No. 12

インドネシア国ジャカルタ首都圏電話網整備拡充計画

業務参考資料

1979年1月

国際協力事業団

インドネシア国ジャカルタ首都圏電話網

整備拡充計画

業務参考資料

1979年1月

国際協力事業団

はじめに（概要）

インドネシア国政府は同国電話公社（Perumtel）の第2次線路網拡張5ヶ年計画（1968～1973）として60万回線にのぼる線路新増設工事を全国的規模において実施中であり第2次計画にひき続き第3次計画を有している。

建設工事の実施にあたり必要な種々の作業、および施設完成後の統一された線路組織のマネージメントのため不可決の、豊富な知識経験を有するスタッフの数がPerumtelに十分でなく下記の3項目に対し我が国に協力を要請してきた。

1　1973～1975にわたりJICAの調査団により行なわれたジャカルタ首都圏線路網基本計画の見直し

　第3次線路網拡張計画の作成

　現在進行中のプロジェクトの調整

2　ジャワ、スマトラ、カリマンタン各島にて現在行なわれている49局、60,900回線におよぶ線路工事の実行線表調整、検査ならびに進行管理

3　Perumtelの統合された屋外線路組織に対する長期及び年度計画、資機材の仕様書作成、標準建設工法の準備、等各種の援助

以上要請は計画、設計、建設、等多岐にわたるがこれらのうち開発調査案件として

1　JICA調査団により1971年3月インドネシア国政府に提出された首都圏線路網長期計画の部分的見直しを含む第3次線路網拡張5ヶ年計画の作成

2　ジャカルタ市内の一部の地域の局の線路網基本設計図の作成

を実施することとしインドネシア政府及びPerumtelと作業内容、スケジュール、便宜供与等を打ち合せあわせて現地の事前踏作を行なうため、昭和53年12月4日より12月22日までインドネシアに事前調査団が派遣された。

本報告書は調査団による事前調査報告書である。

目　　次

参考資料

1　事前調査団の目的

次の開発調査協力の Scope of Workの取極め

(1) 第3次電話網拡充5カ年計画の作成

（1976年3月ＪICA 作成の長期計画の見直しを含む）

(2) ジャカルタ市内における若干の地域の電話網の基本設計の作成

2　調 査 期 間

1978年12月4日～1978年12月22日（19日間）

3　調査団の編成

福　田　　滋	郵政省
三　島　義　郎	日本電信電話公社
福　山　　潔	日本電信電話公社
高　畠　一　純	日本電信電話公社
片　桐　徳　一	国際協力事業団（ＪICA）

4 調査日程

月 日		調査項目等	記事
1978年 12月4日	月	出国、ジャカルタ着	
5	火	関係者あいさつ 日本側内の打合せ	大使館、JICA事務局等 大使館、調査団等参加 調査団の作成したScope of work(案)について
6	水	日本側内の打合せ	同 上
7	木	野外調査	Kebayoran. Cipete. Pasar Minggu. Tebet. Jatinegara. Cawang. Pasar Rebo. Cempaka Putih. GambirⅡ 各局管内
8	金	イ側との打合せ(第1回)	郵電総局と打合せ
9	土	野外調査、資料収集	ジャカルタ通信局、GambirⅠ、Ⅱ 局々内
10	日	ジャカルタ発、バンドン着 日本人専門家グループ(電気通信)と打合せ	宿舎関係・事務所の調査
11	月	イ側との打合せ(第2回) バンドン発、ジャカルタ着	プルムテルとの打合せ
12	火	イ側との打合せ(第3回)	郵電総局と打合せ
13	水	調査団内打合せ及び 資料収集	第3回打合せでPendingになった点につき打合せ
14	木	イ側との打合せ(第4回)	郵電総局(プルムテルを含む)と打合せ
15	金	イ側との打合せ(第5回)	同 上
16	土	野外調査、資料収集	ジャカルタ通信局、Kota. Jatinegara 局内調査
17	日	調査団内打合せ	
18	月	イ側との打合せ(第6回) Marketing center視察・討論	郵電総局(プルムテルを含む)と打合せ
19	火	イ側との最終打合せ(第7回)	同 上 議事録に双方署名
20	水	関係者へ報告	大使館、JICA事務所、ジャカルタ通信局内
21	木	関係者に対するあいさつ ジャカルタ発、シンガポール着	NTTジャカルタ事務所
22	金	シンガポール発 帰国	

5 交渉結果

5.1 交渉概要

調査団はほぼ所期の目的を達し、昨年12月19日にScope of Workの調印を了した。

すなわち、基本的事項（調査内容、イ側の資料入手協力義務、基本設計の対象地域の限定等）については、先方の諒解を得ることができた。ただし、本調査に対する便宜供与につき、イ側において実際上措置できないものがあり、調査に実質的に大きな影響をもたらさないものについては修正に応じた。

なお、調査団はイ側の協力により、資料の入手を行なうとともに、ジャカルタ市内の主要局の施設の現状を調査した。

5.2 軽微な修正事項

(1) Ⅱ、イについて

表現の修正である。

(2) Ⅳについて

最終報告書の提出先を「電気通信総局経由インドネシア政府」と改めた。

(3) Ⅴ、3について

ジャカルタ駐在日本大使館の要請で、当初、A1フォーム特権免除4項の文言をScope of Work中に挿入するよう要請され提案したものである。イ側から具体的事例の説明を要求されることが察知されたため、日本大使館に再考を求めたところ、現文案に代置されたい旨示唆され、これを再提案して先方の了承を得た。

(4) Ⅴ、6について

ガイドの提供については、イ側がカウンターパート7名以上の提供を受け容れたので、これを取り下げた。

(5) Ⅴ、7について

タイピスト及びメッセンジャー各1名の提供については、イ側の適当な人の雇用困難が指摘され、これを了承した。

(6) Ⅴ、8について

事務所（160m² 以上）の提供は強く主張して、これを受容されることができた（家具付）

電話3台分の通信費の負担につき、イ側は国際電話料金の負担は難色を示した（プルムテルはKDDに料金割当を行わなければならない）が、日本側からはプルムテルに料金割当を行なうこととなるので、相互主義を主張したところ、結局、公用のみは負担することに同意した。

(7) Ⅴ、9について

運転手付自動車5台の提供についてはイ側は実際上不可能としたが、これに代って現地

購入の5台分の自動車については免税措置を約束することとなった（ただし、現地ＪICA事務所長によれば、実際の使用に先立つ3か月前に手続を行なうよう注意された）。

5.3　問題となった事項

(1)　付表「調査のタイム・スケジュール」について

イ側は、調査期間中、引続いて日本人メンバーの滞在を要望してきた。実際上、調査に必要な連続事項も想定されるとともに、カウンターパート7名以上及び事務所借上げの中継の影響を考慮し、これは止むを得ないものと思料し、最後の現地調査が終了するまでの16か月間は最低1名の滞イの要望に応じた。

これに伴う経費増は1人・1か月の人件費及び滞在費となる。

(2)　Ⅳ、報告書について

イ側は、最終報告書のみならず、定期にプログレス・リポートの提出を要望してきたので、Record of Meeting 中に提出する旨記録した。

(3)　コンピュータ・プログラムの供与について

プロジェクト実施の進行に伴ない、デマンドの年度別見直しに資するため、イ側から、その供与を要望されたが、調査団限りで回答できない問題であるので経費不足を理由に断った。

この問題は今後同種の要請が予想されるとともに、技術協力の見地からは供与が好ましいと考えられるので、要望は国内の関係の向きに伝えることとした。

(4)　基本設計の対象局選定

初年度及び第2年度における基本設計の対象局は、イ側から複雑、かつ、大規模な地域の順に出されたが、予算規模・調査能力を考慮して初年度は2局とした。なお、第2年度については、イ側が提出した候補地域10の なかから選定される。その選定については、初年度における本格調査の実行状況をみて、来年末に訪イするであろう調査団の交渉事項である旨補足説明した。

6　その他－インドネシアに対する電気通信の技術協力

6.1　技術協力の継続の必要性について

今回の取極めでは、過去における日本のインドネシアに対する技術協力の実績により、インドネシア電気通信の事情・要人の人脈等につき適確な情報の下に折衝することができ、極めて効率よく交渉を進めることができた。業務の内容については、当初から問題点の核心に触れることとなった。これも現在迄の技術協力の実績によるものと思われ、技術協力は是非継続して行うべきであると痛感した。

6.2　一般専門家の派遣について

1975 年から開始された電気通信設備の大増設工事により、インドネシアの電気通信設備の数量は飛躍的に増加した（システムとしては問題があるにしても）。

必然的に問題となるのは、今後の運用保守である。そこで現在派遣されている運用保守アドバイザーチームの意義は大である。然し運用保守についての成果を短年月の間に求めるのは極めて難かしいので、息の長い協力によってこそはじめて輝かしい成果が期待出来ると思われる。現在、バンドンに黒田チームを派遣して技術協力を行なっているが、今後も継続派遣して技術協力を行なっているが、今後も継続派遣が望ましい。

又、今後のインドネシアとしては、需要と国家計画にマッチした通信網拡充整備（例、ジャカルタ　ガンビール市外局計画）を経済的に行う必要がある。そこでこれらの部門に関係するアドバイスを行う専門家チームを新規に送り、今後の計画作成に協力する事は意義ある技術協力と考えられる。

かくて、運用保守から得られたデータを計画にフィードバックして計画を作成するという理想の形が期待出来る。

6.3　研修生の受入れ

今回の Scope　of　Work で、インドネシア側は 7 名以上のカウンターパートを準備する事を約束した。

今度のプロジェクトの実施にあたって、インドネシア側は日本国内において行なう国内作業についても、これらカウンターパートを参加させ、線路設計についての Technical　Transfer　の完結を強く要望した。

これに対して、調査団は全員を電電公社が委託されている既存の集団研修コース（線路）に収容することは困難であるが要望は伝える旨回答するに止めた。

したがって、カウンターパートの訓練につきＪＩＣＡベースで適当な受入措置がとれるよう配慮されたい。

6.4　海外青年協力隊

今回インドネシアに対して青年協力隊を派遣する道が開けたが、電気通信部門でも青年協力隊の協力に適する分野が数多くある（例えば電話局に於けるプラントレコードの作成等）。

ジャワ島特にジャカルタに於ては、生活費の面から現在の青年協力隊給与基準では困難と思われるが、特例によってこれが克服出来れば、その成果は大なるものと思われる。

ただ、たとえ初年度からインドネシア側が多くの人数を希望したとしても、派遣元の問題もあるので初期は数名以下に押えるようにしたい。

MINUTES OF THE MEETING RELATIVE TO THE SCOPE OF WORK ON SURVEY FOR IMPROVEMENT OF TELEPHONE NETWORK IN THE CITY OF JAKARTA.

At the request of the Government of Indonesia for a survey team, the Government of Japan has sent a preliminary study team headed by Mr. Shigeru Fukuda, Special Advisor for International Cooperation, Minister's Secretariat, Ministry of Posts and Telecommunications, to discuss on the draft of the Scope of Work on survey for improvement of telephone network in the City of Jakarta.

Based on attached Scope of Work, The Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of technical cooperation program of the Government of Japan, will carry out the survey in close cooperation with the Indonesian authorities concerned.

The team had a series of discussions with Indonesian authorities concerned.

As a result of the Survey and discussions both parties have agreed upon the attached Scope of Work.

Jakarta, December 19th, 1978,

Mr. ROLLIN.
Secretary of Directorate
General of Posts and
Telecommunications.

福田滋

Mr. Shigeru FUKUDA
Special Advisor for Internati-
onal Cooperation,
Minister's Secretariat
Ministry of Posts and
Telecommunications.

RECORD OF MEETING RELATIVE TO SCOPE OF WORK ON SURVEY FOR IMPROVEMENT OF TELEPHONE NETWORK IN THE CITY OF JAKARTA.

December, 1978.

BETWEEN

DIREKTORAT JENDERAL POS DAN TELEKOMUNIKASI

AND

JAPANESE MISSION.

RECORD OF MEETING RELATIVE TO SCOPE OF WORK
ON SURVEY FOR IMPROVEMENT OF TELEPHONE NETWORK
IN THE CITY OF J A K A R T A.

1. To discuss the draft of "Scope of Work" meetings were held on December 8, 12, 14 and 19, 1978 at the conference room of the Directorate General of Posts and Telecommunications attended by Postel, Perumtel representatives and Japanese Mission.
   List of Attendants is given in Annex I.

2. Mr. Rollin expressed his thanks to Japanese Mission visited Indonesia in response to the request of the Government of Indonesia and he expected that this project will be proceeded in a good way.

3. Mr. Fukuda, Chief of the Japanese Mission, explained the purpose of this visit and pointed out that the field survey for the Junction Network and for the Local Network will be undertaken for a period of about 19 months in Jakarta.

4. The Japanese Mission submitted the draft copy of Scope of Work to Postel and Perumtel representatives for consideration.

5. Postel and Perumtel representatives and Japanese Mission discussed the draft of Scope of Work.

   The main results from the meeting are as follows :

5.1 REVISION OF SCOPE OF WORK

ITEM	ORIGINAL DRAFT	REVISION
II 1 (p.1)	Studying of the following data which will be prepared and provided by the Government of Indonesia.	Collection and analysis of the following data in cooperation with the Government of Indonesia.
IV. (p.3)	Twenty copies of the final official report of the Survey prepared by the JICA will be provided to the Government of Indonesia.	..... provided to the Government of Indonesia through the Director General of Posts & Telecommunications.
V. (p.3)	The Government will indemnify any expert in respect of damages awarded against him for action performed in the course of the survey.	The Government undertakes to bear claims, if any arises, against the Japanese Survey team members, engaged in the project resulting from, occuring in the course of, or otherwise connected with the discharge of their official functions in Indonesia except for these arising from the willful misconduct or gross negligence of the Japanese Survey team members.
V. 6 (p.5)	The Government will provide guides for field survey	(deleted)
V. 7 (p.5)	The Government will provide typist and a messenger.	(deleted)
V. 8	The requirement of these office rooms is more than 160 m2 in total furnished with ..... and three telephone lines at Perumtel expense.	The requirement of these office rooms is more than 160 m2 in total furnished with .... and three telephone lines at Perumtel's expense including official international calls.
V. 9. (p.5)	The Government will provide five automobiles with drivers.	The Government will provide tax exemption for five locally purchased automobiles for the Team.

5.2 TIME SCHEDULE FOR THE SURVEY

On the Appendix 1 - "Time Schedule for the Survey", Japanese Mission accepted at least one member of the Survey Team will stay in Indonesia during the whole survey period namely till September 1980 as shown in the attached Time Schedule on request of Indonesia.

5.3 PROGRESS REPORT

On the item IV page 3 Indonesia requested not only the final official report but also the monthly progress report directly from the Survey Team.

Japanese Mission accepted to submit the monthly progress report.

5.4 COMPUTER PROGRAM

Usually The Survey Team prepare the theory, equation and method on computing the junction cable networks, then entrusted the computing to the private computing company through JICA and receive the output data.

The Survey Team will not concern to the computer program. The payment from JICA to the company is only for the output data.

Ownership of computer program belongs to the computing company.

To purchase the ownership of computer program is possible but it is very expensive.

So within limited budget it is very difficult to purchase it now.

The Mission recognize the importance of computer program transfer to Indonesia. Accordingly, this request from Indonesia will be reported to the Government of Japan.

5.5 EXCHANGE AREAS AND JUNCTION CABLE SECTIONS CHOSEN FOR BASIC DESIGN

The Mission requested Indonesia to point out the priority of exchange areas being object for basic design in the first and second year in order to fix the first year project during the stay of the Mission.

The Mission complemented that the exchange areas and the junction cable sections chosen for second year will be decided by the end of next year between The Government of Indonesia and another Japanese Mission which will be despatched for this purpose.

In this case, the choice will be made in consideration of financial

possibility on Japanese side.

After having studied the conditions of each exchange area, the choice of exchange areas were agreed by both parties as follows :

First Year

x) Exchange areas (Fixed)
Kota I
Jatinegara I
Including transferring Subscriber Network to the surrounding exchange areas.

Second Year

x) Exchange Areas (To be chosen among the following exchange areas in the next year).

Pluit, Slipi, Tegal Alur, Meruya, Cilincing, Kedoya, Penggilingan, Jagakarsa, Kota II, Gambir.

x) Junction cable sections.

Junction cable section will be decided based on fundamental plan survey to be carried out by the first year.

5.6 BASIC DESIGN

x) Subcribers' cable

In case of new exchange areas, it is necessary that exchange location shall be determined by Perumtel untill the end of next year.

x) Junction Cable

In case of new junction cable, basic design will be carried out only for the cables to be laid in the existing duct route at the time of design.

x) Sample drawings for Basic design are given in Annex II.

List of Attendants

Indonesia

Mr. R o l l i n Mr. Theo Suryawan Mr. Agus Darman Mr. Soeprapto	Directorate General of Posts and Telecommunications
Mr. D. Sinulingga Mr. A. Sjarief K. Mr. Heri Purnomo Mr. H. Soeratno Mr. Soedarpo Mr. Bocdiono Mr. Bambang S. Mr. Guntur Siregar	Perum Telekomunikasi

J a p a n

Mr. S. Fukuda	Leader of Mission
Mr. Y. Mishima	Member of Mission
Mr. K. Fukuyama	"
Mr. K. Takabatake	"
Mr. T. Katagiri	"
Mr. S. Kanda	First Secretary of Japanese Embassy.
Mr. M. Miyamoto	Director of JICA Jakarta Office.
Mr. T. Shinoura	Member of JICA Jakarta Office.
Mr. I. Ebihara	N.T.T.P.C.

Consultant.

Mr. J. Kawakami	Resident Representative of the Jakarta Office of NTC.
Mr. R. Matsudo	Chief Engineer of NTC.

SCOPE OF WORK
ON
SURVEY FOR IMPROVEMENT OF TELEPHONE NETWORK IN THE CITY OF JAKARTA.

I. INTRODUCTION

In response to the request of the Government of Indonesia, the Government of Japan has decided to conduct the planning and the designing of the Jakarta City Telephone Network in accordance with pertinent laws and regulations in force in Japan. Japan International Cooperation Agency (JICA), the official agency responsible for implementation of technical cooperation program of the Government of Japan, will carry out the survey.

The present document sets forth the scope of work with regard to the abovementioned survey, which is to be carried out in close cooperation with the authorities concerned.

II. CONTENT OF SURVEY

The purpose of the survey is:

(1) To make outside plant expansion program for Third Five Year Plan including the review of the long term planning prepared by JICA mission on March 1976.

(2) To make a fundamental designing of telecommunication network in certain Jakarta areas.

The survey will be done in the following three stages :

1. First Stage

Collection and analysis of the following data in cooperation with the Government of Indonesia.

