

Telephone services in the Quezon province is provided by PLDT and three interconnecting companies: viz. General Telephone system (GTS), Calauag Telephone System (CTS) and Lucban Telephone System (LTS).

PLDT also operates a mobile telephone system. It serves areas along the highway from Baguio via Metro Manila to Batangas with some 7,500 mobile terminals in operation.

(2) International telephone services

PLDT operates an international gateway exchange and provides international telephone services. Two international record carriers will join in the service market in 1991 with their own international gateway exchange. Five exchanges provide international direct dialing services in CALABARZON: viz. CEPZA, Javalera Industrial Estate, Canlubang Sugar Estate, Batangas and Lucena exchanges. Others provide operator-assisted international telephone services.

Almost all the telephone switching equipment in CALABARZON is of electro-mechanical non-SPC type. Thus, national direct dialing (NDD) and international direct dialing (IDD) services are not available except from Canlubang, Batangas City, Cavite EPZ and Lucena City.

F.1.3 Record services

(1) Domestic record services

Three out of seven domestic record carriers dominate the market: the Radio Communications of the Philippines Inc. (RCPI), the Philippine Telegraph and Telephone Corporation (PT&T) and TELOF. Each of them operates its own trunk network and provides telex and telegraph services.

PT&T operates mostly in urban centers and carries over 90% of the telex traffic. RCPI provides extensive services in rural areas, but also competes in some areas with PT&T and TELOF. TELOF provides telegraph service mostly in isolated rural areas. Other special services primarily catering to business users including data communications, electronic mail, facsimile and radio paging are provided by other private enterprises.

The domestic record carriers do not compete on the price of services but rather on fringe benefits. However, as there is no interconnection among the domestic record carriers, customers are forced to subscribe two or more terminals if they wish to reach a wide range of business. Thus the seven domestic carriers are encouraged by the Government to interconnect their networks in order to improve the overall performance as well as the financial viability of the domestic record segment of this industry.

Availability of telegraph services in CALABARZON is summarized below.

| Province | Total number of municipalities | Number of unserved municipalities |
|---|---|---|
| Cavite | 23 | 22 |
| Laguna | 30 | 30 |
| Batangas | 34 | 33 |
| Rizal | 14 | 12 |
| Quezon | 41 | 41 |

(2) International record services

Four international record carriers provide international data and record services and operate their own telex switching exchanges: Capwire, ETPI, GMCR and Philcom. ETPI, GMCR and Philcom are multi-national affiliates on 60/40% equity share with Filipinos as the major stock holders. Capwire is the only 100% Filipino owned. As they are barred from providing direct record services, they resort to inter-agency agreements with domestic record carriers.

F.1.4 Carriers' carriers

The Philippine Communications Satellite Corporation (Philcomsat) is the exclusive provider (state-owned corporation) of international satellite services, operates an earth station near Manila and leases circuits on the Indian Ocean and Pacific Ocean satellites of Intelsat. The Domestic Satellite Philippine Corporation (Domsat) is a privately-owned corporation, operates a main earth station near Manila and 10 other earth stations in outlying areas, and offers only domestic satellite services. Domsat leases transponder space on the Indonesia Palapa satellite.

F.1.5 Distribution of services and facilities

Telephone density with respect to the number of telephones and the number of main telephone lines is compared in Table F.1 by region and by province in CALABARZON. About 75% of the total telephones are in Metro Manila, and 5.4% in Region IV ranked second. In terms of main telephone lines per 100 population, Region IV ranks fourth with only 0.49, while this density is 5.73 for Metro Manila and 1.09 for the Country. The density varies within CALABARZON: 0.90 in Laguna, 0.80 in Cavite, 0.61 in Rizal, 0.45 in Quezon and 0.30 in Batangas.

Telephone switching facilities are located in 44 out of 142 municipalities in CALABARZON (Table F.2). They are mostly of electro-mechanical type, i.e. step-by-step, cross bar, EMD etc.

Transmission links interconnecting the existing switching equipment consist of open wires, cables, VHF, UHF and SHF. Figures F.2 and F.3 give the radio transmission links and location of telephone switching equipment. In addition, mobile telephone network facilities are provided at Dasmariñas, Antipolo and Canlubang as base stations and at Sampaloc as an exchange station.

Almost all the telephone switching equipments operating in CALABARZON are of electro-mechanical type, i.e. step-by-step, cross bar, EMD, etc. which are no longer modern.

Service shares of different operators in terms of switching capacity are as follows for CALABARZON.

| | |
|---|---|
| Philippine Long Distance Telephone Co. (PLDT) | 85.3% |
| DOTC/Telecommunications Office (TELOF) | 0.6% |
| Western Batangas Telephone Company (WBT) | 2.4% |
| Independent Telephone Company (ITC) | 2.2% |
| General Telephone System (Gentels) | 6.5% |
| Lucban Telephone System (Luctels) | 1.8% |
| Calauag Telephone System (Caltels) | 1.2% |

## F.2 Principal Issues and Constraints in Telecommunications

### (1) Lack of foreign exchange

Lack of foreign exchange constitutes a major constraint to the telecommunications development in the Philippines. Telecommunications goods to be imported, i.e. high-tech products, account for a large part of amount for digital-oriented telecommunications investments. Telecommunications development in the Philippines have mainly depended on the private sectors who will be the leader of sector growth and they necessitate foreign financial sources with adequately low rate of interest.

Concessional loans/grants can be used by the private operators through DOTC, if they are qualified according to the borrowers' qualifications stated in the NTDP. One of the qualifications is the certificate of Public Convenience and Necessity (CPCN) from NTC. Proper access by the private sector to concessional loans/grants under official development assistance (ODA) needs to be further investigated by DOTC and related agencies.

### (2) Inadequate revenue sharing scheme

The sector as a whole is profitable, but in some cases, particularly for small interconnecting companies, deterioration of cost/revenue performance has been experienced that may lead to profit decline. Service inefficiency has been observed due to inability to purchase or upgrade the system. Low tariff rates and inadequate long distance revenues have been cited as the prime contributors to this problem. Normally, revenue sharing rate is 30 % for domestic calls and 7 % for international calls.

### (3) Inadequate competition

Worldwide trend in telecommunications sectors shows that ownership is being privatized and market structure is shifting from monopoly to competition. In the Philippines, telecommunications services are provided by the state owned enterprise, some 61 telephone companies, seven domestic record carriers, four international record carries and two satellite systems. PLDT, owns about 94% of the total main telephones and nationwide long distance transmission network, market environment is not competitive. Moderate competition will activate the market environment and conduce service improvement. However, during the present period of local telephone expansion, there should preferably be no destructive competition to threaten the encouragement of service expansion by small telephone companies.

(4) Lack of interconnection

About 36 local exchanges of small telephone companies are not yet linked to the PLDT's nationwide network, accordingly they are scheduled and provide telephone service only to their franchise area. If all the unlinked telephone companies had been interconnected with the nationwide network, the demand might have been increased much earlier. All public telecommunications networks should be entitled to interconnect with each other and rules of interconnection should be legislated.

(5) Uneven distribution of services

Substantial telephone density is generally proportional to GDP per Capita or Income per Capita, and this indicator in urban area is usually higher than that in rural area. Private sector's operators are concentrated in high-revenue area, i.e. urban centers and Metro Manila. As a result, distribution of services becomes unequal. About 69% of the national population are living in rural area where at present is unprofitable; thus provision of services to rural area still probably remains low until the income per capita in the area rises up to threshold level.

(6) Constraints in Quezon

The province of Quezon particularly suffers from the constraints described above. The private enterprises cannot avail soft loans for service expansion in remote and low revenue areas. Additionally, the peace and order situation and the ragged terrains of the province hinder service expansion.

## F.3 Planned and On-going Projects

### F.3.1 Inventory of on-going projects

To expand and improve the existing telecommunication services in CALABARZON, the private companies as well as DOTC/TELOF have been planning and implementing several projects.

On-going projects/programs related to CALABARZON are as enumerated below.

