'REPARED FOR
NTERNATIONAL COOPERATION ADMINISTRATION

REPORT ON

Telecommunications Systems

FOR
THAILAND, VIETNAM, LAOS
INCLUDING POSSIBILITIES IN CAMBODIA

TUDOR ENGINEERING COMPANY, Washington, D. C.
APRIL 1958

PREPARED FOR
INTERNATIONAL COOPERATION ADMINISTRATION

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RALPH A. TUDOR
L. A HELGESSON
CARL A. THEXEL

TUDOR ENGINEERING COMPANY

595 MISSION STREET, SAN FRANCISCO 5 - YUKON 2-9010

Address reply to 1413 K St., N.W., Washington 5, D. C. • STerling 3-5313

International Cooperation Administration
815 Connecticut Avenue, N. W.
Washington 25, D. C.

Reference: TEC-132

SUBJECT: TELECOMMUNICATIONS SYSTEMS FOR THAILAND, VIETNAM AND LAOS

Attention: Mr. Norman E. Thompson

Gentlemen:

In accordance with the provisions of ICA Task Order No. 132, dated February 21, 1958, we have reviewed the Fundamental Plans for telecommunications systems for the countries of Thailand, Vietnam and Laos, submitted to you by Southeast Asia Communications. These are voluminous reports presented in almost identical format.

A report is attached. This report was prepared by Tudor Engineering Company with Mr. Raymond Foulkrod, former Chief Engineer of the Michigan Bell Telephone Company as Consultant, in collaboration with Mr. John M. Hogg, Regional Telecommunications Coordinator of the International Cooperation Administration (ICA) for Southeast Asia.

The report may be summarized briefly as follows:

1. The "Fundamental Plans" submitted by Southeast Asia Communications are not adequate with respect to basic data presented.

The conclusions drawn and recommendations made are, of necessity, based largely on judgment. The judgment exercised and the recommendations presented are, in many instances, subject to question.

2. The work completed to date, namely, the Fundamental Plans, while necessary except for Laos, are entirely too voluminous and should have been prepared in a much shorter time. They represent only a small portion of the work required by the contract. Conferences with Southeast Asia Communications in Cambridge, Massachusetts, indicated that very little additional work has been done to date beyond that included in the Fundamental Plans.

3. There is a real need for a modern and comprehensive telecommunications system in each of the countries of Thailand and Vietnam. Based on present annual revenues per telephone, they would appear to be economically feasible.

In the case of Laos, a much more modest system would suffice for some years. The military needs appear to be paramount in this country.

4. Recommendations are given in Chapter VI of the attached report in the form of suggested actions for ICA. These may be summarized briefly as follows:

a. Discuss with Southeast Asia Communications the status of the work completed to date and the amount of expenditures under the contract. Determine how much additional work, such as detailed engineering, preparation of specifications, supervision of construction, and

training can be carried out by the contractor under terms of the existing contract.

Decide on the basis of information received as to the above items whether ICA should continue with the contract or cancel it. Based on the amount and quality of work produced to date, the latter action suggested above would merit serious consideration.

b. Proceed with the approval and implementation of approximately $27,000,000 worth of construction in the three countries which will provide a modern complete telecommunications system in each of the three countries ample to satisfy their requirements for some time. It is suggested that the money be allotted $17,000,000 for Thailand, $8,000,000 for Vietnam, and $2,000,000 for Laos. The figure for Vietnam includes $2,000,000 now available in the country program.

c. It is recommended that, regardless of the engineering group chosen to carry out the work, they be stationed in the country where the work is being performed. All responsibility for coordination of planning between countries and authority for making decisions as to amounts and types of plant, methods of training, necessary rehabilitation work and other problems which will inevitably arise in an undertaking of the suggested magnitude should be vested in this field group.

d. Authorize the field groups to confer with the country administrations for the purpose of setting up some reasonable control within each country over the allocation of radio frequencies. While this need not be so comprehensive as that practiced by the Federal Communications Commission in the United States, it should be sufficiently rigid to prevent interference with the proper operation of the radio systems on which the proposed toll plant is almost entirely based.

e. Consult with the administrations of the respective countries with the aim of establishing adequate accounting systems where such do not now exist or reorganizing existing ones, as necessary. An accounting department

should keep adequate and accurate records of all revenues and expenses, prepare and render bills for service, and maintain records of telecommunications plant so that the actual units of plant and the investments therein are available at any time by various classes of plant.

This report is accompanied by a Summary Report indicating the recommended Telecommunications Systems for the countries of Thailand, Vietnam and Laos. It also includes a possible plan for Cambodia. Estimates of cost of each system are indicated.

Very truly yours,

TUDOR ENGINEERING COMPANY

John G. Marr

John G. Marr
Project Manager

RF:ebf

TELECOMMUNICATIONS SYSTEMS FOR THAILAND, VIETNAM, LAOS

Raymond Foulkrod, Consultant
in Collaboration with
John M. Hogg, Regional Telecommunications Coordinator

CHAPTER I

INTRODUCTION

The following constitutes a report on Fundamental Plans prepared by Southeast Asia Communications for telecommunications systems in the countries of Thailand, Vietnam, and Laos.

Southeast Asia Communications is a joint venture of Hycon Eastern, Inc. and Page Communications Engineers, Inc. They have entered into a contract with the International Cooperation Administration (ICA-W-281, dated February 6, 1957) to prepare plans and initiate construction for the telecommunications systems mentioned in the preceding paragraph.

Tudor Engineering Company has been requested to review the results accomplished to date by Southeast Asia Communications. This work is covered under ICA Task Order No. 132. (Copy attached as Appendix A.)

Extent of Contract

Under this contract (ICA-W-281), Southeast Asia Communications was obligated to a general scope of work divided into four phases.

These phases are as follows:

1. Evaluation of Economic Feasibility
2. Engineering
3. Management Consulting
4. Training

Of these four phases, the first has been incorporated in a "Fundamental Plan" for each of the three countries. These will be discussed later.

In paragraph 1.2.3. Engineering, the following statement is included: "Engineer will produce a construction schedule phased to meet projected traffic loads and will prepare firm designs, specifications, and invitations to bid covering construction of network."

Also, in this same paragraph, the following appears: "With respect to projects approved for construction, Engineer will be responsible for the following:

a. Recommending firms to be solicited for bids for providing the equipment and construction.

b. Preparing draft invitations for bids on equipment procurement.

c. Assisting in evaluating bids received.

d. Assisting in negotiation of contracts with the successful bidders.

e. Supervising and inspecting progress of work to assure compliance with specification and contract provisions and recommend approval of documentation for payment."

Under paragraph 1.2.4 Management Consulting, Engineer was obligated to assist host countries in modifying their present telecommunications management systems to bring them into line with modern practices and to prepare them for the administration of the expanded system.

Paragraph 1.2.5 Training, the Engineer was to conduct a training program consisting of administrative management, organizational management, personnel management, and all technical aspects of operation, construction, supply, repair, and maintenance.

This contract was entered into on February 6, 1957, although Southeast Asia Communications was advised to proceed based on letter of intent dated December 19, 1956.

To date, Southeast Asia Communications have completed and submitted to ICA Fundamental Plans for telecommunications systems in each of the three countries. As far as can be determined, practically no work has been carried out on phases 2, 3, and 4 of the contract.

Need for Fundamental Plans

A Fundamental Plan is necessary for the proper design of any major telecommunications system and it should be prepared prior to the detailed engineering of any portions of the proposed plant. A fundamental plan should present a complete picture of the extent of development of the telecommunications system for the area under study at some date or dates in the future. It is intended to serve as a guide to achieve the

ultimate objective. Also, it should be considered as flexible and subject to periodic revision as additional factual data are developed. Any portion of the system approved for construction at any time should conform to and fit into the overall picture. All conclusions and recommendations based on the fundamental plan should be supported by basic facts and/or reasonable estimates when facts are not available.

Fundamental plans normally require a considerable amount of data regarding existing plant as well as estimates for the future. The data and estimates generally accepted as being the minimum required for the preparation of a fundamental plan are given in Appendix B of this report.

Due to lack of records, both historical and current, it was impracticable to obtain in these three countries all of the data normally employed in the preparation of a fundamental plan for a telecommunications system.

Assumptions, where made, should, therefore, be supported by experiences in other successful telecommunications systems. In the cases of Thailand, Vietnam and Laos, experiences in other similar under-developed countries must be drawn upon as criteria.

The fundamental plans for the three countries mentioned above submitted by the Southeast Asia Communications have been reviewed in considerable detail and the comments regarding these plans will be covered in the following chapters, with a separate chapter for each country.

CHAPTER II

FUNDAMENTAL PLAN FOR THAILAND

The Fundamental Plan for the ultimate telecommunications system in Thailand submitted by Southeast Asia Communications (SAC) is a voluminous document divided into six parts as follows:

1. The Evaluation of Economic Feasibility
2. Engineering
3. Management
4. Training Program
5. Recommendations with Cost Recapitulation
6. Appendices

Appendix B attached to this report lists the more important items necessary in the preparation of a fundamental plan.

Due to lack of basic data, many of the conclusions drawn and the recommendations based thereon in the fundamental plan are the result of judgment. This report does not agree with the judgment exercised in the Fundamental Plan and disagrees with some of the recommendations. These are discussed in items A through H of this chapter, covering the areas of agreement or disagreement and reasons therefor.

The report indicates that the total telephones in service in Thailand in 1957 were 17, 794, of which approximately 70 per cent were in Bangkok with the remainder scattered throughout the country in a total of forty-five communities. Estimates of future growth indicate that the telephones in Bangkok can be expected to increase to 70, 000 by the end

1967. By that same date, it is estimated that service will be furnished to 35,500 telephones in sixty-four communities outside of Bangkok. The total telephones in the country in 1967 are estimated by SAC to be 105,500 a growth of 87,500 in nine years or a 490 per cent increase. This is most certainly a substantial estimate of growth and it is not clear on what it is based. The data given in the Fundamental Plan on numbers of held orders now is meagre and conflicting. There is no evidence of a canvas of prospective customers. However, if experience in the next year or two indicates the estimates are high, it will be necessary only to defer some scheduled additions of both central office equipment and outside plant in order to avoid having any substantial part of plant lying idle.

A. Economic Feasibility

Part I of the Fundamental Plan computes annual local revenue requirements of $120 per telephone and toll revenue requirements of $24.50 per telephone, or a total annual requirement of $144.50 per telephone. Data are not available to check these figures, but it is assumed the computations are correct.

However, the annual report of the Telephone Organization of Thailand (TOT) for the period April 1, 1956 to March 31, 1957, furnishes figures indicating that the total annual revenue per telephone in Thailand is approximately $105. Since the proposed program, exclusive of special facilities, is estimated by SAC to cost $41,094,000 for a gain of 87,500

telephones, the increase in investment per telephone gained would be about $470.00.

If an overall annual charge rate of 25 per cent is employed (interest 2.5 per cent, depreciation 5 per cent, operating expenses 17.5 per cent), the annual requirement per telephone would be $117.00. This figure would be lower if the value of existing plant is taken into account. It, therefore, appears that the revenue per telephone per year would approximate the total charges per telephone per year.

B. Rehabilitation of Existing Telecommunications Plant

The Fundamental Plan recommends very extensive rehabilitation of the existing telecommunications plant. There is a verbal description of these proposals beginning on page 22 of Part II. No cost estimates for rehabilitation of existing plant have been found in the plan.

The rehabilitation of the existing plant should be carried out as promptly as possible, as it is absolutely necessary if good service is to be furnished, and it should be done so that engineering for additions may be based on sound figures for existing usable plant.

C. Local Plant

1. Central Office Equipment. The existing central office equipment in Bangkok consists of 14,000 lines of General Electric Co. Ltd. step-by-step dial equipment. In addition, 15,500 lines are on order

with part of them being installed. Upon the completion of this work, there will be 29, 500 equipped dial lines in service divided between six buildings. Two of these offices are presently operating on a satellite basis through tandem switches in their respective parent offices.

The Fundamental Plan proposes the installation of 46, 000 additional lines of dial equipment in Bangkok by the end of 1967 at an estimated cost of $6, 888, 000 or $150 per line installed. The above mentioned cost per line is a reasonable figure.

If the actual growth does not reach the estimate, additions in future years may be deferred. It is proper that all central office equipment additions for local service should be of the dial type.

The plan also recommends changing the two offices now operated as satellites to full office operation with direct trunk groups to and from each other office in the city. This proposal is sound and should be carried out. It will result ultimately in lower costs due to the elimination of selector-repeaters and will provide considerable improvement in service.

In the communities outside of Bangkok, the plan proposes the installation of forty-two new common battery switchboards in 1959, 23 in the period 1960-62, and 38 in the period 1963-67. Also called for are six dial offices to be installed in the period 1960-62, two of which are replacing new manual boards placed in 1959. These proposals are subject to question for the following reasons:

a. A program calling for the installation of forty-two new common battery switchboards, most of them requiring new buildings, in a period of little better than one year is entirely too ambitious and is, in fact, impracticable.

b. The installation of new manual common battery offices is highly questionable. All new offices should be of the dial type, many of them unattended. The increased cost of the dial equipment would be more than offset by the lower costs of the buildings required and much lower future operating costs.

c. The installation of new common battery boards and their consequent replacement with dial in three years or less, as recommended in two cases, is uneconomical, impractical and could well lead the host country to question whether any suggested plans are sound.

2. Subscribers' Plant (Substation Equipment). Table 2 on page 21 of Part II of the Fundamental Plan gives the age and manufacturer of the subscriber sets in use in Bangkok. No cost estimate is given in the Fundamental Plan report received April 14, 1958, whereas in the preliminary draft a cost estimate of $76,840 was given.

Section 2.1.6.7 on page 32 of Part II of the Fundamental Plan states that most of the subscriber sets in the provinces are at least 30 years old, with some of them 50 years of age. The plan makes provision for the replacement of all of these sets as each community has a new central office installed. This is completely necessary.

3. Exchange Outside Plant. Section 2. I. 3. 1 on page 12 of Part II of the plan states that the existing outside plant in Bangkok is inadequate. The cable distribution system is predominantly buried cable of the tape armored type with limited use of troughs in the side walks. Further, cable has been designed in the past with no provision for future growth. Each cable takes care only of the immediate requirements. Such a system is most uneconomical and the TOT management should have pointed out to them the very real economies which can be realized by designing cables to take care of anticipated growth for a reasonable period in the future, at least two to three years.

The plan proposes an extensive conduit system for the city of Bangkok, but does not state how much of it will be built in the first period, 1958-59. This recommendation is sound and should be followed, but it is possible that the cost is on the high side.

Little or no information is given in the plan as to how the distributing cables are to tie into the underground cable network, nor does the plan cover the possible use of aerial cable plant. Both of these items are most important and will require sound engineering knowledge for their solution.

It is suggested that aerial cable distribution be used whenever possible, not only because of the resulting economy, but also because of the easier maintenance and the simplification of installation work.

The interoffice trunk cables proposed in the plan are shown in figure 4, page 27 of Part II. No fundamental data are given which would permit checking the proposed sizes and gauges.

Section 2.1.6.10 on page 33 of Part II of the Plan states that most of the existing outside plant in the provincial communities consists of a combination of buried cable and open wire on pole lines. The poles are generally in fair condition. That being the case, it would appear that much of the cable distribution in the smaller communities could well be of the aerial cable type. This should be carefully investigated.

The plan recommends that all unsatisfactory outside plant be replaced in each town coincident with the installation of new central office and subscribers' equipment. This should certainly be done, making use of any existing outside plant that is in satisfactory condition.

The plan recommends a comprehensive test program in each provincial community in order to determine how much of the existing exchange outside plant is reusable and what amount of rehabilitation work is necessary. It appears that little, if any, of this work has been completed to date. Such a program should be implemented and completed prior to carrying out the detailed engineering work for the new and expanded outside plant.

The total cost of Phase I Outside Plant as recommended in the Fundamental Plan is shown on Appendix C-1 attached. The amount is $2,810,000. If the number of towns converted is changed, this estimate will also change. This will be covered later under specific recommendations for action.

4. Buildings. An addition to the Ploenchitr building in Bangkok is planned for 1959 at a cost of $41,000. Likewise, alterations to the Wat

Leit building are estimated at $66,000. Both of these proposals are necessary and the estimated costs appear reasonable.

In the provinces, 35 small central office buildings are proposed for completion by 1959. These are designed to house new common battery switchboards and are estimated to cost in total $214,000, or an average of $6,100 each. This is a reasonable cost.

D. Toll Plant

1. Toll Circuits. The existing toll system in Thailand is described on page 38 of Part II of the Plan. It consists of both open wire circuits and high frequency radio, neither of which furnishes a good grade of service today. Also, they are inadequate in amounts of channel facilities furnished.

Section 2.2.5.1 on page 41 of Part II of the Fundamental Plan sets forth the primary basis underlying the recommended toll plant. Item No. 5 reads as follows:

> "Maximum sharing of the toll facilities with the number of 'private lines' being kept to a minimum consistent with efficient government administration and national security. Discussions of the concept of facilities sharing and the economic benefits to be derived from maximum sharing are covered in Section 1.3."

The toll system proposed in the plan consists mainly of carrier systems applied to existing open wire on the right of way of the Thai State Railways. This would be supplemented by VHF radio systems beyond the extremities of the open wire lines. The total estimated cost

of this system is $6,779,000 and it is proposed to complete all of it by the end of 1959. No mention is made of the integration of commercial and special toll facilities and it is, therefore, assumed this has not been done.

This assumption is supported by an inspection of the companion volume of special services. This volume proposes an entirely separate toll system to handle special facilities on an exclusive radio basis and with no integration with the commercial toll system recommended in the Fundamental Plan. The estimated cost of the special system is $25,524,000.

It appears that the desirability and economy of maximum sharing of toll facilities has been completely overlooked. This is most unfortunate.

A toll system will be recommended later in this report under the section on specific recommendations for action.

2. Toll Centering Arrangement. The toll centering arrangement and switching system proposed in the Fundamental Plan is described in Section 2.2.7 on page 43 of Part II and illustrated on Figure 6, page 47 A of Part II. The first sentence of Section 2.2.7 states:

> "The proposed system has been devised to provide sufficient channel capacity to accommodate the requirements of P.T.T., Military and other public and private leased carrier circuits."

No data are given in support of this statement. In view of the fact that a $25,524,000 system of radio relay is suggested in a separate volume to take care of special services, it is unreasonable to assume that the $6,779,000 system proposed here is adequate to satisfy both commercial and special services.

The toll switching system recommends the use of toll points which necessitate a maximum of seven switches on some calls. Good service is not possible with such an arrangement. All toll points should be eliminated and consideration should also be given to eliminating some of the five regional centers. Such action would reduce the switches to a maximum of five in a few cases, with a maximum of three switches in most cases. Economies may well result from such an arrangement.

3. Telegraph Facilities. Little is given in the Fundamental Plan regarding telegraph facilities. Beginning at page 202, Appendix 9, there is some general information on suggested methods of handling telegraph traffic. There is not sufficient information to check either the adequacy or feasibility of the proposed methods.

4. Special Facilities. There is some discussion earlier in the Fundamental Plan regarding special facilities such as telephone and telegraph circuits for the police, military, meteorological stations, etc. These are given in a separate volume and, as stated previously, there appears to have been little attempt to engineer a combined system for commercial and special facilities. The estimated costs of the special facilities are included in Appendix C of this report and total $25,524,000. It should be noted that it is proposed to spend $19,300,000 of this amount by the end of 1959.

No data are given which permit checking the reasonableness of this proposal, but it is apparently much too high.

5. International Circuits. The recommended steps to be taken in connection with the international circuits are given in Section 2.3.4 on page 53 of Part II of the Fundamental Plan. The estimated total cost of the recommendations is shown on Appendix C-1 of the report as $147,000. The proposals appear sound and should be carried out.

6. Numbering Plan. The numbering plan suggested for Thailand appears adequate for many years. Future development of additional levels for six digit operation in Bangkok can be implemented as the demand indicates.

E. Management

Part III of the Fundamental Plan, in discussing management problems, points out that a technological advancement of the order of magnitude of the proposed telecommunications system will necessitate drastic modifications, if not outright changes, of the existing management system. This is undoubtedly true.

The Fundamental Plan proposes an interim management organization and a permanent one. As in the case of Vietnam, it would appear that the proposed interim organization would be adequate for many years to come. It must be remembered that the total number of telephones in service in the entire country anticipated by the end of 1967 is approximately 105,500. Of these, only 35,500 will be in the provinces. The regional organizations should, therefore, be few in number, possibly three to four in all. Further, each regional organization should consist at the most of not more than five general supervisors with required numbers of craftsmen and operators. All general functions for a system of the size indicated should be handled at headquarters in Bangkok. In general

functions, this report includes all accounting and billing work, as well as public relations.