(1) Statistics pertinent to the Jakarta area.

(2) The Five Year Economic Development Plan of Indonesia and the Jakarta City Plan.

(3) Statistics pertaining to number of subscribers and number of pending demand in each existing exchange area of the last five years or more than five years.

(4) Number of pending demand by distribution block area.

(5) Statistics on telephone traffic.

(6) Number of persons engaged in industries.

(7) Income standard or living standard.

(8) Diffusion rate of durable consumer's goods.

(9) Economic index.

(10) Consumption amount of electricity, gas, and water.

(11) Number of telegrams, leased lines, and other statistical data concerning telecommunication.

(12) City maps on scales of 1:1000, 1:5000 and aerial photographs.

(13) Plant records of existing facilities concerning telecommunication including trunk circuit assignment list and subscriber pair list.

(14) Technical standard, technical manual, and technical procedure.

(15) Existing basic telecommunication plan made by Perumtel, and other enterprises.

(16) Newest tariff system.

(17) Past construction cost classified by civil, subscriber, and junction cable.

(18) Laws and regulations concerning telecommunication and agreements between Perumtel and related administrations.

(19) Other necessary data for the planning and the designing.

2. Second Stage

Collection and analysis of the following materials or negotiating the following matters:

(1) Local exchange service area.

(2) Telephone exchange location including temporary MCX exchange location.

(3) Telephone supply plan.

(4) Decision on the first optimum capacity of facilities.

(5) Numbering plan.

(6) Routing plan and trunking diagram.

(7) Standard trunk circuit route.

(8) Traffic engineering standard.

(9) Transmission loss assignment.

(10) Outline of nationwide subscriber trunk dialing plan.

(11) Loading standard

(12) PCM system application standard

(13) Application standard for underground cable and aerial cable.

(14) Design application standard for duct cable and direct buried cable.

(15) Duct diameter and material

(16) Application of cross-connection box.
(17) Type of subscriber distribution cable and type of terminal box.
(18) Application standard for jelly filled cable.
(19) Gas pressurization standard.
(20) Limit to number of cables hung on the same pole.
(21) Standardization of cable pair numbers.
(22) Design symbol.
(23) MDF type.
(24) Other necessary data.

3. Third Stage

Conducting field survey and preparing the following reports:
(1) Fundamental planning.
(2) Outside plant expansion program for Third Five Year Plan.
(3) Basic design of junction cable.
(4) Basic design of subscriber cable.

III. TIME - SCHEDULE

The survey is intended to be carried out for a period of 19 months according to the tentative schedule attached hereto as Appendix 1.

IV. REPORT

Twnety copies of the final official report of the survey prepared by the JICA will be provided to the Government of Indonesia through The Director General of Posts and Telecommunications.
The main content of the report is as follows :

1. Fundamental planning

(1) Macroscopic demand forecast by telephone exchange for year of 1979, 1983 and 1993.
(2) Originating traffic estimation classified by telephone exchange for year of 1979, 1983 and 1993.
(3) Traffic flow estimation between each telephone exchange for year of 1979, 1983 and 1993.
(4) Junction cable expansion plan (number of cable pairs, length, etc.).

2. Outside plant expansion program for Third Five Year Plan.

(1) Supply plan.

(2) Outside plant construction cost estimation.

(i) Subscriber cable construction

(ii) Junction cable construction

(iii) Civil construction

(iv) Others.

(3) Standardization of completion drawing.

3. Basic design of junction cable (five cable sections at maximum)

(1) Junction cable route design.

(2) Loading spacing designing (load pair allotment).

(3) PCM design (repeater spacing, PCM pair allotment, etc.).

(4) MDF terminating design.

(5) Principal works.

4. Basic design of subscriber cable (seven exchange areas at maximum)

(1) Microscopic demand forecast.

(2) Cable route and cabinet area design.

(3) Primary cable design.

(4) Secondary cable design.

(5) MDF terminating design.

(6) Gas pressurization system design.

(7) Principal works.

V. CONTRIBUTION BY THE GOVERNMENT OF INDONESIA

1. The Government will exempt the Survey Team from taxes and duties for machinery, equipment and materials to be brought into Indonesia by the Team as the Government normally extends to the Colombo Plan experts.

2. The Government will exempt the members of the Team from income tax and charges of any kind imposed on or in connection with the living allowances remitted from abroad and will exempt the members from import and export duties imposed on the members' personal effects.

3. The Government undertakes to bear claims, if any arises, against

the Japanese Survey Team members, engaged in the Project resulting from, occuring in the course of, or otherwise connected with the discharge of their official functions in Indonesia except for those arising from the willful misconduct or gross negligence of the Japanese Survey Team members.

4. The Government will make arrangements for the Teams to take the data necessary for the Survey.

5. The Government will provide more than six Perumtel engineers as counterpart.

6. The Government will provide one office room for project manager, two planning office rooms and one storeroom. The requirement of these office rooms is more than 160 m^2 in total furnished with office furniture (desks, chairs and air conditioning), house keeping units for office use (refrigerator, sofa, easy chairs, table set, etc.), running water, electricity and three telephone lines at Perumtel expense including international official calls. Required storeroom space is more than 20 m^2.

7. The Government will provide tax exemption for five locally purchased automobiles for the team.

8. The Government will assist in renting several residences.

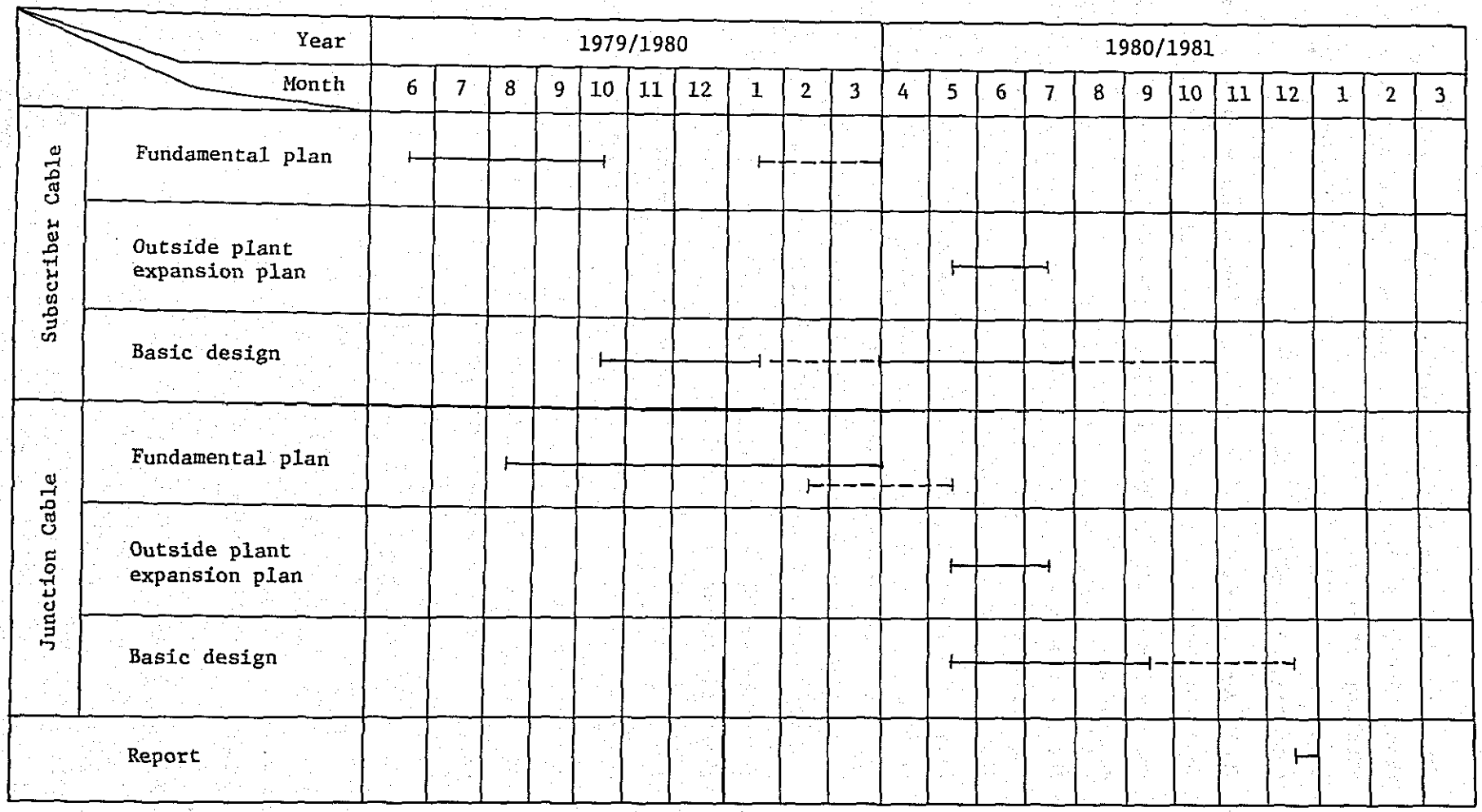
9. The Government will provide telephone traffic measuring equipment.

10. The Government will assist in renting P.O. Box.

11. The Government will furnish identification passes to the members of the Survey Team allowing them to go in and out of the exchange offices.

APPENDIX 1

TIME SCHEDULE FOR THE SURVEY

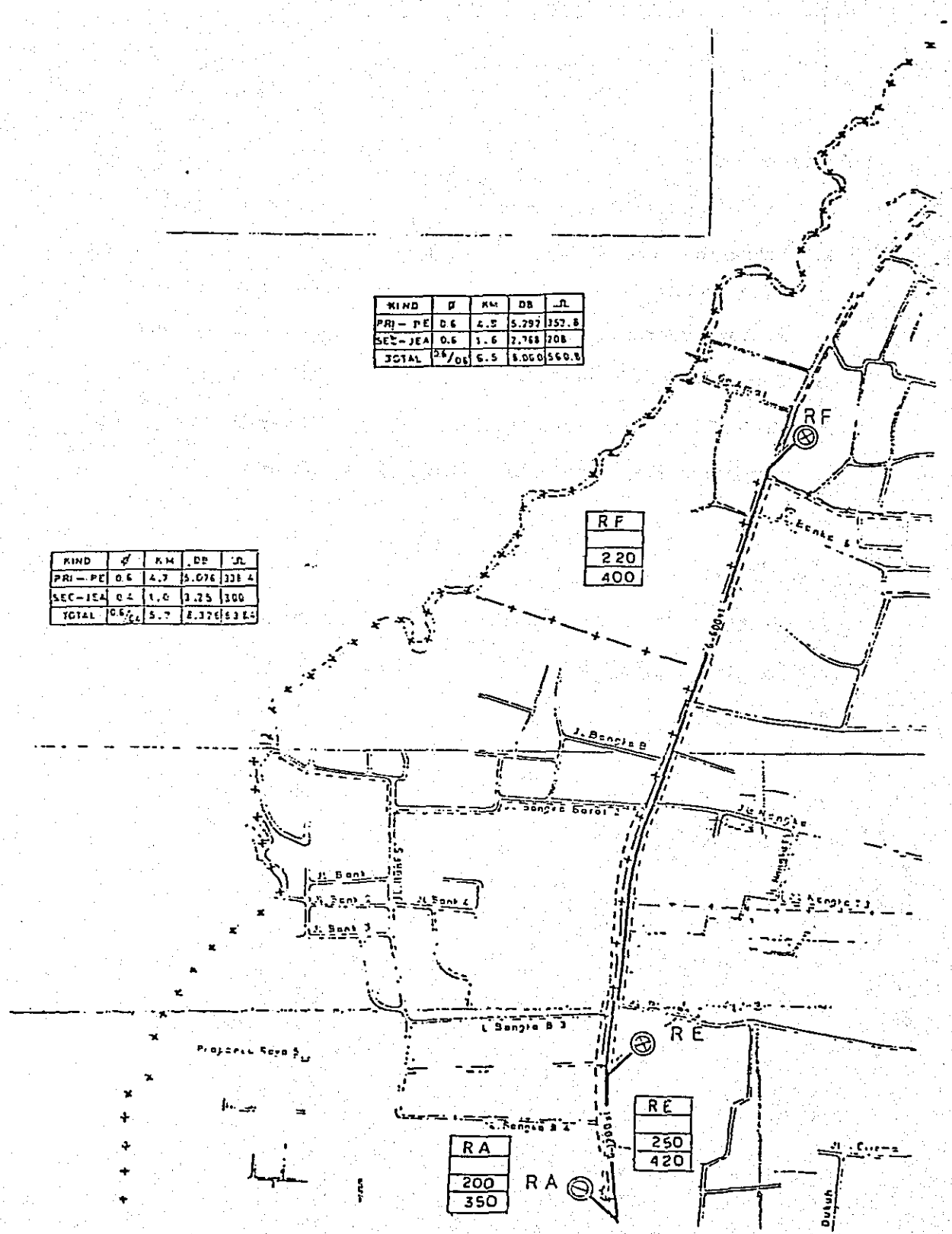


Annex II

Sample Drowings for Basic Design

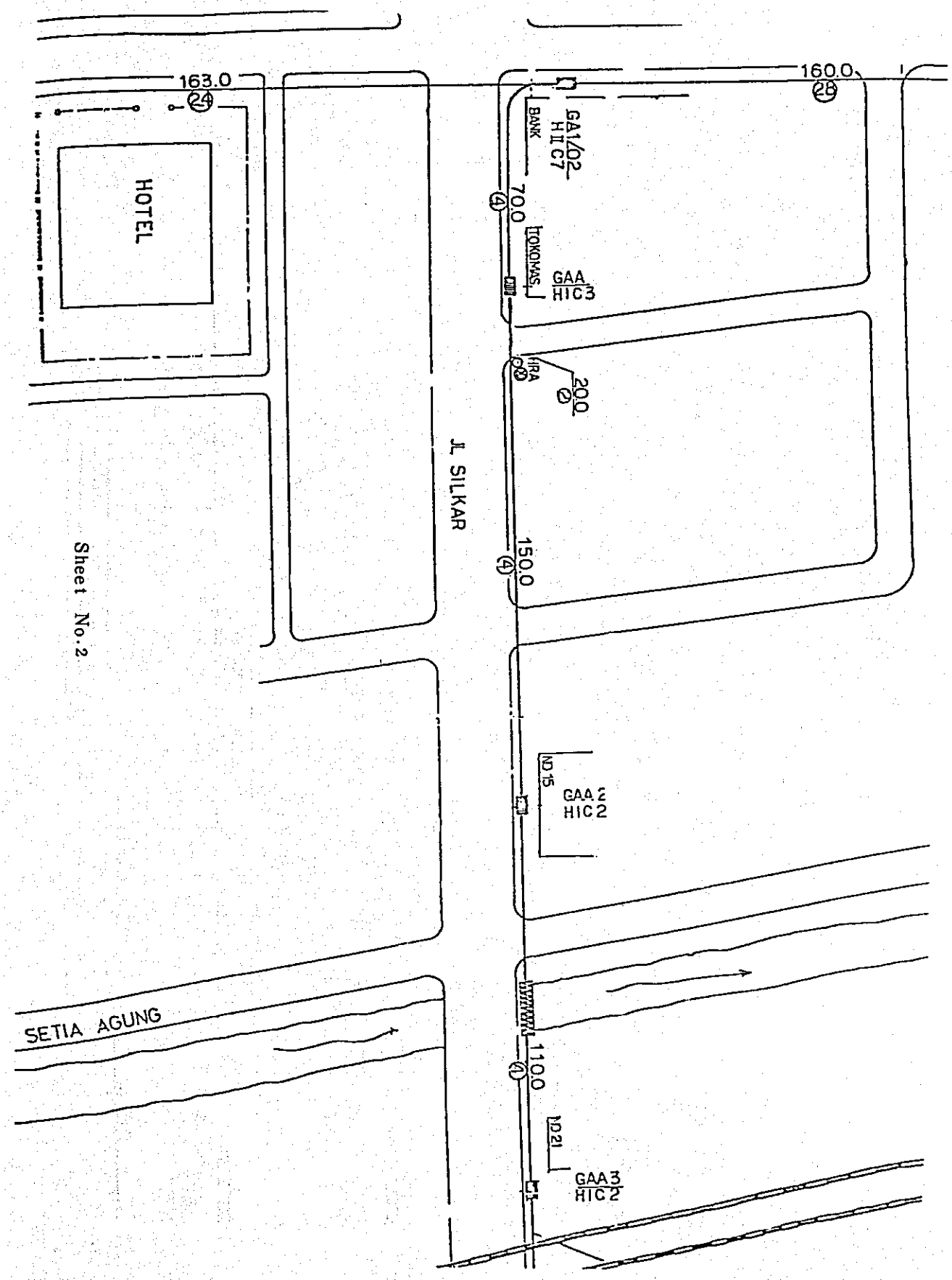
Item	Sheet number
Subscriber Cable	
1. Microscopic demand forecast	Sheet No. 1
2. Subscriber Cable route and cabinet area design	Sheet No. 1 No. 2
3. Primary Cable design	Sheet No. 3, No. 4
4. Secondary Cable design	Sheet No. 5
5. M. D. F. terminating design	Sheet No. 6
6. Gas-Pressurization System design	Sheet No. 3
Junction Cable	
1. Junction Cable route design	Sheet No. 7
2. Loading spacing design	Sheet No. 7
3. PCM design	Sheet No. 8, No. 9 and No. 10
4. M. D. F. terminating design	Sheet No. 6

