central processing unit damage in the main facilities. Indirect strikes via transmission lines inflict especially severe damage on the switching system itself, suspending it as long as one week in the worst case.

However, since no good protection system has been established, the most effective protection is to always maintain spare parts for repairs, immediately replacing applicable parts when damaged to minimize the length of suspensions of the switching system.

Spare parts have been selected in accordance with the above considerations. Since this project can provide only a small number of parts, one spare part per each removable electronic unit, in principle, will be implemented. For echo cancelers, however, there will be two spare parts, since these are directly connected to the transmission lines.

2) Consumables

Consumables like printing ribbons, magnetic tapes, and cartridge tapes for two years will be provided.

3-3-4 Basic Design Drawings

The following basic design drawings are prepared.

1) Figure 3-14 Survey Drawing
2) Figure 3-15 Site Layout of Earth Station
3) Figure 3-16 Floor Layout of Satellite Communication Building
4) Figure 3-17 Elevation Plan of Satellite Communication Building
5) Figure 3-18 Section Plan of Satellite Communication Building
6) Figure 3-19 Engine Generator House at Earth Station
7) Figure 3-20 Site Layout of Repeater Station
8) Figure 3-21 Engine Generator House at Repeater Station

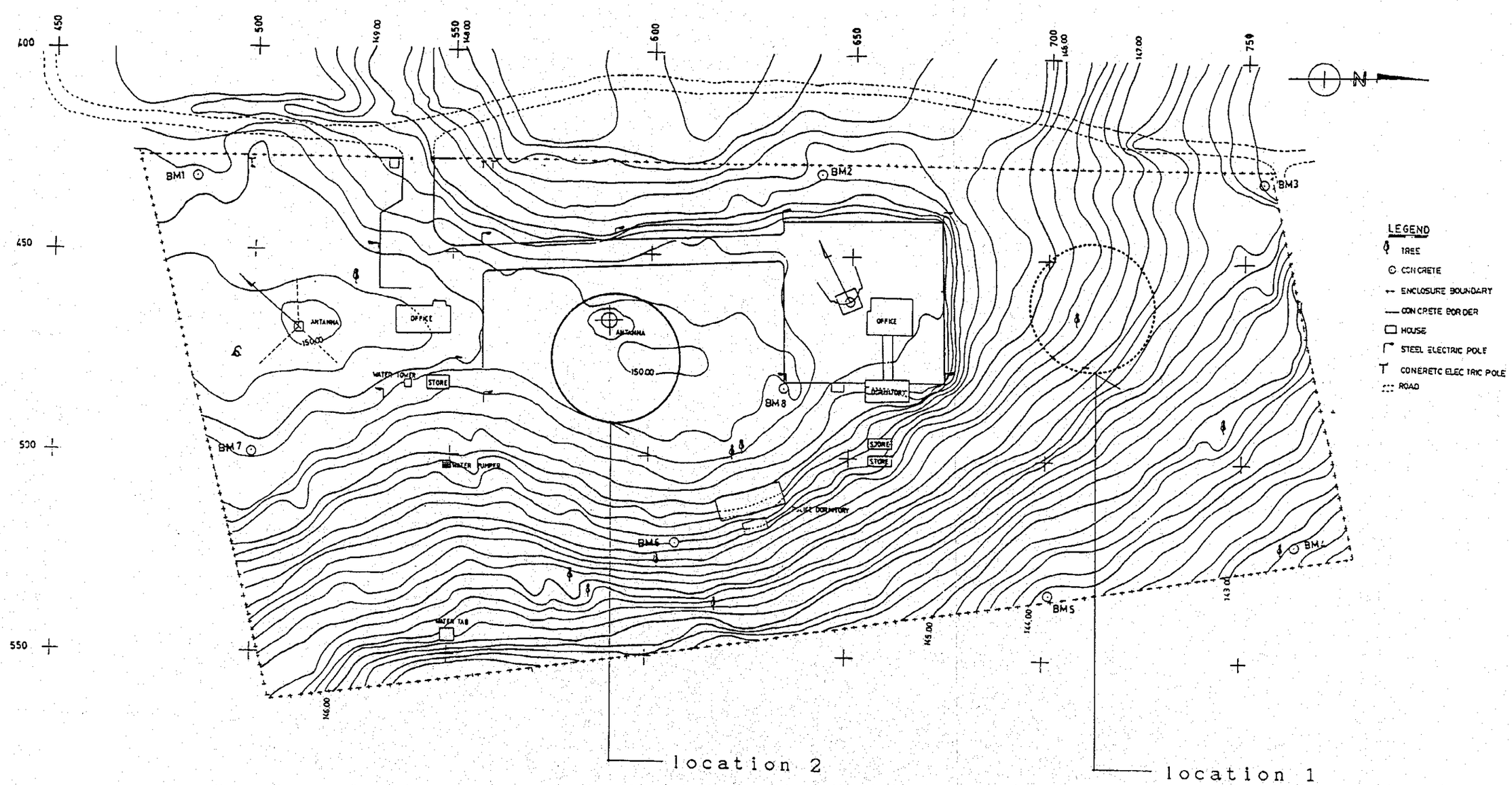


Figure 3-14 Survey Drawing

scale: 1/1000

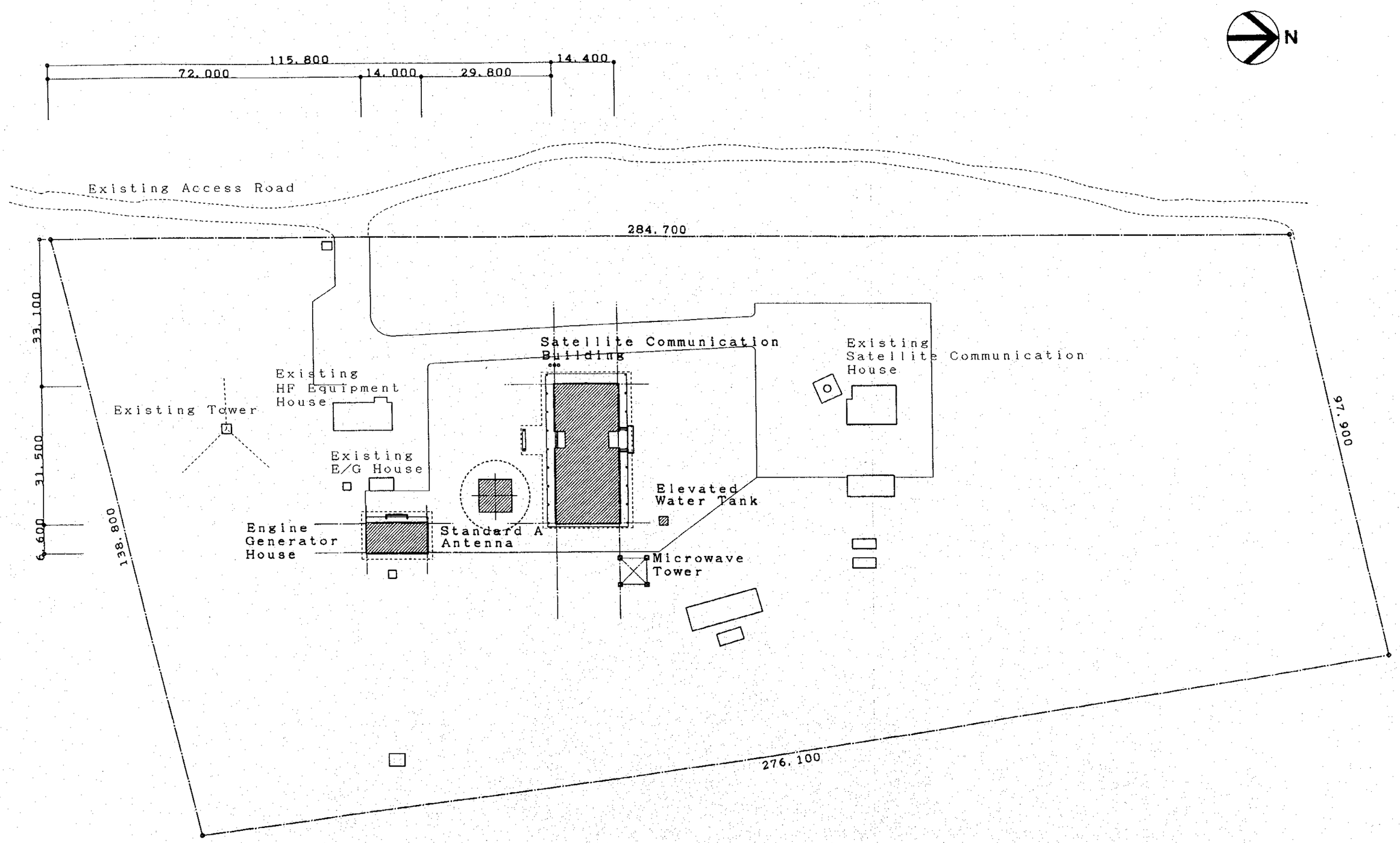


Figure 3-15 Site Layout of Earth Station scale : 1/800

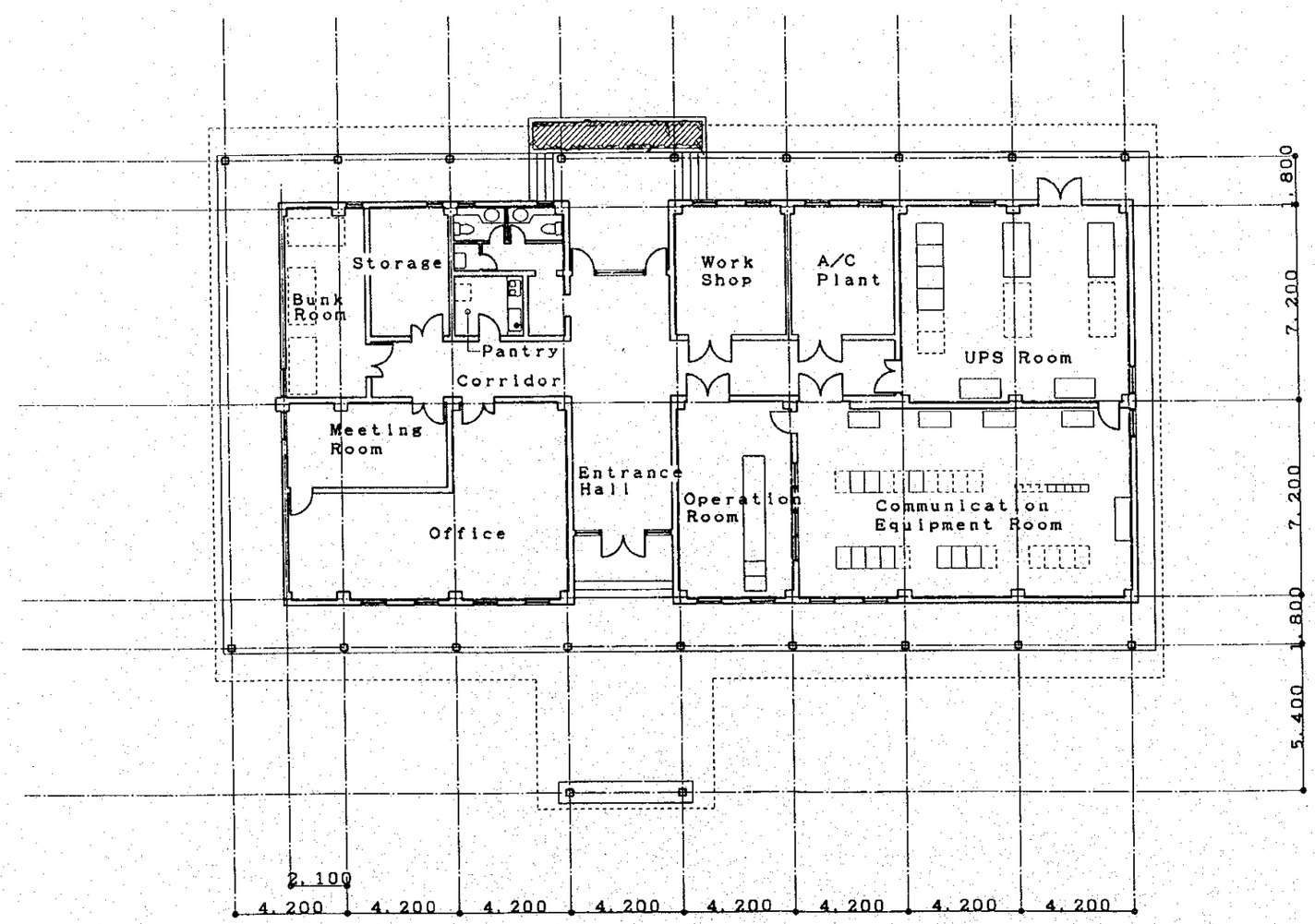
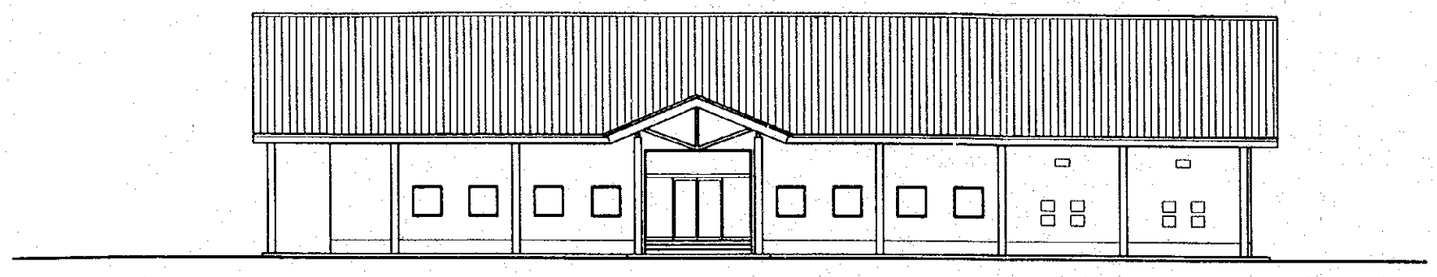
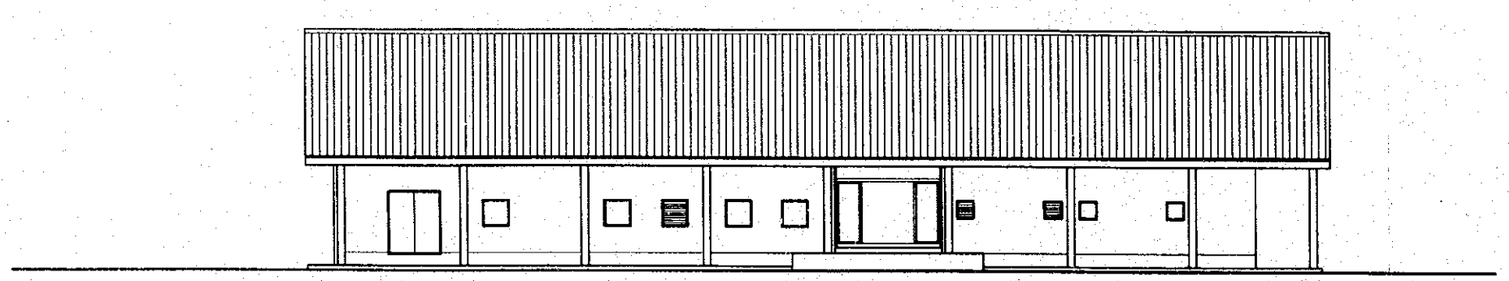


