2-2 Broadcasting Service Area

According to the Final Acts (note 1) of the Regional Administrative LF/MF Broadcasting Conference (Region 1 and 3), which took place in Geneva 1975, a 100 kW medium wave frequency was respectively assigned to the region of Kathmandu and Pokhara, and for the two other regions as well (refer to Appendix 1-3).

In this section, the broadcasting service area is presumed for a 100 kW transmitting station established in Kathmandu and Pokhara.

2-2-1 Presumption of Broadcasting Service Area

In case a transmitting station of 100 kW output power is respectively established in Kathmandu valley and Pokhara, there will be no trouble regarding the service area within the valley and their respective northern mountainous districts. However, there exists a task towards the relatively high populated Southern district of Terai where the radiated wave propagates beyond the mountains (note 2) surrounding the valley. The assumption of the available service towards the Southern Terai district was one of the major problems in respect to this preliminary design survey.

In order to solve this task, the propagation of field strength was calculated under the assumption that the radio wave propagation path on a plain, and then the theoretical value for normal condition was estimated (note 3).

Note 1: Appendix 1-3 (Frequency Assignment).

Note 2: Refer to profile map in Appendix 1-6.

Note 3: The calculation of theoretical value was based on the technical materials of the final document of "Regional Administrative Conference, Additional documents". For the ground conductivity of the propagation path, the values proposed by H.J. Hendriks was amended in accordance with the measured results.

Furthermore, regarding Kathmandu transmitting station, the available service area (field strength intensity 60 dB/0dB=1μV/m) was assumed by compensating the values according to the measured results described in the following. (Appendix 1-4)

(1) Measurement of Field Strength Intensity

The field strength intensity of Kumartar transmitting station in Kathmandu, output power of 10 kW, was measured at several points between Kathmandu and Southern Terai district (refer to Appendix 1-5 for measured data).

In case the transmitting power is 100 kW, expecting that the field strength intensity will rise relatively by 10 dB to the present value, the calculated values were partly amended by the measured results, and thus the 60 dB filed strength area was predicted.

(2) Measurement of Ground Conductivity

To presume the field strength intensity and use for fundamental material to design the transmitting station, measurment of ground conductivity was carried out at the three proposed sites this time; Kathmandu and Pokhara transmitting station and Southern Terai district (Janakpur). The results are given in the following table. The measured data for each site is given in Appendix 1-7.

From these results, it was found that the values were, on the average, lower than those anticipated before the survey both at Kathmandu and Pokhara. Those results were utilized in basic designing, such as, revising of the ground conductivity ratio at the time of calculation of field strength intensity, the earthing of transmitting antenna, etc.

Table 2-1 Results of Ground Conductivity Measured at Proposed Sites and Terai

Site	Kathmandu (LALITPUR)	Pokhara (MALE PATAN)	Southern Terai (JANAKPUR.J.A.D.P.)
Results of measurement	Refer to Appendix Fig. A 1-7-1 (a)	Refer to Appendix Fig. A 1-7-1 (b)	Refer to Appendix Fig. A 1-7-1 (c)
Results of analysis	Ground surface d_1=0.69m, σ_1=1.6mS/m d_2=11m, σ_2=0.35mS/m d_3>11.7m, σ_3=12mS/m	Ground surface d_1=2.6m, σ_1=0.7mS/m d_2>2.6m, σ_2=1.2mS/m	Ground surface d_1=1.6m, σ_1=0.6mS/m d_2>1.6m, σ_2=3.4mS/m
Remarks	° Average value of three directions. ° Relatively homogeneous.	° Average value of three directions. ° The value differs at east and west side of the site.	° Average value of two directions. ° Relatively homogeneous.

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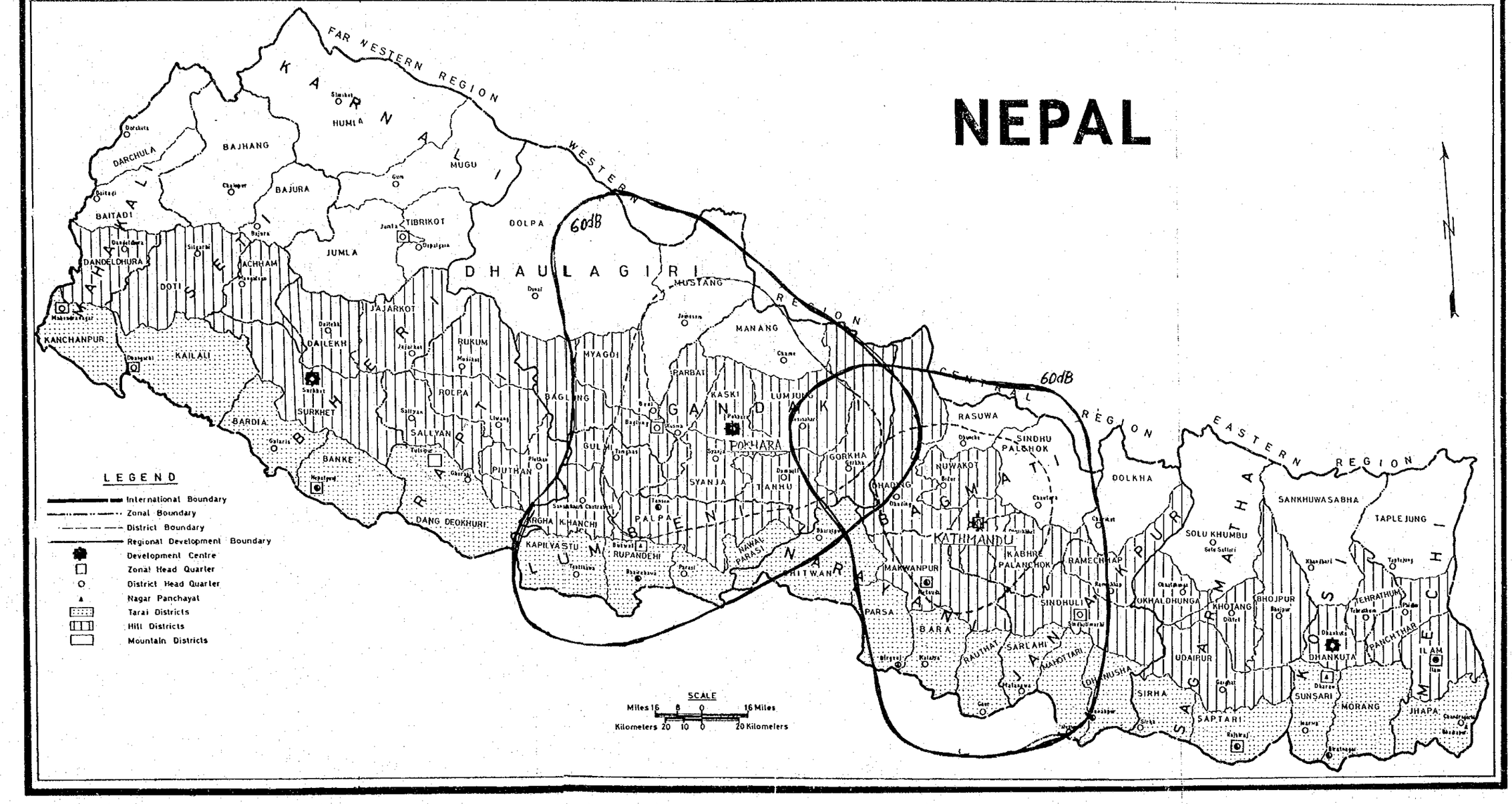

FAR WESTERN REGION
MID WESTERN REGION
WESTERN REGION
CENTRAL REGION
EASTERN REGION
KARNALI
MAHAKALI
SETI
BHERI
RAPTI
BAGMATI
NARAYANI
KOSHI
SAGARMATHA
MECHI
LUMBINI
HUMLA
MUGU
JUMLA
TIBRIKOT
DOLPA
DHAULAGIRI
MUSTANG
MANANG
DARCHULA
BAJHANG
BAJURA
BAITADI
DANDELDHURA
ACHHAM
DOTI
KANCHANPUR
KAILALI
DAILEKH
JAJARKOT
RUKUM
MYAGDI
PARBAT
KASKI
LUMJUNG
BAGLUNG
ROLPA
SURKHET
BARDIA
SALLYAN
GULMI
PUTHAN
BANKE
DANG DEOKHURI
ARGHA KHANCHI
KAPILVASTU
RUPANDEHI
PALPA
SYANJA
TANHU
GORKHA
RASUWA
NUWAKOT
DHADING
KATHMANDU
SINDHU PALCHOK
KABHRE PALANCHOK
RAMECHHAP
DOLKHA
SOLU KHUMBU
SANKHUWASABHA
TAPLE JUNG
MAKWANPUR
PARSA
BARA
RAUTHAT
SARLAHI
MAHOTTARI
SINDHULI
OKHALDHUNGA
KHOTANG
BHOJPUR
TEHRATHUM
PANCHTHAR
ILAM
DHANKUTA
UDAIPUR
SIRHA
SAPTARI
SUNSARI
MORANG
JHAPA
60dB
SCALE
Miles 16 8 0 16 Miles
Kilometers 20 10 0 20 Kilometers
LEGEND
International Boundary
Zonal Boundary
District Boundary
Regional Development Boundary
Development Centre
Zonal Head Quarter
District Head Quarter
Nagar Panchayat
Tarai Districts
Hill Districts
Mountain Districts

From the results obtained, it was found that the ground conductivity of the districts of Kathmandu and Pokhara stations were both relatively lower than that of the predicted values in prior to the survey. As a result, these were used for compensating the ground conductivity value for calculating the field strength intensity and for designing the grounding electrode of the transmitting antenna.

2-3 Soil Survey

The geology of the Kingdom of Nepal is said to be the Fourth Period Layer which was piled when the Himalayas were formed. Roughly speaking, the plains consist of clay and the hills consist mostly of gravel.

The sites which were intended to be surveyed this time were three, namely; for Kathmandu and Pokhara transmitting stations and Kathmandu studio centre. However, the actual boring was performed only at the site for Kathmandu transmitting station, considering the condition of neighbouring geology, data obtained from the Tribhuvan University Institute of Engineering, and the expected scale of building and steel antenna mast. The investigation work was commissioned to the above Institute, and the Rotary Cell and Augur type boring machine was used.

The outline of the soil condition for each site and other related data are explained in the following.

2-3-1 Site for Kathmandu Transmitting Station

This site is on a hill which is about 70 m higher than the Kathmandu plain. In prior to the boring test, a rough survey was performed on the condition of soil near the site. As a result, it was predicted that the soil consists of considerable amount of mixture of sand silt and gravel to a depth over 30 m. According to the boring to a depth of 15 m, almost the same kind of layer was confirmed as illustrated in the report (Appendix 1-9).

Assuming from the results obtained above, if the level of ground bearing a foundation is GL-1.5 m, then the allowable bearing unit capacity of soil for long-time loading will be 65 t/m^2, according to the theoretical equation. However, as there exists a clay layer of N=9, and 50 cm in thickness, near GL-4 m, and considering the influence of the upper load onto this layer, the allowable bearing unit capacity will be 15 - 20 t/m^2 at a depth of foundation bed (1.0 - 1.5 m, underground).

It is judged that even if the clay layer near GL-4 m mentioned above is completely compressed by the weight of the building or steel antenna mast, there will be almost no influence on the structure. Accordingly, it is unnecessary to keep the level of ground bearing a foundation to a level deeper than this clay layer.

2-3-2 Site for Pokhara Transmitting Station

This site is on a hill same as Kathmandu transmitting station. By rough soil survey in and around the site, it was confirmed that layer mainly of gravel (a pretty places have rocks) is continuing to a depth over 40 m from the ground surface, and by judging from the information of Tribhuvan University Institute of Engineering, it was concluded that the ground is solider than that of Kathmandu transmitting station.

In consideration of the condition of the ground, the allowable bearing unit capacity will be 20 - 25 t/m^2 at a depth of foundation bed (1.0 - 1.5 m, underground).

2-3-3 Site for Kathmandu Studio Centre

This site is in the Kathmandu valley which is generally known as having a bad ground in the Kingdom of Nepal, and in the corner of the site where many Government office complexes are located.

According to the boring data (data for a site about 100 m away from this site) obtained from the above Institute,

the ground condition in the neighbourhood of this site is shown in the following table, and the same kind of soil was confirmed at the adjoining site where some foundation construction work was being carried out.

Depth	Name of soil	Long term bearing unit capacity
0 - 8.5 m	medium sand with gravel	15 - 20 t/m^2
8.5 - 27.5 m	organic clay	8 - 10 t/m^2

Water level, GL-3.2 m.

Accordingly, the long-term allowable bearing unit capacity of this site will be 10 - 15 t/m^2, at a depth of foundation bed (1.0 - 1.5 m, underground), considering the margin against sinking and the organic clay beneath a depth of 8.5 m.

2-4 Earthquake

The Kingdom of Nepal is adjacent to the so called Trans-Asian Large seismic zone, running from Central Asia to Malayan Peninsula.

The epicentres of earthquakes occurred in Indian Subcontinent, until about 1950 concentrated in the border between Himalayas and the Ganges Plain, and many of them had a magnitude larger than 7. Of these earthquakes, the magnitude of the one which occurred in 1934 near the border between the Kingdom of Nepal and India (latitude 26° 30' N, longitude 86° 30' E) was 8.3. Both Nepal and India were badly damaged and 7,252 persons deceased.

The earthquakes which the Kingdom of Nepal has been damaged by have mostly originated in India and the neighbouring countries, but in the Kingdom of Nepal, too, an earthquake of magnitude of 7.0 occurred in 1936, and besides this, earthquakes of magnitude of about 6 have frequently occurred, since 1960.

However, as earthquake proofing regulations for buildings in the Kingdom of Nepal, at present, a lateral seismic coefficient of 0.08 - 0.1 (referring to the standards of India) is adopted only for certain buildings.

For reference, the regulation of lateral seismic coefficient in India is divided into the following five zones.

Zone number	Lateral seismic coefficient
V	0.08
IV	0.05
III	0.04
II	0.02
I	0.01

According to this regulation, the border between the Kingdom of Nepal and India belongs to No. IV zone, and in addition to this coefficient of 0.05, other factors, such as natural period and usage of building, type of foundation, etc. are added proportionally.

On the otherhand, there are some examples in which a lateral seismic coefficient of 0.1 - 0.15 is adopted in design for a couple of dams built near the seismic zone in India, and for the Chisapani dam built in the Kingdom of Nepal, a coefficient of 0.12 which is just about the same as above was adopted. In addition, the Seismological Institute of India is proposing that an appropriate lateral seismic coefficient for the Kathmandu valley is about 0.15.

2-5 Weather Condition

Kathmandu and Pokhara are both in the Central Mountainous District, and climate of a year can be roughly divided into the rainy season and dry season. The rainy season is called the monsoon and it rains almost every night from late May to late September. The amount of rain of daytime is little, and not so wet. The dry season is from October to February, and it is called the post-monsoon season, and the season from January to May is called the pre-monsoon season.

The coldest season is from October to February, and the weather is fine almost everyday and there is no wind, but there is deep fog and frost very often.

In Pokhara, it hails sometimes. There is much lightning in Kathmandu and Pokhara district and installation of arrestor is indispensable.

2-6 Building Law

In the Kingdom of Nepal, there exists no particular laws, regulations or standards for buildings and related facilities.

Therefore, most of the regulations enacted in India are applied, but, in this project, the regulations of Japan were referred to.

SECTION 3 PRELIMINARY DESIGN

SECTION 3 PRELIMINARY DESIGN

3-1 Scope of Preliminary Design and Basic Policy

3-1-1 Scope of Preliminary Design

The facilities planned here are divided into two; the transmitter facility and studio facility. The scope for each facility is described in the following.

(1) Transmitter Facility (Kathmandu and Pokhara transmitting station)

1) Transmitter and attached equipment.
2) Electric performance of steel mast (antenna).
3) Electric power equipment for transmitter and attached equipment (power distribution system for broadcast equipment and engine generator equipment).
4) Building and building equipment.

(2) Studio Centre Facility (Kathmandu studio centre).

1) Studio equipment.
2) Master control equipment (including clock and equipment).
3) STL (studio - to - transmitter link) equipment.
4) Electric power equipment for transmitter and related equipment (power distribution system for broadcast equipment and engine generator equipment).
5) Studio equipment for Pokhara transmitting station.
6) Sound outdoor broadcast wagon and radio equipment for Pokhara transmitting station.
7) Building and building equipment.

The meaning of "building" and "building equipment" quoted herein covers the following items.

1) Architectural design.
2) Building structure.
3) Structure of steel mast (for transmitting antenna).

4) Building acoustics.

5) Electric equipment for the building.

6) Water supply, sanitation equipment.

7) Air conditioning, ventilation and heating equipment.

8) Building material.

The broadcasting system for this project is classified into equipments and illustrated as a system diagram in Fig. 4-9.