F. Training

In Part IV, the Fundamental Plan proposes a very ambitious training program, including, among other items, the training of 1890 craftsmen in ten years. With an estimated loss rate of 6 per cent per year, about 1350 of these trainees would still be in service at the end of 1967. With 105,500 telephones in service this equates to an additional 12.8 trained craftsmen per 1000 telephones. Comparing this with the corresponding Bell system figure of 2.5 craftsmen per 1000 telephones in service, the figure appears much too high. It is suggested it is at least double maximum requirements.

A continuous training program outside of Thailand for new management and engineering personnel is also recommended. This report agrees that this is a very desirable thing and it should be put into practice.

The estimated cost of the training program by years as proposed in the Fundamental Plan is given in the following table:

Year	Estimated Cost of Training
1959	$ 761,000
1960	334,000
1961	277,000
1962	227,000
1963	192,000
1964	174,000
1965	174,000
1966	173,000
1967	173,000
Total	$ 2,485,000

In view of comments given above on the size of the training program proposed by the Fundamental Plan, and in view of proposals made later in this chapter, the above training costs can probably be kept below $500,000.

G. Specific Recommendations for Action by ICA

It is recommended that the ICA and the Government of Thailand adopt the recommendations given in this report rather than those set forth in the Fundamental Plan. There is so great variance between the two that it is difficult to reconcile the differences.

The recommendations of this report with reference to an expanded telecommunications system in Thailand are as follows:

1. Rehabilitation. Approve the rehabilitation of existing plant in Thailand up to but not exceeding a cost of $1,000,000. This work should be confined to Bangkok and those provincial communities not specifically designated below as those where the entire plant is to be rebuilt.

It is suggested that this work be carried out under contract with a responsible contractor and under the supervision of SAC, or such other engineering group as ICA and the host country may agree upon. The contract should also provide for the training of such numbers of maintenance and local engineering

personnel as is mutually agreed upon by the Government of Thailand, the contractor, and the supervising engineers.

The contractor should likewise be instructed to prepare adequate plant records of existing plan where these are not now available. This should be incorporated in the contract with the provision that the types of records necessary be mutually agreed upon by the Thailand Government and the supervising engineers. Provision should also be made for keeping these records up to date in the future.

2. Exchange Plant in Bangkok. Approve the addition of 10,000 lines of dial equipment in the Wak-Leb Central Office in 1959. At the same time, introduce a six digit level 29. This would add nine thousand lines net to this exchange.

Further approve the engineering and construction of an adequate underground conduit system together with properly engineered trunk and subscriber feeder cables to meet the demand for a reasonable period in the future, say, two to three years.

Approve the installation of required numbers of subscribers' sets.

It is estimated the total cost of all suggested work under this item 2 will be in the order of $3,000,000.

3. Exchange Plant in the Provinces. Approve the replacement of existing manual switchboards at eight

toll centers and regional centers with new dial equipment and necessary toll boards. Those offices suggested for consideration as toll and regional centers are Saraburi, Uttaradit, Chieng Mai, Had Yai, Petburi, Phuket, Korat, Nakorn Sawan, Udorn, Pracinburi, Cholburi, Chanta Bun, and Ubol. The estimated total cost of this suggested work, including rehabilitation of the outside plant and replacement of subscribers' sets in the towns agreed upon would be about $1,406,000.

Coincidental with the work suggested in the preceding paragraph, about 40 tributary offices in the areas of the toll centers selected above should be converted to unattended dial operation with complete rebuilding of the outside plant and the replacement of the subscribers' sets. This phase of the work should cost about $1,200,000. The final selection should probably be the result of mutual agreement between the Thailand Government and the engineers.

There would be a very definite advantage in having all of the work covered in this item 3 incorporated in one proposal for bids so as to insure having the same type of equipment in all offices. This would have very material maintenance advantages and would probably result in a

lower overall cost than if the projects were carried out separately. It would also be necessary to stock spare parts of only one type of equipment.

4. Toll Plant. While no details are available as to numbers of commercial and special telephone and telegraph circuits required between the various communities, the following suggested toll network should be adequate to provide all such facilities as are decided to be necessary initially. Furthermore, the system is so designed that it is susceptible at any time to economic expansion and the ultimate capacity is sufficient to service the country for many years.

It is recommended that broad band micro wave radio relay systems be constructed from Bangkok to Korat, Saraburi to Uttaradit, and Bangkok to Had Yai at an estimated cost of $4,180,000. These systems would have a maximum capacity of 600 voice channels on one pair of bands - one in each direction. One protective band with automatic switchover in case of trouble should also be provided. The band should be equipped initially for about 10 per cent more circuits than indicated to be required initially, so as to make good circuit failures, allow for patches, and the like.

Branching off from these broad band channels to reach the smaller communities, there would be required about 1500 miles of VHF radio relay with a maximum capacity of 60 voice channels. These should also be equipped initially with a small margin of voice channels over the indicated minimum requirements. The VHF radio would have an estimated cost of $5,250,000.

This gives a total estimated cost for an adequate toll system to take care of both commercial and special requirements of $9,430,000.

The total telecommunications system recommended in 1 through 4 above would be an excellent beginning for an expanded system in Thailand. It is shown diagramatically on Plate No. 1. It would appear logical to assume that the Thailand administration could in the future keep up to date with increased demands for service.

H. Recommended Telecommunications System for Thailand

The telecommunications system recommended in this section for Thailand will provide initially a modern system that should be adequate to satisfy all immediate requirements, both for commercial use and special services. It is so designed that it can be expanded economically and in a relatively short time as demands for service increase. The estimated cost of the recommended system is slightly under $17,000,000.

The proposed telecommunications system is shown in outline form on Plate No. 1. Further details and estimated costs are given below.

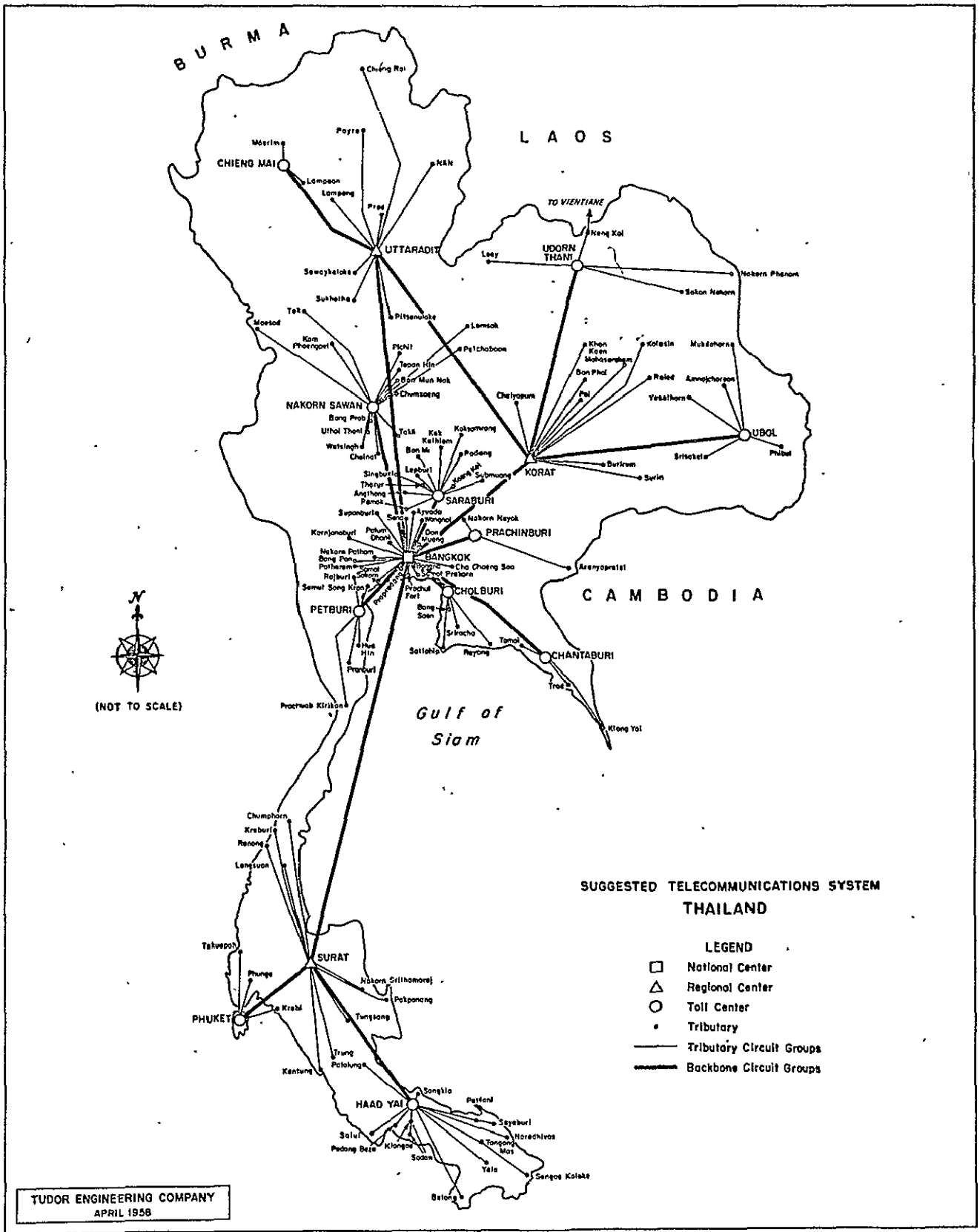

BURMA
LAOS
CAMBODIA
Gulf of Siam
CHIENG MAI
UTTARADIT
NAKORN SAWAN
UDORN THANI
TO VIENTIANE
KORAT
UBOL
SARABURI
PRACHINBURI
BANGKOK
CHOLBURI
PETBURI
CHANTABURI
SURAT
PHUKET
HAAD YAI
(NOT TO SCALE)
SUGGESTED TELECOMMUNICATIONS SYSTEM
THAILAND
LEGEND
National Center
Regional Center
Toll Center
Tributary
Tributary Circuit Groups
Backbone Circuit Groups
TUDOR ENGINEERING COMPANY
APRIL 1958

PLATE I

It should be noted that in those cases where broad band radio relay systems are proposed for toll plant, such systems have an ultimate capacity of 600 voice channels per band. They would be equipped initially to meet the total circuit requirements on each route with approximately 10 per cent spare circuits for emergency and patching use.

The VHF radio relay systems should have an ultimate capacity of 60 voice channels and should be equipped initially to meet total circuit requirements with approximately 10 per cent spare.

Recommended Construction in Thailand

Project	Estimated Cost
Rehabilitation of existing plant that can be reused	$ 1,000,000
Add 10,.000 dial lines in Wat Leb office in Bangkok	1,500,000
Exchange outside plant and station equipment in Bangkok	1,500,000
Korat exchange outside plant and station equipment	20,000
Saraburi 500 line dial office with toll board, building, outside plant and station equipment	119,000
Nakorn Sawan outside plant and station equipment	20,000
Uttaradit 400 lines of dial with toll board, outside plant, building, and station equipment	97,000
Chieng Mai add 200 manual lines and outside plant	57,000
Udorn 300 lines of dial with toll board, outside plant and station equipment	255,000
Petburi 400 dial lines with toll board, building, outside plant, and station equipment	116,000
Phuket 600 dial lines with toll board, outside plant and station equipment	130,000
Pracinburi 300 dial lines with toll board, building, outside plant and station equipment	100,000
Cholburi 300 dial lines with toll board, building, outside plant and station equipment	90,000
Ubol keep C. B. manual board in service, add outside plant and station equipment	12,000
Chantaburi keep C.B. manual board in service, add outside plant and station equipment	15,000
Convert 40 tributary offices to unattended dial operation, offices to be chosen by host country administration and contractor	1,200,000

Toll Plant	Estimated Cost
Build broad band radio relay systems from	$
Bangkok to Korat, 148 miles	740,000
Saraburi to Uttaradit, 150 miles	750,000
Bangkok to Had Yai, 538 miles	2,690,000
Build 1500 miles of VHF radio relay, locations to be determined by contractor and host country administration	5,250,000
Single side band radio circuits for small circuit groups	200,000
Power	250,000
Training	500,000
International Circuits	150,000
Total	$ 16,761,000

Many of the details of the above suggested plan can be worked out only in the field in collaboration with the Thailand Government. It is intended as a broad outline of a complete and adequate telecommunications system. It is recommended for adoption by the Government of Thailand and ICA.

CHAPTER III

FUNDAMENTAL PLAN FOR VIETNAM

The Fundamental Plan for the ultimate telecommunications system in Vietnam submitted by Southeast Asia Communications is similar to that prepared for Thailand and is arranged in an identical pattern.

Appendix B of this report lists the more important items necessary for the preparation of a Fundamental Plan. The underscored phrases on that same appendix give the data furnished by Southeast Asia Communications for the Fundamental Plan for Vietnam.

Due to lack of basic data, the conclusions drawn and stated in the Fundamental Plan are based largely on judgment. This report does not agree with the judgment exercised in the Fundamental Plan and disagrees with some of the recommendations. These are discussed in Items A through F of this chapter covering the areas of agreement or disagreement and the reasons therefor.

In 1957, there were in service in Vietnam a total of approximately 13,000 telephones and estimates furnished in the Fundamental Plan indicate 23,224 in service by the end of 1967. This is an increase of 10,224 telephones in ten years. There are presently in Saigon-Cholon 2240 orders for service that cannot be filled and an estimated unexpressed demand for 4480 more telephones. On this basis, a total estimated growth of 10,224 telephones in ten years appears conservative.

However, local portions of the system recommended are so designed that they can be economically expanded without penalty if experience in the future indicates that the estimates are low. They are probably not on the high side.

The Fundamental Plan for a telecommunications system for Vietnam presents a picture of an integrated system for the country. With suggested modifications, it will serve the purpose for which it is intended, namely, a broad outline of the backbone plant for an ultimate telecommunications system. The Fundamental Plan recommends the use of existing plant wherever it is servicable.

A. Economic Feasibility

Part I of the final draft of the Fundamental Plan for Vietnam deals with the economic feasibility of the proposed telecommunications system for that country.

On page 3 of Part I the Plan states:

> "The principal difficulties with any major undertaking always occur during the initial phases - for it is during this time that the project must operate at a deficit without adequate revenue-earning facilities being made available. The initial investment is, relatively speaking, rather heavy, and even with user facilities installed, a period of time is involved before the user becomes fully familiar with, and aware of, the new services which are available. It, therefore, takes some time before full revenue potential is reached."

The above statement is undoubtedly true and peculiarly so in a country such as Vietnam, whose people have never had available for their use a complete telecommunications system.

Unified operation of public and special facilities such as military, police, etc., is discussed on pages 5 and 6 of Part I. The advantages resulting from such unified operation are pointed out. It is agreed that the reasons given are valid and a unified system should be employed.

Growth rates estimated for the Plan are given on page 11 of Part I. These are 7 per cent per annum for the smaller communities and 11.2 per cent per annum for the metropolitan area. These do not agree with estimates of growth of 5 per cent for 1958-1962 throughout the country and of 6 per cent for Saigon-Cholon and 7 per cent for provincial communities after 1962. These figures appear on page 57 of Appendix 5 of the Fundamental Plan. Apparently, the second set of growth rates were used in the Fundamental Plan to determine quantities of equipment and plant.

On page 16 of Part I, computations have been made in an effort to determine whether the proposed local system will be self-supporting. In order to overcome the difficulties outlined in the quotation given above from page 3 of Part I, the total annual charges on the local plant were extended over a nine-year period. The annual charge rates used were:

Interest rate on capital	2-1/2%
Amortization of capital	4-1/2%
Depreciation of plant	5 %
Total operational costs	23 %
Total	35%

The annual charge figures of 35 per cent are applied to the average value of the proposed new local plant, including an estimated value for existing plant. This estimate is not given. One-half of the proposed training costs are included on the assumption that one-half of these costs is chargeable to local plant and one-half to toll plant.

The total annual charges are then divided by the total subscriber years available during the same nine-year period. The result is a requirement of $126 per annum per telephone in local revenue to support the program. (See page 17, Part I of the Fundamental Plan.)

On the same page is given an estimate of present subscriber local revenue yield of $192 per year. It is not clear how this figure was calculated.

For comparative purposes, the local revenue per telephone in the Michigan Bell Telephone Company is approximately $65 per annum.

With reference to toll service, page 17, Part I states that the toll system proposed will require revenue of $790,000 per annum from non-leasing subscribers and $1,010,000 per annum from leased services. On this basis, the non-leasing subscriber would have to produce $44.50 per annum to meet the costs of the service. This is likewise based on the 35 per cent annual charge figure.

Again quoting from Michigan Bell Telephone Company statistics, the average toll revenue per telephone per annum is about $26.

The figures given in the preceding paragraphs of revenue requirements for local service of $126 per telephone per annum and $44.50

for toll per telephone per annum total to a revenue requirement of $170.50 per telephone per annum to meet the anticipated costs.

It is stated on page 16 that the 35 per cent annual charge rates are assumptions. This report does not agree that amortization of capital and depreciation of plant should both be included. No data are given to support the 23 per cent assumed for operational costs. In view of the fairly large capital investment per telephone under the proposed plan and the existing low labor rates, these figures appear high. It is suggested they be reduced to 15 to 18 per cent.

Removing the amortization figure of 4-1/2 per cent and reducing the estimated operational costs by 8 per cent would give a total annual charge figure of 22.5 per cent.

If these annual charge figures are employed, the annual local service revenue requirement for telephone would be $81 and the annual toll service requirement per telephone would be $28.60 or a total of $109.60 per telephone per annum.

The last sentence in Part I found on page 20 reads as follows:

> "From these facts it is concluded that the Fundamental Plan outlined in this document is in fact economically feasible, is well within the capacity of the Republic of Vietnam to absorb, and will contribute materially to the national welfare."

It is not clear what facts are referred to in the above sentence. It is difficult to find any in Part I of the Fundamental Plan. Facts such as the average annual local revenue per telephone in service were probably available and, if so, should have been used in support of the above statement.

The annual report of the P. T. T. for the Republic of Vietnam for the year 1956 gives for that year total telephone revenues of 60, 372, 444 piastres. The total telephones in service were 5, 892. Based on the official rate of exchange of 35 piastres to the dollar, the above figures indicate an annual revenue per telephone of better than $290.

Assuming these figures are correct, it would appear that the annual revenues per telephone in Vietnam would be ample to satisfy the annual requirements per telephone of $170.50.

B. Rehabilitation of Existing Telecommunications Plant

The Fundamental Plan provides for the rehabilitation of the existing telecommunications system and presents an estimate of the cost of this work in the amount of $725, 000. Details are given by communities to support this estimate, and it is understood these are based on a survey of the existing telecommunications plant in a representative sample of the communities and of the existing toll and telegraph circuits interconnecting the various communities.

This amount of $725, 000 is shown on Appendix C-2 attached. This same appendix carries the estimated costs of all new construction proposed up to and through the year 1967 by SAC.

The rehabilitation work recommended is completely necessary. It is difficult to determine from such data as are given whether the estimated cost of $725, 000 is a reasonable figure. This equates to $725, 000 ÷ 13, 000 telephones, or $55 per telephone in service. In view of the condition of existing plant, the figure of $55 per telephone does not appear too high, but it should be sufficient.

C. Local Plant

1. Central Office Equipment. On page 10 of Part I of the Fundamental Plan, the statement is made that central office plant in the metropolitan areas "is in generally good condition".

The additions of dial equipment proposed for Saigon-Cholon are given on page 88 of Appendix 9. The total net additions estimated through 1966 are 15, 400 lines. It is agreed that all additions of central office equipment in this area should be of the dial type. The increase, namely, 15, 400 lines over a nine-year period, is reasonable. There are presently 6,820 held orders and estimated unexpressed demand which leaves approximately 7800 lines for growth on the basis of a maximum utilization of 95 per cent of the installed lines. This provides for an average growth of 870 lines per year, which does not appear excessive. If the growth does not reach this figure, additions in future years may be deferred. On the other hand, if future demand exceeds the estimate, scheduled additions can be advanced.

The estimated total cost of 12, 800 dial lines proposed for installation under the plan is $1, 856, 000 or $145 per line. This figure does not include the installation of 4400 dial lines already in progress or on order to provide for growth and the replacement of 1800 lines of manual equipment. The estimated cost of $145 per line for future dial additions is a reasonable figure.