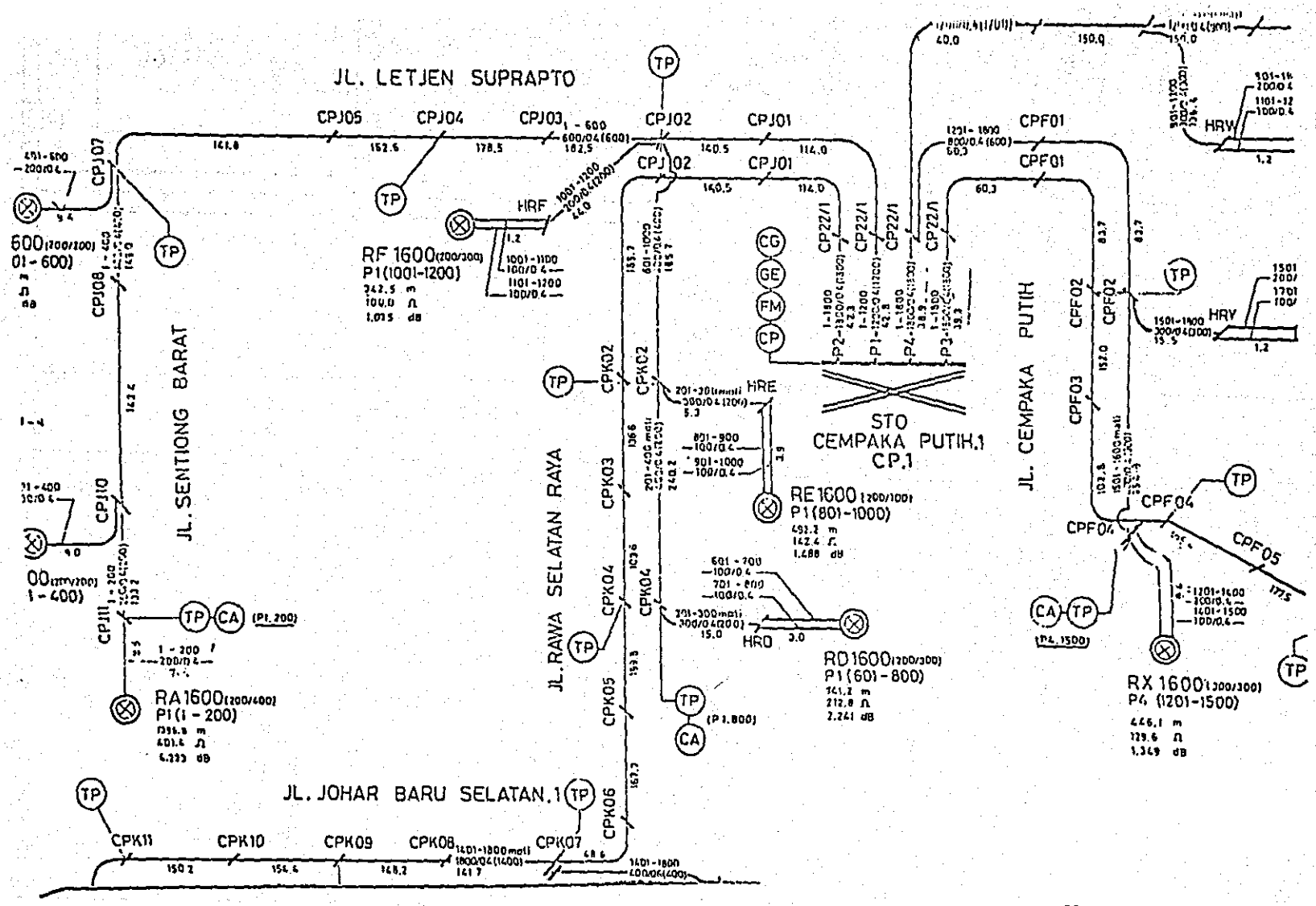
Sheet No.1



KIND	φ	KM	DB	Ω
PRI – PE	0.6	4.3	5.297	357.8
SEC – JEA	0.6	1.6	2.768	208
TOTAL	0.6/0.6	5.5	8.060	560.8

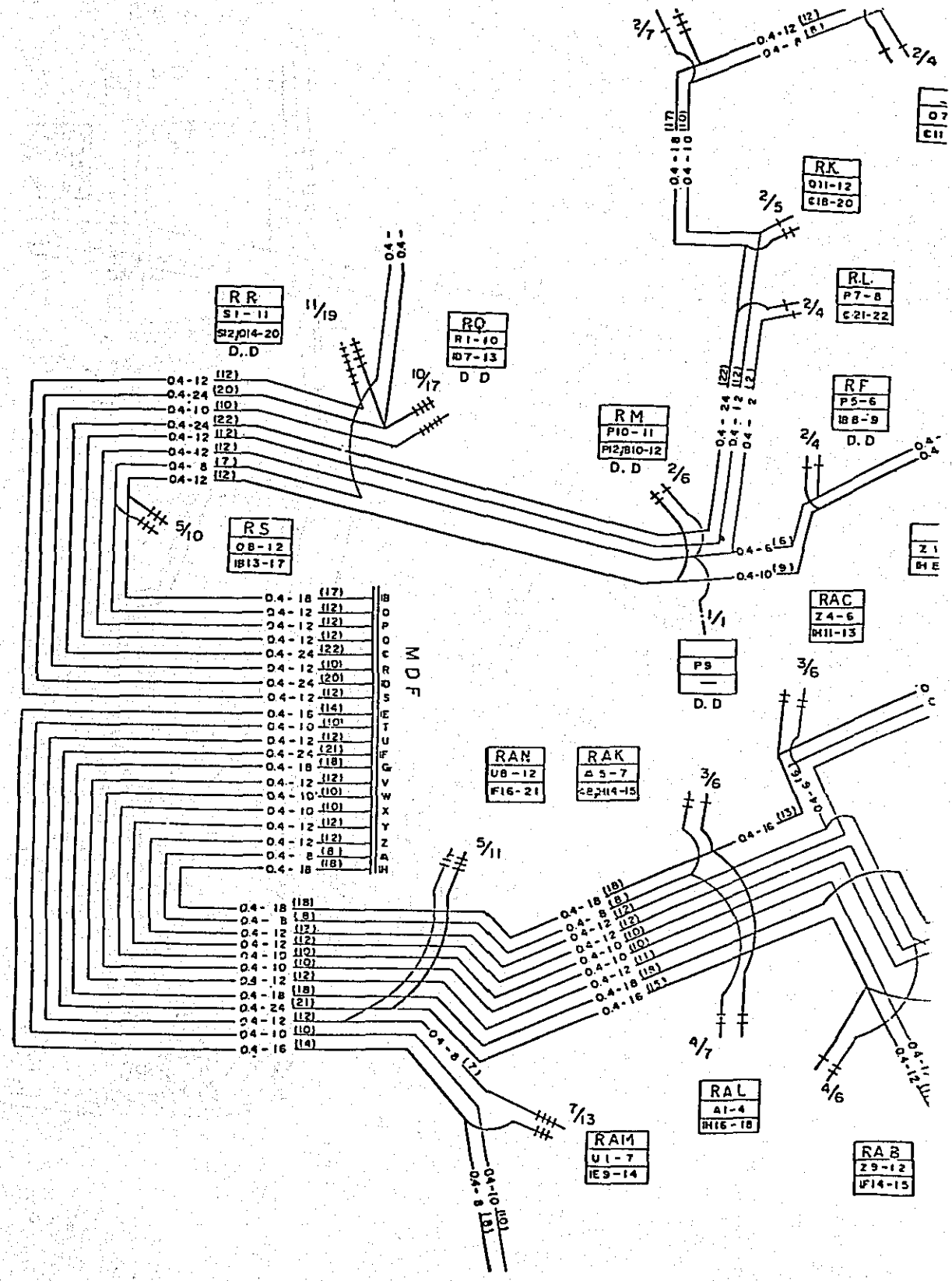
KIND	φ	KM	DB	Ω
PRI – PE	0.6	4.7	5.076	338.4
SEC – JEA	0.4	1.0	3.25	300
TOTAL	0.6/0.4	5.7	8.326	638.4

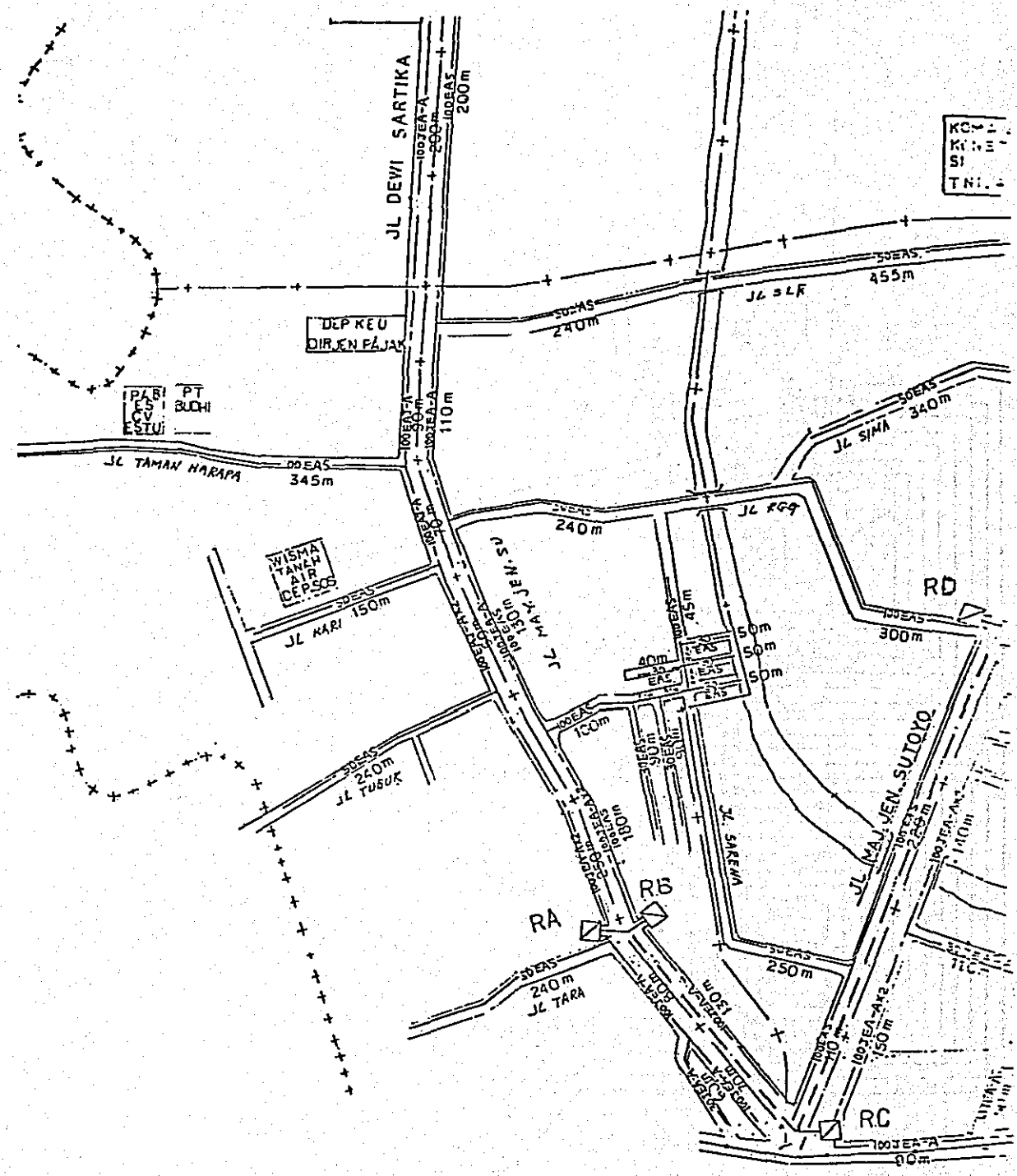

163.0
24
160.0
28
HOTEL
BANK
GA1/02
H II C7
70.0
4
TOKOMAS
GAA
HIC3
HRA
20.0
2
JL. SILKAR
150.0
4
Sheet No. 2
ND 15
GAA 2
HIC 2
SETIA AGUNG
110.0
4
ND 21
GAA 3
HIC 2


JL. LETJEN SUPRAPTO
JL. SENTIONG BARAT
JL. RAWA SELATAN RAYA
JL. CEMPAKA PUTIH
JL. JOHAR BARU SELATAN.1
STO CEMPAKA PUTIH.1 CP.1
RF 1600(200/300) P1(1001-1200)
RE 1600(200/300) P1(801-1000)
RD 1600(200/300) P1(601-800)
RA 1600(200/400) P1(1-200)
RX 1600(300/300) P4 (1201-1500)
HRF
HRE
HRD
HRV
HRW
CPJ01
CPJ02
CPJ03
CPJ04
CPJ05
CPJ07
CPJ08
CPJ10
CPJ11
CPK02
CPK03
CPK04
CPK05
CPK06
CPK07
CPK08
CPK09
CPK10
CPK11
CPF01
CPF02
CPF03
CPF04
CPF05
CP22/1
CG
GE
FM
CP
TP
CA

Sheet No.3

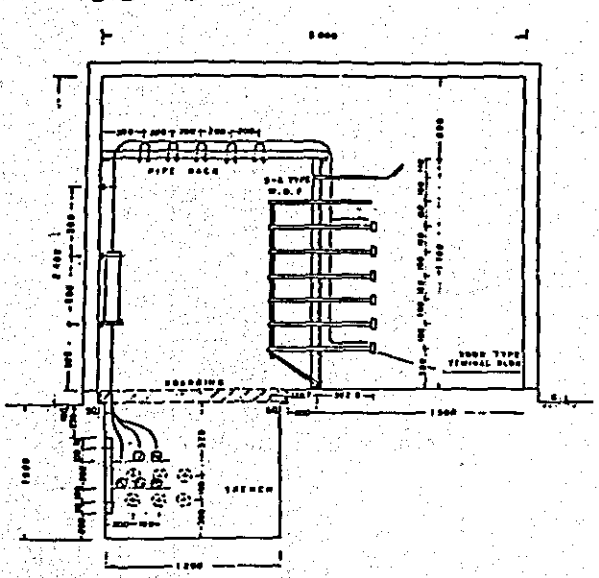
Sheet No.4


RR
S1-11
S12/O14-20
D..D
RQ
R1-10
R07-13
D D
RM
P10-11
P12/B10-12
D. D
RS
O8-12
B13-17
RK
O11-12
C18-20
R.L.
P7-8
C21-22
RF
P5-6
B8-9
D. D
RAC
Z4-6
H11-13
P9
D. D
RAN
U8-12
F16-21
RAK
A5-7
C8,2H14-15
RAL
A1-4
H16-18
RAM
U1-7
E9-14
RAB
Z9-12
F14-15
MDF
2/7
2/5
2/4
2/6
3/6
1/1
5/10
10/17
11/19
5/11
7/13
4/7
4/6

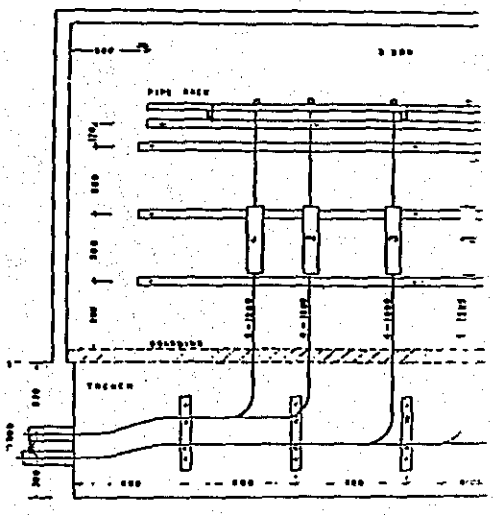

JL DEWI SARTIKA
100EA-A
200m
100EAS
DEP KEU
DIRJEN PAJAK
PT
BUDHI
JL TAMAN HARAPA
100EAS
345m
110m
JL SLR
50EAS
455m
240m
JL SIWA
340m
JL RGG
WISMA
TANAH
AIR
DEPSOS
JL KARI
150m
JL MAJ.JEN.SUTOYO
RA
RB
RC
RD
JL TUSUK
240m
JL TARA
JL SAREWA
250m
300m
100m
150m
90m

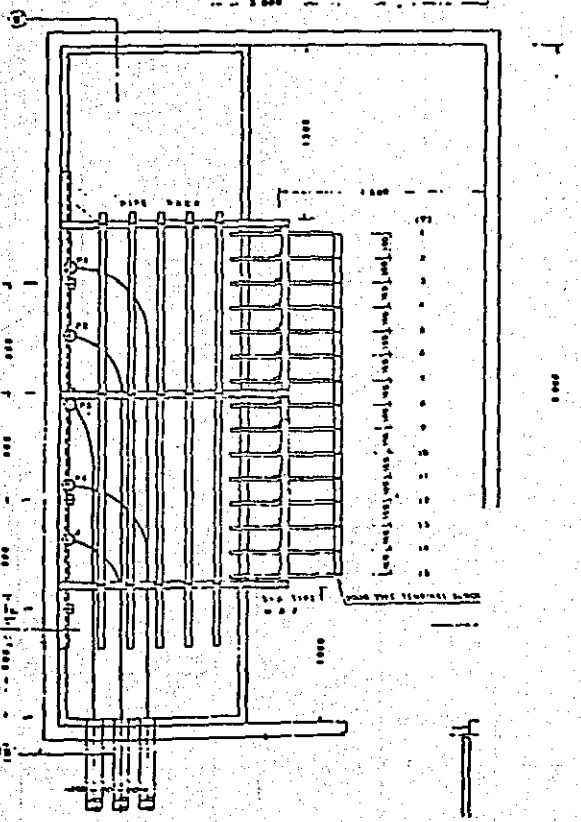
Sheet No.5

Ⓐ-Ⓐ Section

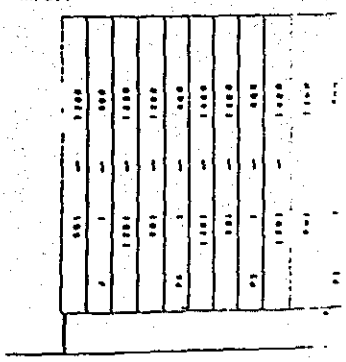


Ⓓ-Ⓔ Section

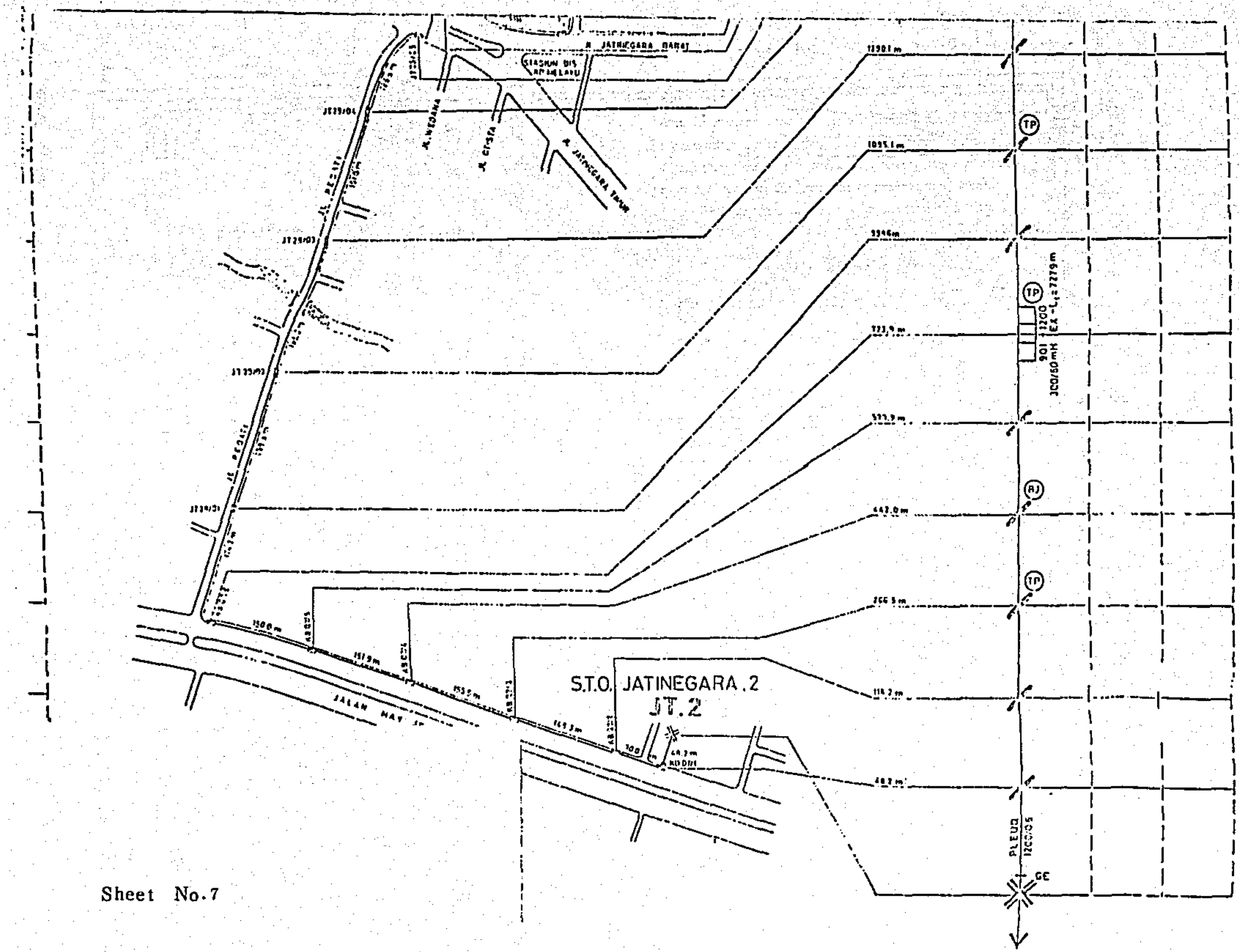




M. D. F



Sheet No. 6



Sheet No.7

JUNCTION LINE ASSIGNMENT FOR PCM (2/5)

