

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT
OF
NATIONAL BROADCASTING
IN
KINGDOM OF CAMBODIA**

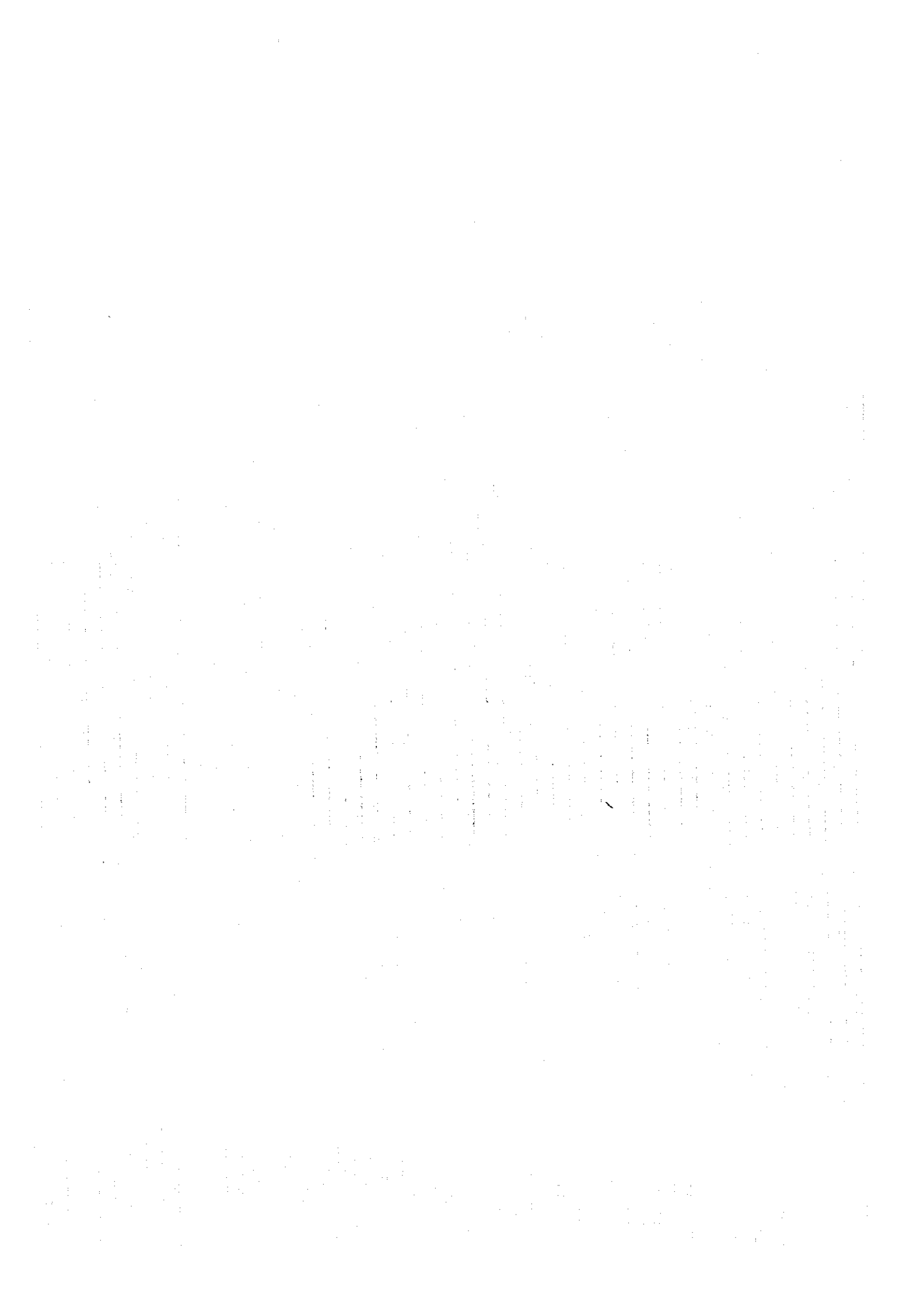
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MINISTRY OF INFORMATION
THE ROYAL GOVERNMENT OF CAMBODIA

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PREFACE

In response to a request from the Royal Government of Cambodia, the Government of Japan decided to conduct a basic design study on the Project for Improvement of National Broadcasting in Kingdom of Cambodia and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Kingdom of Cambodia a study team from November 12th to December 10th, 1995.

The team held discussions with the officials concerned of the Royal Government of Cambodia, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Kingdom of Cambodia in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Royal Government of Cambodia for their close cooperation extended to the teams.

March 1996



Kimio Fujita
President

Japan International Cooperation Agency



March 1996

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of National Broadcasting in Kingdom of Cambodia.

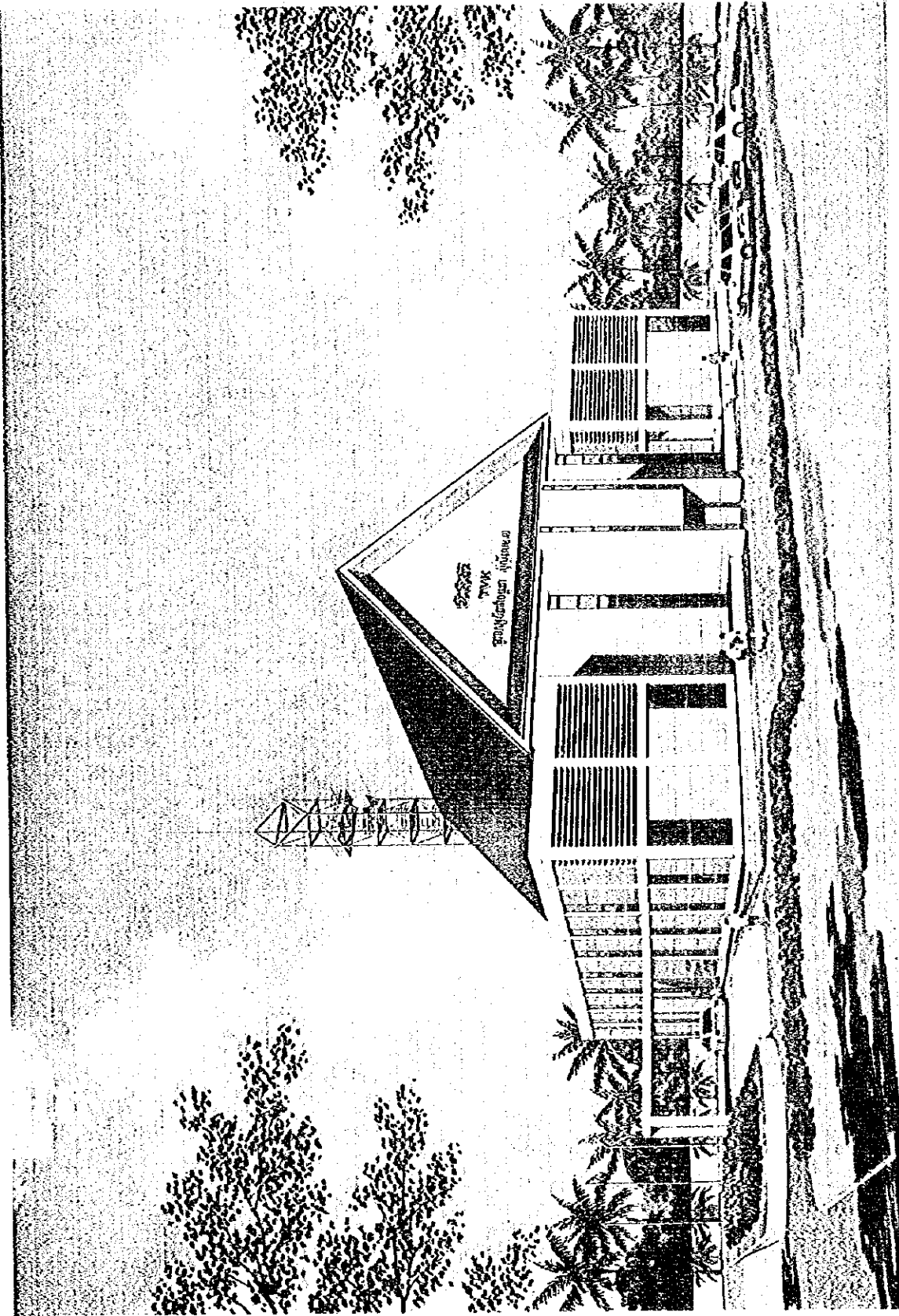
This study was conducted by NHK Integrated Technology Inc., under a contract to JICA, during the period from November 6th, 1995 to March 29th, 1996. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Cambodia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Kei Miyazaki

Kei Miyazaki
Project manager,
Basic design study team on
The Project for Improvement of
National Broadcasting
NHK Integrated Technology Inc.



PERSPECTIVE OF TVK NEW TV STATION

Abbreviations

EDC	Electricité du Cambodge
ICORC	The International Committee on the Reconstruction of Cambodia
IFRB	International Frequency Registration Board
IMF	International Monetary Fund
ITU	International Telecommunication Union
TVK	National Television of Cambodia (Kampuchea)
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNTAC	United Nations Transitional Authority in Cambodia

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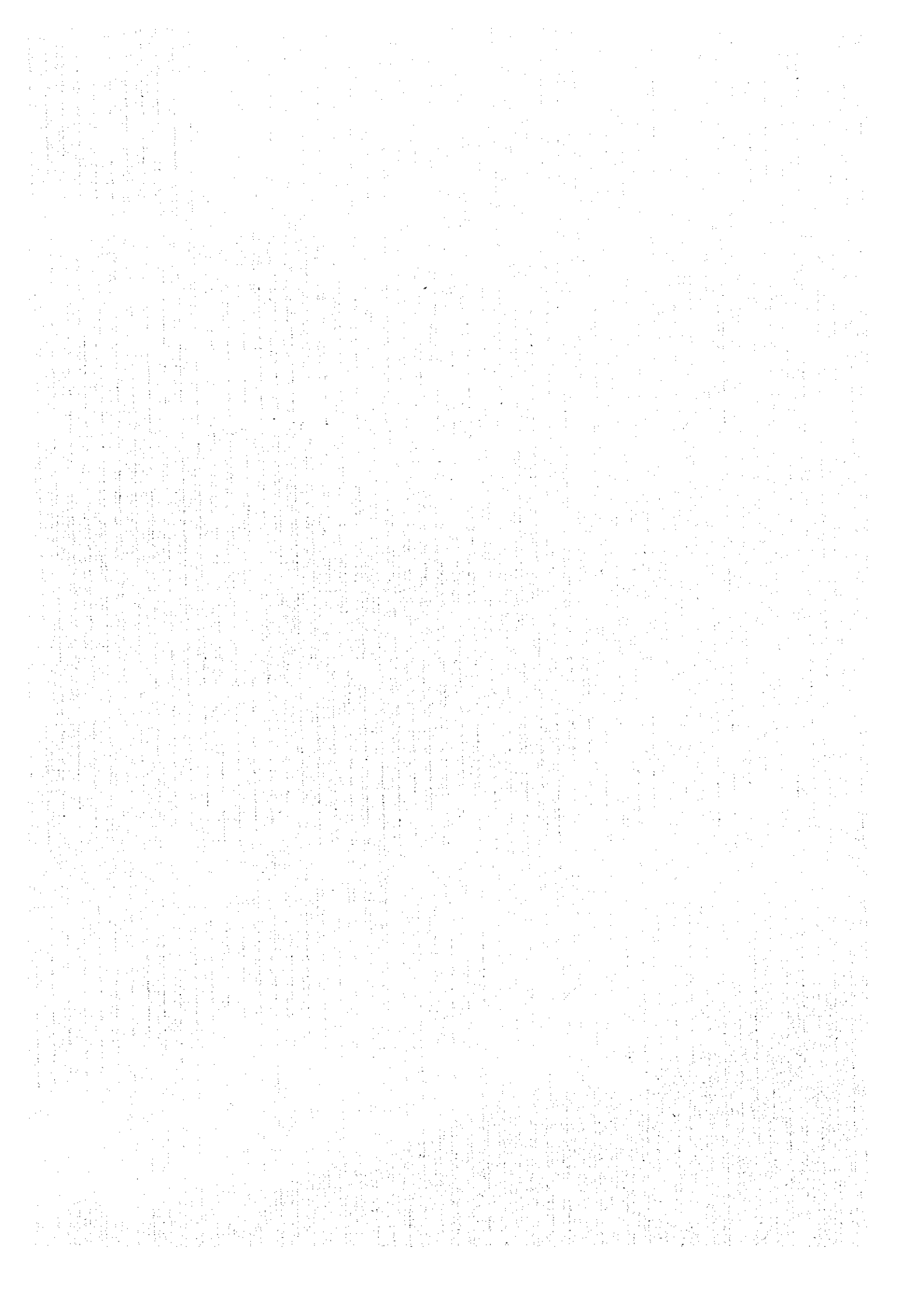
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Chapter 1 Background of the Project



Chapter 1 Background of the Project

1.1 Inception of the Project

Kingdom of Cambodia attained independence under King Sihanouk in 1953. For a while the country managed to stay out of conflicts in the region and was at peace — Phnom Penh, the capital, developed as a cultural city and became known as "Little Paris."

However, the situation changed dramatically and the country was plunged into a civil war which lasted more than 20 years when, in 1970, the pro-American General Lon Nol staged a coup d'état while Sihanouk was paying a visit to the U.S.S.R. Phnom Penh fell in April 1975, and a faction led by Pol Pot established a government in January 1976. In December 1978, the Vietnamese Army moved into Cambodia, and by January of the following year a government headed by the pro-Vietnamese Heng Samrin was established. Throughout this time, the civil war in the country only intensified; many men of talent were lost, infrastructure destroyed, and facilities and equipment deteriorated.

In October 1991, a peace accord called the "Agreement on a Comprehensive Political Solution to the Conflict in Cambodia" (the Paris Accord) was signed by 19 involved countries, and fighting was finally halted. Then, from 1992 through 1993, the activities of the United Nations Transitional Authority in Cambodia (UNTAC) and general elections held in May 1993 helped consolidate the peace process. The International Committee on the Reconstruction of Cambodia (ICORC) was established in 1992, and since then efforts have been underway to rebuild the nation.

During this process of national reconstruction, the Royal Government of Cambodia judged that utilization of television and radio is indispensable in revitalizing the devastated nation and rekindling education and culture. The Cambodian Government thus requested aid from the Japanese Government for renewing the dilapidated national broadcasting facilities and related equipment.

1.2 Outline of Requests

Requests for aid were made first in 1992, again in 1994, and for a third time in 1995, immediately ahead of the dispatch of the survey team for this project in 1995. The request content has expanded and diversified with the passage of time.

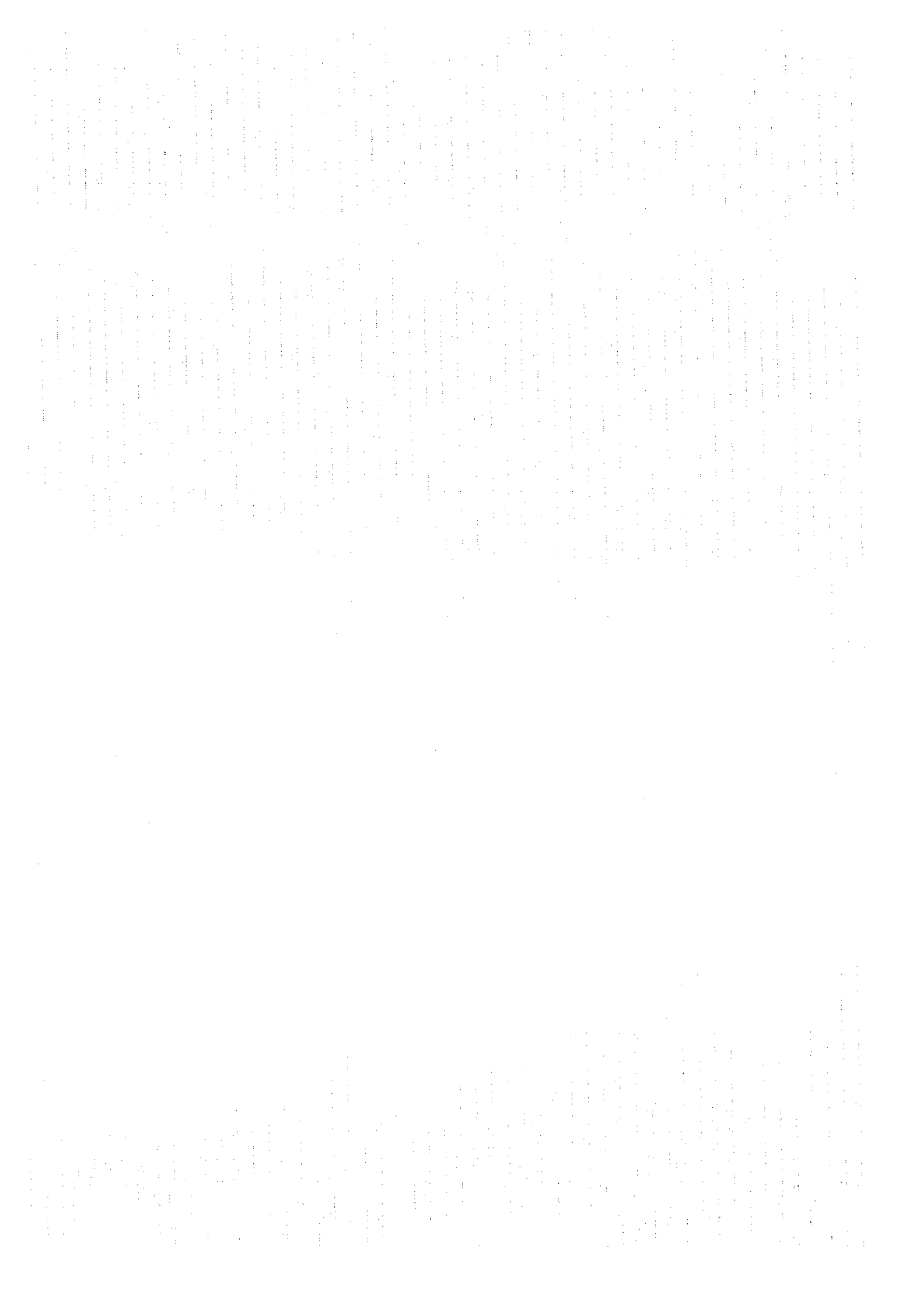
The first request in 1992 concerned improvement of the TV Broadcasting Station in Phnom Penh and related facilities and equipment, an O.B. van, and a transmitter. The activities of the national broadcasting station given in that request were limited to the main broadcasting station in Phnom Penh. In 1994, the second request additionally featured construction of three regional TV stations, a grant for radio broadcasting equipment, construction of radio transmitter stations, and construction of recording studios at radio relay stations. Furthermore, in the third request of 1995, UHF communications equipment and satellite broadcast receivers were added to the list, and the numbers of studio rooms, editing rooms, and O.B. vans were increased.

It was estimated that fulfilling all of these requests would cost too much, so the survey team's top priority was, in addition to studying the suitability of the requests, narrowing down their contents.