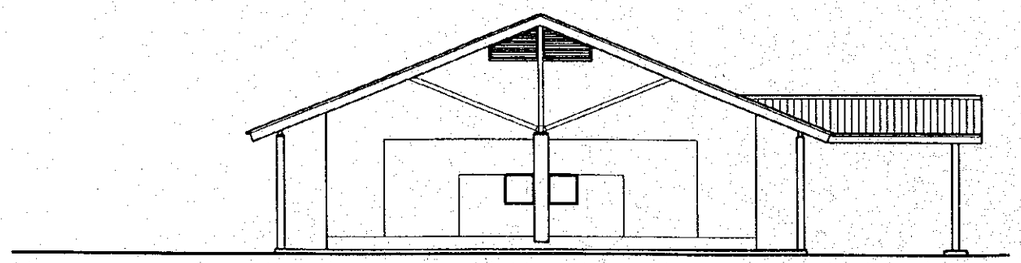
Figure 3-16 Floor Layout of Satellite Communication Building scale : 1/200



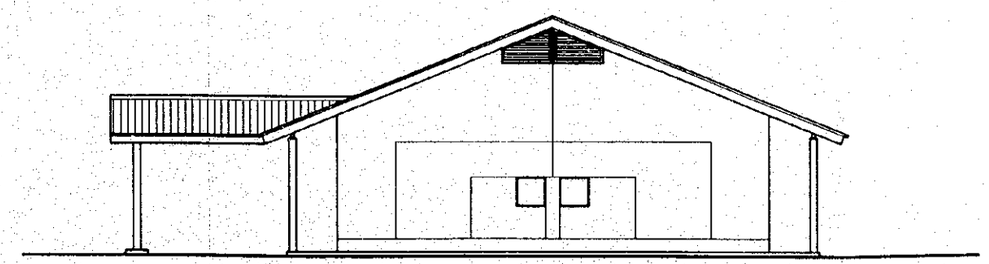
South Elevation



North Elevation

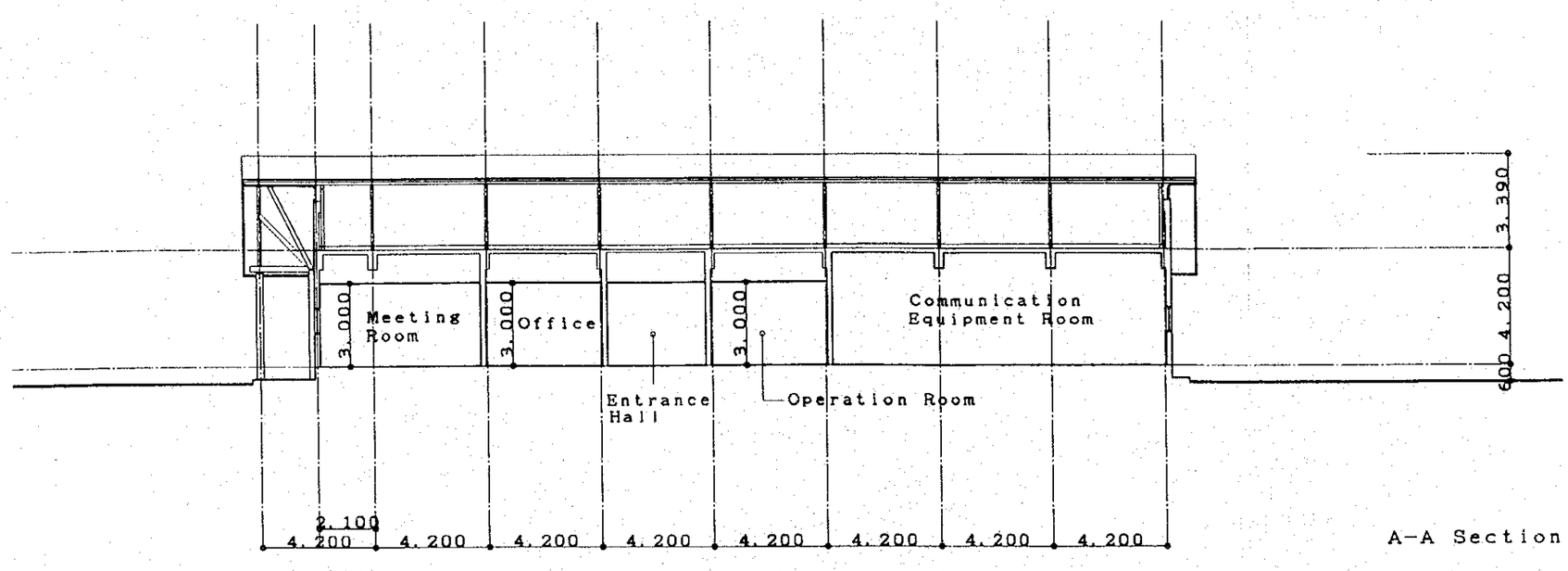


West Elevation