(a) DOTC/TELOF

- National Telephone Program Tranche I-1 (NTP I-1, 1992)
- Rural Telephone Service Plan (RTSP)
- Maritime Communications Project, Phase II

(b) PLDT

- Phase-V Service Improvement and Expansion Program (X-5)
- Phase-V Complementary Service Improvement and Expansion Program (X-5C)
- Phase-VI Service Improvement and Expansion Program
- Provision of Telephone Service at CAVITE Export Processing Zone (CAVITE EPZ)
- Provision of Telephone Service to Industrial Estates

(c) PT&T

- Expansion and Improvement, 1988-1990

(d) International Telecommunications Services

- Capwire Improvement Program, 1989-1992, Capwire
- Capwire Regional/Domestic Satellite Service Proposal, Capwire
- ETPI International Gateway Proposal, ETPI
- Philcom International Gateway Proposal, Philcom
- Philippine Global Communication Improvement Program, 1989-1991, Philcom

F.3.2 Project description

(1) DOTC/TELOF projects

National telephone program Tranche I-1

This project aims at improving telecommunication systems in Region III, IV and V by introducing new automatic, fully digitized, store-programmed telephone switching system, telegraph network and digital toll links composed of digital microwave radio links and optic fiber cable links. It will provide 66 local exchanges with a total capacity of 59,150 lines at its completion in 1993. New local telephone exchanges will be installed in Biñan, Laguna, eight municipalities in Batangas and eight municipalities in Quezon with a total of 11,850 lines.

In the following table are new local telephone exchanges to be installed in CALABARZON.

| Province | Municipalities | Type & Capacity (LU) | |
|---|---|---|---|
| Laguna | Biñan | Digital | 1400 |
| Batangas | Balayan | Digital | 600 |
| | Lemery | Digital | 1100 |
| | Taal (Lem) | Extension | 300 |
| | Nasugbu (Balayan) | Digital (RSU) | 450 |
| | Ibaan | Digital | 600 |
| | Rosario (Ibaan) | Digital (RSU) | 750 |
| | San Juan | Digital | 700 |
| | Cuenca (Ibaan) | Digital RSU) | 400 |
| Quezon | Atimonan | Digital | 600 |
| | Candelaria | Digital (RSU) | 900 |
| | Gumaca | Digital | 600 |
| | Lopez | Digital | 700 |
| | Lucban | Digital | 1200 |
| | Pagbilao | Digital (RSU) | 350 |
| | Tiaong | Digital (RSU) | 500 |
| | Sariaya | Digital | 700 |

Ibaan and Sariaya are combination of local and trunk switch.

Gentex terminals will also be provided at Cavite City in Cavite, Batangas City, Lipa City, Balayan and Lemery in Batangas, and Calamba, Biñan and Sta. Cruz in Laguna, Lucena City and Gumaca in Quezon. The radio transmission links and telephone exchange locations after this project is illustrated in Figure F.4.

NTP Tranche I-1 involves supplementary telephone services in the following locations in CALABARZON.

| Location | Existing Operator |
|---|---|
| Biñan (Laguna) | Independent Telephone Co. |
| Lemery (Batangas) | Western Batangas Telephone Co. (WBT) |
| Balayan (Batangas) | ditto |
| Nasugbu (Batangas) | ditto |
| Atimonan (Quezon) | General Telephone System |
| Candelaria (Quezon) | ditto |
| Gumaca (Quezon) | ditto |
| Tiaong (Quezon) | ditto |
| Sariaya (Quezon) | ditto |
| Lopez (Quezon) | Calauag Telephone System |
| Lucban (Quezon) | Lucaban Telephone System |

Independent Telephone Co. of Binan operates X-bar exchange at present and has made an order for 600-line capacity digital exchange to Whitney International. The exchange can be expanded to 1,500 lines and is scheduled for installation before the end of 1991. GENTELS will expand its number of lines from a total of 2,200 lines to 4,000 lines in their service areas. Furthermore, GENTELS will expand their service in San Juan, Batangas. EMD (siemens) exchange with a capacity of 200 lines is due for installation by April 1991 and will be expanded to 400 lines.

This project especially in CALABARZON likely aims at Batangas and Quezon provinces where there is no telecommunications facilities of PLDT and to provide NDD and IDD services that are essential for telephone users.

Rural telephone service plan

This plan provides for the basic telephone services to all the unserved municipalities in the Philippines to satisfy the mandates of the Municipal Telephone Act of 1989. It outlines the steps necessary to implement the basic service at one (1) public calling station or public telephone at least in each of the municipalities not currently served. The project proposes mainly multiple access radio systems to access scattered municipalities in consideration of presently applicable technologies.

The Rural Telephone Service Plan or the Municipal Telephone Project has been divided into two financial sources, i.e. CIDA and French with a possible additional fund from USAID for Camarines Sur telecommunications project. CIDA and French have a total project cost of P 2,034.90 million with a local counterpart of P 302.58 million and $61.69 million or P 1,727.32 million (1 US$ = P 28), respectively.

It states that if this source of funds is accessed, an accelerated implementation of these projects is feasible with service provision starting as early as third quarter of 1991. The Government has set the following principles for its implementation:

1) Private sector participation is encouraged as much as possible;
2) For areas not covered voluntarily by the private sector, an appropriate operator will be directed to assume responsibility; and
3) Concessional loans/grants can be used through DOTC by the private operators, if they are qualified according to the borrowers' qualifications stated in the NTDP.

Maritime communications project, Phase II

This project will provide maritime mobile services through the construction of coastal stations at 11 key locations throughout the Country: Cebu, Dasao, Zamboanga, Puerto Princesa, Ilollo, San Fernando, Batangas, Cotabao, Cagayan de Oro, Legaspi and Tacloban. This project will be commenced in 1991 for tender evaluation and put into service in 1994.

In CALABARZON, a third class station will be provided at the port of Batangas,and will serve for radio telephone communications with vessels in VHF band having coverage of about 50 km.

(2) PLDT projects

X-5 and X-5 C projects

X-5 project is a plan for the 1989-1992 period that will expand, improve and modernize PLDT's telephone network throughout the Country. This project was embarked in 1989 and provide the installation of 74,300 digital exchange line units in Metro Manila, and 55,700 in the provinces, for a total of 130,000 new line units, outside plant (196,500 pairs), customer premises equipment and paystations, transit (tandem) exchange equipment (20,308 trunk terminations) and toll transmission system including radio, PCM and fiber optic cable.

X-5C project, on the other hand, is a plan which extends the X-5 project from 1991 to 1993. It will install a total of 355,150 digital exchange line units, outside plant (421,560 pairs), customer premises equipment and paystations, transit (tandem) exchange equipment (15,307 trunk terminations), multi-access subscriber radio (11 central stations serving 29 remotes), and toll transmission systems including radio and fiber optic cable.

Under X-5, the local dialing coverage in Metro Manila will be expanded to include the eastern Rizal towns of Angono, Binangonal, Morong, Tanay, Cardona, Baras and Pililla.

In CALABARZON, X-5 and X-5C projects will provide new installation and expansion of the local exchanges as listed in Table F.3. Figure F.5 shows the radio transmission links and telephone exchange location after X-5C project. As seen in Figure F.5, these project might have been elaborated in the light of such probable development priority areas as Cavite City, Rosario and Binakayan in Cavite Province; San Pedro, Sta. Rosa, Calamba, Canlubang, Los Baños, San Pablo, Calauan, Cavinti, Siniloan and Liliw in Laguna Province; Batangas and Bauan in Batangas Province; and Tanay, Binangonan, Morong, Angono, Taytay, Antipolo, Cainta and San Mateo in Rizal Province.

Telephone services for industrial estates

PLDT's provision of telephone service for industrial estates is a part of their expansion program in CALABARZON. Installation of store program control digital switches in industrial estates is as listed in Table F.3. The servicing of the industrial estates comprises part of the World Bank-Philippine Assistance Program.

It is noted that after completion of the projects telephone calls from these areas can be carried on direct dialing basis (NDD & IDD) which is essential services for telephone users, especially for industrial and commercial sectors. With the introduction of digital transmission links, quality will be improved.

Total telephone facilities in CALABARZON after X-5C and NTP Tranche I-1 are enumerated in Table F.4 showing that telephone lines will be increased by 2.9 times in three years, i.e. from 35,562 in 1990 to 101,615 in 1993.

Provision of telephone service at Cavite EPZ

This is implemented by PLDT and to improve the existing telephone service for Cavite EPZ (CEPZ), which includes:

(a) Establishment of a digital microwave radio link equipped with 120 channels operating at 24 Mbps between CEPZA and Sampaloc; and
(b) Installation of a digital PABX equipped with 120 line units linked to Rosario Emd exchange and 41 trunk lines to Sampaloc Toll exchange.

These are implemented as under X-5 project. In addition, the following is implemented as under X-5C project.

(c) Replacement of the PABX installed under X-5 with a 1,250 line units RSU (Remote Subscriber Unit) linked to Rosario SPC-D exchange.

(3) PT&T program

The expansion and improvement program implemented by PT&T for 1988-90 includes digitalization of the existing analog radio network extending telex services to San Pablo City and Calamba in Laguna, and Batangas City and Bauan in Batangas. At present, Los Baños and Lipa City are served by digital radio links, and Cainta by analog radio links. In addition, a digital radio network will cover Biñan, Canlubang, Cabuyao and Sta. Rosa in Laguna, and Dasmariñas, Carmona, Imus, Rosario and Cavite City in Cavite. Through the networks, telex, telegraph, facsimile, data communication and voice services will be provided to these municipalities. The target areas of the services coincide with the existing industrial estates in CALABARZON.