In describing the central office facilities in provincial areas, the following statement is made on page 10 of Part I as follows:

"The smaller offices are generally manual types, many of which are in poor condition through age or lack of maintenance, although a number of communities enjoy adequate local service through new switchboards or switchboards which are in good condition."

In the smaller communities, the plan recommends the installation of fourteen new common battery manual switchboards and seven new small dial offices, each of the latter equipped with a toll board. These are largely replacing worn out and obsolete types of manual switchboards, but, in five cases, they are intended to provide service in communities with no existing service. It is not agreed that manual common battery switchboards should be installed. It is recommended strongly that all new installations should be of the dial type. A number of these should be of the unattended type, but sufficient data are not available to determine which ones should be so treated. This recommendation would increase the cost of central office equipment by approximately $60,000, but would effect a substantial reduction in operating charges, particularly if a number of unattended dial offices are employed.

2. Subscribers' Plant (Substation Equipment). Page 10 of Part I of the Fundamental Plan states that:

"Furthermore, subscriber instruments tend to be old and of a wide range of different types."

The recommendations of the Fundamental Plan call for the replacement of 3272 subscribers' telephones and the addition of 15,085 new ones at a total cost of $496,120. On the basis of installing 18,357

telephones, the unit cost per telephone installed is $27. The recommendation is sound and the estimated cost is reasonable.

3. Exchange Outside Plant. The exchange outside plant in metropolitan areas is described on page 10 of Part I of the plan as follows:

> "Local wire plant in these centers is generally in poor condition and this tends to distort usage data so as to penalize the service."

On the same page, the outside plant in provincial communities is described as being generally in poor condition.

Total expenditures of $1,607,860 are recommended for exchange outside plant. Of this amount, approximately $1,000,000 is to cover the construction of underground conduit in Saigon-Cholon and $608,000 covers the construction of underground cable in conduit in Saigon-Cholon and buried cable in communities outside Saigon-Cholon.

The total amount of underground conduit proposed is 76,000 meters of trench with the numbers of ducts varying in accordance with the requirements. This gives a cost per trench meter of about $13.

Cable to the extent of 301,700 meters is provided for at a total cost of $608,000 or a unit cost of $2.00 per meter. No data are given as to the sizes or gauges of the cables to be employed, so it is impracticable to check either the adequacy of the proposed plant or the cost. On the whole, the estimated costs for both conduit and cable appear low.

4. Buildings. One new building is proposed for Cholon at an estimated cost of $150,000. Four buildings are scheduled for minor additions, two at $4,500 each and two at $24,500 each. It is also recommended that

air conditioning be installed in five buildings at an estimated cost of $3,000 for each building.

All of the above recommended actions are necessary and the estimated costs are reasonable.

D. Toll Plant.

1. Toll Circuits. On page 18 of Part II of the Fundamental Plan, the present toll plant is described as follows:

> "The toll circuits now existing are illustrated on Figure 2 and may be divided into two broad groups, one utilizing overhead lines and the other high-frequency radio. The Vietnam main-line physical wire facilities totalled 693 km at the end of 1956."

The plan proposes the use of these facilities to the best advantage in the future.

The toll system recommended is almost entirely radio of the VHF, UHF, microwave, or scatter type. No data are given as to the ultimate number of voice channels which can be obtained over each of the proposed systems. The circuit requirements through 1967 are given in Part II, page 23. It is not clear, therefore, as to whether the systems recommended will have ample capacity to take care of the ultimate requirements in the most economical manner.

The toll systems recommended are engineered so that they can be employed to carry voice conversations, telegraph messages, facsimile and radio programs.

The total cost of the toll circuits recommended in the plan, including special facilities and an extension program beyond 1967, is

$6,570,000. This is given by phases and in total on Appendix C of this report.

The decision to use radio relay for practically all of the main toll routes is completely sound based on the topography of the country and maintenance problems. Radio should furnish circuits more cheaply in the future, as it lends itself well to economic expansion provided the radio systems first installed have ample ultimate capacity. It is recommended that all systems installed on backbone routes be of the broad band type to provide adequate capacities to meet any future demands. Radio relay is also well adapted to alternate routing in case of emergencies, provided, of course, that more than one route is available.

2. Toll Centering Arrangement. A recommended toll centering arrangement and switching plan is proposed for the entire country. No underlying data are given as to why the proposed arrangement was chosen, nor are any economic studies incorporated in the plan to determine whether this is the cheapest arrangement. In some cases, it is apparent that toll centers have been chosen because they were located geographically between the end point and the national center. This does not necessarily constitute the best layout for a toll centering and switching plan system.

Several recommendations are offered herewith with the thought of improving the toll centering arrangement. They are as follows:

Eliminate all "toll points" (Part II, page 24) by making them either toll centers or end offices (tributaries) depending upon an inspection of each case and a consideration of the economics involved. This would

reduce the number of switches on built up connections to a maximum of three, as contrasted with a maximum of five as shown in Part II, page 24, of the plan. This would result in improved service, particularly with manual switching. There is also the possibility that real economies would result with toll centers properly chosen and rather extensive use of unattended dial offices at tributary points.

As a specific example of the changes involved in the above recommendation, consider the rather limited area of which Tourane is indicated as the center. Quang Tri and Dong-Ha should both be made end offices tributary to Tourane, with direct circuits to Tourane. Assuming that both Quang Tri and Dong-Ha are ultimately equipped with unattended dial offices, calls from one to the other would be switched at Tourane. As an alternative to this, a local rate could be set up giving each community access to the other, with the charges covered by the special local rate. Subscribers in either exchange could then dial directly to the other without switching at Tourane. This is known as extended area service and is enjoying widespread popularity in the United States.

Large circuit groups are much more efficient than small ones and frequently distinct economies may be realized by deliberately choosing a toll center so that much of the toll traffic to its tributaries must be back hauled, that is, flow over the route to the toll center from the national center, but in the opposite direction. This can and should be checked by studies of various areas.

3. Telegraph Facilities. The Fundamental Plan on page 10, Part I, states:

> "Provincial communities are served by widely used telegraph facilities using wire systems and high frequency radio circuits. The bulk of inter-city communication appears to be carried by this telegraph network."

Page 18 B of Part II of the plan gives further details of the existing telegraph system by furnishing information to the effect that there are fifty-five offices involved, thirty of which reach other points over physical open wire facilities and 25 operate via HF radio. Telegraph message traffic is handled principally by the Morse hand key method.

The Fundamental Plan proposes a comprehensive telegraph system for the future, utilizing as much as possible of the existing telegraph plant. Automatic sending and receiving is indicated for the larger offices with extension of this system to smaller offices as the traffic increases to over thirty messages per day.

It is assumed that most telegraph circuits on the back bone radio routes will be provided by means of voice frequency telegraph systems, although no definite statement to that effect appears in the plan.

The contemplated telegraph system appears ample to serve the needs of the country, but definite determination of its adequacy cannot be made due to lack of fundamental data.

The estimated cost of the telegraph system including the extension program beyond 1967 is $513,000. The SAC cost estimate by phases is given in Appendix C of this report.

A general telegraph centering and switching plan is given in Figure 7 of Part II of the plan. Here again, it appears that service improvements and possibly economies would result from the elimination of the so-called "toll points".

4. Special Facilities. Special facilities such as telephone and telegraph circuits for the police, military, meteorological stations, etc., are covered in a separate volume and are not included in the same volume with the Fundamental Plan. The SAC estimated costs of this phase of the plan are included in Appendix C of this report and amount in total to $1,792,000.

It is proposed to construct and operate all special facilities in an integrated system with the commercial facilities. This decision is sound and results in material economies over the costs of separate systems.

5. International Circuits. The Fundamental Plan proposes improving the existing international circuits as outlined on page 34 of Part II of the plan. These recommendations are sound and should be authorized. The total SAC estimated cost through 1967 is shown on page 34 of Part II of the plan as $154,000. This is included in Appendix C of this report and is a reasonable figure.

6. Numbering Plan. The numbering plan suggested for the country of Vietnam is adequate for the future, and there is no reason for going beyond the capacity recommended at this time.

E. Management

Part III of the Fundamental Plan from pages 1 through 8 outlines a proposed organization for both the interim and ultimate periods. It must be remembered that it is anticipated that the telephones in service in 1967 will be less than 25,000. With this thought in mind, the interim organization proposed should be adequate for the ultimate as well.

The regional setup proposed in the organization with the regional director more or less autonomous may well be a sound recommendation for a country such as Vietnam. It is suggested, however, that the number of regions so established be kept to a minimum, e.g., one for Saigon-Cholon, one for the area south of Saigon-Cholon, and one for the area north of Saigon-Cholon. Even these organizations should be simple, consisting of a regional director to whom should report a regional plant manager, traffic manager, commercial manager, and a regional plant engineer. Any organization beyond this would be completely top heavy in view of the expected telephone and telegraph development.

F. Training

Part IV of the Fundamental Plan presents a proposal for a very comprehensive training program estimated to cost the following amounts by years:

Year	Estimated Cost
1959	$ 817,000
1960	414,900
1961	263,000
1962	239,400
1963	217,600
1964	184,900
1965	184,900
1966	184,900
1967	184,900
Total	$ 2,691,500

The numbers of people to be trained are partially covered on page 3 of Part IV. Those listed there to be trained by years are:

Type of Student	1957 -59	1960	1961	1962	1963 + yearly	Total Through 1967
Crafts students	300	100	100	100	73	965
Students abroad, short period in factory training	10	2	2			14
One year or more in service	8+3	2	1	1	1	20

The above appears to be an over-ambitious program. If the training procedure recommended in this report to ICA is followed, it can probably be curtailed materially.

The turnover or annual loss of craftsmen is estimated at 6 per cent a year in the period covered by the proposed program. If interpreted correctly, this would mean that of the 300 craftsmen trained in the period 1957-59, approximately 180 would still be in the service at the end of 1967. Of those trained in 1960, approximately 65 would still be in service at the end of 1967, etc. Of the total of 965 craftsmen trained, 700 would be in service at the end of 1967.

At this same time, it is estimated on page 61 of Appendix 5 that the total number of telephones in service would be under 25,000. This would mean 28 craftsmen per 1000 telephones in service. For comparative purposes, the Michigan Bell Telephone Company, with a much more complicated plant than the one proposed for Vietnam, employs 2.5 craftsmen per 1000 telephones.

It is concluded that the proposed training program is much too ambitious.

G. Specific Recommendations for Action by ICA

The following recommendations with respect to the telecommunications system for Vietnam are made in order that work may be started on this project at an early date.

1. ICA and the Government of Vietnam adopt the modified plan for telecommunications incorporated as a part of this chapter. The Fundamental Plan proposed by Southeast Asia Communications can serve the purpose as a broad outline for an ultimate telecommunications system.

2. The present contract with SAC should either be renegotiated or cancelled, as determined by ICA, and Southeast Asia Communications or other engineers should be immediately requested to start the preparation of the necessary construction plans and specifications to accomplish the following immediate priority projects.

3. ICA should promptly approve the suggested rehabilitation of the existing plant at an estimated cost of $500,000. The engineers should be instructed to prepare whatever plans and specifications are necessary to cover the proposed rehabilitation work. It is not anticipated that this will involve any great amount of engineering detail or specifications. It is recommended that this be carried out under contract, because of the lack of adequate trained personnel in Vietnam. This rehabilitation work affords an excellent opportunity to train craftsmen and any contract which is proposed by the engineers should include a provision for training of as many Vietnam personnel as possible, and as mutually agreed upon by the Government of Vietnam and the contractor. At the same time, a sufficient number of additional personnel should be trained in plant maintenance.

It should also be a requirement during the rehabilitation that the contractor should be instructed to prepare adequate records of existing and rehabilitated plants. Training in preparing and keeping these records up to date from the time of rehabilitation should also be undertaken.

4. ICA should authorize the engineers to proceed with detailed engineering and the preparation of

specifications for the following work:

a. The necessary additions to the exchange plant (central office equipment, subscriber equipment, and outside plant) for Saigon-Cholon. The estimated cost of this work is as follows:

Central office equipment	$ 600,000
Subscriber plant	100,000
Outside plant (exchange)	300,000
Buildings	----
Total	$1,000,000

b. The construction of a portion of the backbone toll plant as follows:

Build a broad band radio relay system from Saigon to Tourane, via Cap St. Jacques and coastal route. Build a broad band radio relay system from Saigon to Cantho. Build VHF from Phan Rang to Dalat-Tourane to Hue and other larger tributary groups.

In general the carrier facilities on the systems proposed above should provide all of the necessary circuits, including special facilities within an expenditure of approximately $4,350,000.

c. Assuming that the above mentioned toll systems are approved for construction, then it would be desirable to rebuild and augment the exchange facilities at the five toll centers of Phan Rang,

Oui Nhon, Tourane, Ban-Me-Thont and Cantho. This is estimated to cost $750,000.

d. Complete new plants in tributary offices at 13 locations, using unattended dial systems plus the necessary outside plant and station equipment. This is estimated to cost $450,000.

e. It is recommended that a single side band radio be installed providing communications to Manila, Bangkok, Singapore and Hong Kong. This is estimated to cost $100,000. In addition, miscellaneous buildings, power and improvements of international circuits should be undertaken at a cost of $405,000.

f. A training program of approximately $200,000 is recommended to be carried on during the time of the contract for rehabilitation and the installation of the above enumerated facilities.

Upon completion of these recommended rehabilitations and constructions, it would be desirable to hold in abeyance any further construction for a limited period, say, two years. Experience with new facilities in service and the ability of the Vietnamese to maintain and operate the system would be indicated fairly accurately when the following questions are answered.

1. Is the telecommunications system as proposed above advantageous and necessary to the economy of the country?

2. Are the estimates and the demands for service reasonable and are they supported by the experience with the new facilities?

3. Are the actual installation costs of the new facilities in line with the estimates? If not, what apparent modifications in overall cost estimates should be made?

4. Is it possible to train sufficient personnel for installation, operation, engineering, planning, and management to operate and maintain all of the expanded facilities in a satisfactory manner?

It might be possible to have part of this work done under the contract which now exists between ICA and Southeast Asia Communications. Their letter of December 12, 1957, stated that the present contract could cover approximately 8 million dollars of detailed engineering, preparation of specifications and supervision of construction. The amount which can be accomplished as of April 1 under this contract is not known.

In the event that a renegotiated contract is possible, or a contract with another engineering firm is drafted, an outline of the desired scope of work is included in Appendix D to this report. Along with training previously recommended, it is believed that arrangements should be made

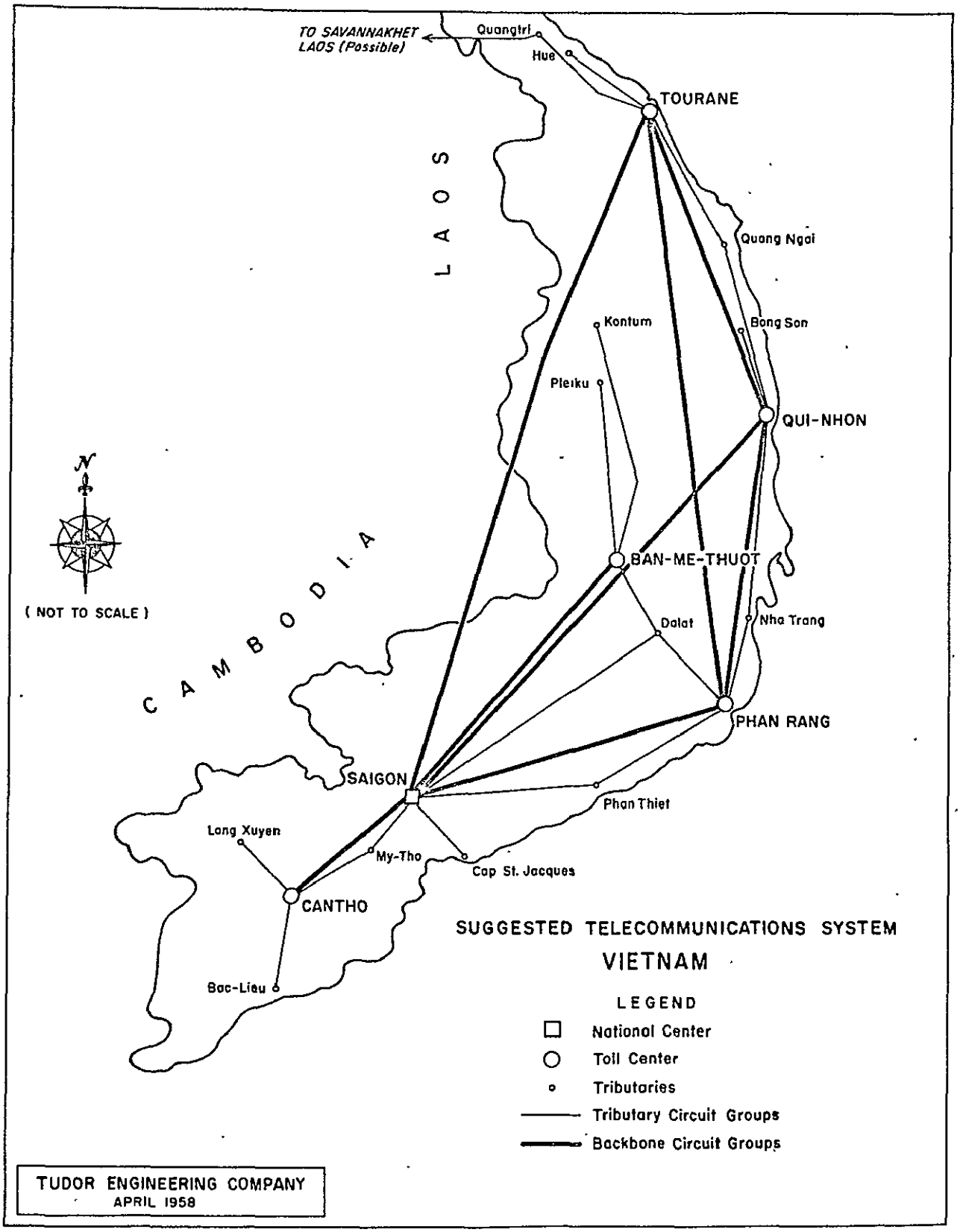
in any future contract for training and the development of a satisfactory accounting practice. A simplified system of the FCC standard system of accounts for Class A telephone companies in the U.S. would be adequate.

H. Recommended Telecommunications System for Vietnam

The proposed telecommunications system for the Republic of Vietnam is shown in outline form on Plate No. 2 and described in more detail below. This system will be adequate initially to satisfy all demands for service, both commercial and special facilities. It will be a completely modern system, will furnish when completed a high grade of service, both telephone and telegraph, and is capable of economical and relatively rapid expansion when necessary. The estimated cost of the recommended system is $7,855,000.

The broad band radio relay systems proposed have an ultimate capacity of 600 voice channels per band. They would be equipped initially with sufficient voice channels to take care of all commercial and special facilities, plus ten per cent for emergencies and some growth. They would also be equipped with one spare band in each direction arranged for automatic switchover in case of trouble.

The VHF systems would have an ultimate capacity of sixty voice channels and would be equipped initially in the same fashion as the broad band systems, that is, to take care of all immediate requirements, plus about 10 per cent spare.


TO SAVANNAKHET
LAOS (Possible)
Quangtri
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LAOS
Quang Ngai
Kontum
Bong Son
Pleiku
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CAMBODIA
BAN-ME-THUOT
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PHAN RANG
SAIGON
Phan Thiet
Long Xuyen
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Cap St. Jacques
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(NOT TO SCALE)
SUGGESTED TELECOMMUNICATIONS SYSTEM
VIETNAM
LEGEND
National Center
Toll Center
Tributaries
Tributary Circuit Groups
Backbone Circuit Groups
TUDOR ENGINEERING COMPANY
APRIL 1958

PLATE 2

Recommended Construction in Vietnam

Project	Estimated Cost
Saigon-Cholon, add 4000 dial lines, 4 pos. toll switchboard and necessary outside plant and station equipment	$ 1,000,000
Complete rebuilding of exchange plant in the five toll centers of Phan Rang, Oui Nhon, Tourane, Ban-Me-Thont, and Cantho, using dial equipment, with toll ~~band~~ board in each case, outside plant, and station equipment	750,000
Complete new plant in the tributary offices of Cap St. Jacques, Phan Thiet, Dalat, Nha Trang, Bong Son, Quang Ngai, Hue, Quang Tri, Plecku, Kontom, My-Tho, Bac Lieu, Long Xayen, using unattended dial offices at each point, plus necessary outside plant and station equipment	450,000
Toll	
Build broad band radio relay stem from Saigon to Tourane via Cap St. Jacques and coastal route - from Saigon to Cantho (total of 655 miles)	3,300,000
Build VHF from Phan Rang to Dalat - Tourane to Hue and for other larger tributary groups (total 300 miles)	1,050,000
Project	
Single side band radio to Manila, Bangkok, Singapore, and Hongkong	100,000
Rehabilitation of existing plant	500,000
Training	200,000
Buildings	200,000
Power	150,000
Improvement of existing international circuits	155,000
Total	$ 7,855,000

It should be understood that many of the details entering into the complete engineering of the suggested system as given above can only be worked out in the field. The above is intended as a broad outline of a complete telecommunications system. It is recommended for adoption by the Government of Vietnam and ICA.