CP/PN-6 600-9 PEF-9

PCM	(36^5) UP	= 36NL (1- 36)
〃	(24^3) 〃	= 24NL (37- 60)
SPARE FOR PCM		= 16NL (61- 76)
		= ( )
SPARE FOR PCM		= 21NL (80-100)
		= ( )
PCM	(36^5) DOWN	= 36NL (385-420)
〃	(24^3) 〃	= 24NL (421-444)
SPARE FOR PCM		= 36NL (445-480)
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )

LS/BK-2 600-9 PEF-P

PCM	(27^5) UP	= 27NL (1- 27)
〃	(38^5) 〃	= 38NL (28- 65)
SPARE FOR PCM		= 2NL (66- 67)
		= ( )
PCM	(27^5) DOWN	= 27NL (385-411)
〃	(38^5) 〃	= 38NL (412-449)
SPARE FOR PCM		= 2NL (450-451)
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )

PL/SW-5 600-9 PEF-P

PCM	(14^5) UP	= 14NL (1- 14)
〃	(28^5) 〃	= 28NL (15- 42)
		= ( )
PCM	(23^5) UP	= 23NL (45- 67)
SPARE FOR PCM		= 9NL (68- 76)
		= ( )
PCM	(14^5) DOWN	= 14NL (386-399)
〃	(28^0) 〃	= 28NL (400-427)
〃	(23^3) 〃	= 23NL (428-450)
SPARE FOR PCM		= 9NL (451-459)
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )

PY/LS-1 600-9 PEF-P

PCM	(26^5) UP	= 26NL (1- 26)
〃	(68^3) 〃	= 68NL (27- 94)
SPARE FOR PCM		= 3NL (95- 97)
		= ( )
PCM	(26^3) DOWN	= 26NL (385-410)
〃	(68^9) 〃	= 68NL (411-478)
SPARE FOR PCM		= 3NL (479-481)
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )

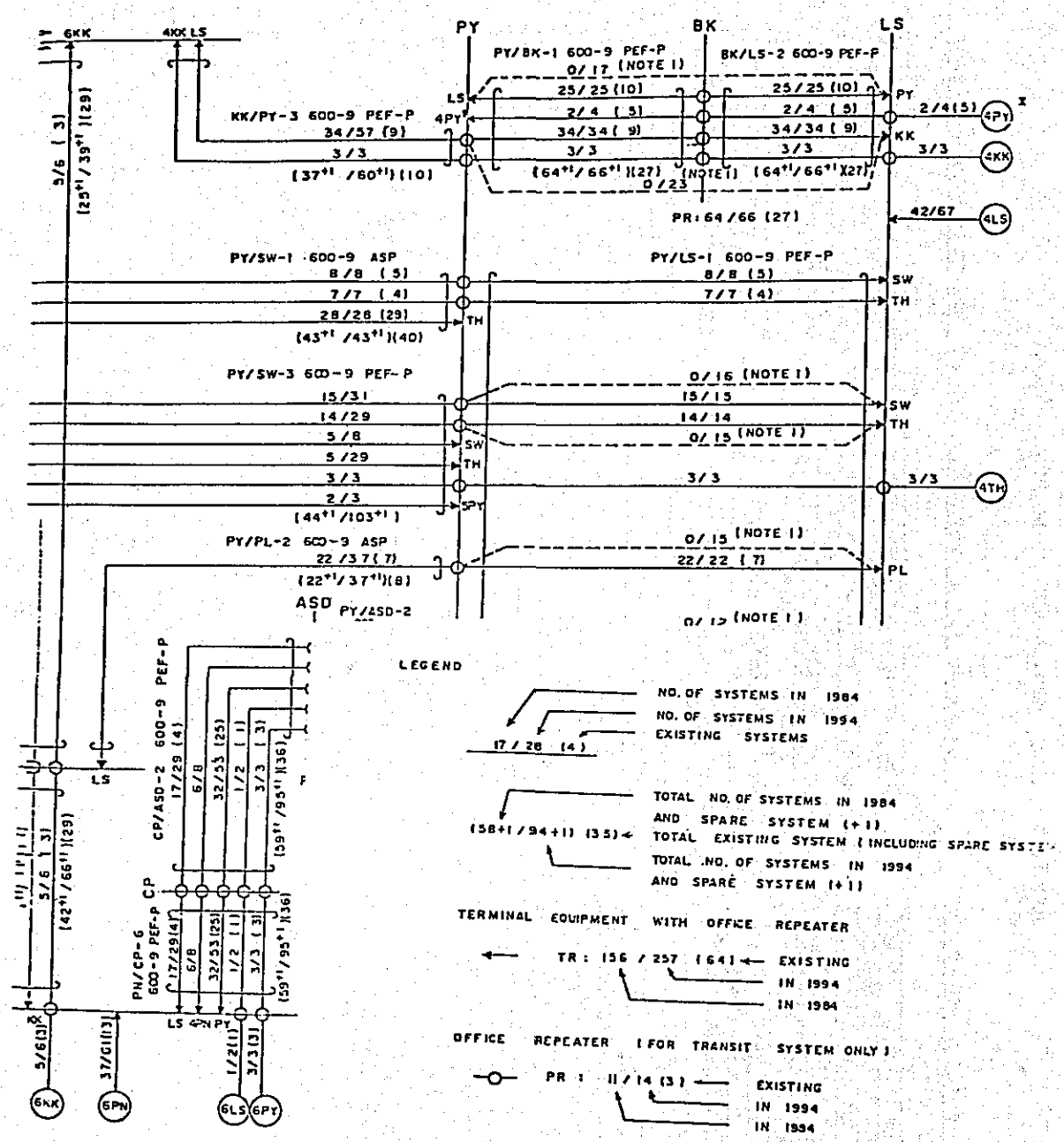
PY/LPI/LS 600/300-9 ASP

PY/LS

PCM	(11^5) UP	= 11NL (101-111)
		= ( )
PCM	(7^5) UP	= 7NL (126-132)
		= ( )
PCM	(3^5) UP	= 3NL (151-153)
SPARE FOR PCM		= 7NL (154-160)
		= ( )
PCM	(11^5) DOWN	= 11NL (201-211)
		= ( )
PCM	(7^5) DOWN	= 7NL (226-232)
		= ( )
PCM	(3^5) DOWN	= 3NL (251-253)
SPARE FOR PCM		= 7NL (254-260)
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )

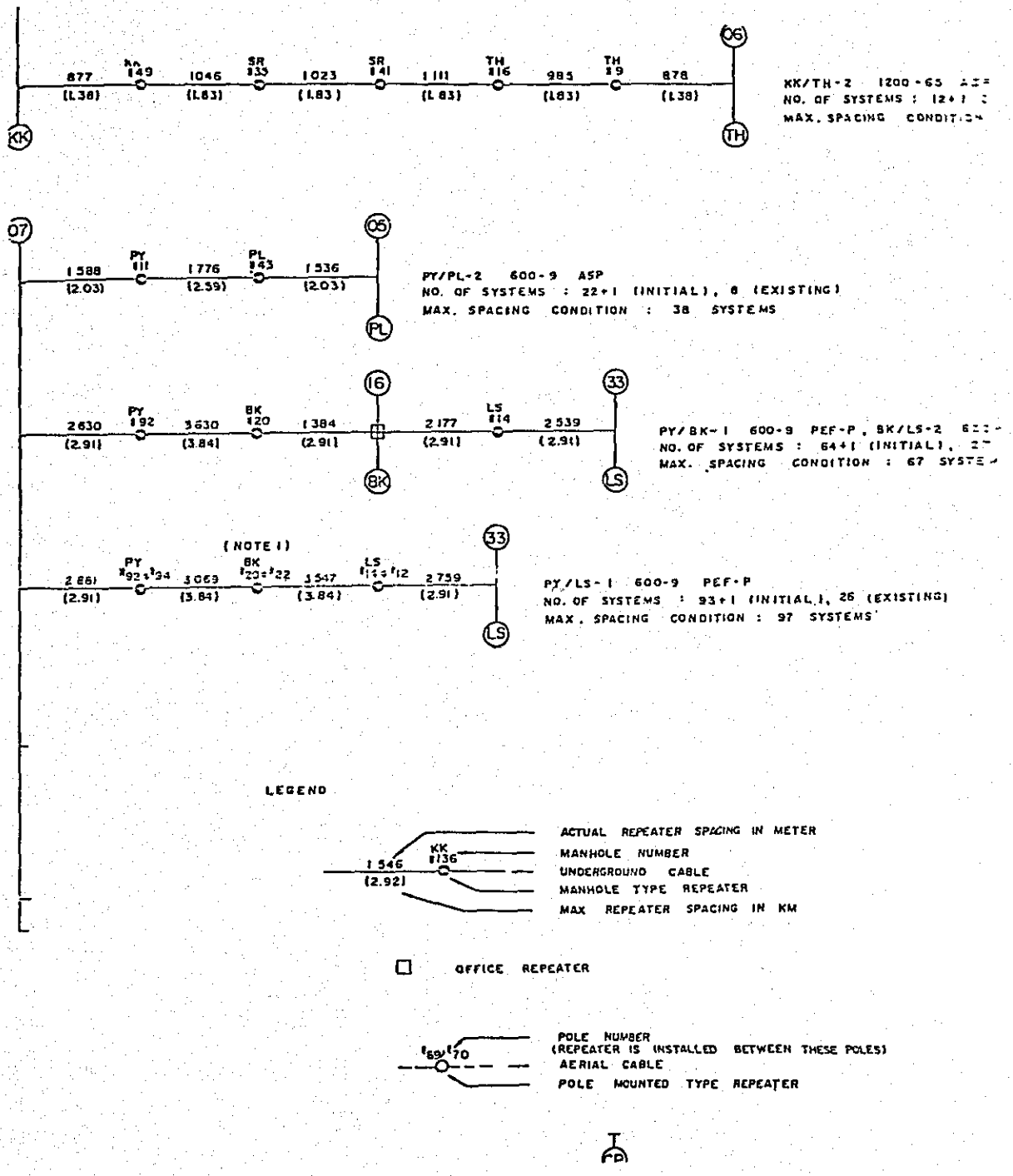
PL/PN-2 600-9 PEF-P

PCM	(29^5) UP	= 29NL (1- 29)
〃	(14^3) 〃	= 14NL (30- 43)
SPARE FOR PCM		= 11NL (44- 54)
		= ( )
PCM	(29^5) DOWN	= 29NL (385-413)
〃	(14^3) 〃	= 14NL (414-427)
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )
		= ( )


PY
BK
LS
6KK
4KK LS
PY/BK-1 600-9 PEF-P
0/17 (NOTE 1)
BK/LS-2 600-9 PEF-P
KK/PY-3 600-9 PEF-P
PR: 64/66 (27)
PY/SW-1 600-9 ASP
PY/LS-1 600-9 PEF-P
PY/SW-3 600-9 PEF-P
0/16 (NOTE 1)
0/15 (NOTE 1)
PY/PL-2 600-9 ASP
ASD
PY/ASD-2
CP/ASD-2 600-9 PEF-P
PN/CP-6 600-9 PEF-P
CP
LEGEND
NO. OF SYSTEMS IN 1984
NO. OF SYSTEMS IN 1994
EXISTING SYSTEMS
TOTAL NO. OF SYSTEMS IN 1984
AND SPARE SYSTEM (+1)
TOTAL EXISTING SYSTEM (INCLUDING SPARE SYSTEM)
TOTAL NO. OF SYSTEMS IN 1994
AND SPARE SYSTEM (+1)
TERMINAL EQUIPMENT WITH OFFICE REPEATER
TR : 156 / 257 (64)
EXISTING
IN 1994
IN 1984
OFFICE REPEATER (FOR TRANSIT SYSTEM ONLY)
PR : 11 / 14 (3)
EXISTING
IN 1994
IN 1984

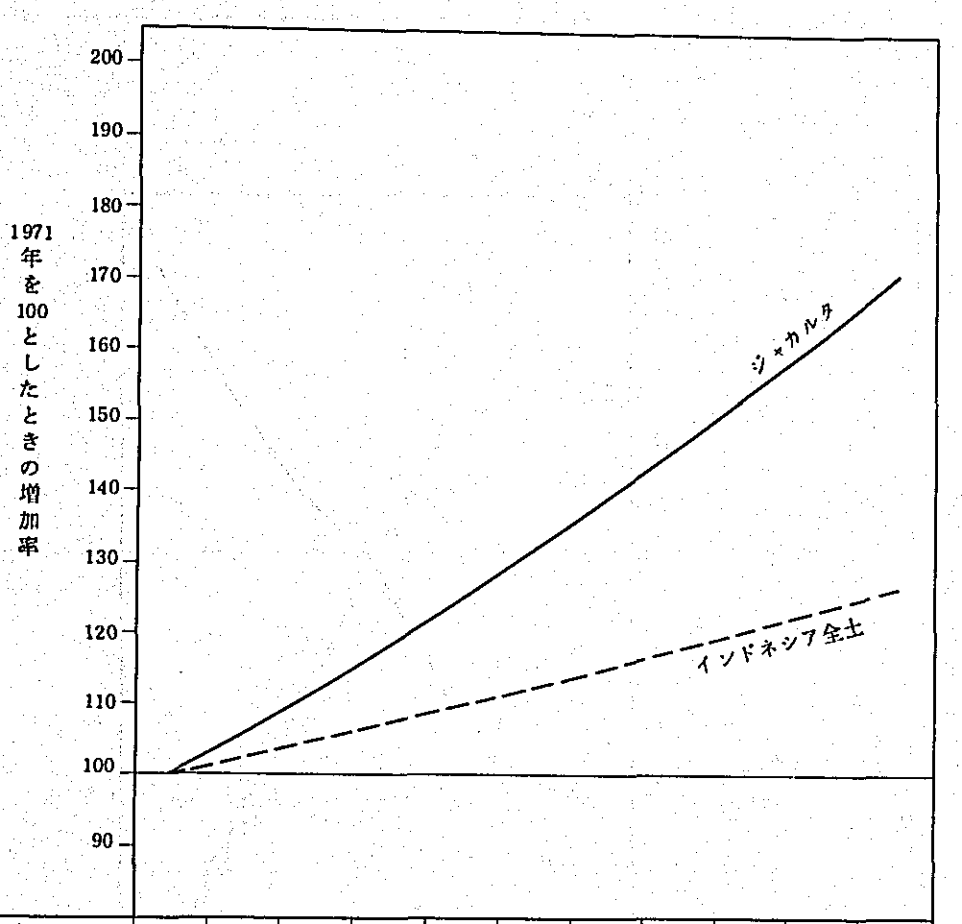
Sheet No.9

PCM REPEATER SPACING PLAN (1/5)



Sheet No.10

参考資料

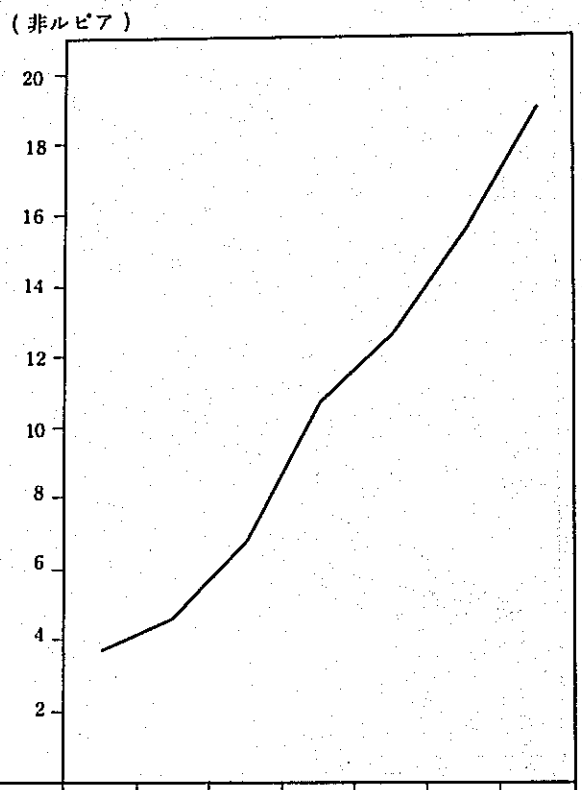


年	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
インドネシア全土（百万人）	120	123	126	129	132	135	138	142	145	148	152
ジャカルタ（百万人）	4.63	4.90	5.19	5.49	5.80	6.12	6.46	6.81	7.16	7.53	7.92

