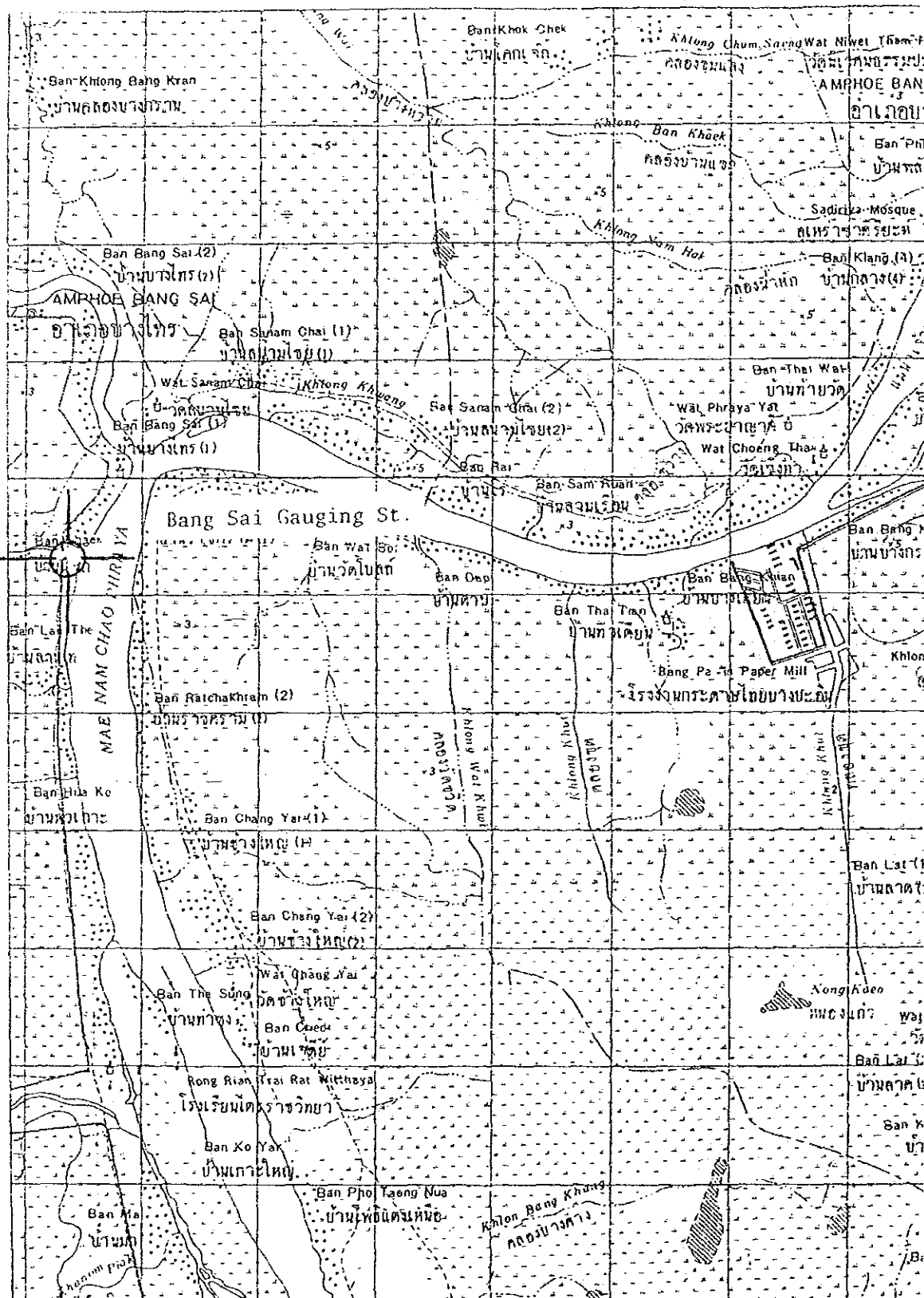


APPENDIX
FIG. 2-2

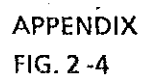
LOCATION MAP OF CHAI NAT GAUGING STATION

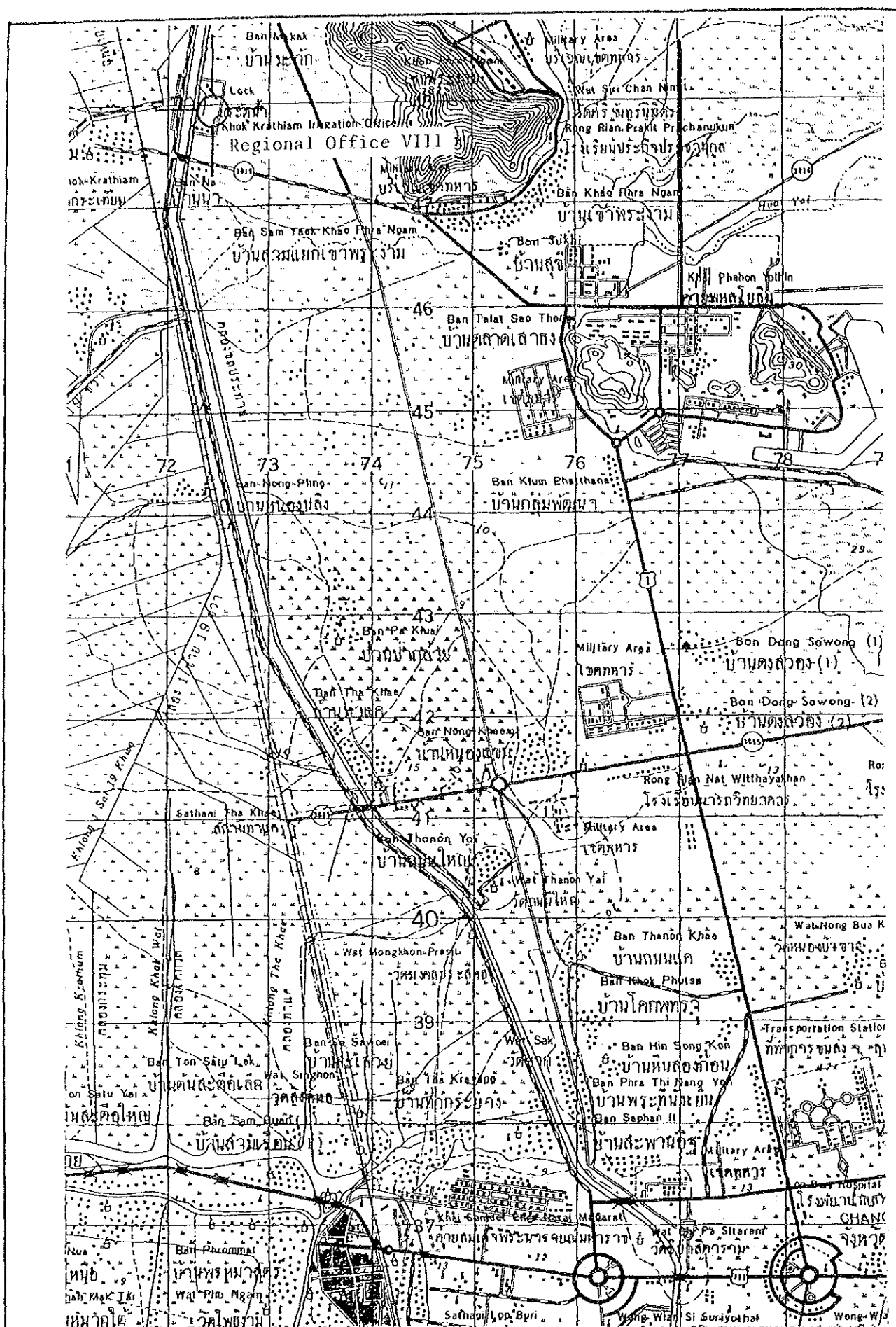


APPENDIX

FIG. 2-3

LOCATION MAP OF BANG SAI GAUGING STATION





APPENDIX
FIG. 2-5

LOCATION MAP OF REGIONAL
IRRIGATION OFFICE 8 (LOP BURI)

BID DOCUMENTS 1

BID DOCUMENTS

FOR

SUPPLY OF TELEMETERING/DATA

COMMUNICATION SYSTEM

FOR

THE IRRIGATION ENGINEERING CENTER PROJECT

PHASE II IN THAILAND

THAILAND OFFICE

JAPAN INTERNATIONAL COOPERATION AGENCY

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JAPAN INTERNATIONAL COOPERATION AGENCY
THAILAND OFFICE

INVITATION TO BID NO. _____

The Japan International Cooperation Agency, Thailand Office hereby invites sealed written bids for the Supply of Telemetering/Data Communication System for the Irrigation Engineering Center Project Phase II.

This Contract will include, among others, the following;

1. Terms and Conditions of this Contract
2. Pledge Agreement
3. Technical Specifications
4. Bill of Quantities
5. Drawings

Bids shall be addressed to Mr. Nobuji ABE, Resident Representative, Japan International Cooperation Agency, Thailand Office, 1674/1, New Petchburi Road, Bangkok 10310, Thailand.

The date for the opening of bids will be held at ____ o'clock p.m/a.m Thailand Standard Time on ____, ____ at the JICA, Thailand Office.

A pre-bidding conference is scheduled on ____, ____ at ____ o'clock p.m/a.m at _____. Attendance for bidders is desirable.

Nobuji ABE
Resident Representative of JICA
Thailand Office

INSTRUCTION TO BIDDERS

INSTRUCTION TO BIDDERS

IB-01 PREPARATION OF BIDS

All bids shall be submitted in an original and three(3) copies on or before the hour and date fixed for receipt of bids, in accordance with the Invitation for Bids, and shall conform to the following requirements;

- a) One copy of proposal shall be marked "original". The original and copies of bids shall be submitted in its entirety with all blanks in the proposal property filled in.
- b) Bids prices shall be written in words as well as in figures. In case of discrepancy between the words and figures, the price in words shall prevail.
- c) The proposal must be signed by the Bidder with his usual signature and shall show his full business address.

IB-02 BASIS ON WHICH BIDS ARE REQUESTED

The form of the Contract to be awarded is on fixed unit Price basis of payment to the Contractor, as specifically set forth in these Contract Documents. Bids are requested on the above basis and a proposal which is on any other basis will not be considered.

Quotation of prices shall be made in Thai Baht and the Contractor shall be paid in Local Currency.

IB-03 DELIVERY OF BIDS

Bids shall be directly delivered to JICA Thailand Office, Mr. Nobuji ABE, Resident Representative on or before the hour and date set for the opening of bids.

IB-04 WITHDRAWAL OF BIDS

A bidder will be allowed to withdraw his bid prior to the time set for the opening of bids if he communicates his purpose in writing to the Japan International Cooperation Agency, Thailand Office, and his bid shall be returned to him unopened. No bid can be withdrawn for any reason whatsoever after the opening of bids has been made.

IB-05 BIDDER'S RESPONSIBILITY

The bidders shall be responsible for having taken steps to carefully examine all of the Bid Documents and also to have fully informed themselves as to all conditions, locality and otherwise, affecting the carrying out of the Contract Works. Failure to do so will be at the Bidder's risk.

IB-06 INTERPRETATION OF CONTRACT DOCUMENTS

If the prospective Bidder is in doubt as to the true meaning of any part of the Bid Documents, the Bidder may submit to the Japan International Cooperation Agency, Thailand Office, a written request for interpretation allowing sufficient time for a reply to reach him before submission of his bid. Any interpretation of the proposed documents will be made only by a Supplemental Notice duly issued.

IB-07 PRE-BIDDING CONFERENCE

A pre-bidding conference is scheduled on _____, at _____ o'clock p.m/a.m at _____. Attendance for Bidders is desirable.

IB-08 COMPARISON OF BIDS

In making its selection, the Japan International Cooperation Agency, Thailand Office will not be bound to award a Contract to the bidder submitting the Bid with the lowest indicated cost; but will take into consideration the bid

prices, unbalanced bids, guaranteed completion time and other relevant consideration.

IB-09 AWARD OF CONTRACT

Bids will be opened in the presence of the Bidders who may desire to attend such opening by the Japan International Cooperation Agency, Thailand Office, at ____ o'clock p.m/a.m. Thailand Standard Time on _____.

Promptly after the opening of the bids the Japan International Cooperation Agency, Thailand Office will undertake a detailed study and appraisal of the proposal submitted. The Contract will be awarded to the Bidder whose proposal is considered to be the most advantageous to the Japan International Cooperation Agency, Thailand Office. The Japan International Cooperation Agency, Thailand Office reserves the right to reject any or all bids received.

IB-10 BID DOCUMENTS

Bid documents shall include the following;

- a) Invitation to Bid
- b) Instruction to Bidders
- c) Terms and conditions of this Contract
- d) Pledge Agreement
- e) Form of Contract
- f) Technical Specifications
- g) Drawings

TERMS AND CONDITIONS OF THIS CONTRACT

TERMS AND CONDITIONS OF THIS CONTRACT

Section 1 General Information

1.1 Objective

The Objective of the Works are to Supply of Telemtering/Data Communication System which is necessary for the Irrigation Engineering Center Project Phase II.

1.2 Location of the site

The job sites are the Nakhon Sawan, Chao Phraya Dam, Bang Sai, Lop Buri, near memorial Bridge and RID samsen.

1.3 Collaboration

According to the objective of the technical cooperation, the counterpart agency of the JICA is executing several experiments around the job site. Prior to or during the course of the Works, the Contractor shall make the good relation with the RID for the satisfactory implementation of the Works as to secure full collaboration. Should it happen that the relation between the RID and the Contractor is disturbed, the Contractor shall inform the Supervisor who will conciliate the both parties.

Section 2 Submission of Notices

2.1 Work Schedule

The Contractor shall submit the Work Schedule before the commencement of the Works to the Supervisor. If the Contractor intends to change the Work schedule, the approval from the the Supervisor shall be obtained prior to the modification of the schedule.

Also the Contractor shall submit the machineries scheme including the numbers, kind of machineries and using period of them.

2.2 Notices

The JICA and the Contractor shall submit the notices to each other, as necessary, in accordance with Article 19 in this Contract within reasonable time except that special articles are provided in Terms and Conditions of this Contract.

Section 3 Field Test and Inspection

The field tests in accordance with the Technical Specifications and the demands from the Supervisor shall be the responsibility of the Contractor. The charges for such field test shall be included in the total amount of the construction cost, and the Contractor is not entitled to claim any amount of the field test charges.

Section 4 Modification of Plan

In case the JICA estimate the cost for the modification in accordance with Article(s) of the Contract and/or the Technical Specifications, and if there are two portions, one for the increase and the other for the decrease of the construction cost resulting from such modification, the JICA shall have the right to offset them in the payment and pay or claim the difference between the increase and decrease of the construction cost as the case may be.

Section 5 Release from the Works

After the final acceptance of the Works by the JICA, the Contractor shall remove its own temporary facilities, warehouses, construction roads, electric wiring, surplus material, debris and so forth which were provided by the Contractor within 10 (ten) days. Upon approval of the Supervisor for the removal of the above-mentioned facilities, the Contractor will be released from

its responsibility of the Works but remains responsible under 1 (one) year guarantee of the Works as specified in Article 11 in this Contract.

Section 6 General Obligations of the Contractor

6.1 Temporary Office and Residence

In case the Contractor intends to build the temporary office, residence and so forth, the Contractor shall submit the plan to the Supervisor for approval at least 10(ten) days in advance of the commencement of such works.

The Contractor is always required to keep the buildings and facilities in good condition and to make proper drainage and sanitary system. Should the Contractor build them outside of the job site, the Contractor shall arrange with the owner of the such land and at its own expense.

6.2 Fuel Storage

In area of temporary office and residence, the fuel tank capacity shall not exceed 1,000 liters and shall be far away from the housing area.

Fuel storage and transportation shall be done with care and shall have a good system of fire prevention. If storage licence is required, the Contractor shall arrange for obtaining it.

6.3 Other Facilities

All necessary facilities for the Works and the Contractor's convenience shall be provided and maintained in good condition by the Contractor.

Section 7 General Text

The Contractor shall implement the Works in accordance with the Contract Documents in broad sense such as the Contract in narrow sense, Terms and Conditions of this Contract, Technical Specifications. Should the events occur that the both parties can not reach agreement on the

interpretation of the above-mentioned Contract Documents in broad sense, both parties shall negotiate with sincerity and good faith for settlement of any disagreement, failing which the decision of the JICA shall prevail.

PLEDGE AGREEMENT

PLEDGE AGREEMENT

TO JAPAN INTERNATIONAL COOPERATION AGENCY, Date _____
Thailand Office

We _____, the Contractor hereby agree that all equipment, materials and supplies brought to the job site under this Contract made with the JICA dated on _____, shall be pledged by us with the JICA as security for our execution of Works, and shall not be removed at any time without prior approval of the JICA in writing.

We further agree that should there be any loss or damage to pledged equipment, materials and supplies kept at the job site, the JICA shall bear no responsibility whatsoever for such loss or damage.

FORM OF CONTRACT

**CONTRACT
ON
Supply for Telemetering / Data Communication System
for
The Irrigation Engineering Center Project Phase II
in
Thailand**

This Contract is executed on the (day)th day of (month), (year) at the Japan International Cooperation Agency, Thailand Office, in Thailand by Mr. Nobuji ABE, Resident Representative as its authorized representative of the Japan International Cooperation Agency, Thailand Office (hereinafter referred to as the "JICA") on the one part
and

(Name of Company) whose office is situated at (address) represented by (Name of representative) Nationality () Title () (hereinafter referred to as the "Contractor" on the other part.

Both parties mutually agree under the terms of the Contract as follows :-

Article 1. Purpose of the Contract and Contract Price

JICA agrees to employ the Contractor and the Contractor agrees to perform the works for the Supply for Telemetering / Data Communication System for the Irrigation Engineering Center Project Phase II, in Thailand (hereinafter referred to as the "Project") at Changwat Chai Nat, Changwat Lop Buri, Changwat Nakhon Sawan, Changwat Ayutthaya and Bangkok for the total amount of (word) Baht only (฿ figure) (hereinafter referred to the "Contract Price"). JICA shall take necessary measures except the Contractor's custom duty, internal tax and other fiscal level which may be imported to the Kingdom of Thailand which respect to supply of products, services and equipment necessary for works.

The following documents shall form an integral of the Contract :-

- Terms and Conditions of the Contract
- Pledge Agreement
- Technical Specifications
- Bill of Quantities
- Drawings

Article 2. Performance Bond

As a security for the faithful performance of the Works under this Contract, the contractor shall deposit a Performance Bond with JICA (words) Baht only (฿ figure) in a Bank Guarantee to be issued by the first class bank in the Thailand within fourteen (14) days after signing of this Contract. Bank issuing bank guarantee and form of bank guarantee are subject to approval of JICA.

JICA will return the Performance Bond to the Contractor at the 12 months after final acceptance of the works by JICA as stipulated in Article 15 of this Contract, provided that the completed works shall not show any defect or damage caused through the fault of the Contractor during the maintenance period as stipulated in article 11 of this Contract.

Should the Contractor be in default, JICA shall have the right to demand payment form all or any part of the Performance Bond, however, the Contractor's responsibility shall not be released in any case.

Article 3. Payment

Payment to the Contractor shall be of unit price basis as stipulated in the Bill of Quantities, however, payment to the Contractor will be made by the following manner :-

a) Advance Payment

Amount of (word) Baht only (฿ figure) which corresponds to thirty (30) percent of the Contract Price will be paid upon acceptance of Performance Bond by JICA. Required documents for advance payment are request letter for

payment and letter of guarantee as a Performance Bond issued by the approved bank by JICA.

b) Interim Payment

Amount of (words) Baht only (¥ figure) which corresponds to thirty (30) percent of Contract Price will be paid to the Contractor upon the shipping of all equipment from shipping port(s) and/or local factories in Thailand. Required documents for interim payment are the request letter for payment and one set of photo copy of shipping document for all importing equipment and shipping certificate by the local factory(s) in Thailand. This payment shall be made at once. Shipping documents shall consist of Clean-on-Board B/L, invoice, packing list and Insurance Policy.

c) Final Payment

The remainder of (words) Baht only (¥ figure) which corresponds to forty (40) percent of Contract Price will be paid upon the delivery of the works to JICA under this Contract. Required documents for the final payment are the request letter for payment, copy of acceptance certificate issued by JICA, and final Bill of Quantities approved by the Supervisor.

Final adjustment of Contract Price shall be made at final payment time in case of modification of works under the Article 14 of this Contract, however adjustment of Performance Bond is not necessary.

Article 4. Completion Time

The Contractor agrees to commence the works within fourteen (14) days from the date of signing of the Contract (commencement date) and the Contractor agrees to satisfactorily complete the works within 240 days (completion time) after the date hereof which will be on the (day)th day of (month), (year) (completion date).

If the Contractor fails to commence the works by the above commencement date, or should, in the course of the construction work, any event occur which may reasonably cause JICA to believe that the Contractor will not be able to complete the work by the completion date, or should the

Contractor fail to meet any of the Contract requirements, JICA shall have the right to terminate the Contract by giving written notice to the Contractor.

However, in case that the Contractor fails to complete the work by the completion date, or to meet any of the Contract's requirements, if the Supervisor judges that the Contractor has the ability to complete the work within a reasonable period of extension, the Contractor may be permitted by JICA to continue the work beyond the completion date but within the extended period.