3-1-2 Basic Broadcast Programming Policy in Relation to the Preliminary Design

In general, the scale of broadcasting facility and number of programme staff is to be decided in accordance with the programme composition policy.

The policy for programme composition can be summarized to the following items, according to the results of the survey.

1) A nationwide broadcast is aimed (For the establishment programme for this time, Kathmandu; the principal city in the Central Development Region and Pokhara; the principal city in the Western Development Region, are taken into consideration).

2) To compose programmes utilizing the superiority of broadcasting as media for mass communication.

3) To provide school programmes and instructive programmes for teachers, to raise the educational level of the nation equally, and to present an equal opportunity of education.

4) To instruct the industry for the development plan of the country and educate person through adult and government publicity programmes.

5) To present healthy entertainment and relaxation to nation through entertainment and sports programmes.

3-1-3 Basic Policy in Relation to the Preliminary Design

The principal points which were taken into consideration in the preliminary design are as follows.

(1) The transmitter power for Kathmandu and Pokhara transmitting station is respectively determined to 100 kW, based on the carrier power (Table A1-3-1) of the Final Acts of the Regional Administrative LF/MF Broadcasting Conference (Region 1 and 3) (Second Session) on Geneva, 1975.

The transmitter power for the stand-by transmitter unit is determined to 10 kW. The reason is to save fuel expense of the engine generator, in case city electricity happens to fail for a long time, and to prevent the excessive reduction in signal-to-noise ratio of the broadcasting area.

As for the transmitting antenna, a 100 m standard guyed cylindrical mast is adopted, in respect to economy of vertical directivity and antenna gain.

(2) The number of studios for Kathmandu studio centre is five, including the master control continuity studio. They are designed as a annex to the existing studio centre in operation.

For the implementation of programme composition policy, the existing number of studios is six and each studio is a production studio provided with a sub-control room.

However, as the sound-proof of each studio is not satisfactory in means of building structure, only 2 - 3 studios can be used at the same time. On the other hand, the sub-control room equipment was made in 1968 and equipment trouble is occurring once or twice every month because of machine-life. Thus, the aforementioned annex type studio centre was planned.

(3) At Pokhara transmitting station, one studio suitable for local continuity and recording programmes is planned.

(4) In addition, one sound outdoor broadcast wagon is planned for covering area to the Far Western Development Region, for recording outdoor programmes.

(5) One STL (Studio-to-transmitter link) and one engineering link of the VHF band is planned for connecting the studio centre and the transmitting station. This is because the site of the transmitting station is away from the city, about 5.8 km from the studio centre.

(6) The design of the building for the studio centre and transmitting station are to be made of reinforced concrete and brick, and emphasis for investment is put on function and structure of building, so as to the design is economical.

(7) As for the building material, the materials which can be purchased in the Kingdom of Nepal will be used as far as they satisfy both of the construction schedule and the economical design.

(8) The operation of studio centre and transmitting station is the manned type. The reason for this is to secure necessary number of technicians and to improve the quality of staff on one hand, and implement an economical design on the other hand.

(9) One of the conditions for the design is that the necessary amount of electric power is to be supplied and the voltage of the electric power supply for the studio centre and transmitting station is to be 400 V at the drop point.

(10) In carrying out the design work for the necessary regulations and standards which are not prescribed in the Kingdom of Nepal, those adopted in Japan will be referred to.

3-2 Broadcasting Facility

3-2-1 Transmitting Station Facility

The fundamental way of thinking about a common design for both Kathmandu and Pokhara transmitting station is described at first.

For both stations, the necessary number of technicians is stationed at the transmitting station for operation and maintenance of station, and the equipment are designed on the premise that the station is of attended operation.

Namely, in principle, the fundamental operations; such as switch on and off of transmitter, selection of change-over from main transmitter unit to stand-by transmitter unit, selection of input programmes are all operated manually. Although the operational condition of principal facilities can be supervised at the control and supervision console.

The output power for the stand-by transmitter unit is 10 kW. The reason why the output power is determined to 10 kW, in comparison with the 100 kW output power of the main transmitter unit, is to reduce the operational expense (maintenance and operation cost, etc.) of the engine generator during failure of city electricity power.

In order to increase the reliability of the transmitter system, a full air cooling system is adopted for cooling the transmitter and engine generator equipment. In addition, the direct coupling system is adopted to feed base of antenna for elimination of use of a long feeder line.

In the following, the fundamental way of considering the design and functions for each equipment of Kathmandu and Pokhara transmitting stations is described.

(1) Kathmandu Transmitting Station

The principal equipment to be installed at Kathmandu transmitting station are shown in the following table.

Table 3-1

	Equipment	Quantity
1)	Main transmitter unit (output power 100 kW)	1 set
	Stand-by transmitter unit (output power 10 kW)	1 set
2)	Attachments to transmitter	1 set
3)	Main electric power board, engine generator equipment	1 set
4)	STL equipment (receiving part)	1 set
	Radio Engineering link equipment	1 set
5)	Transmitting antenna equipment	1 set
6)	Measuring instruments, maintenance tools, etc.	1 set
7)	Accessories, spare parts	1 set

The composition of each equipment, fundamental functions and way of considering the design are respectively described in the following.

1) Transmitter

The output power of the main transmitter unit is 100 kW and the stand-by transmitter unit is 10 kW. The modulation system for both transmitters is the final stage plate-modulation type. For the high power stages, forced air cooled vacuum tubes are used, but for the initial stages, solid-state circuitry is used to improve the reliability and to ensure stability and improve the maintenance.

The necessary meters for supervising the operational condition of the transmitter and the switches for operation are all mounted on the front panel of the transmitter,

facing the control-supervision console which is explained later, to facilitate the operation of the transmitter. The switch of the transmitter is mounted on the main transmitter body and also on the control-supervision console. The switch of the transmitter unit has priority over the operation of the control-supervision console, and a changeover switch is provided in front panel of the transmitter and named as "Manual (transmitter side)" and "Remote (control-supervision console side)".

The switch to select the main transmitter unit and stand-by transmitter unit is fixed on the control-supervision console. In addition, the transmitter unit which is not connected to the transmitting antenna is always connected to the dummy antenna.

2) Equipment attached to transmitter unit

The equipment attached to the transmitter unit consists of the following.

a) Control-supervision console

A console type control-supervision console provided with operational and supervisory functions is installed in the transmitter room.

(Control function)
Switch on/off of transmitter unit.
Adjustment of audio input level of transmitter unit.
Changeover between transmitter unit and dummy antenna.

(Supervisory function)

Indication of transmitter unit in use.
Indication of transmitter unit output power and degree of modulation
Indication of audio signal level (selective switch).

Audio monitor (selective switch)

Indication of abnormality of principal equipment in station and alarm by buzzer.

(Other equipment)

An interphone device connecting each room in the transmitting station.

A radio order line device between studio centre and transmitting station.

b) Programme input equipment

A rack is installed in the transmitter room, and the following equipment are contained in it to process the audio input signal.

Input programme switch, audio level meter and an audio volume control.

Line equalizer, limiting amplifier.

Audio monitor amplifier and speaker.

Jack panel (Displayed in form of block diagram).

c) Antenna dummy load

A common air-cooled dummy load device for the 100 kW and 10 kW transmitter unit is installed in the dummy load room.

d) Surge protector

For measures to prevent lightning and surge current, a surge protector is installed.

3) Main electric power board, engine generator

At normal condition, the city electricity is used for operating the transmitting station, but in case of city power failure, the 100 kW transmitter unit is changed over to the 10 kW stand-by transmitter unit and the necessary power for the transmitter and related equipment is supplied by operating the engine generator. With regard to the changeover between city power and engine generator power, the city power has the priority.

a) Main electric power board

The main power board is located in the power room (except for some of those for the transmitter unit which are explained in the next section.) The equipment in the power room consist of automatic voltage regulator, incoming power board, distribution board and transformer.

b) Engine generator

The performance of the generator is such as; capacity 70 kVA, 3-phase 50 Hz, 400 V, 4-poles, 1500 r.p.m. and it is coupled directly to a 86 horse power diesel engine. In addition, a set of battery with charger is installed for starting the engine generator, and an automatic voltage regulator and a fuel tank are respectively attached to it. The electric power system including the main power board, distribution board and engine generator device is shown in Fig. 4-5. In the incoming city power lines, a voltage detector is inserted to detect the voltage level and in case the voltage level is lower/higher than the normal level, it will send a signal to the control board of the engine generator room and also to the control-supervision console in the transmitter room, to notify the operation of the engine generator.

4) STL device (receiver, radio order line device)

The details are described in Section 3-2-2(3)

5) Transmitting antenna device

In considering the antenna structure, in view of the resistance against earthquakes and limitation of height due to area of the station site on one hand, and the electrical characteristics of the transmitting point in a valley

on the other hand, the vertical directivity of the antenna was designed in consideration of both ground-wave service and nighttime space-wave service. For the practical operation of the antenna a class of 0.25λ - 0.3λ was considered to be appropriate and a mast of 100 m height above ground level with 3-direction guys was adopted. The steel antenna mast of a base isolated type is adopted so that the transmitter output power could be fed directly to the antenna base through the antenna tuning unit to eliminate the use of a long feeder. In addition, a crown shape platform is equipped on top of the mast for maintenance of antenna and prevention of lightning.

With regard to the earthing of antenna, more than 120 lines of radial earth are buried around the base of the antenna mast extending to almost all over the station site.

6) Measuring instrument and maintenance tools

The necessary measuring instruments and maintenance tools for maintenance and repair of transmitter facilities are provided.

7) Spare parts

A set of necessary consumption goods (for instance, vacuum tubes) for operating and maintaining the transmitting station and special parts (for instance, parts for diesel engine) are respectively provided for the transmitting station.

(2) Pokhara Transmitting Station

The fundamental way of thinking about the facilities to be installed at Pokhara transmitting station is the same as that of Kathmandu transmitting station, in general, except for the facilities described in the following.

In Pokhara transmitting station, a small studio is installed in the station building for the service of local programmes.

An outdoor broadcast wagon is also provided for coverage of outdoor programmes and events. On the other hand, the programmes from Kathmandu studio centre are sent to the transmitting station through the TCC lines. In addition, a shortwave receiving equipment is installed in the station for use in case of emergency.

The facilities for Pokhara transmitting station are given in the following table.

Table 3-2

	Equipment	Quantity
1)	Main transmitter unit (output power 100 kW)	1 set
	Stand-by transmitter unit (output power 10 kW)	1 set
2)	Attachment to transmitter	1 set
3)	Main electric power board, engine generator equipment	1 set
4)	Transmitting antenna equipment	1 set
5)	Attached studio equipment	1 set
6)	Measuring instruments, maintenance tools	1 set
7)	Accessories, spare parts	1 set
8)	Outdoor broadcast wagon (with radio equipment)	1 set
9)	Emergency shortwave receiving equipment	1 set

Explanation on each equipment is given in the following.

1) Transmitter unit

The scale of transmitter unit, policy of design are same as that of Kathmandu transmitting station.

2) Attachments to transmitter

The attachments are the same as that of Kathmandu transmitting station.

3) Main electric power board, engine generator equipment

With regard to this equipment the scale and policy of design are same as that of Kathmandu station, except that there is a power distribution system for the attached studio, instead of the STL device.

4) Transmitting antenna equipment

Same as Kathmandu transmitting station. A 0.27λ-class 100 m height antenna with 3-direction guy is installed. In addition, as the ground conductivity of Pokhara site is also relatively low, more than 120 radial earth lines are buried all over the station site.

5) Attached studio equipment

Explained in item 3-2-2(2),1), $20m^2$ class production studio.

6) Measuring instruments, maintenance tools

The contents are the same as those of Kathmandu station, except that the measuring instruments for the studio equipment are provided instead of the measuring instruments for the STL device.

7) Accessories, spare parts

The contents are the same as those of Kathmandu station, except that the spare parts for the studio equipment

and outdoor broadcast wagon are provided instead of the spare parts for the STL device.

8) Outdoor broadcast wagon

Explained in item 3-2-2(2), 2), OB wagon.

9) Emergency shortwave receiver facility

Explained in item 3-2-2(2), 1), 20 m^2 class production studio.

3-2-2 Studio Facility

In considering the programme composition policy of Radio Nepal, the following studio facilities are installed and the equipment for each facility is denoted in Table 3-3.

(Kathmandu studio centre)

Continuity studio(Master Control)	1
Music studio	1
Programme production studio	2
Talk studio	1

(Pokhara transmitting station)

Programme production studio	1
Outdoor broadcast wagon	1

The outline of each facility is explained in the following.

(1) Kathmandu Studio Centre

In order to present attractive programmes and to raise the efficiency of studio operation programmes such as "news", "disk jockey" and simple information programmes are to be presented in live form and the rest of the programmes are to be recorded on tape.

The live programmes are to be produced at the master control and sent to the transmitting station. The taped programmes are to be produced at the four other studios, and then reproduced at the master control room and

sent to the transmitting station. The outline of programme production equipment for Kathmandu studio centre is shown in Fig.4-11-1.

1) Master control room

The planned master control is to be annexed to the existing master control, and has a continuity studio (announce studio, 15 m^2 class), and is provided with functions to perform the following.

a) Production of live programme.
b) Reproduction of taped programme.
c) Switching of programme.
d) Programme transmission to Kathmandu and Pokhara transmitting station.

A real-time display is installed for supervising the operational condition of transmission.

In addition to this, the following equipment are installed;

a) A master clock to drive the slave clocks in the studio centre and to generate time-signal for broadcast use.
b) An engineering line device for communication in building and to transmitting stations.
c) An all-wave radio receiver for monitoring and supervising the programme ON-AIR.

Furthermore, with regard to measures for city power failure, the power for the announce studio equipment and some of master control room equipment and STL equipment to Kathmandu transmitting station are to be fed from the battery system to continue the transmission of programme. The maximum operation period of the battery system is 10 minutes.

2) Music studio (140 m^2 class)

This studio is to be designed recording programmes,

such as light-music, folk song, audience participating programmes, and lectures, etc. A portable echo machine is provided to be shared with other studios.

3) Programme production studio (two 60 m^2 class of same layout)

This studio is to be designed recording programmes, such as drama, small scale music programmes, talks, and interviews etc.

4) Talk studio (15 m^2 class)

This studio is to be designed to record talk programmes, interviews and information programmes.

(2) Pokhara Transmitting Station

The Pokhara transmitting station normally transmits the programmes received from Kathmandu studio centre, in the form of it was received, but, whenever necessary, it can transmit the programmes produced at their studio or OB wagon.

In Fig.4-11-2, the outline of programme production equipment for Pokhara transmitting station is shown.

1) Programme production studio (20 m^2 class)

The studio obtains the function of a continuity studio. It is for broadcasting live programmes such as news, disk jockey etc., and recording of talk programmes and interview programmes etc. It is also for reproducing taped programmes and switching of broadcast programmes.

In addition, an emergency short-wave receiver is installed to receive the short-wave programmes of the existing Khumaltar transmitting station, in case the programme transmission line between Kathmandu studio centre and Pokhara transmitting station fails.

This studio in the transmitter building is provided with electro magnetic shielding in order to prevent interference from its own transmitter.

2) OB wagon

The wagon is for outdoor programme production and for gathering outdoor programme sources. The wagon produces programmes in recorded forms and it is equipped with a compact light-weight mixing unit and recording equipment. The wagon employs a powerful diesel engine ease of maintenance and suitable for climbing hills and running on rural roads.

A walkie-talkie is equipped for communication between the spot and the transmitting station. The programmes taped at outdoor are reproduced at the studio in the transmitting station.

(3) Programme Transmission Equipment

An STL device is installed to connect the distance of 5.8 km between Kathmandu studio centre and Kathmandu transmitting station, for transmission of programmes. In considering the influence of trees and buildings on the radio wave propagation, the transmitter power and frequency was decided 10 W and 160 MHz band. A transmission line using a different frequency is provided as a spare line, which is to be designed ready for operation in full time.

A press-talk type 150 MHz band engineering link is to be installed between Kathmandu studio centre and Kathmandu transmitting station. The programme transmission line and engineering line between Kathmandu studio centre and Pokhara transmitting station are not to be included in this plan.

In Fig.4-11-3, the constitution of STL transmission and engineering link system between Kathmandu studio centre and the transmitting station is shown.

(4) Power Supply Equipment

The electric power is supplied from the city power lines. The power for programme production equipment is stabilized through an automatic voltage regulator, in considering the variation of voltage. The details are given in section 3-8 of "Electrical Equipment".