1　人口の推移（各年末推定）

Population Estimate of Indonesia at the End 1971 — 1981 by Region

Table 1. Biro Pusat Statistik



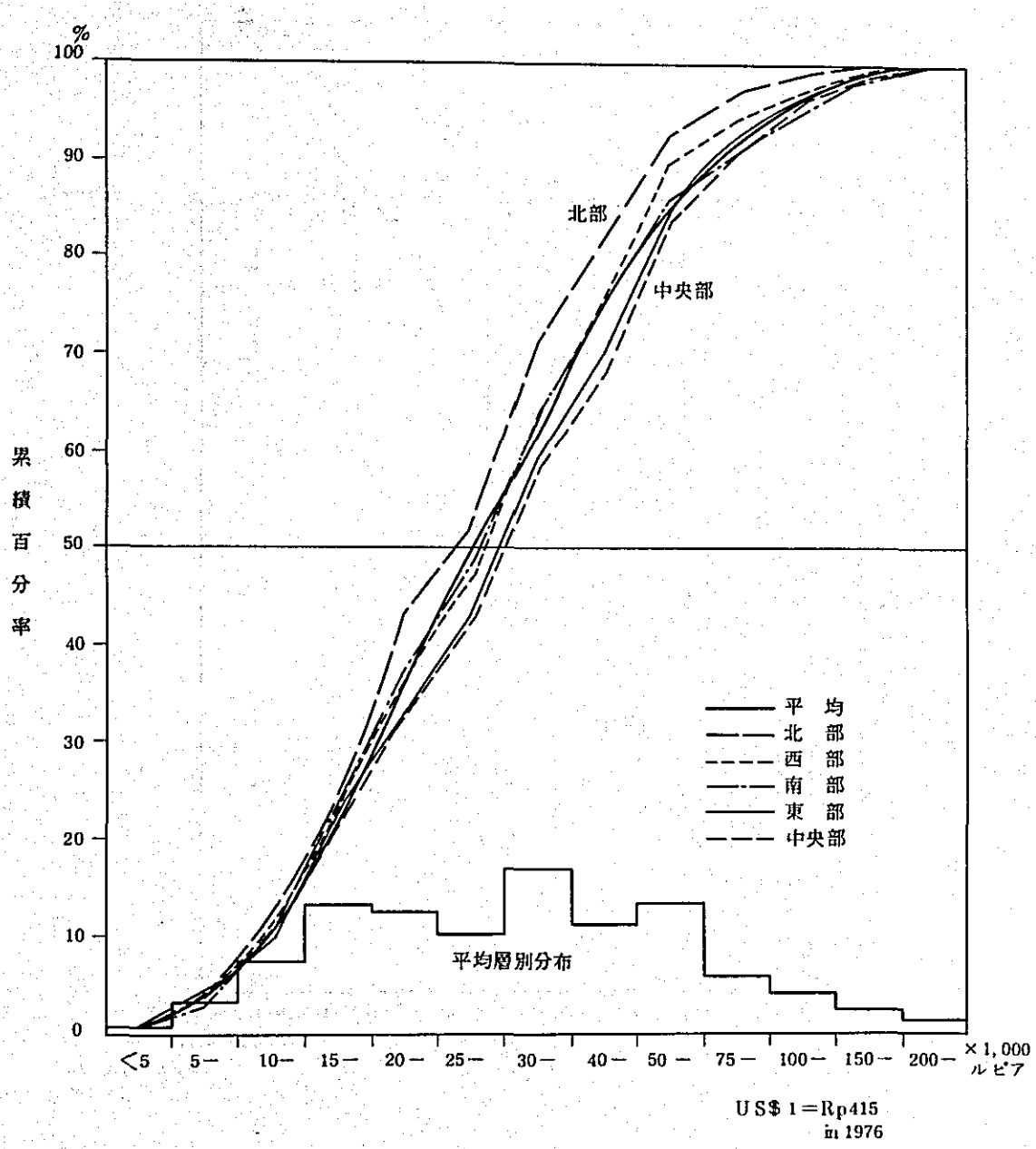
年	1971	1972	1973	1974	1975	1976	1977
GDB（非ルピア）	3. 67	4. 56	6. 75	10. 71	12. 64	15. 47 *	19. 05 *

2　GDPの伸び

（GDP at Current Market Prices）

Main Tables the National Income of Indonesia 1971 — 1977

Biro Pusat Statistik, 3t Ang. 1978

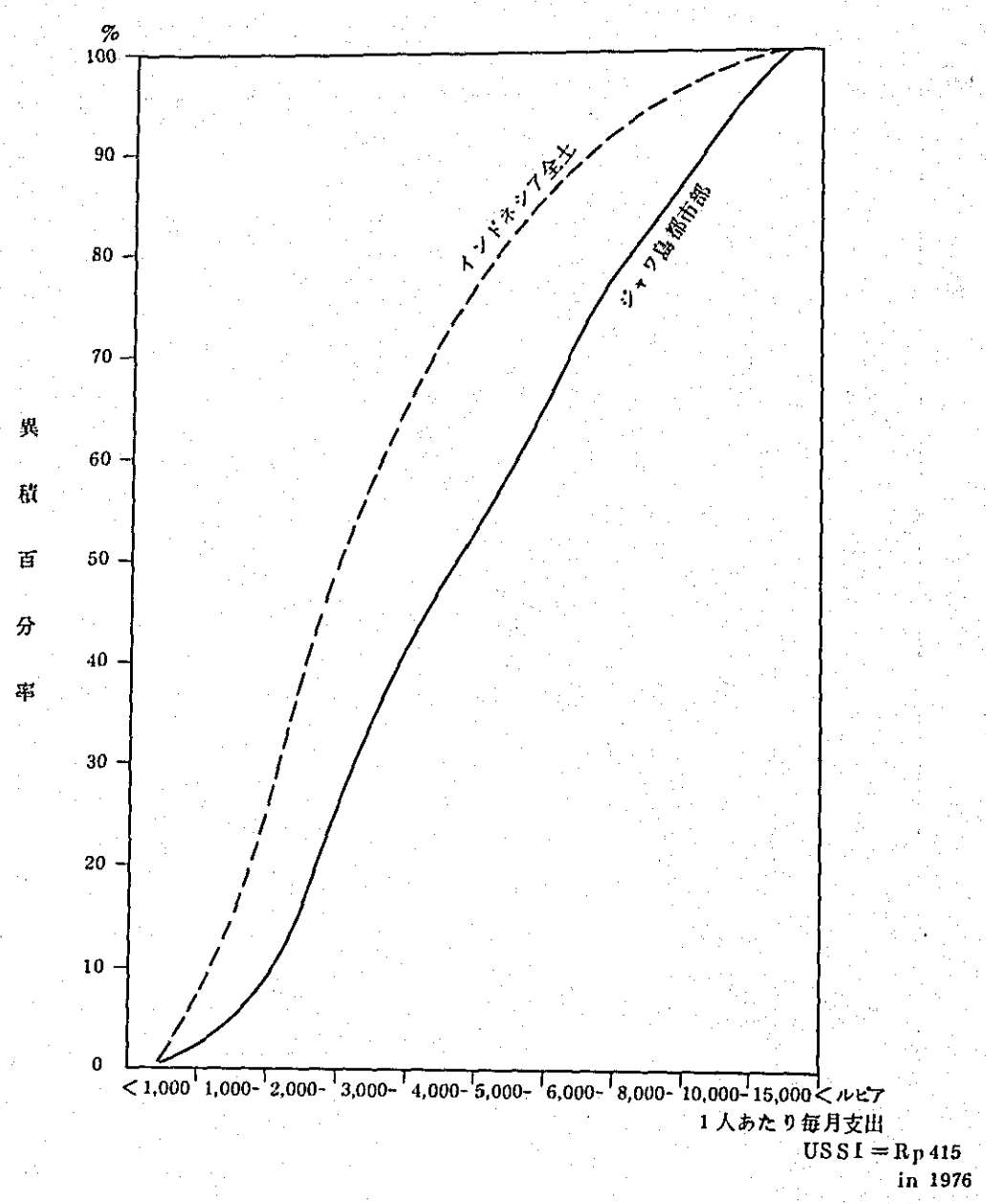


3 月平均家族収入の層別分布

ジャカルタ市内（1976年）

Hasil Sementara Survey Social Ekonomi DKI Jakarta 1976

Table 73. Kantor Sensus dan Statistik DKI Jakarta



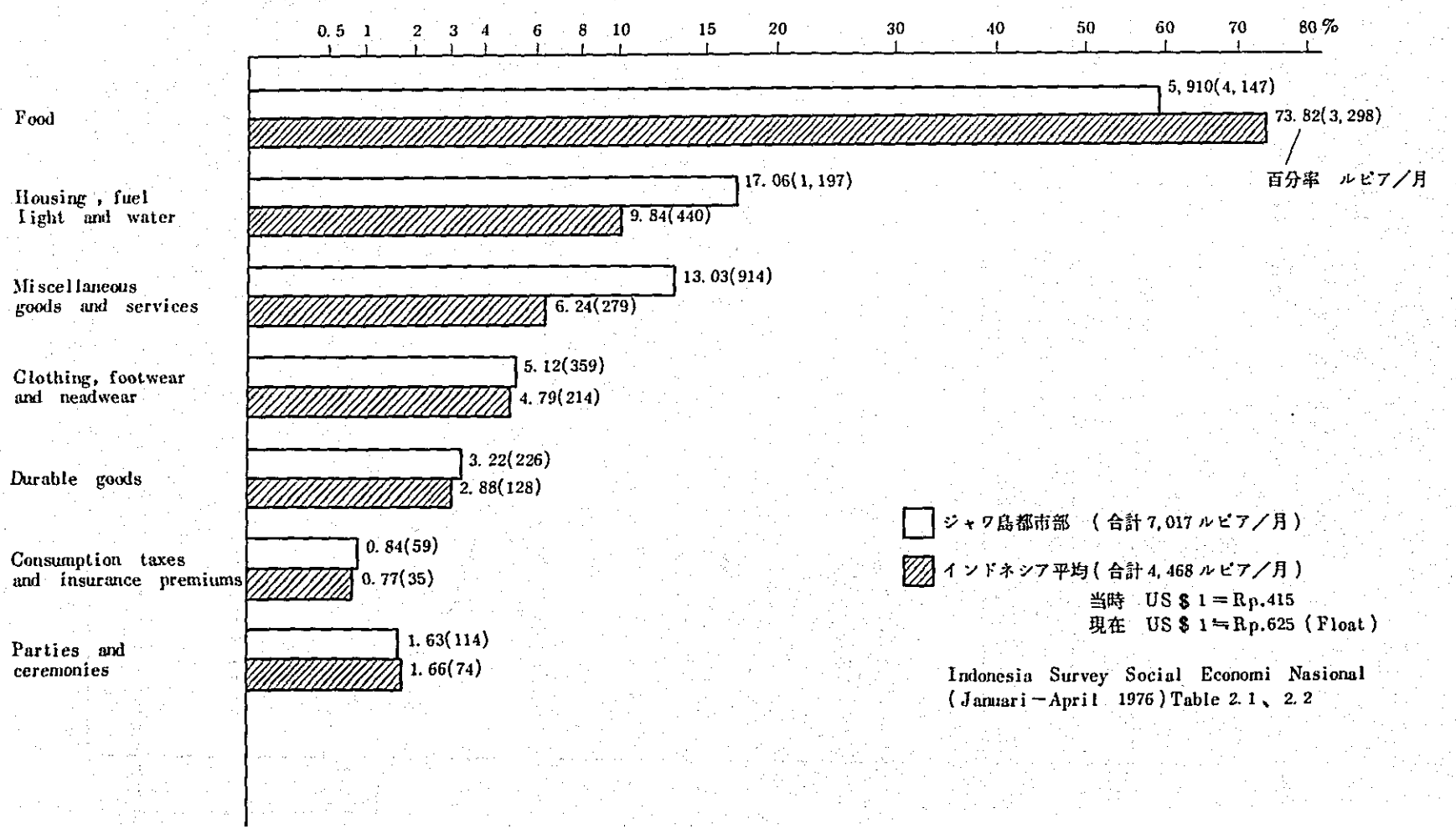
4 支出層別累積分布

Percentage Distribution of Population by Monthly per Capita Expenditure Classes

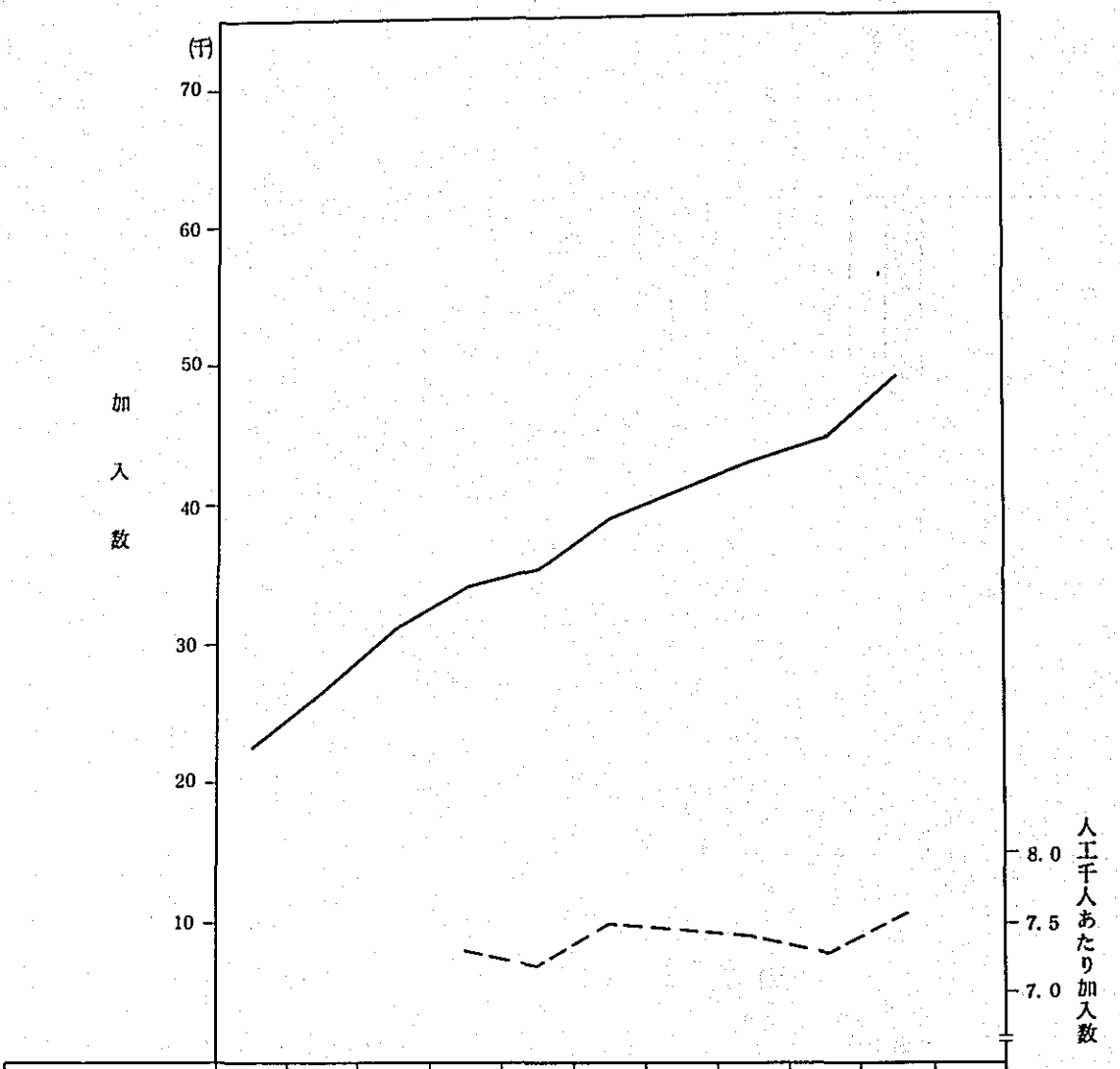
Indonesia Survey Sosial Ekonomi Nasional Tahap ke－lima (Januari－April 1976) Biro Pusat Statistik

5　費目別支出分布

Percentage of Average Monthly Expenditure by Items of Comsumption



Indonesia Survey Social Economi Nasional
(Januari－April 1976) Table 2. 1、2. 2

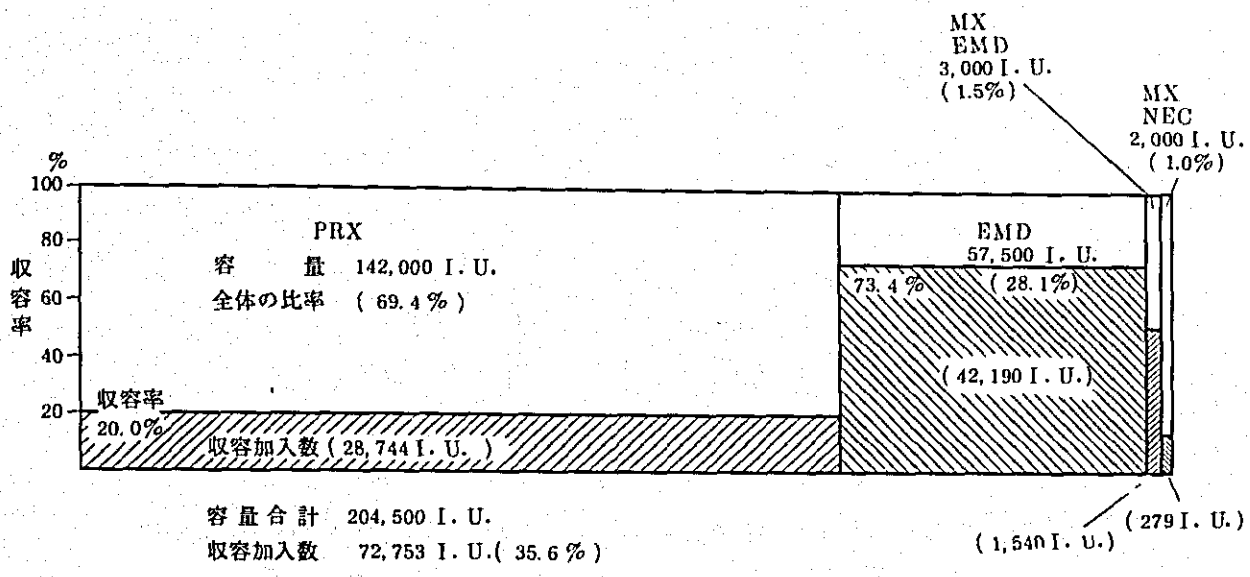


年	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
加入数 (千)	22.4	26.4	30.9	33.8	35.3	38.9	—	43.0	44.6	48.8	
人口千人あたり加入数				7.3	7.2	7.5	—	7.4	7.3	7.6	