Should the amount of extra or additional work of any kind or any cause of delay referred to in these conditions, or exceptional adverse climatic conditions, or any other special circumstances of any kind whatsoever which may occur, other than through a default of the Contractor, be such as fairly to entitle the Contractor to an extension of time for the completion of works, JICA and the Contractor shall hold mutual negotiation to determine the duration of such extension.

Article 5. Penalties

In case that the Contractor is in default as mentioned in Article 4, the Contractor agrees to be responsible to JICA as follows :-

5.1 In case of termination by default of commencement of the work, the Contractor shall pay a penalty of twenty thousand Baht (20,000.00 Baht) per day counting from the commencement date until a new Contract has been fully executed with a new Contractor for this work, the period of which includes the time spent finding a new Contractor and executing the new Contract, etc.

5.2 In case that JICA judges the Contractor will not be able to complete the work within the completion time and thereby terminates the Contract, the Contractor shall pay a penalty of twenty thousand Baht (20,000.00 Baht) per day counting the number of days in the same manner as prescribed in 5.1 above. However, JICA may reduce the number of days according to the ratio between the completed work and the total work as may be decided by the Supervisor.

5.3 In case that the Contractor fails to complete the work by the completion date or to meet any contract requirement, the Contractor shall pay a penalty of twenty thousand Baht (20,000.00 Baht) per day counting from the date following the completion date until the work is satisfactorily completed and accepted by the Supervisor.

Article 6. Compensation

If JICA sustains any loss through direct or indirect damages caused by the Contractor's failure, the Contractor shall compensate JICA for such losses. Both parties agree that time is essential for completion of the work.

Article 7. JICA's right for Default

JICA has the sole and absolute right to decide whether to terminate the Contract, to impose a penalty on the contractor or to claim compensation for damage as stated in Article 5 and Article 6. The money due to JICA exercising its right under this article shall be deducted from any money due to the Contractor but yet unpaid. If the total amount of the loss is larger than the money above-mentioned, the Contractor agrees that JICA has the right to retain the construction equipment, materials and supplies etc. and demand payment of the balance from such equipment, etc. or proceeds of sale thereof.

Article 8. Contractor's Responsibility on Termination of the Contract

After the Contract has been terminated in accordance with the foregoing Article 4, JICA shall have the right to employ another Contractor (hereinafter called the "New Contractor") to carry out the remaining work, and payment to the Contractor that has failed to complete the work shall be made out of the necessary Contract Price for the remaining work. Should the remaining amount after payment of the advance and interim payment from the Contract price insufficient to effect payment to the New Contractor, the difference between such remaining amount and the actual cost estimated by JICA for the satisfactory completion work carried out by the New Contractor shall be deemed as direct loss sustained by JICA, and the Contractor shall pay such difference to JICA within ten (10) days from the date of request by JICA, failing which interest at the rate of eighteen (18) percent per annum shall be charged thereon.

Article 9. Supervisor

The Supervisor, authorized to act on behalf of JICA, will be appointed by JICA and the Supervisor is entitled to do all things that JICA may do. The Supervisor shall control and supervise the work when necessary whether the work is in the preparation or implementation stage and the Contractor shall promptly furnish all necessary facilities for proper inspection of the work in accordance with the Supervisor's request. At any time the Supervisor can request the Contractor to stop the work, if necessary, and the Contractor shall have no claim on JICA for extension of the completion time due to such suspension of the work under this Article.

The supervision will not be deemed as the acceptance of the work, and the Contractor shall not be relieved from his responsibility to meet the Contract requirements by the fact that the Supervisor exercised its duties. Should it be found that the work has not been satisfactorily performed, the Contractor shall correct any part of the work indicated by the Supervisor within the period specified by the Supervisor.

Article 10. Prohibition of Equipment Removal

Should the Contractor fail to complete the work during the completion time or the Supervisor judges that the Contractor will not be able to satisfactorily complete the work, any equipment and materials brought to the site for use on the work shall not be removed without the prior approval of the Supervisor in writing.

Article 11. Rectification of Defective Construction Work

For a further period of one (1) year after satisfactory completion and final acceptance of the work by JICA, whether completed by the Contractor or by a new Contractor in case of termination of the Contract under Article 4, any damage to the work which is caused by the Contractor, either because of defective workmanship or the use of inferior materials, shall be made good as necessary by the Contractor to the satisfaction of JICA at no extra cost.

In case of the termination of the Contract, JICA may request the Contractor to make good the damaged work as the Contractor's responsibility. Should the Contractor fail to do so within the period specified after receipt of

the written request from JICA, JICA shall have the right to employ another Contractor to carry out such work and the Contractor agrees to pay all expensed incurred.

Article 12. Discrepancies among the Contract Documents

If, prior to or during the course of the work, any discrepancies are found in the Drawings and / or the Technical Specification etc. attached to the Contract, the Contractor shall follow the ruling given by the Supervisor at no additional cost to JICA.

Article 13. Construction Method and Temporary Work

The construction method including implementation schedule and plan of the temporary work such as installation of temporary facilities, offices, warehouses, etc. shall be submitted by the Contractor and approved by the Supervisor within 14 (fourteen) days after signing of Contract.

Should the cost of the above temporary work be included in the cost of each work item in the Bill of Quantities in this Contract, the Contractor shall not entitle to claim any amount of charges for the temporary work.

Article 14. Modifications of Plans

If the Supervisor finds it necessary to make modifications of construction design, quantities and / or materials and so forth during the course of construction, JICA has the right to order the modification of the work, to the Contractor, and such orders shall be made in writing from the Supervisor to the Contractor.

JICA agrees to adjust upwards or downwards the necessary expense for such modification to the Contractor, which will be estimated by the unit price plus indirect costs in the Bill of Quantities of the Contract in case of modification of quantities of construction work. In the case of additional work which is not quoted by unit price in the Bill of Quantities of the Contract, the Supervisor will make estimation thereof and JICA will pay the Contractor for such additional work accordingly. But if the Contractor does not agree to such an estimation, the Contractor is then entitled to negotiate with JICA. Also the extension of the completion time due to any modification shall be given by JICA

who shall negotiate with the Contractor to decide the number of days of such an extension for additional modifications.

Article 15. Acceptance of the Work

When the entire work has been completed, the Contractor shall submit an invoice in written form indicating the work actually completed to the Supervisor. If the work is in compliance with the Drawings and Technical Specifications, JICA shall accept the work as the final acceptance of satisfactory completion of the work within fourteen (14) days after the receipt of the written form and it shall be deemed that the final acceptance has been made on such date of the receipt of the written form.

On the other hand, should there be noncompliance with the Drawings or Technical Specifications, or defects be found in the work executed by the Contractor, the Supervisor will have the right not to accept the work and to order rectification of the work. If the required period for the rectification of the defects is beyond the completion date, the Contractor shall not be relieved from its responsibility to pay the penalty as stipulated under Clause 5.3, and after the completion of rectification of the work, then the final acceptance will be made in the same manner as described in the first paragraph of this Article.

During the course of construction, whether in the completion time or extended time specified in the third paragraph of Article 4, JICA has the right to accept a part of the work already completed in written form which shall be considered as a part of final acceptance. However, both parties shall negotiate with each other for the maintenance and usage of the accepted part of the work.

Article 16. Site Engineer

The Contractor shall appoint a site engineer at its own expense for the supervision of the work performance, who shall be authorized to act on behalf of the Contractor, and the instructions given to him shall be deemed as given to the Contractor. The site engineer shall stay at the job site during the construction work and he shall not be transferred without obtaining the prior approval of the Supervisor. If the Contractor replaces the site engineer, the Contractor shall obtain prior approval from the Supervisor in writing.

Article 17. Replacement of Labour, Engineers and Foremen

The Supervisor may request the Contractor to remove any of the Contractor's laborers, foremen or engineers if it appears to the Supervisor that such laborers, foremen or engineers are incompetent in their work or are not suitable or are not capable of handling their workmen or staff, and the Contractor shall promptly replace any such laborers, foremen or engineers. No extra cost or claim for extension of time will be allowed because of such replacements.

Article 18. Sub-Contractor

The Contractor shall not sub-contract or assign any portion of the work under the Contract without obtaining the prior approval of JICA who has the sole right to decide which parts of the work may be sub-contracted or assigned to a Sub-Contractor. However, the Contractor shall be fully responsible for the work done by the Sub-Contractor.

Article 19. Notice

All notices required by the Contract shall be effective only at the time of receipt thereof, and only when received by the parties concerned at the following address :-

JICA Thailand Office.
1674 / 1 New Petchburi Road, Bangkok

The Contractor

All notices required by the terms of the Contract shall be made in writing in English and delivered by registered mail or hand.

Article 20.

Disagreements

In the event of any disagreements arising from the interpretation and performance of the terms of the Contract, both parties agree to make a sincere attempt in good faith to negotiate and amicably settle any such dispute, failing which the parties agree to refer such dispute to arbitration under Thai Commercial Arbitration Rules and Regulations, Bangkok, by two (2) arbitrators, one of each to be appointed by each party. If either party fails to appoint its arbitrator within seven (7) days or should the arbitrator fail, within fifteen (15) days after their appointment, to come to a decision resolving the dispute or no decision is reached on the appointment of an arbitrator, then the dispute shall be brought before the Court of Thailand and a decision reached under the laws and procedures of the Kingdom of Thailand.

Article 21.

Force Majeure

In case where serious damage occurs to the completed part of the work, or the materials, tools, etc., that are already carried into the site of the construction, the Contractor shall promptly inform JICA of the circumstances. If such damage is caused by force majeure such as natural calamity, a civil war, a war, an epidemic or general trade strike, rioting or other unavoidable reason, the occurrence of which no responsibility can be attributed to either JICA and the Contractor.

The Conclusion of the Contract

This Contract is executed in duplicate of the same tenor, one of the original copies, to be kept by JICA and the other to be kept by the Contractor. Both JICA and the Contractor have set their signatures and affixed the seals thereto in the presence of a witness.

Bangkok : _____

JICA

THE CONTRACTOR

Mr. Nobuji ABE
Resident Representative,
JICA, THAILAND OFFICE

WITNESS

TECHNICAL SPECIFICATION

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SECTION 1. INTRODUCTION

- 1.1 The Japan International Cooperation Agency, Thailand office (hereinafter called as JICA) intends to establish a telemeter/data communication system for the Irrigation Engineering Center Project Phase II in Thailand in order to contribute the development of the water management by the Irrigation Engineering Center (hereinafter called as IEC)
- 1.2 This document stipulates the design, supply, delivery and installation of the telemeter/data communication system including adjustment and testing of equipment as well as the necessary engineering services.
- 1.3 The bid proposal shall also include the provision of training and supply of measuring equipment, tools, spare units, spare parts, etc. required for operation and maintenance. However, the Bidder shall not be responsible for land adjustment of site, construction of building, equipment shed and sensor housing (pit and protection pipe) nor civil works associated with the project except for underground cable laying at Chai Nat Gauging Station.
- 1.4 In spite of the preference of the JICA's choice as stated in this document, the bidders are invited to offer any alternative arrangements conforming to the standards of performance and requirements described in this document. The Bidder are, however, requested to offer a prime proposal which will meet the requirement of this document.

SECTION 2. PROJECT INFORMATION

2.1 GENERAL SYSTEM DESCRIPTION

2.1.1 General

- (1) The system is composed of four (4) transmission lines, a master station, four (4) gauging stations and three (3) data entry offices.
- (2) Two leased lines are furnished by the Telephone Organization of Thailand (hereinafter called as TOT) as the transmission lines of this system (refer to Fig. 2-1).
The bandwidth of leased line is 0.3 to 3.4 KHz.
- (3) The overall system configuration is illustrated in Fig. 2-2.
- (4) The location of master station, gauging stations and data entry offices are shown in Fig. 2-3 to Fig. 2-7, and those address are given below.
 - a) Master Station (Irrigation Engineering Center)
Amphoe Dusit, Changwat Bangkok.
 - b) Gauging Station
 - Nakhon Sawan
Tambon Nakhon Sawan, Amphoe Muang, Changwat Nakhon Sawan 60000
 - Chai Nat
Tambon Bangluang, Amphoe Sapphaya, Chaingwat Chai Nat 17150
 - Bang Sai Gauging Stations:
Tambon Bang Sai, Amphoe Bang Sai,
Changwat Phranakhon Si Ayuttaya 13190

- Memorial Bridge Gauging Station:
Tambon Thon Buri, Amphoe Thon Buri, Changwat
Bangkok 10600

c) Data Entry Office

- Regional Irrigation Office VII (Chai Nat)
Same as Chai Nat Gauging Station
- Central Hydrology Office (Chai Nat)
Same as Chai Nat Gauging Station
- Regional Irrigation Office VIII (Lop Buri)
Amphoe Muang, Changwat Lop Buri

2.1.2 Function of Telemeter/Data Communication System

The telemeter/data communication system shall have the function that the observed data and collected data are sent from the gauging stations and the data entry offices respectively to the master station through the leased lines by the following manner.

- a) To send the observed data periodically at the time manually set up.
- b) To send the observed data in sequence with an adequate time interval.
- c) To send the observed data at any time by means of remote control from the master station.
- d) To send the collected data by Regional Irrigation Office VII and Central Hydrology Office during the idle time of the leased line between Nakhon Sawan gauging station and the Master Station.
- e) To send the collected data by Regional Irrigation Office VIII through the leased line.

- f) To record and display the observed data mentioned above to a personal computer placed at the master station.

2.1.3 Sites, Buildings and Equipment Sheds

The details of the sites, buildings and equipment sheds are described below:

(1) Master Station

The master station is established at the second floor of Irrigation Engineering Center. The floor layout of second story and the room allocated to the master station are shown in Fig. 2-8 and Fig. 2-9.

(2) Nakhon Sawan Gauging Station

The site layout and the equipment sheds are shown in Fig. 2-10 and Fig. 2-11.

(3) Chai Nat Gauging Station, Regional Irrigation Office VII and Central Hydrology Office.

- a) The site layout is shown in Fig. 2-12.
- b) Two equipment sheds are newly constructed to accommodate the equipment required to the telemeter system (ref. to Fig. 2-13).
- c) A room is provided to accommodate the telemetry and data communication equipment at the second floor of new building of Regional Irrigation Office VII (Refer to Fig. 2-14).
- d) Sensor for pressure water level gauge shall be put up the point shown in Fig. 2-12. Required pipe housing is installed by another contract (refer to Fig. 2-15).

- e) All the handholds required to lay down under ground cable are constructed by another contract (refer to Fig. 2-15).
- f) A room is provided to accommodate the equipment for data communication at Central Hydrology Office (refer to Fig. 2-16).

(4) Bang Sai Gauging Station

The site layout and equipment shed are shown in Fig. 2-17 and Fig. 2-18.

(5) Memorial Bridge Gauging Station

The site layout and equipment shed are shown in Fig. 2-19.

(6) Regional Irrigation Office VIII

A room is provided to accommodate the equipment for data communication at the ground floor of Regional Irrigation Office (refer to Fig. 2-20).

2.1.4 Existing Facility to be Utilized

(1) Nakhon Sawan Gauging Station

The existing pit shall be utilized to put up a floating water level gauge to be supplied under the contract.

(2) Chai Nat Gauging Station

The existing floating water level gauge (with recorder) located at the upper stream of Chao Phraya dam shall be utilized to this telemeter system (refer to Fig. 2-12).

(3) Central Hydrology Office

The existing telephone cable between Regional Irrigation Office VIII and Central Hydrology Office shall be used for the data communication from Central Hydrology Office.

(4) Memorial Bridge Gauging Station

The existing pit shall be utilized to put up a floating water level gauge to be supplied under the contract.

2.1.5 System Maintenance and Operation

The maintenance philosophy which has been developed for this system is basically as follows:

- (1) The system shall be remotely supervised and controlled by the master station.
- (2) Periodical inspection and repair work for defective units and parts of all the gauging stations are to be carried out by maintenance personnel.
- (3) Measuring equipment and spare units/parts needed for repair work will be provided to the master station.
- (4) If faulty units are found in a gauging station, they shall be replaced with spare ones and the system shall be restored to the normal operation.

2.1.6 Other Information

- (1) The existing floating water level gauge shall be removed, however existing Telemark system shall be kept under present status at Nakhon Sawan and Memorial Bridge gauging stations.
- (2) A.C. commercial power (220V, 1 ϕ , 60 Hz) is available at all the station and data entry offices, however provision of switch box,

circuit breaker, etc. are required at Nakhon Sawan, Bang Sai and Memorial Bridge gauging stations.

- (3) The leased line are led in the inside of equipment shed or data communication room.

2.2 SCOPE OF PROJECT

2.2.1 Required Work

The scope of project of the Contract to this Bid shall include the following:

- (1) Detailed design
- (2) Supply and delivery to each site of all necessary equipment and materials for the system.
- (3) Installation of equipment and instruments.
- (4) Acceptance testing of the system.
- (5) Training of the IEC staff who will take part in the system operation and maintenance.

2.2.2 Equipment to be Provided

Equipment to be provided within the Bid shall cover the following:

- (1) Master Station
 - a) Telemeter/Data Communication Equipment : 1 set
 - b) Personal Computer with Printer and MODEM : 1 set
 - c) D.C. Power Supply Equipment : 1 set
 - d) Measuring Equipment and Tools : 1 lot
 - e) Spare Units and Parts : 1 lot

- (2) Nakhon Sawan Gauging Station
- a) Floating Water Level Gauge with Recorder : 1 set
 - b) Rainfall Gauge with Recorder : 1 set
 - c) Telemeter Equipment including its Ancillary Equipment : 1 set
 - d) D.C. Power Supply Equipment : 1 set
- (3) Chai Nat Gauging Station and Regional Irrigation Office VII
- a) Pressure Water Level Gauge with Recorder : 1 set
 - b) Rainfall Gauge with Recorder : 1 set
 - c) Analog/Digital Converter : 1 set
(for existing floating water level gauge)
 - d) Telemeter/Data Communication : 1 set
Equipment including its Ancillary Equipment
 - e) D.C. Power Supply Equipment : 1 set
- (4) Bang Sai Gauging Station
- a) Floating Water Level Gauge with Recorder : 1 set
 - b) Rainfall Gauge with Recorder : 1 set
 - c) Telemeter Equipment including its Ancillary Equipment : 1 set
 - d) D.C. Power Supply Equipment : 1 set
- (5) Memorial Bridge Gauging Station
- a) Floating Water Level Gauge with Recorder : 1 set
 - b) Rainfall Gauge with Recorder : 1 set
 - c) Telemeter Equipment including its Ancillary Equipment : 1 set
 - d) D.C. Power Supply Equipment : 1 set
- (6) Central Hydrology Office
- Operation Console : 1 set

- (7) Regional Irrigation Office VIII
Connector for MODEM : 1 pc.

(8) Spare Units and Parts

The Bidder shall submit the proposal for spare units and parts specified hereunder.

- a) Replacement units and parts for one (1) year of operation and maintenance.
- b) Consumable materials for one (1) year of operation.
- c) Unit prices of these units and parts shall be given in the Bid.

2.2.3 Installation of Equipment

- (1) All the equipment and instruments shall be installed in accordance with the system configuration shown in Fig. 2-21 to Fig. 2-24 and plan.
- (2) Necessary materials for the installation of equipment and instruments shall be supplied by the Contractor.

2.2.4 Acceptance Testing

- (1) Acceptance of the whole or part of the system shall take place when the Contractor and the Supervisor agree in writing that:
 - a) The installed system or equipment complies with the technical stipulations of the specifications.
 - b) The installation work has been completed and the system is suitable for operation.
 - c) Spare units/parts, measuring equipment and tools have been supplied.

- d) All instruction handbooks and other information including as-built drawings have been furnished.
 - e) All the training schedule for the personnel of the IEC have been completed.
- (2) The acceptance testing shall be carried out in the presence of the Supervisor. The Supervisor may, at his discretion, reject the whole or any part of the equipment or materials which in his opinion, does not comply with the forms of the Contract.
- (3) The Contractor is allowed to use measuring equipment for the field tests and the acceptance testing, however, they shall be delivered to the Supervisor after repairing any defect in performance and finishing. Any measuring equipment and tools which are necessary for the field tests and the acceptance tests but not to be delivered nor to be sufficient in quantity shall be brought to the Thailand at the Contractor's own expense:
- (4) In-station tests shall be carried out after the completion of the installation work. However, the Contractor may propose to perform a part or all of the in-station tests before the completion of the whole installation work.

In-station tests shall cover the following items at least.

- a) Mechanical check:
Dimension, finishing (painting, galvanizing, etc.), fixing
- b) Indication check
- c) Meter reading
- d) Installation workmanship
- e) Overall functional test within a station
- f) Operation test
- g) Insulation resistance for rectifier

- (5) System tests shall be carried out after the completing of all the in-station tests. The system tests shall cover the following items at least.

- a) Overall functional test
- b) Operation test and level setting

2.2.5 Training Service

- (1) The Contractor shall carry out the training of the IEC's personnel who are to be engaged in operation, maintenance and supervision of the system to be delivered in accordance with the undermentioned prescriptions.

The Bidder shall submit his training program.

- (2) Training Course and Place

The training shall be executed at the places and for the courses as follows:

<u>Course</u>	<u>Place</u>
Class room training	IEC in Bangkok
On-the-job training	IEC in Bangkok and Regional Office VII (Chai Nat)

- (3) Training Period and Number of Trainees

The training service shall be carried out by the Site engineer and his staff for ten (10) personnels by five (5) days in English language.