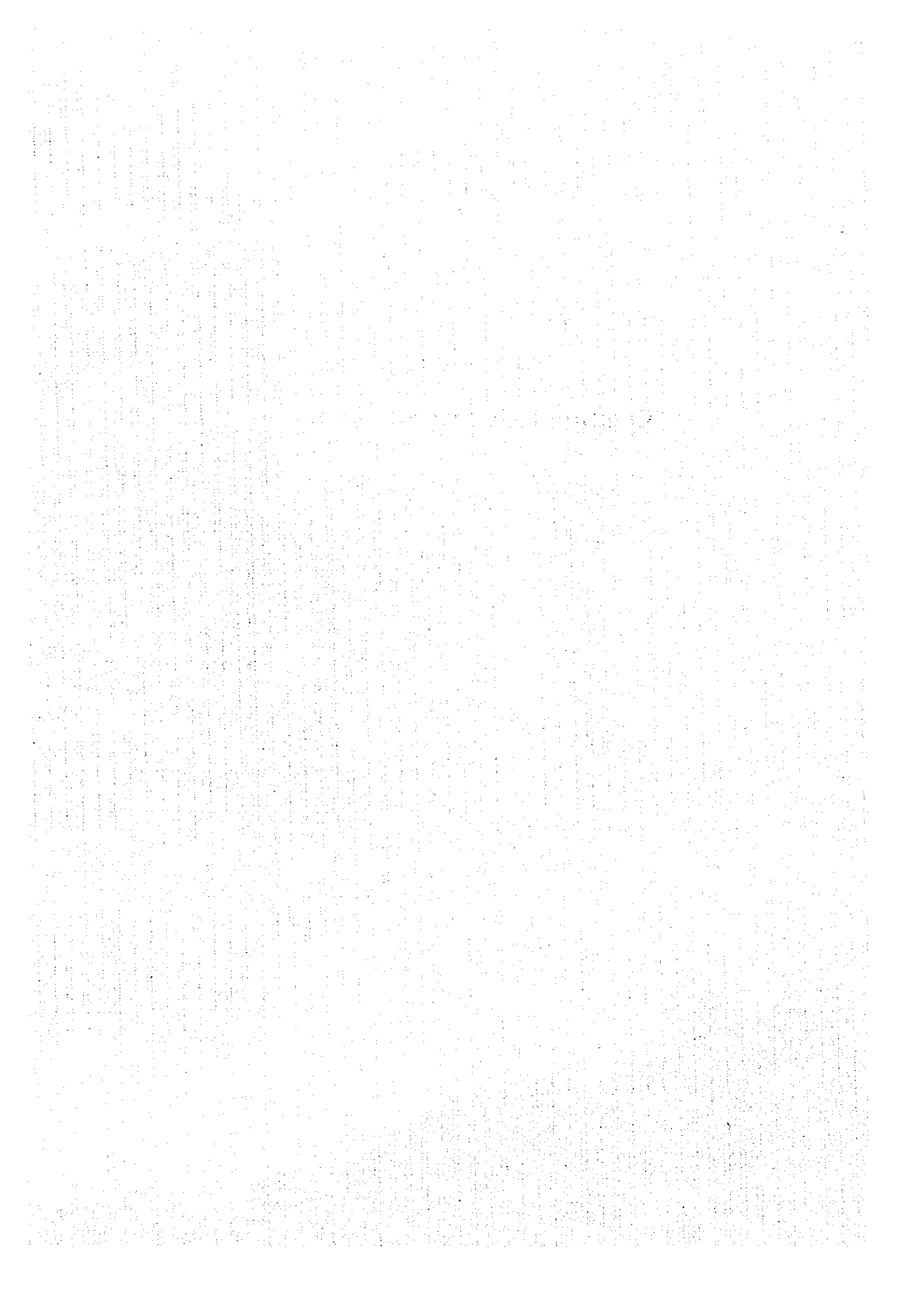
As a result of several conferences with officials from the Royal Government of Cambodia, it was agreed that radio-related requests would be fully withdrawn and the construction of a regional TV broadcasting station would be limited to only one. It was decided to concentrate aid on the construction of the main broadcasting station in Phnom Penh and the improvement of equipment therein, as well as on renovation and improvement of the Sihanoukville Regional Broadcasting Station (see Chapter 2, Part 2, "Basic Concept of the Project" for details).

The National Television of Cambodia (TVK) hopes that the following objectives will be achieved through the implementation of this project.

1. Stabilization of broadcast transmissions and expansion of the serviced area
2. Rise in in-house production of programmes to 60% from 40%
3. Increase in daily broadcasting time to 12-13 hours from 9.5 hours
4. Better quality and more quantity of news, informational programmes, and educational programmes, as well as the in-house production of dramas and ethnic music programmes that contribute to the enhancement of inherent Cambodian culture
5. Start the probes of improving and strengthening regional broadcasting stations, using enhancement of the station in Sihanoukville as a foothold.



Chapter 2 Contents of the Project



Chapter 2 Contents of the Project

2.1 Objectives of the Project

The Project for Improvement of National Broadcasting in Kingdom of Cambodia is the first step in enhancing both the quantity and quality of broadcasting by National Television of Cambodia (TVK). It involves the construction of a TV Broadcasting Station in Phnom Penh, the capital, the refurbishment of equipment therein, and improvement of the Phnom Penh transmitter station. Additionally, programme production facilities and broadcast transmission equipment will be upgraded at one regional station.

It is hoped that this will increase the area covered and the population reached, and preserve and develop Cambodia's inherent tradition and culture. News and information should reach the citizens of the Kingdom more swiftly, and concepts of education and hygiene will be popularized.

In specific, the goals to be attained are:

- (1) Better stability of transmissions. This should increase the population reached.
- (2) The proportion of domestic production by TVK will be raised from 40% to 60%.
- (3) Broadcasting hours by TVK will be lengthened to 12-13 hours per day from 9.5 hours per day.
- (4) Enhanced content and larger volume of news, information and educational programmes; in-house production of drama and music programmes, to contribute to a better representation of the domestic culture of Cambodia.
- (5) Start the probes of improving and strengthening regional broadcasting stations, using the enhancement of the station in Sihanoukville as a foothold.

2.2 Basic Concept of the Project

2.2.1 Contents of Requests and Study Results

The requests from the Cambodian government were diverse and extensive, concerning various aspects of both television and radio, but can be summarized into six core headings.

- (1) Grant for construction of a Phnom Penh TV Broadcasting Station, including studios, and required equipment
- (2) Grant for television broadcasting transmission equipment
- (3) Construction of three TV relay stations
- (4) Grant for radio broadcasting equipment
- (5) Construction of radio transmitting stations (medium frequency, short wave, and FM)
- (6) Grant for recording studios and transmitters at radio relay stations

In response to these requests, a team was dispatched to Kingdom of Cambodia from November 12 through December 10, 1995 to conduct a survey in order to formulate a basic design policy. Through a survey of local conditions and discussions with the Cambodians, the requests were amended as follows:

Retraction of radio-related requests, Nos. 4, 5 and 6

Requests Nos. 5 and 6 concerning radio transmitting and relay stations were retracted because the frequencies currently in use by the national radio station are not registered with the IFRB (International Frequency Registration Board) of the ITU (International Telecommunication Union). We pointed out that this meant aid would be difficult to approve, and the Cambodians agreed to withdraw the requests after consulting with the ITU branch office in Thailand.

Request No. 4 for radio equipment was withdrawn for the same reasons mentioned above, and in accordance with suggestions from the Japanese side that aid should be concentrated on the National Television of Cambodia, rather than spread across both television and radio.

Amendment of Requests Nos. 2 and 3

In regard to Request No. 3, the construction of three relay stations, Japan explained that due to restrictions concerning the granting of financial aid, it would be better to reduce the request to one station only. Kingdom of Cambodia accepted this position and amended the request accordingly. Agreement was more difficult, however, regarding the location of the station to be constructed or improved. The Cambodians insisted on Battambang, which lies in a flat area, has a large population, and is also the most important district for enhancing the national identity and eliminating the influence of the Khmer Rouge. We pushed for expansion and improvement of the regional broadcasting station in Sihanoukville; the poor condition of the roads to Battambang mean that construction materials and technical equipment would have to be carried by air, resulting in higher expenses, while Sihanoukville, being Cambodia's only seaport, has great potential for future development. In the end, the Cambodians allowed themselves to be persuaded, and agreement was reached to renovate the broadcasting station at Sihanoukville, to supply programme production equipment, to boost transmitter power to 100W from 10W, to replace the antenna and the feeder, to supply new broadcast transmission equipment, and to remodel the building housing the transmitter station.

Note that the respective sides had different interpretations of the concept of a television relay station. Whereas it was our understanding that "a relay station receives microwaves or air broadcasting from the mother station, changes the frequency and/or amplifies the signal, and re-transmits," it was soon discovered that microwave links for broadcasting do not exist in Cambodia, and that locals use the term "relay station" even for locations not reached by the air broadcast and which receive tapes of recorded programmes forwarded by land or air. According to Japanese conceptions, Sihanoukville station would more likely be called a "regional broadcasting station" than a "relay station."

In regard to Request No. 2, as Kingdom of Cambodia had in March, 1995, bought and installed a new 10 kW transmitter for the Toul Kok transmitter station, it was decided to not supply a new transmitter, and limit aid to supplying spare units for the transmitter and replacing the antenna and the feeder. The new antenna and feeder

would be designed for the power of the transmitter, promising considerably improved performance in terms of broadcast stability.

2.2.2 Basic Concept Based on Research and Study

The content of the requests enumerated by the Cambodian Government, narrowed down through the conferences mentioned in the previous section, were analyzed after the return to Japan following the basic design survey, and the operating budget, staff size, and technical capability of the National Television of Cambodia (TVK) were studied. At this stage the conclusion was reached that, although requirements had roundly been fulfilled in terms of staff size, the scale of the operating budget and the level of technical capability mean that the operational capability of TVK might be overwhelmed if all equipment is upgraded during a single period.

Hence, in regard to furnishing equipment suited to a national broadcasting station, only the most superannuated of facilities and equipment will be improved immediately; the project will reserve the option of carrying out a second-phase improvement plan in future, once a state of readiness has been reached by TVK.

An outline of aid content drawn up to reflect these conclusions follows:

(1) Construction of Phnom Penh TV Broadcasting Station

A Broadcasting Station with total floor space of approximately 1,690 m², and ancillary facilities (such as the generator housing), will be constructed on a vacant plot of government-owned land south of the Information Ministry (90m east-west x 72m north-south, or 6,480 m²). The Station will be fitted with the minimum amount of equipment a national broadcasting station requires.

1) Determination of the Size of the Station

(a) Number of News Transmissions and Programmes Produced

In order to increase the amount of internally-produced programmes to 60% from 40%, and to prolong broadcasting hours to 12-13 hours per day from 9.5 hours, as well as to improve the quality of programmes and news, facilities are

required for 34 programmes per week in total, i.e. 14 news programmes and 20 other programmes per week. If around five of these are recorded or transmitted live using the O.B. van, the remaining programmes to be produced at the Broadcasting Station would number around 30.

The design makes provisions for, in addition to a news/continuity studio for news programmes, a 180m² studio and the minimum required support facilities including four editing rooms, which will enable production of programmes of basic format — such as simple drama programmes of one scene only or music programmes centred on song performances. In addition, provisions were made for future recordings of multi-set dramas and music programmes featuring orchestras by setting a 300 m² space aside, leading to the final floor space given above.

(b) Planned Personnel

In total, 230 persons are currently employed at TVK. In addition to three general managers, there are 56 persons in administration, 59 in news, 18 in programme production, 21 in TV programming, and 73 in engineering. The Cambodians' agreement was obtained for limiting accommodation and capacity in the new TV Broadcasting Station to the minimum number of news, production and engineering staff required for the technical operation of the Station. Hence the total number of persons that can be accommodated at one time will be around 76 staff plus 30 visiting performers, or around 100 persons in total.

The Cambodians have announced their intention of preparing at their own expense an administrative building for housing the remaining employees. Therefore, designs for the new Broadcasting Station must take into account the construction of an administrative building on the same site.

2) Facilities and Equipment in the Phnom Penh TV Broadcasting Station

(a) 180 m² Production Studio and News/Continuity Studio

The original Cambodian requests included three studios: one large, one medium, and one small. But after discussions it was agreed that based on the amount and content of in-house programmes, one 300 m² studio and one news/continuity studio would suffice.

However, since the operating budget of TVK is only 3,000 to 10,000 U.S. dollars per month, it would be difficult to meet the expenses for producing multi-set dramas or music programmes featuring orchestras. Hence it was decided to first furnish a 180 m² space with production equipment, and to enable future expansion of the studio when the budget becomes larger by allocating 300 m² for studio space in total.

A 180 m² studio will allow the recording of almost all types of basic-format programmes which require only a few sets. This and the active use of the O.B. van should enable the intended amount of programming to be almost achieved. Note that principal equipment currently owned by TVK will be transferred to the news/continuity studio in the new facility; only two or three types of ancillary equipment not already owned by TVK will be supplied.

(b) Master Control Room

Currently the National Television of Cambodia does not have a master control room. The addition of a master control room will enable efficient connection between broadcasting of taped programmes, live news programmes, outside broadcasting, or satellite broadcasts from abroad.

(c) Radio Control Room

This is a facility intended mainly for handling the reception of programmes from outside of the Station, satellite broadcasts, and international broadcasts, and maintaining UHF communication with O.B. vans, but the system

should be designed so as to also enable future transmissions from Kingdom of Cambodia to the rest of the world.

In order to enable reception of international broadcasts for utilization in news programmes, a set of existing receiving equipment of TVK will be moved to the new Broadcasting Station.

Note that although in Japan the functions of the radio control room are usually included in the master control room, in this project the two will be separated out of respect to the methodology employed by the Cambodian broadcasters.

(d) VTR Editing Room

At least four editing rooms are necessary if the objective of making TVK strong in news is to be fulfilled. Besides two rooms for 1/2" VTR, one for 2:1 editing and another for 1:1, one room each will also be necessary for 3/4" VTR and S-VHS VTR, in order to comply with the various material still owned by TVK.

(e) Audio Dubbing Room

For broadcasting stations such as TVK, which have numerous opportunities to purchase or exchange programmes with foreign countries, an audio dubbing room, where foreign soundtracks are dubbed into the native language, are indispensable.

The VTRs to be installed must include 3/4" or S-VHS systems, in addition to the usual 1/2", so as to be compatible with programmes in a wide variety of formats.

(f) Electricity Generation and Measuring Instruments

In Kingdom of Cambodia a power generator is essential for maintaining uninterrupted broadcasting and recording, as sudden power outages are frequent and the commercial power supply is unstable. A power generator with sufficient capacity to power the entire Broadcasting Station, including studio lights and air conditioning, will be installed. However, the administrative building to be established

autonomously by Kingdom of Cambodia will not be covered.

An uninterruptible power supply (UPS) will be installed in order to guarantee the continuity of broadcasting. Recording, however, will be taken care of by a system that automatically launches a backup generator in the event of a power failure.

Note also that, taking into consideration the noise, exhaust, and vibration it produces, the power generator will be housed in a separate building.

As TVK currently does not even have the most fundamental of measuring instruments, several sets of important measuring instruments required for maintaining and repairing the various equipment will be supplied.

3) Outside News Gathering Equipment

(a) O.B. Van

The O.B. van currently owned by TVK is old and Hungarian-made; its mobility is poor, and it does not really deserve to be called an O.B. van as it does not have the capacity to transmit live broadcasts.

TVK first requested two O.B. vans, one medium-sized and one small, to allow for cases in which broadcasts from parliament and from other events overlap. However, as cases requiring two O.B. vans simultaneously are extremely rare — particularly cases in which both O.B. vans transmit live are almost unthinkable — we convinced TVK that in cases when two vehicles are required the existing old van or ENG cameras should be used instead.

A small-sized O.B. van with two cameras will be provided. In regard to FPU (a Field Pick-up Unit), TVK has already provided autonomously.

(b) ENG Cameras

To comply with TVK's ideal of strengthening its news-gathering operations, seven sets of ENG (Electronic News Gathering) cameras will be provided. Six sets will be used for day-to-day gathering of news and programme material, and

for day-to-day gathering of news and programme material, and one will be kept as a spare to deal with unforeseen occurrences.

(2) Transmitter Facilities at the Phnom Penh Transmitter Station

The Phnom Penh Transmitter Station is located in a district of northwest Phnom Penh called Toul Kok, and is approximately 2 km away from the new Broadcasting Station, across the Boeng Kak Lake. In this Project no changes will be made to the existing transmitter tower (built in 1962) or the transmitter building.

1) Transmitter, Antenna, and Feeder

The Cambodians initially requested a new transmitter, but a transmitter was bought autonomously in March, 1995. In response to recommendations from the survey delegation, the request was changed to one for a spare transmitter. However, as insufficient space exists inside the transmitter station to accommodate a spare transmitter, only a set of spare transmitter units will be supplied instead; the renewal of the antenna and feeder will enable the stability of broadcasts to be enhanced. The current antenna and feeder are intended for a 1 kW transmitter and there were some worries regarding whether the 10 kW transmitter installed in March, 1995, would work at full capacity. Renewal of the antenna and feeder will solve this problem.

In regard to replacement of the antenna, it was pointed out that the load imposed by a commercial broadcaster's antenna sharing the transmitter tower reduced the strength of the tower. The Cambodian Government promised to have the commercial broadcaster's antenna removed before installation of the new antenna.

2) STL

An STL (Studio to Transmitter Link) is required in the form of a microwave link connecting the Broadcasting Station and the transmitter station. As the current equipment has deteriorated considerably, the entire system will be replaced.

(3) Facilities at the Sihanoukville Regional Broadcasting Station

The Cambodians initially requested three regional relay stations, and strongly urged that the station in Battambang be assigned priority. However, after it was explained that transportation expenses for the building materials would be high, agreement was reached to concentrate on the station in Sihanoukville.

In Sihanoukville the broadcasting station and the transmitter station are at separate locations, and though not far apart on the map, around 20 minutes are required to make the trip by car. No programme transmitting facilities exist between the broadcasting station and the transmitter station, neither microwave links nor cable lines. Tapes of recorded programmes are manually carried over and played back at the transmitter station.

1) Soundproofing the Programme Production Studio, Establishing an Editing Room, and Installing a Generator

The broadcasting station consists of a large gym-like building that has been partitioned into a studio and an office for the General Director. The studio is also used for editing, and no provisions whatsoever have been made to soundproof the area.

In this project, the existing studio will be soundproofed, and its entrance, which faces the hallway, will be replaced to connect it to the editing room. In the unused space between the studio and the Director's Office, a video editing room will be established, and this room will also function as a sub-control room for the studio.

Additionally, an electricity generator will be installed, so that recording work can continue during power outages.

2) Installation of Recording Equipment in the Studio and Editing Room

One complete portable 3CCD camera, two sets of colour cameras with built-in S-VHS VTRs, two sets of video editing equipment, as well as other equipment required for recording simple programmes will be provided. The portable 3CCD will be used for the studio, and the two other cameras will be used for news gathering.

3) Renewal of the Transmitter at the Transmitter Station

The transmitter station will be upgraded from 10 W to 100 W, and antennas and feeders will be replaced. Also the building will be remodelled inside, including installation of electrical and air-conditioning facilities.

The improvements will lead to larger coverage: 50% in terms of geography and 20% in terms of population.

4) Installation of VTRs and Generator at the Transmitter Station

As tapes are carried and played back manually, VTRs and programme switching equipment will be installed. Additionally, in order to maintain transmissions in the event of a power outage, the transmitter station will be fitted with an electricity generator.

2.3 Basic Design

2.3.1 Design Concept

Broadcasting plays an important role in the life of a nation, which is comparable to that of the central nervous system in the human body. Broadcasting systems must be sound and reliable, and must be capable of functioning on a permanent basis. They must also be open to expansion in response to needs arising out of future development and changes in life-styles. The buildings accommodating broadcasting equipment, must therefore be provided with higher levels of durability, safety and adaptability to future alteration in comparison with ordinary buildings, and must, at the same time, be buildings capable of surviving with vital functions intact in all kinds of disasters.

The broadcasting facilities to be constructed under the present project will be designed in accordance with the above basic concepts, and with special considerations to the following points.

(1) Natural Conditions

Broadcasting facilities have low resistance to high humidity, and flooding of broadcasting facilities would impart fatal damage to broadcasting equipment. Hence the facilities must be highly resistant to flooding and dampness, and careful provisions will be made to to this effect when designing the buildings.

(2) Social Conditions

Emphasis must be placed on the fact that the facilities will serve as a model for facilities contributing to the future development of broadcasting in Kingdom of Cambodia. The building will be designed according to traditional architectural motifs so as to blend in with the surrounding environment.

(3) Site Conditions

Since materials available in Kingdom of Cambodia are limited, almost all materials will have to be imported. However, in order to facilitate future maintenance of the building, importation from Japan

will be kept to a minimum, and materials will be obtained, where possible, from neighboring countries.

(4) Use of Local Contractors

The current technical standards and work supervision capabilities of local contractors cannot be said to be at a sufficient level; hence most work contracted out locally will be labour-oriented. As the construction schedule for this project is extremely tight, technicians and skilled workers from other countries will have to be employed. Technology transfers will be carried out throughout, as deemed appropriate under the circumstances.