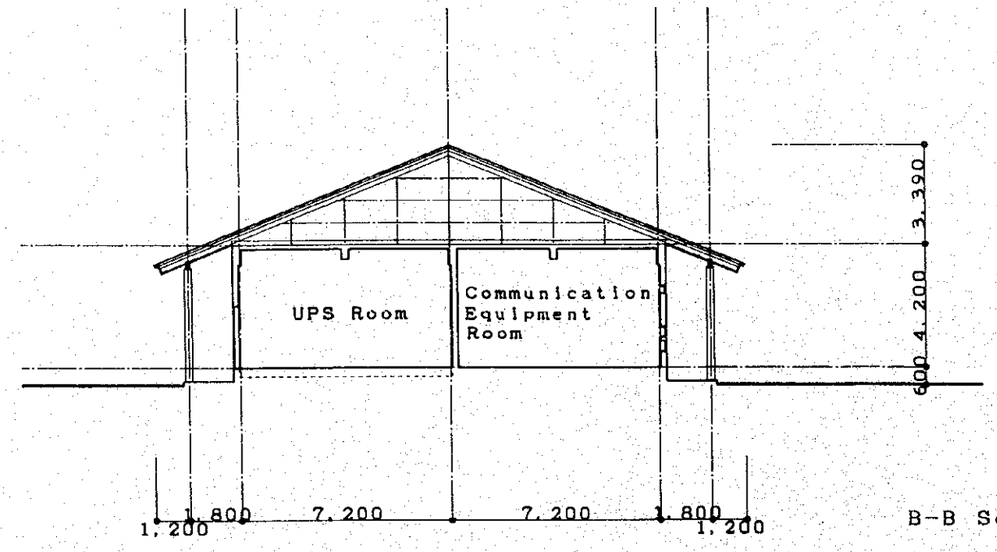


East Elevation

Figure 3-17 Elevation Plan of Satellite Communication Building scale : 1/200



A-A Section



B-B Section

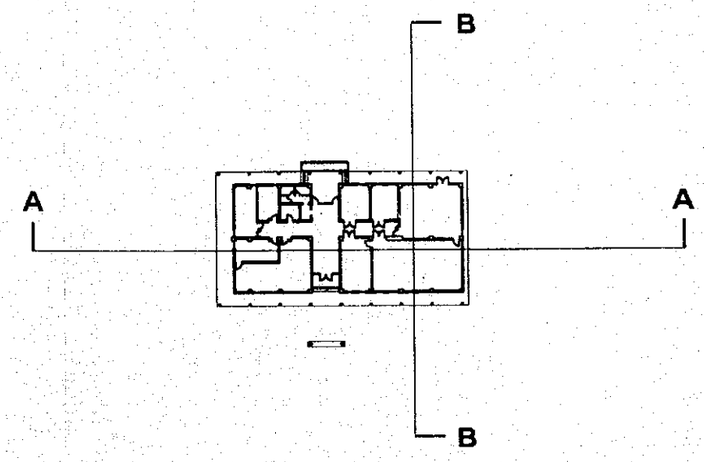
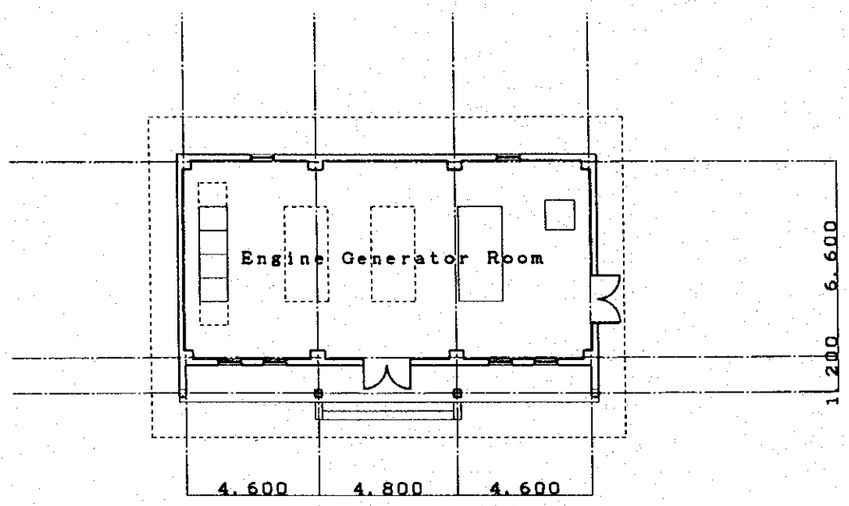
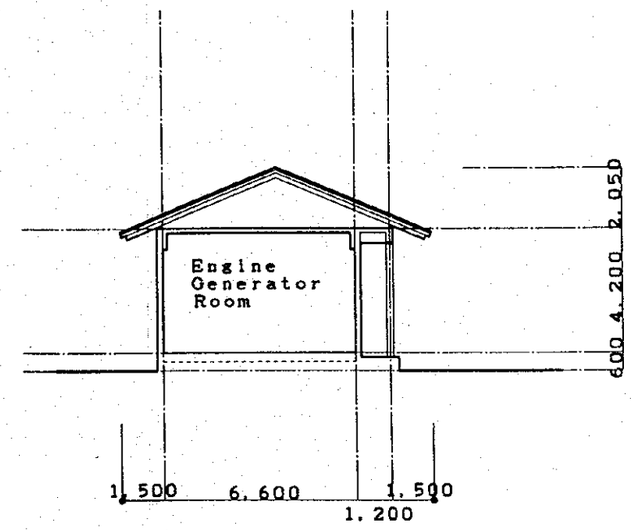