- (4) Training Items

The training items shall include the followings:

- a) Introduction of telemeter system
- b) Equipment and gauging instrument details

- c) Adjustment, test and trouble shooting of equipment and gauging instrument.
- d) Operation, adjustment, test and trouble shooting of the system.
- e) Maintenance and management of the equipment, gauging instrument and system.

(5) Text for Training

The Contractor shall supply all the texts to be used for training, each in five (5) copies, to IEC in Bangkok, in addition to those to be delivered to trainees.

(6) Cost Estimate

The Bidder shall submit training cost estimates stating the cost for the following:

- a) Remuneration for instructor
- b) Lodging expenses for instructor
- c) Cost of texts
- d) Miscellaneous

2.2.6 Information to be Supplied

- (1) All the information to be supplied by the Contractor shall be delivered a part of the Contract without additional charge.
- (2) A detailed plant-manufacturing, delivery and installation program chart showing the time of design and the time of orders made for materials required for manufacture, delivery, installation, adjustments and testing.
- (3) The Contractor shall supply five (5) sets of Equipment Instruction Handbooks for each equipment ordered. These handbooks shall contain the following details:

- a) Comprehensive index.
- b) Explanation of symbols, abbreviations and terminologies.
- c) General description of each equipment and gauging instruments.
- d) Details of electrical performances and operating condition.
- e) Description of mechanical construction of equipment and gauging instruments including size and weight thereof.
- f) Schematic block and circuit diagrams with their complete part list of equipment and units thereof.
- g) Step-by-step procedures of operation, testing, alignment and routine maintenance of thereof, and the list of test equipment to be employed.
- h) Cause of troubles and their phenomena.
- i) Functional description of telemetering / data communication equipment.

SECTION 3. TECHNICAL SPECIFICATION

3.1. GENERAL

- (1) All the equipment and gauging instruments offered shall be stable in operation for a long continuous period of time.
- (2) All the equipment and gauging instruments shall be solid mechanically and shall be able to withstand shocks and vibrations during transportation, loading and unloading.
- (3) Emphasis shall be placed on the need for components and equipment to withstand tropical conditions without deterioration.
- (4) All steelwork and fitting used in the work, except that used in the concrete foundation and handhole, shall be galvanized by the hot dip process (applicable for outdoor facilities only).
- (5) At all gauging stations, proper arrangement shall be made to protect the equipment from damage due to thunderbolt.

3.2. GAUGING INSTRUMENT

3.2.1. General

All the gauging instruments shall meet the requirements in the specifications under the following conditions.

- a) Temperature range of 10°C to 40°C
- b) Relative humidity of up to 95%

3.2.2 Water Level Gauge

(1) Floating Water Level Gauge

The floating water level gauge shall be Suiken-62 Model and associated with an analog/digital converter and a long term recorder.

The floating water level gauge shall conform to the followings:

a) Composition

- Long term recorder with pulley : 1 set
- Vinyl chloride float (250 mm ϕ) : 1 piece
- Stainless steel wire (15 m) : 1 piece
- Wire clip : 2 pieces
- Counter weight (1 kg) : 1 piece
- Recording paper : 4 roles
- Recording per (red and green) : 4 pieces cash
- Dry cell (1.5 V) : 1 piece

b) Recording System

- 10 m/0 - 10 m by course pen (green)
- 100 cm reverse by fine pen (red)

c) Accuracy : 0.1 %

d) Drum rotation : 90 days - 6mm/hour

e) Power source : 1 dry cell

(2) Pressure water Level Gauge

Proposed pressure water level gauge shall employ crystal quartz as the sensor and associate with a sensor cable, analog/digital converter and long term recorders.

The pressure water level gauge shall conform to the followings:

- a) Sensor
 - Measuring range : 20 m
 - Accuracy : 0.05% FS
 - Temperature null shift : $\pm 0.02\%$ FS/ $^{\circ}\text{C}$
 - Temperature span shift : $\pm 0.02\%$ FS/ $^{\circ}\text{C}$
 - Over load : 120% FS
- b) Analog/Digital Converter
 - Digital output : BCD 4 digit add number
 - Analog output : 0 ~ 10V or 20 mA
- c) Sensor Cable
 - Length : 50 m
- d) Long Term Recorder

The same specification for floating water level gauge shall be applied.

3.2.3. Rainfall Gauge

Proposed rainfall gauge shall be tipping bucket type with a long term recorder and shall conform to the followings:

- a) Tipping Bucket Rainfall Gauge
 - Orifice : 200 mm ϕ
 - Tilting volume : 1 mm
 - Switching time : 0.1 ~ 0.15 sec.
- b) Long Term Recorder
 - Drum rotation : 6 mm/hour
 - Power source : Dry cell

3.3 TELEMETER/DATA COMMUNICATION SYSTEM

3.3.1 General

(1) All the equipment composed of the system shall meet the requirements in the specifications under the following conditions.

- a) Temperature range of 10°C to 40°C
- b) Relative humidity of up to 95%

(2) The Following Data shall be the Object of This System

- a) From Nakhon Sawan, Bang Sai and Memorial Bridge Gauging Stations:
 - One water level
 - One rainfall
- b) From Chai Nat Gauging Station
 - Two water levels
 - One rainfall
- c) From Three Data Entry Offices
 - Various information concerning water management

(3) All the equipments except personal computer shall conform to the following:

- a) Input and output level are adjustable with the range of 0 to -30dBm
- b) Input and output impedance are 600Ω

3.3.2 Telemeter/Data Communication Equipment

(1) Telemeter Equipment for Nakhon Sanwan, Bang Sai and Memorial Bridge Gauging Stations

- a) The equipment shall operate by D.C. power source.
- b) All the units and panels composed of the equipment shall be able to insert and remove at the front of the equipment.
- c) The equipment shall be able to check and adjust at the front of the equipment.
- d) The equipment shall have the function to prevent abnormal operation such as transmitting data irregularly.
- c) The equipment shall have the function to communicate with the engineering staff of master station by telephone handset.

(2) Telemeter/Data Communication Equipment for Chai Nat Gauging Station

- a) The equipment shall operate by D.C. power source and shall have the same functions stated in the previous paraph.
- b) The equipment shall have the function to send data incorporate with a personal computer (refer to Fig. 2-24). The interface condition shall be RS-232C.
- c) A branching circuit for Central Hydrology Office shall be provided to the equipment as shown in Fig. 2-24.
- d) The equipment shall have the following functions to indicate the status of leased line whether it is being occupied or not.

(3) Telemeter/Data Communication Equipment for Master Station

- a) The equipment shall operate by D.C. power source.

- b) All the units and panels composed of the equipment shall be able to insert and remove at the front of the equipment.
- c) The equipment shall be able to check and adjust at the front of the equipment.
- d) The equipment shall have the following functions.
 - To supervise all the gauging stations.
 - To set up the time for periodic data transmission as 1 hour, 2 hours or 3 hours.
 - To communicate with the person stationed at all the gauging stations and data entry offices by telephone handset.
 - To lock out the above-mentioned communication by 5 minutes before starting of periodic data transmission automatically and by manual operation at any time.
 - To collect the observed data from any gauging station by means of manual operation.
 - To provide audible and visual alarms when trouble breaks out at any telemeter equipment and telemeter/data communication equipment.
 - To indicate the real-time data sent from the gauging stations automatically on the display of computer.
 - To indicate the status of the system mentioned above by visual elements.
- f) All the received data shall be kept recorded to floppy diskettes through a personal computer.

(4) Operation Console

- a) The operation console shall operate by A.C. commercial power (220V, 60 Hz)
- b) The operation console shall have the following functions.
 - To send data incorporate with a personal computer. The interface condition shall be RS-232C.

- To communicate with the person stationed at the master station by telephone handset.
- To indicate the status of leased line whether it is being occupied or not.

(5) Personal Computer

Proposed personal computer shall be compatible with the products by IBM and shall operate by A.C. commercial power (220 V, 60 Hz).

3.3.3. D.C. Power Supply Equipment

- (1) The power supply equipment shall be the floating charge type and comprise a rectifier and a alkaline storage battery.
- (2) A lightning arrester shall be provided to prevent damage to the telemeter/data communication equipment by lightning surges.
- (3) The capacity of storage battery shall be sufficient for supplying power to the telemeter/data communication equipment under the following condition.
 - a) Interval of data transmission : One hour
(Water level and rainfall only)
 - b) Duration of commercial power : 24 hours
interruption
- (4) Built in meter shall be provided to facilitate normal operation and maintenance.
- (5) Noise voltage shall not exceed the value of 5 mV.

3.3.4. Measuring Equipment and Tools

- (1) The Contractor shall provide measuring equipment and tools required for routine maintenance and fault correction of the delivered facilities.
- (2) Those items of measuring equipment, which may have to be transported to gauging stations for routine maintenance, testing or repair purposes, should be preferably supplied in a shock-cushoining carrying case.
- (3) All impedances and levels of the measuring equipment shall match those of the equipment to be tested.
- (4) Measuring equipment shall include all necessary cords, patches, attenuators, connectors, test probes and accessories required to carry out all the tests.

3.4 INSTALLATION WORK

3.4.1 Scope of Services

The scope of installation work is as follows:

- (1) Installation, adjustment and testing of gauging instruments, telemetry equipment and power supply equipment, as well as laying of cable.
- (2) Provision of all necessary materials and transportation of all the equipment, instruments and materials.

3.4.2 Workmanship and Submission of Photographs

- (1) Installation work shall be carried out in conformity with the standard practices authorized by the administration concerned of the Contractor's country.
- (2) For the part of Work that remains covert and invisible when the Work completed, e.g., the laying of underground conduit pipe and the handhole, the Contractor shall take photographs that serve as ample proof to the workmanship achieved and submit such photographs to the Supervisor.

3.4.3 Transportation of Equipment, Instruments and Materials

The Contractor shall be responsible to transport the equipment, instruments and materials safely to the site where they are to be delivered.

3.4.4 Delivery and Storage of Equipment, Instruments and Materials

- (1) The Contractor shall be responsible for loading and unloading as well as handling of equipment, instruments and materials at all stages up to the handing over the system to the JICA.
- (2) The Contractor shall also be responsible for unpacking, identification and checking of equipment, instruments and materials, and relevant invoices or other documents.
- (3) The handling and storage of any equipment, instruments, etc. during the installation work shall be at the risk of the Contractor.

3.4.5 Cleaning of Site

The Contractor shall keep the work and storage areas clean and tidy and shall remove daily all combustible rubbish from inside of building and equipment shed.

3.4.6 Repair of Damage

The Contractor shall make good, to the satisfaction of the IEC and at his own expenses, all damages to buildings, equipment sheds, plants, etc., caused by himself and his employees during the installation work.

3.4.7 Equipment and Instrument Layout

- (1) The Bidder shall submit his Bid a set of drawings showing the equipment and instrument layout which he would recommend for each site.
- (2) The Bidder's recommendation shall include:
 - a) The arrangement of equipment and instruments within each building and equipment shed.
 - b) Weiring and cabling arrangements.
- (3) The Contractor shall install the equipment and instruments at each site in accordance with the agreed layout.

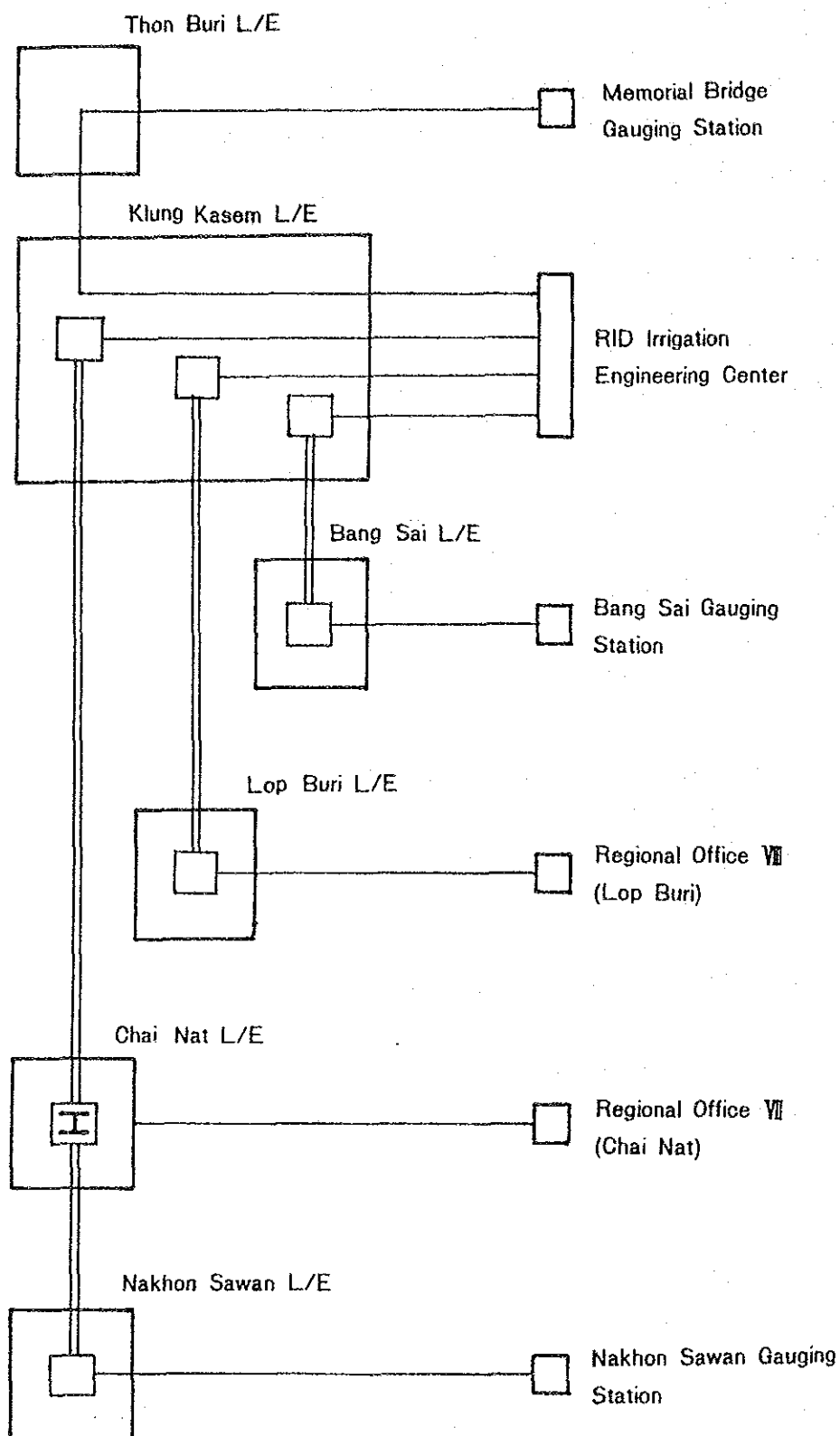


FIG. 2 - 1

LEASED LINE FOR TELEMETER/DATA
COMMUNICATION SYSTEM

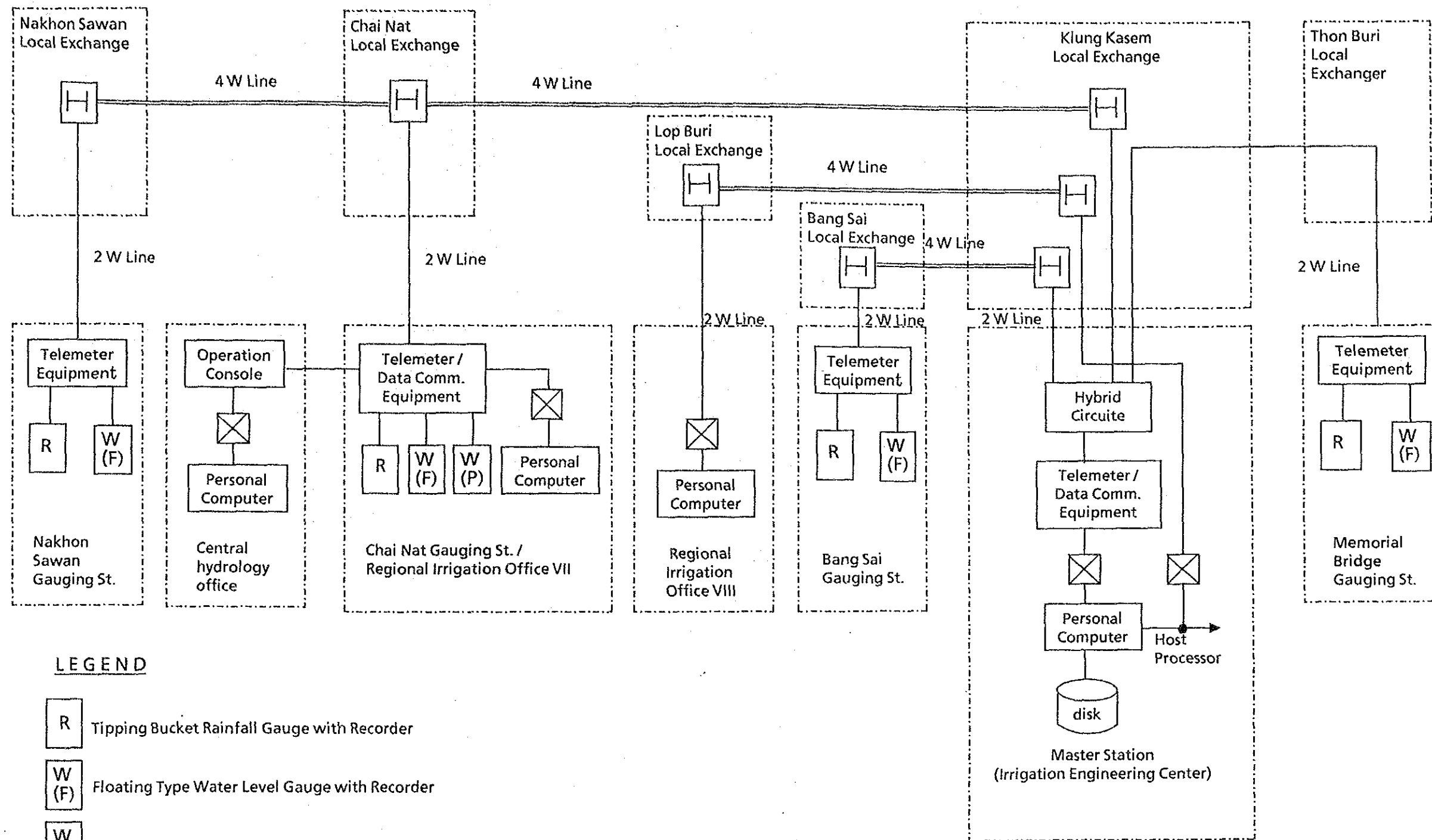
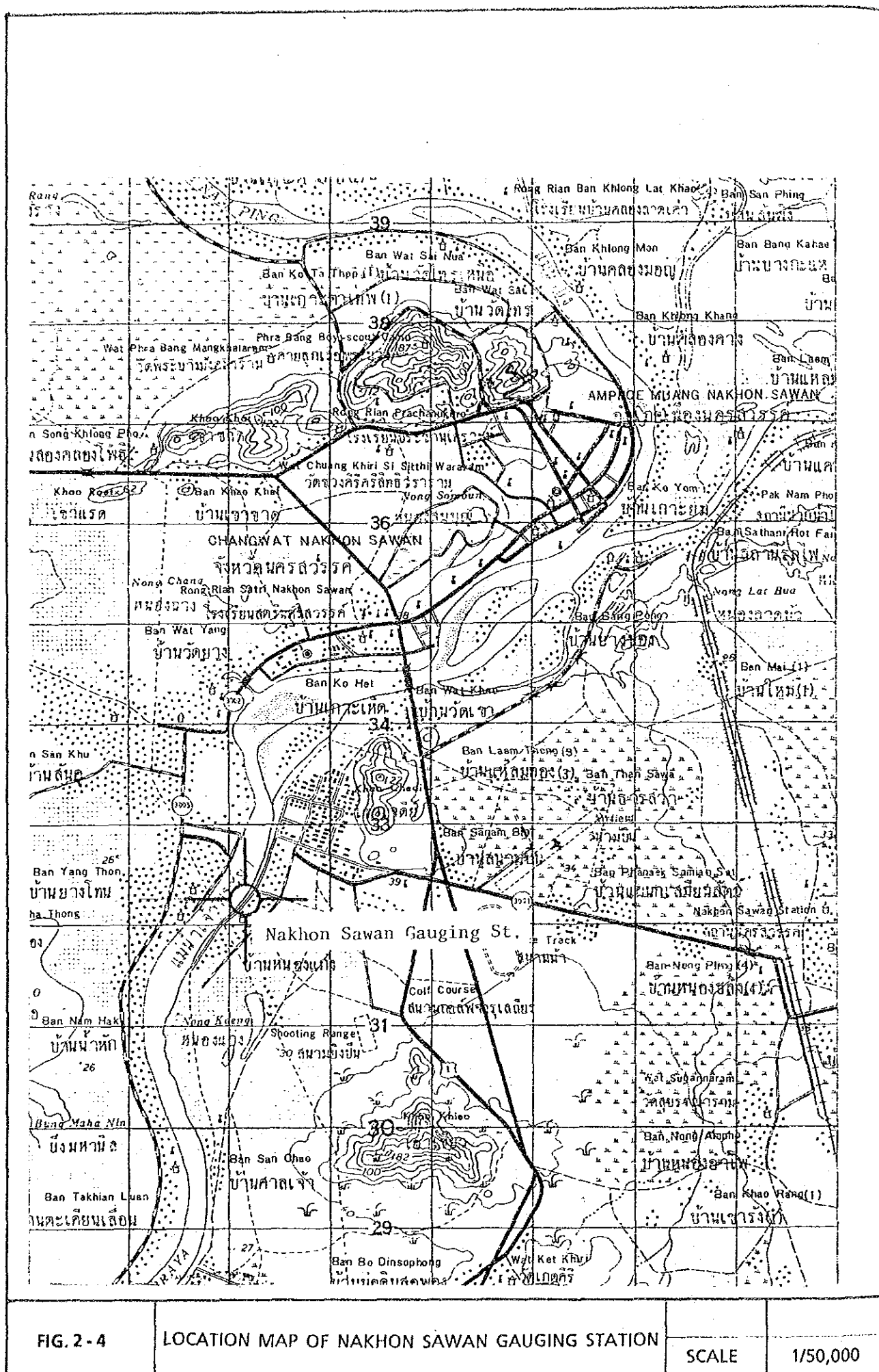