(4) International telecommunication services

Capwire improvement program 1989-1992

This program includes:

- investment in digital fiber optic submarine cable systems starting with HAW-4, TPC-3 and GPT cable systems;
- launch of international X-400 Message Handling System/Electronic Mail Service; and
- expansion of data and facsimile services by introducing a new circuit-switched exchange, Group IV digital facsimile service, and facsimile store and forward service.

After the commissioning of services (1992), it is preferable to extend the new services up to the digitized areas of the provinces through PLDT's backbone network.

Capwire regional/domestic satellite service program

This program is to acquire space segment on the PACSTAR series of satellites, the first of which is scheduled for launch in 1991. This satellite will allow small aperture terminals to be deployed for both regional and domestic applications and provide high quality voice and data communications nationwide. Capwire field application for a Certificate of Public Convenience and Necessity (CPCN) and as of July 1991 it is still on hearing by NTC. However, a Provisional Authority (PA) had been issued by NTC.

As a nature of satellite system it is particularly benefitable to remote areas or geographically difficult access areas to serve by terrestrial links.

ETPI and Philcom international gateway projects

These are same category of service provision. The projects are to install digital international gateway exchange facilities through which incoming and outgoing overseas calls have to pass. Moreover, Philcom International Gateway is scheduled to be operational by August 1, 1991.

The projects offer telephone subscribers with an alternative. This will bring dismantlement of PLDT's monopoly in the operation of international gateway facilities, and better rates of service. Moreover, these facilities will eliminate international traffic bottlenecks at the international exchange level.

Philippine global communication improvement program 1989-1991

This is to install transmission facilities to provide each industrial estate with international services of telex, facsimile, telephone, leased channel, packet switching and electronic mail by means of point-to-point circuits between each industrial area and Philcom's headquarter.

The industrial estates to be served are:

- Cavite Export Processing Zone
- Carmona Industrial Estate (People's Technology Complex)
- Canlubang Industrial Estate
- Science Park Industrial Complex
- Carmelray Industrial Complex (Canlubang)
- Gateway Industrial Estate (Gen. Trias)
- First Cavite Industrial Estate (Dasmariñas)

Construction was planned to start during the last quarter of 1990 and is expected to be completed by 1993.

On improvement program for Quezon province, Philcom did consider possible expansion of their facilities to the said province. However, specific program could be outlined once a blueprint for the industrialization of Quezon province is in place.

## F.4 Telecommunications Development Plan

### F.4.1 Strategy for telecommunications development

The private sector enterprises and the Government are implementing many projects as outlined above for telecommunications development. In CALABARZON, they cover collectively both rural areas and most important urban centers, and full range of services for most of the existing industrial areas. These projects should be further promoted, overcoming the major constraints identified above.

Of the major constraints, the most relevant to CALABARZON is the access to foreign financial sources. The private enterprises' access to foreign loans/grants under official development assistance for those projects should be improved in line with the national policy framed in the National Telecommunications Development Plan (NTDP) 1991-2010.

Overall, telecommunication services for the Project CALABARZON should make the maximum use of accesses to the public telecommunications network being expanded and improved under the NTDP. The accesses should encompass direct dialing services, telex, non-switched data circuits, public switched data network, and others by use of the public switched telephone network such as facsimile, mobile communication, paging and electronic mail.

In the long term future, integrated services digital network (ISDN) will make it possible to provide all the advanced telecommunication services. For a next couple of decades, telecommunication services for CALABARZON will be provided through respectively dedicated networks for telephones, data, telex and others.

### F.4.2 Development targets

#### (1) Telecommunications services

The telecommunications facilities to be provided under the CALABARZON Project shall be able to access to the public telecommunications network constructed in accordance with physical targets prescribed in NTDP. Accordingly, the following accesses shall be objectives:

- to direct dialing service network,
- to telex network,
- to non-switched data circuits,
- to public switched data network,

- to other services by use of the public switched telephone network, e.g. facsimile, mobile communication, paging, electronic mail, etc. and
- to integrated services digital network (ISDN) in future.

ISDN makes it possible to provide all advanced telecommunications services. Evolution from the existing analog network to a complete digital network may require one or more decades. For the next couple of decade, telecommunications services required for socio-economic activities in CALABARZON will be provided through the respective integrated networks such as telephone, data and telex network.

(2) Telecommunications demand

In general, telecommunications demands for the areas developed under industrial development project is higher than those for ordinary areas. In consideration of this fact, the following demand estimation is preferably applied for CALABARZON Project.

Industrial area

| | Phase I (1995) | Phase II (2000) | Phase III (2010) |
|---|---|---|---|
| Factory (10 ha or more) | 10 | 10 | 12 |
| (8 ha) | 8 | 8 | 10 |
| (6 ha) | 7 | 7 | 9 |
| (3 ha) | 7 | 7 | 9 |

Unit: No. of circuits
Note: Each of the above figures includes one telex and one data circuit.

In addition to the above, 2 to 7 public coin (or pre-paid card) telephones shall be provided for public use in each of the factories.

Housing estate factory employees

| | Phase I (1995) | Phase II (2000) | Phase III (2010) |
|---|---|---|---|
| High Class House | 1.7 | 1.8 | 2.0 |
| Middle Class House | 1.0 | 1.2 | 1.4 |
| Low Class House | 0.5 | 0.6 | 0.7 |

Unit: Penetration Factor

Tourism area

| | | Phase I - Phase III |
|---|---|---|
| Hotel | (a.c. = 500 or more) | 25 |
| | (a.c. = 400) | 20 |
| | (a.c. = 200) | 10 |

Unit: No. of circuits
"a.c." means accommodation capacity of guests.
Note: Direct dialing access to public telephone network from each guest room is considered. Each of the above figures includes one telex and one data circuit.

Other establishments

| | Phase I (1995) | Phase II (2000) | Phase III (2010) |
|---|---|---|---|
| Power Generating Station; Port Office and Shipping Office; Big Laboratory; Hospital; and Similar scale of Establishments | 4 | 5 | 7 |

Unit: No. of circuits
Note: The above figures include one telex and one data circuit.

F.4.3 Measures for telecommunications

There are 14 existing industrial estates in CALABARZON as shown in Table F.5. The existing industrial estates where factories are more or less established and already operating rely on the establishment of infrastructures in the estates. The estates areas mostly coincide with the present telecommunications service areas. Those industrial estates secluded from public telecommunications service network area can hardly be developed.

As seen in the case of Canlubang Industrial Park as best developed in CALABARZON, infrastructures have been established in that area as compared with other estates. As far as telephone service concerns, NDD and IDD services that are essential for industrial and commercial sectors are available in Canlubang exchange area, and Cavite EPZ in Rosario is equipped with direct lines to Sampaloc Toll Center that make it possible to provide NDD and IDD services.

Since real time communication, in other words, real time interconnection is inevitable for investors/firms, less-developed telecommunications services never attract foreign investors. Hence, it must be stressed that higher grade of telecommunications services are indispensable to success of industrial development.

Phase 1 (upto 1995)

Since the on-going projects cover most areas and services for CALABARZON, telecommunications development during Phase 1 should concentrate on additional industrial areas not effectively covered by any on-going efforts. An urgent project has been formulated under the title of the Dasmariñas-Silang telecommunication system upgrading project. The profile of this project is contained in Appendix K. During this period, a demand survey should be conducted to identify rapidly growing urban centers where the needs for improved telecommunication services seem to be the highest.

Phase 2 (1996-2000)

Expansion of facilities and service quality improvement will have to take place most rapidly during this phase. During this period, telephone facilities will be expanding to a level of telephone density 1.2 in Region IV in accordance with the target of NTDP as shown in Table F.6. The rapidly growing urban centers identified during Phase 1 will be the main focus. The telephone density of 1.2 in the year 2000 is aimed at by the NTDP for Region IV. The density expected in CALABARZON in the same year is around 3.2 much higher than this, in accordance with high growth of regional economy envisioned (Table F.7).

Demand survey is important to forecast future demand. The demand survey especially for industrial and services sectors which generally require more telecommunications services than others shall be executed to meet actual demand.

In line with the government policy that the efficient and rapid growth of the telecommunications sector requires the maximization of the role of the private sector, with the Government acting as a facilitator not a competitor, the private telecommunications companies should positively invest in the expansion of telecommunications facilities in order to promote the nation's economy and to raise more employment and personal incomes. They shall timely provide adequate telecommunications services which will meet the targets.