Table 3-3. MAIN FACILITIES AND EQUIPMENTS

EQUIPMENT / CLASSIFICATION	MIXING CONSOLE	OPEN REEL TAPE MACHINE	DISC REPRODUCER	CARTRIDGE TAPE MACHINE	CASSETTE TAPE MACHINE	MICROPHONE and STAND	MONITOR SPEAKER	REMARKS
MUSIC STUDIO	1 SET	2 SETS	2 SETS (1)		2 SETS (1)	1 SET	1 SET	ECHO MACHINE 2 SETS
PRODUCTION STUDIO No. 1	DITTO	DITTO	1 SET	1 SET	DITTO	DITTO	DITTO	
PRODUCTION STUDIO No. 2	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO	
TALK STUDIO	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO	
MASTER CONTROL ROOM	1 SET (2)	DITTO	2 SETS	DITTO	DITTO	DITTO	DITTO	MASTER CLOCK 1 SET INTERPHONESET 1 SET STL TRANSMITTER (INCLUDING COMMUNICATION LINK) 1 SET ALL WAVE RECEIVER 1 SET
(POKHARA) PRODUCTION STUDIO	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO	SHORT WAVE RECEIVER 1 SET
(POKHARA) O.B WAGON	2 SETS (PORTABLE 4CH)	2 SETS (PORTABLE)			DITTO	DITTO	DITTO	WALKIE TALKIE 3 SETS
(ADDITIONAL) MAINTENANCE EQUIPMENT				TEST EQUIPMENT 1 SET SPARE EQUIPMENT 1 SET REPAIR MATERIALS 1 SET				

(1) Stereophonic system equipment

(2) Including switching equipment

(5) Outline of Principal Programme Production Equipment

The performance for all equipment to be used are in principle, the monaural system.

1) Disk player
   Turntable speed: 33-1/3,45, 78, r.p.m.
   Asynchronous motor.

2) Open reel type recorder and reproducer
   Tape speed: 19, 38 cm
   Asynchronous motor.

3) Cartrige tape equipment
   Tape speed: 19 cm. NAB-A standard.
   Asynchronous motor.

4) Cassette tape equipment
   Stereo performance with noise suppressor attached.

(6) Outline of Other Equipment

1) Master Clock

   Crystal clock, Accuracy is within 1×10^{-7} day. Powered by battery-floating system, with operate 30 minutes without city electricity. Provided with time signal generator.

2) Interphone

   Call system, push button selection.

3-3 Building

3-3-1 Layout of Building

(1) Kathmandu Studio Centre

The layout of the building is shown in Fig.4-1-1. According to the suggestion of the HMG of Nepal, the centre is located in the central part of the site and for access the existing road will be used.

The centre consists of two building blocks; studio block and equipment block. The engine generator room, power board room and equipment room, etc., are all installed in an equipment block apart from the studio block, to prevent from vibration and noise from this block. The two building blocks are connected with a roofed passage.

The floor area of these building blocks is as follows.

Studio block	894.0 m^2
Equipment block	288.0 m^2
Roofed passage	9.0 m^2
Total	1,191.0 m^2

(2) Kathmandu Transmitting Station

The location of the building is shown in Fig. 4-1-2. The area of the site is about 44,400 m^2. A 100 m antenna mast is erected in the central part of the site, and the station building is located about 3 - 4 meters apart from this antenna mast, so that the antenna feeder can be drawn directly into the tuning unit room. The front of the building is facing north-north west, considering the relation to the access road.

The floor area of the building is 643 m^2.

(3) Pokhara Transmitting Station

The location of the building is shown in Fig. 4-1-3. The area of the site is about 50,870 m^2. The relation between the location of the 100 m antenna mast and building is the same as that at Kathmandu transmitting station, but the difference is that the front of building is facing south, in relation to the access road.

The area of the building floor is 643 m^2.

3-3-2 Plan and Cross Section

(1) Kathmandu Studio Centre

The floor plan and cross section are respectively shown

Table 3-4 Kathmandu Studio Centre
(Floor area of each room)

Building	Name of Room	Floor Area (m^2)	Sub-total (m^2)
Studio	Music studio	140.0	228.0
	Sub-control room	28.0	
	Sound-lock room	12.0	
	Music instrument store room	18.0	
	Storage room	30.0	
	Production studio-1	72.0	108.0
	Sub-control room	26.0	
	Sound-lock room	10.0	
	Production studio-2	72.0	108.0
	Sub-control room	26.0	
	Sound-lock room	10.0	
	Talk studio	24.0	54.0
	Sub-control room	20.0	
	Sound-lock room	10.0	
	Master control room	108.0	130.05
	Announce studio	15.3	
	Sound-lock room	6.75	
	Performer's waiting room	30.0	265.95
	Service room	20.25	
	Inquiry office	11.7	
	Entrance hall	66.0	
	Air conditioning equipment room	30.0	
	Corridor	108.0	

Building	Name or Room	Floor Area (m^2)	Sub-total (m^2)
Equipment	Engine generator room	48.0	216.0
	Battery room	24.0	
	Electric power board room	72.0	
	Equipment room	72.0	
	Maintenance staff room	18.0	72.0
	Storage room	18.0	
	Water-closet(Men)	12.0	
	Water-closet(Ladies)	12.0	
	Corridor	12.0	
Roofed passage		9.0	9.0
Total		1,191.0	1,191.0

in Fig.4-2-1 and Fig.4-4-1, the building is a single-story consisting of 6^{m} x 6^{m} span-work, in principle.

The floor area for each room is shown in Table 3-4. The studio and master control room occupies most of the space and there is only one office for inquiry service.

With regard to the height of rooms, the music studio is 8.0 m, programme production studio is 6.0 m and the rest are all 4.5 m.

The points particularly taken into consideration in the floor planning are as follows.

1) The entrance for the music studio is planned near the main entrance hall of the building so that it provides convenient access to audience.

2) The layout for each studio, sub-control room and front sound-lock room is of the same pattern, to make a clear distinction of movement, flow and equality of arrangement of sub-control equipment.

3) The performers waiting room common for the studios, is planned almost in the centre part of the building to shorten the path of flow.

4) The place of the master control room is planned so as to provide windows at wall and improve room conditions.

5) The equipment room, engine generator room, electric power room etc., which generate noise and vibration are planned in a equipment block separated from the studio block and connected to the studio block with a roofed passage.

(2) Kathmandu Transmitting Station

The building, as shown in the floor plan and cross section in Fig.4-2-1 and Fig.4-4-2 respectively, is a single-story building consisting of 6^{m} x 6^{m} span-work, in principle,

Table 3-5 Kathmandu Transmitting Station
(Floor area of each room)

Name of Room	Floor area (m^2)	Sub-total (m^2)
Transmitter room	192.0	282.0
Tuning unit room	16.0	
Dummy load room	8.0	
Storage room (1)	18.0	
Storage room (2)	30.0	
Shield room	18.0	
Office (1)	12.0	60.0
(2)	12.0	
(3)	12.0	
(4)	12.0	
(5)	12.0	
Workshop	24.0	24.0
Kitchen	20.0	32.0
Wash room	12.0	
Engine generator room	48.0	124.0
Electric power board room	36.0	
Maintenance staff room	16.0	
Storage room	24.0	
Entrance hall	15.0	121.0
Water-closet	12.0	
Air conditioning equipment room	24.0	
Corridor	70.0	
Total	643.0	643.0

same as the studio centre building.

The floor area for each room is shown in Table 3-5. The total floor area is 643 m^2, and has office rooms, stores and wash room etc., suitable for attended operation. The height of the story is 4.0 meters.

The entire building is shielded and the tuning unit room and shield room are both double-shielded.

The points which were taken into consideration in the floor planning are such as;

1) An antenna tuning unit room is located in the corner of the building so that the stay of the antenna mast will not touch the building.

2) An office for maintenance staff for engine generator and electric power board etc., is provided.

3) A storage room for equipment related to transmitter, electric power board and engine generator is separately provided.

4) As the station is of attended supervision, an office, kitchen and wash room is provided.

(3) Pokhara Transmitting Station

The floor plan and cross section is respectively shown in Fig. 4-2-3 and Fig. 4-4-3. The layout is the same as Kathmandu transmitting station, except for the studio, sub-control room and sound lock room, which are provided instead of a shielded testing room and two offices.

The floor area for each room is shown in Table 3-6. The total floor area is 643 m^2. The entire building is provided with shielding material, and in addition to this, an antenna tuning unit room is shielded individually and the studio, sub-control room and sound lock room are provided with double shield, as a whole.

The points which were taken into consideration in the floor planning are same as those of Kathmandu transmitting station.

Table 3-6 Pokhara Transmitting Station
(Floor area of each room)

Name of Room	Floor area(m^2)	Sub-total(m^2)
Transmitter room	192.0	264.0
Tuning unit room	16.0	
Dummy load room	8.0	
Storage room (1)	18.0	
Storage room (2)	30.0	
Studio	24.0	54.0
Sub-control room	20.0	
Sound-lock room	10.0	
Office (1)	12.0	36.0
(2)	12.0	
(3)	12.0	
Workshop	24.0	24.0
Kitchen	20.0	32.0
Wash room	12.0	
Engine generator room	48.0	124.0
Electric power board room	36.0	
Maintenance staff room	16.0	
Storage room	24.0	
Entrance hall	15.0	109.0
Water-closet	12.0	
Air conditioning equipment room	24.0	
Corridor	58.0	
Total	643.0	643.0

3-3-3 Acoustics

(1) Condition of Surroundings in View of Noise

With regard to vehicle noise for Kathmandu studio centre, as there is a considerable distance to the road, consideration is only to be paid for vehicles arriving and leaving Radio Nepal building. For Kathmandu transmitting station, there will be no problem to consider, because there is no studio and furthermore, because the distance from the station to the road is over 100 m.

However, for Pokhara transmitting station, there exists a studio, but as the station is located about 150 m away from the road, consideration is only to be taken on vehicles arriving and leaving the station.

On the other hand, regarding air plane noise, Kathmandu studio centre is about 5 km away from the airport and off the flight route, but as jet planes will take off and land, reduction of noise is to be taken into account. For Pokhara transmitting station, a local airport exists at a distance of about 2 km, but, as small planes only use this airport, and that the station is off the flight route, the degree of noise reduction could be less.

There will be nothing to consider for Kathmandu transmitting station.

(2) Countermeasures against Noise

The target values of design for air conditioning noise of each room are as follows.

Announce studio Talk studio	}	NC - 15
Production studio Music studio	}	NC - 20
Sub-control room		NC - 25
Master control room		NC - 30

Performer's waiting room NC - 30
Offices NC - 35

NC; Noise criteria curve and for example NC-5 means that 5 dB of Speech Interference Level

Concerning the noise reaching in studios from outside, it is to be suppressed so that it will not be so noisy, in considering the masking effect of air conditioning noise. For the structure of walls around the studios, reinforced-concrete is adopted in considering the reduction of noise.

To prevent transmission of solid borne sounds of foot steps etc., the studios are of the floating structure. In addition, sound-proof doors and windows are used for studios.

(3) Room Acoustics

A desirable ratio of dimension is considered for the length, width and height of studios. The target value of design for reverberation time is as follows. The average sound absorption coefficient for studios excluding the music studio, is 0.35 - 0.40 at 500 Hz. The average absorption coefficient for the music studio is between 0.25 - 0.35 at 500 Hz.

The walls and ceilings of music and programme production studios are constructed in uneven forms, in considering the scattering of sound.

The approximate values of the dimensions for studios are given in Table 3-7. In the detailed design, these values may be changed slightly.

Regarding the design for sub-control rooms, room acoustics are taken into consideration.

Table 3-7

Name of Station	Name of Studio	Usage	Dimention of Studio							Reverber-ation Time (sec)
			Length (m)	Width (m)	Height (m)	Floor Area* (m^2)	Total Surface Area S (m^2)	Volume V (m^3)	V/S (m)	
Kathmandu Studio Centre	Music Studio	Music	12.8	8.1	5.0	104	416	518	1.25	0.5-0.7
	Production Studio-1	Music Speech	7.6	6.6	3.5	50	200	176	0.88	0.3-0.35
	Production Studio-2	Music Speech	7.6	6.6	3.5	50	200	176	0.88	0.3-0.35
	Talk Studio	Speech	5.2	3.0	2.4	17	71	40	0.56	0.17-0.20
	Announce Studio	Speech	3.6	2.5	2.3	9	46	21	0.46	0.13-0.17
Pokhara Transmitting Station	Studio	Music Speech	5.0	3.1	2.4	16	70	37	0.53	0.17-0.20

* Effective floor area

3-4 Building Structure

3-4-1 Structural Design

The building planned is of reinforced-concrete rigid frame construction, and in design, bearing walls are located in a well balanced manner, resistive to earthquakes.

The structure of the foundation is a solid one of reinforced-concrete, and the weight of building is directly supported by a footing on the ground, and a footing beam is adopted to prevent uneven settlement and for measures against earthquakes.

The structural analysis and design will be performed in accordance with the habitual practice in the Kingdom of Nepal, with reference to the Japanese Building Standard Law and Related Regulations, and various structural design standards set out by the Architectural Institute of Japan.

The live loads to be adopted for the design will be determined by referring to the Japanese Building Standard Law and Related Regulations and the load standards formulated by the Architectural Institute of Japan and BS.

For special rooms (studio, master control room, sub-control room and transmitter room, etc.), the weight of equipment to be installed will be calculated and then the live loads will be determined by referring to the standard values adopted by NHK.

The lateral seismic force coefficient of 0.15 will be adopted for the structural design against earthquakes.

For the structural design against wind load, the maximum instantaneous wind velocity of 50 m/sec. (at a height of 10 m above ground level) will be adopted.

3-4-2 Outline of Structure and Scale of each Building

(1) Structure of Kathmandu Studio Centre

The building is one-storied with rigid frame of reinforced-concrete. The walls surrounding the studio are of reinforced-concrete structure, considering the resistance

against earthquakes and acoustics, and walls other than bearing walls are of brick structure.

The floor slab and roof slab are of reinforced-concrete structure. On the roof slab, an additional shelter made of wooden structure is built, and it is to be covered with roofing materials.

For the type of foundation a continuous footing and an independent footing are adopted, both of reinforced-concrete structure.

The allowable bearing capacity of soil to be adopted for the design will be 15 t/m^2.

(2) Structure of Kathmandu Transmitting Station

The building is one-storied with rigid frame of reinforced-concrete. The bearing walls are of reinforced-concrete structure, and the rest are of brick structure.

The floor slab and roof slab are of reinforced-concrete strucure, and on the roof slab, an additional shelter made of wooden structure is built, and it is covered with roofing materials.

The foundation of building to be adopted is an independent footing of reinforced-concrete.

The bearing capacity of soil to be adopted for the design will be 15 t/m^2.

(3) Structure of Pokhara Transmitting Station

The structure is the same as that of Kathmandu Transmitting Station except for that a soil bearing capacity of 20 t/m^2 is adopted. In addition to this, bearing walls made of reinforced-concrete are adopted for the walls surrounding the studio.

3-4-3 Materials to be employed for Structure and Construction Method

In consideration of the importance of the building and facilities, the structural materials will be strictly

selected, and for the way of construction, those methods established in the Kingdom of Nepal will be adopted as a policy.

(1) Steel Materials: All steel materials to be used will be products conforming to the Japanese Industrial Standards (JIS), and the products will be imported for use at the site.

(2) Reinforcing Steel Bars: All bars conforming to the Japanese Industrial Standards (JIS) are to be used.

(3) Concrete: The building structure (frame members - column, girder -, beam, floor slab, roof slab, bearing wall and foundation) will be of concrete with crushed stone, and cement conforming to the Japanese Industrial Standards (JIS) is to be used.

3-5 Steel Antenna Mast

3-5-1 Structural Design

The structural analysis and design will be carried out by referring to the Japanese Building Standard Law and Related Regulations, and various structural design standards set out by the Architectural Institute of Japan. The structural calculation for the guy wire will be performed by the habitual method adopted by NHK.

The structural design against wind pressure will be made on the basis of the maximum instantaneous wind velocity of 50 m/sec. (at 10 m above ground level in height), and extra margines for altitude will be considered.

3-5-2 Outline of Steel Mast (Antenna) Structure

The structure and scale of mast for Kathmandu and Pokhara transmitting station are of the same design.

The mast (antenna) is 100 m in length, and it is a steel cylindrical type with a diameter of 40 cm. It is supported by five-stage guy wires extended to three directions. The base of mast is isolated with a base insulator,

and under the insulator a spherical acceptor is placed to avoid harmful power applying onto the insulator.

These are mounted on a reinforced concrete independent foundation of about three meters in height above ground level. The five-stage guy wires in each directions are respectively anchored to the three steel anchor frames buried in concrete blocks located at a distance of about 80 m from the centre of the mast. In each guy wire, insulators are inserted at proper intervals, and for the insulators in the guy wire of the very top stage, choke coils are attached.

For airplanes flying at night, three pairs of aviation obstruction lights are mounted on the mast, one on the top and the others at two intermediate points of the mast. For aviation obstruction marking in the daytime, the entire mast is painted red and white into seven stripes.

In order to extend the effective length of the antenna, a platform with a diameter of three meters is mounted on the very top of the mast.