(5) Scale and Grade of the Facilities

As mentioned above, the facilities shall have high levels of durability and safety, but care will be taken to avoid excesses, given the local circumstances and capacity for maintenance and operation.

Studios and ancillary rooms which will accommodate broadcasting equipment shall be of the same grade as those in Japan for the sake of performance, however, office rooms, storage and other rooms shall follow the local standards.

(6) Design Policy for the Equipment

As mentioned under the section on natural conditions, Kingdom of Cambodia has high levels of humidity. In view of this, architectural precautions will be taken such as ensuring that the air conditioning in the equipment rooms is highly reliable. Additionally, utmost care will be taken, such as assigning stringent standards for equipment, both indoor and outdoor.

2.3.2 Facilities Design Plan

The outlines for facilities explained in Nos. (1) - (6) in this section all concern the Broadcasting Station in the capital, which will be built from scratch. As remodelling work on the existing broadcasting station in Sihanoukville is on a smaller scale, details of that project are all in No. (7), Facility Remodelling Plan.

(1) Site and Facility Layout

1) Site Conditions

The site for the Phnom Penh TV Broadcasting Station is located in the city centre, within the grounds of the Information Ministry between Monivong Street, which bisects the city north-south, and Boeng Kak Lake. The site is flat grassland approximately 90m long east-west and 72m north to south (total area approximately 6,480 m²), and is sufficiently large to accommodate the Broadcasting Station. It is bordered on the north by the wooden building of the Information Ministry, on the east by municipal buildings, and on the south by the International Telecommunications Satellite Bureau. On the west, between the site and the lake, squatters have erected ramshackle huts.

The site is accessed through the gate of the Information Ministry. The area in the vicinity of the site is supplied with commercial electricity, as well as with water-supply and sewerage, thus rendering the site a suitable place for building the new Broadcasting Station.

2) Facility Layout

The site for the Phnom Penh TV Broadcasting Station is on the south side of an existing building, namely the Information Ministry, and is in the shape of a rectangle slightly longer in the east-west direction. The site is accessed via the forecourt on the east side of the Information Ministry. The shape of the site enables the positioning of the Broadcasting Station in-line with the axis of the Information Ministry, so this will be done. The new facility will be located slightly towards the west of the centre of the site and face eastwards, just like the Information Ministry building.

The forecourt on the east side of the building will feature a circular driveway, which will serve as the front entrance for staff, performers, and visitors. The path followed by the driveway will be chosen to flow as naturally as possible from the street in front of the Information Ministry to the front entrance. The 50m by 16m space east of the circular driveway

will be set aside for construction of the administrative building to be built by the Cambodians.

At the back of the building and on its south side will be the separate power building, the oil tank for the generator, a water tank, and a purification tank. Ancillary facilities and the service yard for moving studio equipment in and out will also be located here.

A driveway connecting the forecourt and the service yard will run from east to west on the north side of the building, the approach to the Station. The north side will also accommodate parking spaces for staff and visitors.

3) Landscaping

During the rainy season, almost all roads in Phnom Penh may be submerged to a depth of 10 - 20 cm. A drainage ditch will be dug around the perimeter of the site, and will be designed to rapidly draw off water from within the site.

The driveways and the parking lots will have gravel surfaces, as does the driveway for the Ministry of Information. Flagpoles will be erected in the islet inside the circular driveway.

(2) Building Plan

1) Floor Plan

The various compartments composing the Phnom Penh Broadcasting Centre can be organized into three zones. The first is the Studio Zone, consisting of the studios and related rooms, the second is the Staff Zone, consisting of staff locker rooms and dressing rooms for performers, and the third is the Service Zone, consisting of equipment/machinery rooms.

Out of layout considerations, the Staff Zone will be located on the east side, towards the front entrance. The Service Zone will be located on the west, close to the service yard. The Studio Zone, with its strict demands for isolation from noise, will be positioned between the Staff and Service Zones, to help shut out sound from the outside. The Station will thus be clearly zoned.

The corridor will be positioned so as to encircle the Studio Zone, to facilitate movement from zone to zone. To ensure that evacuation can proceed in two directions in the event of an emergency, staircases will be located in the centres of the corridor on the north and south sides, where they can easily be accessed from each zone.

Table 2.3.1 shows the rooms in the Phnom Penh TV Broadcasting Station and their functions, as well as the reasoning behind the calculation of their floor area.

Table 2.3.1 Function and Determination of Floor Area for Rooms in the Phnom Penh TV Broadcasting Station (1)

Room Name	Function	Planned Floor Area (m ²)	Determination of Floor Area
Main Building			
Ground Floor	Studio	Production & recording of TV programmes	300 Standard based on programme content
	Sub-control Room	Sound adjustment during programme production, switching of light, etc.	40 Due to equipment layout
	Sound Lock	Shutting out noise from entries and exits during programme production	8 Minimum requirement for sound lock
	Camera Store	Storing studio cameras	12 Space for storing 4 cameras
	Parts Store	Storage of spare parts	12 The minimum amount of space required for storing parts
	Audio Dubbing Room	Dubbing of foreign programmes	40 Minimum allowable for a sound studio; also due to equipment layout
	Dressing Room (Men)	Changing and makeup by performers	12 $3 \text{ m}^2/\text{person} \times 4 \text{ persons} = 12 \text{ m}^2$
	Dressing Room (Women)	Changing and makeup by performers	12 $3 \text{ m}^2/\text{person} \times 4 \text{ persons} = 12 \text{ m}^2$
	Waiting Area	Waiting space for performers	48 $3 \text{ m}^2/\text{person} \times 16 \text{ persons} = 48 \text{ m}^2$
	Meeting Room	Programme-related discussions	24 $3 \text{ m}^2/\text{person} \times 8 \text{ persons} = 24 \text{ m}^2$
	PBX Room	PBX and operator	8 $3 \text{ m}^2/\text{person} \times 3 \text{ persons} = 9 \text{ m}^2$
	Kitchenette	Tea-brewing	8 Minimum required to hold sink, refrigerator, etc.
	General Director's Office	General Director's seat, receiving visitors, small meetings	24 12 m^2 for the Director, 12 m^2 for the reception area
	Staff Room (Technical)	Staff room for technical personnel	24 $3.5 \text{ m}^2/\text{person} \times 7 \text{ persons} = 24.5 \text{ m}^2$
	Staff Room (Programme)	Staff room for programming personnel	24 $3.5 \text{ m}^2/\text{person} \times 7 \text{ persons} = 24.5 \text{ m}^2$
	Props Store	Storage of props used in studio	24 Minimum storage space permissible
ENG Room	Storage of ENG equipment	24 ditto	
Maintenance Room	Repair of equipment & storage of spare parts	24 ditto	

**Table 2.3.1 Function and Determination of Floor Area for Rooms
in the Phnom Penh TV Broadcasting Station (2)**

Room Name	Function	Planned Floor Area (m ²)	Determination of Floor Area
Main Building (cont.)			
Ground Floor	O.B. Van Equipment Room	Storage of equipment for the O.B. van	24 ditto
	Electricity Room	Accommodation of distribution board, automatic voltage adjuster, UPS, etc.	30 Due to equipment layout
	Dimmer Room	Accommodation of studio lighting dimmers	18 Due to equipment layout
First Floor	News Studio	News programme production & recording	48 Enough space for the operation of two cameras
	Master Control Room	Control of broadcast transmission & sub-control of studio	48 Due to equipment layout
	Radio Control Room	Reception and transmission by STL, FPU, & UHF	24 Due to equipment layout
	Video Library	Storage of recorded video tapes	24 Determined to be minimum amount of space required
	Editing Rooms (1) - (5)	Video editing	36 Due to equipment layout
	Staff Room (News-1)	Staff room for news personnel in charge of general news	60 3.5 m ² /person × 20 persons = 70 m ²
	Staff Room (News-2)	Staff room for news personnel in charge of special events & international news	36 3.5 m ² /person × 10 persons = 35 m ²
	Air-Conditioning Machine Room	Accommodation of air conditioning equipment for Studio Zone	192 Due to equipment layout
	Store	Storage of objects required for maintenance of the building	12 Minimum required according to total equipment
Common Space	Toilet (Men)	(on each floor)	12×2 Ground floor: 3 urinals, 2 toilet bowls, 2 washbowls First floor: 2 urinals, 1 toilet bowl, 2 washbowls, 1 cleaning sink
	Toilet (Women)	(on each floor)	12×2 Ground floor: 2 toilet bowls, 3 washbowls, 1 cleaning sink First floor: 2 toilet bowls, 2 washbowls
	Corridor, Staircase	Connectivity between each room and the staircase	423 According to the best possible layout for all rooms
Total Floor Area of Main Building		1,691	
Power Building			
Transformer Room	Accommodation of transformer equipment	16	Due to equipment layout
Generator Room	Accommodation of electricity generator	32	Due to equipment layout
Total Floor Area of Power Building		48	
Grand Total Floor Area of Phnom Penh TV Broadcasting Station		1,739	

2) Sectional Plan

To prevent flooding, the ground floor level of the Phnom Penh TV Broadcasting Station shall be 1m higher than the surrounding ground level.

The building will have two storeys. The height of each is determined by the dimensions required to accommodate the various equipment to be installed. The standard height of 4m allows the ceiling height required in the Staff Zone (2.7m) and the air-conditioning ducts and various piping and cables to be positioned within the ceiling, as well as the minimum height for scenery storage in the Service Zone, and for positioning of required equipment in the air conditioning machine room.

In the 300 m² large medium-sized studio, 6m are required for the placement of backdrops (the screens used as background during filming), and 1 - 1.5m are required above the backdrops to install a grid for hanging various lighting apparatus, as well as an additional approximately 2m above the grid for working on the lighting. Hence at least 9m are required from the studio floor to the ceiling surface, or 12m if the ducting within the ceiling is taken into account. Hence the studio, covering a span of 15m, will be open-ceilinged for a height equivalent to three storeys, and will be constructed using a steel frame.

Additionally, on top of the roof slabs of the Studio Zone, a hut will be erected and an inclined gabled roof will be constructed using slate and traditional Cambodian architectural techniques, to harmonize the design with the surroundings. This inclined roof has aesthetic merits, in that it hides the air conditioning ducts leading from the air conditioning machine room to the studio, as well as highly practical benefits, namely enhancing the watertightness of the zones housing delicate instruments, blocking noise, and providing added insulation for the air conditioning ducts.

(3) Structural Plan

1) Foundation Structure

According to an investigation of geology carried out at the site, the site on which the Phnom Penh TV Broadcasting Station is to be built is comprised of sandy clay and/or clay near the surface, and the bearing strength at a depth of 1 - 2m from the current surface level is estimated to be less than 5 t/m². It is impossible to construct a two-storey (or equivalent to 3 in the studio section) reinforced-concrete structure with a radio tower on such ground, and consolidation settlement would be cause for concern even with a mat foundation.

Hence piles will be driven into a layer of clay 8m below the current surface, which has an N value of approximately 20 - 30, and the structure will rest on individual footings.

2) Design Load and Determination of External Force

(a) Dead Load

This consists of the total weight of the structure plus the weight from the radio tower.

(b) Live Load

Calculations for the weight of equipment rooms will be based on the total weight of equipment that will actually be contained, as well as experiences from broadcasting facilities in Japan. The structural standards set by the Architectural Institute of Japan will be used in setting the design strengths for the other rooms.

(c) Wind Load

No accurate data on maximum wind strength could be obtained for the site in question, but it is said that the maximum recorded wind velocity in Phnom Penh has been 20 m/sec. Owing to the important nature of the facility, it will be designed to resist a design wind strength occurring during a wind velocity of 30 m/sec.

(d) Seismic Load

Seismic data could not be obtained locally. According to a map of seismic risk in seismic areas worldwide, contained in a study edited by the Building Research Institute of the Japanese Ministry of Construction and published in February, 1980 (Building Research Institute Report, No. 88), seismic acceleration occurring in Kingdom of Cambodia is, even at a return period of 200 years, unlikely to exceed 20 gal. Generally, for buildings conforming to the Japanese Building Code, response acceleration reaches 2.5 to 3.0 times the peak acceleration of the input seismic waves. Hence the shear coefficient for structural plans for the building in this project would be between 0.05 and 0.06; to be on the safe side due to the importance of this facility, however, the value used in calculations will be 0.1.

3) Structural Design Standards

As the structural design standards have not yet been established in Kingdom of Cambodia, the structural design standards issued by the Architectural Institute of Japan will be used.

(4) Building Equipment Plan

1) Electrical Installations

(a) Power-source Facilities

Part of a separate building (the power building) established within the site will be used as a substation, and the power transformer and principal switching equipment will be positioned here. Triple-phase three-wire commercial electricity at 15 kV 50 Hz will be converted into triple-phase four-wire 380/220V and drawn to the electricity room in the main building. Note that an increase in voltage to 22 kV is planned for the district, and therefore the power transformer and related equipment must be of specifications compatible with this level.

The maintenance and management of the substation will be carried out by EDC (Electricité du Cambodge). Supply of electricity up to the receiving side of the transformer will be taken care of by the Cambodians.

A low voltage main switch board will be installed in the electricity room, from which electricity will be supplied to separate systems for broadcasting equipment, studio lighting, sockets-outlets, air conditioning, and water-supply and sewerage.

For the sake of safety, reliability, as well as practicality and protection maintainability, a cubicle type switch board will be used.

(b) Wiring Facilities for Main Power Lines

The mains will be partitioned out to ordinary lighting and sockets-outlets, studio lighting, broadcasting equipment, air conditioning equipment, and water-supply and sewerage. Distribution will rely on polyvinyl chloride conduits or a cable rack system. In order to prevent disruptive effects on the broadcasting equipment, such as magnetic induction or interference, these electrical power lines will be laid out so as not to be close to or intersect with the broadcasting equipment or the lines thereof.

(c) Lighting Installations

Mainly fluorescent lamp, which are superior in terms of colour rendition and economy, will be used as light sources. Levels of illumination for each room, determined on the basis of the Japanese Industrial Standards (JIS) and with reference to local conditions, will be as follows:

- 400 lx : Sub-control room, master control room, editing rooms, etc.
- 200 lx : Studios, video library, dimmer room, electricity room, air-conditioning machinery room, etc.
- 100 lx : Corridors, staircases, toilets, storerooms, etc.

At principal points along emergency evacuation routes, emergency lights which are constantly recharged and designed to automatically turn on during a power outage, will be installed to supply minimum levels of illumination.

(d) Socket Outlets

Apart from general use sockets-outlets, special sockets for broadcasting and other equipment will be positioned as necessary. The shape and standards of the sockets will conform to those generally used in Cambodia.

(e) Clocks

Battery-driven wall clocks will be positioned in ordinary rooms, but not in studios or control rooms.

(f) Fire Alarm System

Owing to the importance of the TV Broadcasting Station, sufficient automatic fire detectors and alarms will be installed. In all rooms other than toilets, heat-sensing or smoke sensing detectors will be positioned. Corridors will have alarm buttons and alarm bells. These alarms will activate an alarm-signal receiving panel installed in continuously staffed rooms.

(g) Telephone Conduit System

In addition to laying conduits for carrying telephone lines to locations where telephones are to be installed in the building, the required terminal boards and outlet boxes will be installed.

(h) Earthing

The earthing to be provided for electrical installations and broadcasting equipment is as follows:

[Use]	[Earth Resistance Value]
High-voltage equipment	Less than 10 Ω
Low-voltage equipment	Less than 10 Ω
Broadcasting equipment	Less than 10 Ω
Telephone conduit system	Less than 100 Ω

(1) Lightning Protection System

A lightning protection air termination will be fastened to the top of the radio tower to prevent damage to the building by lightning.

2) Water Supply/Drainage and Sanitary Installations

(a) Water Supply Installations

A city water-supply main passes near the site, and the Cambodians will arrange for pipes to be drawn to the site boundary. Water pressure will be provided by gravity, as water will be supplied from an elevated water storage tank.

(b) Drainage Installations

Separate systems will be installed to drain waste water and soil water. Soil water pipe will be drawn to a septic tank outside, and after treatment will be merged with the waste water pipe before being connected to a sewer mains pipe near the site. Pipes from the site boundary to the sewer mains will be installed by the Cambodians.

(c) Sanitary Instruments and Installations

Toilets will be fitted with western style toilet fixtures, urinals, lavatory basins and service sinks.

(d) Fire Extinguishing Installations

Fire extinguishers will be positioned at required locations in the main and ancillary buildings, as appropriate for room usage functions.

3) Air Conditioning/Ventilation Installations

(a) Air Conditioning System

In order to ensure the quality of programme production and the reliability of broadcasting equipment, it is extremely important to provide a suitable environment. As Kingdom of Cambodia generally has high temperature and humidity, air conditioning is indispensable. This is also true from the standpoint of protecting the work environment of the staff. In addition to the studios and related rooms, the video store room, the dressing rooms, the general conference room, and the general director's office will be air-conditioned.

Lighting and broadcasting equipment in the studios and the studio-related rooms, such as the master control room and sub-control room, will emit a large amount of heat. Yet the rooms will be airtight, and will have to be isolated from noise and vibration as much as possible. Hence the rooms in the Studio Zone will be supplied with single-duct air conditioning; self-contained unit air conditioners, which are easy to maintain, will be accorded to each zone. As the studio is a large area with a large concentration of heat-emitting devices, several air-conditioning units will be installed in order to prevent a complete loss of function in the event of a failure.

(b) Target Temperature/Humidity Conditions

Outdoor temperature/humidity conditions and target indoor temperature conditions were determined on the basis of past meteorological data and environmental conditions required for broadcasting equipment. They are as follows:

- Outdoor temperature/humidity conditions
 - Dry-bulb temperature: 36.7 °C
 - Relative humidity: 69%
- Target room temperature
 - Dry-bulb temperature: 26±2 °C

(c) Ventilation Installations

Ventilation installations will be provided for rooms which generate heat, dust, moisture or foul smells. Ventilation will be achieved by means of natural intake and mechanical exhaust. The rooms to be ventilated and their ventilation rates are as follows:

[Room]	[Ventilation Rate]
• Electricity room	(pegged to heat generated)
• Generator room, toilets, tea kitchen	10 air changes/hour

(d) Fixed-type Ceiling Fans Installations

Rooms that will not be air-conditioned, such as staff rooms and waiting areas, will be equipped with an appropriate number of fixed ceiling fans.

4) Special Facilities

(a) Diesel Engine Generator

The reliability of the electricity supply in Phnom Penh is extremely low. Almost all important facilities, including existing broadcasting facilities, have their own generators. In the case of the Phnom Penh TV Broadcasting Station, an uninterruptible power supply is essential if it is to fulfill its function. Hence an electricity generator will be installed.

The diesel-powered generator will produce triple-phase four-wire electricity at 380/220V and 50 Hz, and start or switch over automatically by storage battery power. As it will also produce noise, vibration, and exhaust gases, it will be housed in an annex (the generator room).

The power produced by the power generator will be used for, in addition to broadcasting, important lighting, air conditioning in rooms directly related to broadcasting, water supply and drainage pumps, and other facilities. To cope with prolonged and frequent power outages, the output power rating of the generator will be around 400 kVA.

(b) Other Special Facilities

Other special facilities are the AVR (automatic voltage regulator) and the UPS (uninterruptible power supply), required as power sources for broadcasting equipment. Both will have specifications that provide the capacity required by the broadcasting equipment. These facilities will be placed in the electricity room of the main building.

(5) Radio Tower

An STL (studio to transmitter link) is required for linking the Phnom Penh TV Broadcasting Station with the existing Transmitter Station, which houses the transmitting facilities. Also required are an FPU receiver unit for receiving signals from the O.B. van, as well as an antenna for UHF transmitting and receiving equipment to be used for communications. A tower for fixing this equipment will be built at the new site. The FPU antenna must be positioned 30m above the ground, so the tower will be 35m high. A lightning protection air termination will be installed at the top, and an operation deck for the FPU receiver unit will be positioned 27.5m high. The STL antenna will be fixed 2 - 3m below the deck.