From user's side viewpoint, firms or factories who come in the estates develop in line with the national policy shall be given exclusive priority to receive telecommunications services under a certain regulation/rule to be legislated. In this case, if the private telecommunications company necessitates financial support, the Government shall assist in raising financial sources, and moreover foster telecommunications sector including manufacturing sector in financially viable level.

Phase 3 (2001-2010)

The target growth rates of telephone density are lower for this period than the previous period. Still, the telecommunication sector will face rapid expansion of facilities and services areas, and may be entering a preliminary stage of the ISDN services. The nation-wide switched data network will be possessed by 50% of municipalities in CALABARZON (Table F.8). The ISDN services may be extended from Metro Manila to CALABARZON, depending on the results of trial exchanges in Metro Manila and Cebu.

According to the projected regional economy, the telephone density of 4.7 is expected by 2010. The number of main telephones in CALABARZON will reach around 570,000.

As given in NTDP, number of waiting applicants will be minimized by 2005, i.e. application for service to be satisfied within four weeks will be improved from the present 6% to 98% by 2005. Therefore, by 2005 in some cases, specific telecommunications project for CALABARZON development may be required. Thus improved thereafter, there is no constraint to CALABARZON development.

# *Tables*

## Table F.1 Telephone Densities, Number of Telephones and Main Telephone Lines

With respect to Number of Telephones

| Region | No. of Telephones (per 100 person) | Population (x 1,000) | Population Share (%) | No. of Telephones | Telephone Share (%) |
|---|---|---|---|---|---|
| NCR | 8.13 | 7,768 | 12.9 | 631,183 | 75.5 |
| Region 1 | 0.38 | 4,214 | 7.0 | 16,021 | 1.9 |
| Region 2 | 0.06 | 2,903 | 4.8 | 1,801 | 0.2 |
| Region 3 | 0.52 | 6,000 | 10.0 | 30,948 | 3.7 |
| Region 4 | 0.57 | 7,899 | 13.1 | 45,267 | 5.4 |
| Region 5 | 0.16 | 4,293 | 7.1 | 6,928 | 0.8 |
| Region 6 | 0.56 | 5,556 | 9.2 | 31,107 | 3.7 |
| Region 7 | 0.74 | 4,531 | 7.5 | 33,386 | 4.0 |
| Region 8 | 0.07 | 3,302 | 5.5 | 2,185 | 0.3 |
| Region 9 | 0.25 | 3,127 | 5.2 | 7,796 | 0.9 |
| Region 10 | 0.20 | 3,526 | 5.9 | 6,929 | 0.8 |
| Region 11 | 0.39 | 4,732 | 7.0 | 18,495 | 2.2 |
| Region 12 | 0.14 | 2,871 | 4.8 | 3,977 | 0.5 |
| Philippines | 1.38 | 60,722 | 100.0 | 836,023 | 100.0 |

With respect to Number of Main Lines

| Region | No. of Main Telephone Lines (per 100 person) | Population (x 1,000) | Population Share (%) | No. of Main Telephone Lines | Main Telephone Line Sahre (%) |
|---|---|---|---|---|---|
| NCR | 5.73 | 7,768 | 12.9 | 445,009 | 67.5 |
| Region 1 | 0.68 | 4,214 | 7.0 | 28,680 | 4.4 |
| Region 2 | 0.22 | 2,903 | 4.8 | 6,498 | 1.0 |
| Region 3 | 0.63 | 6,000 | 10.0 | 37,719 | 5.7 |
| Region 4 | 0.49 | 7,899 | 13.1 | 38,581 | 5.9 |
| Region 5 | 0.17 | 4,293 | 7.1 | 7,450 | 1.1 |
| Region 6 | 0.43 | 5,556 | 9.2 | 23,972 | 3.6 |
| Region 7 | 0.61 | 4,531 | 7.5 | 27,510 | 4.2 |
| Region 8 | 0.14 | 3,302 | 5.5 | 4,500 | 0.7 |
| Region 9 | 0.20 | 3,127 | 5.2 | 6,350 | 1.0 |
| Region 10 | 0.21 | 3,526 | 5.9 | 7,490 | 1.1 |
| Region 11 | 0.44 | 4,732 | 7.0 | 20,948 | 3.2 |
| Region 12 | 0.13 | 2,871 | 4.8 | 3,850 | 0.6 |
| Philippines | 1.09 | 60,722 | 100.0 | 658,557 | 100.0 |
| CALABARZON | | | | | |
| Cavite | 0.80 | 1,076 | 23.6 | 8,442 | 25.0 |
| Laguna | 0.90 | 1,289 | 28.2 | 11,639 | 34.5 |
| Batangas | 0.30 | 1,432 | 31.4 | 4,327 | 12.8 |
| Rizal | 0.38 | 768 | 16.8 | 2,882 | 8.5 |
| Quezon | 0.45 | 1,427 | 23.8 | 6,470 | 19.2 |
| Total | 0.57 | 5,992 | 100.0 | 33,760 | 100.0 |

SOURCES: POPULATION - NSO POPULATION PROJECTION DATA FOR 1989
TELEPHONE DATA - DOTC STATISTICS AS OF 1989

NOTE: The number of main telephone lines is assumed to be equal to the present capacity of exchanges.

**Table F.2 Telephone Facilities in CALABARZON as of February 1990**

| Province | Town/ Municipality | Operator | Type of Exchange | Capacity (Lines) |
|---|---|---|---|---|
| CAVITE | CAVITE CITY | PLDT | EMD | 2,280 |
| | DASMARIÑAS | PLDT | SXS | 332 |
| | KAWIT (BINAKAYAN) | PLDT | EMD | 3,800 |
| | ROSARIO | PLDT | EMD | 950 |
| | JAVALERA (ROSARIO) | PLDT | SPC-D | 190 |
| | SILANG | PLDT | SXS | 720 |
| | TAGAYTAY CITY | PLDT | SXS | 170 |
| | **SUB-TOTAL** | | | **8,442** |
| LAGUNA | BIÑAN | IND. TEL. CO. | XB | 750 |
| | CALAMBA | PLDT | CXP-5 | 750 |
| | CANLUBANG | PLDT | EMD | 426 |
| | CANLUBANG SE | PLDT | XB | 570 |
| | LILIW | PLDT | EMD | 285 |
| | LOS BAÑOS T | PLDT | EMD | 425 |
| | LOS BAÑOS UP | PLDT | SXS | 966 |
| | PAETE | PLDT | EMD | 285 |
| | SAN PABLO CITY | PLDT | SXS | 2,470 |
| | SAN PEDRO | PLDT | EMD | 2,099 |
| | STA. CRUZ | PLDT | CXP-5 | 1,152 |
| | STA. ROSA | PLDT | EMD | 150 |
| | **SUB-TOTAL** | | | **10,328** |
| BATANGAS | BALAYAN | W.B. TEL. | SXS | 305 |
| | BATANGAS CITY | PLDT | SXS | 450 |
| | BATANGAS CITY | PLDT | XB | 1,152 |
| | SAN JOSE | PLDT | DPABX | 300 |
| | BAUAN | PLDT | EMD | 285 |
| | IBAAN | TELOF | SXS | 200 |
| | LIPA CITY | PLDT | SXS | 750 |
| | NASUGBU | W.B. TEL. | SXS | 110 |
| | TANAUAN | PLDT | CXP-5 | 375 |
| | LEMERY | W.B. TEL. | M | 400 |
| | **SUB-TOTAL** | | | **4,327** |
| RIZAL | ANGONO | PLDT | EMD | 380 |
| | BINANGONAN | PLDT | EMD | 380 |
| | MORONG | PLDT | EMD | 190 |
| | TANAY | PLDT | EMD | 145 |
| | TAYTAY | PLDT | EAX | 1,787 |
| | **SUB-TOTAL** | | | **2,882** |
| QUEZON | LUCENA CITY | PLDT | SPC-A | 3,000 |
| | ATIMONAN | GENTELS | SXS | 400 |
| | CALAUAG | CALTELS | SXS | 200 |
| | CANDELARIA | GENTELS | SXS | 800 |
| | GUMACA | GENTELS | SXS | 500 |
| | HONDAGUA, LOPEZ | G. PUYAT & SONS * | SXS | 100 |
| | LOPEZ | CALTELS | SXS | 200 |
| | LUCBAN | LUCTELS | SXS | 600 |
| | SARIAYA | GENTELS | SXS | 300 |
| | TAYABAS | PLDT | SXS | 170 |
| | TIAONG | GENTELS | | 200 |
| | **SUB-TOTAL** | | | **6,470** |
| | **GRAND TOTAL** | | | **32,449** |