CHAPTER IV

FUNDAMENTAL PLAN FOR LAOS

A. General

The Fundamental Plan for Laos as submitted by Southeast Asia Communications provides for a commercial telecommunications system designed to serve in 1967 a total of 1280 telephones in six communities, together with two high frequency radio toll circuits. The two toll circuits will be one each from Vientiane to Luang Prabang and Savannakhet respectively. In addition, it provides for desirable improvements on existing international radio telegraph circuits and a new telephone circuit to Nong Khai in Thailand.

The total cost of the exchange plant to be added in the nine year period is estimated by SAC at $232,400 (practically all of it in Vientiane). The two commercial toll circuits will cost $76,000 and the improvements to existing international circuits, plus the addition of a new international telephone circuit, will cost $238,000. The above figures represent a total of $546,400.

On the basis of a system of the indicated size, namely, 1280 telephones in six communities, two toll circuits, and a total expenditure in nine years of $546,400, a Fundamental Plan is hardly necessary.

The special facilities, largely military, are estimated to cost $9,136,000 in the next nine years. This figure appears high, particularly in view of the police network now in existence. It is reasonable to assume it can be reduced materially by a careful scrutiny of the stated military requirements. While a plan for the construction of such special facilities as are finally determined upon is necessary, this does not require an elaborate Fundamental Plan.

B. Economic Feasibility

Based on the figures given in the Fundamental Plan, the proposed construction is apparently economically feasible. However, these figures are questionable.

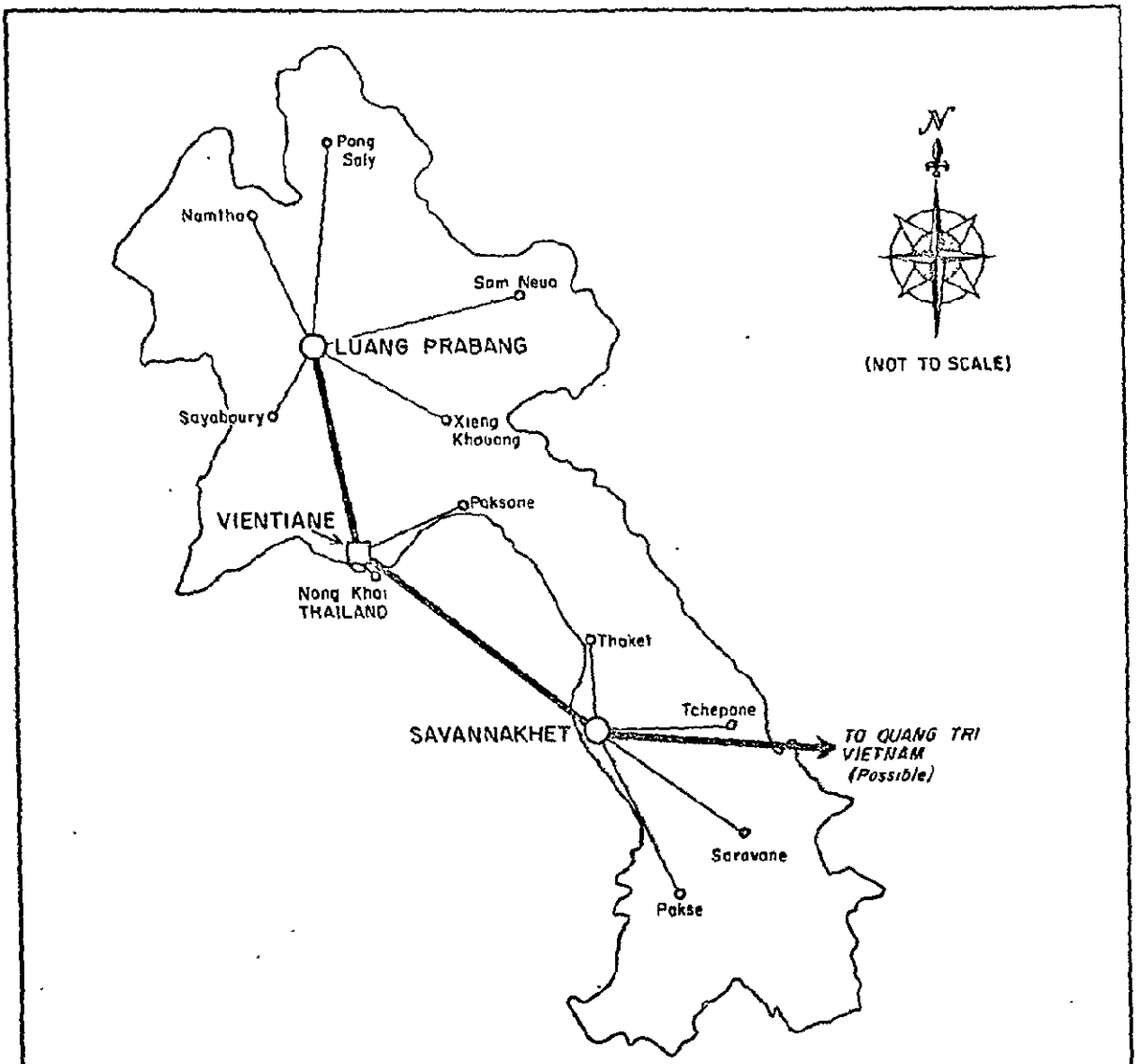
C. Engineering

The engineering is confined almost entirely to the exchange plant in Vientiane and the two toll circuits. The recommendations appear sound.

D. Management

The organization setup proposed in the plan is similar to that proposed for Vietnam with doubling up of responsiblities suggested due to the smaller system.

It would appear that one capable manager with two assistants, one for plant, traffic, and engineering, and the other for commercial and accounting functions, would be all that would be required for the proper supervision of a system of the indicated size. In addition to these people, there would, of course, be the proper numbers of craftsmen, operators, and clerical help.



SUGGESTED TELECOMMUNICATIONS SYSTEM

LAOS

LEGEND

- National Center
- Toll Center
- Tributary
- Tributary Circuit Groups
- Backbone Circuit Groups

TUDOR ENGINEERING COMPANY
APRIL 1958

PLATE 3

E. Training

The training program as set forth in the Fundamental Plan calls for an expenditure of $911,000 in nine years and the training of 180 craftsmen by 1962. Both figures appear too high, taking into account the proposed special facilities network.

F. Conclusions

1. A Fundamental Plan is hardly necessary for a telecommunications system of this size and the time and effort involved in assembling such a plan appears unnecessary.

G. Recommended Telecommunications System for Laos

A suggested telecommunications system for Laos is shown in outline form on Plate No. 3. The proposed system is adequate to satisfy all demands for service, both commercial and special facilities, not only initially, but for many years in the future. It is so designed that it can be readily expanded when expansion is indicated. The cost of the proposed system is estimated at $1,825,000. The major recommendations are given below.

The French reconstruction programs have arranged for the installation of an 800 line dial office in Vientiane, scheduled to be shipped in May of 1958. That should be ample for some years. This plan designates Vientiane as the national center with toll centers at Luang Prabang and Savannakhet. Following is a program of the construction needed.

Project	Estimated Cost
Vientiane outside plant and station equipment	$ 200,000
Luang Prabang and Savannakhet - each 100 line dial office with toll board, outside plant, and station equipment	200,000
Ten unattended dial tributary offices with outside plant and station equipment	390,000
Eleven single side band HF radio systems	110,000
One tropospheric scatter system - Vientiane to Savannakhet	200,000
International circuits	80,000
Rehabilitation of existing usable plant	100,000
Buildings	220,000
Training	200,000
Power	125,000
Total	$ 1,825,000

This proposal is recommended for adoption by the Government of Laos and ICA.

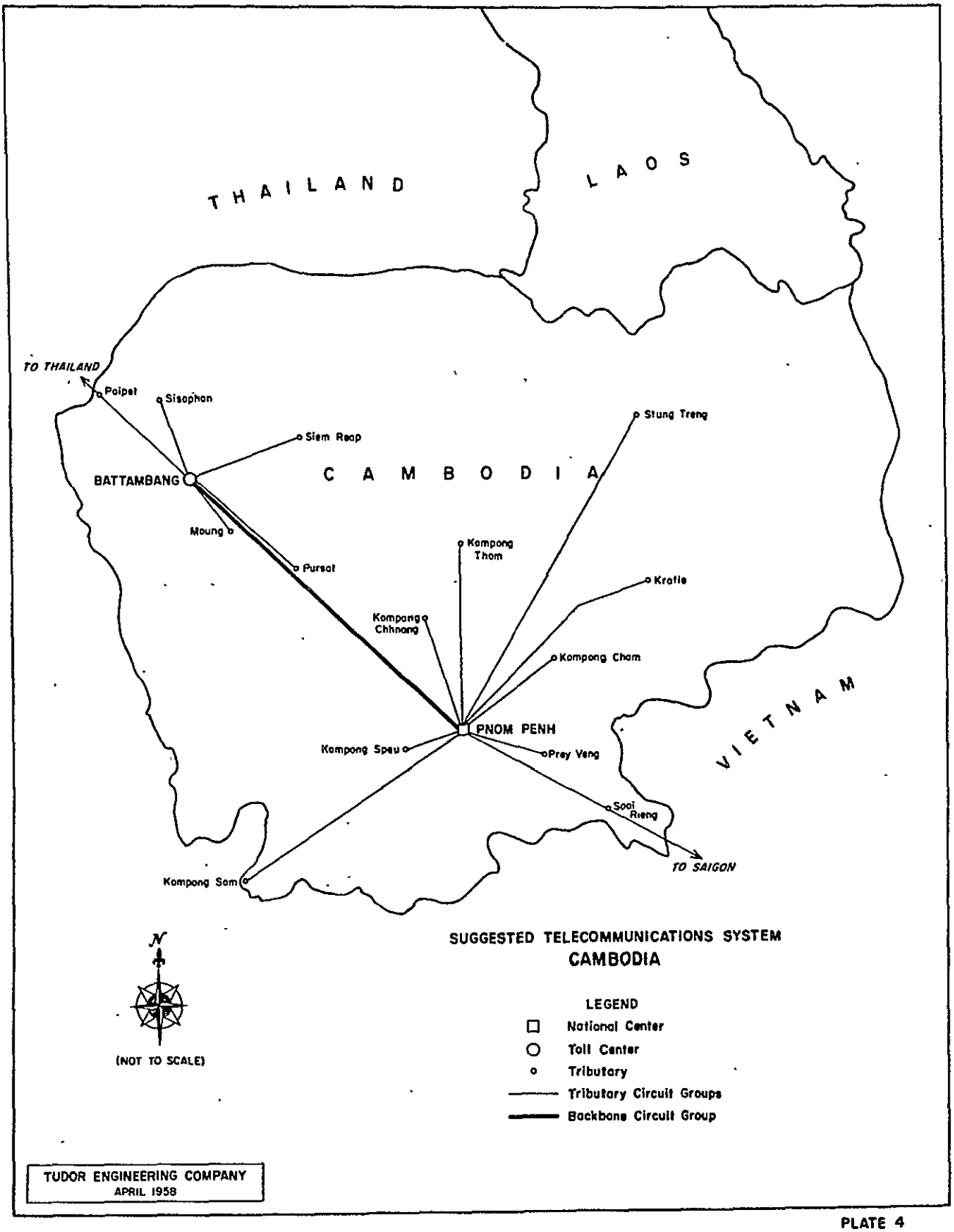

THAILAND
LAOS
CAMBODIA
VIETNAM
TO THAILAND
Poipet
Sisophon
Siem Reap
BATTAMBANG
Moung
Pursat
Stung Treng
Kompong Thom
Kratie
Kompong Chhnang
Kompong Cham
PNOM PENH
Kompong Speu
Prey Veng
Soai Rieng
TO SAIGON
Kompong Som
N
(NOT TO SCALE)
SUGGESTED TELECOMMUNICATIONS SYSTEM
CAMBODIA
LEGEND
National Center
Toll Center
Tributary
Tributary Circuit Groups
Backbone Circuit Group
TUDOR ENGINEERING COMPANY
APRIL 1958

PLATE 4

CHAPTER V

POSSIBLE TELECOMMUNICATIONS SYSTEM FOR CAMBODIA

Plate No. 4, attached, gives in outline form a recommended telecommunications plan for the Kingdom of Cambodia. This was prepared to indicate the possibility of ultimately coordinating a plan for Cambodia with the telecommunications plans for Thailand, Vietnam and Laos into one unified system. It should be adequate to take care of all commercial and special telecommunications requirements for some time to come. Pnom Penh has been designated as the national center, with Battambang as the only other toll center. It is understood that the French are now installing in Pnom Penh a 2000 line dial office, but are making no provision for outside plant and station equipment.

Major items recommended for construction are given below:

Project	Estimated Cost
Pnom Penh, outside plant and station equipment	$ 200,000
Battambang, 400 line dial office with toll board, outside plant and station equipment	122,000
Fourteen tributaries equipped with unattended dial offices, outside plant and station equipment	330,000
Toll Plant	
VHF radio relay, Pnom Penh to all other offices except Kratie and Strung Treng (600 miles)	2,100,000
Two single side band circuits to serve Kratie and Strung Treng	25,000
International circuits from Pnom Penh to Paris, Hongkong, and Singapore	75,000
Training	100,000
Power	80,000
Total	$ 3,052,000

CHAPTER VI

RECOMMENDATIONS FOR ACTION BY ICA

1. Present Contract

It is recommended that ICA discuss with Southeast Asia Communications contract No. ICA-W-281 for the purpose of determining what amount of total funds provided for in the contract have already been expended. At the same time, SAC should be requested to furnish promptly an estimate of the amount of detailed engineering, supervision of construction, rehabilitation work, and training that can be completed with the remaining funds.

If, after receiving the above information, ICA decides to continue the project under the direction of SAC, it is urged most strongly that all future work be done in the field. It is definitely impracticable to carry out a program of the magnitude of that suggested in this report with supervision and the authority to make decisions in the hands of persons 12,000 miles away.

On the other hand, if ICA feels it desirable to cancel the present contract ICA-W-281 under the terms of paragraph 24.3.1 of that document, it is recommended that it be done promptly and that a new engineering group be employed to carry out the program suggested in previous chapters for each of the three countries.

2. Provisions of New Contract

2.A. All engineering and supervision of construction to be carried

out in the field under the general supervision of a competent and experienced telecommunications engineer.

2.B. It is estimated that the following numbers of engineers and construction supervisors would be sufficient for Thailand and Laos.

2.B.1 For Thailand and Laos combined - six engineers and six construction supervisors.

2.B.2. Increase USOM in Thailand by one telecommunications engineer.

2.B.3. Four management and training supervisors.

2.C. For Vietnam, the following numbers of people should be sufficient:

2.C.1. Four engineers and four construction supervisors.

2.C.2. Increase USOM in Vietnam by one telecommunications engineer.

2.C.3. Four management and training supervisors.

Provisions should be made so that the activities of these country groups will be coordinated in the field with the result that the telecommunications plans for all three countries will be coordinated.

2.D. It is recommended that a Regional Telecommunications Coordinator's Office be established in Washington, in order to assist ICA in evaluation and approval of proposals submitted by the field. Any necessary coordination with the contractor could be carried out by trips to the field.

2.E. If a new contract is entered into by ICA, the contractor should be responsible for the following:

2.E.1. Detailed engineering and supervision of construction of program outlined in 3 below.

2.E.2. Supervision of training of management people, engineers, and necessary craftsmen.

3. Recommended Construction

a. There exists at present earmarked Asia Economic Development Funds to the extend of $25,000,000. These funds are adequate to rehabilitate and construct an integrated telecommunications system in each of the three countries. The system proposed should be ample to take care of each country's initial requirements on the basis of expenditures of $17,000,000 in Thailand, $8,000,000 in Vietnam, and $2,000,000 in Laos. The $8,000,000 for Vietnam includes $2,000,000 in current country program.

The above figures represent the total estimated cost of the proposed telecommunications system in each host country and include engineering costs. The figures also include local currency which will be made available by the host countries. It is estimated this latter figure will be from 20 per cent to 25 per cent of the total estimated cost.

b. It is recommended ICA make allocations to the three countries on the basis of the above figures.

(I) Recommended Construction in Thailand. It is recommended that a telecommunications system after the pattern outlined below be authorized for Thailand.

Project	Estimated Cost
Broad band micro wave radio relays systems	
between Bangkok and Korat, 148 miles	$ 740,000
Saraburi and Uttaradit, 150 miles	750,000
Bangkok and Had Yai, 538 miles	2,690,000
(Note: Broad band systems should have an ultimate capacity of 600 voice channels per band and should be equipped with protective band and automatic switchgear)	

Project	Estimated Cost
Approximately 1500 miles of VHF radio relay for less important routes	$ 5,250,000
Bangkok central office equipment and outside plant	3,000,000
Rehabilitation of existing plant that can be revised	1,000,000
New central offices, new subscribers' sets and rebuilding outside plant at 14 regional and toll centers	1,031,000
Convert 40 tributary offices to unattended dial	1,200,000
Single side band radio for small circuit groups	200,000
Power	250,000
Training	500,000
International circuits	150,000
Total	$ 16,761,000

The recommended telecommunications system for Thailand is shown on Plate No. 1 attached. It is adequate to take care of both commercial and special facility requirements initially.

(2). Recommended Construction in Vietnam. The recommended telecommunications system for Vietnam is given in the table below.

Project	Estimated Cost
Build broad band micro wave radio relays systems between the following points:	
Saigon and Tourane via Cap St. Jacques and following coastal route, 560 miles	$ 2,800,000
between Saigon and Cantho, 95 miles	500,000
300 miles of VHF radio relay for branch and less important routes	1,050,000
International circuits	155,000
Complete rebuild of 5 toll centers (dial)	750,000
Rebuild of 15 tributaries with unattended dial	450,000
Additions to C.O. equipment, station equipment, and outside plant in Saigon	1,000,000
Rehabilitation of existing plant	500,000
Training	200,000
Buildings	200,000
Power	150,000
International circuits (new circuits)	100,000
Total	$ 7,855,000

The above recommended system is shown on Plate No. 2 attached. This system should be adequate for all initial requirements (both commercial and special) and it can be expanded economically to take care of growth.

(3) Recommended Construction in Laos. The recommended telecommunications system for Laos is given in the following table:

Project	Estimated Cost
Eleven single side band HF radio systems	$ 110,000
One tropospheric scatter system, Vientiane to Savannakhet	200,000
International circuits	80,000
Additions to Vientiane exchange system	200,000
Two 100 line dial attended toll centers	200,000
Ten unattended dial tributary offices	390,000
Rehabilitation of usable existing plant	100,000
Buildings	220,000
Training	200,000
Power	125,000
Total	$ 1,825,000

The above suggested system should be adequate to take care of all commercial and special telecommunications requirements for many years to come. The system is shown in outline on Plate No. 3 attached.

4. General Considerations on Construction

All of the above recommended radio systems for toll facilities would be equipped with sufficient carrier terminals to provide for initial requirements of both commercial and special services with at least ten per cent spare to take care of some growth, circuit outages, patching in emergencies, and the like.

It is recommended that in each country all new central office equipment covering all offices in the country be prepared as one proposal

for bids. Such action would have the very definite advantage of insuring the employment of the same type of equipment in each office. Real advantages in terms of economy and reduction of maintenance problems would result.

Likewise, all toll systems in each country could be prepared as one proposal. Again, the uniformity of equipment would result in economies in construction and would operate to minimize maintenance difficulties.

As to time intervals, it is estimated the proposed systems in all three countries could be completely in service before the end of 1962 with a good probability of advancing this date by at least a year.

It is strongly recommended that all rehabilitation work be carried out first and completed promptly. It is necessary to know definitely just how much of the existing plant can be reused before engineering new and expanded systems.