3-5-3 Materials to be used for Structure

(1) Steel Mast: Products conforming to the Japanese Industrial Standards (JIS) are to be used.

(2) Guy Wire: All products conforming to the Japan Steel Standard (JSS) are to be used.

(3) Base Insulator, Wire Guy Insulator, Obstruction light and other Parts: Products conforming to JIS and its related standards, the Broadcast Technical Standards of NHK and Specifications established by NHK will be imported and used.

(4) Reinforcing Bars: All products conforming to JIS are to be used.

(5) Concrete: Concrete with crushed stone are to be used for the foundation and anchor block. Cement conforming to JIS is to be used.

3-6 Air Conditioning, Heating, Ventilation Facility

The condition of external temperature, and humidity for designing was assumed as follows.

Kathmandu Studio Centre and Transmitting Station

{	Summer season	29.0°C	65 %
	Winter season	1.2°C	70 %

Pokhara Transmitting Station

{	Summer season	30.0°C	65 %
	Winter season	6.0°C	70 %

3-6-1 Kathmandu Studio Centre

All rooms in the centre are to be fed fresh air by means of three air handling units which have the built-in electric heater, except for the music studio and master control room which are air condition also with two packaged air conditions.

The amount of intake air for the music studio and master control room is to be 25 m^3/hr. person respectively throughout the year. For the other rooms, it is to be 25 m^3/hr. person during the winter season and for the summer season the amount is to be calculated according to the condition of the load.

The air conditioning, heating and ventilation systems are divided as follows,

No. 1	Music studio	-- A packaged air conditioner
No. 2	Master control room	-- same as above
No. 3	Production studio-1	-- An air handling unit
No. 4	Production studio-2	-- same as above
No. 5	Other places	-- same as above

In addition to the above, ventilation equipment for water-closet room, engine generator room, electric power board room, battery room and euqipment room are respectively installed.

3-6-2 Kathmandu Transmitting Station

A ventilation equipment is installed for the air-cooling transmitter, transmitter room, tuning unit room, shielded room, electric power board room, engine generator room and dummy load room. For the rest of the rooms, fresh air is to be fed with handling unit (with built-electric heater).

The system for ventilation and heating is divided into two, for office (1) to (5) and work shop, and the other for office (6) and kitchen and wash room.

3-6-3 Pokhara Transmitting Station

The constitution of this station is foundamentally the same as that for Kathmandu transmitting station, but the difference is that air-cooling of the studio and sub-control room is able to be provided by a packaged air conditioner.

3-7 Plumbing

The city water supply is used. The sewage is drained to the sewage disposal, and then to the gutter, while the rain water and other water drained directly into the gutter.

As for each water-closet, one western style chamber pot and some eastern types are installed.

3-7-1 Kathmandu Studio Centre

An intake water tank is newly built underneath the equipment room floor, to store the city water. This water is supplied to the necessary places by water pumps with a pressure tank.

With regard to fire extinguish equipment, two indoor and one outdoor fire hydrants are installed.

An underground oil tank for the engine generator of maximum capacity of 2,000ℓ is newly installed with the necessary pipings.

3-7-2 Kathmandu Transmitting Station

A water tank is newly installed underneath the equipment room floor, and the stored water is supplied to each place by water pumps with a pressure tank.

In the kitchen, an electric kettle, an electric range, a sink, etc., are equipped. In the wash room, a bath and a shower facility is provided.

As for fire extinguish facility, a fire hydrant is installed at one place and fire extinguishers are provided for the transmitter room as well.

In addition, an underground oil tank for the engine generator of maximum capacity of 3,000 ℓ is also installed with the necessary pipings.

3-7-3 Pokhara Transmitting Station

The equipment for this station are same as those for Kathmandu transmitting station.

3-8 Electrical Equipment

3-8-1 Electric Power Board, Engine Generator Equipment

An electric power board and an engine generator equipment is respectively installed in the power board room and engine generator room.

The incoming power transformer is a 11,000/400 V type, and the capacity of the transformers for the three places are as follows.

Kathmandu Studio Centre	150 kVA
Kathmandu Transmitting Station	600 kVA
Pokhara Transmitting Station	600 kVA

An I.V.R is inserted in the output line of the incoming power transformer. The capacity of the engine generator is as follows.

Kathmandu Studio Centre	100 kVA x 1 (set)

Kathmandu Transmitting Station	70 kVA x 1 (set)
Pokhara Transmitting Station	70 kVA x 1 (set)

The engine is a forced air-cooling type and adopts a starter-motor.

The electric power block diagram for the above three stations are respectively given in Fig. 4-5-1. 4-5-2.

3-8-2 Battery Equipment

For Kathmandu studio centre, two sets of batteries are installed in the battery room with battery chargers. The two sets of batteries are used for the following purposes.

Engine generator starter, fire alarm, emergency lighting	--- 1 set
Broadcast equipment, building clock	--- 1 set

For the two transmitting stations, two sets of batteries, same as those above, are respectively installed in the engine generator room, but there is no studio equipment installed in Kathmandu transmitting station.

3-8-3 Main Power Line Equipment (Refer to Fig. 4-5-1, 4-5-2)

For Kathmandu studio centre, the low voltage distribution board is also installed in the power board room, and from this board, the power is fed to the broadcast equipment distribution board, the lighing distribution board and the motor control board, etc.

For the two transmitting stations, the low voltage distribution board for the transmitters is installed in the transmitter room, and the other low voltage distribution boards is installed in the power board room, to feed power to each power board and motor control board in other places.

3-8-4 Lighting and Plug Socket Equipment

Fluorescent lighting equipment are principally used. The intensity of illumination for studios, transmitter room and offices is 400 lux, and for other rooms, it is

about 200 lux. Plug sockets are provided for all of the necessary places.

Emergency D.C. lights are installed near the emergency exits which are fed from the batteries in case of city power failure. After the engine generator starts operating, some of the lighting euqipment are fed by the engine generator power.

3-8-5 Motor Power Equipment

A motor power control boards are installed in the equipment room and air conditioner room, and from these boards, the power control board for the transmitter room ventilation is installed in the transmitter room.

The start and stop of equipment, excluding the water supply and drainage pumps etc. which operate automatically, are operated by a push-button switch.

The fire hydrant pumps can be started at location of each fire hydrant box.

3-8-6 Earthing

For the transmitting antenna of the two transmitting stations, a radial earth shown in Fig. 4-8-2 and Fig. 4-8-3 is respectively installed.

In addition, for the studio centre and two transmitting stations, an earthing poles are provided for the incoming electric power board, transmitter and lightning arrester. All the buildings concerned on the programme, a lightning conductors are installed on the building roof because the buildings are located in heavy lightning districts.

3-8-7 Fire Alarm Equipment

A thermally-sensitive fire detector is installed in each room and a manual push button alarm is installed near each fire hydrant box as well. The alarm receiver for the studio centre is installed in the inquiry office and these for the transmitting stations is located in the transmitter room.

3-8-8 Clock Equipment

In respect to Kathmandu studio centre, a crystal oscillator type master clock is installed in the master control room and slave clocks are equipped in each studio and offices.

The clocks for the studio, sub-control room and master control room are of the one-second readable type and the others are of the 30-second readable types.

With regard to the transmitting stations, a one-second readable type clock operated by a dry battery is installed in the studio, sub-control room, transmitter room and offices.

3-8-9 Telephone Equipment

At this stage, the necessary conduit tube for telephone lines are provided, so that the telephone lines can be wired in the future.

3-8-10 Interphone Equipment

Interphone sets are installed in the following rooms.

Kathmandu studio centre:

master control room, each sub-control room, engine generator room, power board room, equipment room, inquiry office, maintenance staff room.

Kathmandu transmitting station:

transmitter room, office (3),(4), work shop, engine generator room, main power board room, maintenance staff room, kitchen.

Pokhara transmitting station:

transmitter room, sub-control room, office (1),(2), work shop, engine generator room, power board room, maintenance staff room, kitchen.

3-9 Building Materials

Among the materials produced in the Kingdom of Nepal, those mentioned as follows are to be adopted as construction material brick, rock, snad, gravel, lumber, terrazzo, marble and fuel tank.

Smong the available materials in the Kingdom of Nepal, lighting fixtures and plug sockets which will be imported from foreign countries can be used for electric equipment. The rest will be imported from Japan. However, the cement which is to be used for places other than those of building structure can be the product of the Kingdom of Nepal.