As the FPU receiver has to change direction according to the location of the O.B. van, it will require relatively frequent manipulation. Hence the tower will be built above the staircase on the south side of the building, and it will be possible to access the tower via a trapdoor at the staircase. Seen from the path leading up to the Station, the tower will be located at the centre towards the back, and as its axis will coincide with the grand roof of the Studio Zone, its contribution to the design should also be positive.

(6) Interior/Exterior Finishing Plan

In addition to being highly durable, the materials used for the exterior finish of the Phnom Penh TV Broadcasting Station should express modernity, reliability, and traditional elements. In principal, local sub-contractors should be able to work with the material selected, and the material should also be economical. From such considerations, spray-on epoxy paint will be used for most of the exterior, and aluminum will be used for washing windows. Local slate with a finish common in Kingdom of Cambodia will be used for the

inclined roof; the flat roof, on the other hand, will be waterproofed with asphalt and then finished with troweled concrete.

Sound-absorbent materials selected according to the acoustical specifications given below will be used to finish the interior of studio-related rooms, as follows:

• Design specifications for studio-related rooms

Room	Target NC Value	Target Reverberation Time
Studio	25 - 30	about 0.6 - 0.8 seconds
News studio	25 - 30	about 0.3 seconds
Audio dubbing room	25 - 30	about 0.2 seconds
Control and editing rooms, master control room, and editing rooms		

40

• Interior finish of studio-related rooms

[Studio]

- Floor : Vinyl tiles (using a self-leveling base)
- Ceiling : Reinforced concrete slabs + suspended ceiling panels (plaster boards with glass wool on top and sound absorber underneath)
- Walls : Hollow walls (mortar with brick on both sides + brick with mortar on one side) with sound-absorbing finish on the inside
- Doors : Soundproof steel doors

[News studio, audio dubbing studio]

- Floor : Vinyl tiles
- Ceiling : Reinforced concrete slabs + suspended ceiling panels (plaster boards with glass wool on top and sound absorber underneath)
- Walls : Mortar with brick on both sides and sound-absorbent interior finish with light-weight steel grid base
- Doors : Soundproof steel doors

[Sub-control and master control rooms, editing rooms]

Floor : Vinyl tiles
Ceiling : Reinforced concrete slabs + suspended ceiling panels
Walls : Mortar with brick on both sides
Doors : Airtight steel doors

Vinyl tiles will be the standard floor finish for all other rooms. As the entrance hall will be trodden with wet footwear, a terrazzo finish will be used for the floor there. Waiting rooms and conference rooms will have carpet tiles to absorb sound. The electricity and air-conditioning machinery rooms will have dust-proof floor coverings. Mortar + emulsion paint will be used to finish walls, and generally sound-absorbent rock-wool panels will be used for the ceilings. Rooms subject to moisture, such as toilets and kitchenettes, will have a suitable finish for coping with this.

(7) Facility Renovation

1) Existing Broadcasting Station in Sihanoukville

(a) Site Conditions

The existing broadcasting station in Sihanoukville is located in the city centre, and is a simple and flat structure with 300 m² of floor space. Although the site has only about 700 m², work space can be secured, and the site can also be easily accessed. The building is supplied with commercial electricity, but it has no water supply except for rain water. This does not pose particular difficulties for the construction work, however, as there is a water main in the vicinity.

(b) Building Plan

The current studio (floor area around 25 m²) in the station is an ordinary room, and does not perform adequately as a studio. The room will be turned into a proper studio, i.e. all areas open to the outside will be sealed, the interior will be finished with sound-absorbent material, and a grid for lighting apparatus and rails to hold backdrops

will be installed.

Part of what is currently office space (floor area 25 m²) will be turned into two editing rooms, which will have the same specifications as those in the Phnom Penh TV Broadcasting Station. The editing room adjacent to the studio will also function as a sub-control room, and a fixed window with steel sashes will be created in the partitioning wall, for observing the studio. Steel doors, with high performance in terms of airtightness and soundproofing, will be used at the entrances to each room.

(c) Building Equipment Plan

The renovation of the building will include the installation of lighting and sockets appropriate for each room, as well as electrical wiring for the broadcasting and air conditioning equipment. Currently the building has no air conditioning. Air conditioning will be installed in order to maintain a suitable environment for the studio and editing rooms during use. The indoor air conditioning unit will be installed in the office next door, which is sufficiently large, and connected to ducts leading to each room. An electricity generator for around 30 kVA will be installed to provide against power outages. The generator will be positioned at an appropriate location outside, within a cubicle to protect it from the rain.

2) Existing Transmitter Station in Sihanoukville

(a) Facility Circumstances

The existing transmitter station in Sihanoukville is located on a hill behind the broadcasting station, around 20 minutes away by car. A small facility with a floor area of only around 70 m², it has a steel tower supported by wires. The station is located on flat ground, and is supplied by commercial electricity and a water mains, and poses no difficulties for the renovation work.

(b) Building Plan

The current transmitter station includes a video tape playback transmission room, a broadcasting machinery room, and a staff room. Although it has not deteriorated to the point where rebuilding is required, dirt and damage are apparent both inside and outside. Now is thought to be a suitable time for overhauling the building. Outside, the walls and door will be repainted. Inside, a portion of the floor tiles will be repaired, the walls and doors will be repainted (playback transmission and broadcasting rooms), new wall panels installed (staff office), and all ceiling boards replaced.

(c) Building Equipment Plan

Existing electrical facilities and wiring is generally incomplete, in addition to having suffered from aging. Also from the standpoint of safety and reliability, the electrical facilities will be replaced as necessary during the overhaul of the building, according to the function of each room. In tandem with the enhancing of the broadcasting equipment, the deteriorated air conditioning equipment (window-units) will be removed, and new air conditioning equipment with indoor and outdoor units will be installed. After the remodelling work, an electricity generator of the same model as that installed in the Sihanoukville Broadcasting Station will be installed, as the output capacity of current equipment is insufficient.

(8) Basic Design Drawings

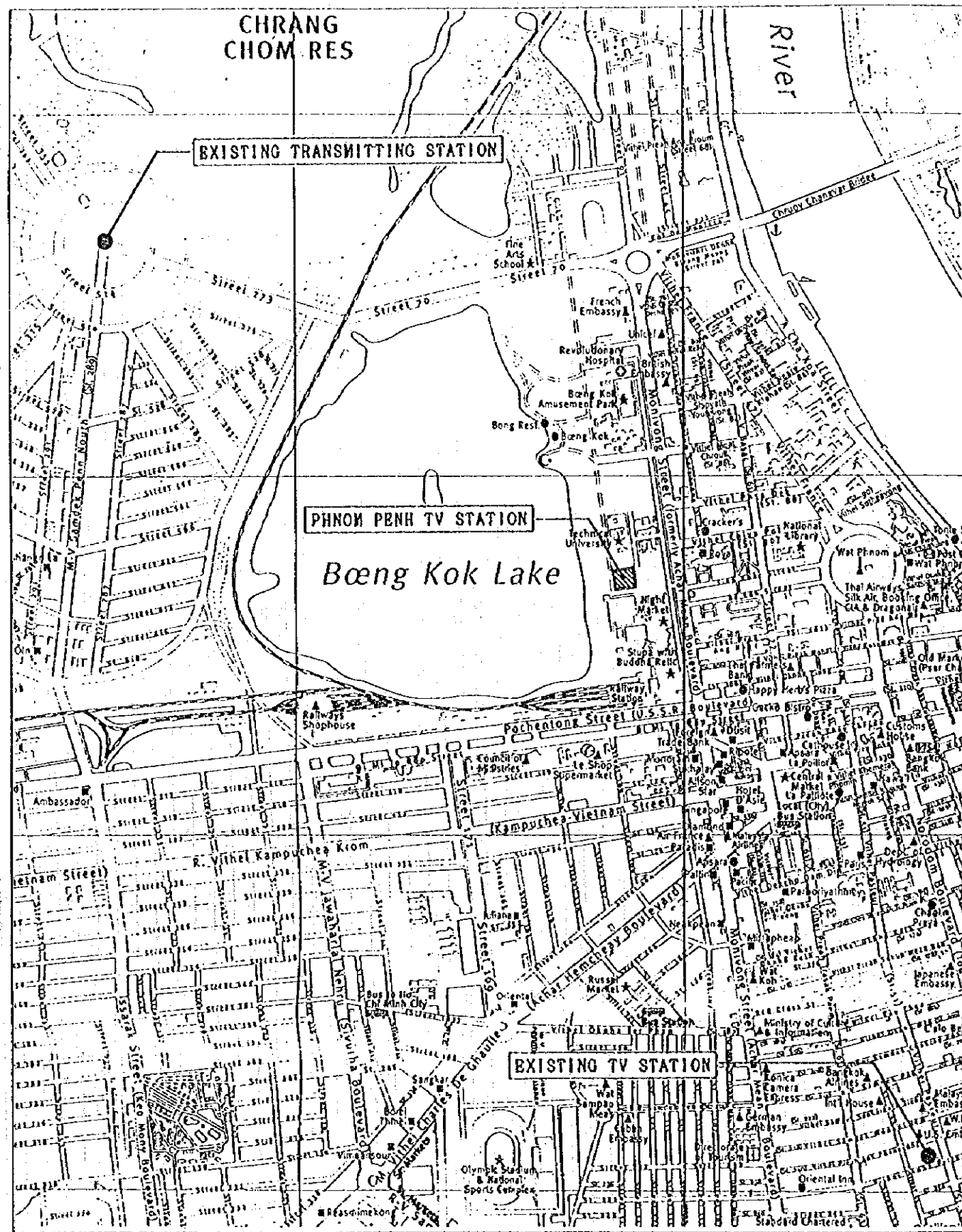
From here on, the following drawings will be referred to:

- Fig. 2-3-1 Site Location Map
- Fig. 2-3-2 Phnom Penh TV Station, Site Layout Plan
- Fig. 2-3-3 Phnom Penh TV Station, Ground Floor Plan
- Fig. 2-3-4 Phnom Penh TV Station, First Floor Plan
- Fig. 2-3-5 Phnom Penh TV Station, North Elevation
- Fig. 2-3-6 Phnom Penh TV Station, East Elevation
- Fig. 2-3-7 Phnom Penh TV Station, South Elevation
- Fig. 2-3-8 Phnom Penh TV Station, West Elevation
- Fig. 2-3-9 Phnom Penh TV Station, Section (1)
- Fig. 2-3-10 Phnom Penh TV Station, Section (2)
- Fig. 2-3-11 Phnom Penh TV Station, Annex Building
- Fig. 2-3-12 Phnom Penh TV Station, Schematic Diagram for Electrical Installation
- Fig. 2-3-13 Phnom Penh TV Station, Schematic Diagram for Water Supply, Sewage and Drainage System
- Fig. 2-3-14 Phnom Penh TV Station, for Air-Conditioning System
- Fig. 2-3-15 Sihanoukville Existing Buildings, Renovation Drawing

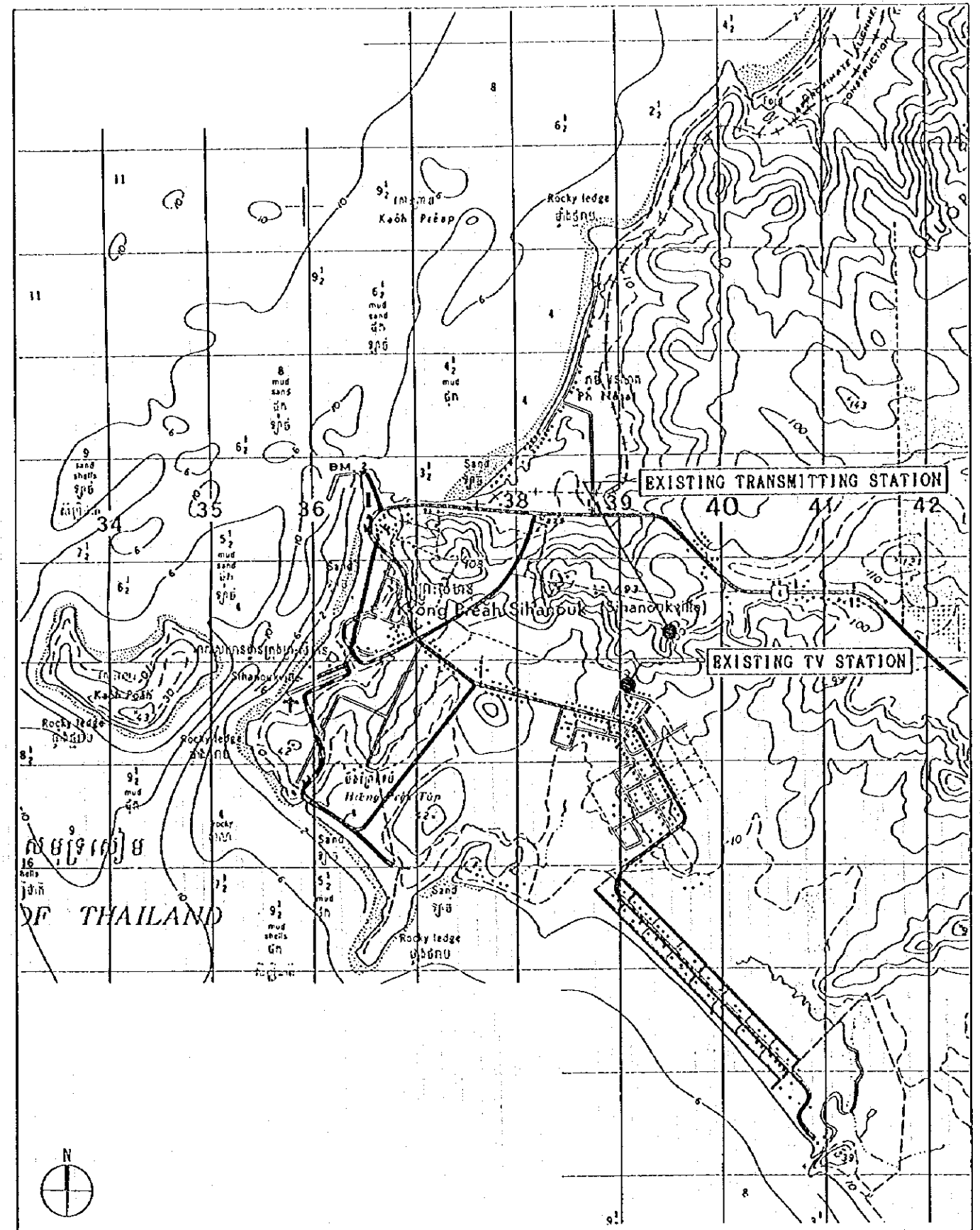
Abbreviation used in the drawings are as follows:

A/C	Air-conditioning
A.C.M.R.	Air-conditioning Machine Room
E/G	Engine Generator
TX Room	Transmitter Room





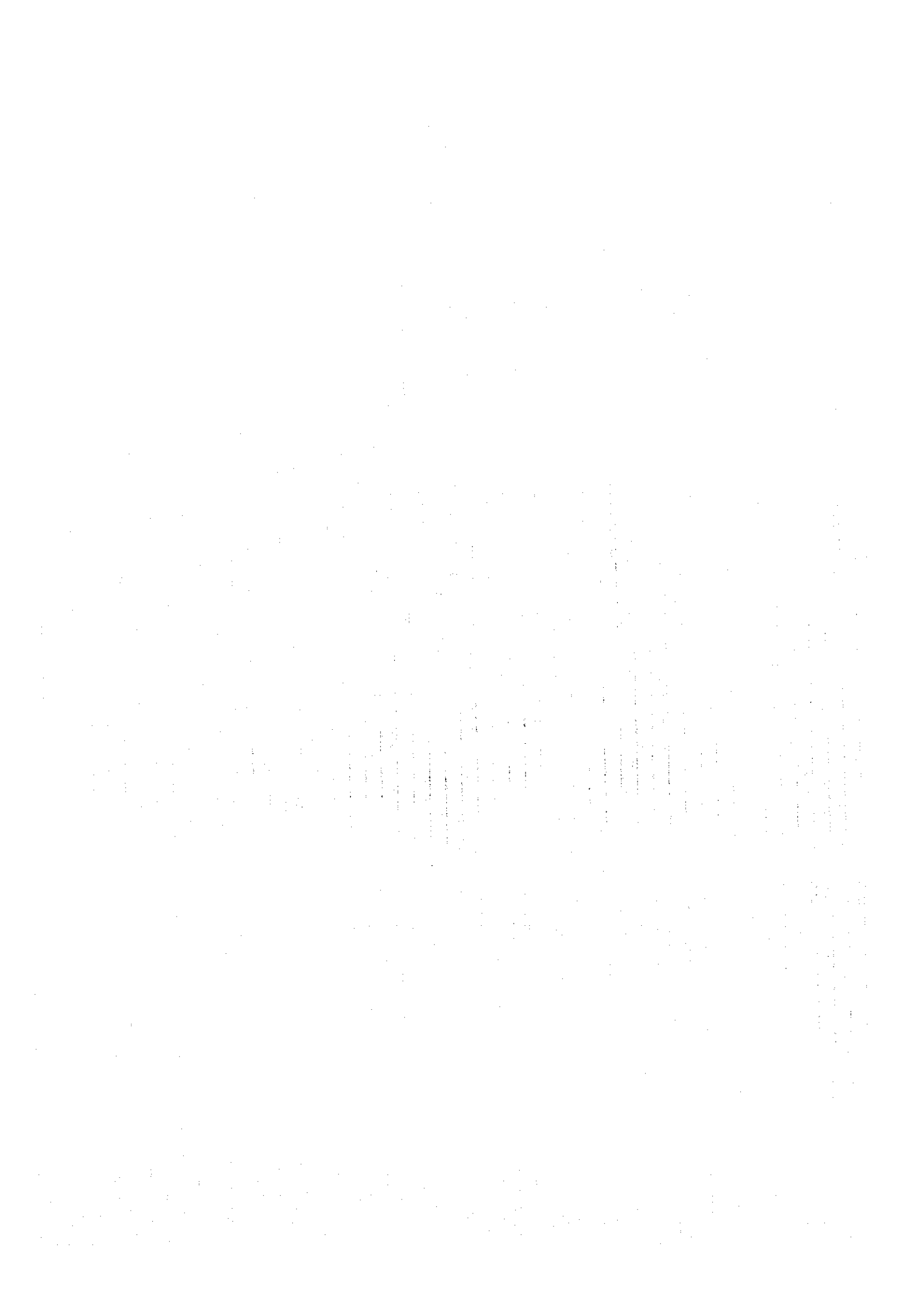
PHNOM PENH SITE LOCATION MAP S:1/17,000

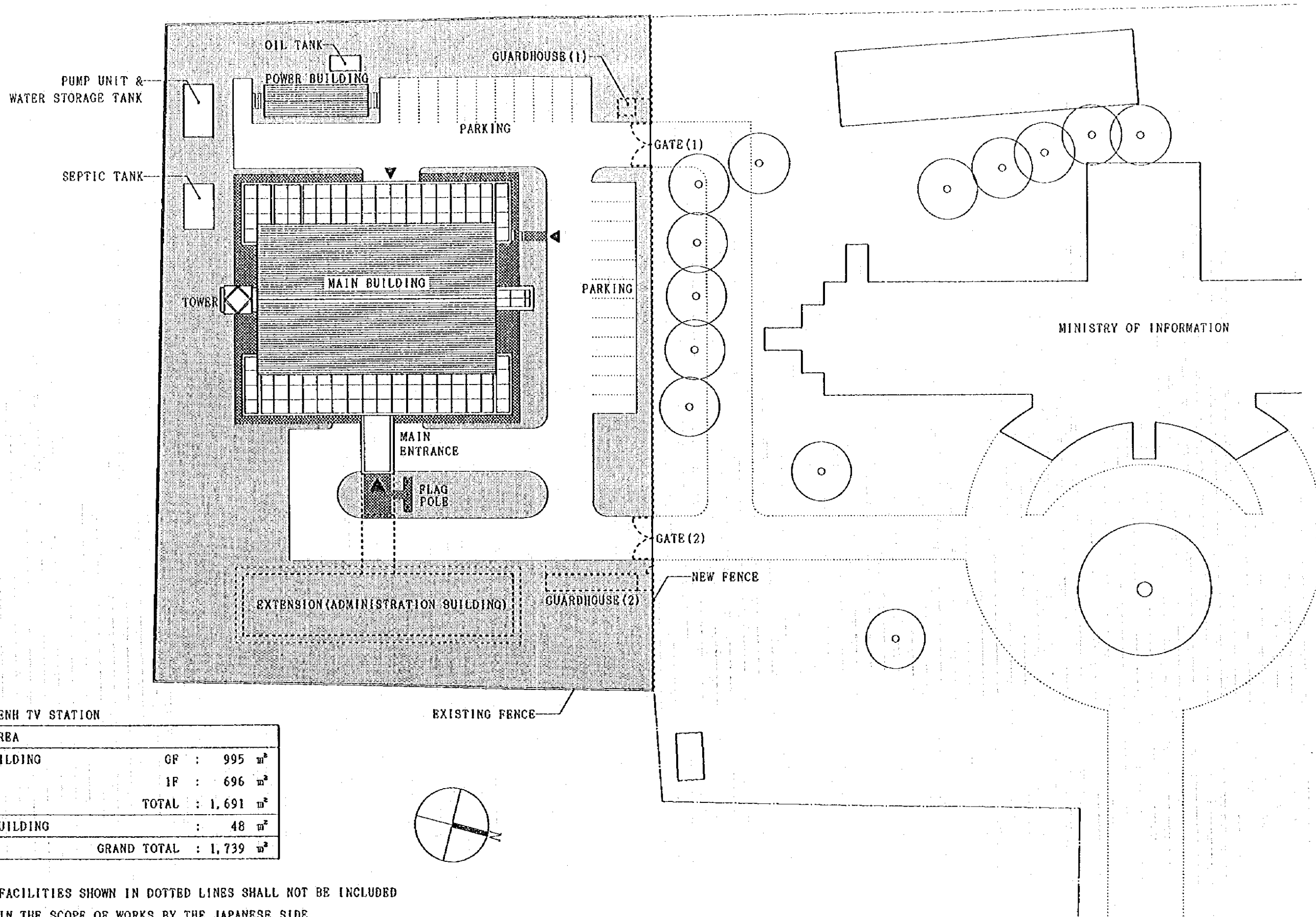


SIHANOUKVILLE SITE LOCATION MAP S:1/50,000

Fig. 2-3-1 PHNOM PENH & SIHANOUKVILLE
SITE LOCATION MAP







PHNOM PENH TV STATION

FLOOR AREA	
MAIN BUILDING	GF : 995 m ²
	1F : 696 m ²
	TOTAL : 1,691 m ²
POWER BUILDING	: 48 m ²
GRAND TOTAL : 1,739 m ²	

REMARK: FACILITIES SHOWN IN DOTTED LINES SHALL NOT BE INCLUDED IN THE SCOPE OF WORKS BY THE JAPANESE SIDE.