In connection with the carrying out of the rehabilitation work, it is suggested that in each country this work should be let on contract. The contractor should be authorized not only to complete promptly all rehabilitation work covered in the specifications for each country, but should also be asked to do the following:

Train sufficient maintenance personnel to maintain the plant continuously in good condition after the contractor has completed his portion of the project.

Prepare adequate records of all plant for which records of a satisfactory type are non-existent. Also, train a sufficient number of personnel to keep such records current in the future. This may involve the establishment of a plant record department or the radical reorganization of any now existing.

Raymond Foulkrod
Consultant

John M. Hogg
Regional Telecommunications
Coordinator, ICA

RF:JMH:ebf

APPENDIX A

TASK ORDER NO. 132

APPENDIX A

TASK ORDER

OFFICE OF INDUSTRIAL RESOURCES ICA No. 132
INTERNATIONAL COOPERATION ADMINISTRATION
Washington 25, D. C.

Date: February 21, 1958

TO: Tudor Engineering Company

ICA Project No. and Title: 51-22-002 Telecommunications - Thailand, Vietnam and Laos

Country: Thailand, Vietnam and Laos

Project Engr./Mgr.: C. Gysland

Phone Extension: 2581

Assignment: 1. To review the agreement between Hycon Eastern, Inc. and Page Communications Engineers, Inc. and ICA, dated December 1956, and the progress reports thereon.

2. To present a report covering but not necessarily limited to the items indicated on the attached scope of work.

Target Date:

Remarks:

Estimated Cost: Approximately 45 man days and approximately $5400. (Tudor to insert)

Acknowledged:

/s/ John G. Marr
Tudor Engineering Company, 2-25-58
(Please return one signed copy to ICA)

/s/ N. E. Thompson
Norman E. Thompson, Chief
Industrial Engineering Division
Office of Industrial Resources

Tudor Project No. 132

Task Engineer:
Phone: Sterling 3-5313

ICA-10-70
(6-56)

APPENDIX A

SCOPE OF WORK

Telecommunications - Thailand, Vietnam and Laos

1. Review the "Fundamental Plan" for telecommunications systems in Thailand, Vietnam and Laos, submitted by Hycon Eastern, Inc., and Page Communications Engineers, Inc., as to content, to establish the adequacy and adaptability of the telecommunications plans and programs set forth therein.

2. Compare the work required by the contract with the work which has been completed to date.

3. Review the basic information provided in the Fundamental Plan and the estimates based thereon.

4. Analyze the conclusions drawn from the facts stated in the Fundamental Plans to determine the reasonableness thereof, particularly in respect to the scope and advisability of the proposed initial construction recommended therein.

5. Prepare an outline of the generally accepted information and estimates required for the design of a complete segment of a communications system.

6. Compare items 3 and 5 above, and comment on any deficiencies revealed in the Fundamental Plan.

7. Prepare an independent recommendation based upon the facts presented in the Fundamental Plans for suitable communications facilities in the above countries, if the facts and basic information warrant deviation from the plans presented.

8. Prepare comments on the type of systems proposed, their economic feasibility, and general technical characteristics. Completely document any recommendations with facts available and include reasons for such recommendations.

9. Make such other analyses and comments as may be indicated by the content of the Fundamental Plans.

10. Prepare a report in preliminary draft form on items 1 to 9 above. Upon completion, confer with the Regional Telecommunications Coordinator with respect to the content of the preliminary draft report and whatever comments the Regional Telecommunications Coordinator makes in an independent report. Indicate differences and reconcile these, if possible.

11. Recommend a course of action for ICA.

APPENDIX B

MINIMUM REQUIREMENTS FOR THE PREPARATION OF A FUNDAMENTAL PLAN

APPENDIX B

Data and Estimates Necessary for the Preparation of a Fundamental Plan for a Telecommunications System

The following data are those required for the design of a complete communication system:

1. Existing plant, both local and toll, giving the following facts:

   a. Location of existing central offices, types and capacities. Yes.

   b. Numbers of telephones presently working in each central office. Yes.

   c. Numbers of orders for local service that cannot be satisfied due to lack of either central office equipment or outside plant. For Saigon-Cholon only.

   d. Past history as to rates of growth, that is, increases in demands for service. No.

   e. Present rate structure, both local and toll, and present annual revenues per telephone. No.

   f. Condition of existing plant, giving per cent serviceable and amounts which should be replaced due to poor physical condition, obsolescence, etc. Very generally.

   g. Present toll plant with data as to types of toll circuits, lengths, condition, capacities, and loads being carried. Types and numbers of circuits only.

   h. Existing telegraph facilities, lengths, condition, message capacities, and present loads. Existing facilities only.

   i. Existing toll centering arrangement. No.

   j. Existing numbering plan. Yes.

2. Estimates required:

   a. An estimate for each central office of probable increases in demands for local service for a reasonable period in the

future, say, five years. This should be based on a demand forecast survey including actual sampling canvass of cities and towns. For Saigon-Cholon only.

b. An estimate for each toll and telegraph circuit group of probable increases in demands for service of the indicated types for at least five years and, if practicable, a look well into the future, say, fifteen years hence. Not complete.

c. A determination as to whether any considerable amounts of toll business will be dialed in the future, either by the operator or the subscriber. None initially.

d. A complete numbering plan for the future so chosen that it will serve adequately for at least twenty-five years. Yes.

e. Unit costs for each type of plant fairly applicable to the location of the proposed telecommunications system. No.

f. A determination of accurate annual charges and operating costs including the following:

(1) Cost of money. Yes.
(2) Depreciation rates for each class of plant. Composite rate for plant as a whole.
(3) Taxes in terms of percentage of first costs of plant. No taxes.
(4) Insurance. No.
(5) Maintenance expense per unit of plant. No.
(6) Traffic operating expenses. No.
(7) Commercial expenses. No.
(8) Accounting expenses. No.
(9) Administration expense. No.
(10) Engineering costs in terms of percentage of first costs of plant. No.

g. A proposed rate structure, both local and toll. No.

h. Future toll centering arrangement. Yes.

3. Conclusions and Recommendations:

a. Location of each central office to be in service by last date of the plan - type and amounts of equipment to be installed. Yes.

b. Plans for outside exchange plant in general form showing ultimate plans for underground conduit, cable feeder routes, and probable numbers and gauge of conductors. No, with exception of conduit plans for Saigon.

c. Future long distance plant showing numbers of circuits anticipated by routes, capacities of facilities recommended, reasons underlying recommendations, alternate routing possibilities, and provision for special services. Numbers of circuits only.

d. Estimated total costs of plant at ultimate date and at any other dates where cross sections are available. Yes.

NOTE: Underscored phrases give status of items furnished in the Fundamental Plan for Vietnam submitted by Southeast Asia Communications.

APPENDIX C

DETAILED ESTIMATES FROM FUNDAMENTAL PLANS

DETAILED ESTIMATES

TELECOMMUNICATIONS SYSTEM FOR THAILAND

Prepared by

HYCON-PAGE TELECOMMUNICATIONS ENGINEERS

(Southeast Asia Communications)

Item	1959 Phase I	1962 Phase II	1967 Phase III	Total
Rehabilitation	Extensive program recommended; costs not given.			
Central Office Equipment	2,236,000	3,982,000	4,976,000	11,194,000
Subscribers' Plant	411,000	902,000	1,053,000	2,366,000
Outside Plant (local)	2,810,000	4,059,000	4,247,000	11,116,000
Buildings	321,000	512,000	164,000	997,000
Toll Plant	6,779,000	2,286,000	2,609,000	11,674,000
International Circuits	109,000	30,000	8,000	147,000
Telegraph	912,000	90,000	113,000	1,115,000
Special Facilities	19,300,000	5,166,000	1,058,000	25,524,000
Training	761,000	837,000	887,000	2,485,000
Totals	33,639,000	17,864,000	15,115,000	66,618,000

NOTE: The detailed breakdown of the estimated costs of this telecommunications system are shown in Appendix 9, pages 188 through 201 of the Fundamental Plan.

DETAILED ESTIMATES

TELECOMMUNICATIONS SYSTEM FOR VIETNAM

Prepared by

HYCON-PAGE TELECOMMUNICATIONS ENGINEERS
(Southeast Asia Communications)

Item	1959 Phase I	1962 Phase II	1967 Phase III	Extension Program	Special Facilities	Total
Rehabilitation	$ 725,889	--	--	--	--	$ 725,889
Central Office Equipment	875,900	$1,084,950	$ 886,300	--	--	2,847,150
Subscribers' Plant	134,170	178,440	183,510	--	--	496,120
Outside Plant (local)	381,200	540,800	685,060	--	--	1,607,060
Buildings	49,000	174,000	--	--	--	223,000
Toll Plant*	2,245,000	1,208,000	339,000	$1,066,000	$1,712,000	6,570,000
International Circuit	84,000	65,000	5,000	--	--	154,000
Telegraph*	228,000	126,000	54,000	105,000	80,000**	593,000
Training	817,000	917,300	957,200	--	--	2,691,500
Totals	$5,540,159	$4,294,490	$3,110,070	$1,171,000	$1,792,000	$15,907,719

* Combined in detailed estimate.
** Additional carrier channel terminals.

NOTE: The detailed breakdown of the estimated costs of this telecommunications system are shown in Appendix 9, pages 70 through 114 of the Fundamental Plan. The above estimated costs do not include $174,000 for the purchase and rehabilitation of 10 to 12 privately owned PBX systems.

APPENDIX C-3

DETAILED ESTIMATES

TELECOMMUNICATIONS SYSTEM FOR LAOS

Prepared by

HYCON-PAGE TELECOMMUNICATIONS ENGINEERS
(Southeast Asia Communications)

Item	1959 Phase I	1962 Phase II	1967 Phase III	Extension Program	Special Facilities	Total
Rehabilitation	--	--	--	--	--	--
Central Office Equipment	$ 2,400	--	--	--	--	$ 2,400
Subscribers' Plant	15,000	$ 4,500	$ 10,500	--	--	30,000
Outside Plant (local)	200,000	--	--	--	--	200,000
Buildings	--	--	--	--	--	--
Toll Plant*	76,000	--	--	--	$ 9,136,000	9,212,000
International Circuit	148,000	67,000	23,000	--	--	238,000
Telegraph*	--	--	--	--	--	--
Training	193,000	567,000	152,000	--	--	912,000
Totals	$ 634,400	$ 638,500	$ 185,500	--	$ 9,136,000	$10,594,400

*Combined in detailed estimate.

NOTE: The detailed breakdown of the estimated costs of this telecommunications system are shown in Appendix 9, pages 57 through 59 of the Fundamental Plan.

APPENDIX D

SUGGESTED ITEMS TO BE INCORPORATED IN RENEGOTIATED CONTRACT BETWEEN ICA AND SOUTHEAST ASIA COMMUNICATIONS

APPENDIX D

Suggested Items to be Incorporated in Renegotiated Contract between ICA and Southeast Asia Communications

If it is decided to renegotiate the contract between ICA and Southeast Asia Communications, it is suggested the following items, among others, be incorporated in the new contract as work to be performed by Southeast Asia Communications.

I. Rehabilitation Work.

A. Prepare specifications covering rehabilitation work to be done in each of the three countries.

B. Prepare total rehabilitation project in each country for bids and select contractors who shall be solicited for bids.

C. Assist in evaluating bids received and in choosing contractor.

D. Reach agreement with the administration of each country and the contractor as to number of personnel to be trained during progress of work.

E. Supervise work of contractor and see that job is done in accordance with specifications.

F. Complete items A through D by July 1, 1958, and complete entire rehabilitation project in each country by May 1, 1959.

II. New Construction

A. Prepare detailed engineering work and specifications for $X of completed construction in each country.

B. Prepare projects for bids and assist in selection of contractors to be solicited.

C. Assist in evaluation of bids and selection of successful contractor.

D. Agree with administration of each country and the contractor as to numbers of personnel to be trained during progress of work.

E. Supervise construction and accept project when it has satisfactorily complied with specifications.

F. Complete items A through D by November 1, 1958, and complete all projects by March 1, 1960.

III. Training.

Assist management of each country in organizing and initiating a training program to train such numbers of personnel as are not trained through I and II above.

IV. Accounting System.

Assist management in setting up and putting into operation an accounting system modeled after but simpler than FCC standard system of accounts for Class A telephone companies.

V. Payment.

All of above work is to be covered under payments authorized in existing contract between ICA and Southeast Asia Communications.

APPENDIX E

REGIONAL TELECOMMUNICATIONS COORDINATOR'S ANALYSIS OF THE FUNDAMENTAL PLAN FOR THAILAND, VIETNAM AND LAOS AS PRESENTED BY HYCON-PAGE TELECOMMUNICATIONS ENGINEERS

APPENDIX E

Regional Telecommunications Coordinator's Analysis of the Fundamental Plan for Thailand, Vietnam and Laos as Presented by Hycon-Page Telecommunications Engineers

John M. Hogg
March 31, 1958

This report is based on the "Preliminary Draft" reports on Thailand and the final reports for Vietnam and Laos and the general economic study. The specific economic study on the former two was not furnished by the Contractor.

Summary

The "Fundamental Plan" for Thailand, Vietnam and Laos, as submitted by Hycon-Page, is more of the "thesis" type and is not substantiated by adequate fact-type information to form a conclusive basis for detailed engineering and financial arrangements. I concur that a telecommunication system of the general magnitude recommended is feasible, but strongly do not concur with certain bases used as reasons and certain technical aspects of the systems recommended. There are always many points of minor non-concurrence to be expected in a study of this type that in the overall picture do not materially affect the end conclusions or results. These will not be discussed in this report. There are, however, in the case of this report, major points of non-concurrence that must be considered. These major points are:

1. Too much reliance on doubtful "available" statistical data and lack of factual data.

2. Use of national average income to determine telephone demand.

3. Annual subscriber charge.

4. Required annual charges.

5. Required number of personnel.

6. Cost of training program.

7. Recommended management structure.

8. Lack of long-range planning.

9. Extensive use of manually operated switchboards.

10. Extensive use of VHF for major trunking.

11. Toll switching plan.

12. Military requirements.

These points are treated in detail in the following discussion.

Conclusions

1. This report of Hycon-Page is not submissible to the host countries in its present state.

2. Serious revisions are required to bring Hycon-Page's report in line with the findings contained in this document and such findings as presented in Tudor Engineering report.

3. The cost that has been incurred by the U.S. and host countries, the time that has been consumed and the prestige of the U.S. dictate that this Hycon-Page report, though inconclusive, be accepted by ICA/W,

modified as in 2. above and used for the purpose of going ahead with the project as planned. Every effort should be made to secure from the Contractor the results of a percentage sampling of a commercial survey on telecommunications demand, in at least one of the countries involved, to be included as part of the economic justification.

4. Contractual changes are required.

Recommendations

1. Do not submit this report of Hycon-Page to the host countries.

2. Use joint recommendations for future action, by RTC and Tudor Engineering (attached hereto), as basis for further negotiations and implementation.

3. Accept the report with a clear understanding that acceptance is not commitment in any form and require Hycon-Page to furnish ICA/W, without delay, the results, to include work sheets, of the telecommunications commercial survey of Thailand.

4. Serious thought be given to the best means of salvaging as much as possible of this project by (a) changing the current contract to terminate with rehabilitation plans and specifications; (b) separate contract for management; (c) separate contract for physical rehabilitation; (d) place training under supervision of educational divisions of the USOM's and perform by special contracts part of equipment procurement and expansion of host countries permanent educational facilities; and (e) contract for manufacturers's

packaged services to include specialized training, detailed engineering, equipment, installation and guarantee of service and proper operation.

Discussion

The facts and judgments presented herein are based on engineering judgments as they revealed themselves in the past fifteen months in the field. This was done through close observation and discussion with the Contractor's personnel, host-country officials, merchants (just plain people), and the USOM's while actually traveling over 14,000 miles by air and over 30,000 miles by automobile in the countries of Southeast Asia. Contractor information was greatly curtailed, but not completely cut off, due to the Contractor's "don't talk" directive to his field personnel in January 1958. The points to be discussed follow in the order given in the preceding summary:

1. Too much reliance on doubtful "available" statistical data and lack of factual data.

The report is in general a "thesis" type of document in which much verbiage is used to explain in great detail things that the Contractor is going to use as a basis of his conclusions, but followed up by very little factual information or data. A large part of the economic report is based on general statistics of other underdeveloped countries and gives one the impression that we are endeavoring to make these countries "the average underdeveloped countries" rather than assist them into a higher level.

Another point is that countries that are neighbors and of the same general conditions, environment and customs were not considered. An example is Malaya.

The Marconi field representative in Southeast Asia advised the writer as to their findings in connection with the Marconi-installed VHF long lines system in Malaya. His report was, in general, as follows: The original estimate was for twelve voice channels the entire length (north to south) of Malaya, but that while making actual sight tests, it became apparent that local interest was much greater and they therefore installed forty-eight channels instead of the original twelve. Demand, however, was greater than expected, in fact, so much so that Malaya is now installing broad band (600 channel) micro-wave half-way up Malaya. The original 48 channel VHF system had amortized itself in two and one-half years, and profits were such that the new broad band micro-wave system was sound even though actual installation had proven more expensive and difficult, due to terrain and jungles, than had been anticipated. His explanation of the high usage was basically that, while business fairly well loaded the system, an unanticipated demand was found, due to the fact that the displaced poor (resulting from the last war), who, while not able to afford a telephone of their own, will, due to the near religion of the "family tie", go hungry, if necessary, in order to phone home once or twice a year on special family occasions, thus causing a large business in pay telephones and an increase

in postal service, since the called party must be notified when to go to a telephone to receive the call. It is also of interest that the "bookies" tie up all of the circuits on horse racing days. A careful check and study, with detailed data, of the foregoing, would have been valuable to include as an assist to the host countries in evaluation of their own possibilities.

Statistics in the host countries are at best "guesstimates". No complete actual census of either of the countries has been made that is on record. The telephone organization's records are incomplete and, to a great extent, carried in the minds of the individual employees. There is no record of commercial surveys for telecommunications and only limited such surveys on other items. It becomes evident, therefore, that most of the statistical data available are at best a guess. Even data as to current use of telephones are not conclusive without some type of "K" factor, since all of the existing systems offer such limited and poor service that they would discourage their use. It would not seem improper to expect that the telephone demand in Bangkok would equal or exceed the number of automobiles if they worked as well. (There are only about 14,000 telephones available, but there are over 50,000 automobiles in Bangkok now.) However, these things are not considered in the report. One of the usual methods to determine feasibility and actual demand is to make a percentage sampling of towns and communities and actually conduct a house-to-house, business-to-business, survey. It is granted that some error could be expected in the results of such a survey, especially in

light of the little knowledge of the people concerning "good" telecommunications. Nevertheless, it would be a firm foundation for future work and would show the host countries "factual desires" of the people with reference to telecommunications.

2. Use of national average income to determine telephone demand.

Lengthy discourse is given in the report on how the national average income reflects the need for telephones. This may be true in the U. S. and more forward European countries. However, the countries of Southeast Asia are quite different. In the countries concerned in this report, we have the population divided into two major parts and a small third part. These are, first, 80 to 85 per cent of the population are very, very poor and barely exist - they don't live as we understand the word. Second, 10 to 15 per cent of the people have all of the wealth, several wives and several homes; in fact, there are more extremely wealthy people in this area than in the U. S. Third, there is the relatively small middle class, making up the overlapping 5 per cent of the population. This middle class is on the growth and will continue to grow as the countries industrialize. Therefore, to take the national income and divide by the population is not an indication as to who can afford a telephone. In fact, these figures range from $65 to $85 per year (Appendix I, Eckstein Report uses $65) and yet the report says that the subscriber in Vietnam must pay $126 plus $44.50 toll per year. The very poor are farmers, and under current local laws restricting size of private farms, they must remain poor and could not afford a telephone at

any price and at the most could be counted on to make one or two calls a year to relatives over a pay telephone. We must, therefore, look to the balance of the population to bear the cost and support of the telephone system. Here we hit a slightly knotty problem that is: "Can we be criticized for such an approach?" The answer, in all fairness, is "no", since proper communications are a necessity in a modern civilization and rapid telecommunications speed up development of business, industry and social welfare of a country, thus expanding the requirement for the middle class and giving the extremely poor a place in a better life. With this, laws curtailing the farmers are forced to change as the number of farmers decrease. At this point, national average income begins to have some bearing on telephone demand.