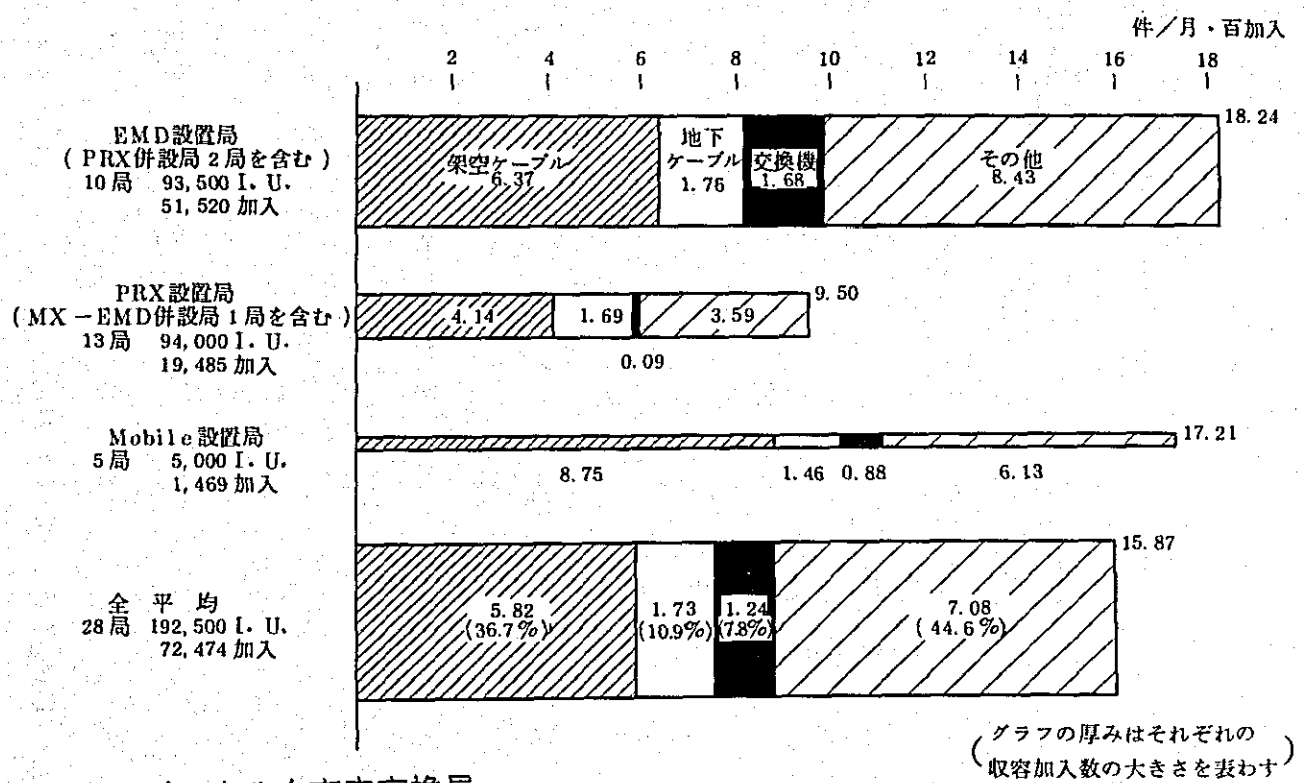
6 ジャカルタの電話加入数の推移

1968 − 1973 JTP *Report* Fig. 2 − 5 − (14) P.400

1975 − 1977 Perumtel 資料



7 ジャカルタ市内機種別交換機容量



8 ジャカルタ市内交換局

障害原因別内訳 1978, 11. 6 － 12

Laporan Gangguan Hubungan Telepon

di Jakarta Tabel no. 156/N/7

9 料金制度の概要

設 備 料（ジャカルタの例）

本電話機

設備料	(installation charge)	Rp. 750,000
〃	(Inden system)	Rp. 600,000
保障費	(assurance charge)	Rp. 25,000
調査費	(survey charge)	Rp. 10,000
引込料	(connection charge)	Rp. 3,360 (Kmあたり)
場 変		Rp. 385,000

基 本 料（月額）

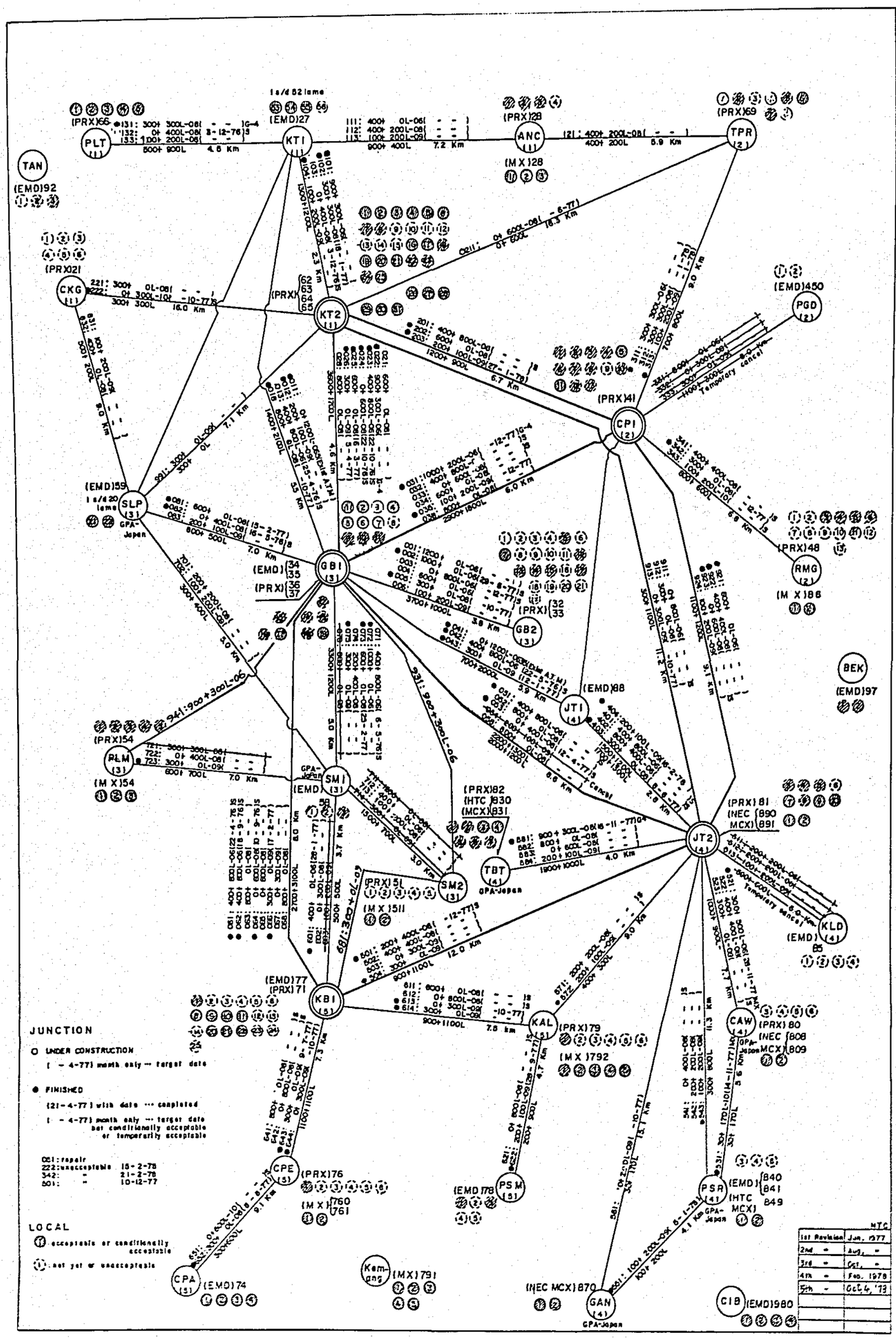
本電話機	Rp. 280
付属電話機	Rp. 140

度 数 料

市内（1通話）	Rp. 20
市内・公衆（〃）	Rp. 25
区域内（intra area）（1度数 60秒）	Rp. 20
区域外（interlocal）（1度数）	Rp. 20

Zone Ⅰ	(— 100 Km)	1度数	6秒
〃 Ⅱ	(101 — 200 Km)	〃	5秒
〃 Ⅲ	(201 — 300 Km)	〃	4秒
〃 Ⅳ	(301 — 1000 Km)	〃	3秒
〃 Ⅴ	(1001 Km—)	〃	2秒

10 JUNCTION CABLE NETWORK IN JAKARTA

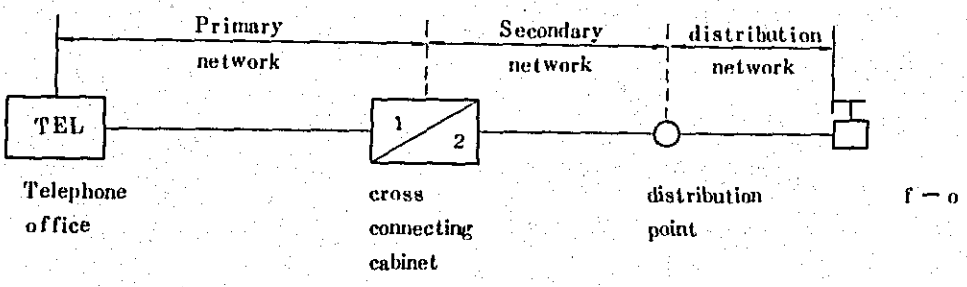


11 市内線路と中継線の設計標準

(1) 配 線 法

Cabinet方式 直接配線（局周辺ブロック）

Cabinet内のケーブル収容： Primary 1 ： Secondary 1.5 ～ 2.0



(2) 局引込管路条数 …… 48条

（30,000 回線以上の収容が出来ること）

(3) Primaryケーブル（管路内）

ケーブル対数： 300p ～ 1200p PE絶縁

マンホール間隔： 250m

管 路 内 径： 100mmφ（15 ～ 20年）PVC

ケーブル接続： Modular System Splicing

Thermofit Shrinkable Sleeve

(4) Primaryケーブル（直埋）

ケーブル対数： 300p ～ 1200p PE絶縁

ケーブル接続： Modular System Splicing

Thermofit Shrinkable Sleeve

(5) Secondaryケーブル

（5.1） 地下ケーブル（管路）

使用ケーブル： Jelly filledケーブル

心線の接続： U connector

B wire connector

外被接続： プラスチックスリーブ

Compound注入

（再解体可能であること）

配 端 子 函： 屋外用端子函、屋内端子函の2種類あり

管 路： 60mmφ PVC pipe

（5.2） 地下ケーブル（直埋）

使用ケーブル： Jelly filled ケーブル

接　続　点： P.V.C スリーブにより保護

接続方法は管路用Jelly filledと同一

（5.2） 架空ケーブル

使用ケーブル： PE 絶縁で自己支持型

Pole 間隔隔： 40 ～ 50 m

Pole の種類： 木柱又は　柱

木柱　標準　7 m（8 mあり）

柱　（2ケ組立　6 ～ 7 m）

（3ケ〃　　8 m）

端　子　函： 柱に取付

(6) ガスシステム

ガス封入ケーブル： Primay ケーブル、中継ケーブル

Contactorの間隔： 1500m

ガス圧測定点　： 300m

(7) 中継ケーブル

装　荷　型　式： 1500m － 80mH

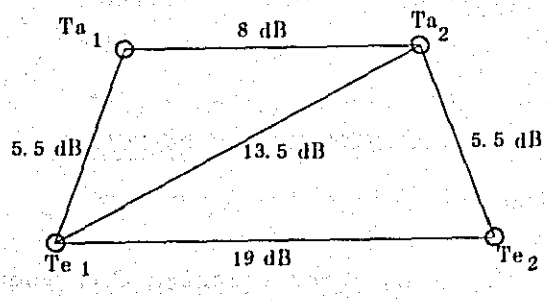
（Mutual capacitance 50nF/Km）

Hasil dari pengukuran traffic tersebut akan sangat berguna untuk menentukan performance dari network serta perlu untuk mengecek apakah sirkit-sirkit yang disediakan cukup atau tidak.

Batasan untuk menentukan routing di Jakarta.

Faktor-faktor yang membatasi routing di Jakarta adalah :

- Redaman (attennation)



$Te_1 - Te_2$: 19 dB
$Te_1 - Te_2$: 13.5 dB
$Ta_2 - Te_2$: 5.5 dB
$Ta_1 - Ta_2$: 8 dB
Te - PTC : 7 dB

- Tahanan (loop resistance).

  Tahanan (loop resistance) yang diperkenankan antara dua sentral adalah sebagai berikut :

  $Te_1 - Te_2$: 1800 Ω (PRX - PRX)
  $Te_1 - Te_1$: 1600 Ω (EMD - PRX)
  $Te_1 - Ta_2$: 1800 Ω (PRX - PRX)
  $Ta_2 - Te_2$: 1800 Ω (PRX - PRX)
  Te - PTC : 1600 Ω

- Untuk hubungan 3 kawat (EMD - PRX atau PRX - EMD)

  Tahanan kawat C (single wire) adalah : 350

Untuk dapat memenuhi batasan-batasan tersebut maka digunakan kabel-kabel dengan diameter kawat yang berbeda-beda serta kemungkinan pemakaian loading atau unloading.

ø	RO	CO	LO	Loaded	Un loaded
(NM)	(/Km)	(nf/km)	(mH)	(dB/km)	(dB/km)
0.6	130	50	80	0.548	1.11
0.8	73	55	80	0.322	0.88
0.9	58	55	80	0.256	0.78
1.0	48	55	80	0.212	0.70

OUTSIDE PLANT INSTALLATION DESIGN PRINCIPLE

PERUM TELEKOMUNIKASI

CONTENTS:

1. GENERAL ASPECTS OF OUTSIDE PLANT INSTALLATION DESIGN PRINCIPLE

1.1 INTRODUCTION

In order to achieve uniformity of installation practice throughout Perum. Telekomunikasi in the area of Outside Plant, certain standards have been defined in these Planning Engineering Instructions and will be the Basis of design and provision of plant for both Perum Telekomunikasi staff and contractors (whether local or foreign assistance). Contractors will supply detailed plans, drawings, etc. of their proposals and where the design varies from the standards defined in these Engineering Instructions, must state specific reasons for the departure from these standards.

1.2 STANDARDS

It is not possible to define standards for every situation of installation practice as conditions vary from one situation to another, but the standards must be applied wherever possible and variations reduced to a minimum where they can not be applied completely. Always they will be the chief guide in design proposals.

1.3 VARIATIONS FROM STANDARD

There will be occasions where for reasons of economy, shortage of materials, etc. a contractor may wish to depart from standard methods or practices. These proposals must be clearly stated and submitted to Perum. Telekomunikasi Headquarters at the Tender stage giving the reasons for Perum. Telekomunikasi consideration.

2. THE STRUCTURE OF THE LOCAL CABLE NETWORK

2.1 GENERAL

2.1.1 It has been seen, that several different systems for a cable network to be built up in a local exchange area have been developed in the last year. Therefore it is essential to standardize one of those system in order to make the best possible use of the cables and to facilitate operation and maintenance.

2.1.2 This standardization describes the systems and the layout concerned working on the planning, construction, operation and maintenance of a local telephone network.

2.2 THE TELEPHONE NETWORK SYSTEM

2.2.1 To built-up a local telephone network a distribution system shall be used, which shall be based on the division cabinet principle. This means that the exchange area is divided into well defined cabinet area (cross connecting area), each with its division cabinet (cross connecting point).

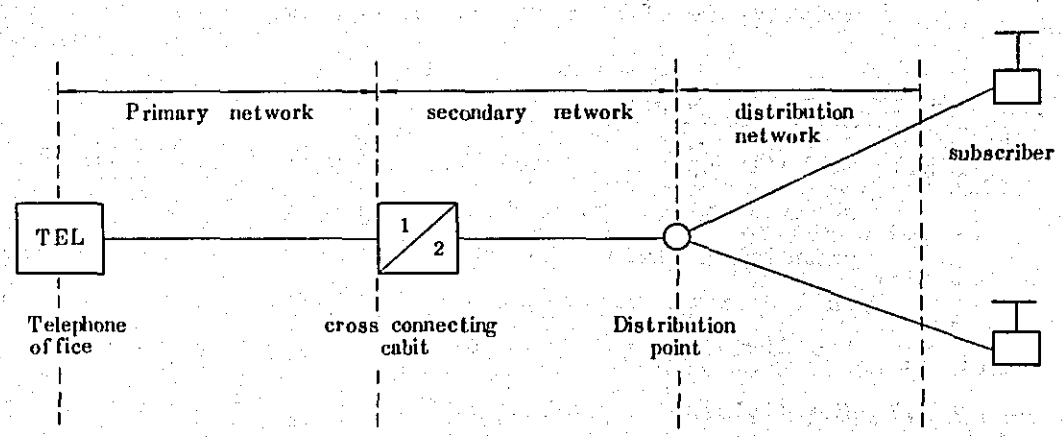
2.2.2 The division cabinet is connected to the exchange by primary cable, while the division cabinet area is subdivided into a large number of small distribution areas, each with its distribution points (generally 10-20 pairs for outdoor installation and for indoor depends upon requirement) placed in such a manner that expensive distribution lines are as short as possible. Secondary cables connect the distribution points with the division cabinet.

2.2.3 As a rule it is determined that the comparation between the number of pairs of primary cable which running into the cross-connecting cabinet and the number of pairs of the secondary cable shall be 1 : 1,5 to 1 : 2 ; while the exchange capacity compared to the number of pairs of the total primary cables, shall be 1 to 1,5.

2.2.4 The first construction of the secondary network capacity must be based upon the fill-up number i.e. the number of subscribers in the secondary cable network for existing buildings on

saturation or if saturation is not expected within a period corresponding to the life of the material, at a time which corresponds to the network is estimated average length of life, while the determination of cross-connecting-point capacity must be based upon the saturation number i.e. the number of subscribers in existing and future new building in the town area builtup at the time of planning on saturation or, if saturation is not expected at the end of the extreme period covered by the estimate, usually 25 - 40 years.

2.2.5 The general structure of a local telephone network is illustrated below.



2.3 ATTENUATION

2.3.1 Attenuation to be allowed should be in accordance with the already stipulated values for certain network stated in the Fundamental Plan 1972 for the Telephone Network in Indonesia (Chapter 5 Transmission Plan).

2.3.2 Based on this permissible attenuation and transmission properties of the telephone instruments in the area, one should calculate what diameter of conductor will result in the lowest cable cost without exceeding the attenuation limit.

3. INSTALLATION DESIGN PRINCIPLE

3.1 DFSIGN OF EXCHANGE BUILDING FOR CABLE ENTRY

3.1.1 Introduction

Provision for cable entry must be an integral part of the design of new exchange buildings. This provision must be generous to avoid expersive and difficult relief measures involving alterations to the structure of the building.