SECTION 4 DIAGRAM OF PRELIMINARY DESIGN

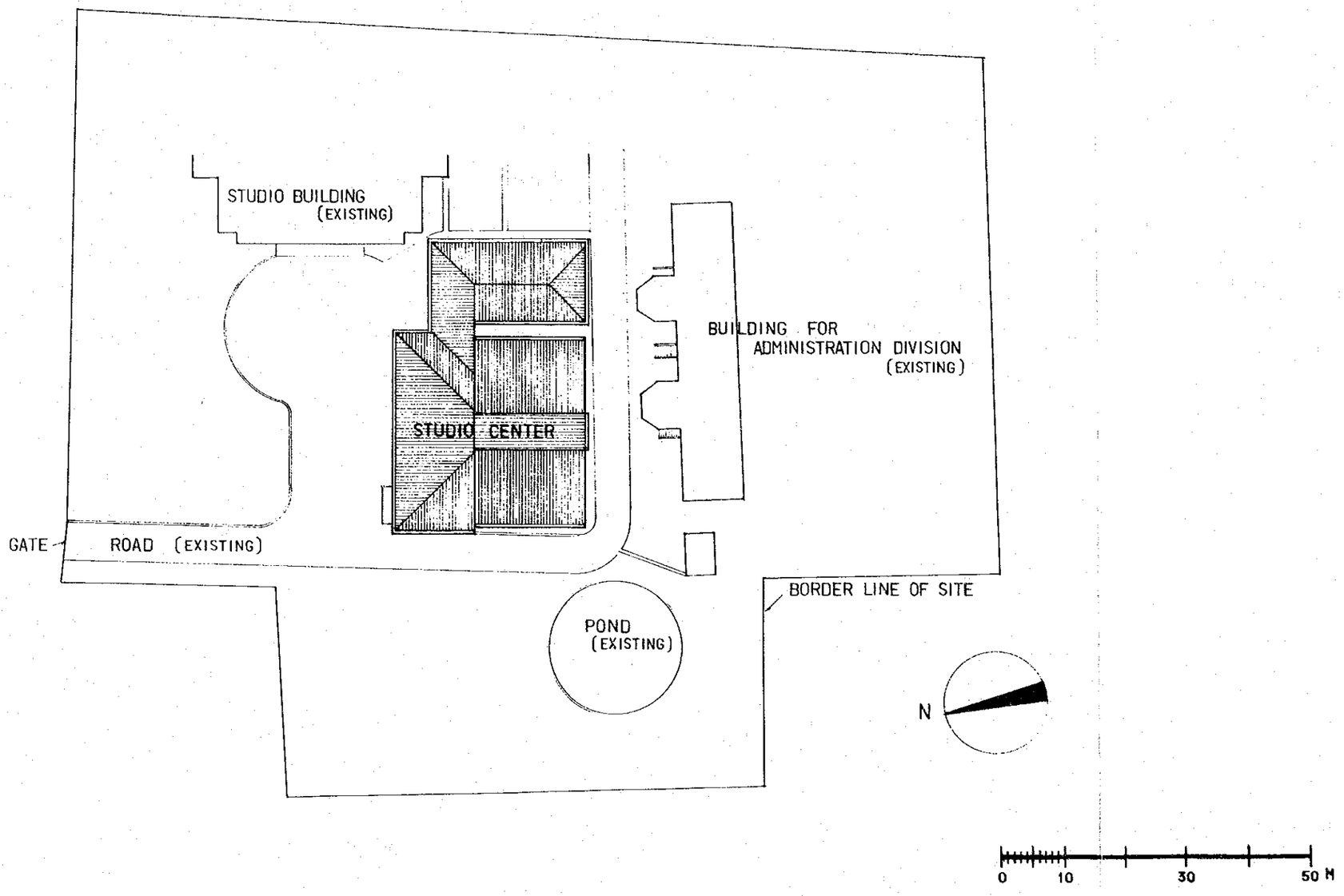


FIG.4-1-1. SITE PLAN — KATHMANDU STUDIO CENTER

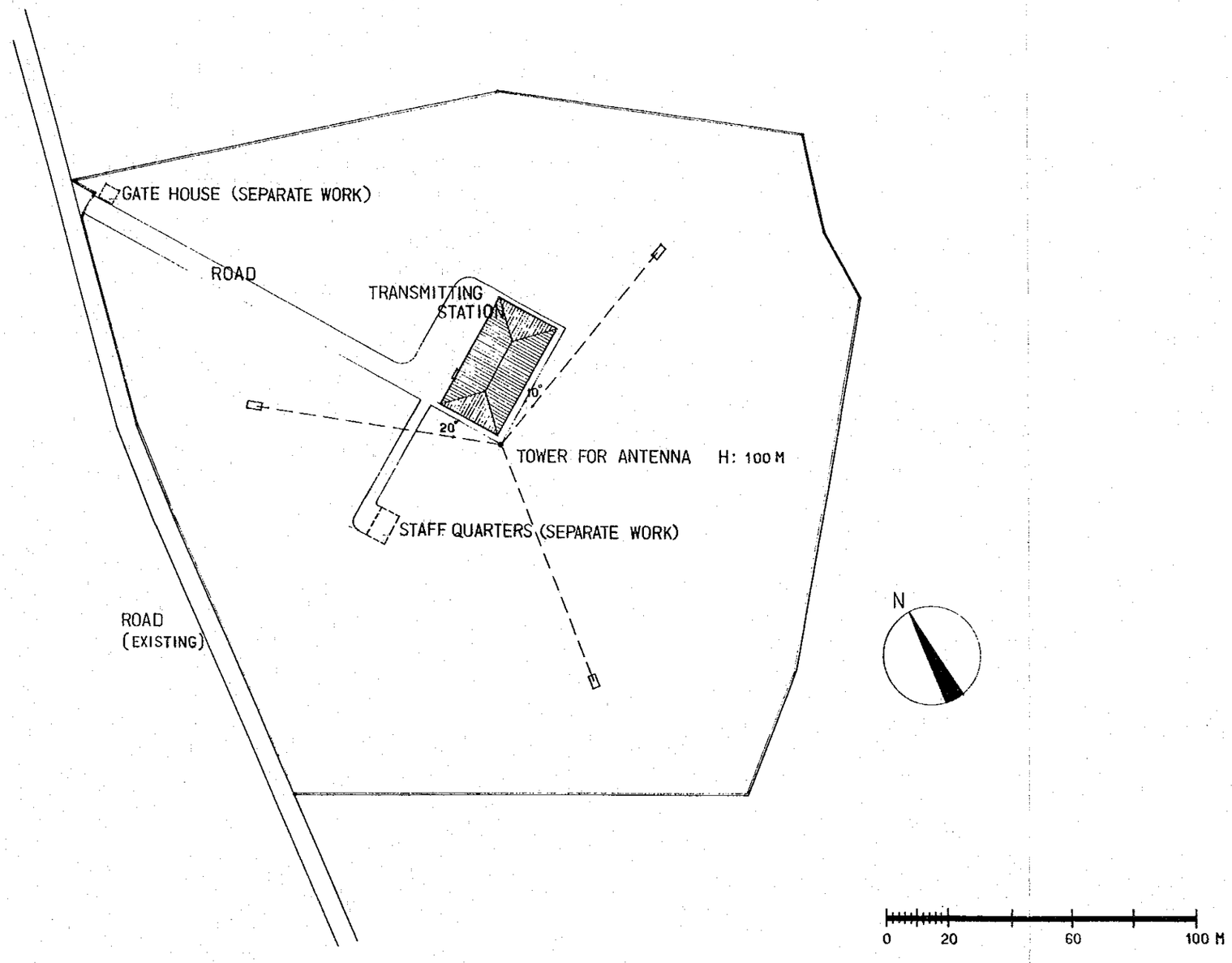


FIG.4-1-2. SITE PLAN — KATHMANDU TRANSMITTING STATION

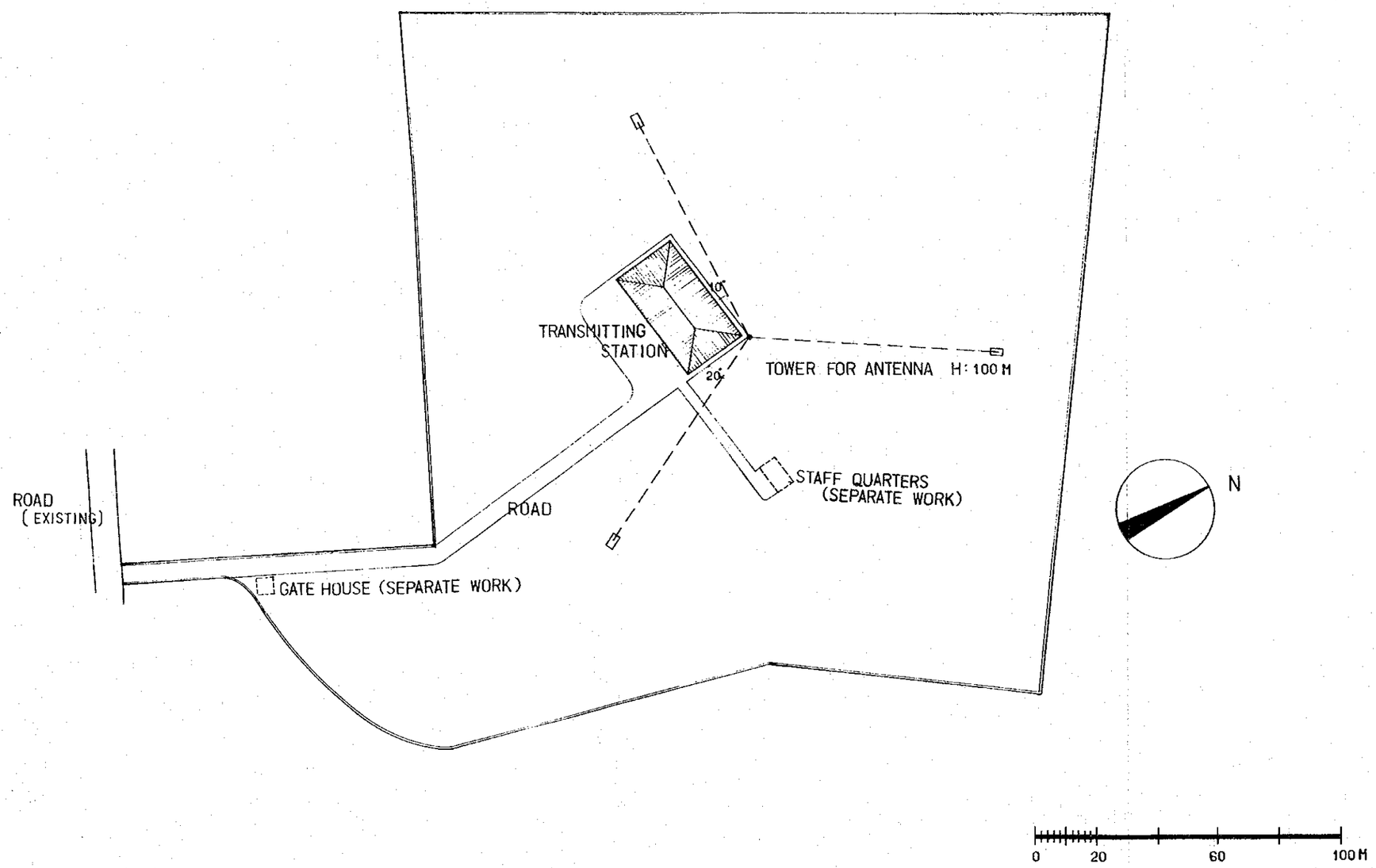


FIG.4-1-3. SITE PLAN — POKHARA TRANSMITTING STATION

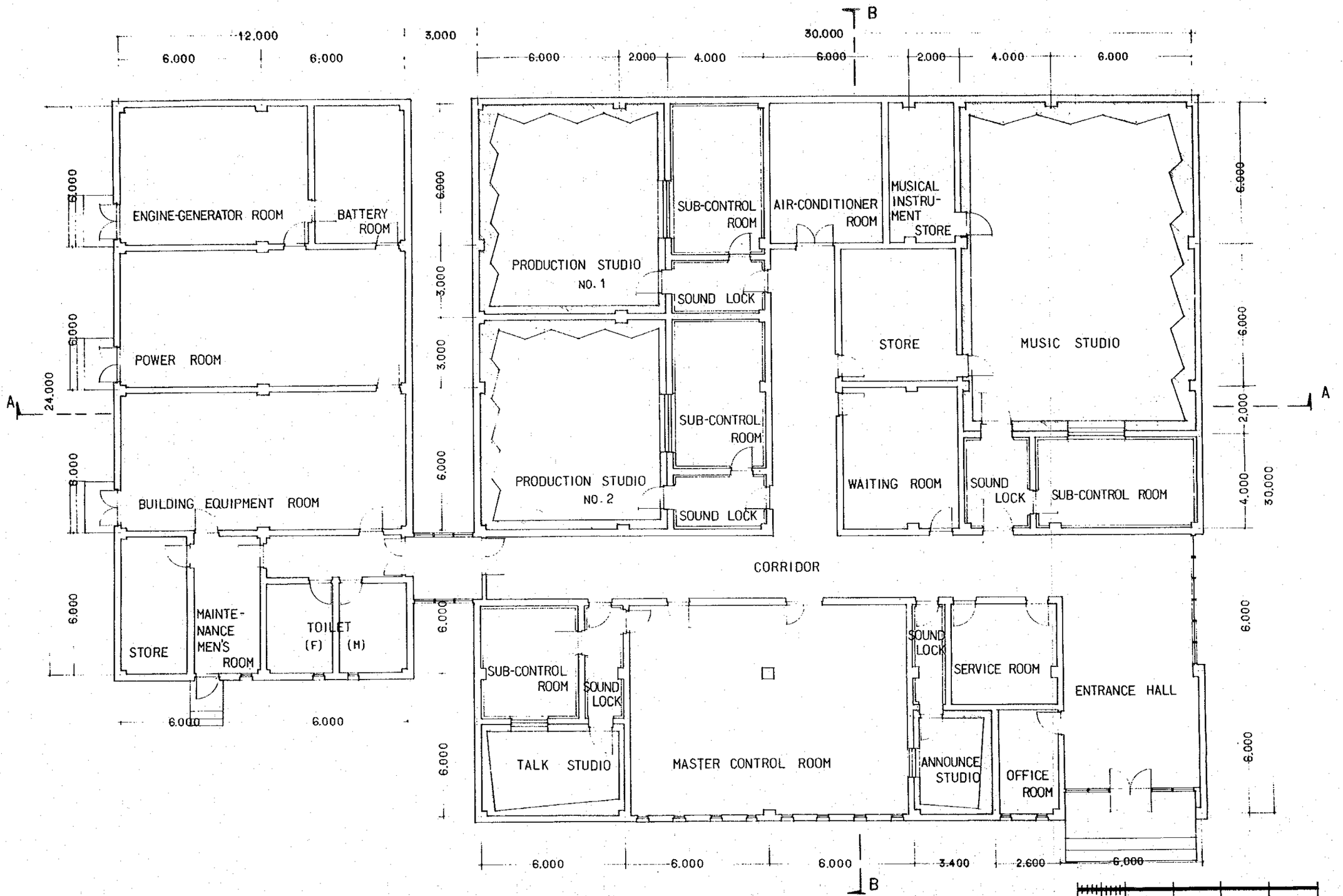


FIG.4-2-1. FLOOR PLAN — KATHMANDU STUDIO CENTER

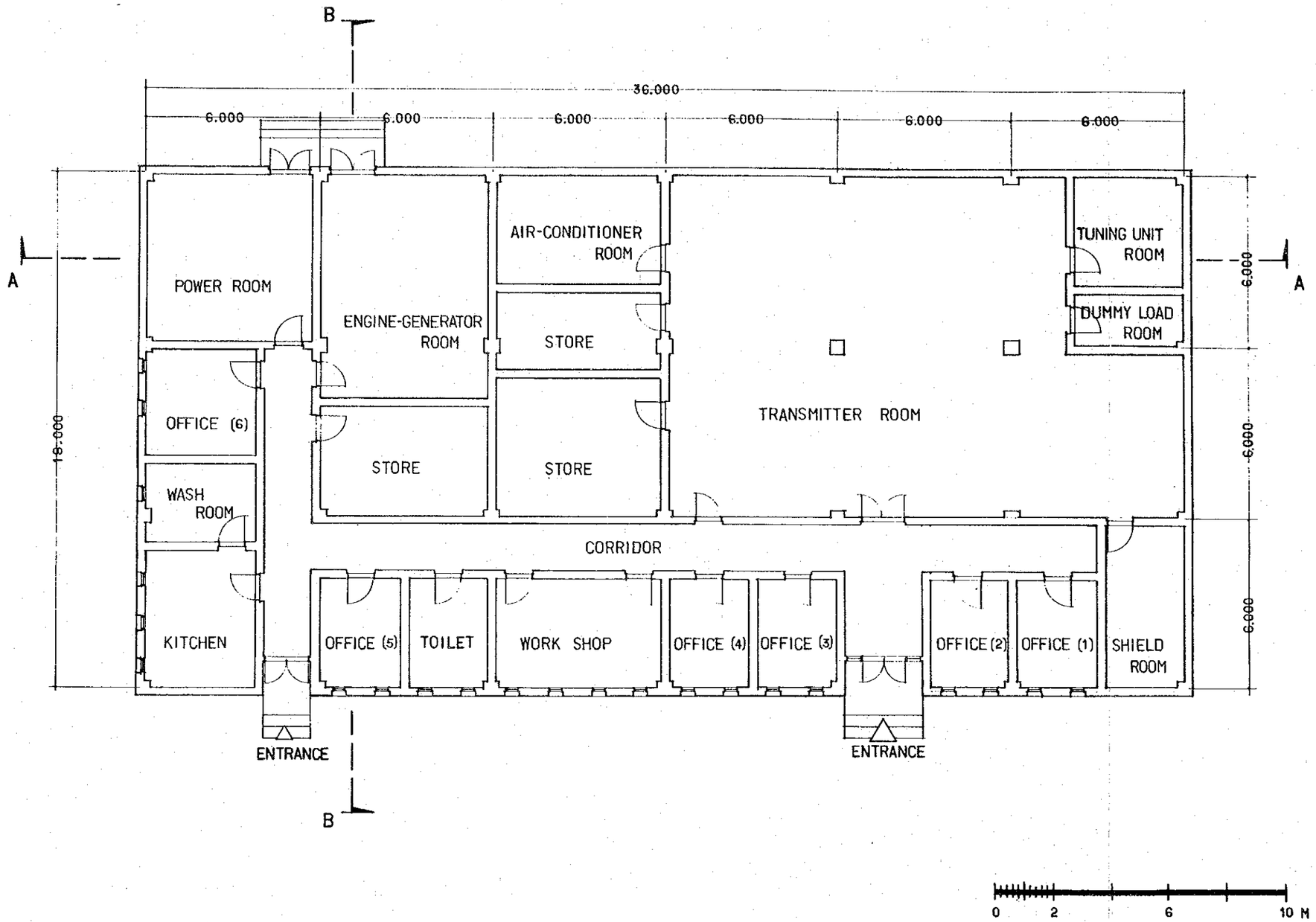


FIG.4-2-2. FLOOR PLAN — KATHMANDU TRANSMITTING STATION

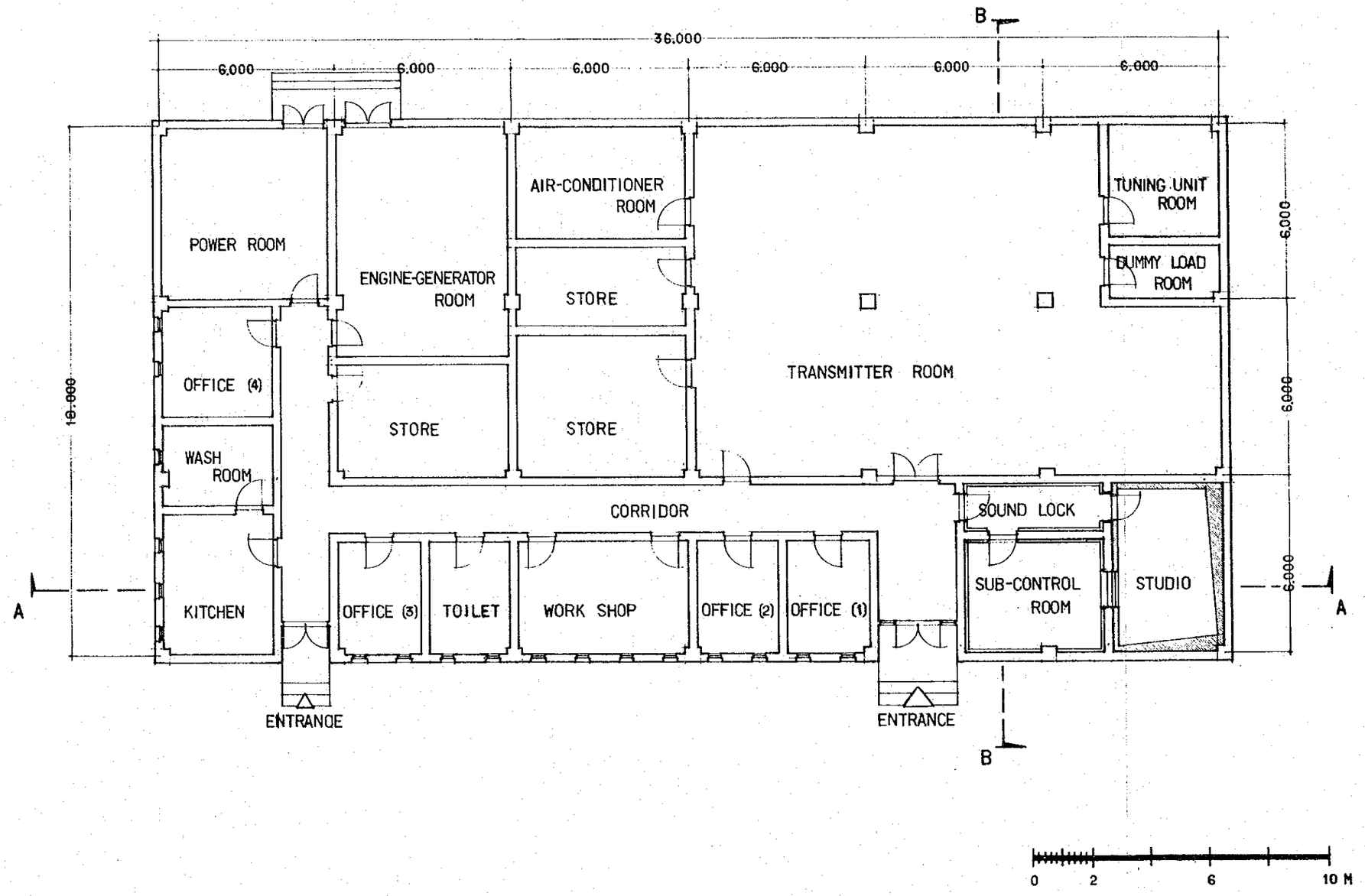
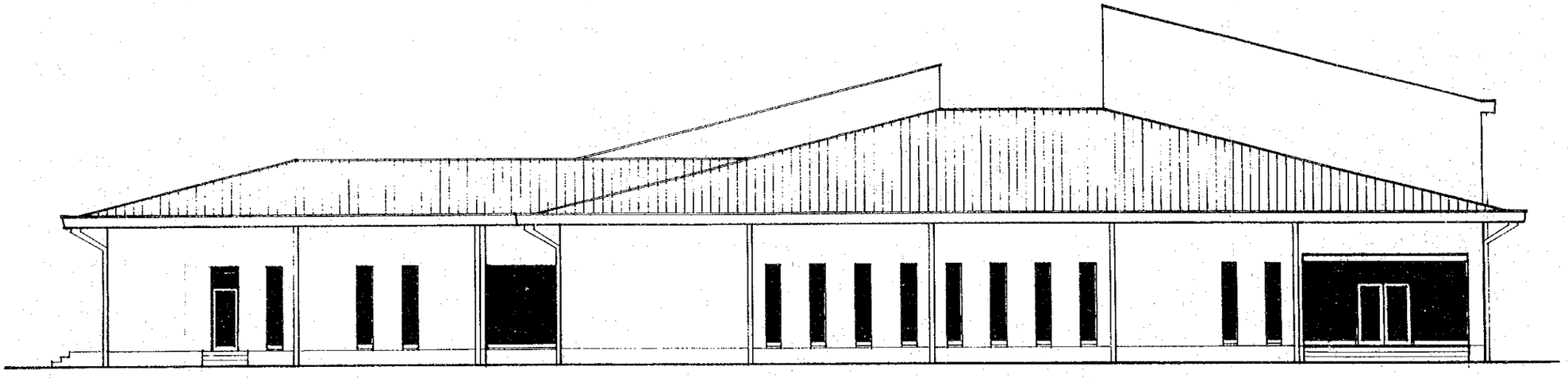
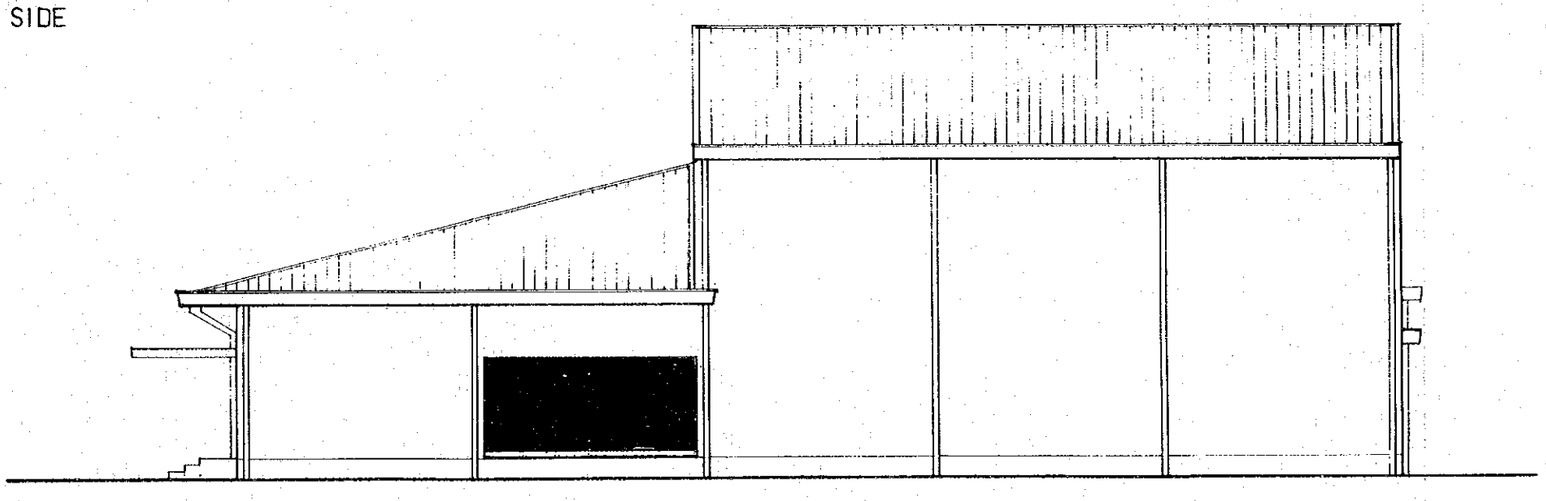