* CLASS A OPERATOR

**Table F.3 PLDT's New Installation of Local Exchanges for Industrial Estates**

| Industrial Estate/ Service Extension | Type of Exchange | Capacity (LU) |
|---|---|---|
| **CAVITE** | | |
| People's Technology Center<br>Carmona, Cavite | SPC-D | 1,000 |
| First Cavite Industrial Estate<br>Dasmariñas, Cavite | SPC-D | 1,000 |
| Javalera Industrial Estate<br>Gen. Trias, Cavite | SPC-D | 330 |
| **LAGUNA** | | |
| Ayala-Lagun Industrial Park<br>Sta. Rosa, Laguna<br>* Unilab Industrial Park | SPC-D | 2,000 |
| Ayala-Laguna Industrial Park<br>Biñan, Laguna | SPC-D | 1,000 |
| Light Industry & Science Park<br>Cabuyao, Laguna | SPC-D | 1,000 |
| Canlubang Sugar Estate<br>Cabuyao, Laguna<br>* Carmel Industrial Park | SPC-D | 2,000 |
| **BATANGAS** | | |
| Batangas Industiral Center<br>Batangas City, Batangas | RSU | 500 (X5-C)<br>700 (X-6) |
| **Total** | | **9,530** |

Table F.4 Telephone Facilities in CALABARZON after X5-C and NTP Tranche I-1 (1/2)

| Province | Town/ Municipality | Operator | Type of Exchange | Installed (Lines) |
|---|---|---|---|---|
| CAVITE | BINAKAYAN | PLDT | DIGITAL | 2,400 |
| | BINAKAYAN | PLDT | EMD | 4,000 |
| | MOLINO (BACOOR) | PLDT | RSU | 600 |
| | CAVITE CITY | PLDT | EMD | 2,400 |
| | CAVITE CITY | PLDT | DIGITAL | 1,200 |
| | DASMARIÑAS | PLDT | SXS | 400 |
| | ROSARIO | PLDT | DIGITAL | 1,300 |
| | CAVITE EPZA (ROSARIO) | PLDT | RSU | 1,250 |
| | JAVALERA (GEN. TRIAS) | PLDT | DIGITAL | 330 |
| | SILANG | PLDT | SXS | 800 |
| | TAGAYTAY CITY | PLDT | SXS | 200 |
| | NAIC | PLDT | SXS | 300 |
| | INDANG | PLDT | XB | 200 |
| | CARMONA IE | PLDT | DIGITAL | 1,000 |
| | DASMARIÑAS IE | PLDT | DIGITAL | 1,000 |
| | TRECE MARTIRES | PLDT | DIGITAL | 400 |
| | **SUB-TOTAL** | | | **17,780** |
| LAGUNA | BIÑAN | IND. TEL. CO. | XB | 750 |
| | BIÑAN | IND. TEL. CO. | DIGITAL | 800 |
| | BIÑAN | TELOF | DIGITAL | 1,400 |
| | CALAMBA | PLDT | DIGITAL | 2,500 |
| | CANLUBANG | PLDT | RSU | 1,100 |
| | CANLUBANG SE | PLDT | SPC-D | 600 |
| | CALAUAN | PLDT | RSU | 250 |
| | LILIW | PLDT | RSU | 450 |
| | LOS BAÑOS T | PLDT | DIGITAL | 2,250 |
| | PAETE | PLDT | EMD vans | 300 |
| | SAN PABLO CITY | PLDT | SXS | 2,840 |
| | SAN PABLO CITY | PLDT | DIGITAL | 3,000 |
| | SAN PEDRO | PLDT | EMD vans | 3,200 |
| | SAN PEDRO | PLDT | RSU | 5,000 |
| | STA. CRUZ | PLDT | CXP-5 | 1,600 |
| | STA. ROSA | PLDT | RSU | 650 |
| | SINILOAN | PLDT | DIGITAL | 650 |
| | CAVINTI | PLDT | DIGITAL | 400 |
| | STA. ROSA IE | PLDT | DIGITAL | 2,000 |
| | BIÑAN IE | PLDT | DIGITAL | 1,000 |
| | CABUYAO IE | PLDT | DIGITAL | 1,000 |
| | CANLUBANG SE | PLDT | DIGITAL | 2,000 |
| | **SUB-TOTAL** | | | **33,740** |
| BATANGAS | BALAYAN | W.B. TEL. | SXS | 305 |
| | BALAYAN | TELOF | DIGITAL | 600 |
| | BATANGAS CITY | PLDT | DIGITAL | 2,500 |
| | BATANGAS CITY | PLDT | SXS | 600 |
| | BIC (BATANGAS) | PLDT | RSU | 500 |
| | BAUAN | PLDT | RSU | 650 |
| | IBAAN | TELOF | DIGITAL | 600 |
| | IBAAN | TELOF | SXS | 200 |
| | LIPA CITY | PLDT | SXS | 1,000 |
| | NASUGBU | W.B. TEL. | SXS | 110 |
| | NASUGBU | TELOF | DIGITAL | 450 |
| | SAN JOSE | PLDT | DPABX | 300 |
| | SAN JUAN | GENTELS | EMD | 400 |
| | SAN JUAN | TELOF | DIGITAL | 700 |
| | TAAL | TELOF | DIGITAL | 300 |
| | TANAUAN | PLDT | CXP-5 | 600 |
| | LEMERY | W.B. TEL. | SXS | 500 |
| | LEMERY | TELOF | DIGITAL | 1,100 |
| | ROSARIO | TELOF | DIGITAL | 750 |
| | CUENCA | TELOF | RSU | 400 |
| | **SUB-TOTAL** | | | **12,565** |

Table F.4 Telephone Facilities in CALABARZON after X5-C and NTP Tranche I-1 (2/2)

| Province | Town/ Municipality | Operator | Type of Exchange | Installed (Lines) |
|---|---|---|---|---|
| RIZAL | ANGONO | PLDT | RSU | 2,000 |
| | ANTIPOLO | PLDT | RSU | 2,200 |
| | BINANGONAN | PLDT | RSU | 500 |
| | MORONG | PLDT | RSU | 300 |
| | TANAY | PLDT | RSU | 300 |
| | CAINTA | PLDT | DIGITAL | 8,000 |
| | SAN MATEO | PLDT | RSU | 1,600 |
| | TAYTAY | PLDT | EAX | 4,800 |
| | TAYTAY | PLDT | RSU | 1,000 |
| | **SUB-TOTAL** | | | **20,700** |
| QUEZON | ATIMONAN | GENTELS | SXS | 600 |
| | ATIMONAN | TELOF | DIGITAL | 600 |
| | CALAUAG | CALTELS | SXS | 200 |
| | CANDELARIA | GENTELS | SXS | 1,500 |
| | CANDELARIA | TELOF | DIGITAL | 900 |
| | GUMACA | GENTELS | SXS | 700 |
| | GUMACA | TELOF | DIGITAL | 600 |
| | LOPEZ | CALTELS | SXS | 200 |
| | LOPEZ (HONDAGUA) | G. PUYAT & SONS (*) | SXS | 100 |
| | LOPEZ | TELOF | DIGITAL | 700 |
| | LUCBAN | LUCTELS | SXS | 600 |
| | LUCBAN | TELOF | DIGITAL | 1,200 |
| | LUCENA | PLDT | SPC-A | 3,000 |
| | LUCENA | PLDT | SPC-A | 4,000 |
| | MAUBAN | PLDT | SXS | 300 |
| | SARIAYA | GENTELS | SXS | 600 |
| | SARIAYA | TELOF | DIGITAL | 700 |
| | TAYABAS | PLDT | SXS | 200 |
| | TIAONG | GENTELS | SXS | 500 |
| | TIAONG | TELOF | DIGITAL | 500 |
| | **SUB-TOTAL** | | | **17,800** |
| | **GRAND TOTAL** | | | **101,815** |