Fig. 2-3-2 PHNOM PENH TV STATION
SITE LAYOUT PLAN S:1/500





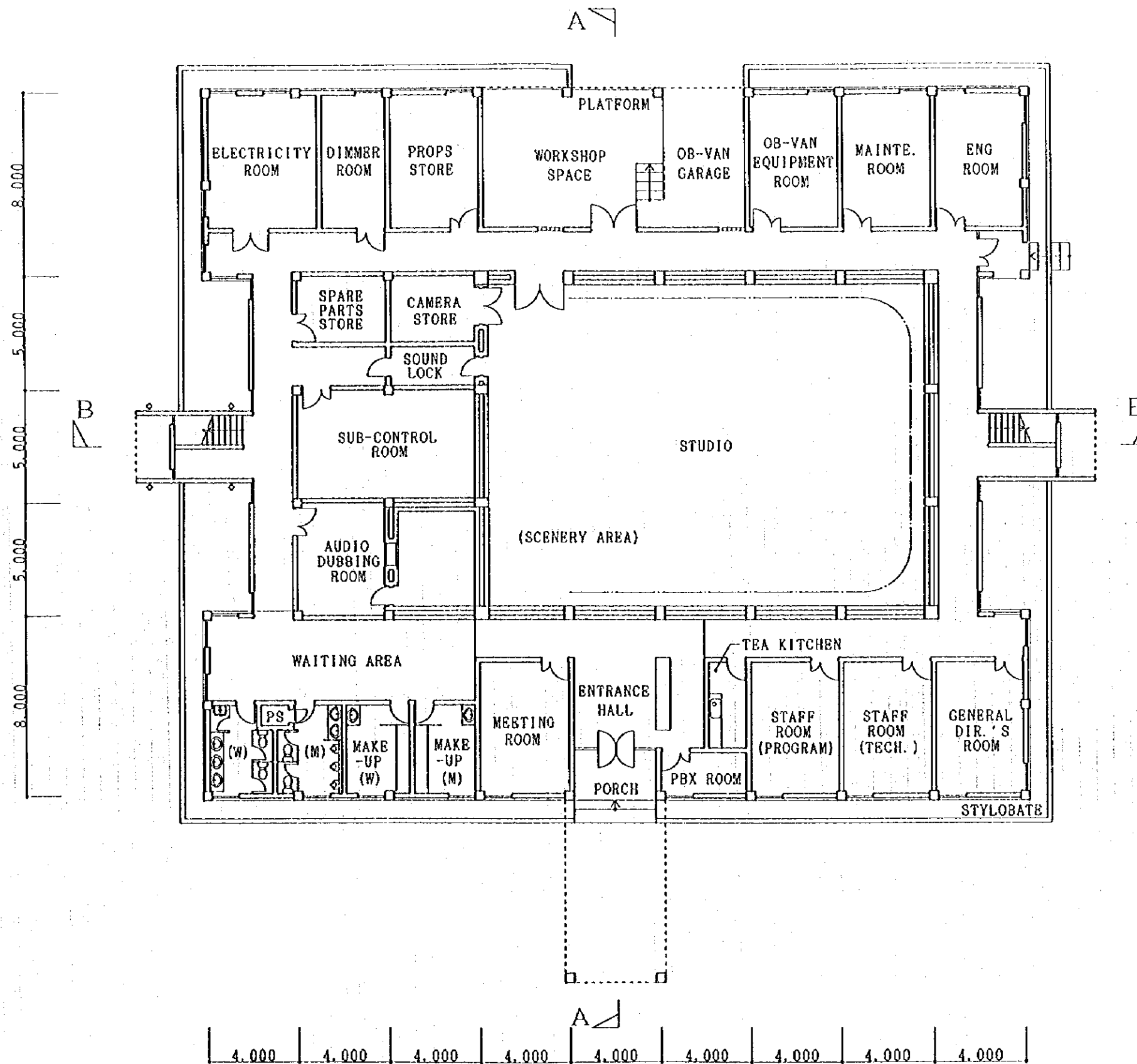
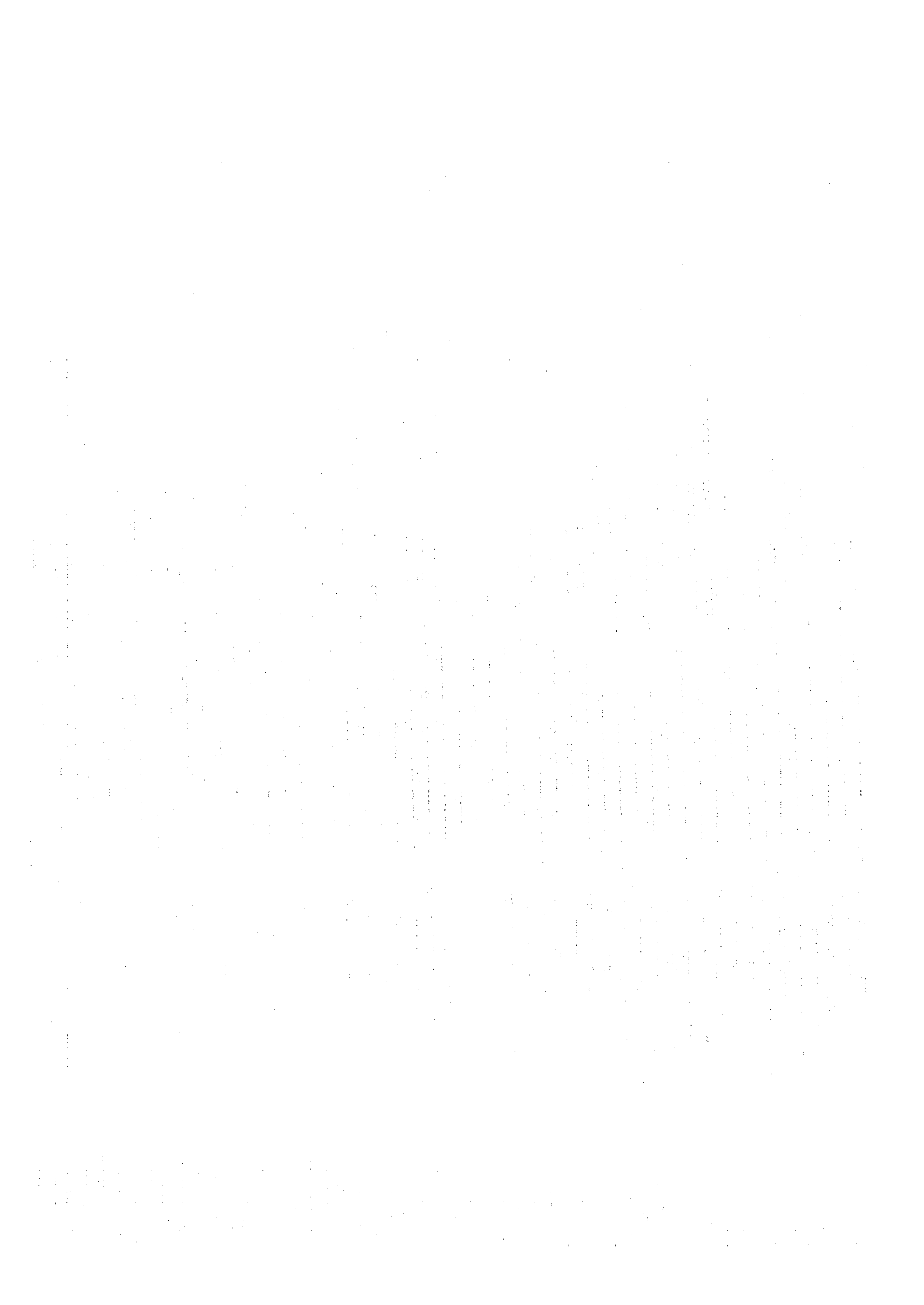
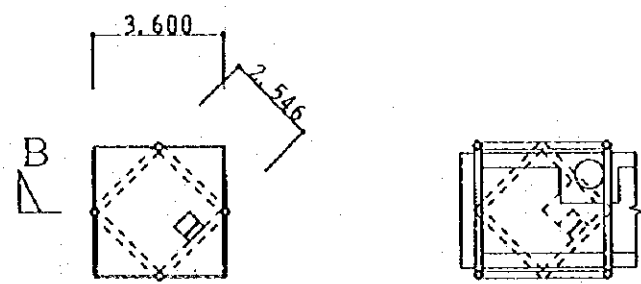


Fig. 2-3-3 PHNOM PENH TV STATION
GROUND FLOOR PLAN S:1/200





ANTENNA DECK PLAN
(GL+27,500)

(GL+9,500)

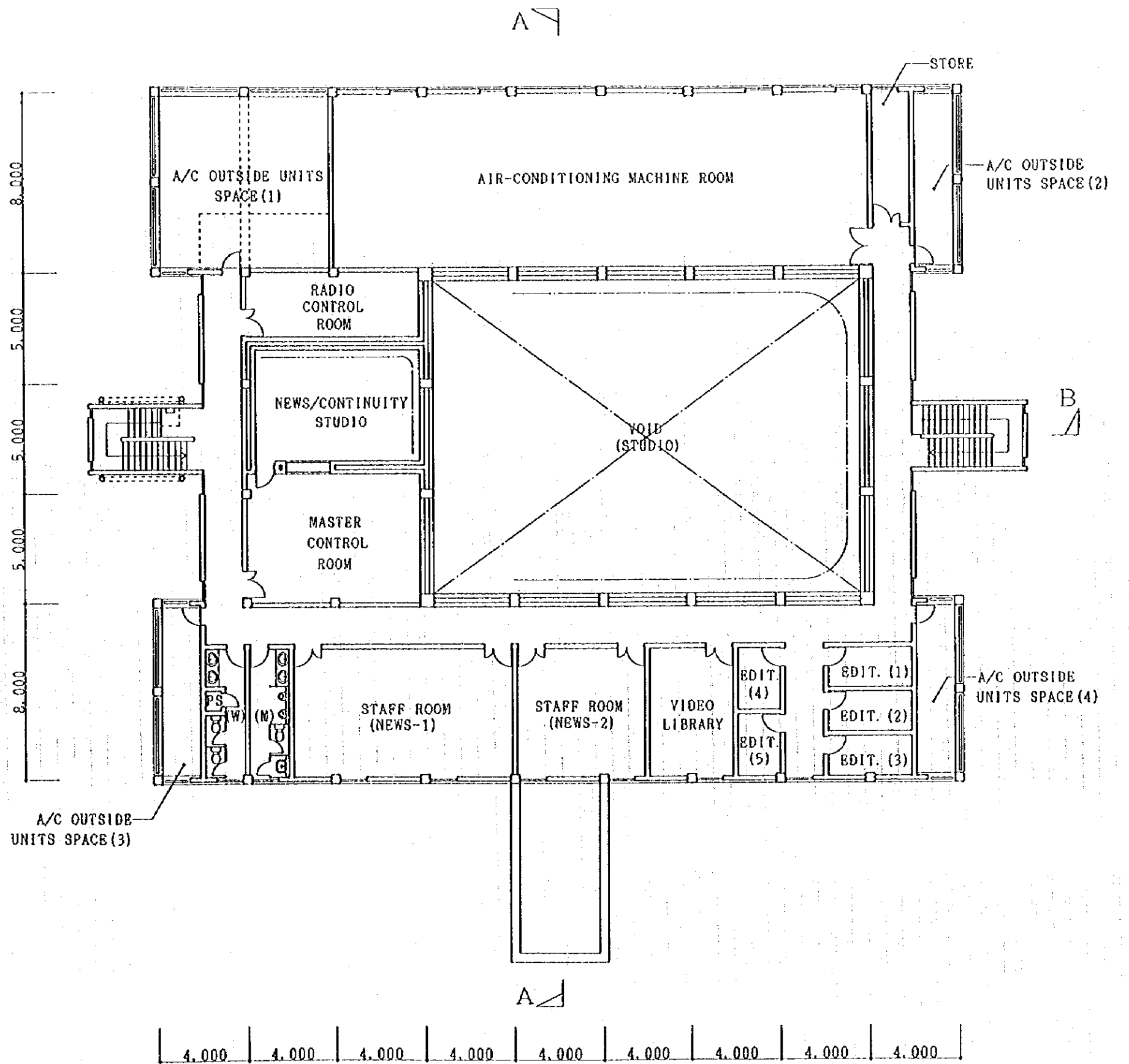
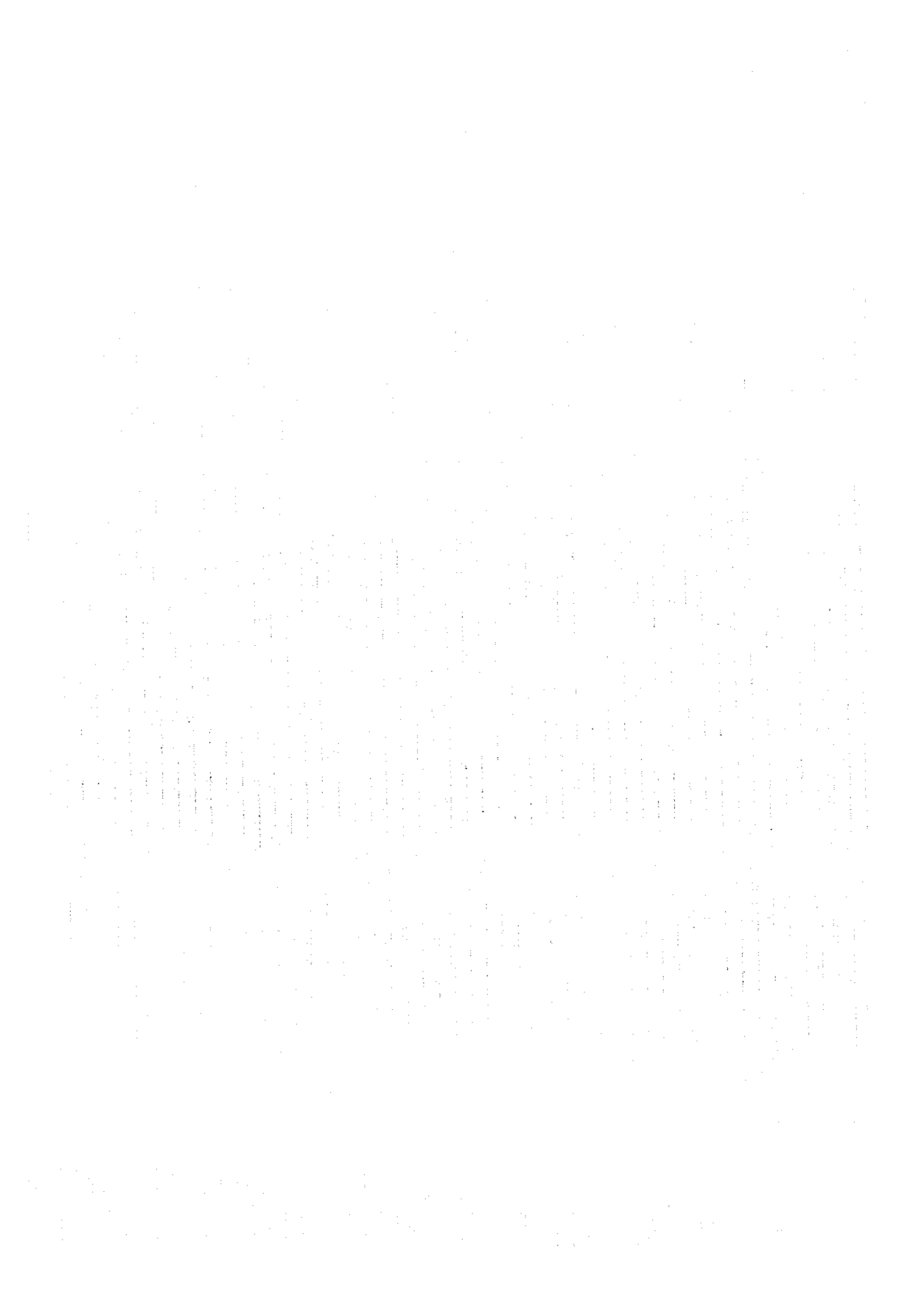
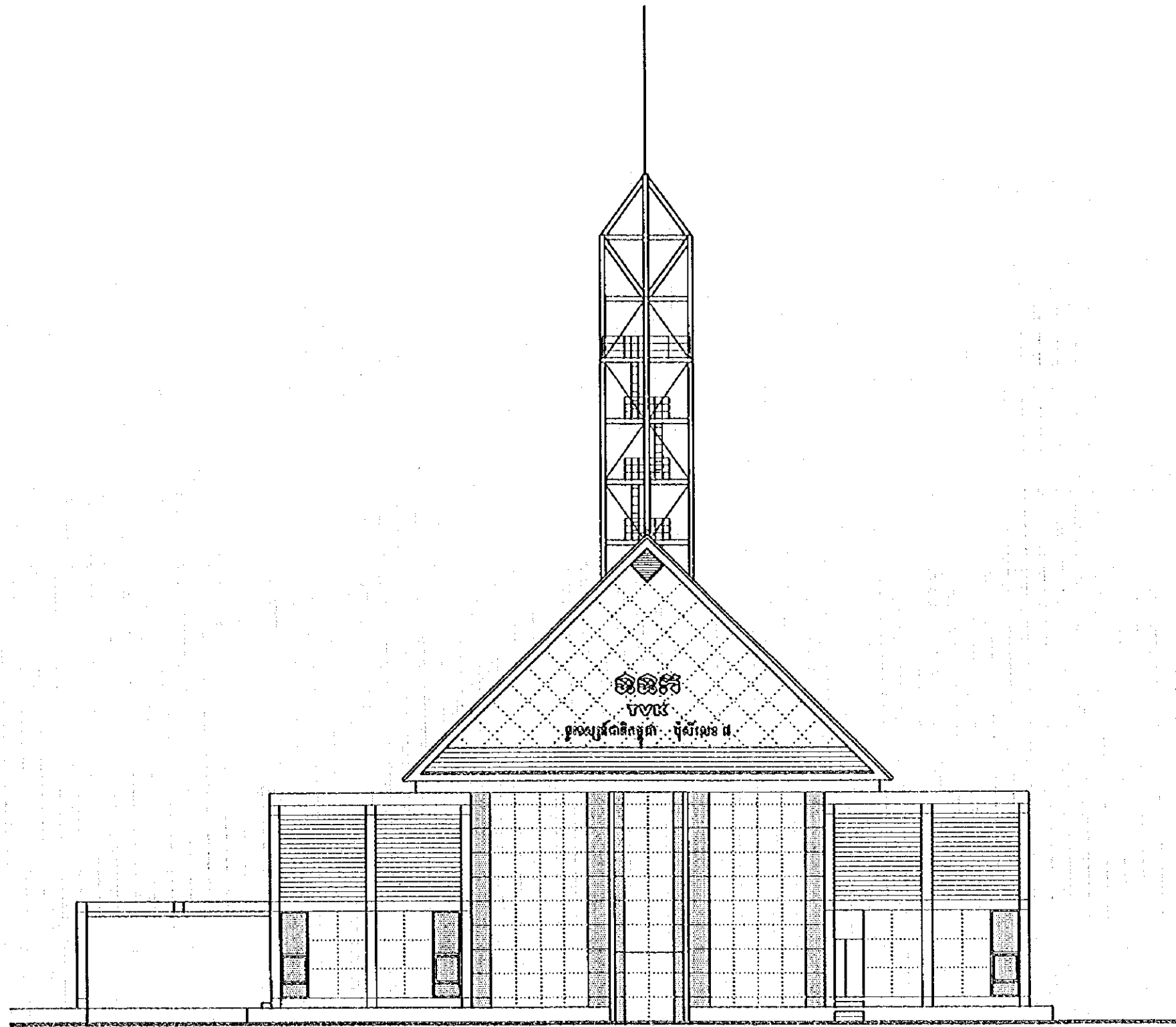