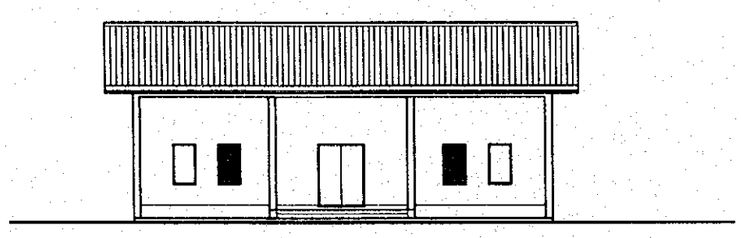
Figure 3-18 Section Plan of Satellite Communication Building scale : 1/200



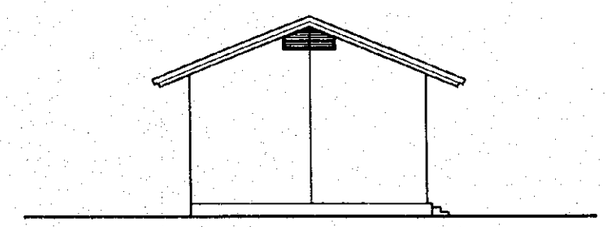
Ground Floor Plan



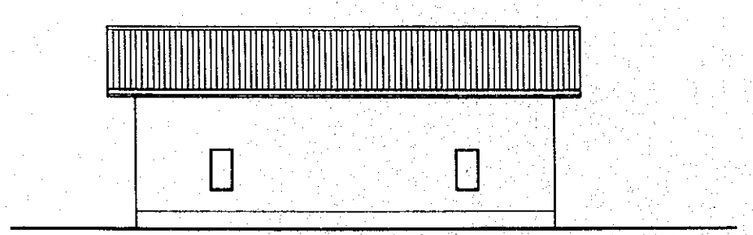
Section



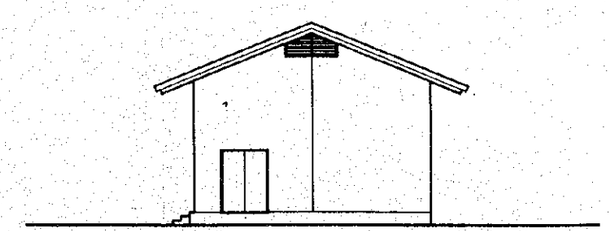
West Elevation



North Elevation



East Elevation



South Elevation

Figure 3-19 Engine Generator House at Earth Station scale : 1/200

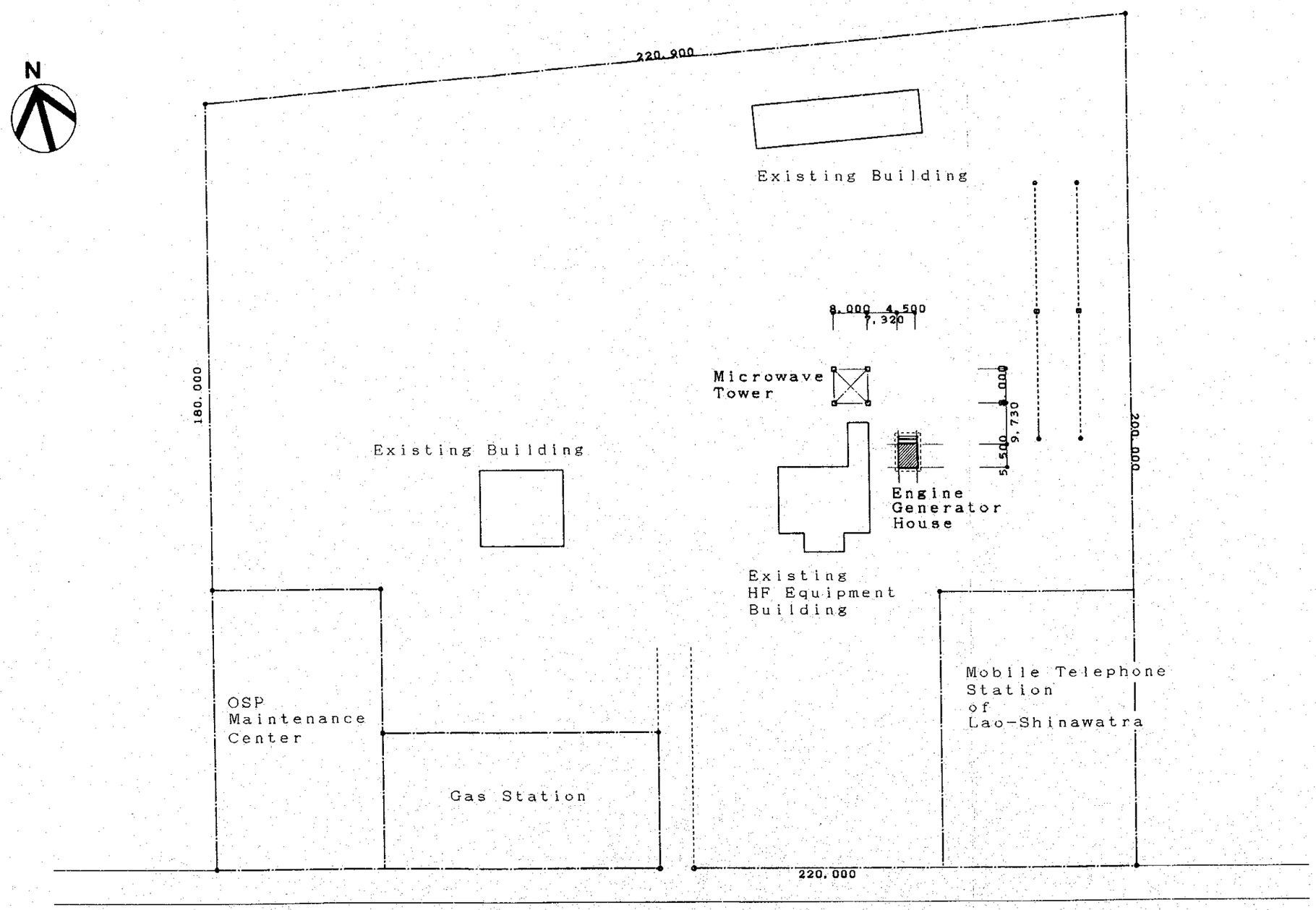
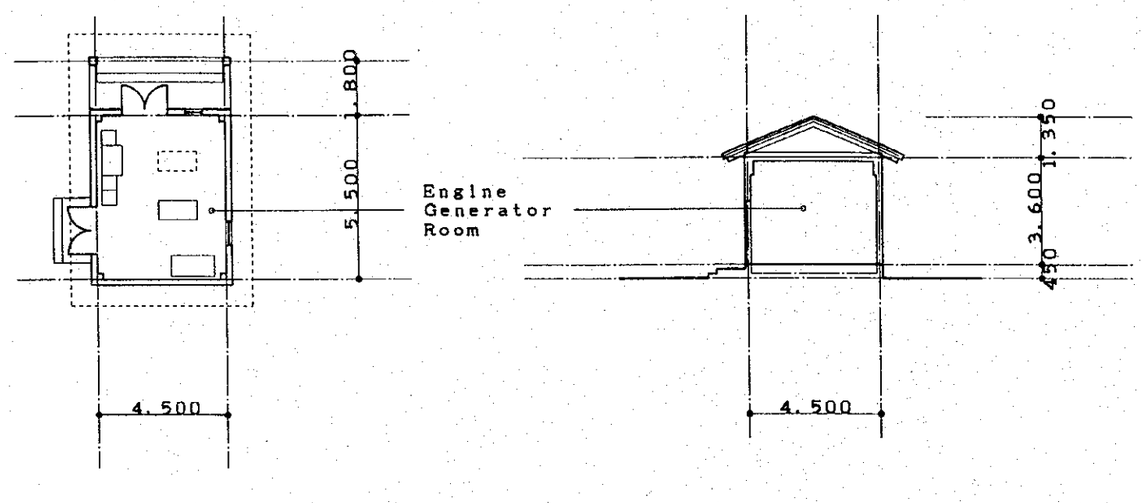