* CLASS A OPERATOR

**Table F.5 Existing Industrial Estates in CALABARZON, May 1990**

(ha)

| Name | Location | Land Area | Developed Area | Area Sold/ Occupied | Available for Sale | Employment |
|---|---|---|---|---|---|---|
| 1. Gen. Mariano Alvarez Industrial Estate | Gen. Marian Alvarez, Cavite | 9.73 | 9.73 | 1.07 | 8.66 | 3,485 |
| 2. Gateway Industries Complex | Javalera, Gen. Trias, Cavite | 400.00 | 120.00 | 30.00 | 90.00 | None |
| 3. New Cavite Industrial Estate | Gen Trias, Cavite | 43.89 | 30.16 | 21.32 | 8.84 | None |
| 4. First Cavite Industrial Estate | Dasmariñas, Cavite | 230.00 | 155.00 | 38.00 | 117.00 | None |
| 5. Ayala-Laguna Technopark | Biñan & Sta. Rosa, Laguna | 233.00 | 233.00 | 64.77 | 168.23 | None |
| 6. Dasmariñas Bagong Bayan Industrial Estate | Dasmariñas, Cavite | 12.81 | 12.81 | 7.96 | 4.85 | 3,406 |
| 7. Cavite Exporting Processing Zone | Rosario, Cavite | 275.00 | 255.00 | 50.00 | 205.00 | 3,565 |
| 8. Canlubang Industrial Park | Canlubang, Laguna | 1,240.00 | 708.00 | 176.00 | 532.00 | 5,883 |
| 9. The Science Park of the Philippines | Bo. Diezmo, Canlubang, Laguna | 143.00 | 45.00 | 45.00 | | |
| 10. Informal Industrial Estate | Imus, Cavite | | | | | 3,152 |
| 11. People's Technology Complex | Carmona, Cavite | | | | | |
| 12. Cavite-Carmona Industrial Estate | Carmona, Cavite | 53.00 | 53.00 | 53.00 | 0.00 | 2,775 |
| 13. First City Land Heavy Industry Center | Dasmariñas, Cavite | 24.00 | 24.00 | 24.00 | 0.00 | 350 |
| 14. Bulihan NHA I.E. | Silang, Cavite | 3.00 | 3.00 | 3.00 | | |
| | **Total** | **2,667.43** | **1,648.70** | **514.12** | **1,134.58** | **22,616** |

Source: DTI and other sources

**Table F.6 Projected Telephone Demand by Region**
**1991 - 2010**

| | 1991 | | 1995 | | 2000 | | 2005 | | 2010 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | MS ('000) | MS/ 100 | MS ('000) | MS/ 100 | MS ('000) | MS/ 100 | MS ('000) | MS/ 100 | MS ('000) | MS/ 100 |
| NCR | 650 | 7.3 | 870 | 8.6 | 1,164 | 10.4 | 1,558 | 12.7 | 2,085 | 15.9 |
| Region I | 24 | 0.6 | 26 | 0.6 | 28 | 0.6 | 31 | 0.6 | 34 | 0.6 |
| Region II | 9 | 0.3 | 10 | 0.3 | 11 | 0.3 | 12 | 0.3 | 13 | 0.3 |
| Region III | 54 | 0.9 | 73 | 1.1 | 99 | 1.3 | 134 | 1.7 | 182 | 2.1 |
| Region IV | 58 | 0.8 | 78 | 1.0 | 104 | 1.2 | 139 | 1.4 | 186 | 1.8 |
| Region V | 13 | 0.3 | 16 | 0.3 | 20 | 0.4 | 25 | 0.4 | 31 | 0.5 |
| Region VI | 46 | 0.8 | 61 | 1.0 | 80 | 1.2 | 105 | 1.4 | 138 | 1.8 |
| Region VII | 55 | 1.6 | 72 | 2.0 | 94 | 2.4 | 123 | 2.9 | 161 | 3.6 |
| Region VIII | 11 | 0.2 | 14 | 0.3 | 18 | 0.3 | 23 | 0.4 | 29 | 0.5 |
| Region IX | 16 | 0.5 | 21 | 0.6 | 28 | 0.7 | 37 | 0.9 | 49 | 1.1 |
| Region X | 17 | 0.5 | 23 | 0.6 | 31 | 0.7 | 42 | 0.8 | 57 | 1.1 |
| Region XI | 31 | 0.7 | 36 | 0.7 | 42 | 0.8 | 49 | 0.8 | 57 | 0.9 |
| Region XII | 10 | 0.3 | 12 | 0.4 | 15 | 0.4 | 19 | 0.5 | 24 | 0.5 |
| **Total** | **994** | **1.6** | **1,312** | **1.9** | **1,734** | **2.3** | **2,297** | **2.8** | **3,046** | **3.5** |

Notes: MS - Number of telephone main stations.
MS/100 - Number of telephone main stations per 100 inhabitants.
Source: NTDP, Feb. 1990

**Table F.7 Telephone Density in CALABARZON**

| | 1988 | 1995 | 2000 | 2010 |
|---|---|---|---|---|
| CALABARZON | | | | |
| GRDP (Pesos x 10^6) | 96,660 | 149,224 | 232,776 | 479,760 |
| Population (x 10^3) | 5,950 | 7,468 | 8,785 | 12,154 |
| Per capita GRDP (Pesos) | 16,245 | 19,982 | 26,497 | 39,473 |
| Per capita GRDP (Dollars) | 759 | 934 | 1,238 | 1,845 |
| Per capita GRDP at 1985 price | 660 | 817 | 1,083 | 1,614 |
| Telephone Density | | 2.3 | 3.2 | 4.7 |
| Macroscopic Demand Forecast | | 171,764 | 281,120 | 571,238 |
| NTDP's Target Density in Region IV | | 1.0 | 1.2 | 1.8 |

Exchange rate: P21.4 per US$

**Table F.8 NTDP's Physical Target**

| Criterion | 1989 | 1995 | 2000 | 2005 | 2010 |
|---|---|---|---|---|---|
| Main Telephone Density | 1 | 1.9 | 2.3 | | 3.5 |
| Service Quality | | | | satisfied | |
| | | 1991 | | | |
| Percentage of Local Exchange with Long Distance Interconnection | 85% | 100% | | | |
| Percentage of Municipalities and Cities access to Public Switched Data Network | 0.60% | 15% | 35% | | 50% |
| | 1993 | | | | |
| ISDN: Trial Exchange | Manila | Cebu | | | |

# *Figures*

REPUBLIC OF THE PHILIPPINES
THE MASTER PLAN STUDY OF

# THE PROJECT CALABARZON

| Legend | Figure F.1 |
|---|---|

UNSERVED AREA

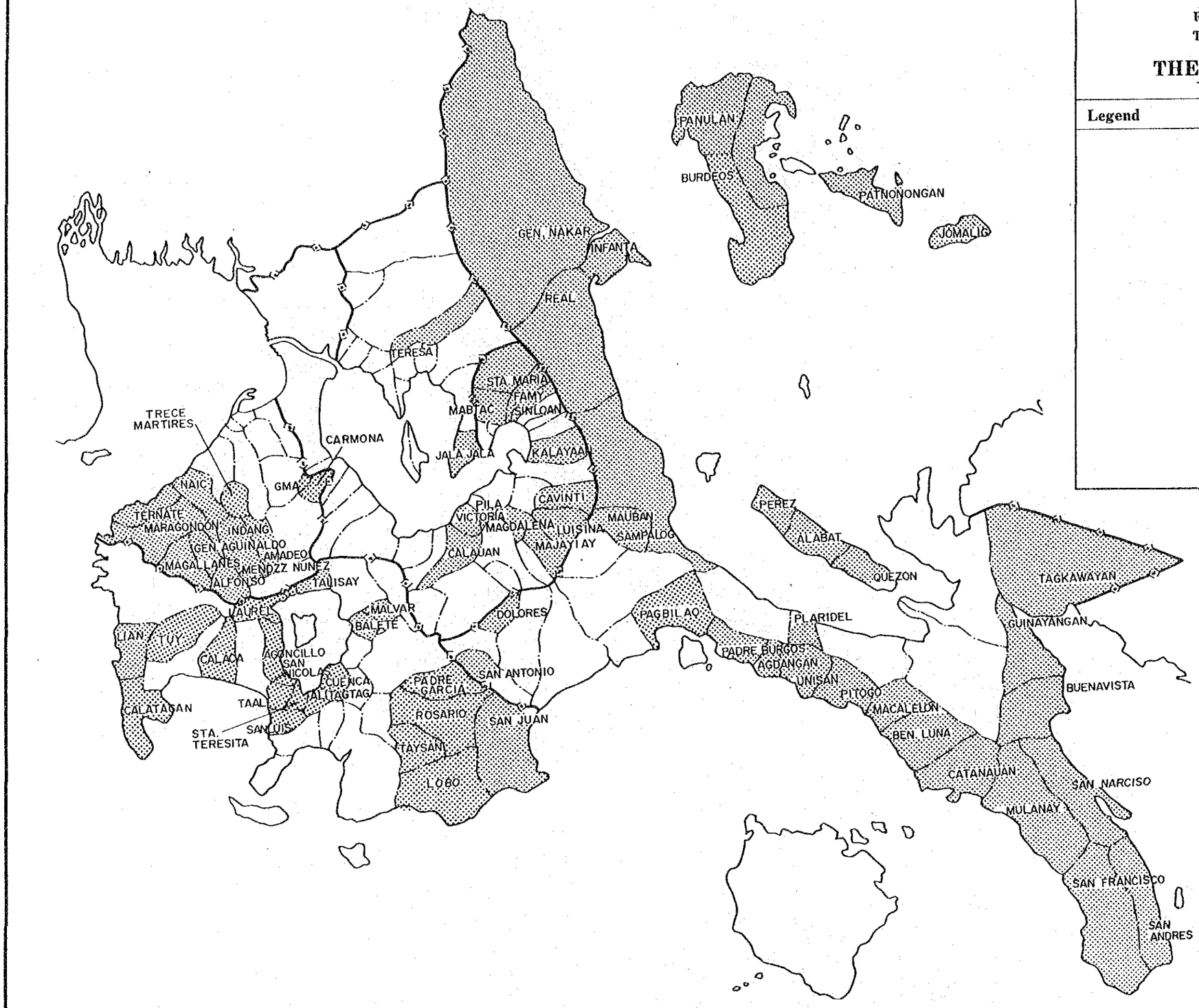



**Figure F.1**

Telephone Unserved Municipalities

| Department of Trade and Industry |
|---|
| Japan International Cooperation Agency |