FIG.4-2-3. FLOOR PLAN — POKHARA TRANSMITTING STATION



NORTH SIDE



WEST SIDE

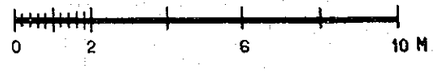
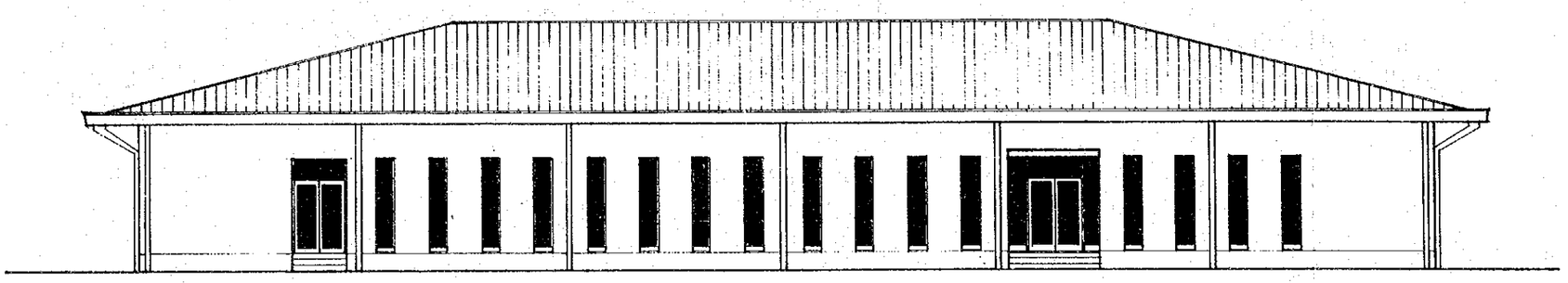
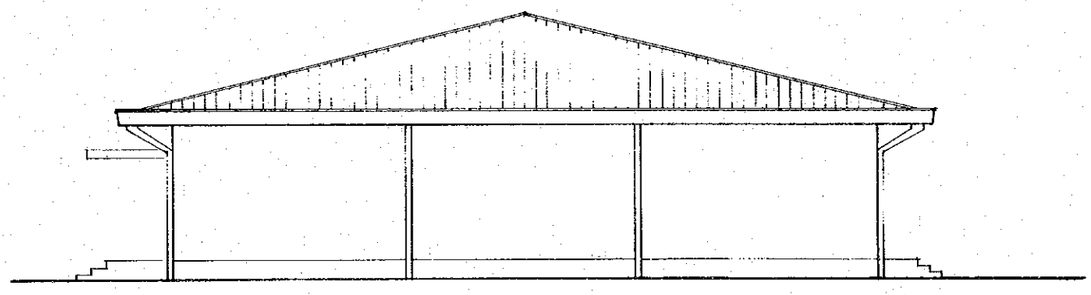


FIG.4-3-1. ELEVATION —— KATHMANDU STUDIO CENTER



NORTH SIDE



WEST SIDE

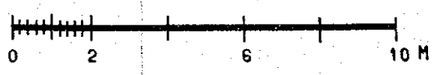
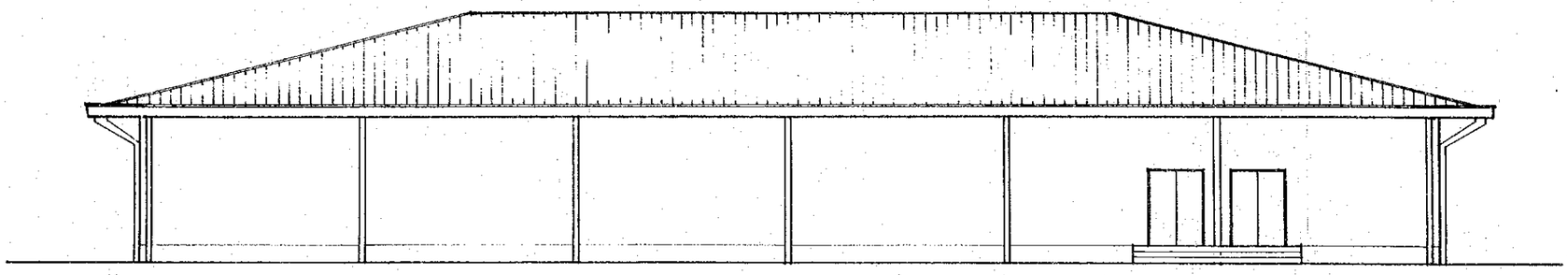
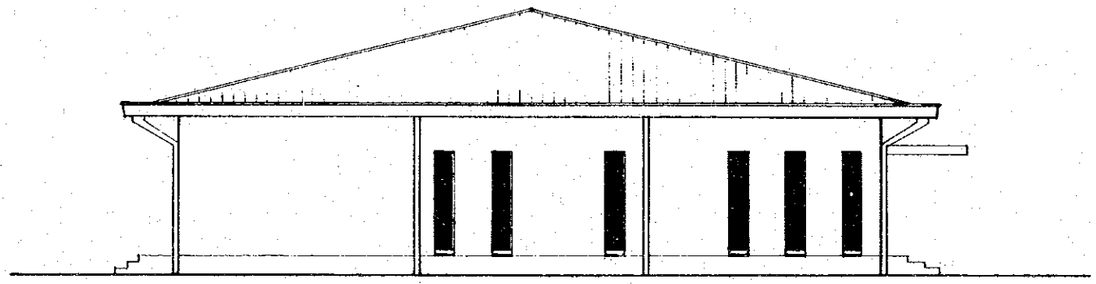


FIG.4-3-2. ELEVATION — KATHMANDU TRANSMITTING STATION



NORTH SIDE



WEST SIDE

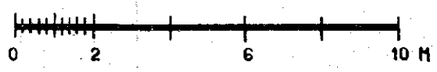
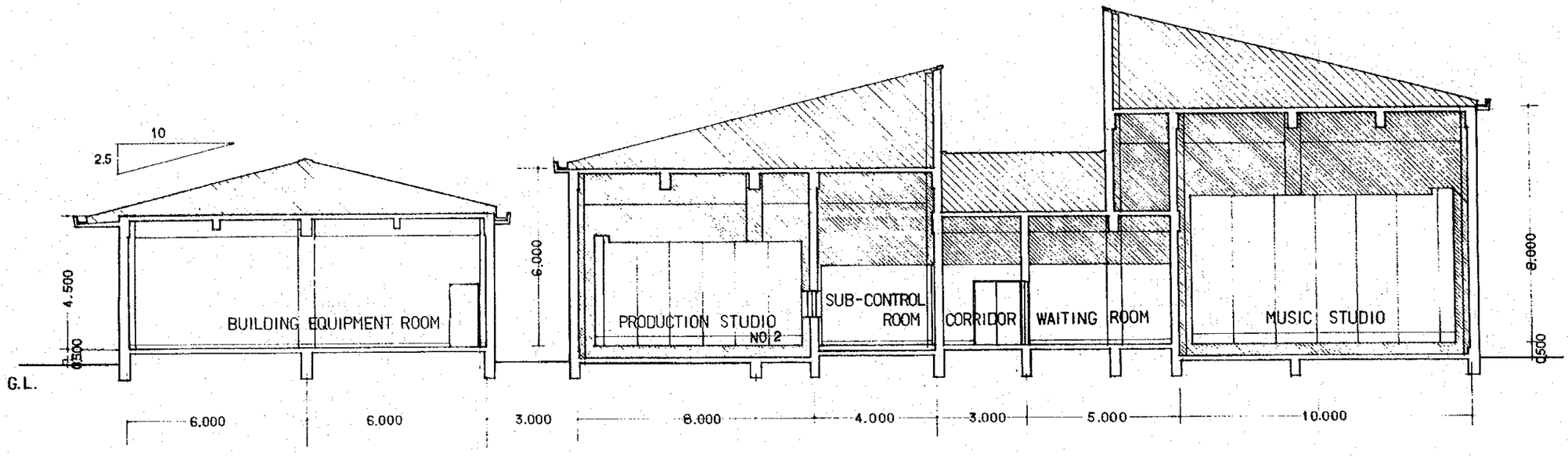
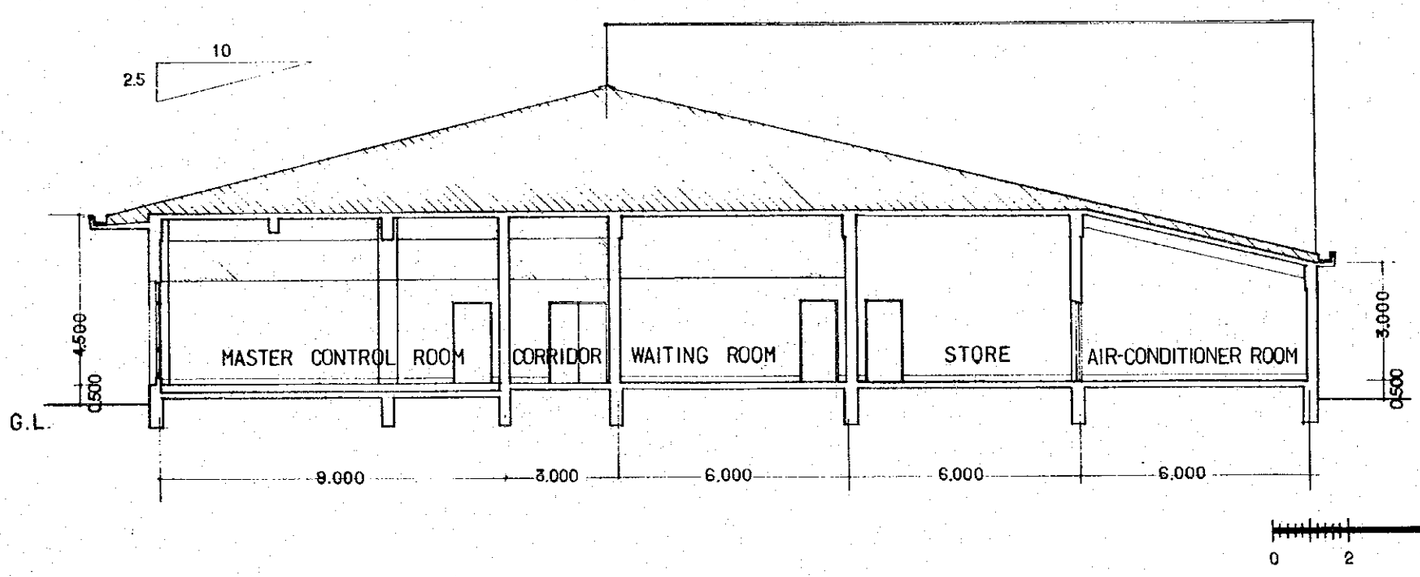