FIG. 2 - 2

OVERALL SYSTEM CONFIGURATION FOR
TELEMETER/DATA COMMUNICATION



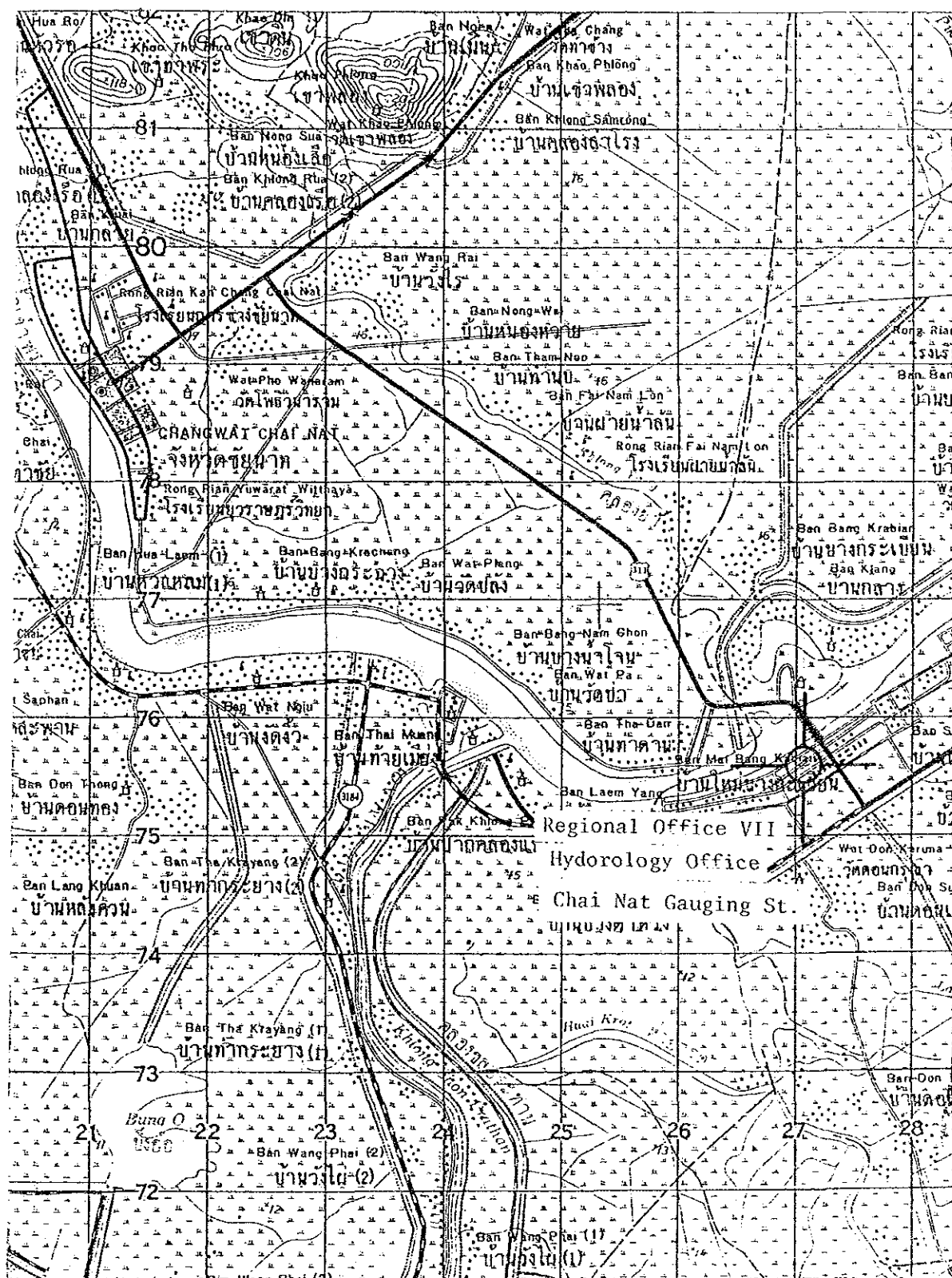


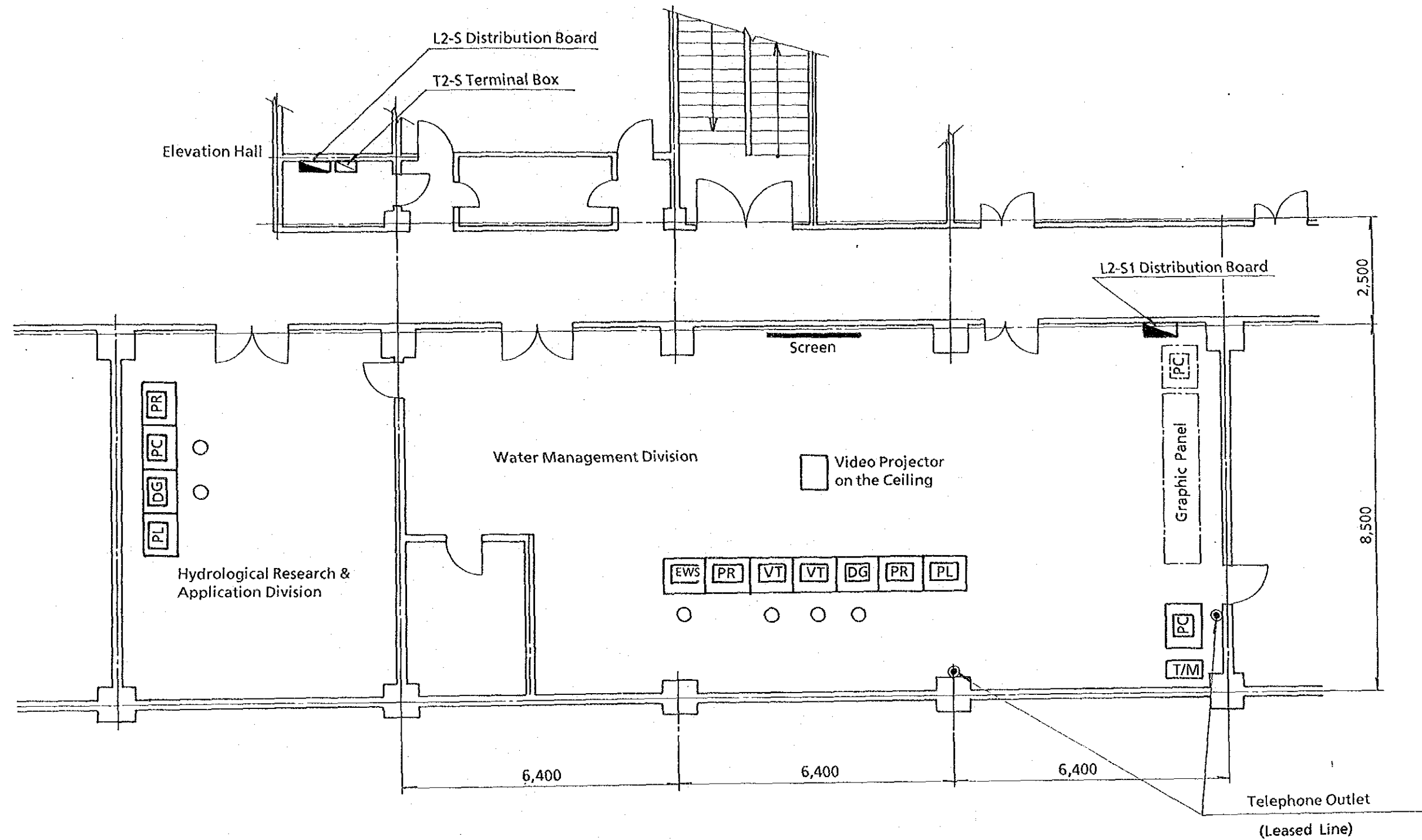
FIG. 2 - 5

LOCATION MAP OF CHAI NAT GAUGING STATION

SCALE

1/50,000

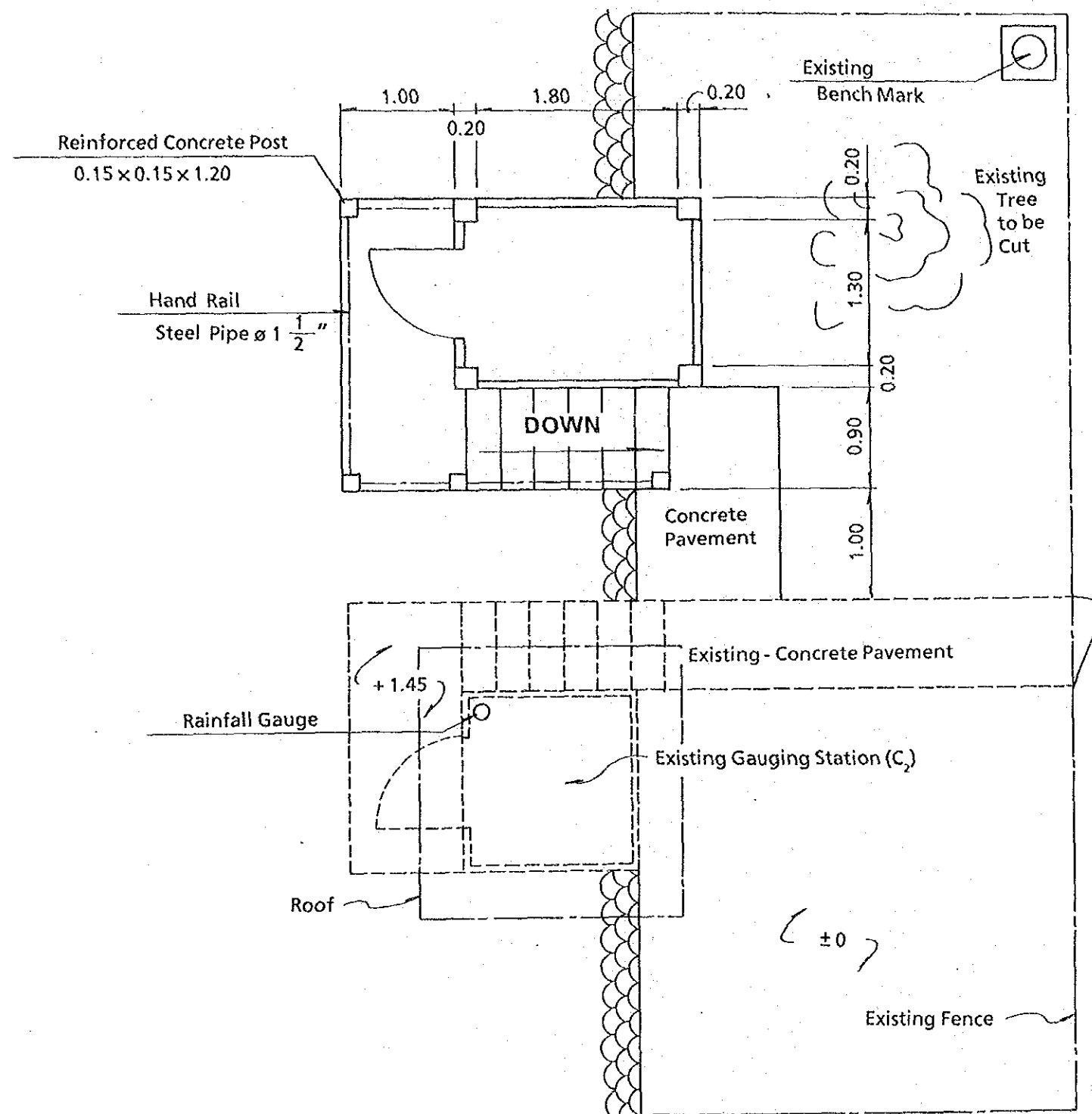
1/50,000



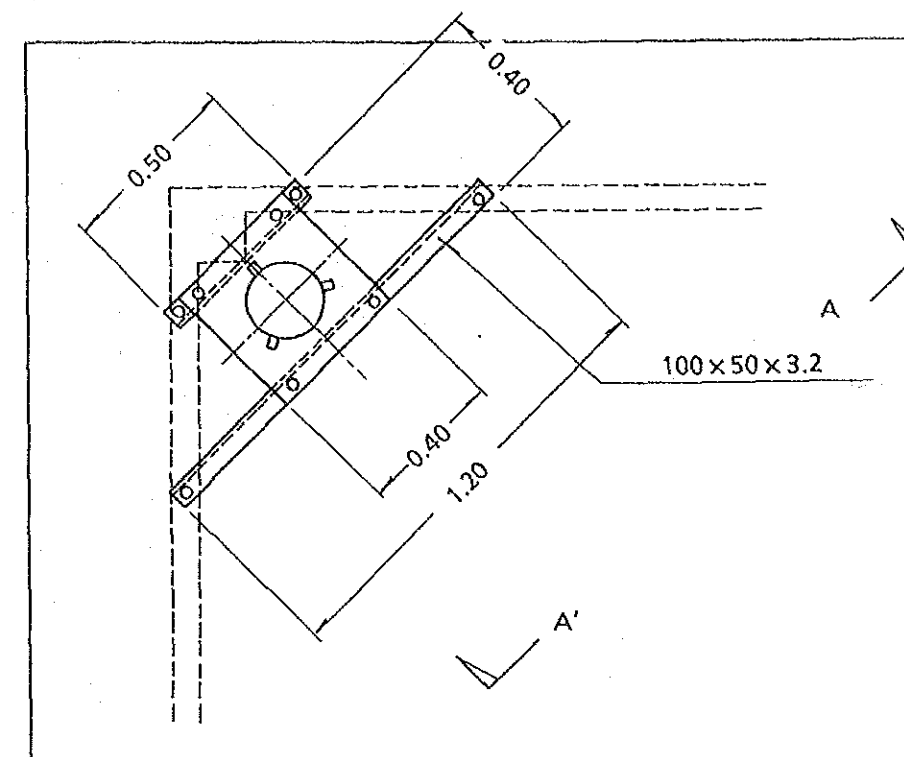
LEGEND

EWS	ENGINEERING WORK STATION
PR	PRINTER
VT	TERMINAL
DG	DIGITAL PRINTER
PL	PLOTTER
T/M	TELEMETERING / DATA COMMUNICATION EQUIPMENT

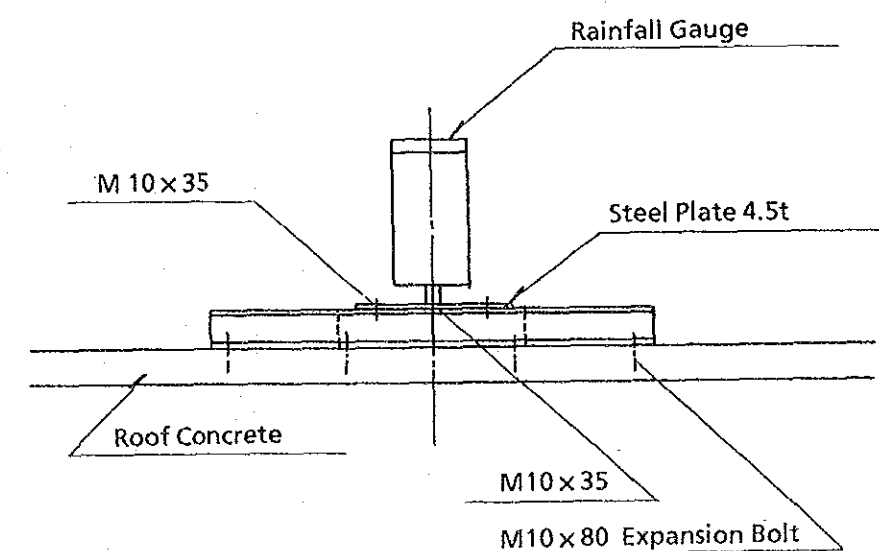
FIG. 2 - 9	UNIT	MILLIMETER
	SCALE	1/100
TELEMETER/DATA COMMUNICATION ROOM IN IEC		
JAPAN INTERNATIONAL COOPERATION AGENCY		