REPUBLIC OF THE PHILIPPINES
THE MASTER PLAN STUDY OF

# THE PROJECT CALABARZON

**Legend** | **Figure F.2**

| SPC DIGITAL | ANALOG SPC | ANALOG NonSPC | HIERARCHY |
|---|---|---|---|
| ▣ | | | TERTIARY CENTER |
| □ | | | SECONDARY CENTER |
| □ | ⊖ | ○ | PRIMARY CENTER |
| ■ | ⊖ | ● | LOCAL EXCHANGE |
| ▷ | | | RSU |
| ▲ | | | PABX |

- ANALOG RADIO LINK
- DIGITAL RADIO LINK
- FIBER OPTIC CABLE
- CABLE LINK
- ⊗ RADIO RELAY STATION
- MAS CENTRAL STATION
- OUT STATION
- ⬡ MOBILE TEL. EXCHANGE
- ○ MOBILE TEL. BASE STA.
- ● RADIO TERMINAL TOLL STATION / PCO

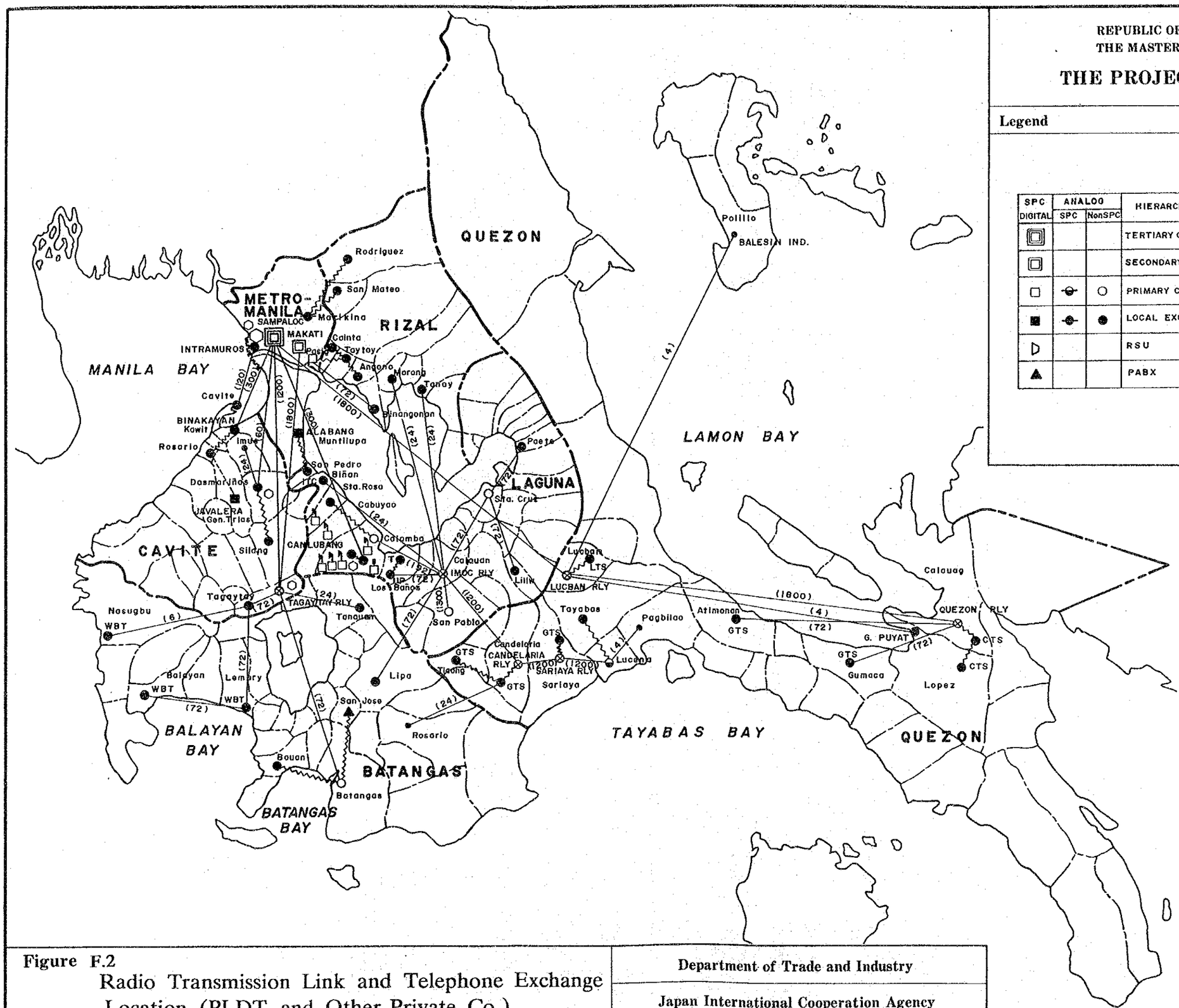



**Figure F.2**
Radio Transmission Link and Telephone Exchange Location (PLDT and Other Private Co.)

Department of Trade and Industry

Japan International Cooperation Agency

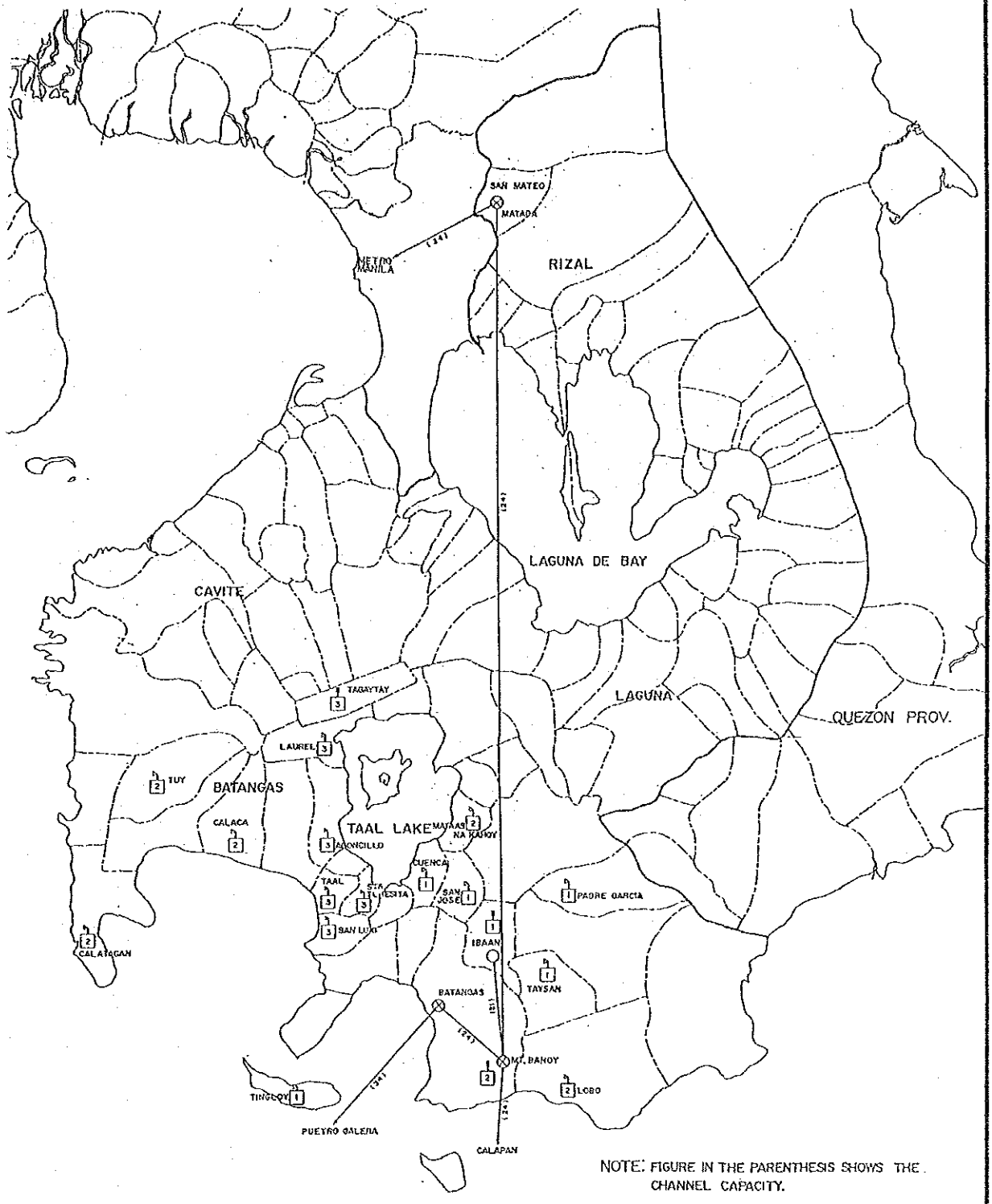



FIGURE F.3 Radio Transmission Link and Telephone Exchange Location (TELOF)