3.1.2 General exchange building design

Ideally an exchange building will be designed to be built in stages according to the future demand of telephone services. The first stage may be designed for a maximum capacity of 5.000 lines, the second stage up to 20.000 lines, while provision may be made for a third stage of relief to further increase the capacity at some time in the future.
The building design should arrange for the M.D.F. to be positioned so that it merely extends in length through the various stages of relief.

3.1.3 Capacity of cable entry

As relief of cable and duct entry into an exchange generally results in costly and difficult reconstruction work on building, ducts and manholes it is generally desirable to reduce this to a minimum. Hence the duct provision should be for long term, an entry comprising 48 ducts being acceptable as long term provision while the cost is a very small percentage of the total building cost.

3.1.4 Means of cable entry

The ideal arrangement for cable entry is a cable vault positioned under the M.D.F. The cable enter the vault, are positioned and jointed to potheads on cable racks, and small cables extended from the potheads directly overhead to the M.D.F.
On sites which have a shallow water table or are subject to flooding and where cable entry to existing exchange has not been provided, a cable vault is not practicable.
Here a cable room adjacent to the M.D.F. room may be buil similar in dimensions and layout to a cable vault.

The cable vault and the cable room adjacent to the MDF room are adopted as standard cable entries to the exchange and where they cannot be applied directly, are used as the basis for designing "modified" cable entries.

3.1.5 Cable vaults

The vault must be wide enough to accommodate 3 racks and deep enough to allow pothead joint to be arranged vertically on the cable racks. The vault should be drained to a sump fitted with an automatic pump. It should be well ventilated with an exhaust fan providing an end to end flow of air and 2 entrance hatches should be included, one being a normal entrance and exit hatch while the other is an emergency exit hatch, being latched from the inside.

The vault must extend for the whole length of the exchange building and 2 pipes installed from the end wall to a pit outside the building where a winch can be located for hauling cables into the vault. If this method cannot be provided 2 rings capable of withstanding a tension of about 5.000 kilograms should be built into the end wall of the vault.

A low resistance earthing system should be installed in or near the cable vault for M.D.F. and cable sheath earthing.

Ceiling lighting will be provided in the cable vault controlled by a switch with a pilot light mounted on the wall in the M.D.F. room near the entrance hatch. The switch for the ventilation fan should be positioned near the light switch.

3.1.6 Cable racks

The number of ducts entering the vault is always 8 per layer and the usual number of layers is 6 giving a total of 48 ducts sufficient for an exchange size in excess of 30.000 lines.

It should be noted that for each of the 8 ducts per layer, the cables extend in 4 pairs, each pair terminating on one rack.

Between the mouth of the ducts and the cable racks, each pair of cables change from a horizontal arrangement to a vertical arrangement and each cable lies on a cable bearer in a position especially designed for that cable.

Care must be taken to place each new cable in its predetermined position as one cable wrongly placed can seriously interfere with

the placement of later cables.

3.1.7 Cable room alongside M.D.F. room

Where an exchange site is subjected to flooding or a cable entry is required for an existing exchange building it may not be possible or desirable to provide a cable vault. In these cases a cable room will be built alongside the M.D.F. room.
The dimensions of the cable room will be the same as a cable vault, the same racking will be used but the duct entry and the cable entry to the M.D.F. room should be arranged in such a manner that fullfil the technical requirement.

3.1.8 Cable termination

For cables which terminate either in a cable vault or a cable room, a pothead joint will be made vertically on the cable racks. Below the pothead the cable should be injected with suitable compound to build a gas seal.

3.2 PRIMARY CABLE NETWORK

Ordinarily, for primary cable that connects the main distribution frame in a telephone exchange office and the secondary cable, either the conduit cable or the direct buried cable shall be used.

3.2.1 Conduit Cable

3.2.1.1 Conduit cable to be used in P.E. insulated and sheathed aluminium screened, unit quad type cable, ranging in size from 300 pairs to 1200 pairs (as per Specification Perumtel No. S1 - 6 - 009).

3.2.1.2 Maximum manhole span is 250 m and one conduit cable is to be laid in one 100 mm diameter conduit pipe. Connection to the primary cable is made in the manhole.

3.2.1.3 Necessary are providing materials to prevent incursion of moisture into the cable in the event it is cut in the manhole or handhole, and the materials for setting of cable at the desired position in the manhole or handhole.

3.2.1.4 For jointing the cables, the following method is employed:

a. To joint cable conductors by means of modular system splicing. The jointing system shall provide a means to connect a 25 pair straight splice with no

insulation stripping.

b. To cover the jointed portion with a thermofit shrinkable sleeves and should be sticked both ends of the sleeves to the P.E. sheath of cable and thereby seal the jointed portion hermetically.

c. To fill the jointed portion interior with desiccant.

d. Considering that the cable jointing work has to be suspended before it is completed, water-proofing materials have to be prepared.

3.2.2 Direct Buried Cable

3.2.2.1 Direct buried cable to be used is the aluminium screened, polyethylene insulated and sheathed, unit quad type cable with steel tape armouring, ranging in size from 300 pairs to 1.200 pairs (as per Perumtel Specification No. S_1-6-009).

3.2.2.2 To be prepared are the materials to prevent incursion of moisture into cable in case it is cut during the cable installation work.

3.2.2.3 The method of jointing shall be done in the same way as specified in clause 3.2.1.4.

3.2.2.4 For protection of cable joint, protective sleeve shall be used to cover the joint.

3.2.2.5 For protection against mechanical damage, the cable must be covered by protective stones.

3.3 SECONDARY CABLE NETWORK

3.3.1 Method of Construction

3.3.1.1 Service area of one telephone exchange is divided into several distribution blocks. Ordinarily each distribution block is established on the demand forecast for the future by taking road, railway and river conditions into consideration.

3.3.1.2 In the distribution blocks which are located near the telephone exchange and where the subscriber density is high, primary cable pairs and secondary cable pairs are to be directly connected. Such distribution block is

otherwise called the direct service area.

3.3.1.3 In one distribution block, one set of cross connecting cabinet is established, and using this cross connecting cabinet as a starting point, the secondary cable network in the distribution block is organized. Such this distribution block is otherwise called the cabinet area.

3.3.1.4 Cable pairs with capacity to meet the demand expected for the time being in each direct service area or cabinet area are supplied to the secondary cable directly or through cross connecting cabinet from the primary cable.

3.3.1.5 In the big building area, commercial area, high class residential area, and such area where the aerial cable system is not desirable, the secondary cable is distributed by the underground cable system;

3.3.1.6 For underground cable, either conduit cable (in whose case there is no need of digging the road for cable repair or replacement) or direct buried cable (which is buried where the digging work for cable repair or replacement is easy to do) is used. Choice between the two depends on the road condition.

3.3.1.7 In the commercial or similar area, where buildings of the like appearance stand close together, the building wall distribution method which uses building cable, shall be adopted. In this case the cable is suspended on the building walls, using the suspension metals fixed on the building walls.

3.3.1.8 Further other areas, "the aerial cable distribution method" which uses aerial cable, shall be applied, running the cable on the poles.

3.3.2 Underground Cable

3.3.2.1 Jelly filled conduit cable :

a. Secondary conduit cable to be used is the jelly filled, polyethylene insulated and sheathed, unit quad type cable (in accordance with Perumtel Specification No.S1-4-007).

b. A handhole is used at each cable joint, cable

branching point, and the point where to take out lead-in cable to be connected to the terminal box. Cable jointing work has to be done in the handhole.

c. Necessary materials are required for treating the cut end of cable after it is cut in the handhole and for setting the cable at the desired position in the handhole.

d. For cable jointing, the following method is employed :

   i. To joint cable conductors by means of U - element connector or B - wire - connector.

   ii. To cover the jointed portion with a plastic sleeve.

   iii. To inject a compound inside of the plastic sleeve.

   The compound must be such in nature that it never interrupts the cable re-jointing work, including the opening of the previously jointed portion, making additional branch cables and taking out additional lead-in cables.

e. For raising secondary cable to an overhead position, the riser pipe is laid from the handhole to the riser pole, in which to run the riser cable. The portion of riser cable ascending along the pole is fixed to the pole with cable fastener.

f. Terminal box is linked, via lead-in cable, to secondary cable pairs. The terminal box comprises two types: outdoor type and indoor type.
The outdoor type terminal box is used on the outer wall of building. Required is the material to connect plastic stub cable in this terminal box and lead-in cable. The indoor type terminal bix is used on the inner wall of building.

g. In the area suitable for the underground cable distribution system, where buildings stand apart, terminal post are built at appropriate intervals, and secondary cable or lead-in cable is led into each terminal post and are terminated at the terminal

block installed inside the terminal post.

3.3.2.2 Jelly filled direct buried cable :

a. Secondary direct buried cable to be used is the jelly filled, polyethylene insulated and sheated, unit quad type with steel tape armouring (in accordance with Perumtel Specification No. S_1 - 4 - 007).

b. No handhole is used at the cable joint which, however, is protected with a protective P.V.C. sleeves applied there on.

c. Method of cable jointing to be employed shall be the same as clause 3.3.2.1. (d).

d. For raising secondary direct buried cable to an overhead position, riser pipe shall be applied (in some cases to avoid difficult handling, steel tape and polyethylene outer sheath of the cable could be taken away).

e. For laying lead-in cable to the terminal-post, two methods are available, i.e. :

   i. to run the cable (conduit cable) in the conduit.

   ii. to apply direct buried cable.

   Choice between those two methods depends upon the road conditions. In most cases, secondary cable is to be directly led into terminal-post without cutting of distribution cable.

3.3.3 Aerial Cable

3.3.3.1 Aerial cable to be used is polyethylene insulated and sheathed unit quad, self-supporting type cable (in accordance with Perumtel Specification No. S_2 - 1 - 001).

3.3.3.2 Aerial cable using pole :

a. Average distance between poles shall be 40 - 50 m.

b. Two kinds of poles are to be used i.e. wooden poles and steel pipe poles (iron poles).

c. The kinds and sizes of poles to be used shall be as follows:

i. Steel pipe pole comprises two kinds :
   - two sectional pole, 6 and 7 m in length.
   - three sectional pole, 8 m in length
   - the pole diameter at the top is approximate 75 mm and the bottom diameter is approximate 100 mm.

ii. Wooden pole :
   - The standard pole length is 7 m. However the wooden poles to be used measure 8 m in length. The top diameter is approximate 13 - 14 cm and should be treated.

d. There must be prepared anchoring and suspension materials for aerial cable, as well as materials for setting of push braces and guys, hooks and clamps for dropwire clamping, and other hardware and adjustable bands.

e. There are cases where self-supporting overhead-cable branches out in the different direction from certain pole.
   To serve such purpose there must be prepared branching material.

3.3.3.3 Wall distribution cable (aerial cable on wall):

a. For building cable, self-supporting cable is used. At the points where to anchor the cable, anchoring metals are fixed on the building wall.

b. Cable stainless steel suspenders are fixed on the building wall at the average intervals of 10 meter.

3.3.3.4 Terminal box on pole (Pole mounting terminal box) :

a. At each joint of aerial cable and at each drop point for dropwire, pole mounting type terminal box is installed on the pole.

b. For the same case suspended type cable terminal box can be applied.

c. To take out drop wire from suspended type cable terminal box, terminal wires at terminal block in the terminal box and cable pair are jointed with connectors. By fixing each dropwire conductor to

each terminal, secondary cable pair and dropwire are connected.

d. In case the distribution lines using open-wire line protected terminal box must be used.

3.3.3.5 Subscriber terminations :

a. Dropwire, which originates from terminal box on pole or suspended terminal box, in its run before reaching the subscriber premises, should be as specified below :

i. When running on the pole, self supporting is used.

ii. When running on the building wall, grey colured outdoor P.V.C. sheathed wire is used.

iii. When to be direct-buried, 2 pairs or 4 pairs under-ground distribution cable is used.

b. For dropwire running on the pole line :

i. In case of steel pipe pole, suspension hook fitted on the pole with reinforced stainless band strong enough to endure dropwire tension is used.

ii. In case of wooden pole, suspension hook fitted on crossarm bolt is used.

c. At an appropriate place in the subscriber premises, subscriber terminal is set. Dropwire is terminated at this subscriber terminal.

3.4 CIVIL INSTALLATION WORKS

3.4.1 Conduit Route

3.4.1.1 Primary cable conduit :

For conduit pipes, P.V.C. pipes used in principle in accordance with Perumtel Specification S_9 - 1 - 012, However in sections, where the conduit route runs across canals or along side bridges and where P.V.C. pipes are not applicable steel pipe are used. Pipe diameter should be 100 mm (inner diameter). The number of conduit routes must be installed sufficient

to contain the number of cables expected to be required 15 - 20 years ahead plus spare number.

P.V.C. pipes are jointed by means of socket joint and using binding agent. To joint P.V.C. pipe and steel pipe, an adhoc socket is used.

3.4.1.2 Secondary cable conduit :

In case secondary cable is necessary to be laid in conduit in principle P.V.C. pipe with inner diameter of 60 mm should be used. The number of conduit must be large enough to contain the number of cables to be laid. No spare conduit is installed. The jointing method of P.V.C. pipes should be the same as the jointing method of primary cable conduit pipes.

3.4.2 Manhole and Handhole

3.4.2.1 Manhole :

Manhole should be constructed according to the standard size of manhole. By the number of conduits to be contained and the branching directions, the manholes are divided into several types.

All manholes construction must be complete with manhole cover, frame and interior metal accessories.

Each and every manhole must be equipped with cable supporters - each capable of supporting cable lines required - in the number large enough to hold all the cable lines to run.

Drainage system must be provided in every manhole.

3.4.2.2 Handhole :

Handhole to be built must be in accordance with standard sizes of manhole, as per Perumtel Specification. Each handhole, must be completely equipped with handhole cover with frame and interior metal accessories.

3.4.3 Direct buried cable

In section where direct buried cable is installed and at such places where the cable line runs across a road, canal or alongside a bridge, the cable must be protect with pipes, (P.V.C. concrete and steel pipes), depending upon the type of cables.

Cable joints must be protected with protective P.V.C. sleeves.

3.4.4 Other construction work

3.4.4.1 Cross-connecting cabinet base :

Cross-connecting cabinet base must be constructed according to Perumtel specification and drawing, one 100 mm diameter P.V.C. pipe is installed to the nearest manhole or handhole from the cabinet base. For curved riser pipe, 100 mm diameter 90° curved P.V.C. pipe is used.

3.4.4.2 Riser pipe :

Riser pipe rises on the pole or on the building wall from manhole handhole or direct buried cable joint. Usually, P.V.C. pipe is used, either 60 mm diameter or 30 mm diameter depending upon the type of cable is contained. However, in case the pipe line runs across a cannal, for instance and the P.V.C. pipe is unfit, the steel pipe is used.

For setting the straight pipe on pole, stainless band is used, and for setting it on the building wall, the riser pipe fastener is used.

3.4.4.3 Bridge attachment :

In case of bridge attachment of the pipe line when it runs alongside a bridge across a river, the equipment used is multi various as the pipe that is used at one place di differs from the pipe used at another, not only in type and diameter but also the number of cables to be contained.

For this reason some of such equipment are made by contractor at site.

3.5 CROSS CONNECTING CABINET

3.5.1 At each joint of primary cable and secondary cable in the cross connecting area, the cross-connecting cabinet point is installed.

3.5.2 One cross connecting cabinet must have a capacity for 800 pairs, primary and secondary cable combined. In case an especially large cabinet capacity is required or the traffic demand increase

exceeding one cabinet capacity in the future it must be arranged that one additional cabinet can be mounted over the existing cabinet to produce the capacity twice.

3.5.3 It must be possible that the terminal blocks to be accommodated in the cross-connecting cabinet can be increased by a unit of 100 pairs.

3.5.4 The terminal block must have cable and must be composed gas-tight stub cable (terminal cable) to be connected to primary cable is polyethylene insulated and sheathed unit quad type cable and its joints to primary cable must be performed according to the requirement stated in clause 3.2.1.4. Stub cable connected to secondary, cable is jelly-filled polyethylene insulated and sheathed cable, which should be jointed to secondary cable in accordance with the requirement stated in clause 3.3.2.1.d.

3.6 GAS PRESSURIZATION SYSTEM

3.6.1 To prevent disturbances to service by entering humidity (moisture) into the cable and destroying the insulation in the event of the cable cover being damaged, gas controle (pressurization) on all primary and junction cables must be applied.

3.6.2 The gas pressurization system to be used must be the continuous flow system.

3.6.3 Gas pressure alarm equipment installation inside the exchange :

3.6.3.1 All primary and junction cable must be gas sealed.

3.6.3.2 Compressor dryer, flowmeter-panel, and all associated tubing should be installed.

3.6.3.3 Alarm system must be installed, which informs the maintenance staff of the gas pressure decrease due to gas leakage in the cable.

3.6.4 Gas pressurization alarm equipment installation on the line

3.6.4.1 At certain manholes and cable terminal contractors should be installed at interval of about 1.5 km; which should operate if gas pressure decreases to a determined value and indicate the alarm device. This gas alarm contactor is placed in the cable jointing

and uses one pair for alarm conductors.

3.6.4.2 At each key-point (usually on joint) of primary and junction cables, test points must be placed with an interval of 300 m.

3.6.5 Cable gas pressurization equipment to be applied should be in accordance with Perumtel Specification No. S_7 - 1 - 014.

3.7 JUNCTION CABLE

3.7.1 In a multi-exchange - area city exchanges are connected to each other, either directly or via a tandom-exchange by means of junction - lines.

3.7.2 Cables to be used for junction - lines are polyethylene insulated and sheathed, having a conductor diameter of 0.4, 0.6, 0.8 and 1.0 mm, ranging in size from 300 pairs to 1200 pairs.

3.7.3 Junction cables must be installed in duct. The method of installation should be similar to the installation of primary duct cable.