LAYOUT OF NAKHON SAWAN GAUGING STATION

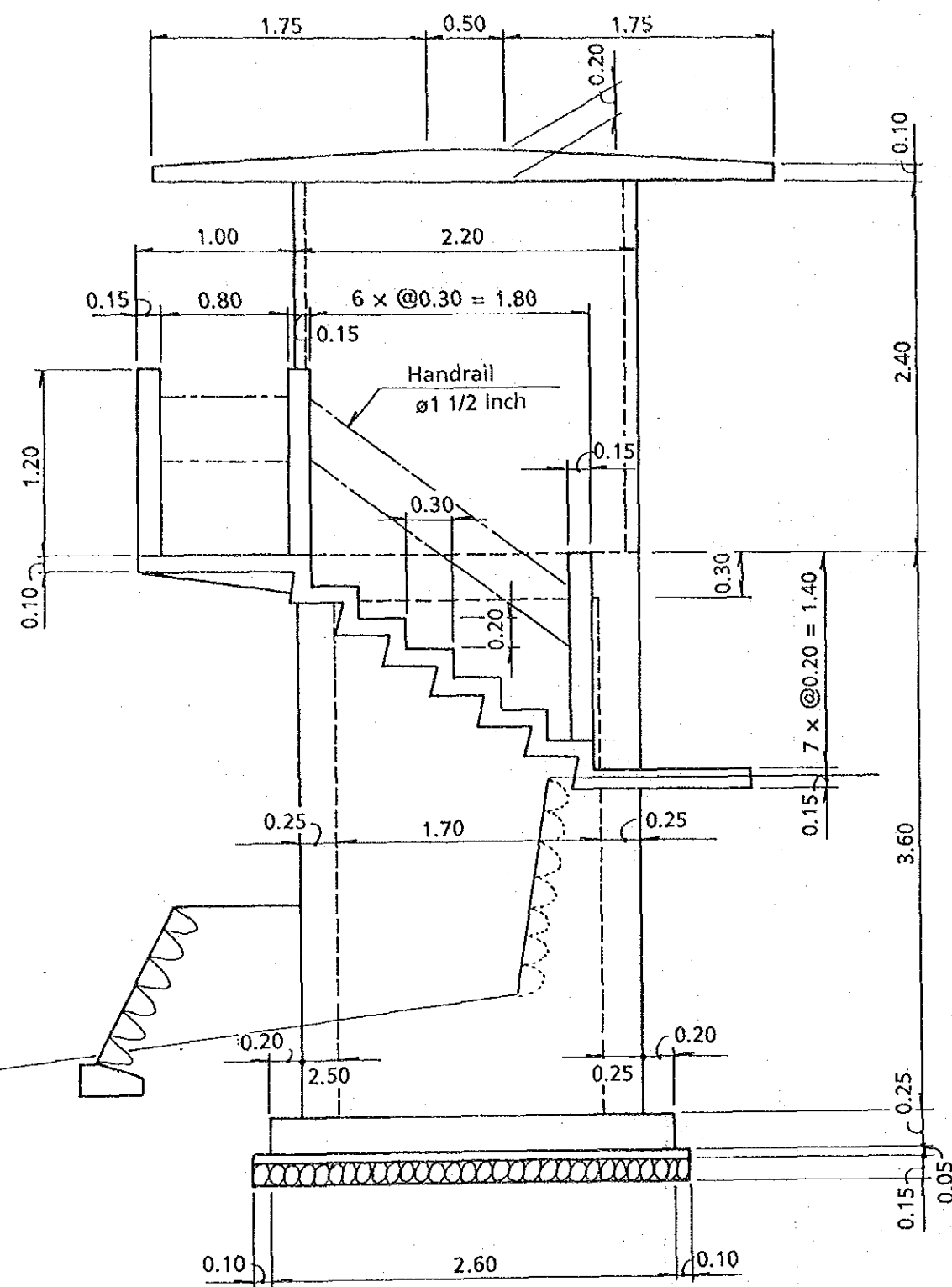


DETAIL OF RAINFALL GAUGE

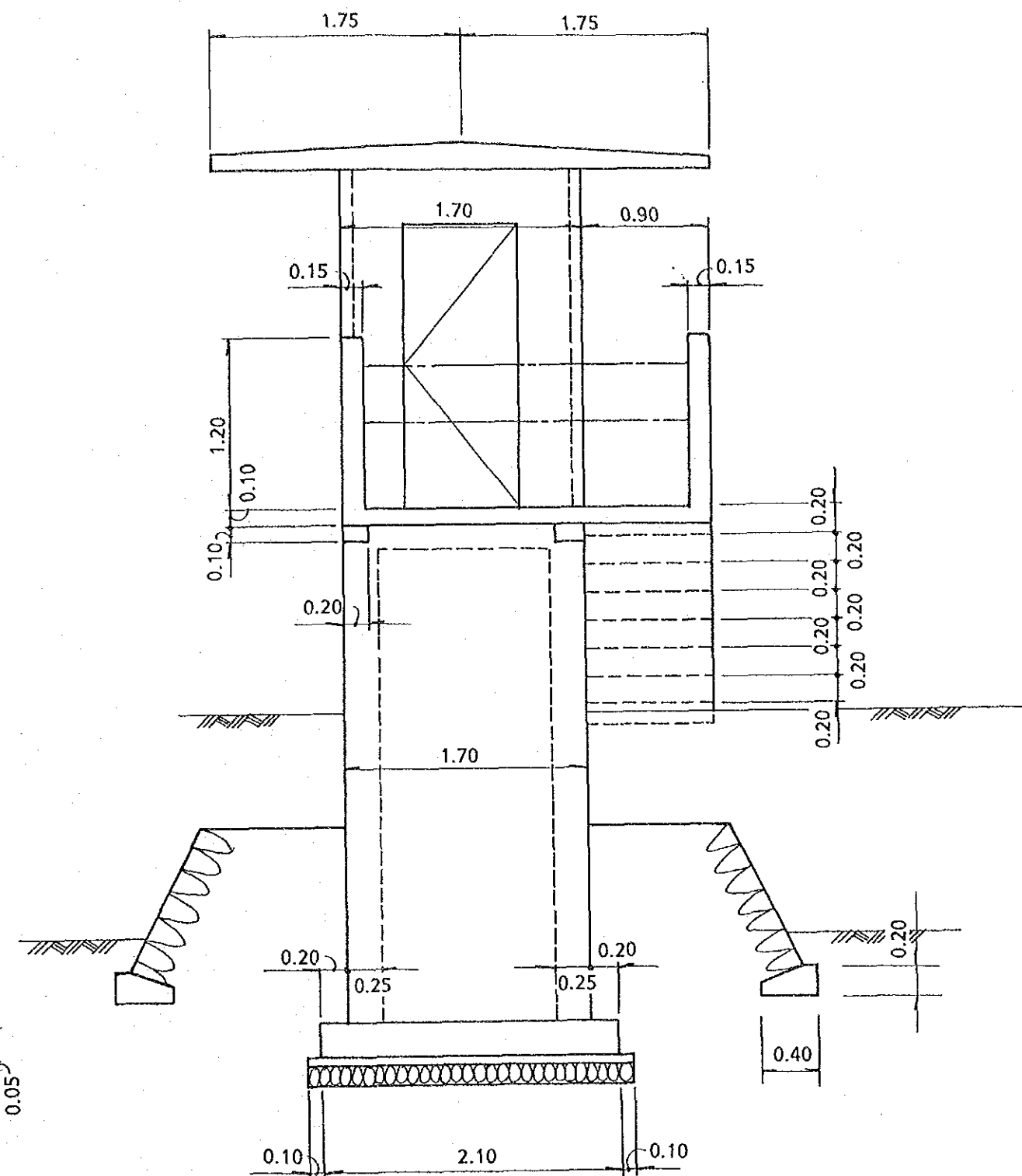


ELEVATION OF RAINFALL GAUGE

FIG. 2 - 10	UNIT	METER
	SCALE	1/50, 1/20
PLAN AND RAINFALL GAUGE OF NAKHON SAWAN GAUGING STATION		
JAPAN INTERNATIONAL COOPERATION AGENCY		



ELEVATION A



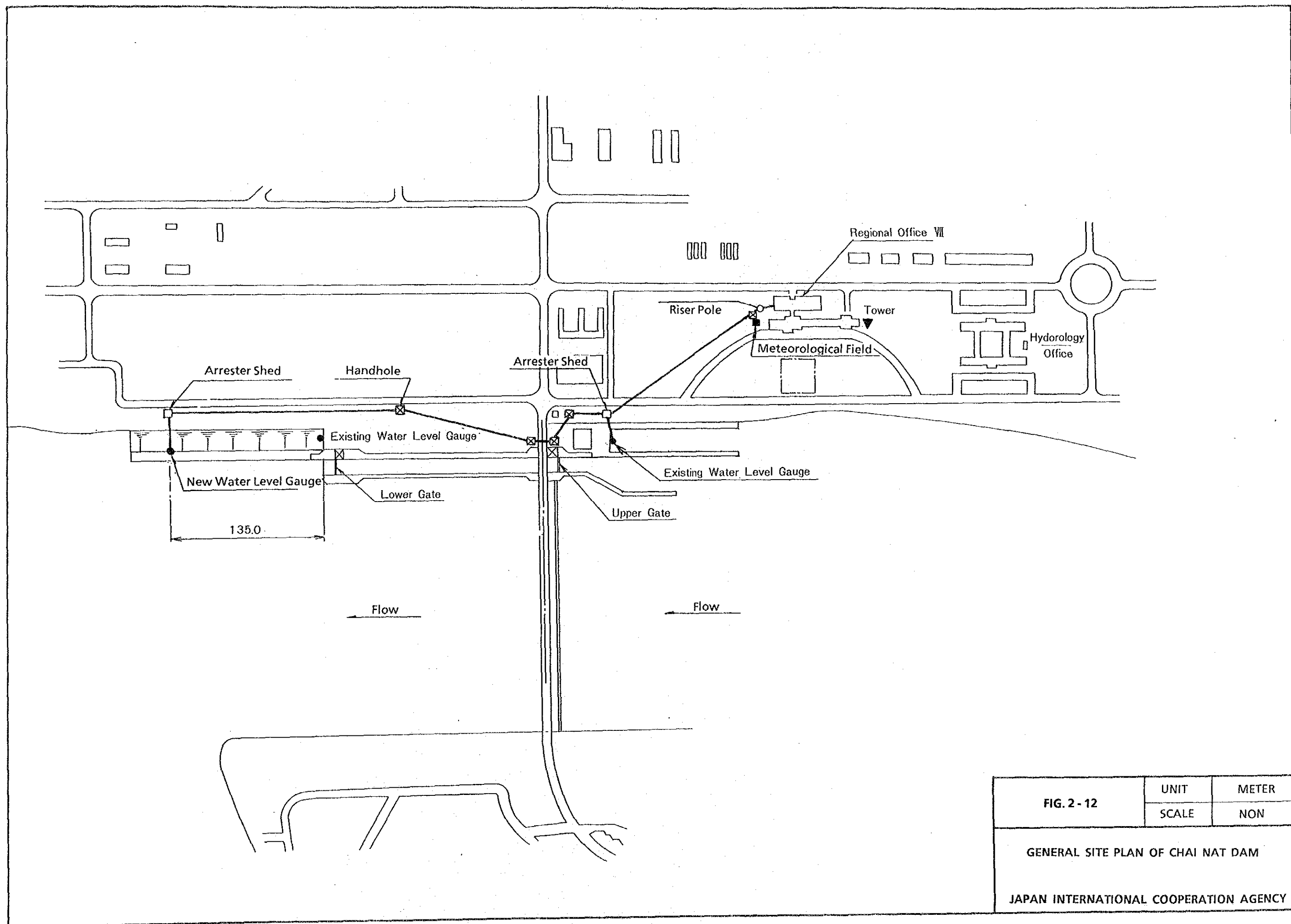
ELEVATION B

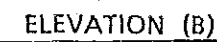
FIG. 2 - 11

UNIT	METER
SCALE	1/40

STRUCTURE OF
NAKHON SAWAN GAUGING STATION

JAPAN INTERNATIONAL COOPERATION AGENCY

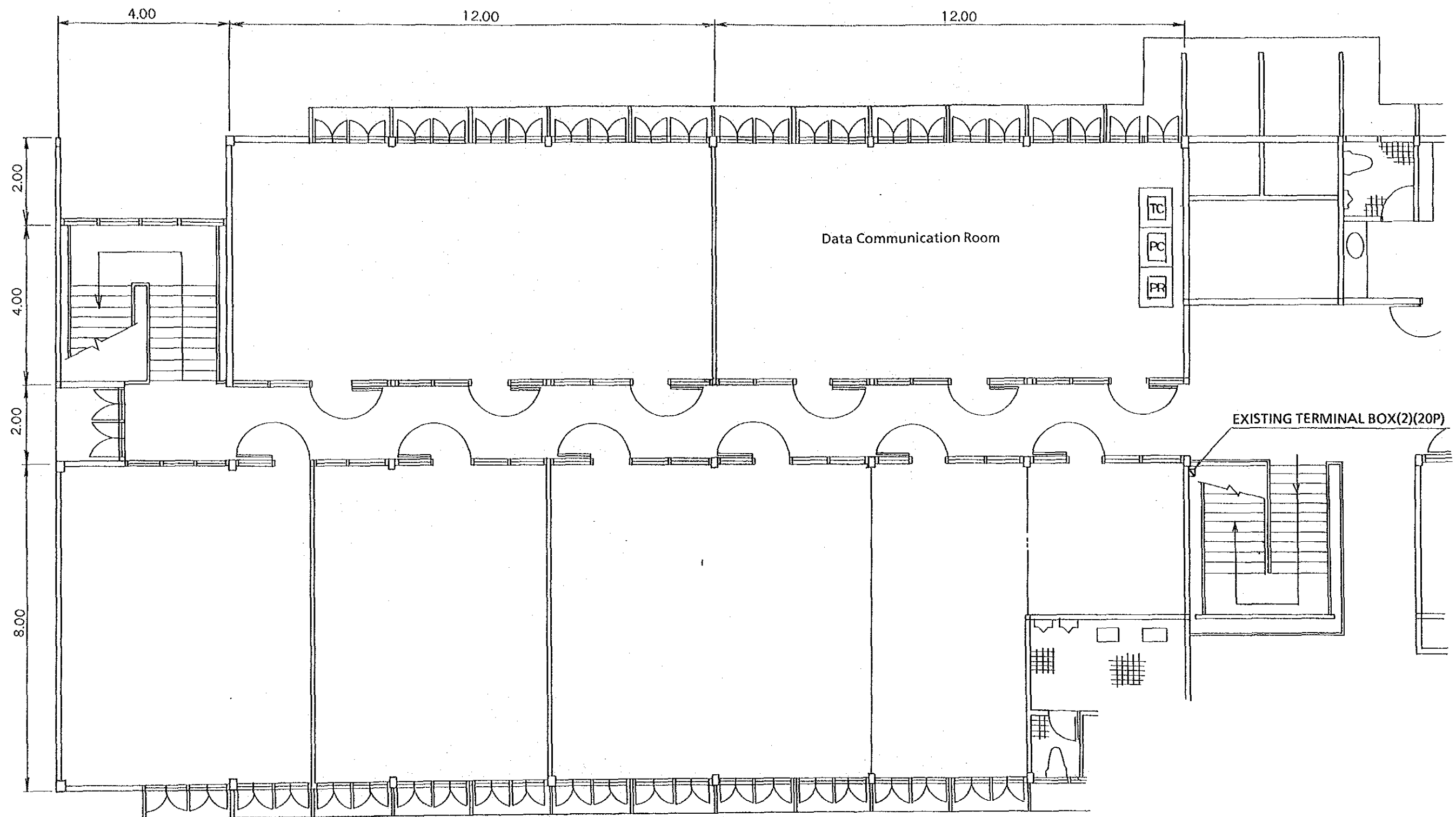


FIG. 2 - 13

UNIT	METER
SCALE	1/40

STRUCTURE OF ARRESTER SHED IN CHAI NAT

JAPAN INTERNATIONAL COOPERATION AGENCY



LEGEND

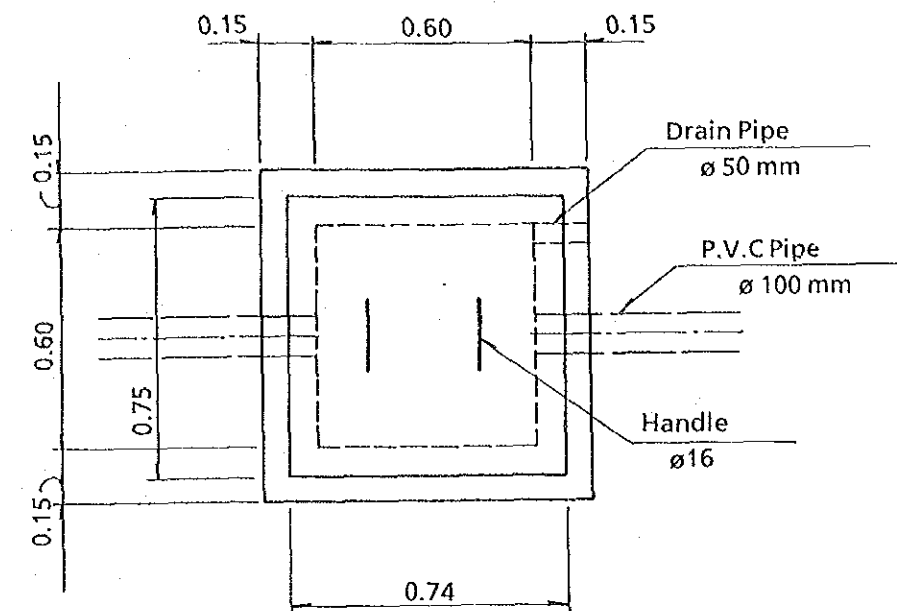
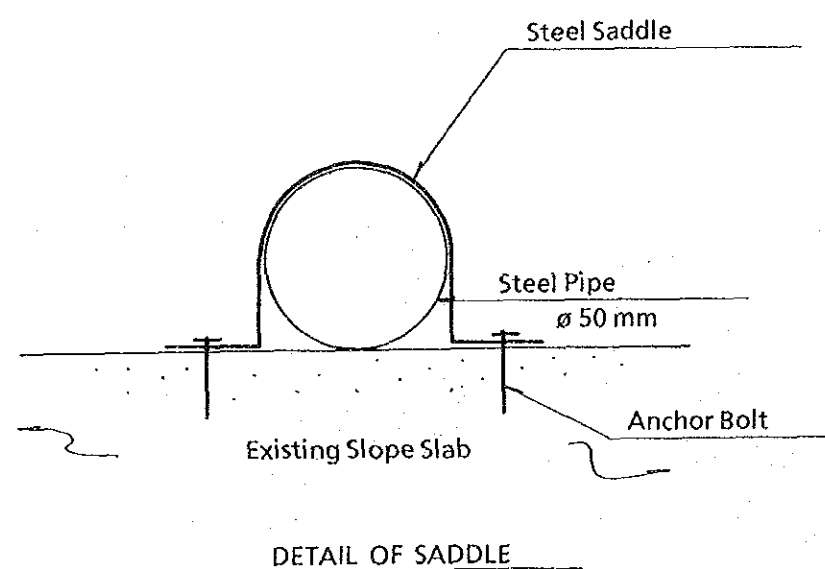
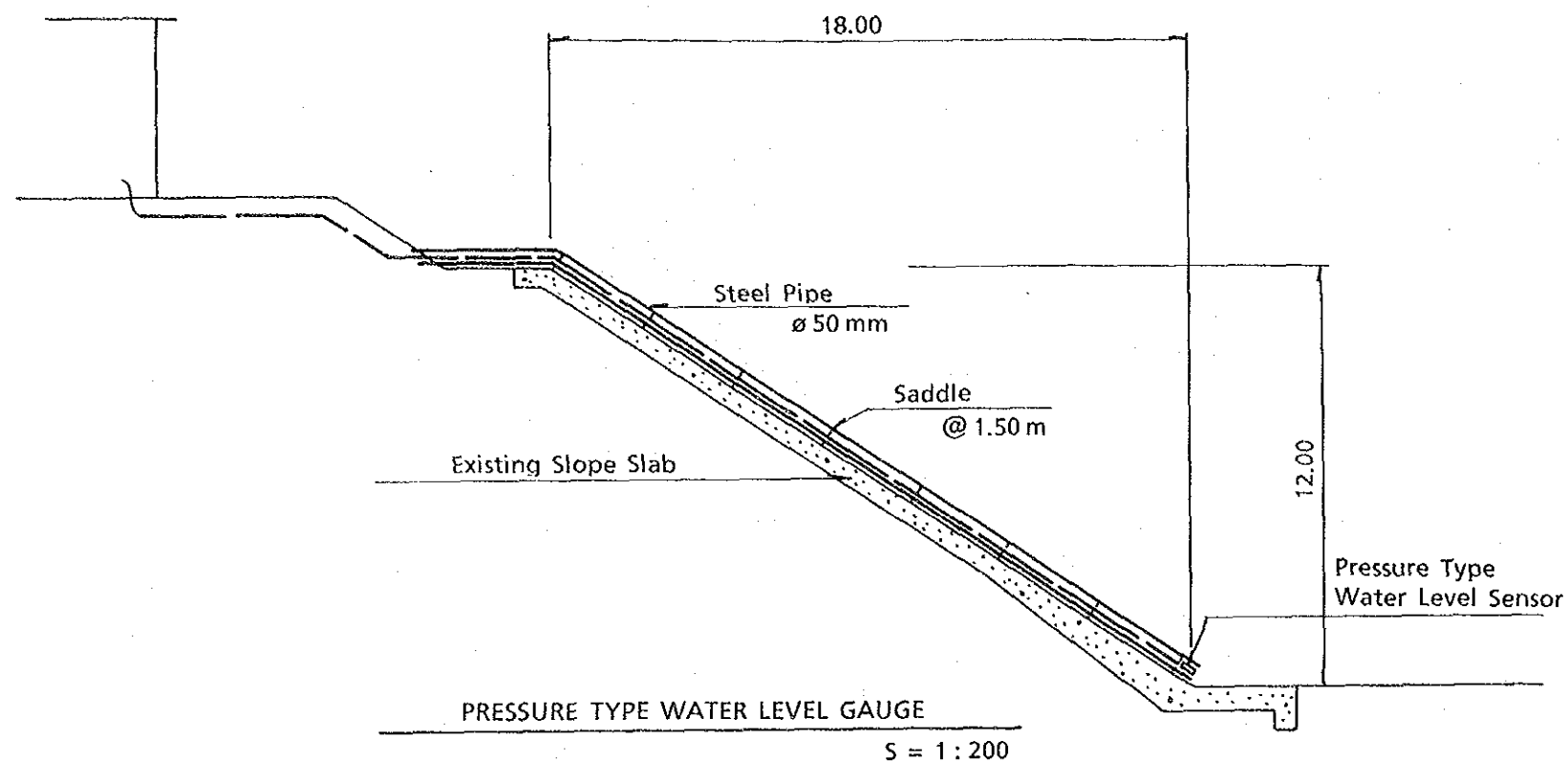
TC	TELEMETERING / DATA COMMUNICATION EQUIPMENT
PC	PERSONAL COMPUTER
PR	PRINTER