REPUBLIC OF THE PHILIPPINES
THE MASTER PLAN STUDY OF

**THE PROJECT CALABARZON**

JAPAN INTERNATIONAL COOPERATION AGENCY

LEGEND :

| SPC DIGITAL | Analog SPC | Analog Non-SPC | HIERARCHY |
|---|---|---|---|
| | | | TERTIARY CENTER |
| | | | SECONDARY CENTER |
| | | | PRIMARY CENTER |
| | | | LOCAL EXCHANGE |
| | | | R S U |

- ANALOG RADIO LINK
- DIGITAL RADIO LINK
- FIBER OPTIC CABLE
- CABLE LINK
- RADIO RELAY STATION
- MAS CENTRAL STATION
- CUT - STATION
- MOBILE TELEPHONE EXCHANGE
- MOBILE TELEPHONE BASE STATION

REPUBLIC OF THE PHILIPPINES
THE MASTER PLAN STUDY OF

# THE PROJECT CALABARZON

**Legend** | **Figure F.4**

| SPC DIGITAL | ANALOG SPC | ANALOG NonSPC | HIERARCHY |
|---|---|---|---|
| ▣ | | | TERTIARY CENTER |
| ▣ | | | SECONDARY CENTER |
| □ | ⊸ | ○ | PRIMARY CENTER |
| ■ | ⊸ | ● | LOCAL EXCHANGE |
| ▷ | | | RSU |
| ▲ | | | PABX |

- ANALOG RADIO LINK
- DIGITAL RADIO LINK
- FIBER OPTIC CABLE
- CABLE LINK
- ⊗ RADIO RELAY STATION
- MAS CENTRAL STATION
- OUT STATION
- ⬡ MOBILE TEL. EXCHANGE
- ⬡ MOBILE TEL. BASE STA.
- ● RADIO TERMINAL TOLL STATION / PCO

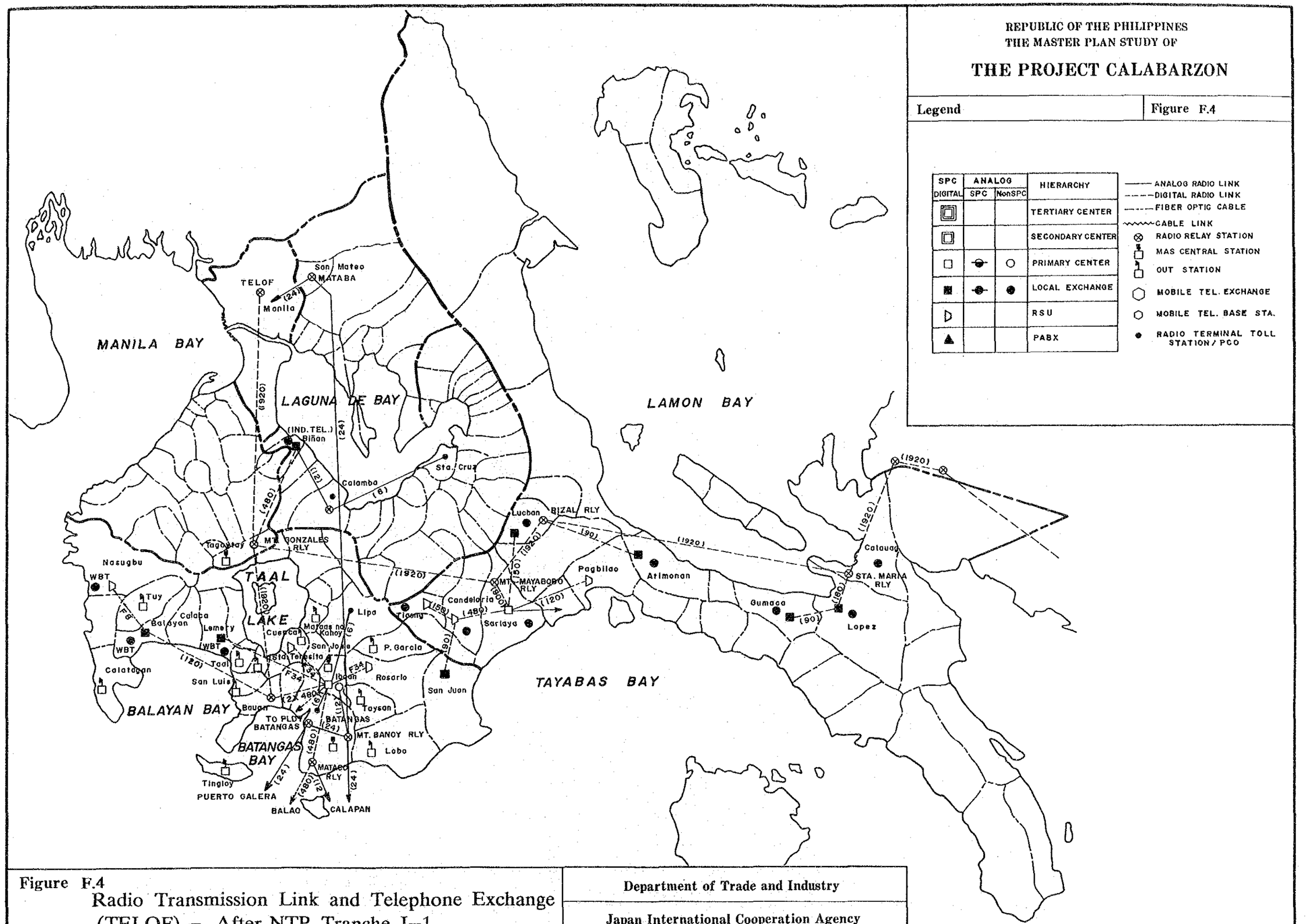



**Figure F.4**
Radio Transmission Link and Telephone Exchange (TELOF) – After NTP Tranche I–1

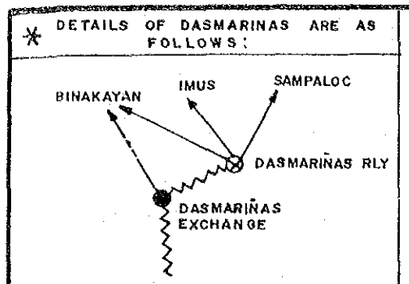
**Department of Trade and Industry**

**Japan International Cooperation Agency**

REPUBLIC OF THE PHILIPPINES
THE MASTER PLAN STUDY OF

# THE PROJECT CALABARZON

**Legend** | **Figure F.5**







| SPC DIGITAL | ANALOG SPC | ANALOG Non SPC | HIERARCHY |
|---|---|---|---|
| ◎ | | | TERTIARY CENTER |
| ◎ | | | SECONDARY CENTER |
| □ | ○ | ○ | PRIMARY CENTER |
| ■ | ●— | ● | LOCAL EXCHANGE |
| ▷ | | | RSU |
| ▲ | | | PABX |

- ANALOG RADIO LINK
- DIGITAL RADIO LINK
- FIBER OPTIC CABLE
- CABLE LINK
- ⊗ RADIO RELAY STATION
- MAS CENTRAL STATION
- OUT STATION
- ⬡ MOBILE TEL. EXCHANGE
- ○ MOBILE TEL. BASE STA.
- • RADIO TERMINAL TOLL STATION / PCO

**Figure F.5** Radio Transmission Link and Telephone Exchange Location (PLDT and Other Private Co.)
– After X–5C Program –

**Department of Trade and Industry**

**Japan International Cooperation Agency**

JICA