3. Annual subscriber charge.

The annual subscriber charges as presented in the report would appear rather high, especially in an area where the labor factor is relatively low. Even if current technicians' pay is raised three or four times its current rate, it will still be much less than that paid in the U. S. It is true that shipping charges must be added to equipment cost, but ocean freight from the U.S. to Southeast Asia compares with overland freight costs in the U. S. to some of our inland towns. Annual subscriber charges for telephones in the U. S. is approximately $85 as compared to $126 required in the report. It appears that a system was designed, costed and then

divided by the number of subscribers to determine the annual subscriber charge, rather than determining what the economy could stand for a realistic annual subscriber charge and then designing the system to fit.

4. Required annual charge.

The report shows annual charges based on:

Interest on capital	2-1/2%
Amortization of capital	4-1/2%
Depreciation of plant	5 %
Total operating cost	23 %
for a total of	35%

While the interest rate would seem lower than expected, the overall annual charges appear rather high. To further the statement in 3. above on cost of labor, even if telephone workers were raised to the same high wage scale paid by the local USOM in Bangkok, they would still make less than half the amount paid in the U. S. The pay scale must be raised to attract and hold good technicians. USOM pay scale is realistic, but in comparison to current local pay, it is high. For example, a draftsman makes 2400 Baht ($120 U.S.) per month at USOM compared to not over 800 Baht ($40 U.S.) in public services. It is felt that we should either amortize or depreciate, but not both.

It would appear, in summary of the above, that annual charge should be closer to a total of 25 per cent of capital invested, which would then be very close to the U.S. figure. One thing that runs up the Hycon-Page cost figure is the large number of personnel for operation that they show. This will be discussed in five below.

5. Required number of personnel.

The manpower requirements appear excessive. It must be granted that you cannot expect as high a degree of efficiency from Orientals as is expected from Americans. In other words, the Oriental has a comparable degree of intelligence, but his living habits limit his ability even when the proper desire and knowledge are acquired. The exact manpower requirement is not given in Hycon-Page report, but analysis does show that it is better than 25 per 1000 telephones. In the U.S., this ratio is about 3 per 1000 telephones. With proper management and organization, and considering their lower overall efficiency, it would appear that they would not be one-eighth as efficient as Americans, but closer to three-fourths, or, at the least, one-half. Therefore, a figure of 4 to 6 per 1000 telephones would be more realistic.

6. Cost of Training program.

The Hycon-Page report shows a training cost of $2,691,500 for Vietnam, $2,485,300 for Thailand, and $1,822,200 for Laos. It further states that actually the Laos figure should be about one-half of this or $911,000, while the cost of the Laos program is only $546,200. This indicates that it will cost, in round figures, about 4,000 dollars per person to be trained. This figure is considered excessive by many times what it should be. It is granted that church-sponsored schools do not necessarily include all of the real expenses involved, but they should be a good guide.

A check was made by me of several church institutions in the vicinity of Bangkok and the average cost per student per year in trade type schooling was 5500 Baht ($275 U.S.). We could not expect to establish schools this cheaply, but it should not cost twelve times as much. While the data in the report is not complete enough to analyze in detail the costs included therein, it can be assumed from the high cost of the Laos program that a large part of the cost is in the equipment, buildings, and grounds. This would indicate that the action suggested under recommendation 4 (d) and (e) above should be seriously considered.

7. Recommended Management Structure.

That part of Hycon-Page's report that deals with management is especially disappointing. It furnishes just an organization chart with the corresponding job descriptions. It must be realized that while rehabilitation of existing exchanges is essential before high quality trunking can be profitable, so must management be reoriented prior to rehabilitation. The major reason for the current extremely poor state of existing equipment lies in the lap of poor management. It is, therefore, useless to proceed until positive study, plans, and actions are under way to reorient management. (See recommendation 4(b) above.)

8. Lack of long range planning.

The report states several times that they cannot look further than "15 years into the future", which is not in keeping with the financial aspects

of the project when it is considered that: (a) the loan payment portion of the project will probably be deferred for at least 5 years, and (b) the loan will probably be required to be repaid in 20 years after start of payment. This totals at least 25 years. The host governments should not be required to base their agreement on a document that does not indicate what the general status will be for the last 10 years of payment.

9. Extensive use of manually operated switchboards.

Hycon-Page's report, in most instances, recommends the use of manually operated switchboards. I do not concur and recommend a broader use of unattended dial in their place. Manual boards soon become outgrown and must be replaced by dial sooner or later. This being the case, it is not clear why the additional expense of the manual boards is recommended. Unattended dial, on the other hand, can be expanded on almost indefinitely. Another problem with manual boards is that of language in this area, as there are many dialects and languages spoken. Refer to Part VI, Appendix 3, page 28, in third paragraph of Vietnam report.

10. Extensive use of VHF for major trunking.

Study of the Hycon-Page report shows that, except in few cases, they recommend the use of VHF for trunking facilities. This is not concurred in, and it is recommended that broad band (up to 600 channel) microwave be used in all cases except in long range, low demand tributary circuits. Reference is made to Marconi's experience in Malaya cited in 1 above, experience and use in Taiwan and the U. S., and any other country of large

communication use. VHF systems by nature are limited in band width (number of channels). These band widths vary with manufacturers and exact carrier frequency involved. Broad band widths vary with manufacturers and exact carrier frequency involved, broad band microwave is more exacting in sighting and costs more money, but, in view of the fact that the recommended VHF system is initially fairly full, and in the not too removed future would therefore have to be paralleled by another similar system or replaced by broad band microwave, it does not seem proper to place the added expense of VHF first on the host governments. Broad band microwave should be used even if financial considerations cause a cutback in the extent of the system.

11. Toll switching plan.

The toll switching plan as recommended by Hycon-Page is considered fair. It is not possible to comment in detail, since the basic data they used to arrive at their system is not a part of the report. I do recommend shifting of certain toll centers and elimination of toll points. This may require some back-hauling of traffic, but, in general, is cheaper and cuts down on switching requirements, as well as personnel.

12. Military requirements.

In accordance with the Invitation to Bid, the contractor was furnished a chart showing the U. S. minimum military requirements for telecommunications between various types of installations. This chart

was made by compiling data from numerous unclassified military documents and was intended to save the contractor time, as well as give him a full picture of such requirements. When it was found that this chart had not been forwarded to the field, both field offices were furnished copies. One of the main reasons for this action was because past experience has shown that Far East military units do not fully know what their telecommunications requirements are and, therefore, to play safe, ask for much more than they really need. True to form, all three countries requested quite a "gold plated" system, which was incorporated in the plan by Hycon-Page "as is". One of the main features of the abovementioned chart is that it shows that the larger part of military circuits can be placed on a switched basis rather than private wire basis, thus reducing the number of trunks required and making it more compatible with the commercial system. This part of the plan needs careful study.

General Remarks.

There are other points that should be considered in the final document, such as the toll call rate per telephone in the Orient is higher than in the U. S. ; why the numbering plan (see Part VI, Appendix 3, page 30, paragraph 1) of Vietnam and Laos should be coordinated and not with Thailand, when the circuitry recommended ties Laos to Thailand and Thailand to Vietnam, but does not tie Vietnam to Laos except through Thailand. Whether it is better to train a large number to medium degree or a small number to a high degree should be studied. I would recommend the latter. There are too

many points recommended for further study. Why does report recommend other than U. S. standards in contrast to existing ICA policy and M. O. 's on specifications? (See Part II, page 2, paragraph 1. 9.) Page 4 of Part VI, Appendix 1, gives cost of phases 1 plus 2 as 2 to 3 per cent of total investment, while thus far in phase 1 only we have spent about 5 per cent.

Part VI, Appendix 3, page 29, paragraph B should be removed.

Part VI, Appendix 9, Item 2 should be placed in the classified section.

Financial arrangements should be such that U. S. assistance is given to the minimum degree necessary to establish a going concern. This amount is, since this is to be a sound, economical revenue-producing system, at that point in time where the curve for demand intersects the curve for construction (estimated at about 1962 or 1963). Careful evaluation of the final accepted plan can pinpoint this date more accurately.

The course of action contained herein is recommended as the future endeavor of ICA on Regional Telecommunications in Southeast Asia. ICA is now in a very awkward and unrealistic position with the host countries resulting from the inaction and non-performance of its prime contractor, Hycon-Page. Further lack of action will only result in more embarrassment to ICA.

The lack of factual data and firm, well founded, engineering recommendations in the Fundamental Plan, as presented by Hycon-Page,

coupled with the obvious lack of any other detailed engineering work (as determined by inspection trip to Hycon-Page Cambridge office on 19 to 21 March 1958 by RTC and Mr. Foulkrod of Tudor Engineering Company) shows positively that little detailed engineering plans and specifications can be expected from the contractor in the near future. Mr. Oakley stated in Cambridge that they could not do any detailed work until their Fundamental Plan had been accepted. This type of thinking is completely contrary to the desires of ICA contract ICA-W-281 in which it is realized that in the countries involved the rehabilitation of local exchanges must be done prior to any trunking and, further, that regardless of the final extent of the systems, certain definite backbone routes must be included and therefore can be engineered.

The current contract (ICA-W-281) between Hycon-Page and ICA has not been fulfilled. This contract was signed on 6 February 1957 and started with a Letter of Intent dated 19 December 1956 to terminate on 19 December 1958. The Contractor has not followed the contract nor produced according to the schedules contained therein. In over half the contract life, the Contractor has spent over half of the funds and produced less than one-fourth of the work required therein. A recent trip (19 to 21 March 1958) to the Contractor's home office in Cambridge, Massachusetts, by the Regional Telecommunications Coordinator and Mr. Foulkrod of Tudor Engineering Company revealed that the Contractor has not prepared any

detailed or specific engineering or specifications; that the Contractor has prepared general specification forms but not filled any out; that the Contractor does not intend to do any detailed work unless and until his Fundamental Plan is approved in whole or in part.

Review of the Contractor's final Fundamental Plan for Vietnam and Laos and the draft of the Contractor's Fundamental Plan for Thailand reveals a totally inadequate plan for the purpose of financing and negotiating. The recommendations in these plans are not backed up by adequate factual data nor are the recommended systems considered sound. For example, the Contractor recommends extensive use of manual switchboards that must be replaced in the not too distant future and that the backbone toll system be of 60 channel VHF that does not allow for adequate expansion ability. Cost figures presented by the contractor are much higher than would be expected. For example, to install a TD-2 Western Electric type broad band microwave system up the coast of Vietnam from Saigon to Hue with repeater stations every thirty miles comes to $3,000,000 in round figures, which is less than that indicated in the Plan for a cheaper and limited VHF system; however, it is difficult to break out exactly what the costs are in the Plan since the coast route was not followed all of the way.

According to Mr. Oakley and Mr. Alter in Cambridge, there will be little change in the final Fundamental Plan from the draft for Thailand. It is, therefore, recommended that little is to be gained by ICA's delaying action for receipt of the final Thailand Fundamental Plan.

APPENDIX E

It should be assured that the Contractor complete and furnish to ICA all data on the Demand Forecast (house to house canvassing) survey now underway in Thailand.

Enclosure No. 1 is an example of one means of meeting toll center requirements at a typical toll center.

Enclosure No. 2 is an example of one means of meeting tributary requirements at a typical tributary.

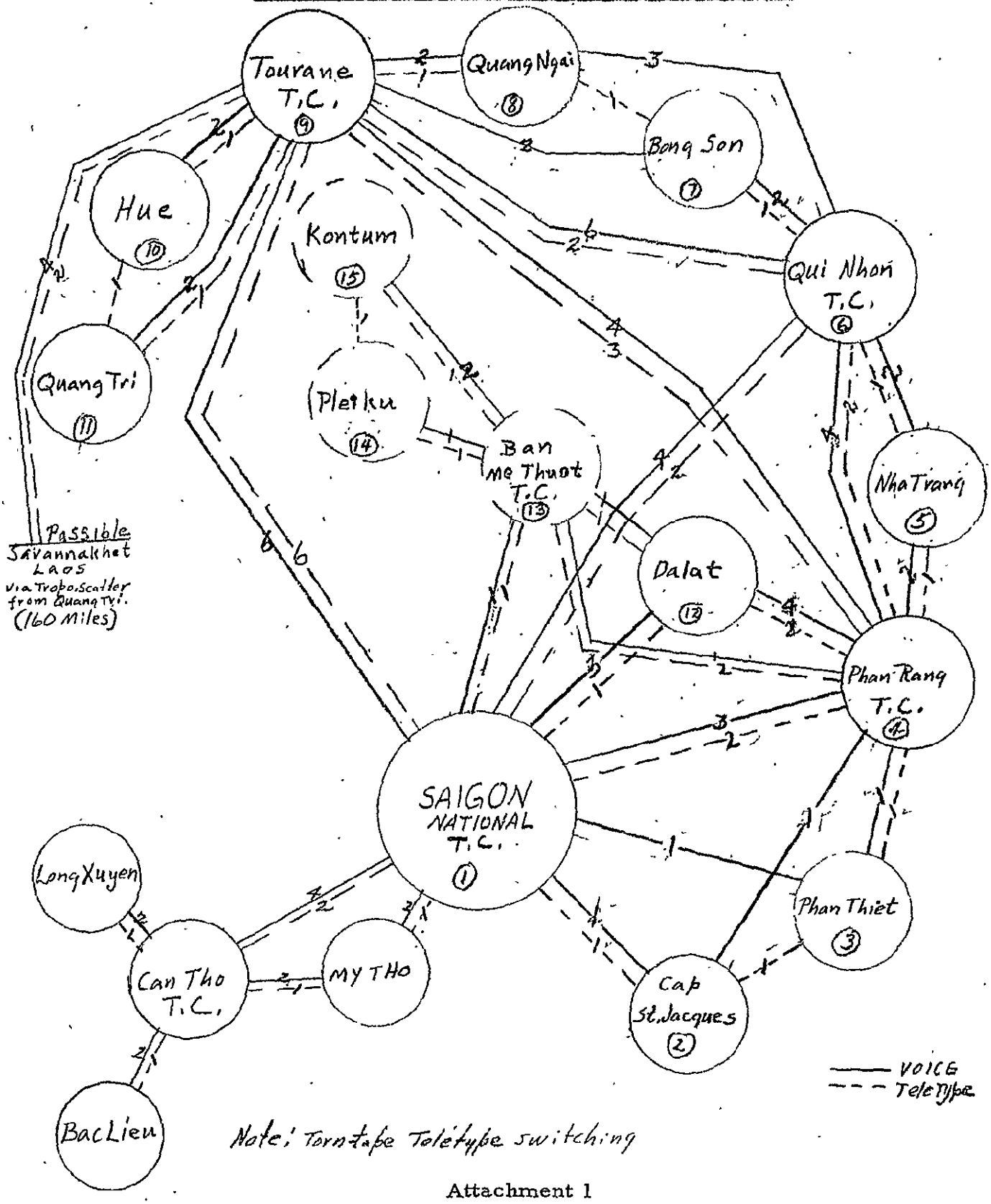
Enclosure No. 3 is a traffic diagram for proposed system for Laos.

Enclosure No. 4 shows the initial minimum circuit requirements between Saigon and Quang Tri by service required.

Enclosure No. 5 shows a recommended general traffic diagram for Cambodia.

John M. Hogg
Regional Telecommunications
Coordinator
March 31, 1958

Telephone & Teletype Traffic Diagram (C) Commercial VIET NAM



Note: Torn tape Teletype switching

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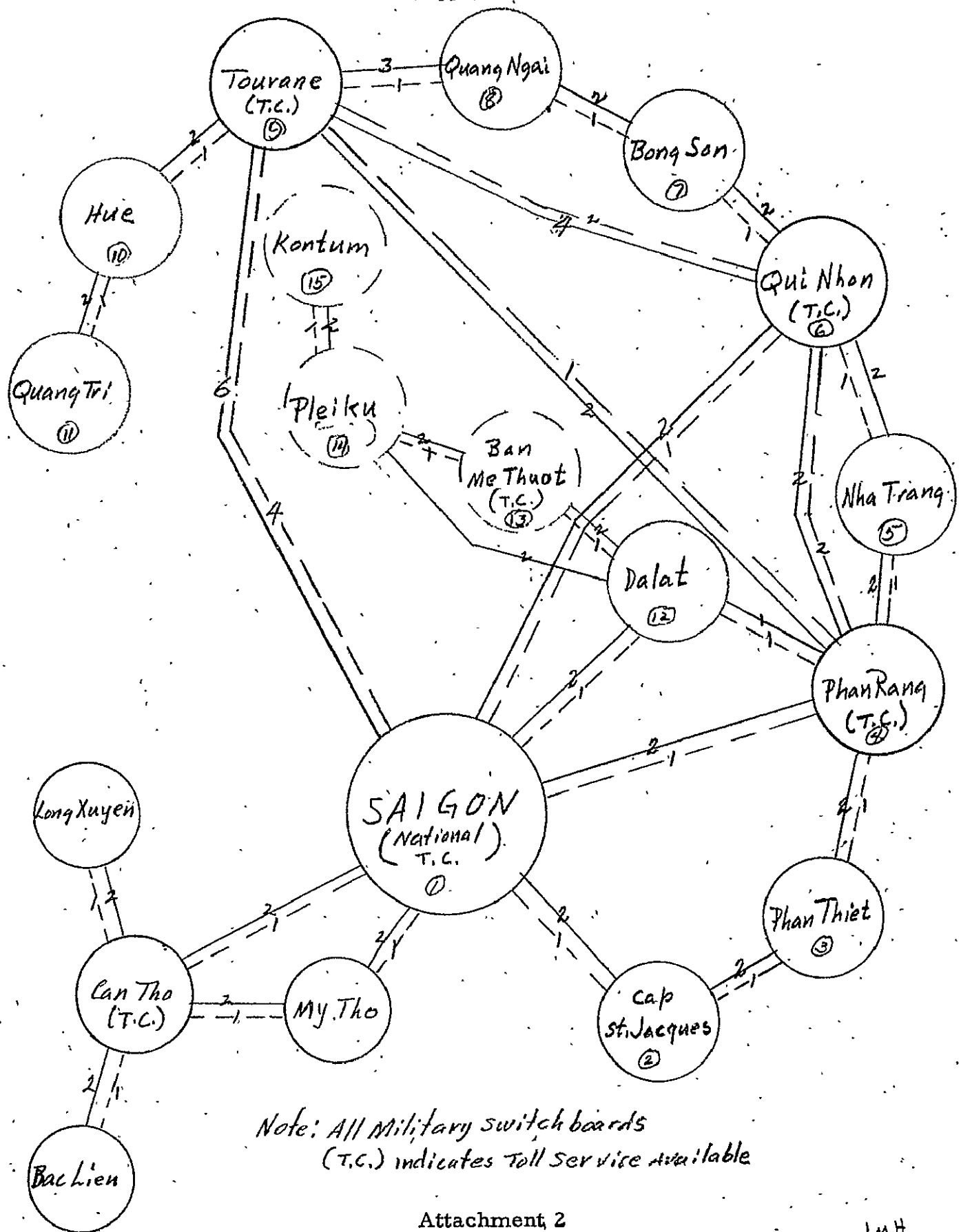
Telephone & Teletype Traffic Diagram