Fig. 2-3-4 PHNOM PENH TV STATION

FIRST FLOOR PLAN S:1/200





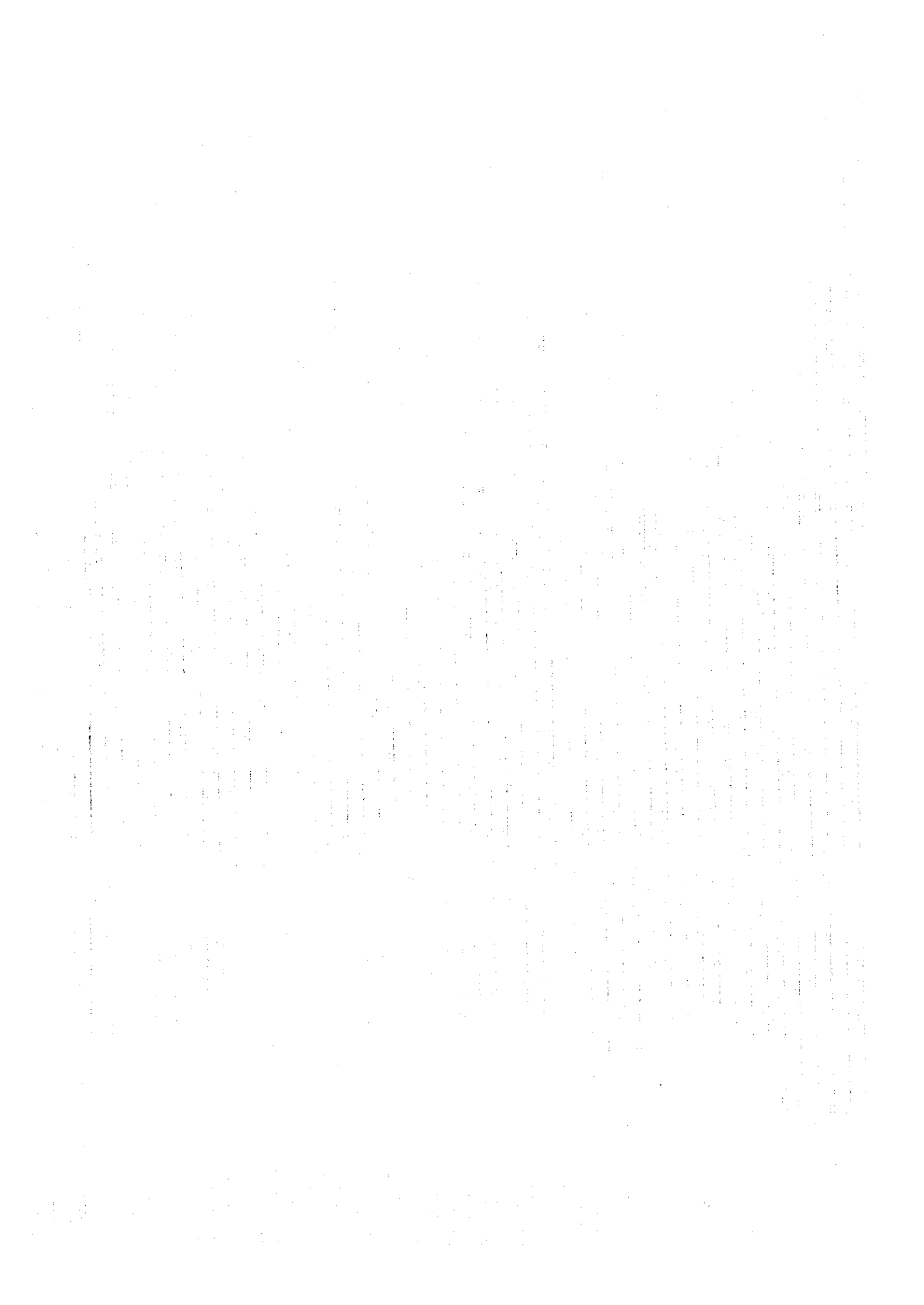


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Fig. 2-3-5 PHNOM PENH TV STATION