Figure 3-20 Site Layout of Repeater Station scale : 1/1000



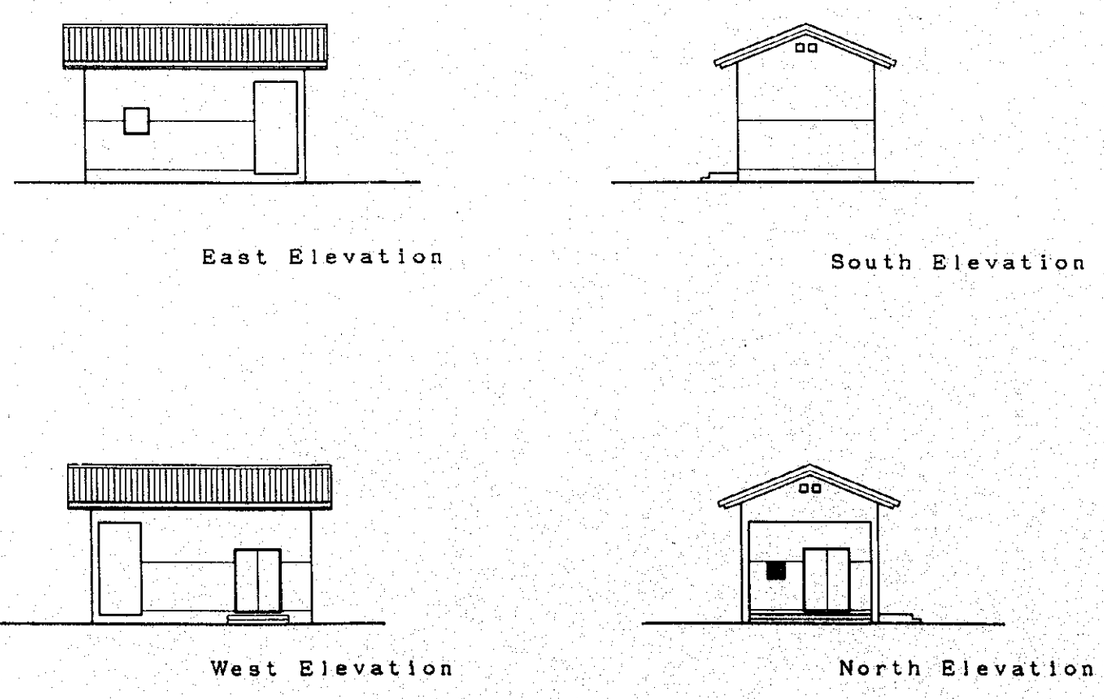


Figure 3-21 Engine Generator House at Repeater Station scale : 1/200

3-4 Implementation Plan

3-4-1 Conditions of Construction

(1) Phasing of Work

As mentioned above, the operation of the existing switching systems international functions, are irregular, causing delays monthly. The switching system should be improved as soon as possible.

On the other hand, work on the earth station and the approach link will take a long time. The commencement of these works should be timed with due consideration of the characteristics of the Japan's grant aid system.

Therefore, work on the project should be divided into two phases. In the first phase, the enhancement of the existing switching system will be implemented and in the second phase, construction of buildings, satellite communication facilities, and approach link facilities will be implemented.

(2) Consultant

After the signing of the Note of Exchange between the governments of the Lao PDR and Japan, EPTL should contract with a Japanese consulting firm in order to make a detailed design, prepare the tender document, and administer construction work. The contract should be concluded shortly after the signing of the Note of Exchange in order to shorten the total work time.

Services of the consultant are as follows:

1) Drafting specifications and tender document
2) Assisting evaluation of bids and negotiation with a contractor
3) Witnessing factory tests
4) Supervising work
5) Assisting tests

3-4-2 Method of Implementation

Implementation of this project requires advanced technology. To ensure execution of the work within a limited period, and because construction requires close cooperation between

manufacturers of communication equipment, building constructors, and the consultant. Therefore, construction should be by Japanese contractors on a full turn-key basis.

3-4-3 Construction and Supervision

The executing agency of the project is EPTL. EPTL should set up a project team to do procurement, construction, testing, and operation.

This project is to proceed as follows:

(1) Signing of Note of Exchange

Note of Exchange for grant aid for this project signed by and between the Government of the Lao PDR and the Government of Japan.

(2) Banking Arrangement

The Government of the Lao PDR appoints a Japanese bank to disburse grant aid, from among Japanese banks officially approved by the Japanese Government.

(3) Contract With Consultant

EPTL contracts with a Japanese consultant to assist EPTL in designing and supervising the work of this project. The contract becomes effective subject to the approval of the Japanese Government.

(4) Field Survey and Preparation of Tender Documents

The consultant contracted with EPTL carries out the field survey at the sites. Detailed design is made up based on the field survey findings, and then the tender documents are prepared. The tender documents are finalized subject to the approval of EPTL.

(5) Tender Evaluation and Conclusion of Contract

The consultant assists with bidding and evaluates the proposals using a method approved in advance by EPTL.

EPTL begins to negotiate with the top bidder. The consultant drafts a contract and assists EPTL in contracting with suppliers. The contract becomes effective subject to the approval of

the Japanese Government.

(6) Approval of Installation Drawings

On behalf of the Government of the Lao PDR, the consultant examines the installation drawings submitted by the contractor, to finalize the Bill of Quantity, and reports to EPTL.