FIG.4-3-3. ELEVATION — POKHARA TRANSMITTING STATION



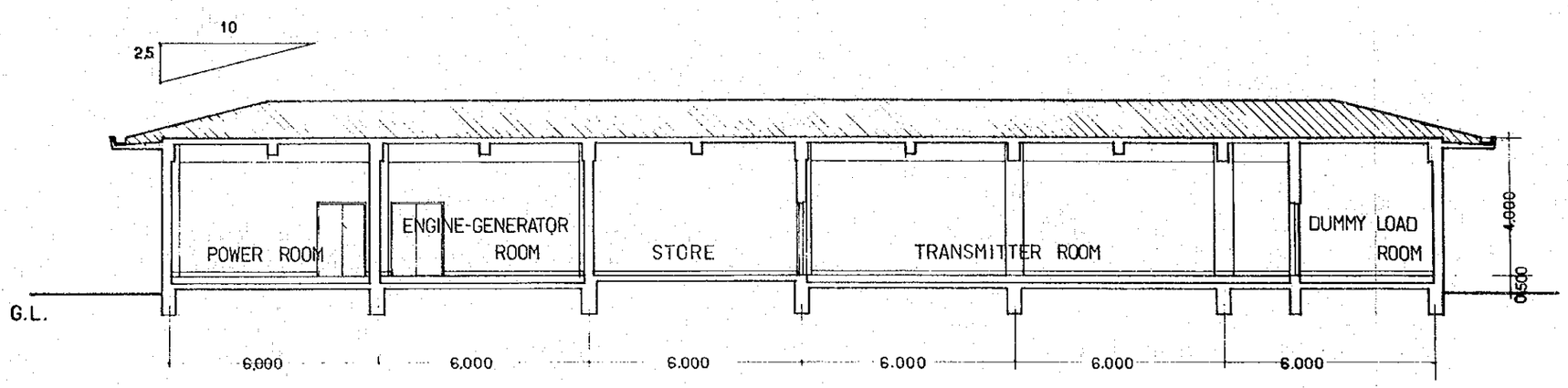
A ~ A



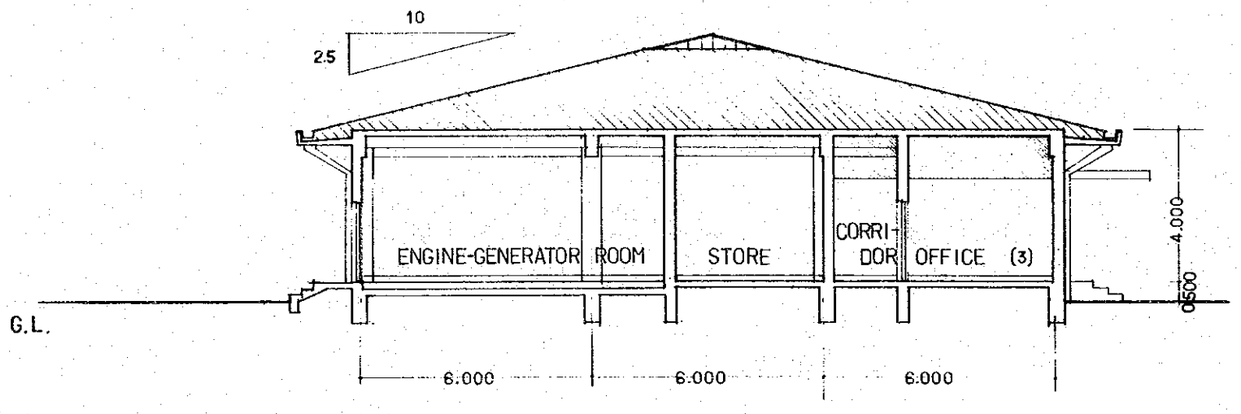
B ~ B

NOTE: SECTION A~A OR B~B, REFER TO FIG.4-2-1. FLOOR PLAN

FIG.4-4-1. SECTION — KATHMANDU STUDIO CENTER



A ~ A



B ~ B

NOTE: SECTION A~A OR B~B, REFER TO FIG.4-2-2. FLOOR PLAN

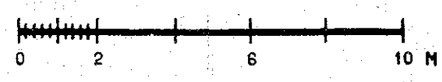
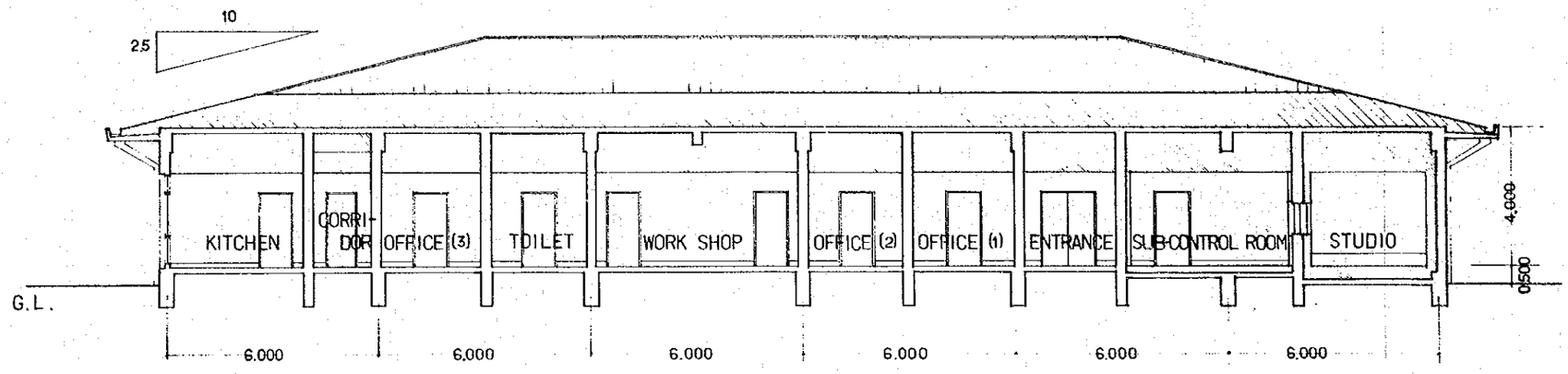
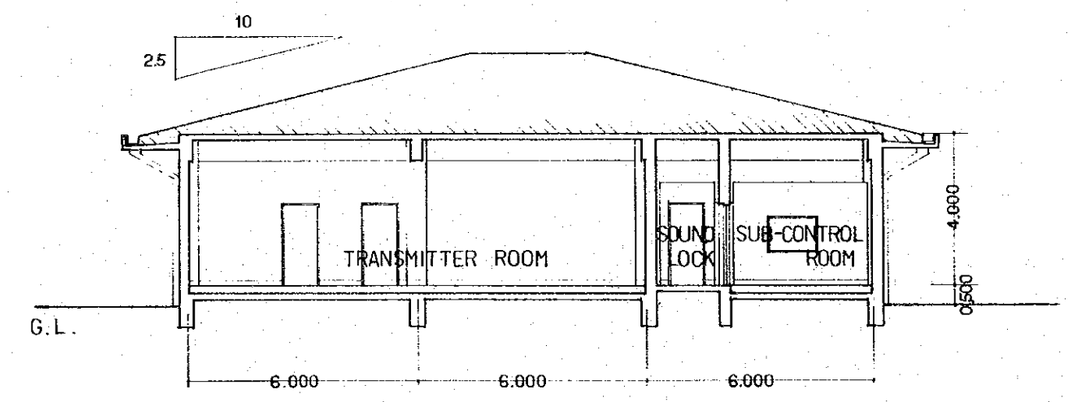


FIG.4-4-2. SECTION —— KATHMANDU TRANSMITTING STATION



A ~ A



B ~ B

NOTE: SECTION A~A OR B~B.
REFER TO FIG.4-2-3. FLOOR PLAN

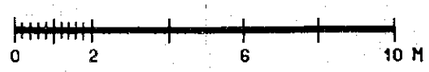


FIG.4-4-3. SECTION —— POKHARA TRANSMITTING STATION

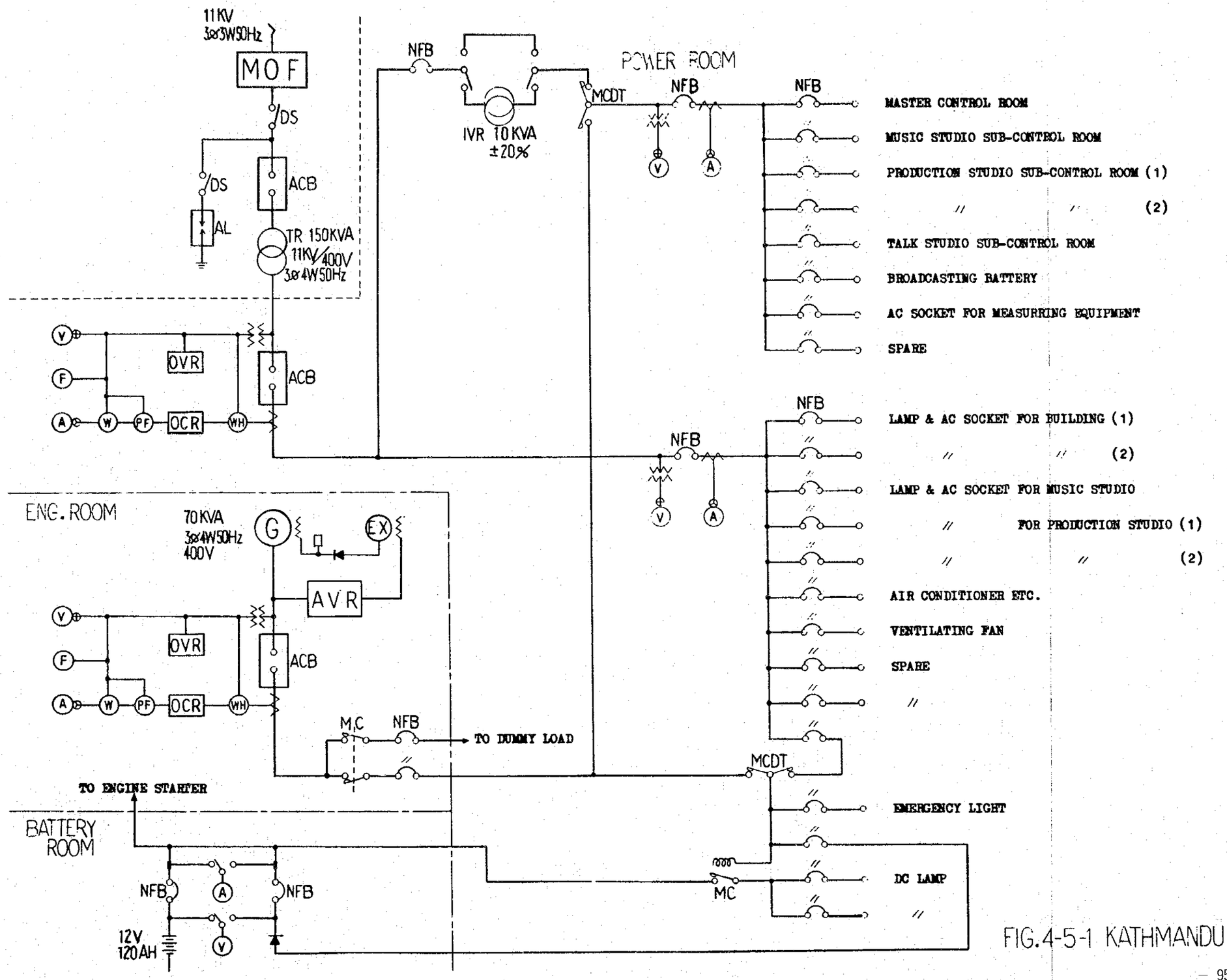


FIG.4-5-1 KATHMANDU STUDIO CENTER

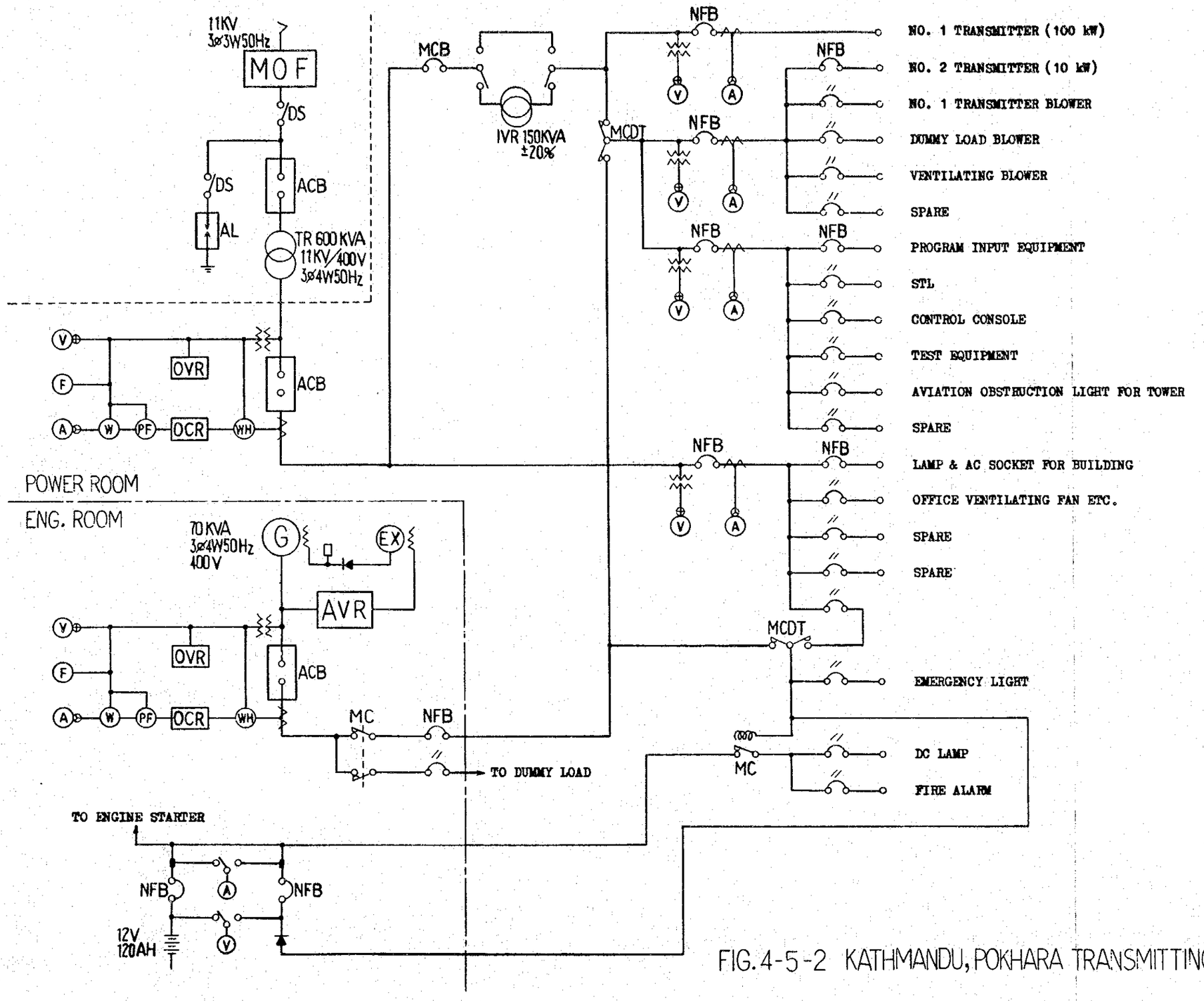


FIG. 4-5-2 KATHMANDU, POKHARA TRANSMITTING STATION

SYMBOLS	ITEMS	REMARKS
P.A.C.– 1	PACKAGED AIR CONDITIONER.– NO.1	
P.A.C.– 2	PACKAGED AIR CONDITIONER– NO.2	
A.H.U.– 1	AIR HANDLING UNIT–NO.1	WITH ELECTRICHEATER
A.H.U.– 2	AIR HANDLING UNIT–NO.2	WITH ELECTRIC HEATER
F.1	EXHAUST FAN FOR PRODUCTION STUDIO	
F.2	EXHAUST FAN FOR STORE	
F.3	EXHAUST FAN FOR ENTRANCE HALL	
F.4	EXHAUST FAN FOR MASTER CONTROL ROOM	
F.5	EXHAUST FAN FOR MUSIC STUDIO	
F.6	EXHAUST FAN FOR TOILET	
F.7	EXHAUST FAN FOR BUILDING EQUIPMENT ROOM	
F.8	EXHAUST FAN FOR POWER ROOM	
F.9	O.A. SUPPLY FAN FOR POWER ROOM	
F.10	O.A. SUPPLY FAN FOR ENGINE& BATTERY ROOM	
F.11	EXHAUST FAN FOR ENGINE & BATTERY ROOM	

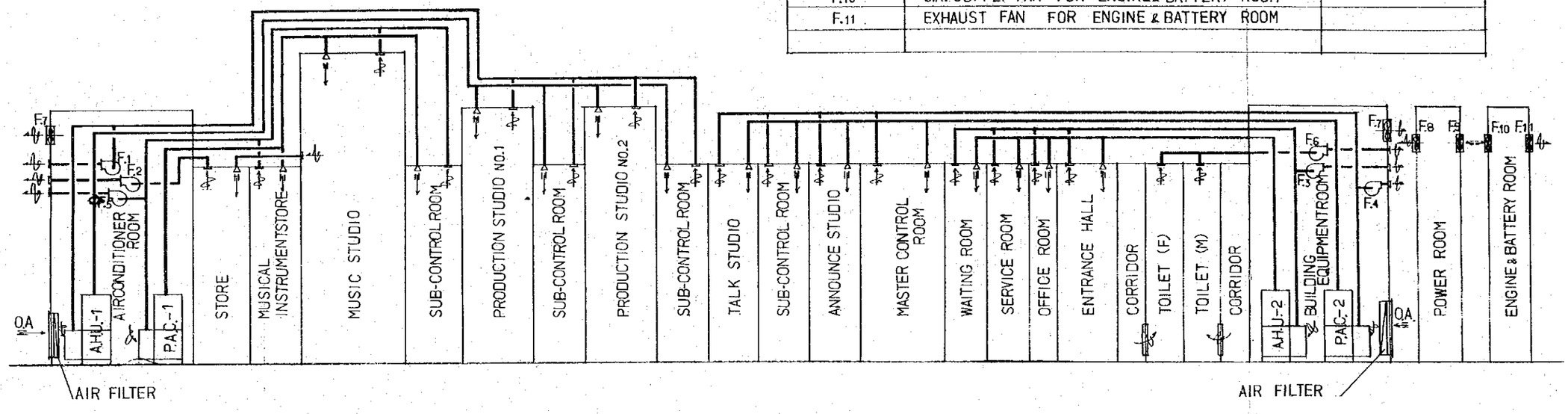


FIG. 4-6-1 DIAGRAM OF AIR DUCT SYSTEM — KATHMANDU STUDIO CENTER

SYMBOLS	ITEMS	REMARKS
A.H.U.	AIR HANDLING UNIT	WITH ELECTRIC HEATER
F.1	O.A. SUPPLY FAN FOR TRANSMITTER ROOM	
F.2	EXHAUST FAN FOR TRANSMITTER ROOM	
F.3	EXHAUST FAN FOR OFFICE	
F.4	EXHAUST FAN FOR TOILET	
F.5	EXHAUST FAN FOR POWER ROOM	
F.6	O.A. SUPPLY FAN FOR POWER ROOM	
F.7	O.A. SUPPLY FAN FOR ENGINE ROOM	
F.8	EXHAUST FAN FOR ENGINE ROOM	