FIG. 2-14

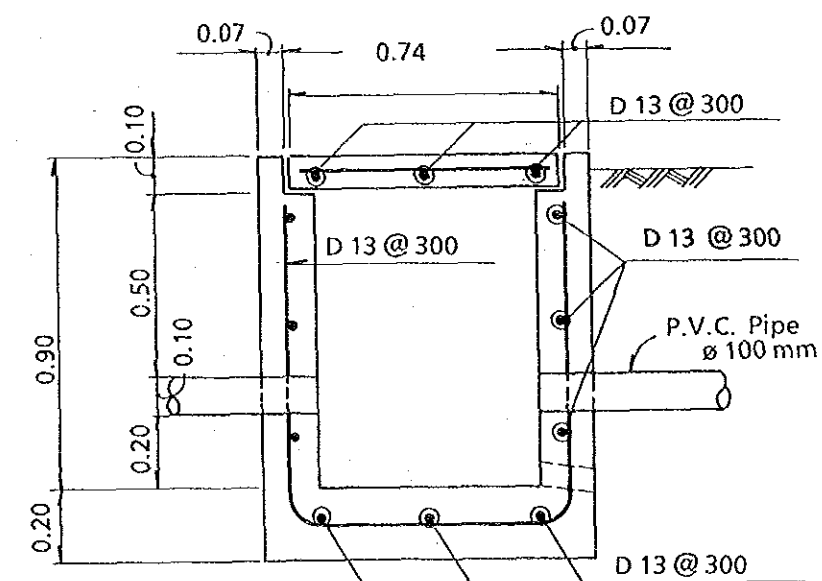
UNIT	METER
SCALE	1/100

**DATA COMMUNICATION ROOM OF
REGIONAL IRRIGATION OFFICE 7**

JAPAN INTERNATIONAL COOPERATION AGENCY

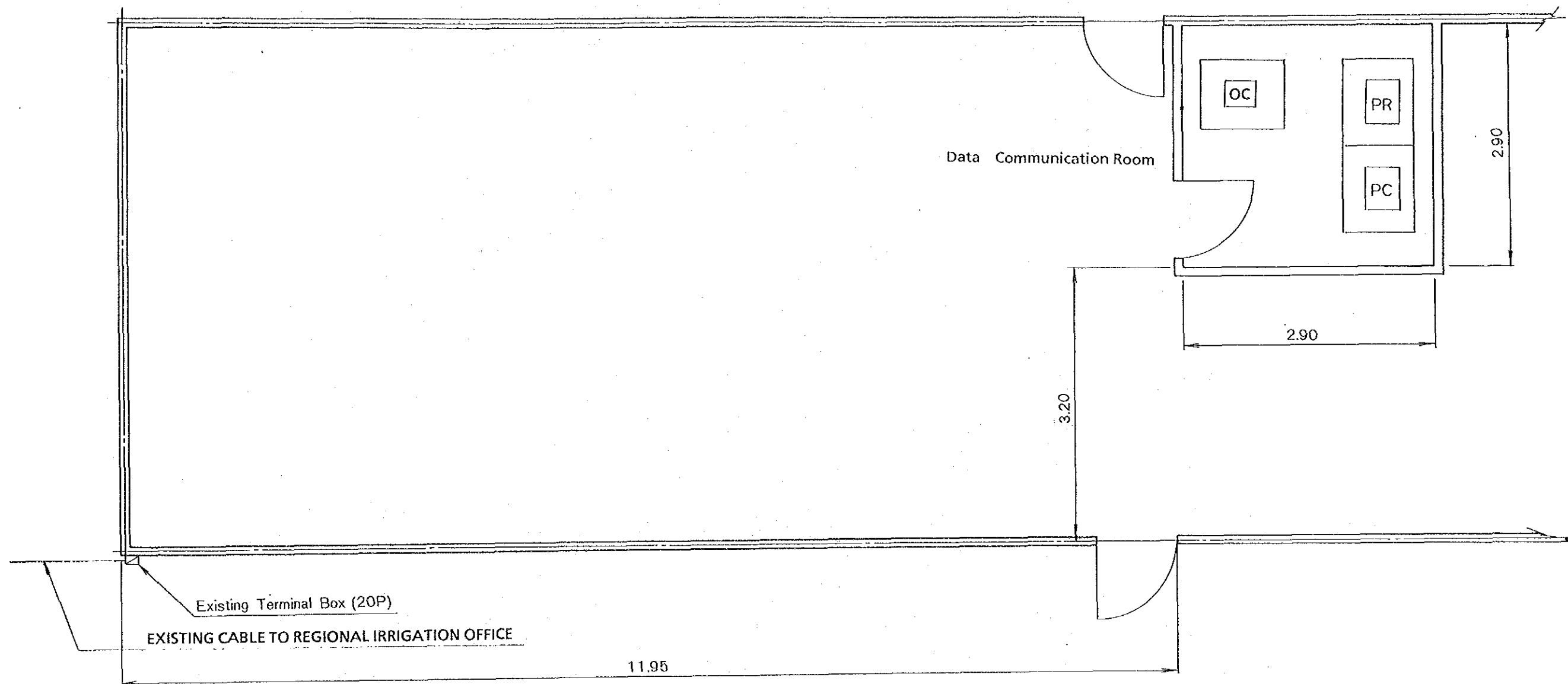


PLAN OF HANDHOLE



PROFILE OF HANDHOLE

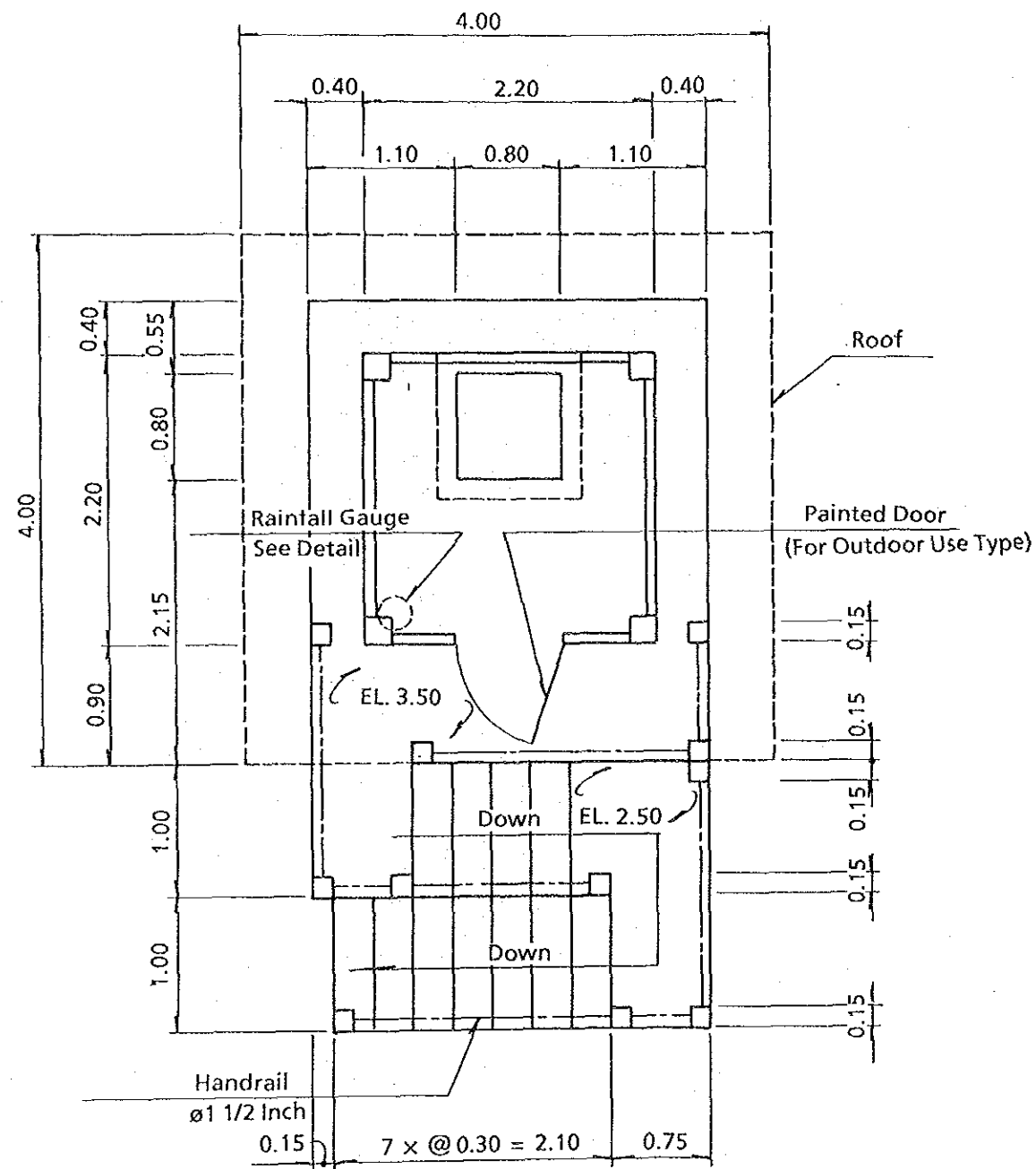
FIG. 2 - 15	UNIT	METER
	SCALE	1/200, 1/20
PRESSURE TYPE WATER LEVEL GAUGE & HANDHOLE		
JAPAN INTERNATIONAL COOPERATION AGENCY		



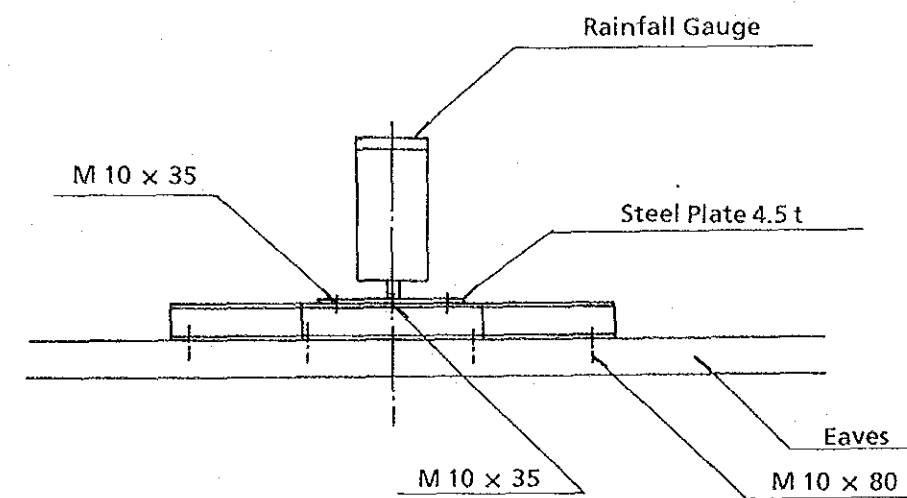
LEGEND

OC OPERATION CONSOLE
 PC PERSONAL COMPUTER
 PR PRINTER

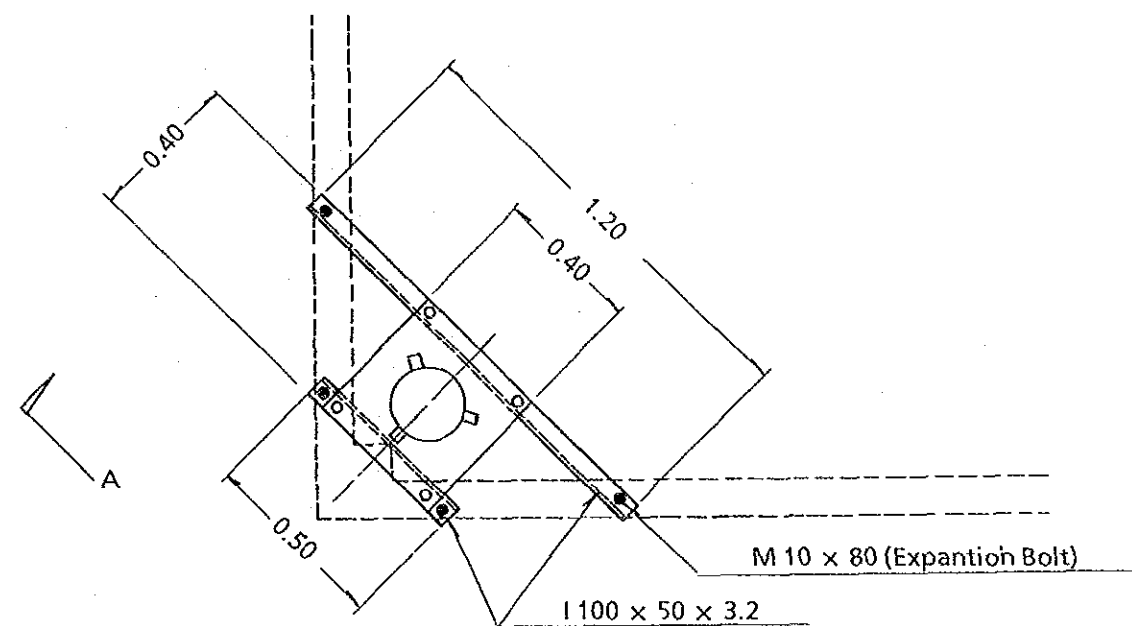
FIG. 2 - 16	UNIT	METER
	SCALE	1/50
DATA COMMUNICATION ROOM OF CENTRAL HYDROLOGY OFFICE		
JAPAN INTERNATIONAL COOPERATION AGENCY		



PLAN



A-A'



A'

FIG. 2 - 17	UNIT	METER
	SCALE	1/50, 1/20
PLAN AND RAINFALL GAUGE OF BANG SAI GAUGING STATION		
JAPAN INTERNATIONAL COOPERATION AGENCY		

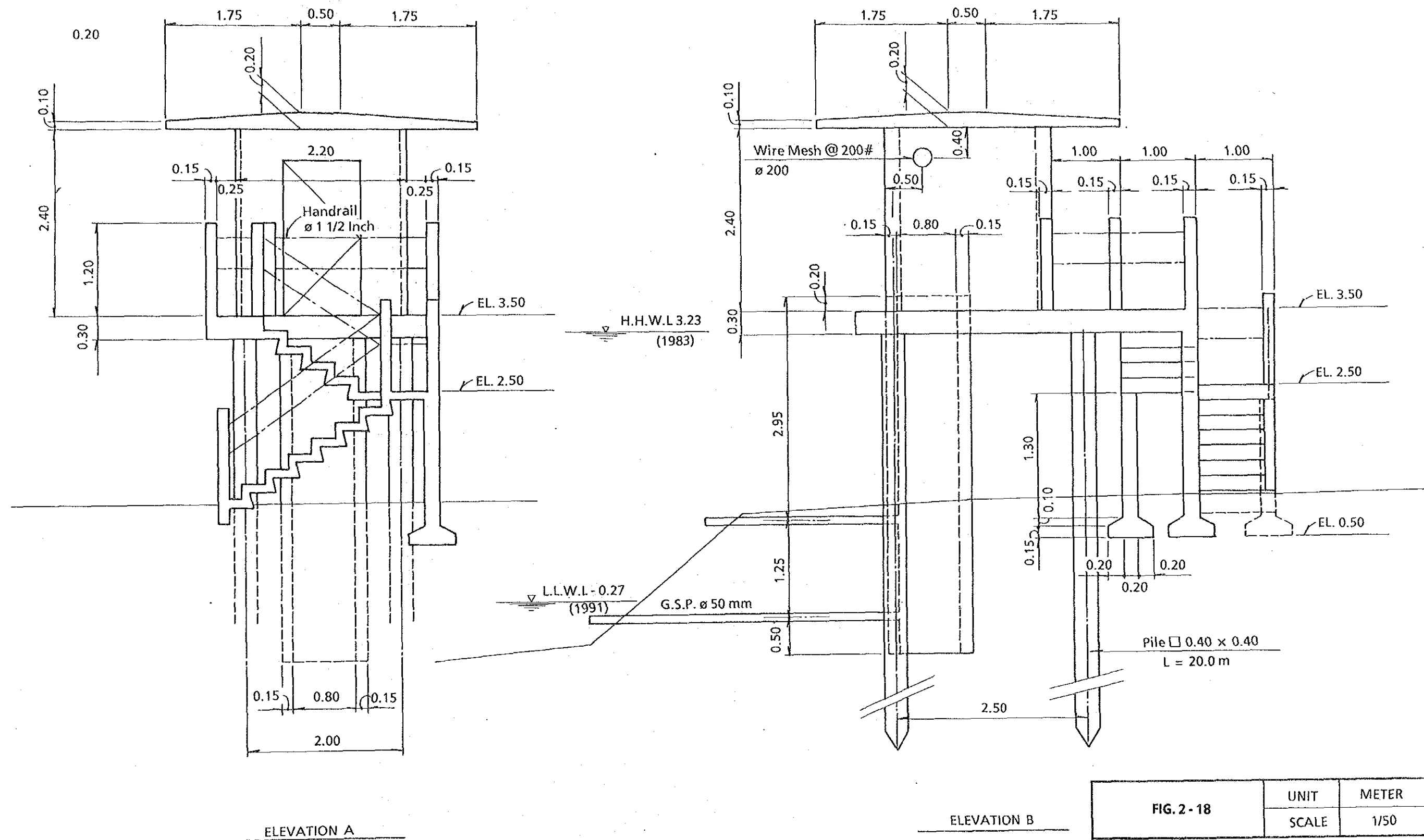


FIG. 2 - 18	UNIT	METER
	SCALE	1/50
STRUCTURE OF BANG SAI GAUGING STATION		
JAPAN INTERNATIONAL COOPERATION AGENCY		

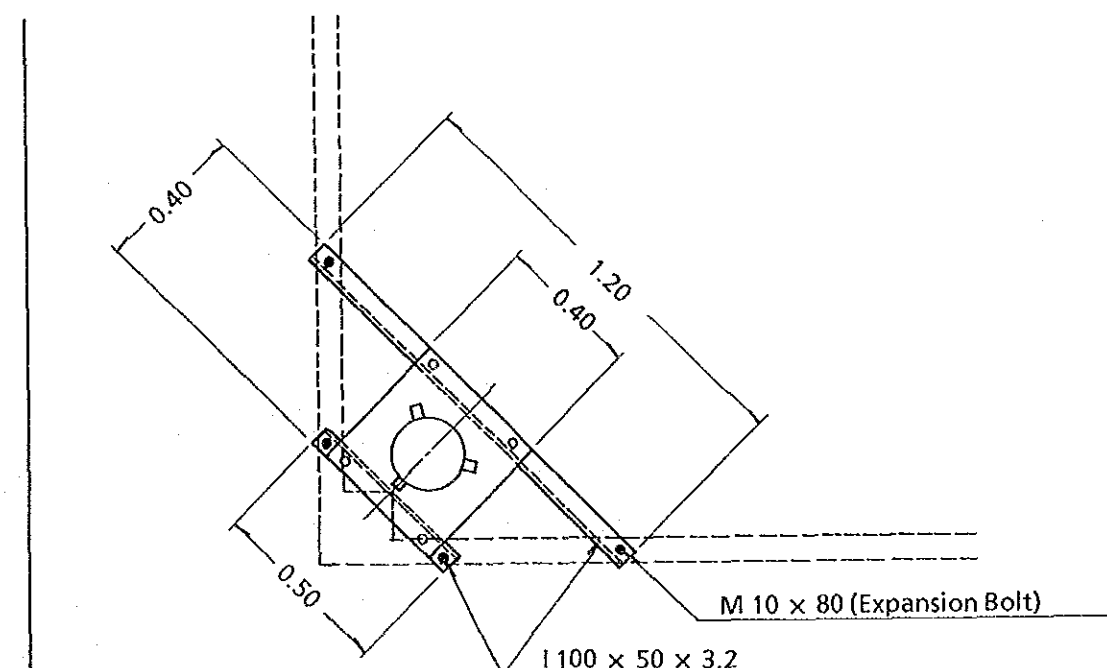
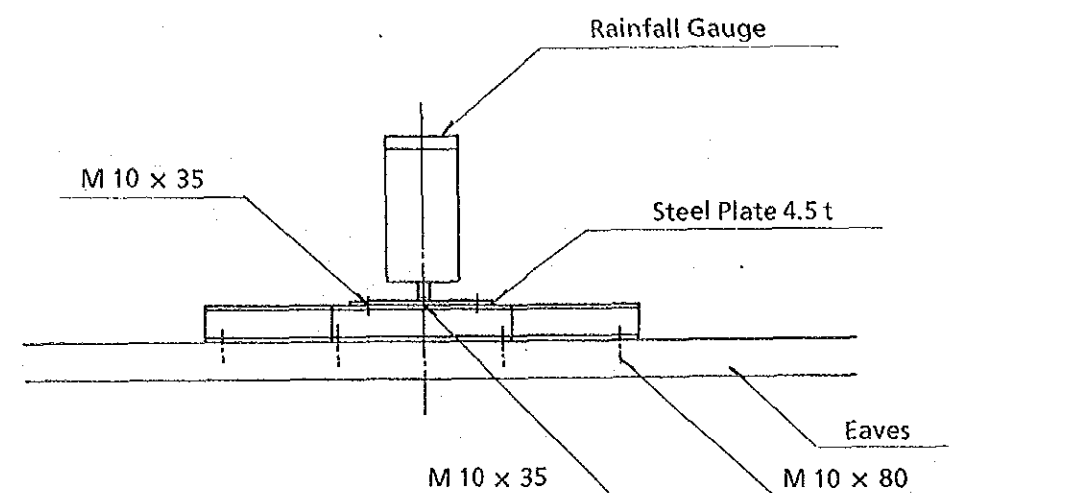
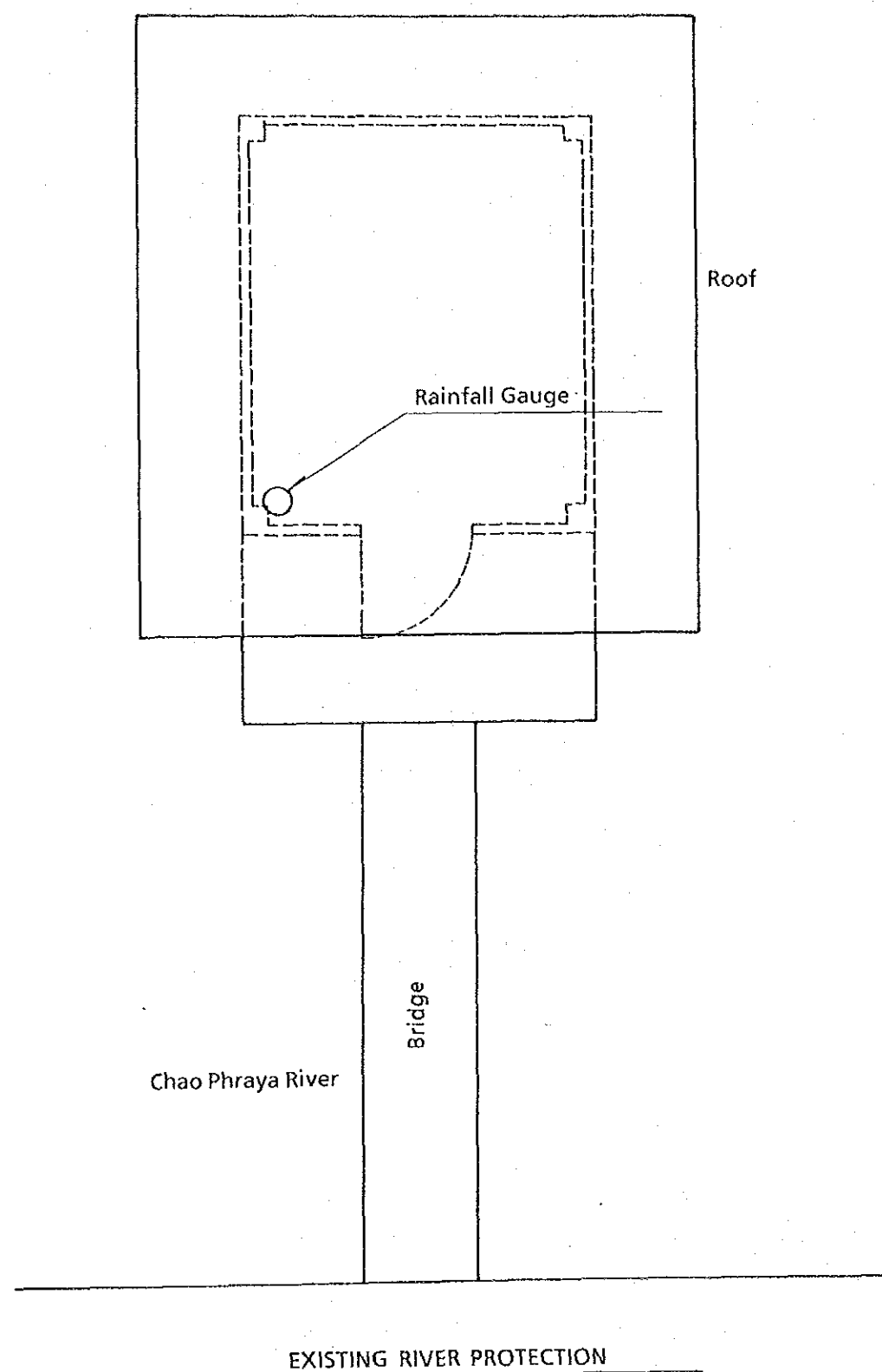