NORTH ELEVATION S:1/200





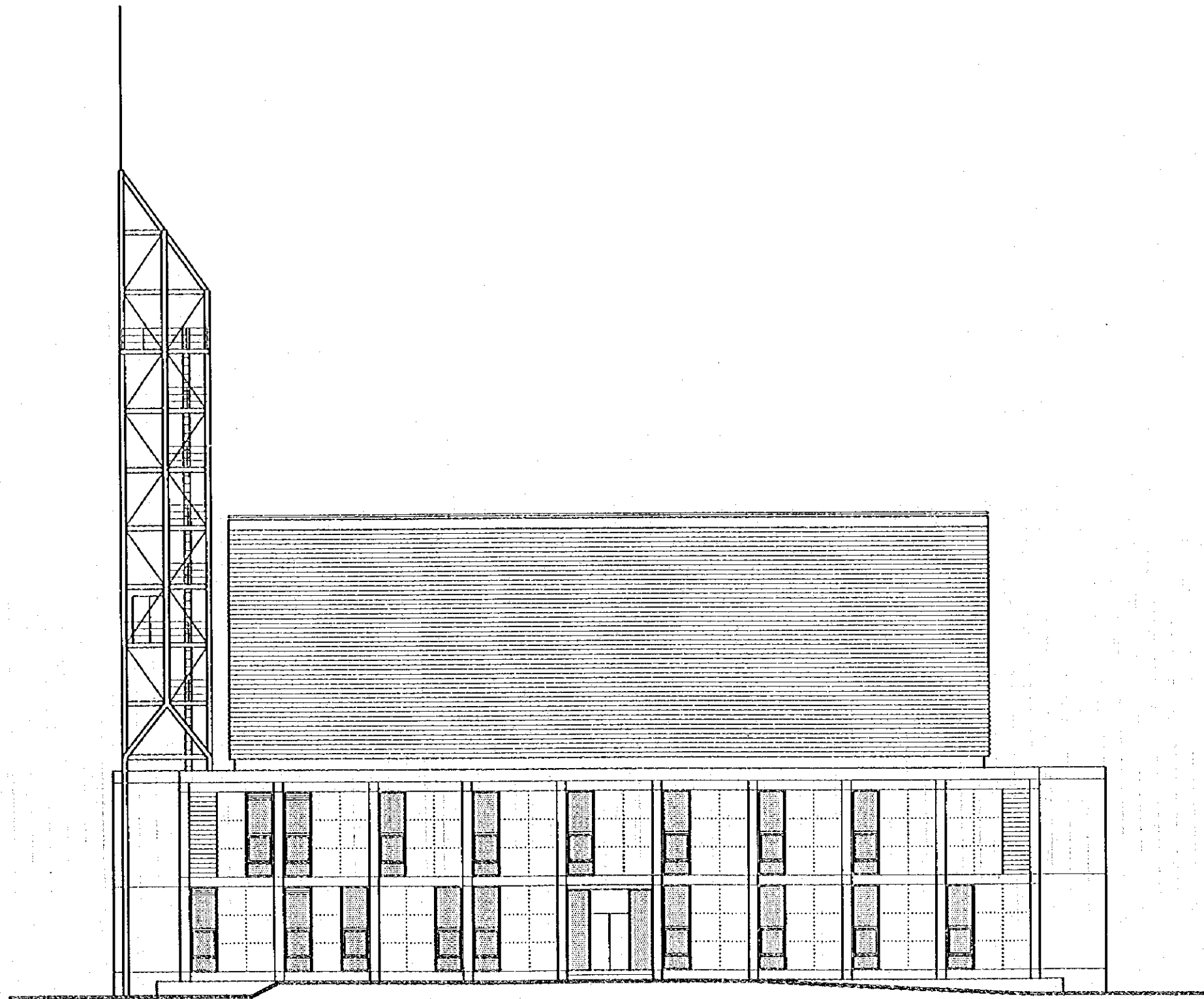


Fig. 2-3-6 PHNOM PENH TV STATION

EAST ELEVATION S:1/200



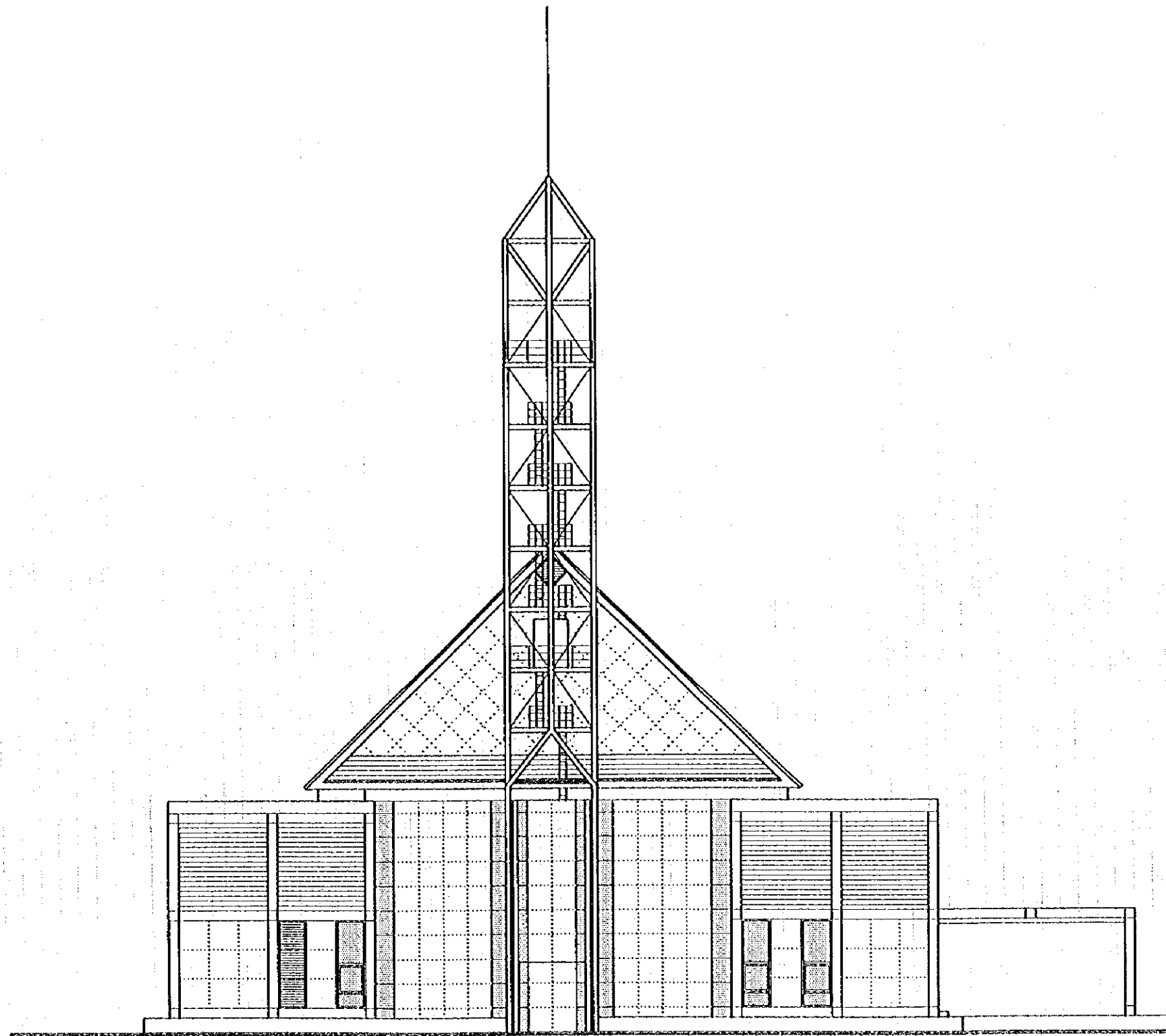


Fig. 2-3-7 PHNOM PENH TV STATION

SOUTH ELEVATION S:1/200



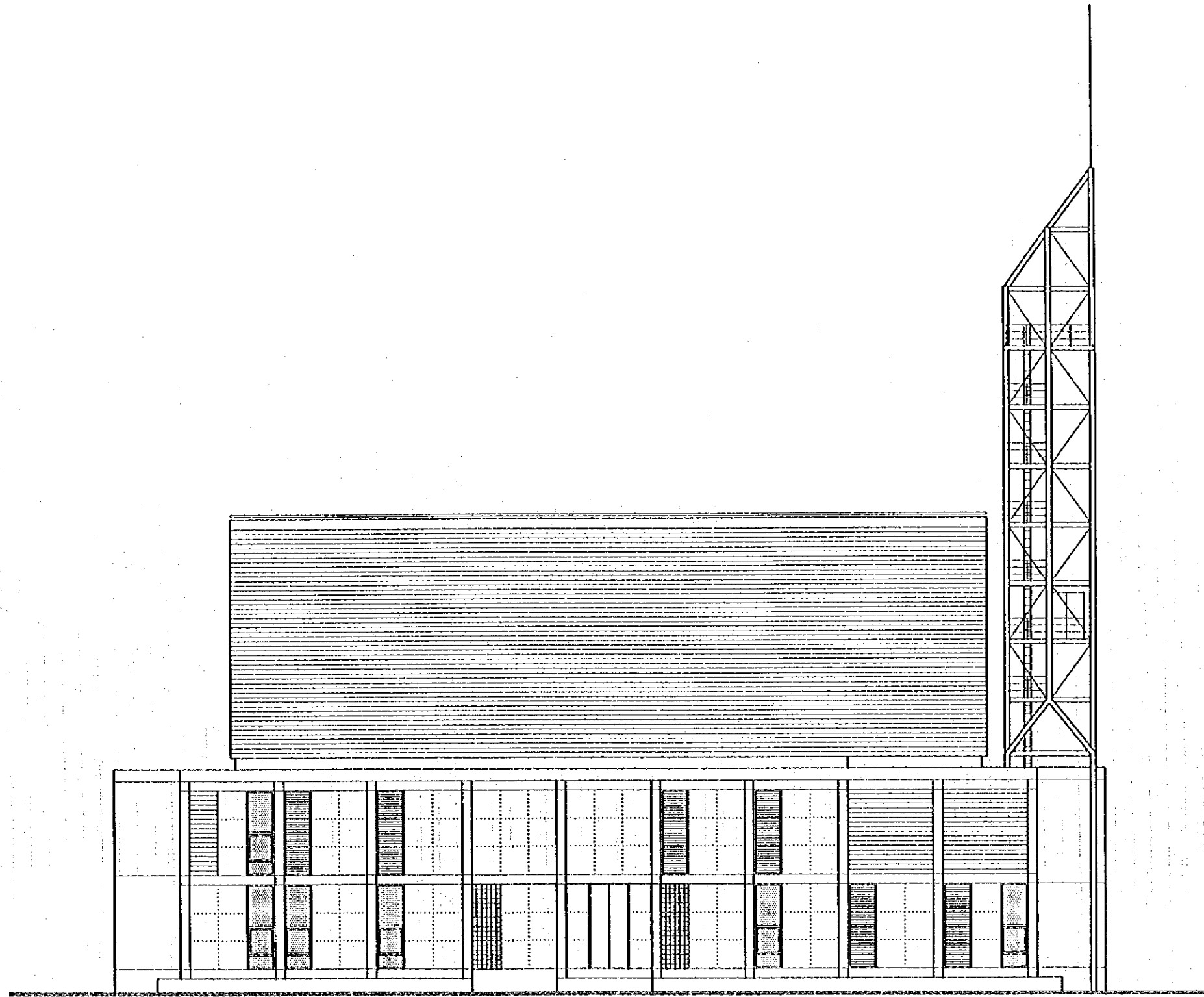


Fig. 2-3-8 PHNOM PENH TV STATION

WEST ELEVATION S: 1/200





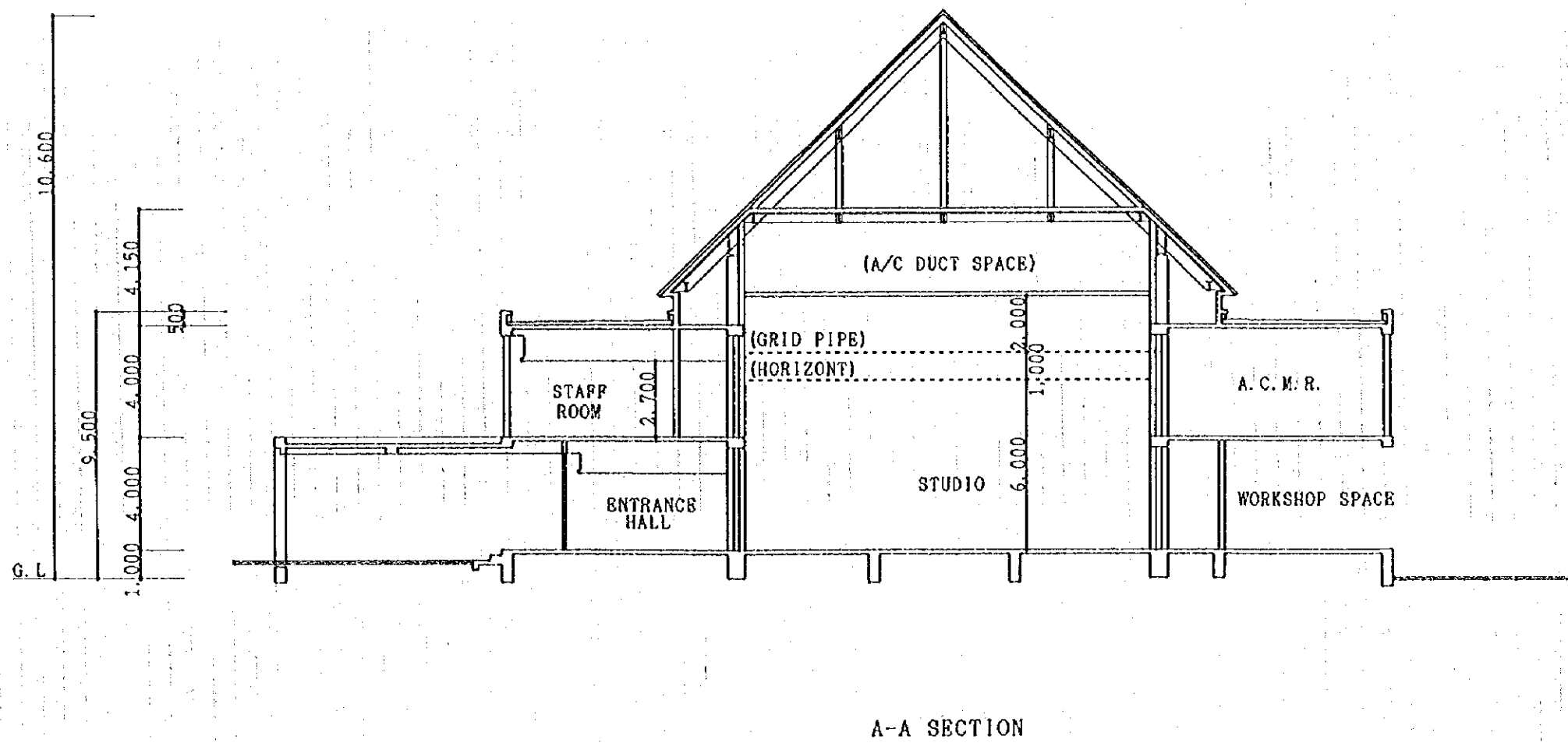
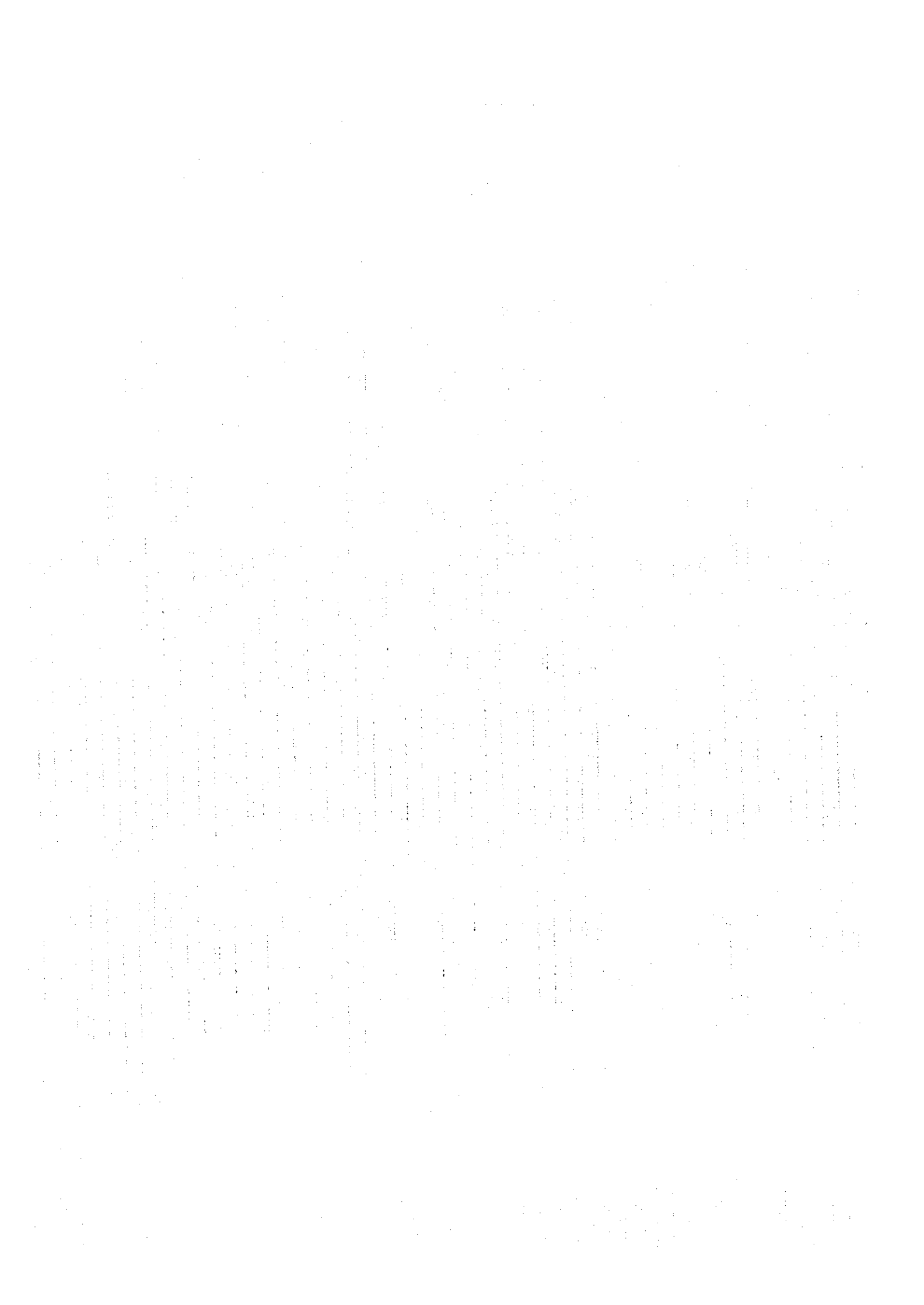


Fig. 2-3-9 PHNOM PENH TV STATION

SECTION (1) S:1/200





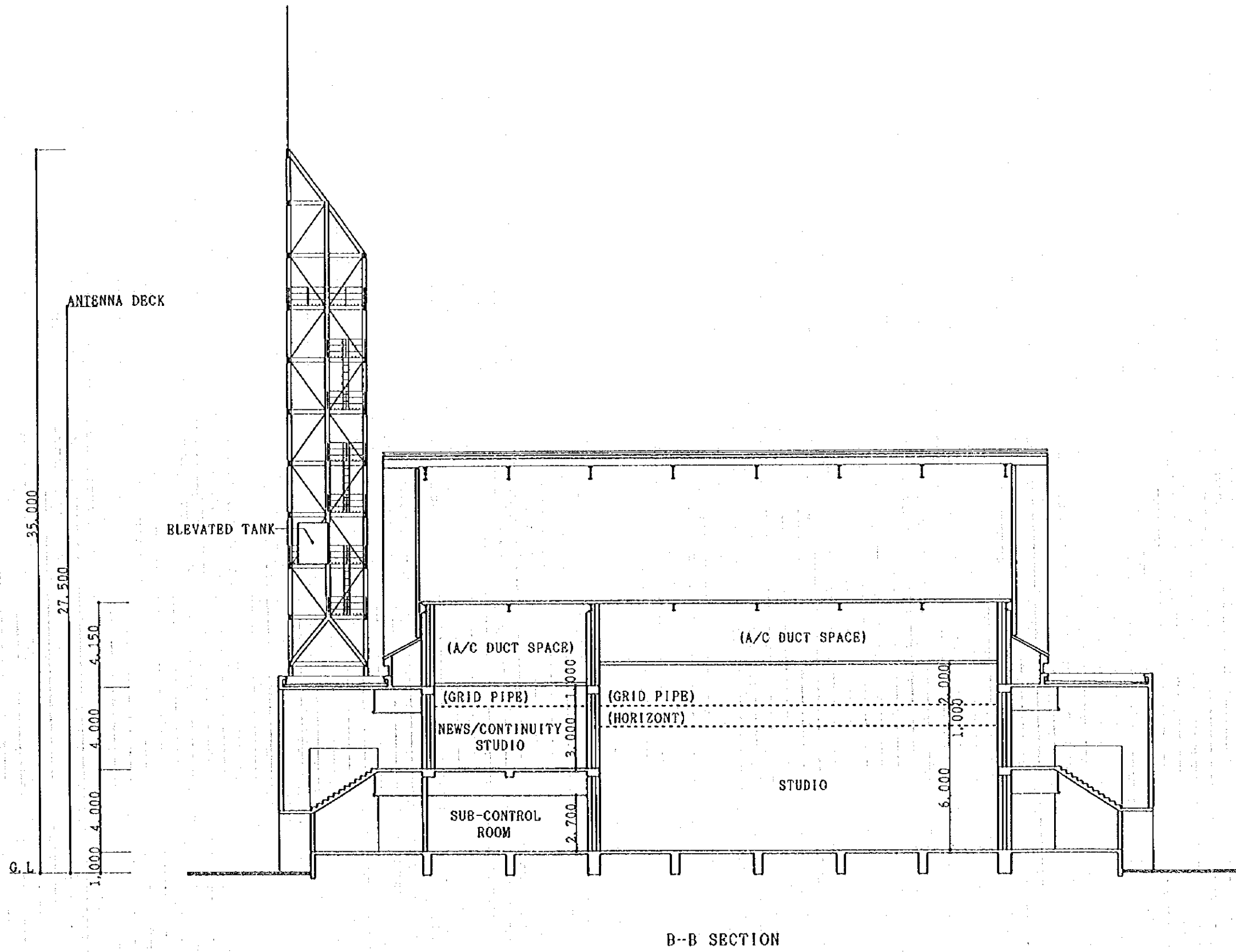
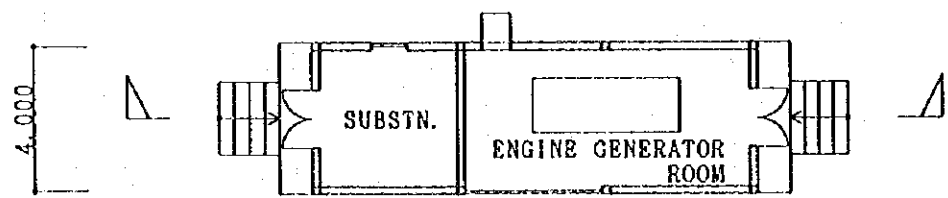


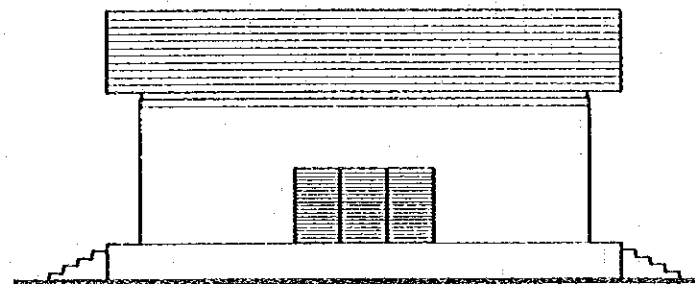
Fig. 2-3-10 PHNOM PENH TV STATION
SECTION (2) S:1/200