(M) Military
VIET NAM



Note: All Military switchboards
(T.C.) indicates Toll Service Available

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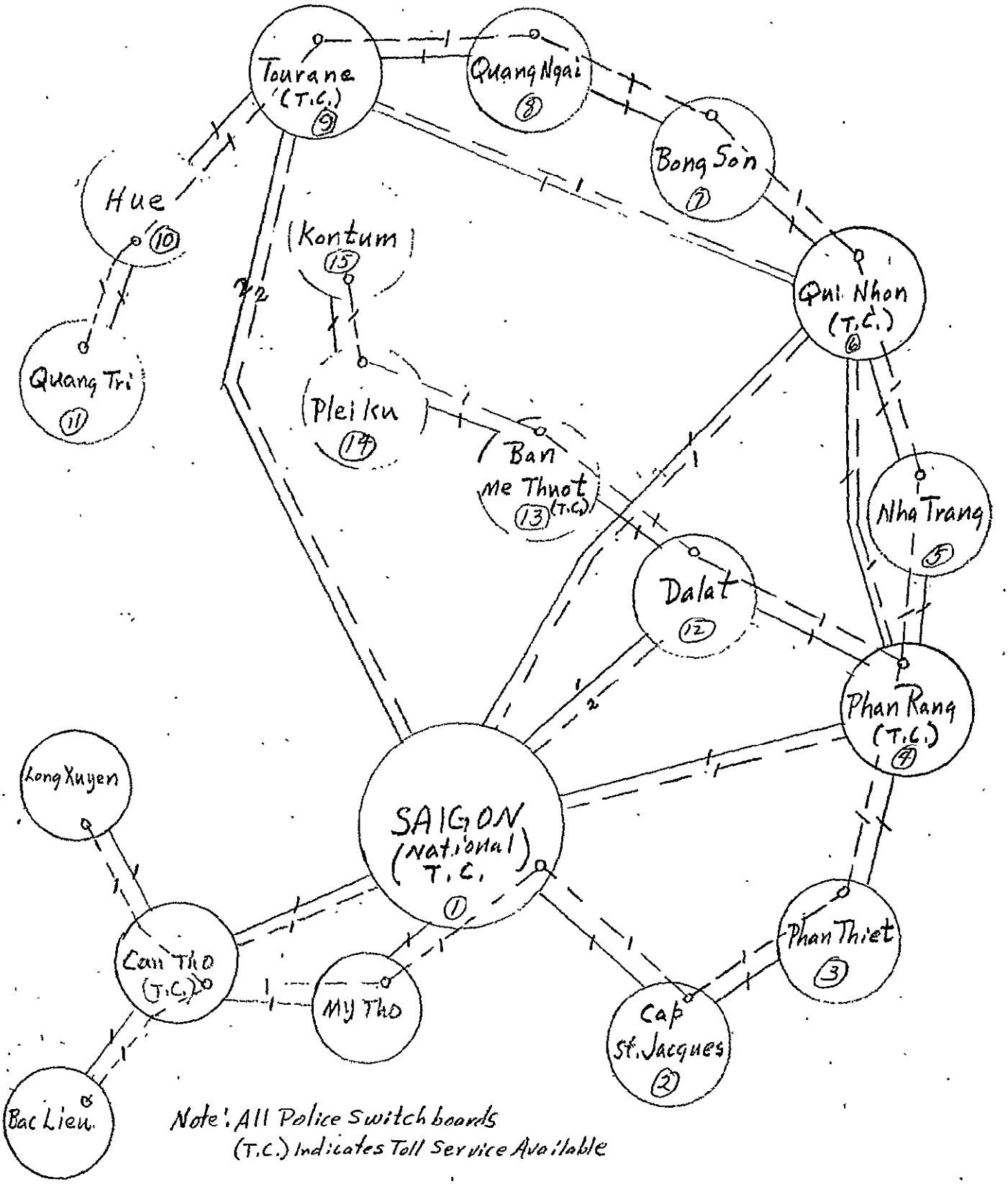
3-58


Telephone & Teletype (looped in parallel)
Traffic Diagram
(P) National Police
VIET NAM
Tourane (T.C.) (9)
Quang Ngai (8)
Bong Son (7)
Hue (10)
Kontum (15)
Qui Nhon (T.C.) (6)
Quang Tri (11)
Plei Ku (14)
Ban me Thuot (13) (T.C.)
Nha Trang (5)
Dalat (12)
Phan Rang (T.C.) (4)
Long Xuyen
SAIGON (National) T.C. (1)
Can Tho (T.C.) (2)
My Tho
Phan Thiet (3)
Cap St. Jacques (2)
Bac Lieu
Note: All Police Switch boards
(T.C.) Indicates Toll Service Available

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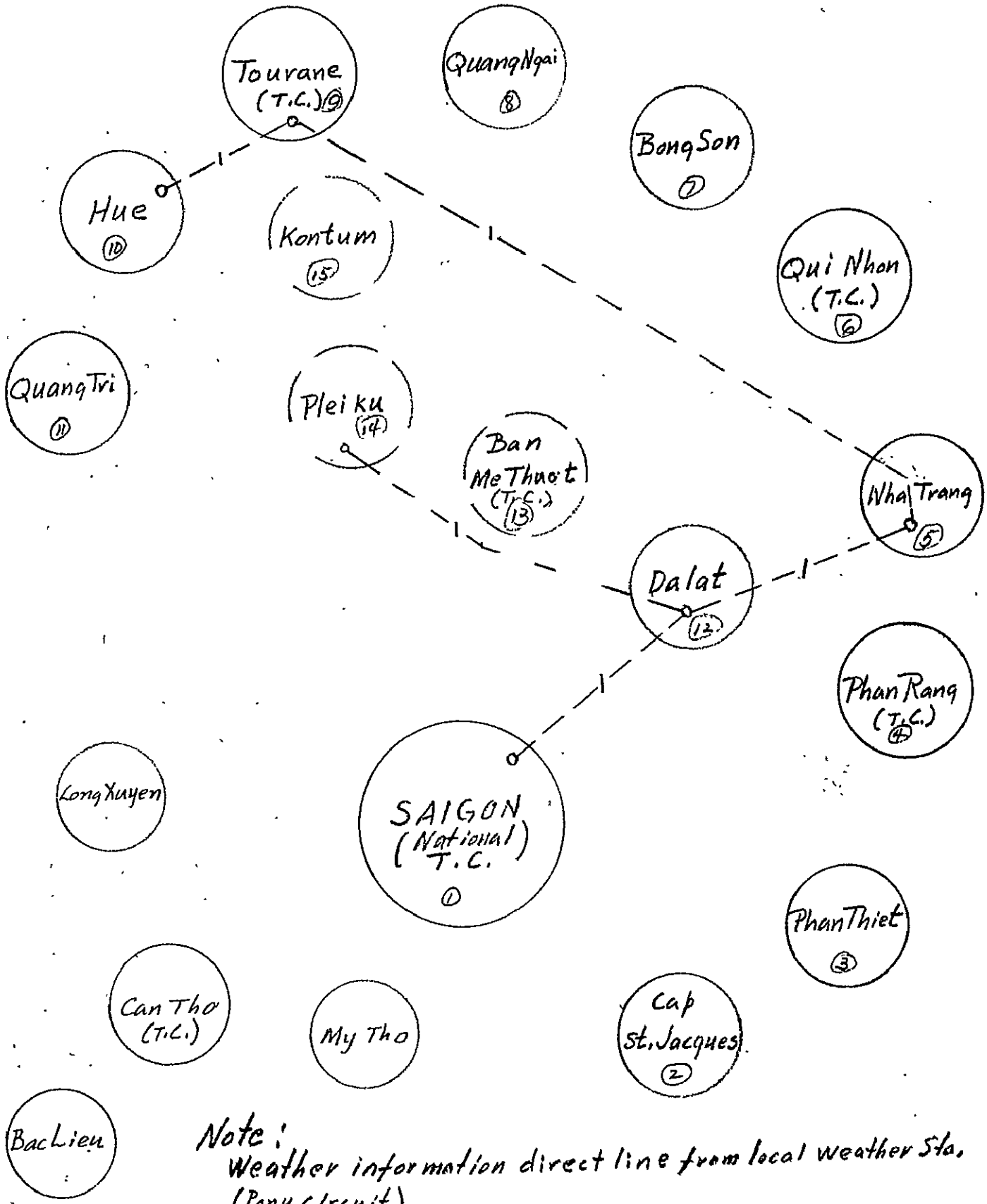
Teletype (looped in parallel)
Traffic Diagram
(CAA) CIVIL AERONAUTICS ADMIN.



Note:
Weather information direct line from local weather Sta.
(Pony circuit)

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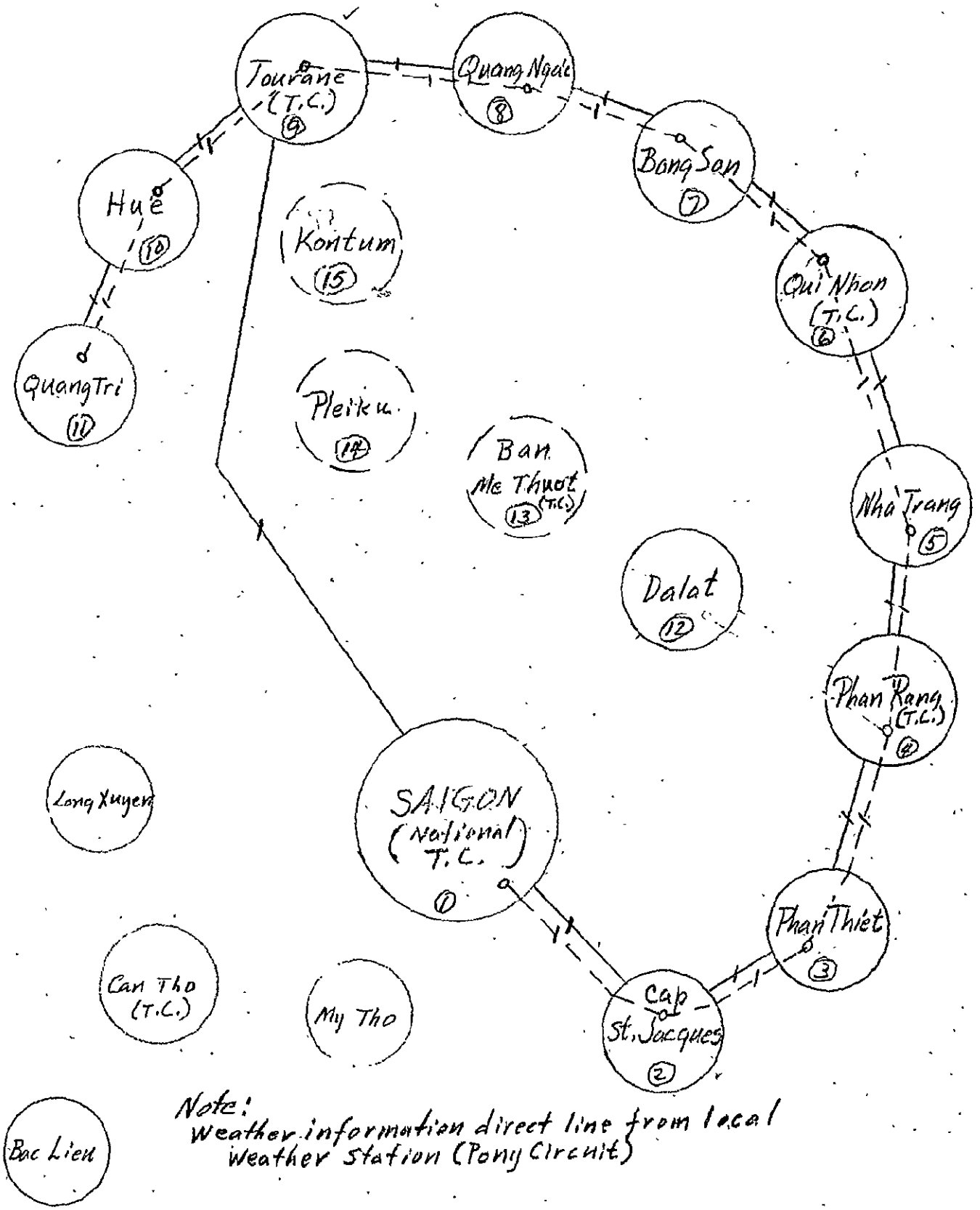
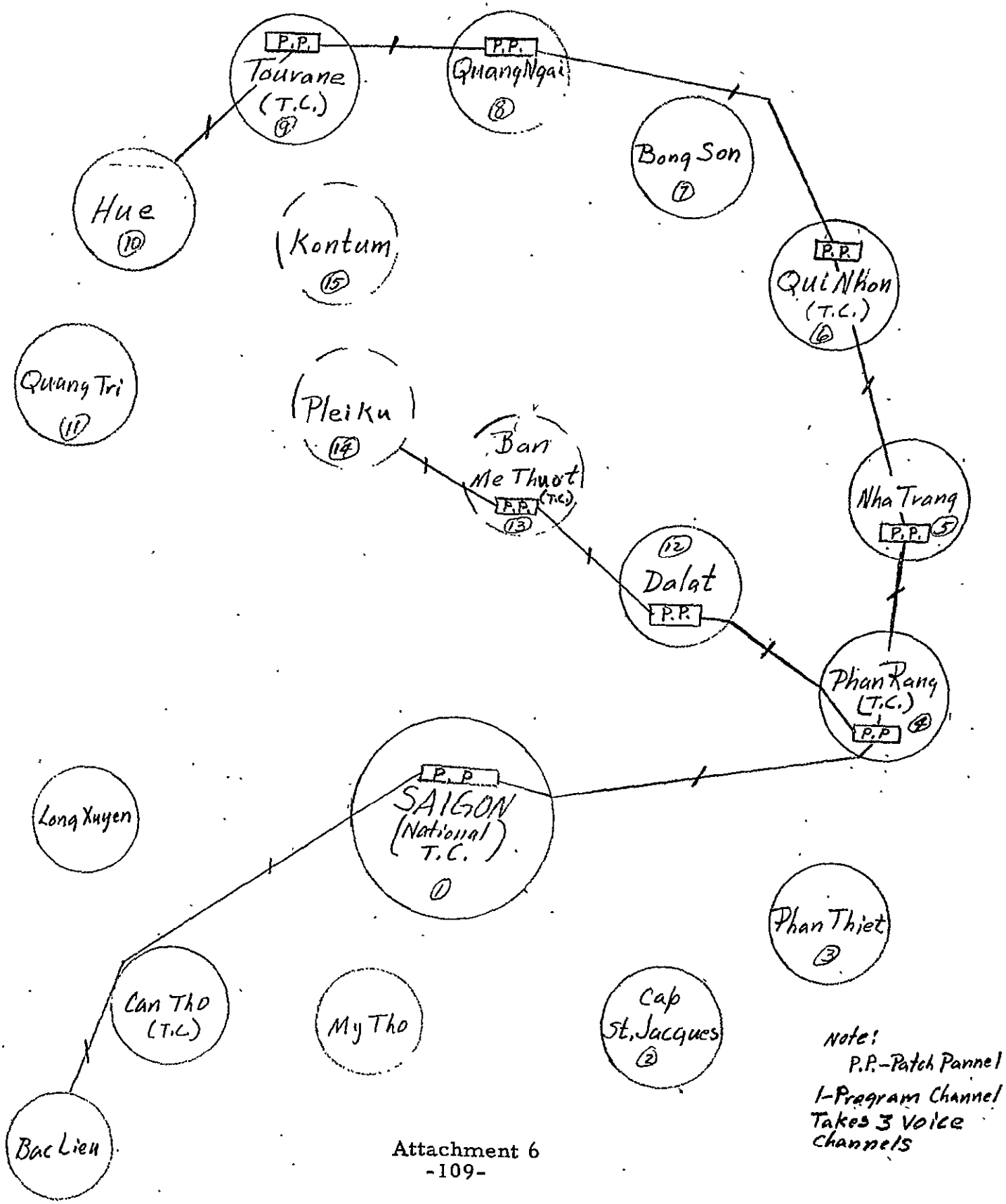
Telephone & Teletype (Looped in parallel)
Traffic Diagram
(H) Ports, Harbors & Waterways
VIET NAM



Note:
Weather information direct line from local weather station (Pony Circuit)

JMH
3-58

Traffic Diagram
(PC) VOICE Program (Radio Viet Nam)
VIET NAM



Note:
P.P.–Patch Pannel
1–Program Channel
Takes 3 Voice
channels

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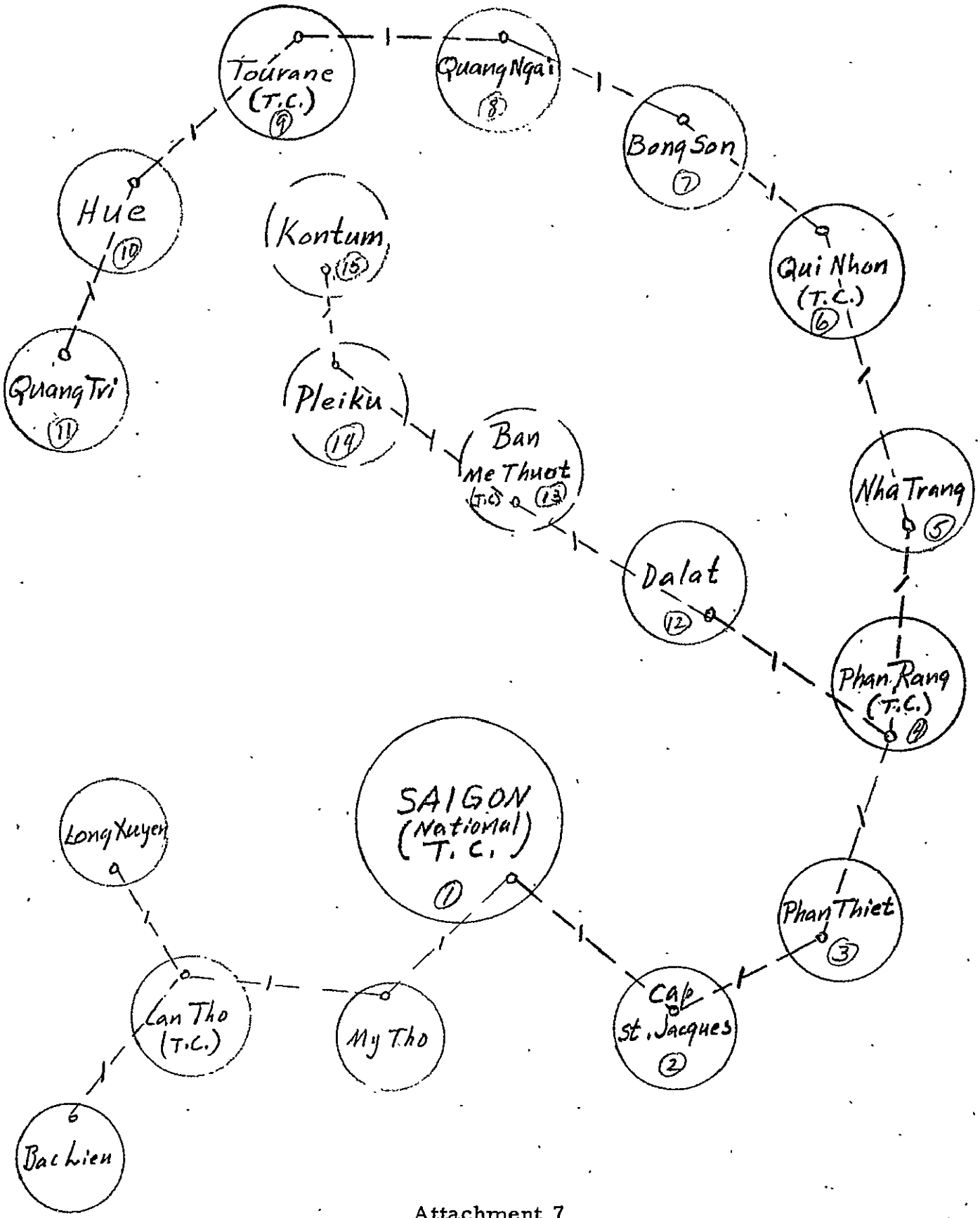
3-58

Teletype (Looped in Parallel)
Traffic Diagram
(WX) Weather



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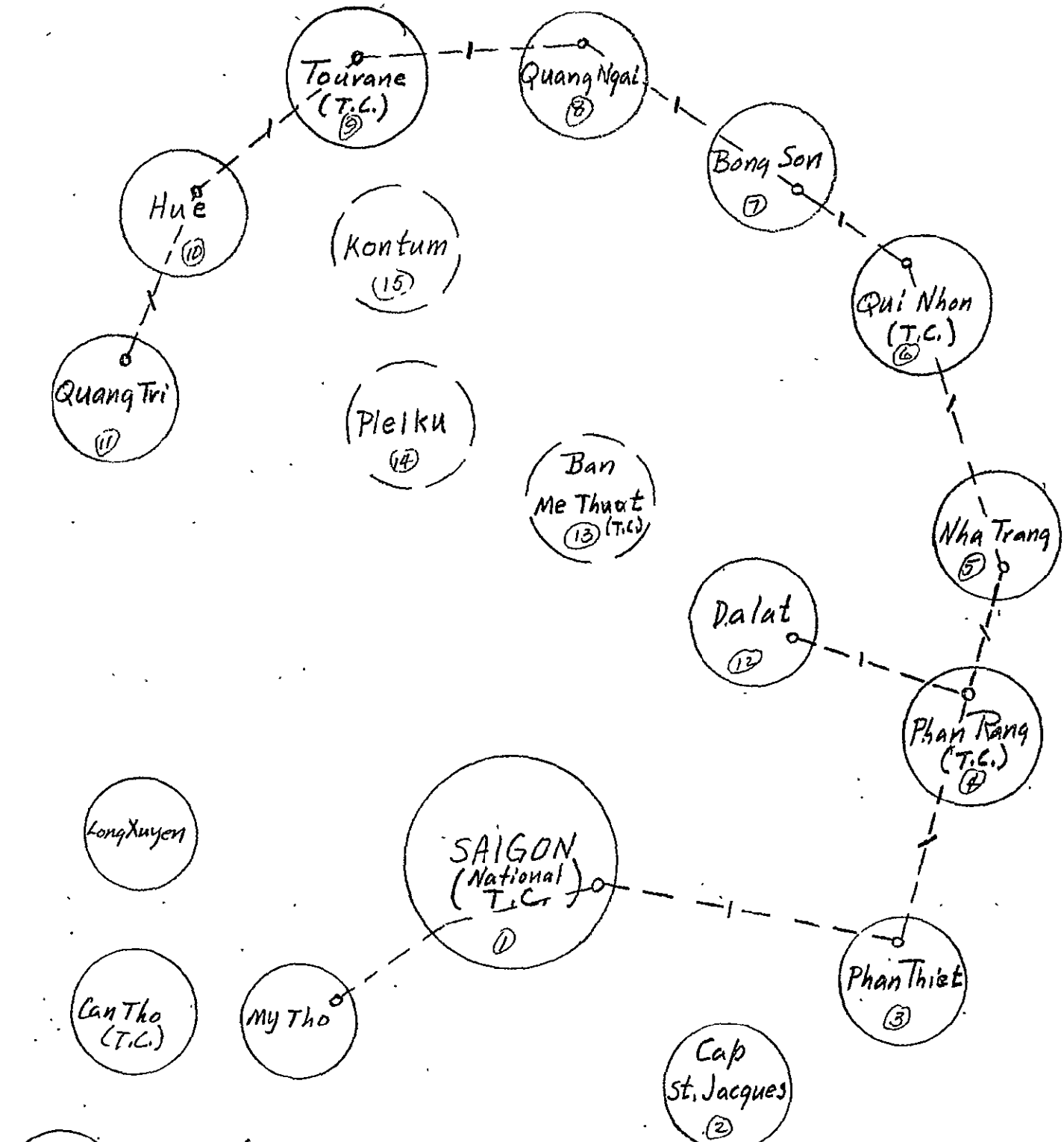
Teletype (Looped in parallel)

Traffic Diagram

(RR) Rail Road



Note: The organization of Rail Road communications requires that all but higher echelon traffic follow closely to the Rail Road and does not lend itself to incorporation into a common system.