(7) Witnessing Factory Inspection

Prior to shipping, the consultant inspects the equipment and materials to confirm their compliance with the contracted specifications, particularly with respect to the mechanical and electrical characteristics.

(8) Installation Work Supervision

The consultant checks the work schedule submitted by the contractor, and gives instructions, where necessary. The consultant visits the sites periodically and supervises work and progress.

(9) Delivery of Completed System

The consultant witnesses tests of the equipment, and examines documents. After confirming that spares/accessories, measuring equipment, operation manuals, etc., supplied by the contractor are as specified, the consultant recommends that EPTL accept the project.

3-4-4 Procurement Plan

The equipment and materials for this project should be procured economically as long as quality is maintained.
Guidelines for the procurement of each component are as follows:

(1) Satellite Communication System and Approach Link System

The equipment for this project introduces advanced technology and is produced in industrialized countries including Japan. Among such countries, Japan's is of superior long term quality and reliability.

Considering achievements, reliability, after-care and price of products, it is recommended that at least principal communication equipment be Japanese.

However, for products not requiring high technology, such as power supply and iron tower, products from another country should be purchased, if they comply with specifications and are economical.

(2) Switching and Billing Systems

Switching systems are designed and manufactured based on each manufacturer's own philosophy making it impossible for another manufacturer to modify another's equipment.

The equipment and materials for expansion of trunks and of functions of the existing switching system can be procured solely from the original manufacturer of the switching system, for technical and economical reasons. It costs too much for a manufacturer to supply equipment not its own. As patents and manufacturing are known exclusively by the original manufacturer, the original equipment should be purchased, by paying for manufacturing technical information.

In this case, manufacturing is extremely expensive compared to buying directly from the original manufacturer.

Consequently, equipment and materials for the switching system and billing system should be procured under a private contract with the supplier of the existing system.

(3) Equipment and Materials for Building

Construction materials locally produced in Laos are primary commodities such as concrete aggregate, bricks, blocks, and timber. Laos, therefore, almost completely depends on imports from other countries for other materials such as cement, reinforcing steel, finishing materials, and equipment-related materials. The country Laos most heavily depends on for such imports is Thailand, followed by Vietnam and China. Imports from Thailand are diverse and of high quality, and their supply is dependable. In this project, therefore, construction materials will be mostly procured domestically or imported from Thailand in order to ensure ease of maintenance. Only those materials that are difficult to obtain from Thailand will be supplied from Japan.

3-4-5 Implementation Schedule

The implementation schedule for the project is shown in Table 3-12.

3-4-6 Scope of Work

The scope of work for each party, i.e., Japan and the Lao PDR, is as follows:

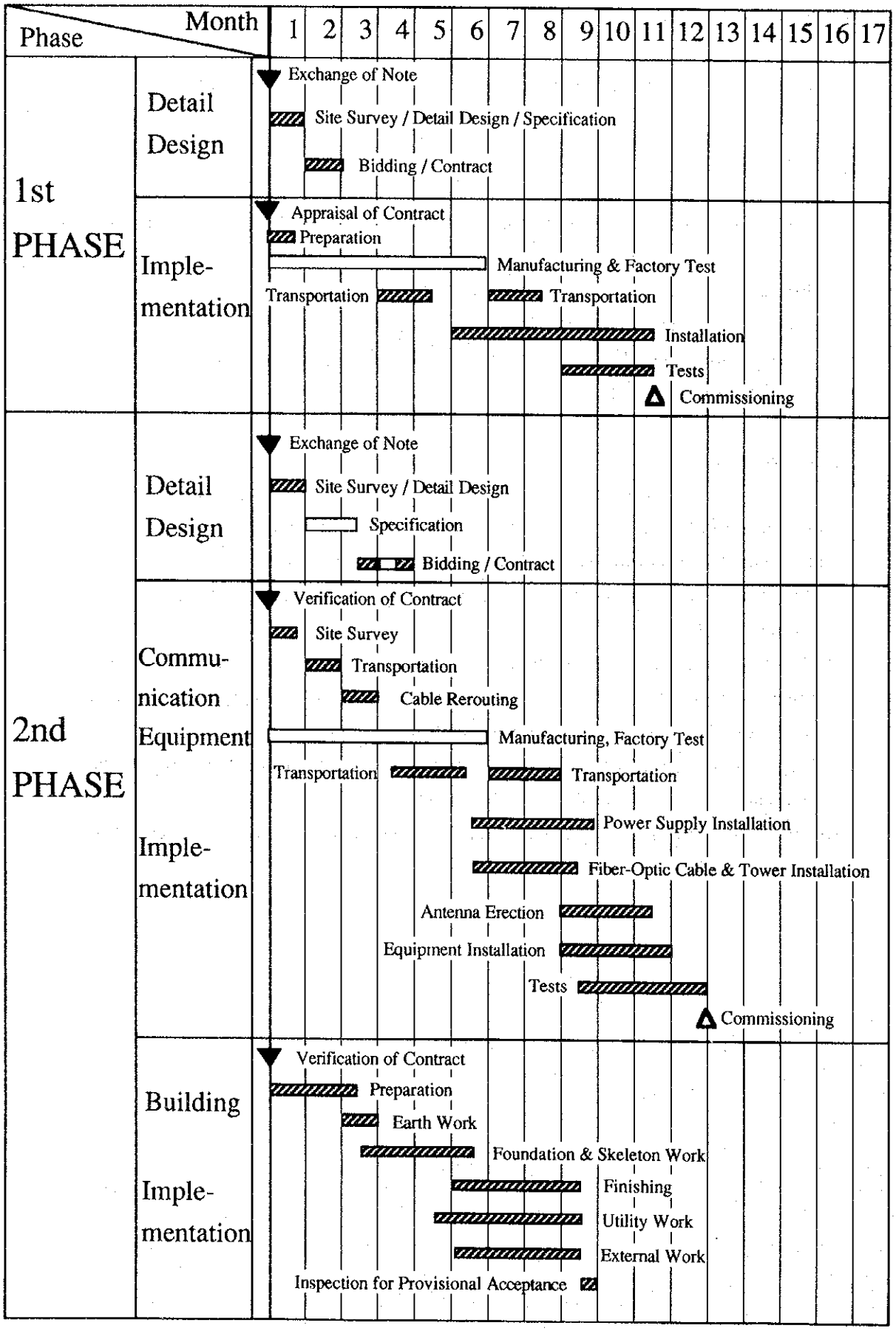
(1) Japan

1) Provision of equipment and materials for enhancement of telephone switching and charging systems
2) Provision of equipment and materials for the earth station
3) Provision of equipment and materials for the approach link
4) Construction of buildings at the earth station and the repeater station
5) Provision of spare parts