FIG. 2-19	UNIT	METER
	SCALE	1/50, 1/20
RAINFALL GAUGE ON MEMORIAL BRIDGE GAUGING STATION		
JAPAN INTERNATIONAL COOPERATION AGENCY		

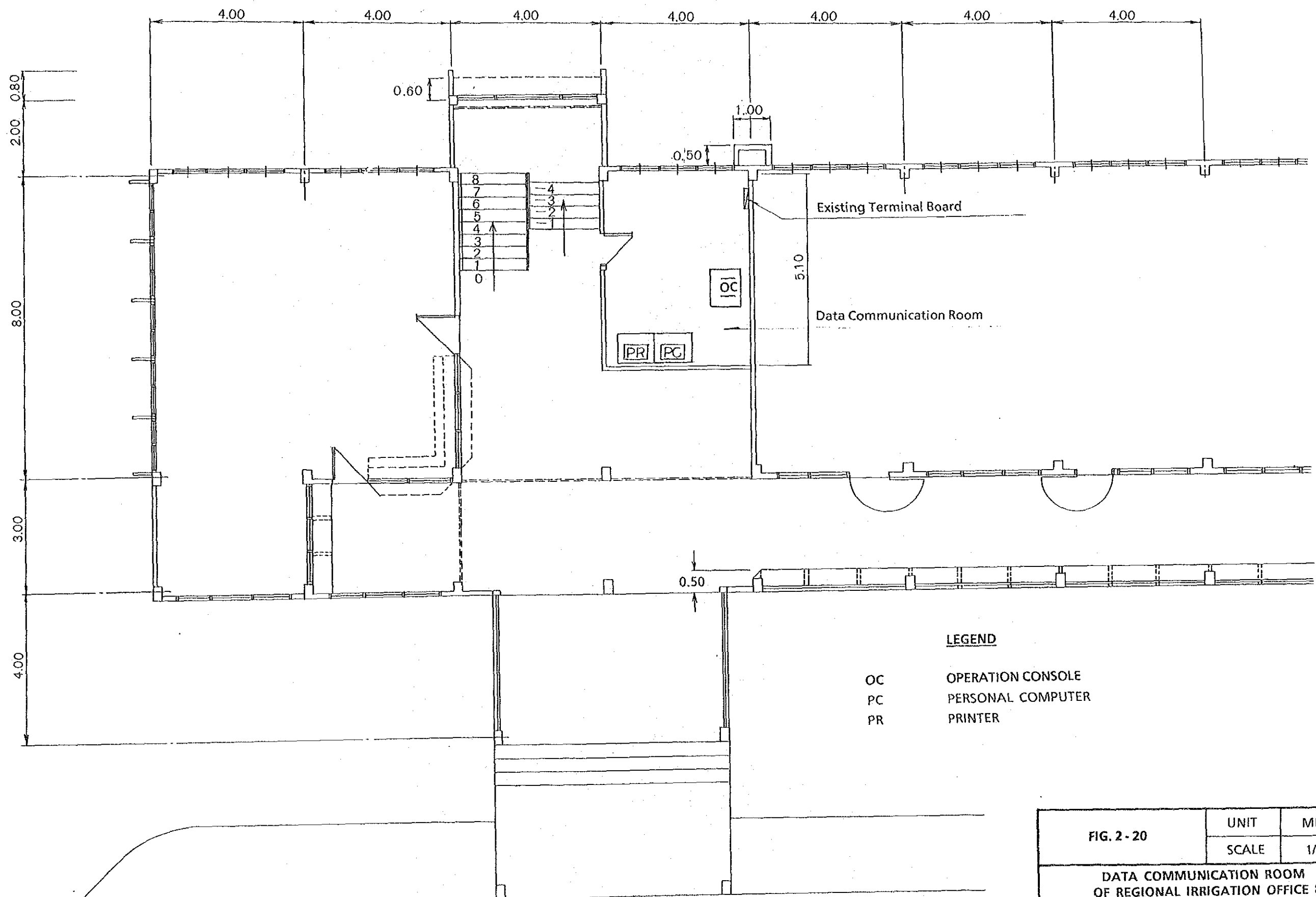


FIG. 2-20

UNIT	METER
SCALE	1/100

DATA COMMUNICATION ROOM
OF REGIONAL IRRIGATION OFFICE 8

JAPAN INTERNATIONAL COOPERATION AGENCY

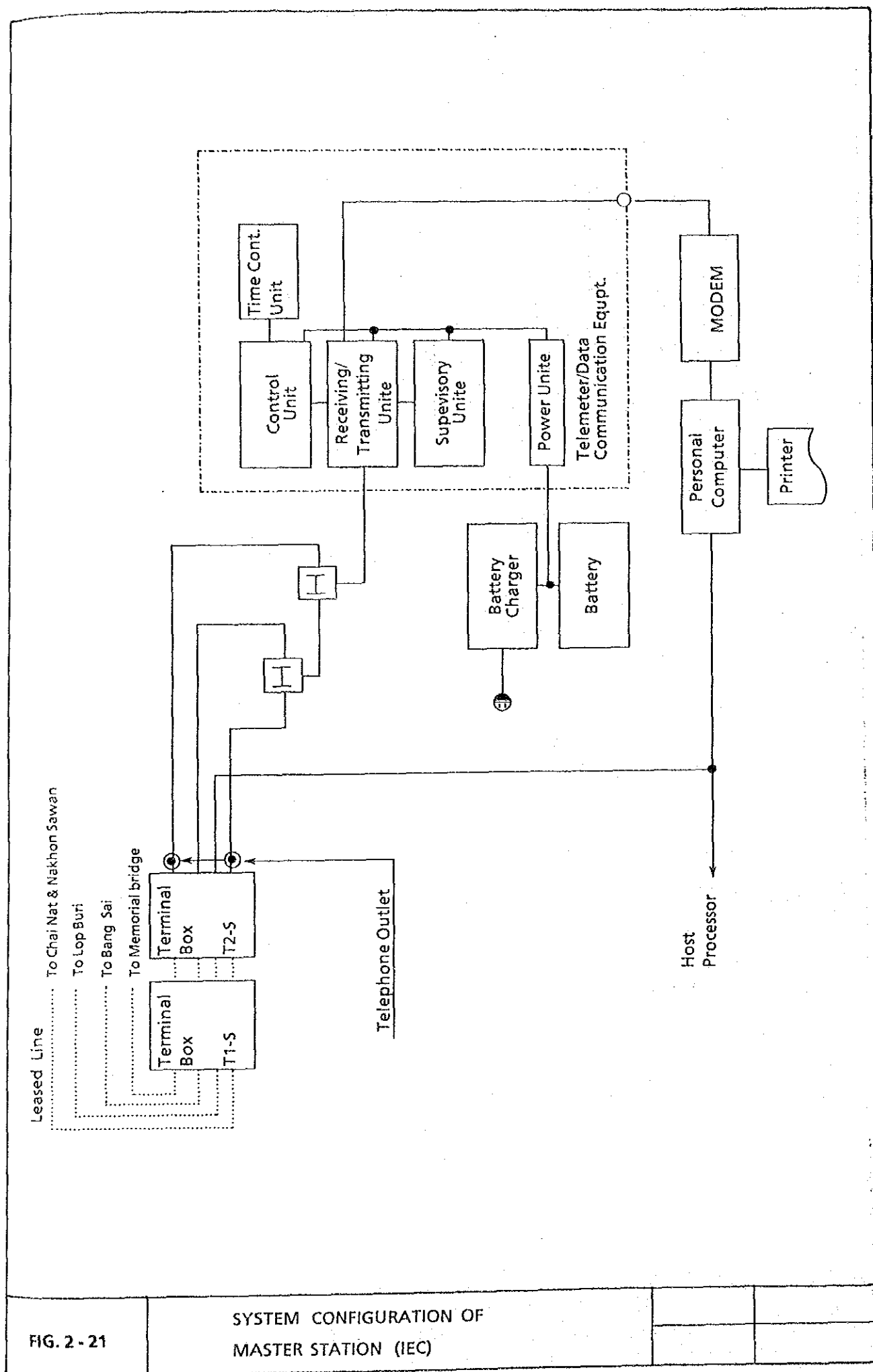


FIG. 2 - 21

SYSTEM CONFIGURATION OF
MASTER STATION (IEC)

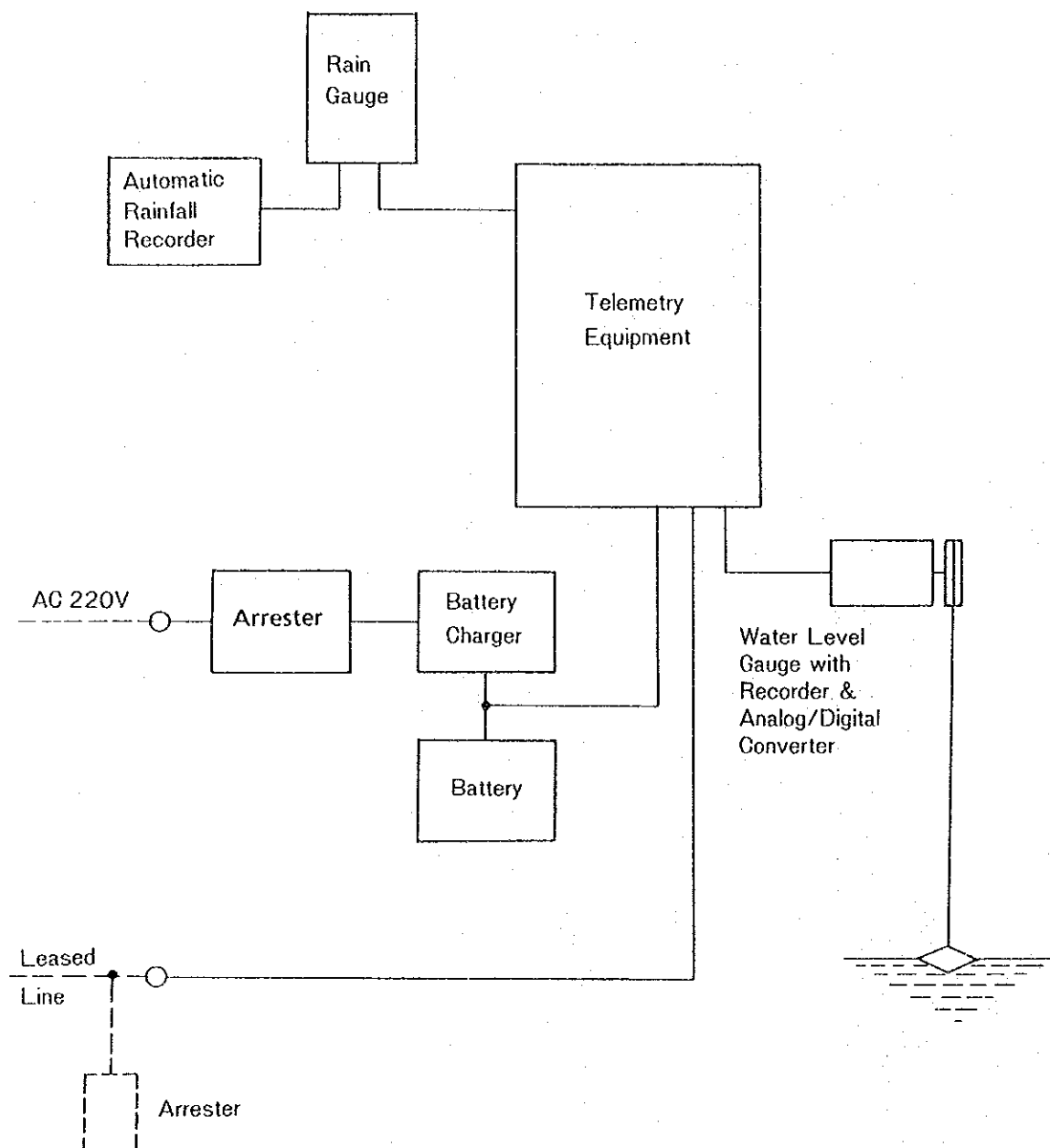


FIG. 2 - 22

SYSTEM CONFIGURATION OF NAKHON SAWAN,
BANG SAI AND MEMORIAL BRIDGE GAUGING STA.