JMH
3-58

(11N)

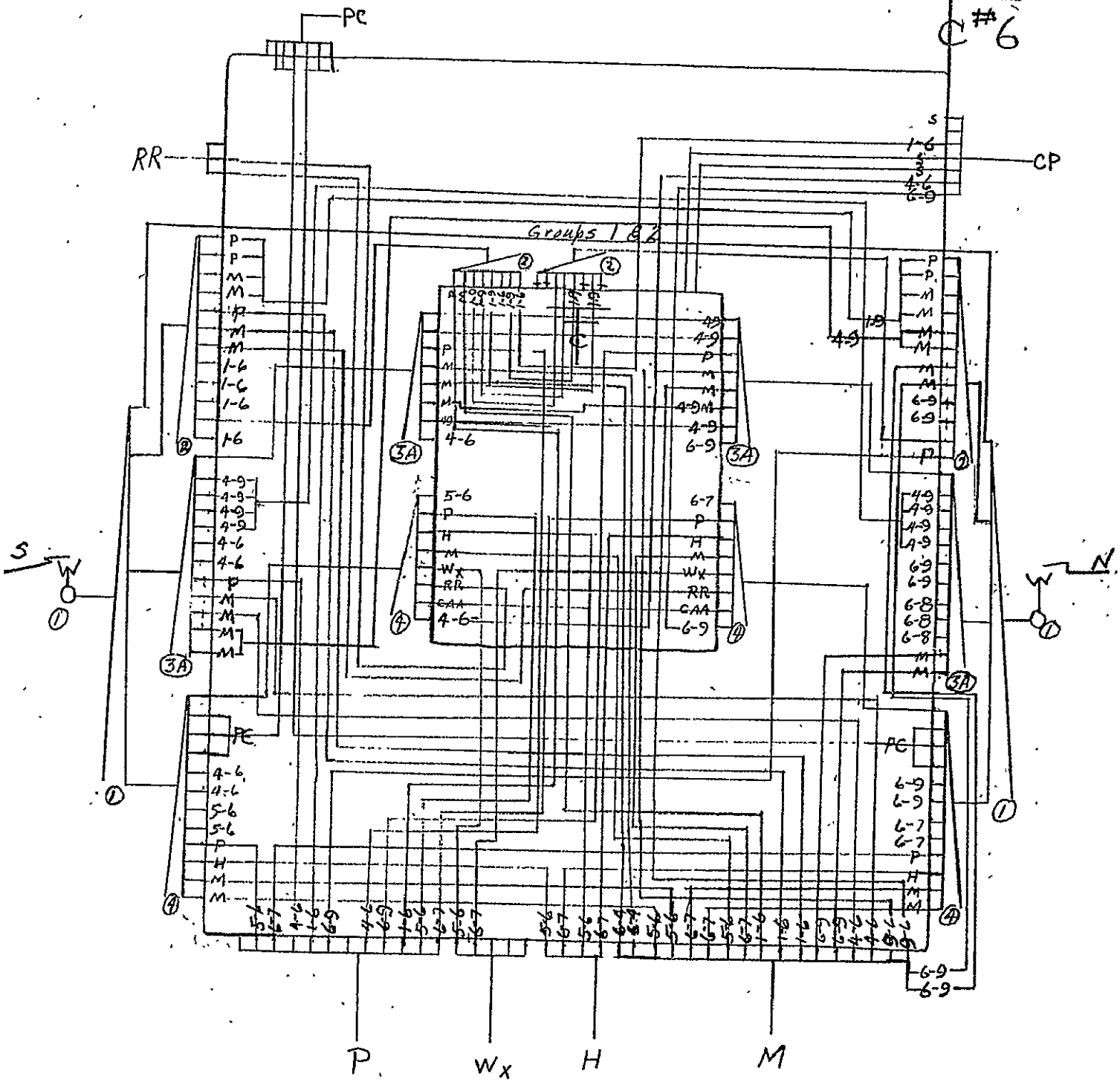
Relay #6 ← 60 Miles { Qui Nhon, Vietnam (Toll Center) } 21 Miles → Relay #7

Lat, N 13 0 46 1 15 11

Long E 109 0 14 1 30 11

100 Line Dial

Toll Board #6

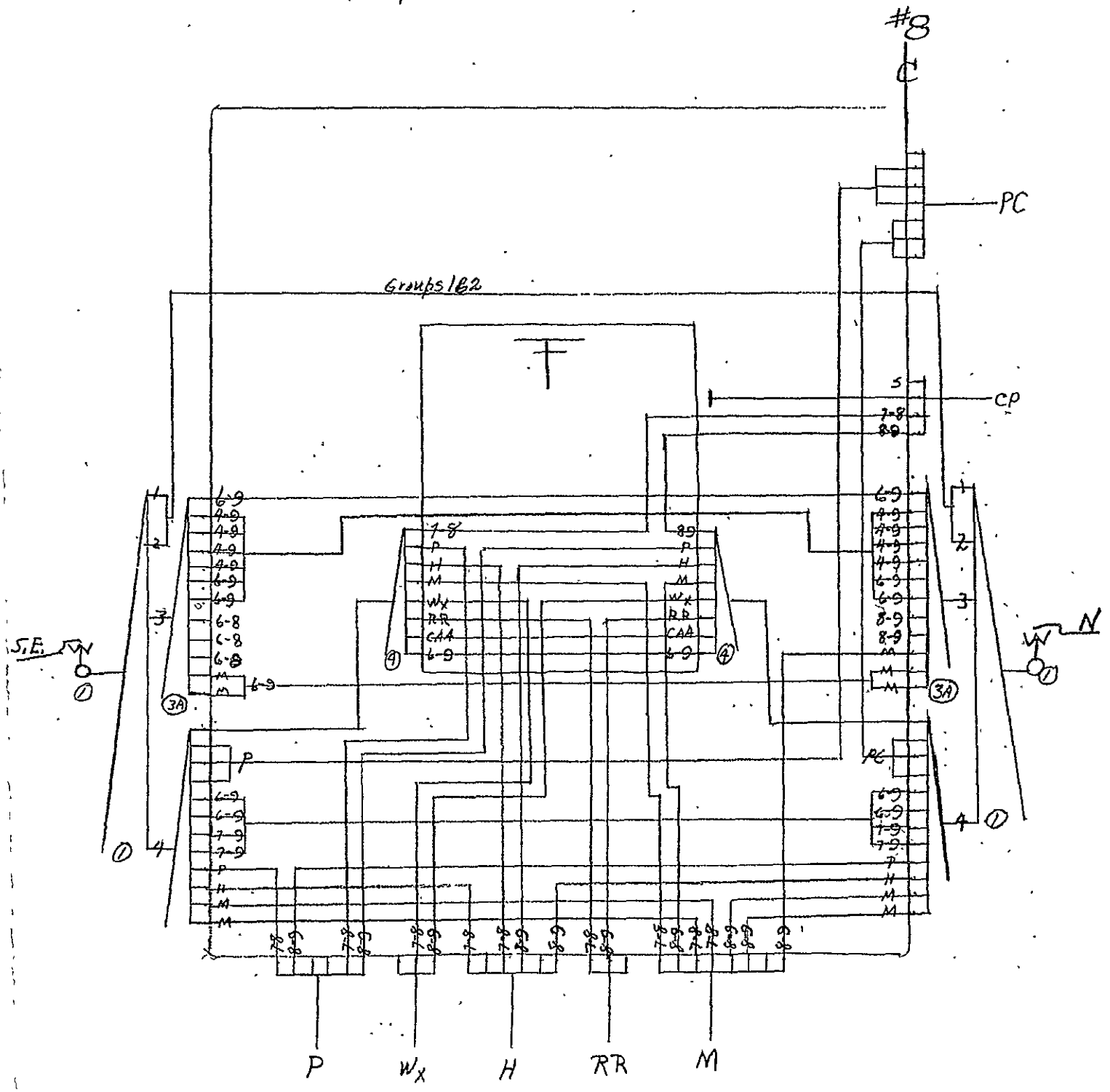


RR - Rail Road
PC - Program Channel
CP - Commercial PT&T
Wx - Weather
P - Police
H - Ports & Harbors
M - Military
CAA - Civil Air Admin.

JMH
3-58

(15N)

Relay #8 ← 35 Miles { Quang Ngai, Viet Nam
100 Line unattended Dial
Lat. N15° 07' 20"
Long. E108° 48' 40" } 20 Miles → Relay #9



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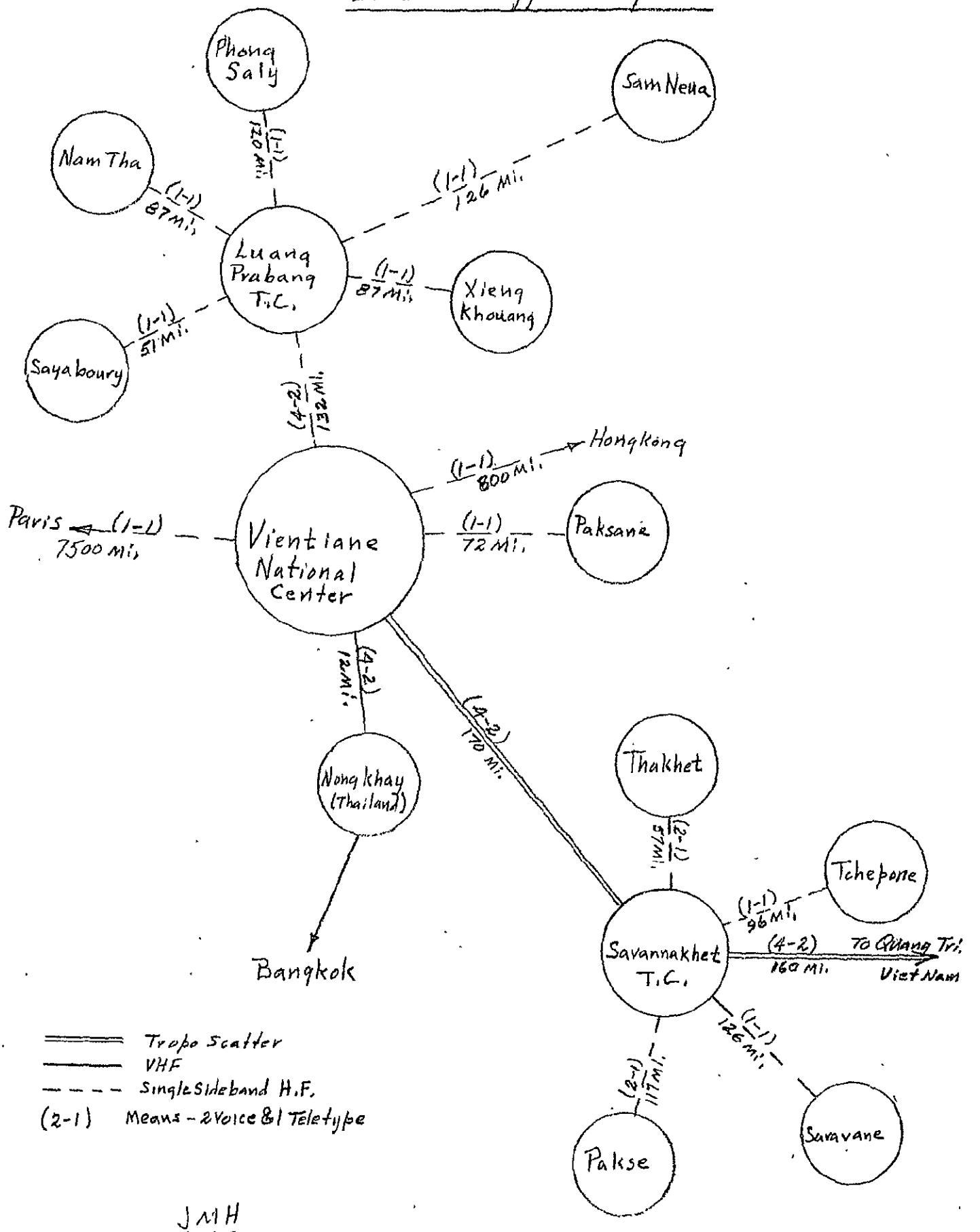
LAOS Traffic Diagram



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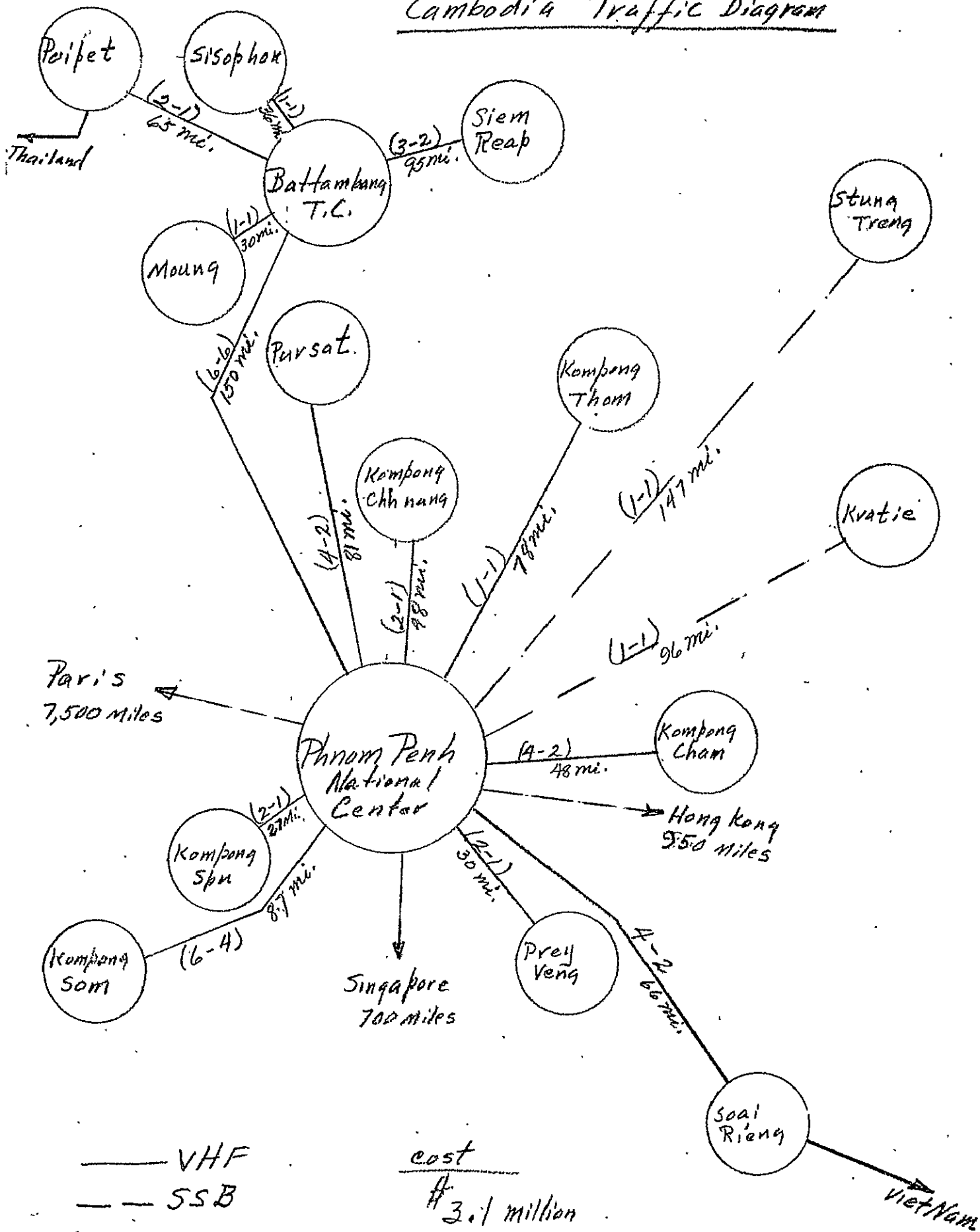
Cambodia Traffic Diagram



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ASIA/PCS FKENEFICK
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GC/ASIA: CSTEPHENSON (PHONE)
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TAGS:

SUBJECT: PRODUCTION OF AID FILES AND RECORDS OF TELECOM-MUNICATIONS AND RELATED PROJECTS

1. THE UNITED STATES GOVERNMENT HAS BROUGHT AN ANTI-TRUST SUIT AGAINST AMERICAN TELEPHONE AND TELEGRAPH COMPANY, WESTERN ELECTRIC COMPANY, INC., AND BELL TELEPHONE LABORATORIES, INC. IN ACCORDANCE WITH THE FEDERAL RULES OF CIVIL PROCEDURE AND A PRE-TRIAL ORDER BY THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF COLUMBIA, GOVERNMENT AGENCIES ARE REQUIRED TO PRODUCE FOR EXAMINATION BY THE DEFENDANTS CERTAIN AGENCY FILES AND RECORDS REQUESTED BY THE DEFENDANTS. THE REQUEST DIRECTED TO A.I.D. COVERS ALL AGENCY FILES AND RECORDS RELATING TO TELECOMMUNICATIONS PROJECTS WITH WHICH A.I.D. AND ITS PREDECESSORS HAVE BEEN CONCERNED SINCE 1956. THIS COVERS ALL FILES AND RECORDS IN THE POSSESSION OF AID/W AS WELL AS THE COUNTRY MISSIONS. IT INCLUDES DOCUMENTS WHICH HAVE BEEN RETIRED TO STORAGE. LISTED PARA. TWO ARE THE TELECOMMUNICATIONS PROJECTS WITHIN YOUR AREA OF RESPONSIBILITY FOR WHICH A.I.D IS REQUIRED TO PRODUCE ITS FILES AND RECORDS.

2. 493-ØØ98 - REGIONAL TELECOM ENGINEERING; 498-ØØ4) - TELECOMMUNICATIONS; 498-ØØ95 - REGIONAL TELECOM CONSTRUC-

TION; 498-Ø)35 - SEATO TELECOM; 498-ØI4Ø - SEATO TELECOM; 498-Ø228 - REGIONAL TELECOM DEVELOPMENT

3. IT IS REQUESTED THAT YOU CABLE PRIORITY NLT COB FEB 21 WHETHER ANY RECORDS ARE STILL RETAINED IN THE MISSION ON PROJECTS LISTED ABOVE.

4. ALSO ADVISE WHETHER ANY RECORDS ON THESE PROJECTS SENT TO AID/W FOR RETIREMENT WITHIN PAST 9Ø DAYS.

5. NEGATIVE RESPONSES ARE REQUIRED. THANK YOU FOR YOUR ASSISTANCE ON THIS PRIORITY MATTER. VANCE