(2) The Lao PDR

1) Removal of obstacles in the sites of the earth station and the repeater station
2) Leveling the sites of the earth station and the repeater station
3) Incidental outdoor work such as gardening, fencing, gate,s and exterior lighting in and around the site
4) Providing facilities for distribution of electricity (including a transformer for primary power), water supply (including provision of a well water feed pipe to the receiving tank), telephone, drainage, sewage and other incidental facilities
5) Taking necessary measures for radio coordination procedures in Radio Regulations and for an application for use of INTELSAT space segment
6) Negotiating with foreign telecommunications administrations for establishment of international lines

Table 3-12 Implementation Schedule



CHAPTER 4 EVALUATION AND CONCLUSION

Chapter 4 Evaluation and Conclusion

4-1 Beneficial Effects

The expected beneficial effects for the Lao PDR and the Laotian people, direct and indirect, are as follows:

4-1-1 Direct Effects

(1) Meeting the Demand for International Telecommunications

The demand for international telecommunications in the Lao PDR has been growing at a very high rate due to the revitalization of the economy under the new economic mechanism. This project, which strengthens the capability of international telecommunications, will contribute greatly to meeting the demand of the citizens and enterprises of the nation.

(2) Reduction of Transit Charges

By establishing a direct line, transit charges will be reduced, EPTL can reduce its costs, and Laos can minimize payments to other countries. In the year 2001, such savings should amount to over 1,000 million Kips (1.4 million dollars or 140 million yen).

(3) Reduction of Satellite Charge

By introducing a Standard-A earth station, the space segment charges per line will be less expensive than with the existing Standard F-3 earth station, reducing the payment to INTELSAT. The total sum saved for all lines in the year 2001 will be 240 million Kips (330 thousand dollars or 33 million yen).

(4) Stabilization of Finances

Improving international telecommunications, which account for more than 60 percent of all telecommunication business sales. Secure sales will contribute to stabilizing finances of EPTL and, consequently, sound finances for the Laotian Government.

(5) Improving Quality of International Telephone Calls

By using newly established direct routes and sufficient number of international lines, quality of international telephone call will be much improved for both national and foreign users. This will increase demand for international calls and consequently increase sales.

4-1-2 Indirect Effects

(1) Revitalization of the Economy

Business enterprises, when investing in a country, generally regard the international telecommunication infrastructure of as extremely important. Therefore, the improvement of international telecommunications in this project will result in increased foreign investment and the revitalization of the whole national economy.

(2) Contribution to the Development of Domestic Telecommunications Networks

By appropriating a part of the revenue from international telecommunications, it will be possible to accelerate the development of domestic telecommunications networks which are now very poor. It is expected that the revenue can partially finance Telecom III (a rural telecommunications project under consideration).

4-2 Recommendations

The use of grant aid to implement this project is therefore plausible, as it is expected to produce the considerable effects mentioned above. Furthermore, the recipient country is able to offer the necessary personnel and money for this project.

However, if the following items are improved and upgraded, this project can be implemented more effectively.

(1) The Reinforcement of the Organizations

The earth station for the project is only hardware and cannot achieve its objectives unless it is operated properly. Therefore planning international networks is of urgent necessity. In addition, there will be more external contacts in accordance with the increase of direct lines. Accordingly, a new department needs to be established to plan international telecommunications networks and negotiate with foreign entities such as INTELSAT and telecommunications carriers.

(2) Development of Human Resources

For securing skilled human resources and continuous recruitment of the staff, it is recommended that the Posts and Telecommunications Training Center be taken advantage of and national educational institutions be used.

(3) Marketing Activities

To fuel demand for international telecommunications and to secure EPTL business income, it is of vital importance that EPTL put more stress on formerly neglected marketing activities.

[APPENDIXES]

Member List of Survey Team

1. Field Survey Team

Yusuke KITAMURA	Leader, Project Coordinator Director, Training Div., Tsukuba International Center Japan International Cooperation Agency
Toshio TAKAHASHI	International Communication Planner International Cooperation Div., International Affairs Department Ministry of Posts and Telecommunications
Toru KIZUKA	Chief Consultant, Satellite Communication System Planner KDD Engineering and Consulting, Inc.
Takahiko ADACHI	Switching System Planner The Nippon Telecommunications Consulting Co., Ltd.
Ryusuke TAKEHIRA	Radio Transmission System Planner KDD Engineering and Consulting, Inc.
Masaaki RYOKE	Architecture Planner KDD Engineering and Consulting, Inc.

2. Draft Final Report Explanation and Consultation Team

Yusuke KITAMURA	Leader, Project Coordinator Director, Training Div., Tsukuba International Center Japan International Cooperation Agency
Atsushi OZU	International Communication Planner International Cooperation Div., International Affairs Department Ministry of Posts and Telecommunications
Toru KIZUKA	Chief Consultant, Satellite Communication System Planner KDD Engineering and Consulting, Inc.
Takahiko ADACHI	Switching System Planner The Nippon Telecommunications Consulting Co., Ltd.
Masaaki RYOKE	Architecture Planner KDD Engineering and Consulting, Inc.

Survey Schedule

1. Field Survey

1994

Oct.	13	Thu	Arrival in Vientiane
	14	Fri	Courtesy call to MCTPC, EPTL, M. of Foreign Affairs
	15	Sat	Courtesy call to Minister of MCTPC, Field survey
	16	Sun	Internal meeting
	17	Mon	Discussion on the project, Field survey
	18	Tue	Discussion on the project, Field survey
	19	Wed	Signing on Minutes of Discussions
	20	Thu	Field survey, Technical discussion
	21	Fri	Field survey
	22	Sat	Field survey
	23	Sun	Internal meeting
	24	Mon	Field survey, Technical discussion
	25	Tue	Field survey, Technical discussion
	26	Wed	Field survey, Technical discussion
	27	Thu	Field survey, Technical discussion
	28	Fri	Field survey, Technical discussion
	29	Sat	Field survey, Technical discussion
	30	Sun	Field survey, Technical discussion
	31	Mon	Field survey, Technical discussion
Nov.	1	Tue	Field survey, Technical discussion
	2	Wed	Confirmation of discussion
	3	Thu	Additional survey
	4	Fri	Leave Vientiane

2. Explanation of Draft Final Report

1995

Jan.	6	Fri	Arrival in Vientiane
	7	Sat	Courtesy call to EPTL, Explanation of D/F Report
	8	Sun	Internal meeting
	9	Mon	Courtesy call to MCTPC, Meeting with CPC, Explanation of D/F Report
	10	Tue	Discussion on D/F Report
	11	Wed	Signing on Minutes of Discussions
	12	Thu	Leave Vientiane