3.7.4 The method of jointing junction cable should be the same as required for jointing the primary cable.

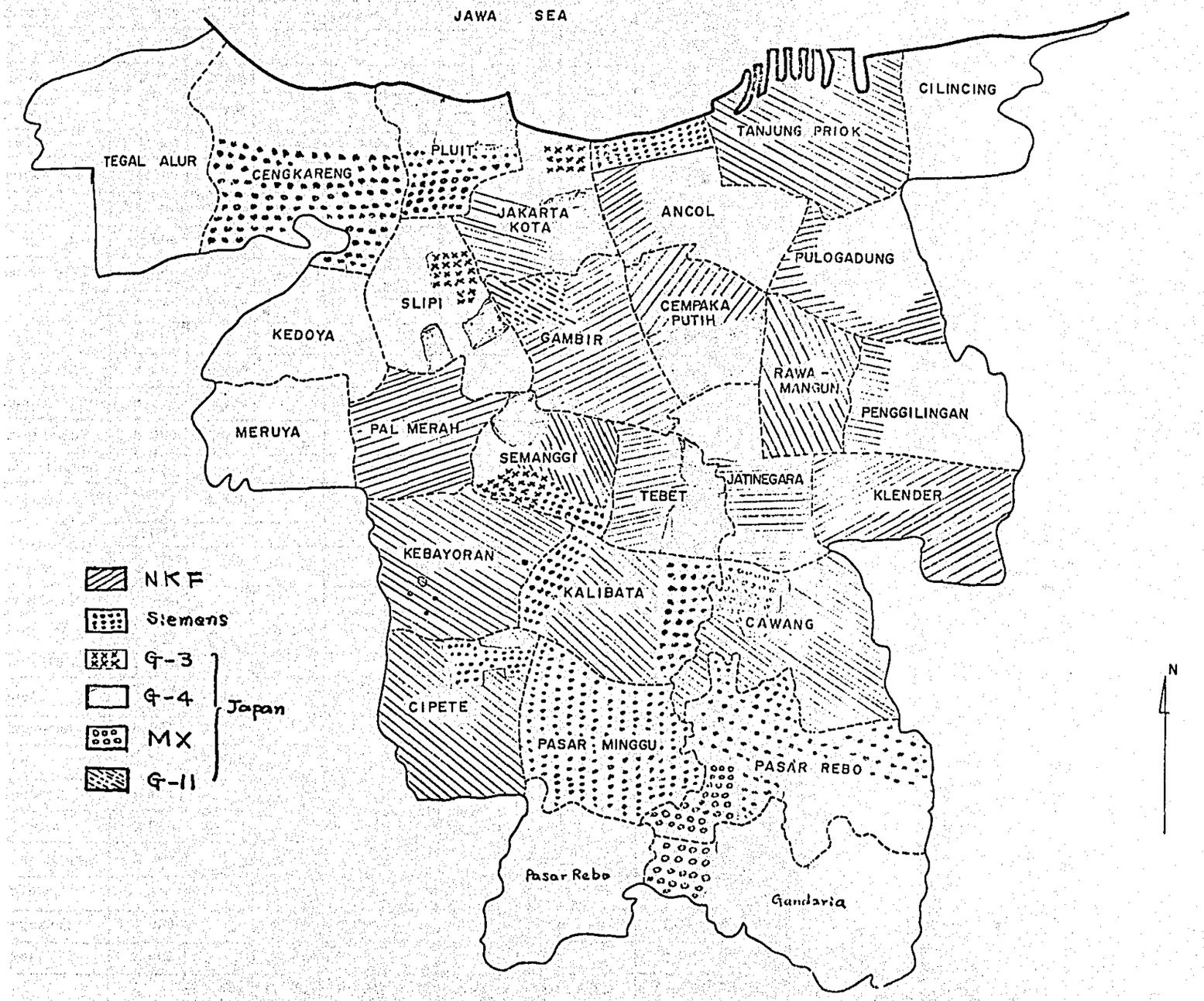
3.7.5 To reduce both voice frequency attenuation and frequency distortion on junction cables loading must be applied.
For loading the junction cable the following loading system should be applied :

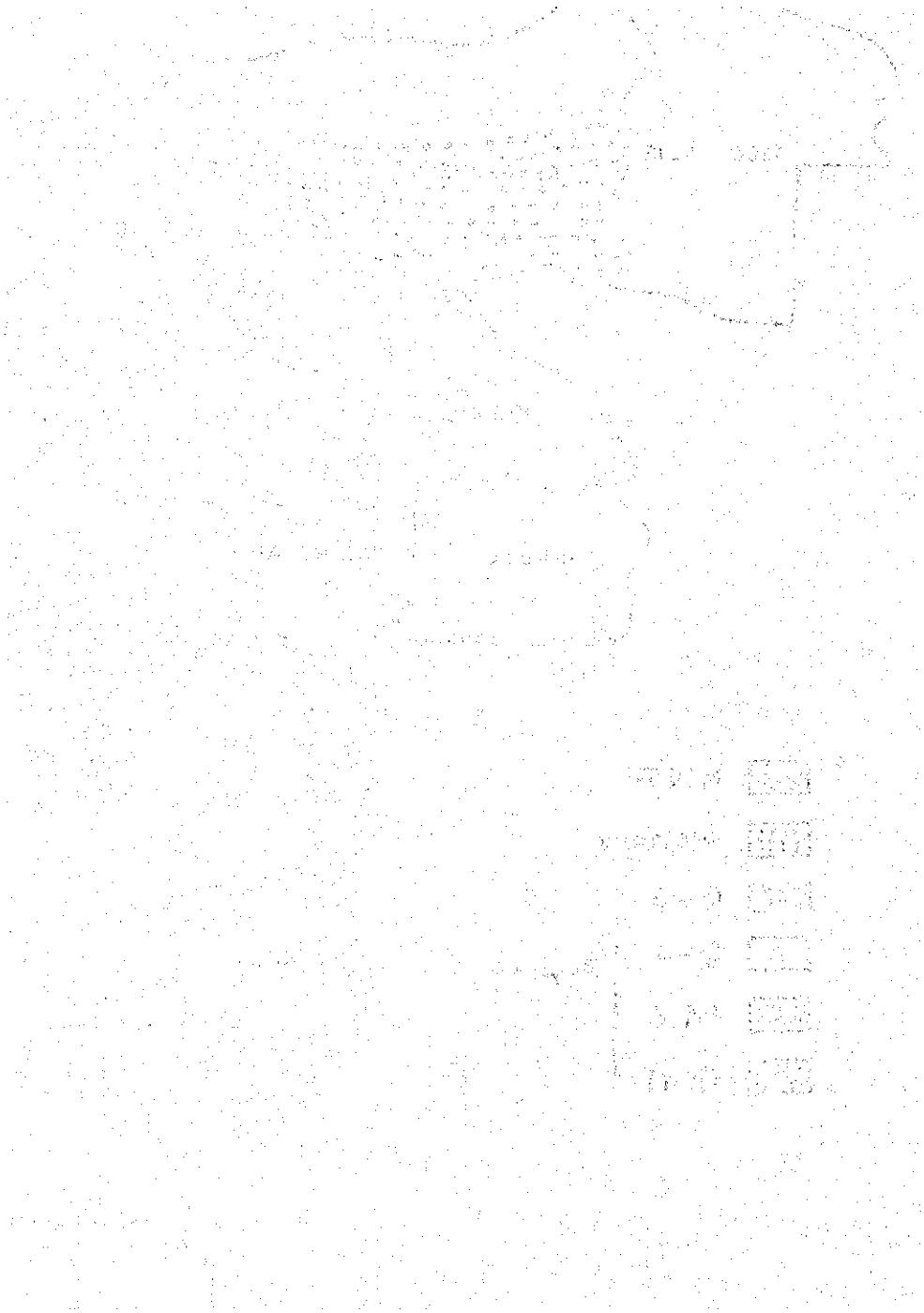
(a) TT - loading, starting with a half loading space (section), followed by a full section etc, terminating with a half section.

(b) Loading - coils should be 80 m Hr
Loading - space should be 1.5 Km.
(Cable mutual capacitance 50 nF/Km)

3.7.6 Synchronisation between the loading - space and construction of duct - route especially manhole - distance must be made.

12　ジャカルタ市内線路工事のプロジェクト別色分け

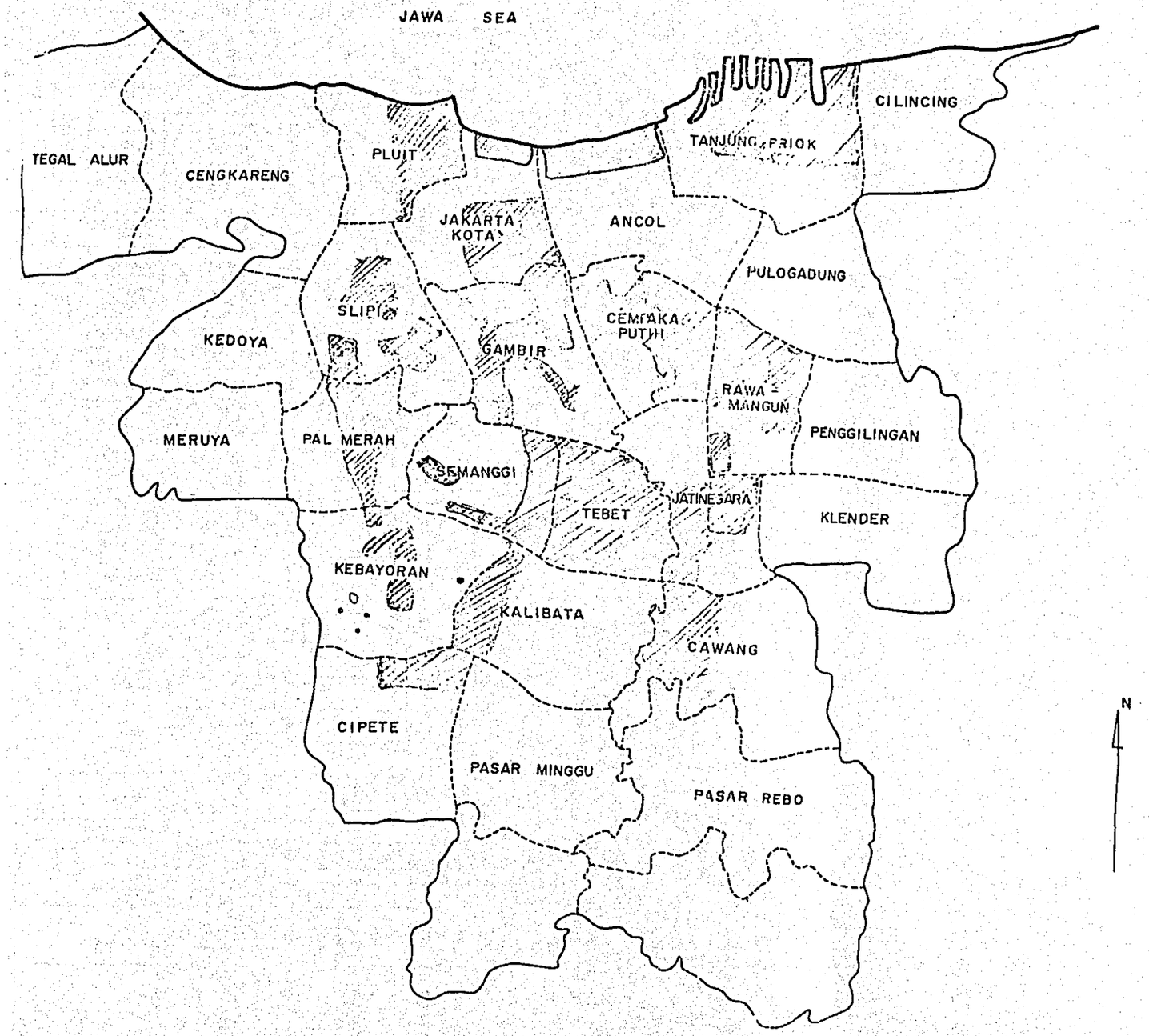




13 Telnus Project による線路引込増設対数

Exchange	LU	NKF (オランダ)	Siemens (ドイツ)	G-4 (日本)	MX	G-S (日本)	G-11 (日本)		Total
1 Kota 2	32, 000	30, 000	—	10, 600					40, 600
2 〃 1	10, 000					5, 800			5, 800
3 Ancol	4, 000	3, 400							3, 400
4 Tanjung Priok	6, 000	9, 200							9, 200
5 Pluit	4, 000		3, 400	3, 600					7, 000
6 Cengkareng	4, 000		5, 600						5, 600
7 Gambir 1	36, 000	21, 000					5, 200		26, 200
8 〃 2	16, 000	25, 400							25, 400
9 Semmangi 1	6, 000		4, 800						4, 800
10 〃 2	8, 000	5, 200							5, 200
11 Sipi	6, 000			3, 600				2, 000	5, 600
12 Pal Merah	4, 000	4, 800							4, 800
13 Cempaka Putih	8, 000	10, 400		6, 600					17, 000
14 Rawamangun	8, 000	13, 360							13, 360
15 Pulo Gadung	1, 000							2, 400	2, 400
16 Jatinegara 2	8, 000+2, 000	6, 800			2, 000				8, 800
17 〃 1	4, 000								
18 Cawang	4, 000+2, 000	2, 400			2, 000				4, 400
19 Klender	2, 000							4, 200	4, 200
20 Pasar Rebo	2, 000 +1, 000		2, 000		1, 200				3, 200
21 Gandaria	1, 000				1, 200				1, 200
22 Tebet	8, 000+2, 000	2, 800		7, 200					10, 000
23 Kebayoran	36, 000	21, 800							21, 800
24 Cipete	8, 000	7, 200							7, 200
25 Ciputat	2, 000		3, 600						3, 600
26 Kalibata	8, 000	6, 000							6, 000
27 Pasar Minggu	2, 000		4, 300						4, 300
28 Cibinong	1, 000		1, 500						1, 500
29 Tangexang	2, 000		2, 900						2, 900
30 Bekasi	2, 000		2, 400						2, 400
Total	250, 000	(65. 8%) 169, 760	(11. 8%) 30, 500	(12. 3%) 31, 600	(2. 5%) 6, 400	(2. 2%) 5, 800	(2. 0%) 5, 200	(3. 3%) 8, 600	(100%) 257, 360

14　ジャカルタ市内 marketing　area



Jumlah langganas yang dijual/dipasang

13 Nop s/d 19 Nop 1978

AREA	Exchange type	Exchange				Pairs cable prepared on DP		Transferring	Use by personnel	Sold							Install						
										Direct			Inden				Direct			Inden			
		Capacity exc.	Additional	In order	Empty	Total pairs	Project			At present	Last week	Addi-tional	At present	Last week	Addi-tional	Total additional	At present	Last week	Addi-tional	At present	Last week	Addi-tional	Total additional
GAMBIR 1	EMD	20.000	o	15383	4617	2000	C P		1	1437	1437	-	-	-	-	-	1437	1437	-	-	-	-	-
						574	P S																
	PRX	16.000		6980	9020	4570	TELNUS	2480	187	3550	3494	56	763	763	-	56	3446	3401	45	763	763	-	45
GAMBIR 2	PRX	8.000		1018	6982			237	80	382	360	22	319	319	-	22	343	342	1	319	319	-	1
SLIPI	EMD	3.500		3395	105	3050	C P		45	1768	1752	16	200	200	-	16	1646	1636	10	145	144		11
						192	P S																
						1440	TELNUS																
SEMANGGI 1	EMD	6.000		4151	1849	2300	C P	953	27	1377	1375	2	-	-	-	2	1369	1369	-	-	-	-	-
						192	P S																
SEMANGGI 2	PRX	8.000		229	7771	1180	TELNUS	23	2	204	204	-	-	-	-	-	191	191	-	-	-	-	-
PAL MERAH	MX-EMD	1.000		892	108	990	TELNUS	235	4	296	292	4	357	357	-	4	268	264	4	343	343	-	4
CEMPAKA PUTIH	PRX	8.000		1151	6849	5680	TELNUS	170	81	900	883	17	-	-	-	17	862	847	15	-	-	-	15
KOTA 1	EMD	10.000		8935	1065	192	P S		4	1486	1475	11	-	-	-	11	1448	1442	6	-	-	-	6
KOTA 2	PRX	32.000		6644	25356	17575	TELNUS	1830	322	4239	4201	38	253	253	-	38	4103	4083	20	231	231	-	20
PLUIT	PRX	4.000		2572	1428	5805	TELNUS	432	42	944	933	11	1154	1154	-	11	913	905	8	1149	1149	-	8
TANJUNG PRIOK	PRX	6.000		2229	3771	3700	TELNUS	1865	59	305	304	1	-	-	-	1	295	295	-	-	-	-	-
ANCOL	PRX	4.000		315	3685	890	TELNUS	190	8	117	117	-	-	-	-	-	115	115	-	-	-	-	-
KEBAYORAN BARU	PRX	16.000		2084	13916	5450	TELNUS	1169	164	751	723	28	-	-	-	28	709	703	6	-	-	-	6
						1480	C P																
	EMD	10.000		6624	3376	574	P S			1457	1457	-	-	-	-	-	1457	1457	-	-	-	-	-
KEMANG	MX-EMD	1.000		582	418	1800	TELNUS	78	3	501	500	1	-	-	-	1	494	490	4	-	-	-	4
						240	C P																
CIPETE	PRX	8.000		1328	6672	970	TELNUS	113	9	1206	1201	5	-	-	-	5	1197	1192	5	-	-	-	5
CIPUTAT	EMD	2.000		153	1847	2340	TELNUS	49	2	102	101	1	-	-	-	1	99	99	-	-	-	-	-
KALIBATA	PRX	8.000		320	7680	780	TELNUS	49		271	268	3	-	-	-	3	261	256	5	-	-	-	5
PASAR MINGGU	EMD	2.000		178	1822	1320	TELNUS	30		143	141	7	-	-	-	7	126	126	-	-	-	-	-
JATINEGARA 1	EMD	4.000		3371	629	384	P S		51	593	590	3	-	-	-	3	588	586	2	-	-	-	2
JATINEGARA 2	PRX	8.000		1239	6761	1474	TELNUS	264	83	892	829	63	-	-	-	63	778	766	12	-	-	-	12
RAWAMANGUN	PRX	8.000		1453	6547	2590	TELNUS	446	11	796	626	170	200	200	-	170	404	366	38	145	138	7	45
PASAR REBO	MX-EMD	1.000		66	934	540	TELNUS			66	65	1	-	-	-	1	63	63	-	-	-	-	-
CAWANG	MX-NEC	1.000		88	912	1331	TELNUS			88	86	2	-	-	-	2	87	86	1	-	-	-	1
GANDARIA	MX-NEC	1.000		191	809	480	TELNUS	159		32	32	-	-	-	-	-	26	23	3	-	-	-	3
TEBET	PRX	8.000		1182	6818	17310	TELNUS	357	83	742	724	18	-	-	-	18	703	692	11	-	-	-	11
		204.500		72753	131747	98393		11129	1268	24650	24170	480	3246	3246	-	480	23428	23232	196	3095	3087	8	204

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16. " : Specification for Dropwire for Direct Burial, (June 1971)

17. " : Specification for Drop Wire with Conductor Diameter 0.6 mm, (May 1971)

18. " : Specification for Drop Wire with Conductor Diameter 0.8 mm, (May 1971)

19. " : Specification for Cable: PVC Insulated, PVC Sheathed for Indoor Use, (

20. " : Specification for Rigid PVC Pipe, Bend and Coupling, (Nov. 1971)

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