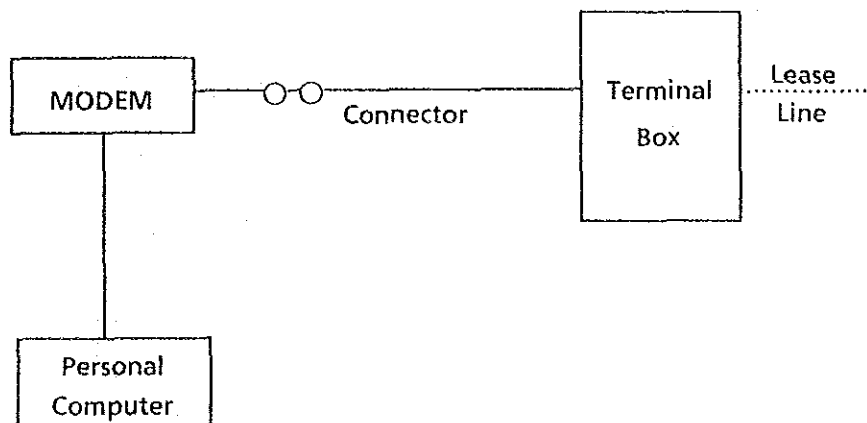


FIG. 2 - 23

SYSTEM CONFIGURATION OF REGIONAL IRRIGATION
OFFICE VIII

HYDROLOGY OFFICE

REGIONAL OFFICE VII

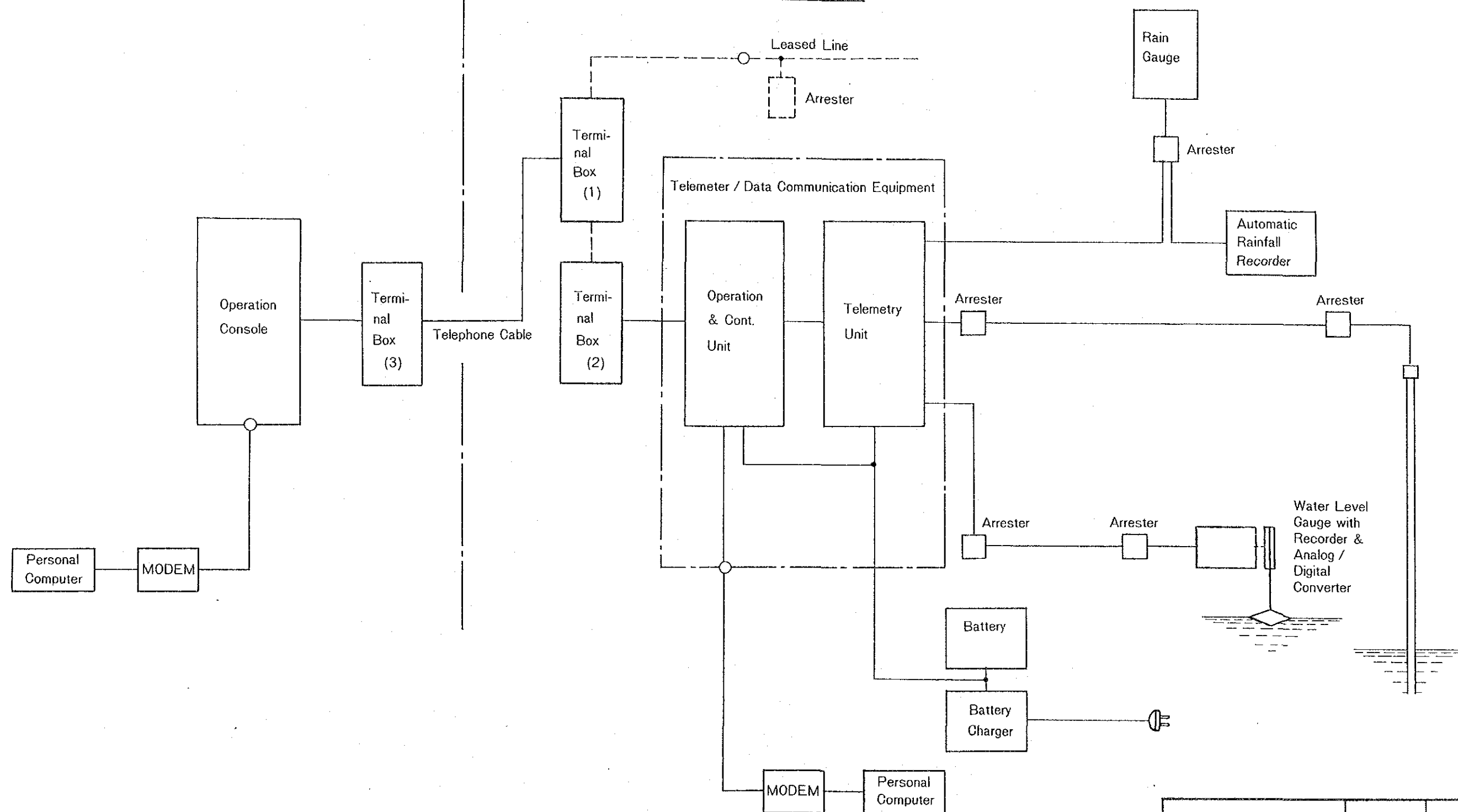
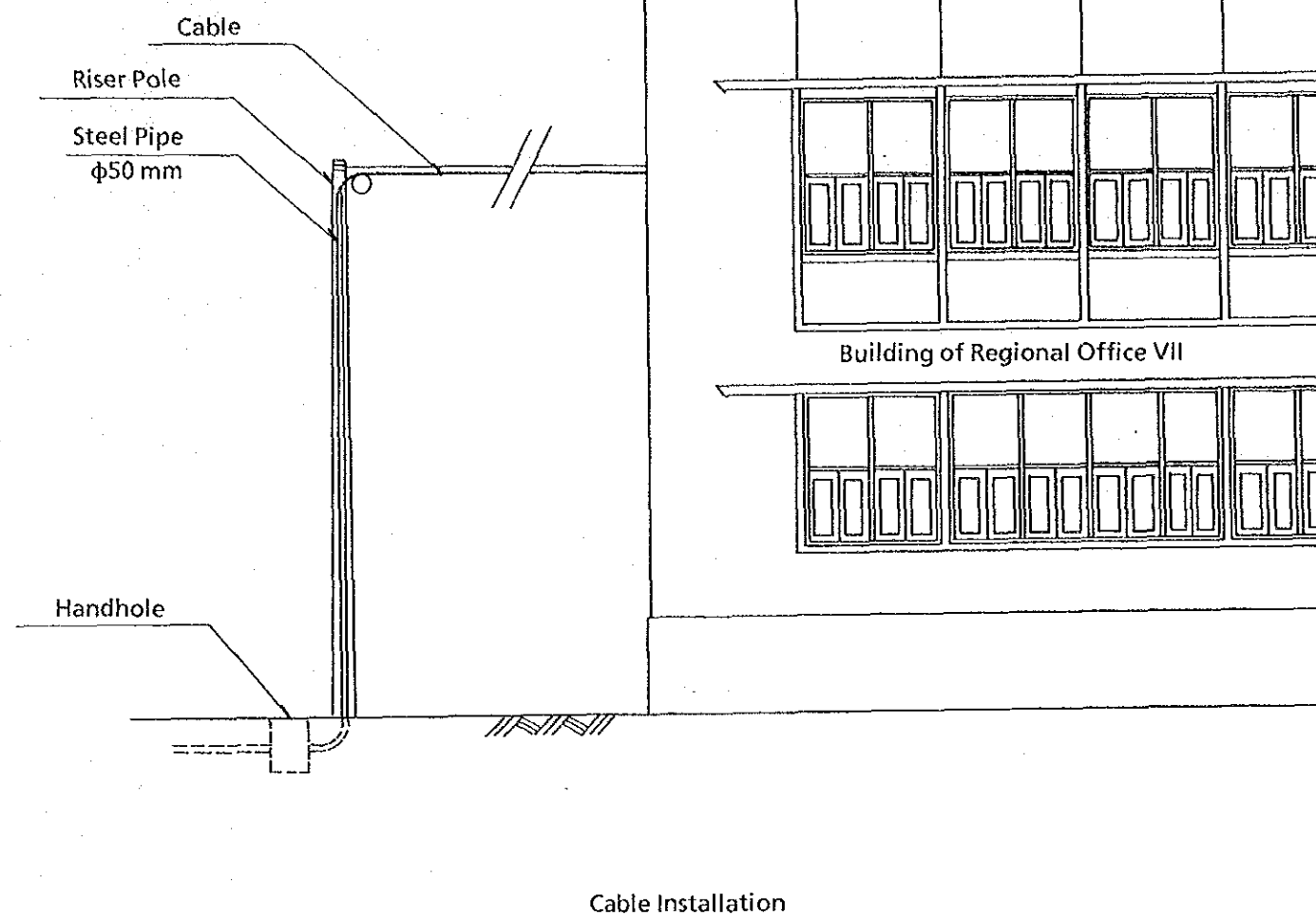
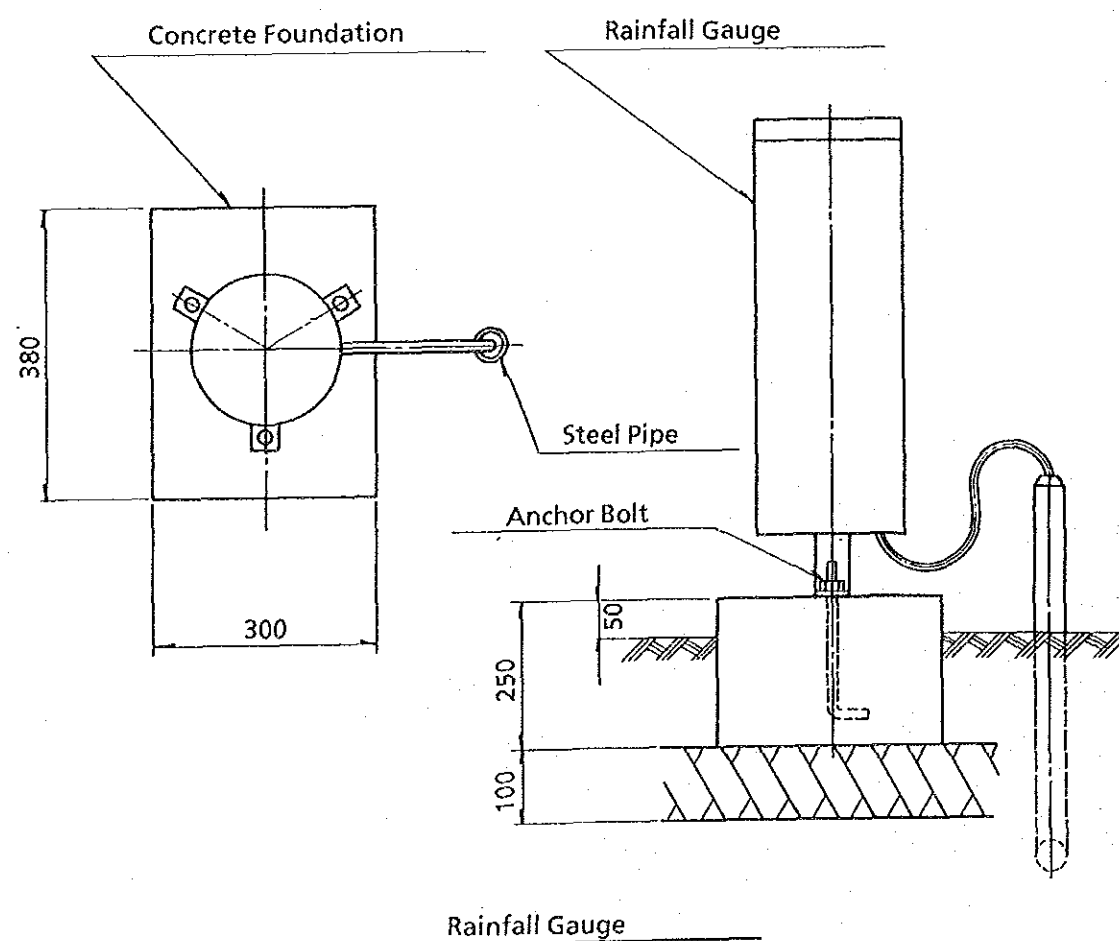
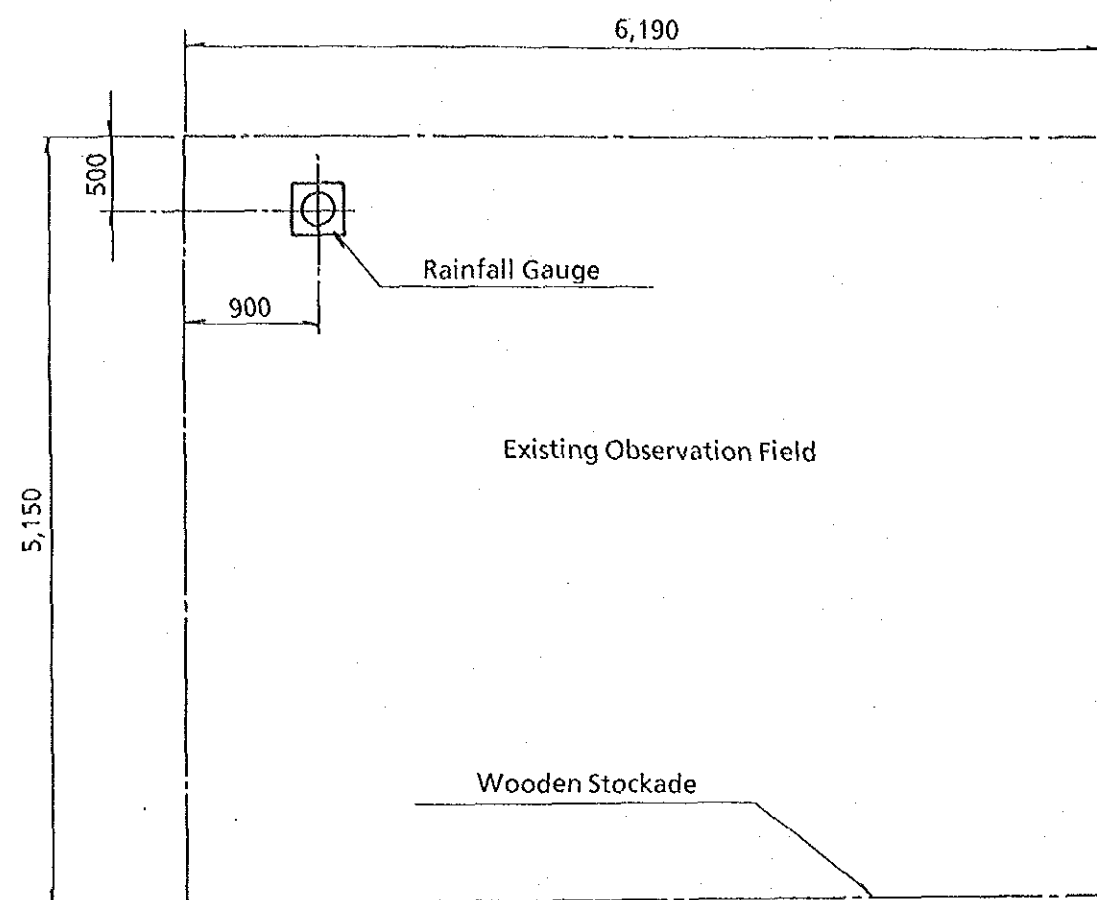


FIG. 2 - 24

SYSTEM CONFIGURATION OF CHAI NAT GAUGING STA., REGIONAL IRRIGATION OFFICE VII AND CENTRAL HYDROLOGY OFFICE



Cable Installation

FIG. 2 - 25	UNIT	mm
	SCALE	NO TO SCALE
RAINFALL GAUGE & CABLE INSTALLATION PLAN IN CHAI NAT		
JAPAN INTERNATIONAL COOPERATION AGENCY		

BID DOCUMENTS 2

... BID

BID DOCUMENTS

FOR

CONSTRUCTION OF STRUCTURE FOR

TELEMETERING / DATA COMMUNICATION SYSTEM

FOR

THE IRRIGATION ENGINEERING CENTER PROJECT

PHASE II IN THAILAND

THAILAND OFFICE

JAPAN INTERNATIONAL COOPERATION AGENCY

CONTENTS

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* Invitation to Bid	B-2
* Instruction to Bidders	B-3
* Terms and Conditions of this Contract	B-7
* Pledge Agreement	B-12
* Contract	B-14
* Technical Specifications	B-26

JAPAN INTERNATIONAL COOPERATION AGENCY
THAILAND OFFICE

INVITATION TO BID NO. _____

The Japan International Cooperation Agency, Thailand Office hereby invites sealed written bids for the Construction of Structure for Telemetering/Data Communication System for the Irrigation Engineering Center Project Phase II.

This Contract will include, among others, the following;

1. Terms and Conditions of this Contract
2. Pledge Agreement
3. Technical Specifications
4. Bill of Quantities
5. Drawings

Bids shall be addressed to Mr. Nobuji ABE, Resident Representative, Japan International Cooperation Agency, Thailand Office, 1674/1, New Petchburi Road, Bangkok 10310, Thailand.

The date for the opening of bids will be held at ____ o'clock p.m/a.m Thailand Standard Time on ____, ____ at the JICA, Thailand Office.

A pre-bidding conference is scheduled on ____, ____ at ____ o'clock p.m/a.m at _____. Attendance for bidders is desirable.

Nobuji ABE
Resident Representative of JICA
Thailand Office

INSTRUCTION TO BIDDERS

INSTRUCTION TO BIDDERS

IB-01 PREPARATION OF BIDS

All bids shall be submitted in an original and three(3) copies on or before the hour and date fixed for receipt of bids, in accordance with the Invitation for Bids, and shall conform to the following requirements;

- a) One copy of proposal shall be marked "original". The original and copies of bids shall be submitted in its entirety with all blanks in the proposal property filled in.
- b) Bids prices shall be written in words as well as in figures. In case of discrepancy between the words and figures, the price in words shall prevail.
- c) The proposal must be signed by the Bidder with his usual signature and shall show his full business address.

IB-02 BASIS ON WHICH BIDS ARE REQUESTED

The form of the Contract to be awarded is on fixed unit Price basis of payment to the Contractor, as specifically set forth in these Contract Documents. Bids are requested on the above basis and a proposal which is on any other basis will not be considered.

Quotation of prices shall be made in Thai Baht and the Contractor shall be paid in Local Currency.

IB-03 DELIVERY OF BIDS

Bids shall be directly delivered to JICA Thailand Office, Mr. Nobuji ABE, Resident Representative on or before the hour and date set for the opening of bids.

IB-04 WITHDRAWAL OF BIDS

A bidder will be allowed to withdraw his bid prior to the time set for the opening of bids if he communicates his purpose in writing to the Japan International Cooperation Agency, Thailand Office, and his bid shall be returned to him unopened. No bid can be withdrawn for any reason whatsoever after the opening of bids has been made.

IB-05 BIDDER'S RESPONSIBILITY

The bidders shall be responsible for having taken steps to carefully examine all of the Bid Documents and also to have fully informed themselves as to all conditions, locality and otherwise, affecting the carrying out of the Contract Works. Failure to do so will be at the Bidder's risk.

IB-06 INTERPRETATION OF CONTRACT DOCUMENTS

If the prospective Bidder is in doubt as to the true meaning of any part of the Bid Documents, the Bidder may submit to the Japan International Cooperation Agency, Thailand Office, a written request for interpretation allowing sufficient time for a reply to reach him before submission of his bid. Any interpretation of the proposed documents will be made only by a Supplemental Notice duly issued.

IB-07 PRE-BIDDING CONFERENCE

A pre-bidding conference is scheduled on _____, at _____ o'clock p.m/a.m at _____. Attendance for Bidders is desirable.

IB-08 COMPARISON OF BIDS

In making its selection, the Japan International Cooperation Agency, Thailand Office will not be bound to award a Contract to the bidder submitting the Bid with the lowest indicated cost; but will take into consideration the bid

prices, unbalanced bids, guaranteed completion time and other relevant consideration.

IB-09 AWARD OF CONTRACT

Bids will be opened in the presence of the Bidders who may desire to attend such opening by the Japan International Cooperation Agency, Thailand Office, at ____ o'clock p.m/a.m. Thailand Standard Time on _____, _____.

Promptly after the opening of the bids the Japan International Cooperation Agency, Thailand Office will undertake a detailed study and appraisal of the proposal submitted. The Contract will be awarded to the Bidder whose proposal is considered to be the most advantageous to the Japan International Cooperation Agency, Thailand Office. The Japan International Cooperation Agency, Thailand Office reserves the right to reject any or all bids received.

IB-10 BID DOCUMENTS

Bid documents shall include the following;

- a) Invitation to Bid
- b) Instruction to Bidders
- c) Terms and conditions of this Contract
- d) Pledge Agreement
- e) Form of Contract
- f) Technical Specifications
- g) Drawings

TERMS AND CONDITIONS OF THIS CONTRACT

TERMS AND CONDITIONS OF THIS CONTRACT

Section 1 General Information

1.1 Objective

The Objective of the Works are to Construction of Structure for Telemtering/Data Communication System which is necessary for the Irrigation Engineering Center Project Phase II.

1.2 Location of the site

The job sites are the Nakhon Sawan, Chao Phraya Dam, Bang Sai, Lop Buri, and RID sumsen.

1.3 Collaboration

According to the objective of the technical cooperation, the counterpart agency of the JICA is executing several experiments around the job site. Prior to or during the course of the Works, the Contractor shall make the good relation with the RID for the satisfactory implementation of the Works as to secure full collaboration. Should it happen that the relation between the RID and the Contractor is disturbed, the Contractor shall inform the Supervisor who will conciliate the both parties.

Section 2 Submission of Notices

2.1 Work Schedule

The Contractor shall submit the Work Schedule before the commencement of the Works to the Supervisor. If the Contractor intends to change the Work schedule, the approval from the the Supervisor shall be obtained prior to the modification of the schedule.

Also the Contractor shall submit the machineries scheme including the numbers, kind of machineries and using period of them.

2.2 Notices

The JICA and the Contractor shall submit the notices to each other, as necessary, in accordance with Article 19 in this Contract within reasonable time except that special articles are provided in Terms and Conditions of this Contract.

Section 3 Field Test and Inspection

The field tests in accordance with the Technical Specifications and the demands from the Supervisor shall be the responsibility of the Contractor. The charges for such field test shall be included in the total amount of the construction cost, and the Contractor is not entitled to claim any amount of the field test charges.

Section 4 Modification of Plan

In case the JICA estimate the cost for the modification in accordance with Article(s) of the Contract and/or the Technical Specifications, and if there are two portions, one for the increase and the other for the decrease of the construction cost resulting from such modification, the JICA shall have the right to offset them in the payment and pay or claim the difference between the increase and decrease of the construction cost as the case may be.

Section 5 Release from the Works

After the final acceptance of the Works by the JICA, the Contractor shall remove its own temporary facilities, warehouses, construction roads, electric wiring, surplus material, debris and so forth which were provided by the Contractor within 10 (ten) days. Upon approval of the Supervisor for the removal of the above-mentioned facilities, the Contractor will be released from

its responsibility of the Works but remains responsible under 1 (one) year guarantee of the Works as specified in Article 11 in this Contract.

Section 6 General Obligations of the Contractor

6.1 Temporary Office and Residence

In case the Contractor intends to build the temporary office, residence and so forth, the Contractor shall submit the plan to the Supervisor for approval at least 10(ten) days in advance of the commencement of such works.

The Contractor is always required to keep the buildings and facilities in good condition and to make proper drainage and sanitary system. Should the Contractor build them outside of the job site, the Contractor shall arrange with the owner of the such land and at its own expense.

6.2 Fuel Storage

In area of temporary office and residence, the fuel tank capacity shall not exceed 1,000 liters and shall be far away from the housing area.

Fuel storage and transportation shall be done with care and shall have a good system of fire prevention. If storage licence is required, the Contractor shall arrange for obtaining it.

6.3 Other Facilities

All necessary facilities for the Works and the Contractor's convenience shall be provided and maintained in good condition by the Contractor.

Section 7 General Text

The Contractor shall implement the Works in accordance with the Contract Documents in broad sense such as the Contract in narrow sense, Terms and Conditions of this Contract, Technical Specifications. Should the events occur that the both parties can not reach agreement on the

interpretation of the above-mentioned Contract Documents in broad sense, both parties shall negotiate with sincerity and good faith for settlement of any disagreement, failing which the decision of the JICA shall prevail.

PLEDGE AGREEMENT

PLEDGE AGREEMENT

TO JAPAN INTERNATIONAL COOPERATION AGENCY, Date _____
Thailand Office

We _____, the Contractor hereby agree that all equipment, materials and supplies brought to the job site under this Contract made with the JICA dated on _____, shall be pledged by us with the JICA as security for our execution of Works, and shall not be removed at any time without prior approval of the JICA in writing.

We further agree that should there be any loss or damage to pledged equipment, materials and supplies kept at the job site, the JICA shall bear no responsibility whatsoever for such loss or damage.

FORM OF CONTRACT

**CONTRACT
ON
Construction of Structure for Telemetry / Data Communication System
for
The Irrigation Engineering Center Project Phase II
in
Thailand**

This Contract is executed on the (day)th day of (month), (year) at the Japan International Cooperation Agency, Thailand Office, in Thailand by Mr. Nobuji ABE, Resident Representative as its authorized representative of The Japan International Cooperation Agency, Thailand Office (hereinafter referred to as the "JICA") on the one part

and

(Name of Company) whose office is situated at (address) represented by (Name of representative) Nationality () Title () (hereinafter referred to as the "Contractor" on the other part.

Both parties mutually agree under the terms of the Contract as follows :-

Article 1. Purpose of the Contract and Contract Price

JICA agrees to employ the Contractor and the Contractor agrees to perform the works for the Construction of Structure for Telemetry / Data Communication System for the Irrigation Engineering Center Project Phase II, in Thailand (hereinafter referred to as the "Project") at Changwat Chai Nat, Changwat Nakhon Sawan, Changwat Ayutthaya and Bangkok for the total amount of (word) Baht only (B figure) (hereinafter referred to the "Contract Price"). JICA shall take necessary measures except the Contractor's custom duty, internal tax and other fiscal level which may be imported to the Kingdom of Thailand which respect to supply of products, services and equipment necessary for works.

The following documents shall form an integral of the Contract :-

- Terms and Conditions of the Contract
- Pledge Agreement
- Technical Specifications
- Bill of Quantities
- Drawings

Article 2. Performance Bond

As a security for the faithful performance of the Works under this Contract, the contractor shall deposit a Performance Bond with JICA (words) Baht only (฿ figure) in a Bank Guarantee to be issued by the first class bank in the Thailand within fourteen (14) days after signing of this Contract. Bank issuing bank guarantee and form of bank guarantee are subject to approval of JICA.

JICA will return the Performance Bond to the Contractor at the 12 months after final acceptance of the works by JICA as stipulated in Article 15 of this Contract, provided that the completed works shall not show any defect or damage caused through the fault of the Contractor during the maintenance period as stipulated in article 11 of this Contract.

Should the Contractor be in default, JICA shall have the right to demand payment form all or any part of the Performance Bond, however, the Contractor's responsibility shall not be released in any case.

Article 3. Payment

Payment to the Contractor shall be of unit price basis as stipulated in the Bill of Quantities, however, payment to the Contractor will be made by the following manner :-

a) Advance Payment

Amount of (word) Baht only (฿ figure) which corresponds to thirty (30) percent of the Contract Price will be paid upon acceptance of Performance Bond by JICA. Required documents for advance payment are request letter for payment and letter of guarantee as a Performance Bond issued by the approved bank by JICA.

b) Final Payment

The remainder of (words) Baht only (¥ figure) which corresponds to seventy (70) percent of Contract Price will be paid upon the delivery of the works to JICA under this Contract. Required documents for the final payment are the request letter for payment, copy of acceptance certificate issued by JICA, and final Bill of Quantities approved by the Supervisor.

Final adjustment of Contract Price shall be made at final payment time in case of modification of works under the Article 14 of this Contract, however adjustment of Performance Bond is not necessary.

Article 4. Completion Time

The Contractor agrees to commence the works within fourteen (14) days from the date of signing of the Contract (commencement date) and the Contractor agrees to satisfactorily complete the works within 120 days (completion time) after the date hereof which will be on the (day)th day of (month), 1992 (completion date).

If the Contractor fails to commence the works by the above commencement date, or should, in the course of the construction work, any event occur which may reasonably cause JICA to believe that the Contractor will not be able to complete the work by the completion date, or should the Contractor fail to meet any of the Contract requirements, JICA shall have the right to terminate the Contract by giving written notice to the Contractor.

However, in case that the Contractor fails to complete the work by the completion date, or to meet any of the Contract's requirements, if the Supervisor judges that the Contractor has the ability to complete the work within a reasonable period of extension, the Contractor may be permitted by JICA to continue the work beyond the completion date but within the extended period.

Should the amount of extra or additional work of any kind or any cause of delay referred to in these conditions, or exceptional adverse climatic conditions, or any other special circumstances of any kind whatsoever which may occur, other than through a default of the Contractor, be such as fairly to