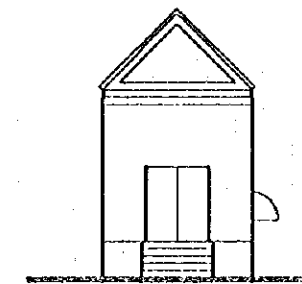




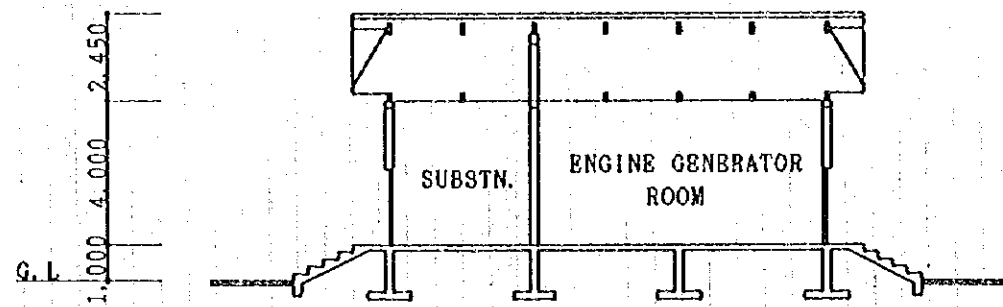
PLAN



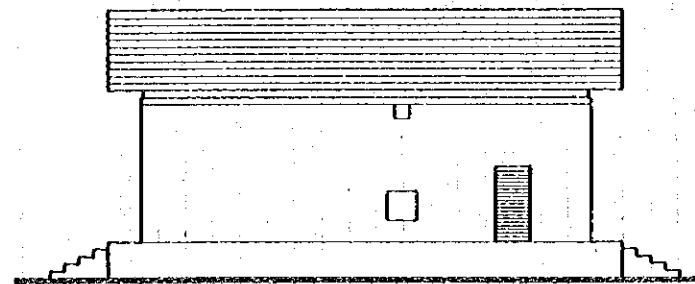
EAST ELEVATION



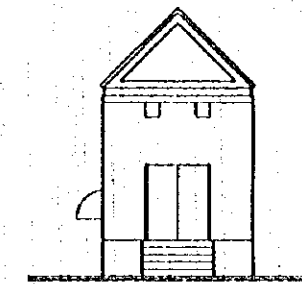
NORTH ELEVATION



SECTION



WEST ELEVATION



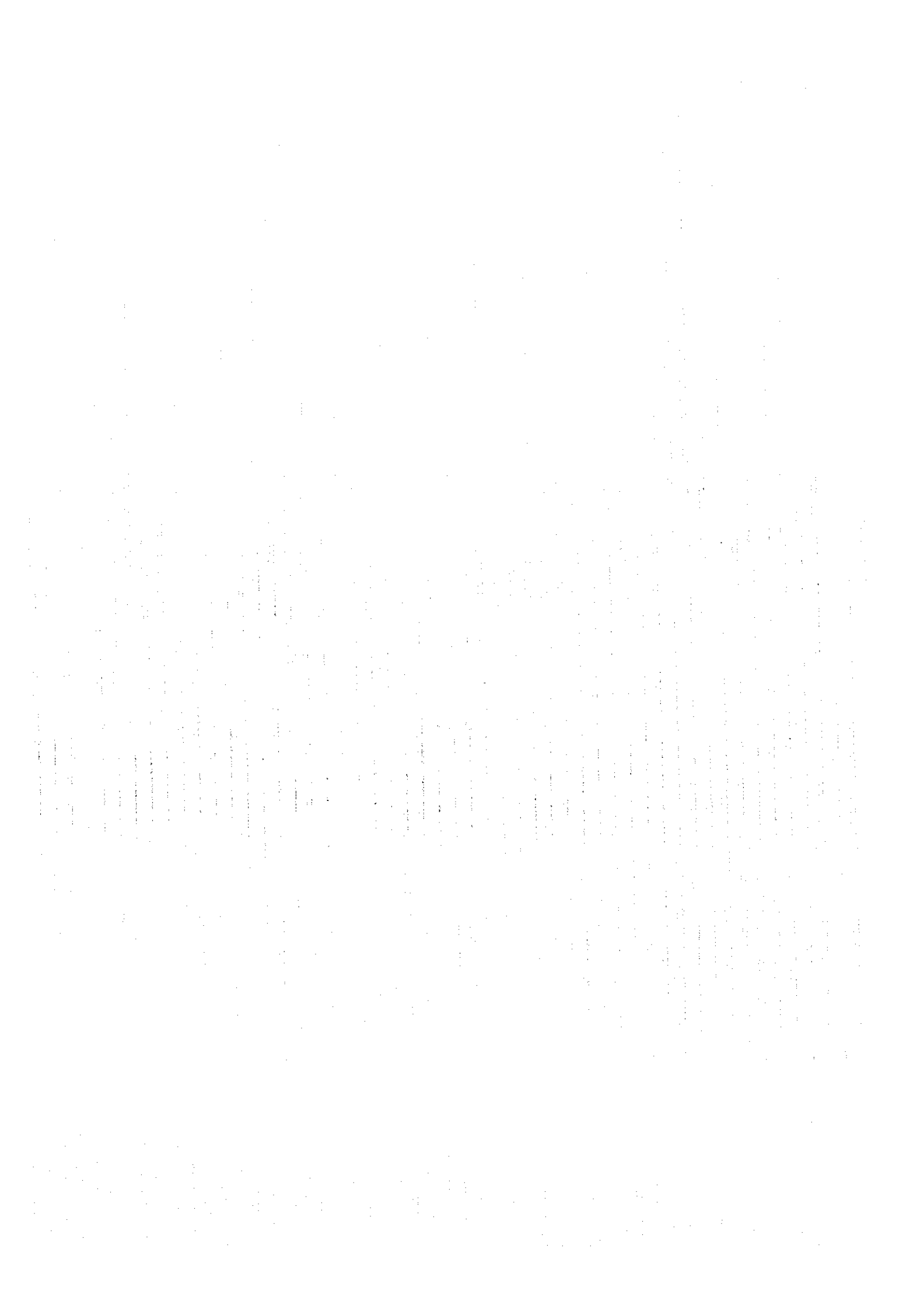
SOUTH ELEVATION

POWER BUILDING

Fig. 2-3-11 PHNOM PENH TV STATION

ANNEX BUILDING S:1/200





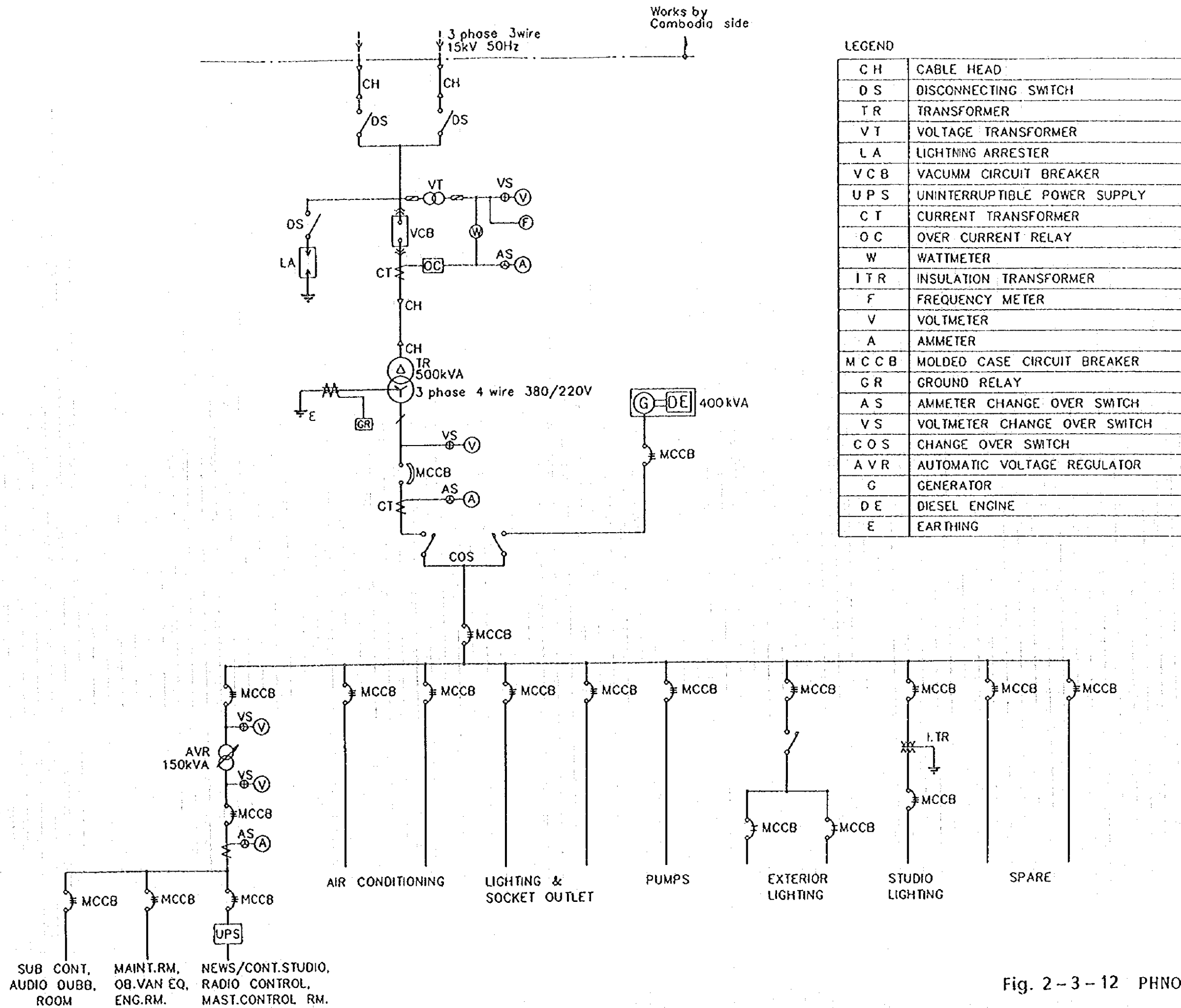


Fig. 2-3-12 PHNOM PENH TV STATION
SCHEMATIC DIAGRAM FOR ELECTRICAL INSTALLATION





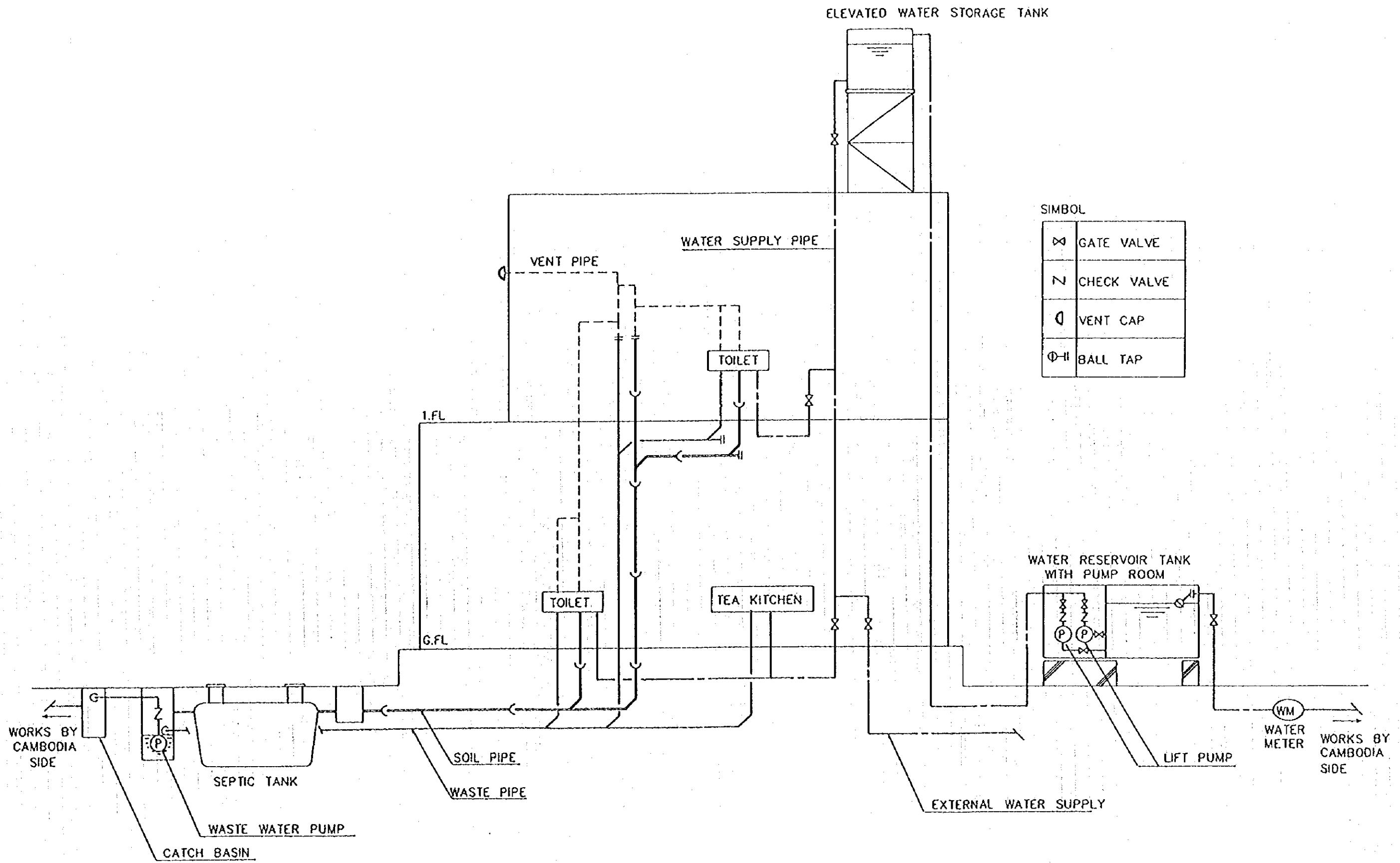
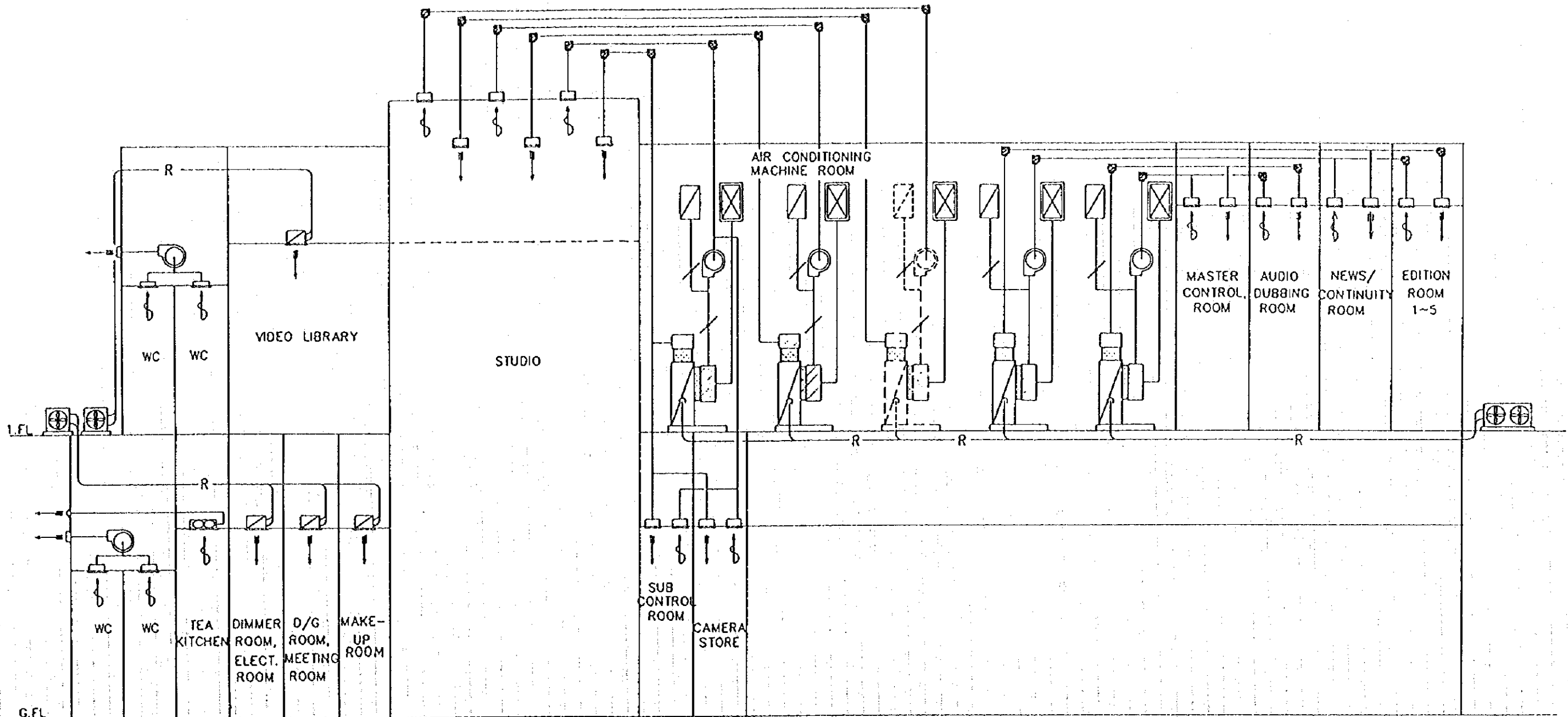


Fig. 2-3-13 PHNOM PENH TV STATION
SCHEMATIC DIAGRAM FOR WATER SUPPLY, SEWAGE AND DRAINAGE SYSTEM





MAIN BUILDING	
	PACKAGED TYPE AIR CONDITIONER
	CASSETTE TYPE CEILING AIR CONDITIONER
	CONDENSER FOR AIR CONDITIONER
	SOUND ABSORBING BOX
	SUPPLY AIR & RETURN AIR DUCT
	AIR VOLUME DAMPER
	REFRIGERANT PIPE
	VENTILATOR & EXTRACTOR
	CASSETTE TYPE CEILING FAN
	WALL MOUNT TYPE FAN
	THERMOSTAT SWITCH
	OA INTAKE GRILL

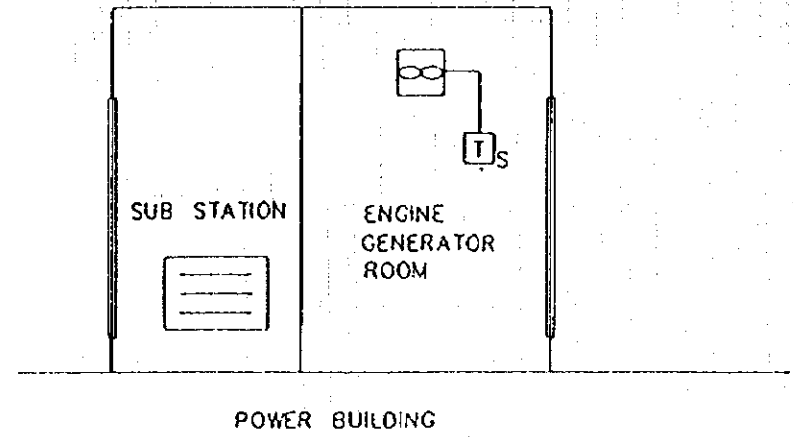
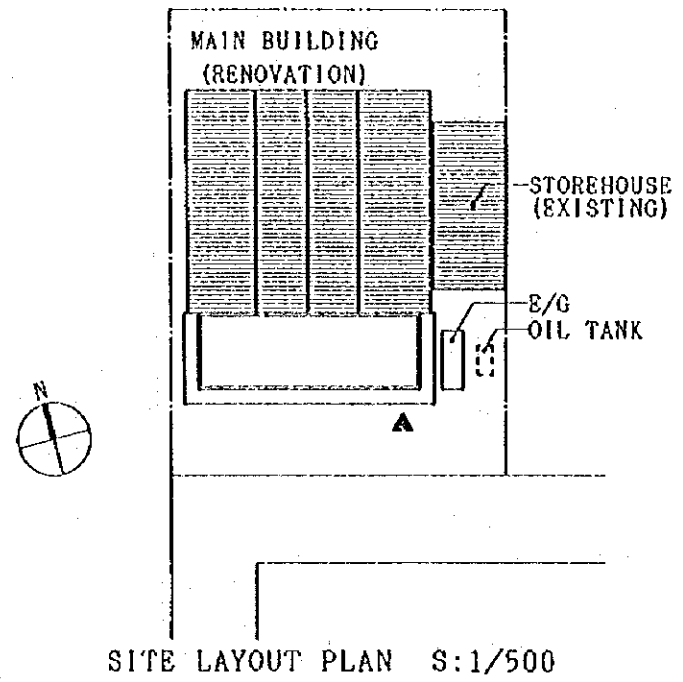


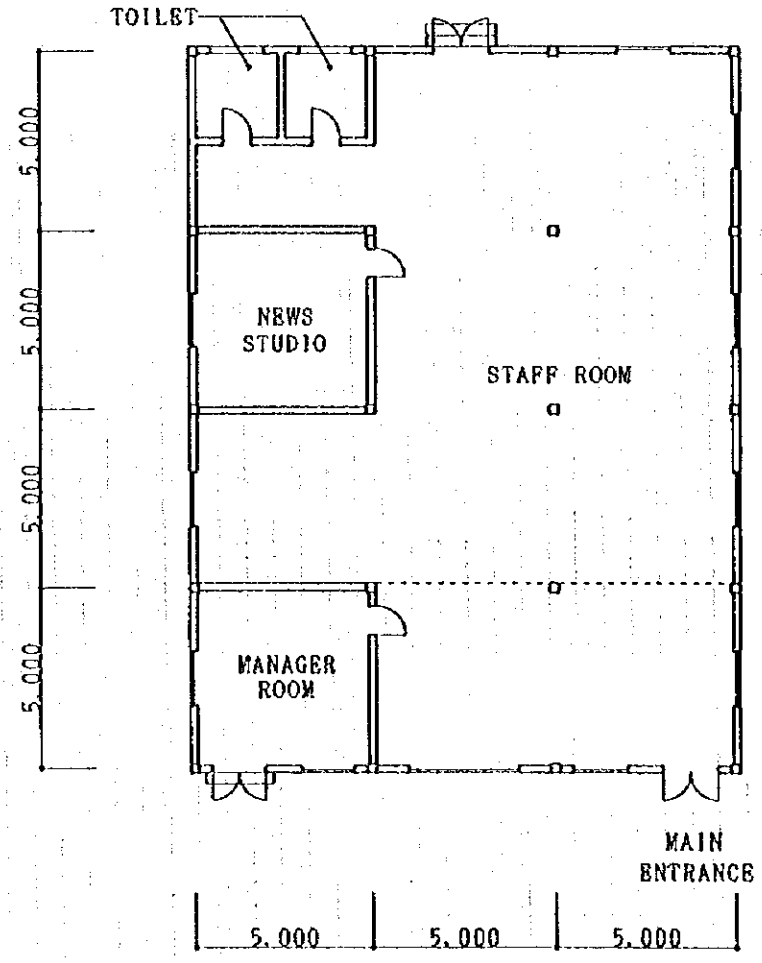
Fig. 2-3-14 PHNOM PENH TV STATION
SCHEMATIC DIAGRAM FOR AIR-CONDITIONING SYSTEM



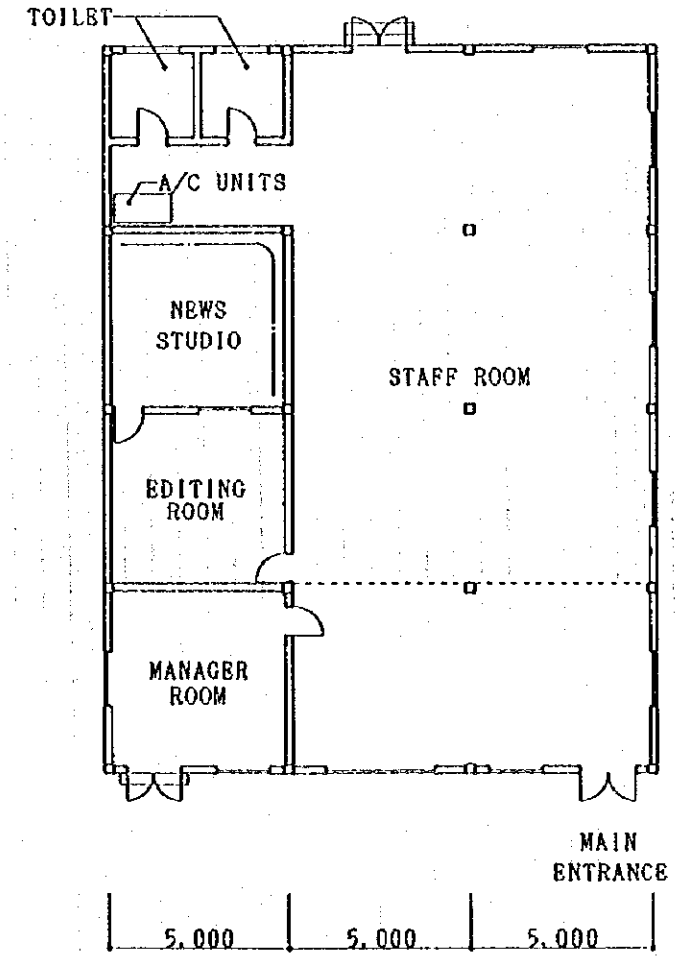




SIHANOUKVILLE TV STATION	
FLOOR AREA	: 300 m ²
RENOVATED FLOOR AREA	: 300 m ²

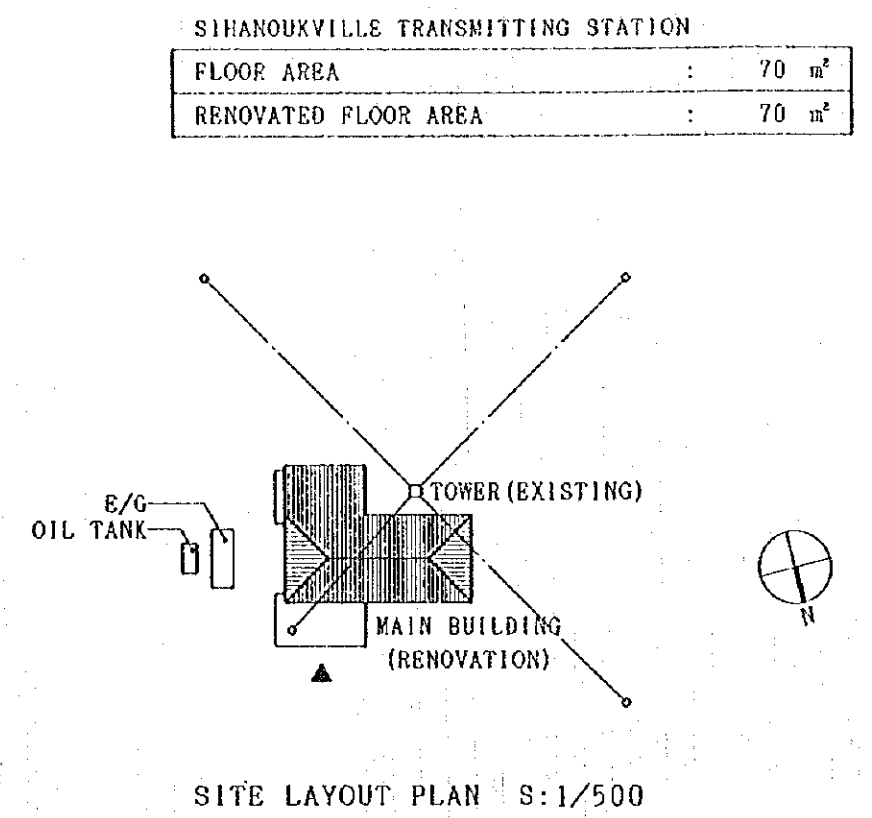


(EXISTING FLOOR PLAN)
RENOVATION PLAN S:1/200

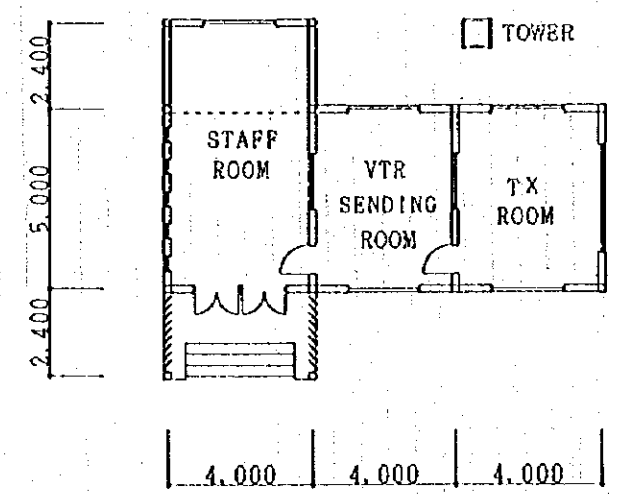


(AFTER RENOVATION)

TV STATION



SIHANOUKVILLE TRANSMITTING STATION	
FLOOR AREA	: 70 m ²
RENOVATED FLOOR AREA	: 70 m ²



RENOVATION PLAN S:1/200
TRANSMITTING STATION

Fig. 2-3-15 SIHANOUKVILLE EXISTING BUILDINGS

RENOVATION DRAWING