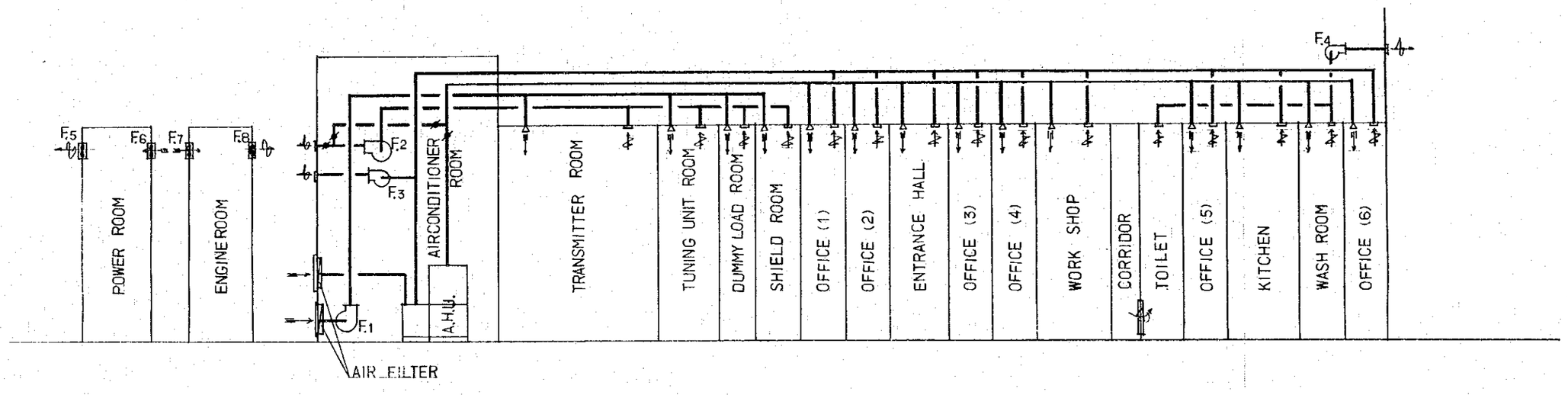


FIG. 4-6-2 DIAGRAM OF AIR DUCT SYSTEM — KATHMANDU TRANSMITTING STATION

SYMBOLS	ITEMS	REMARKS
P.A.C.	PACKEGED AIR CONDITIONER FOR STUDIO	
A.H.U.	AIR HANDLING UNIT	WITH ELECTRIC HEATER
F.1	O.A. SUPPLY FAN FOR TRANSMITTER ROOM	
F.2	EXHAUST FAN FOR TRANSMITTER ROOM	
F.3	EXHAUST FAN FOR STUDIO	
F.4	EXHAUST FAN FOR OFFICE	
F.5	EXHAUST FAN FOR TOILET	
F.6	EXHAUST FAN FOR POWER ROOM	
F.7	O.A. SUPPLY FAN FOR POWER ROOM	
F.8	O.A. SUPPLY FAN FOR ENGINE ROOM	
F.9	EXHAUST FAN FOR ENGINE ROOM	

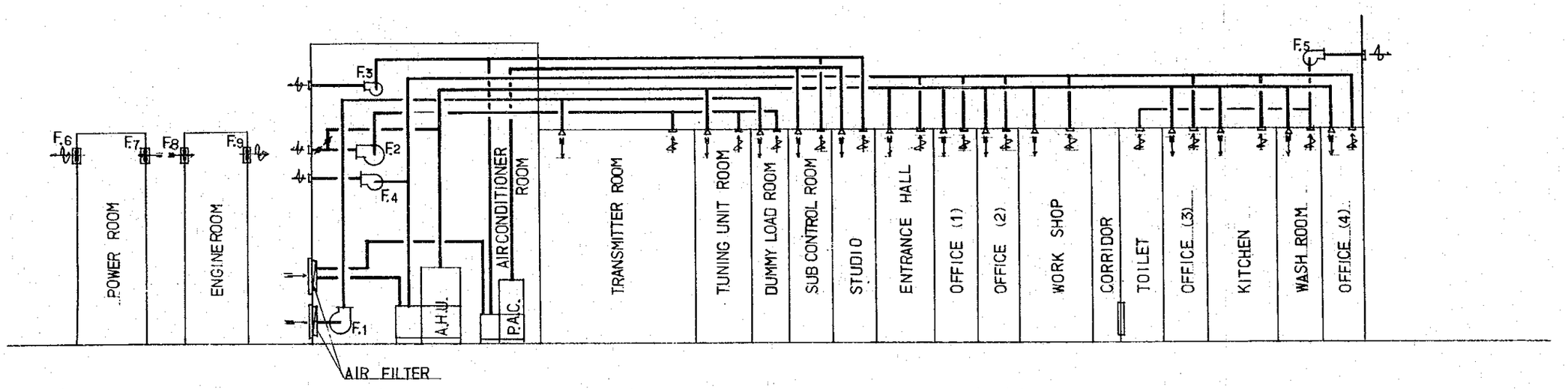


FIG. 4-6-3 DIAGRAM OF AIR DUCT SYSTEM — POKHARA TRANSMITTING STATION

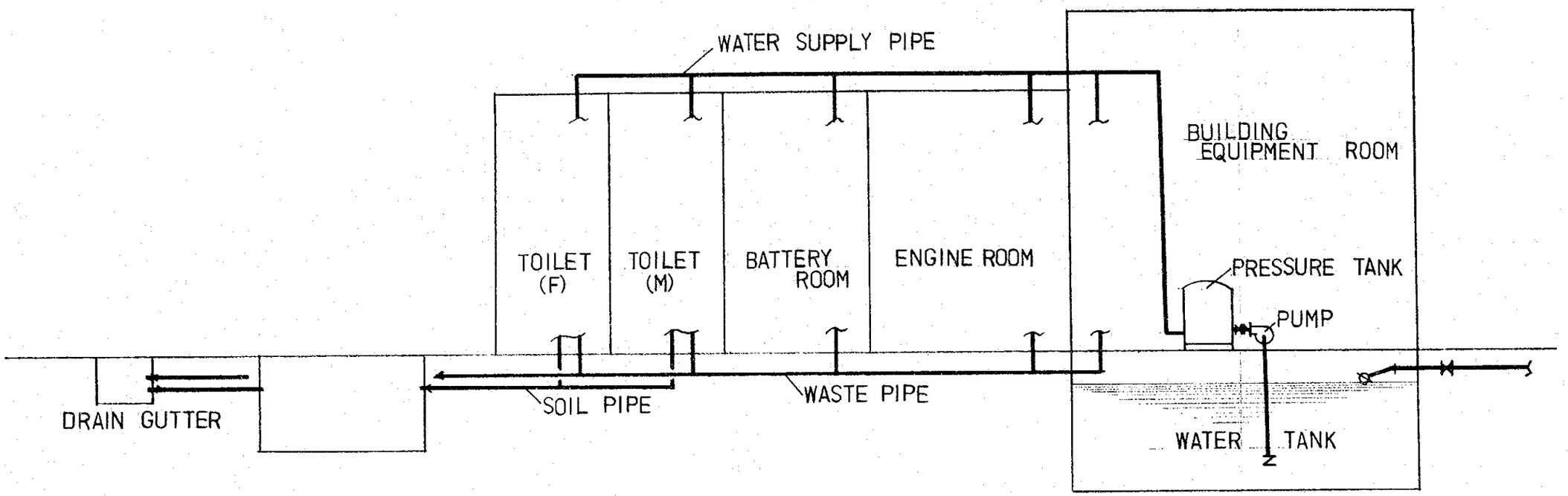


FIG. 4-7-1 DIAGRAM OF PLUMBING — KATHMANDU STUDIO CENTER

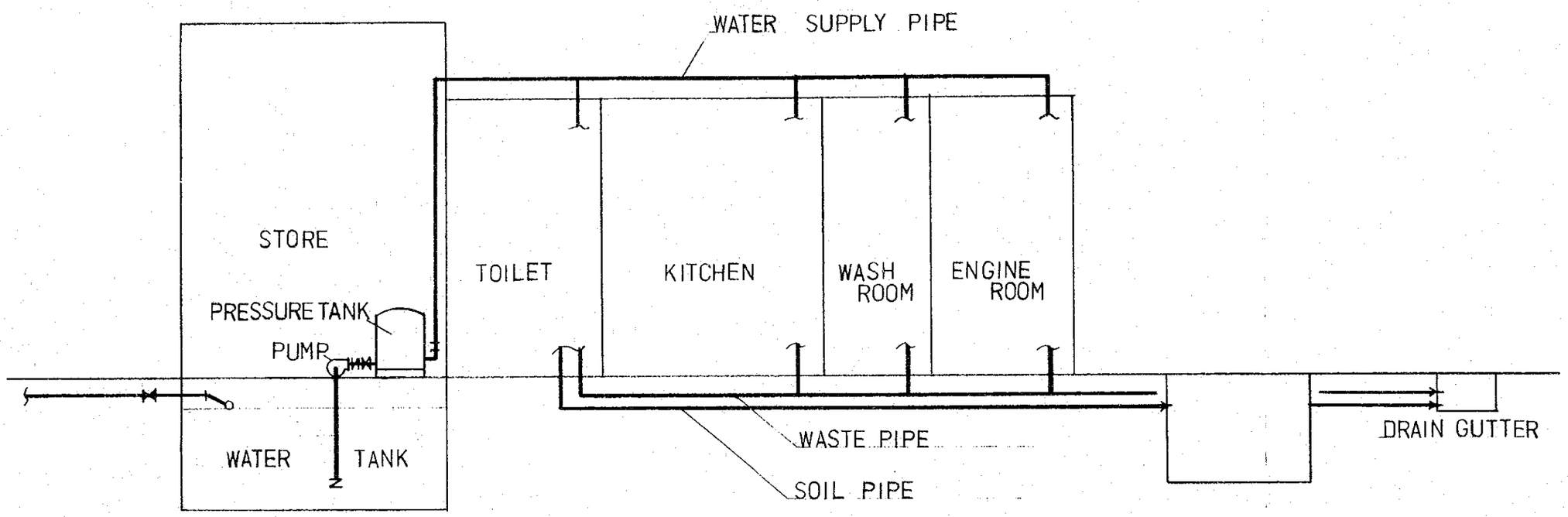


FIG. 4-7-2. DIAGRAM OF PLUMBING- KATHMANDU / POKHARA TRANSMITTING STATION

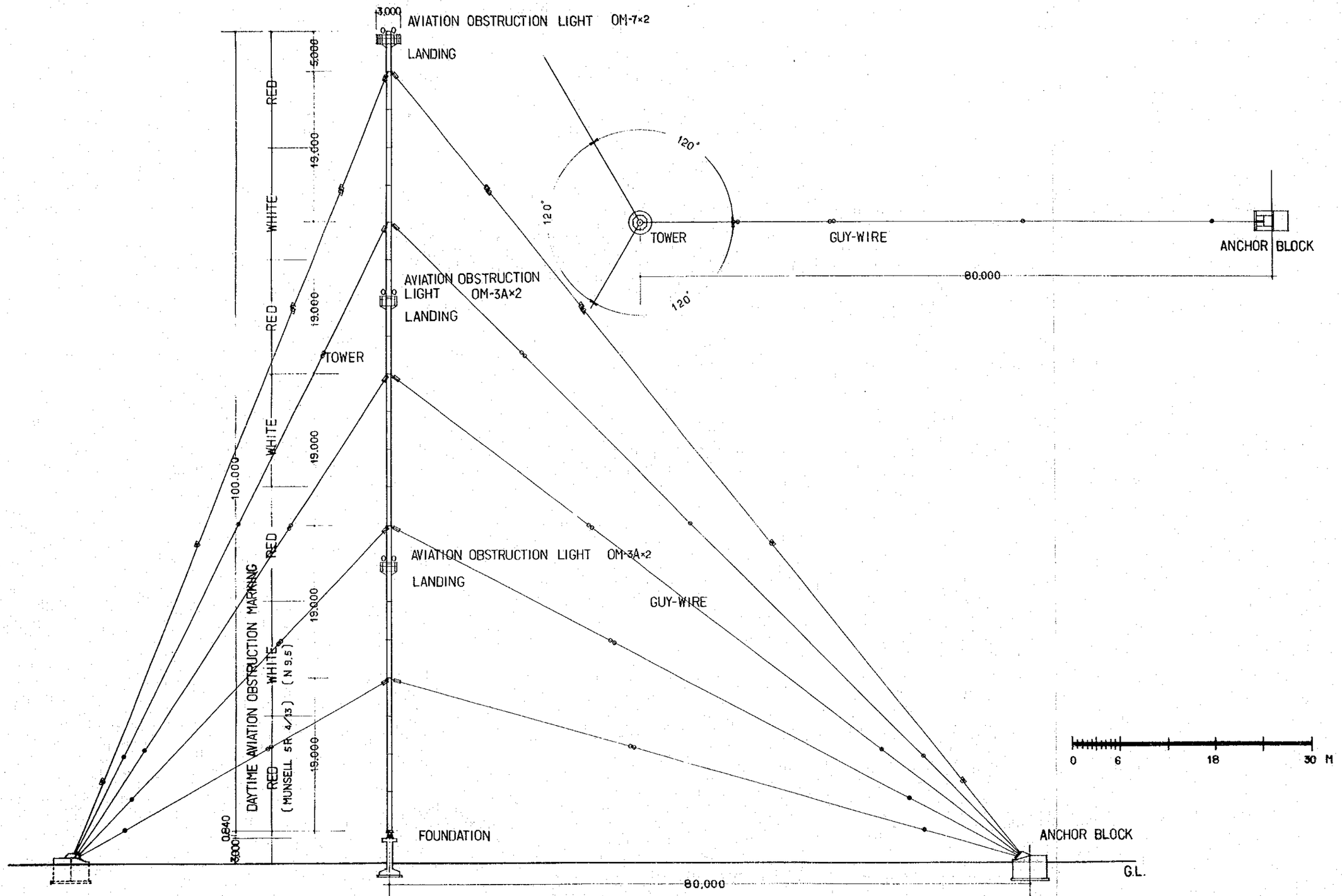


FIG.4-8-1. OUTLINE OF TOWER

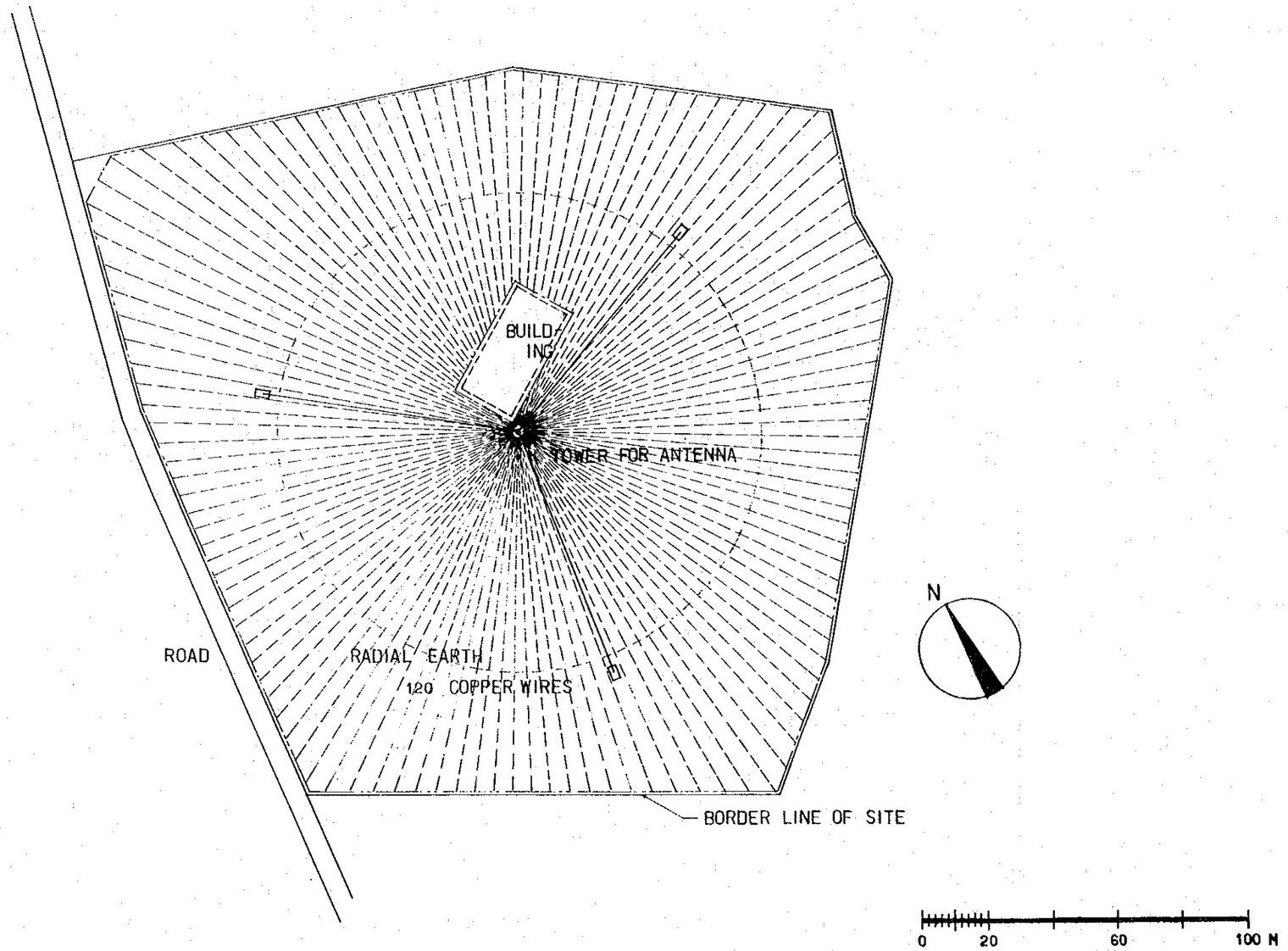


FIG.4-8-2. LAY-OUT OF TOWER AND EARTH —— KATHMANDU TRANSMITTING STATION

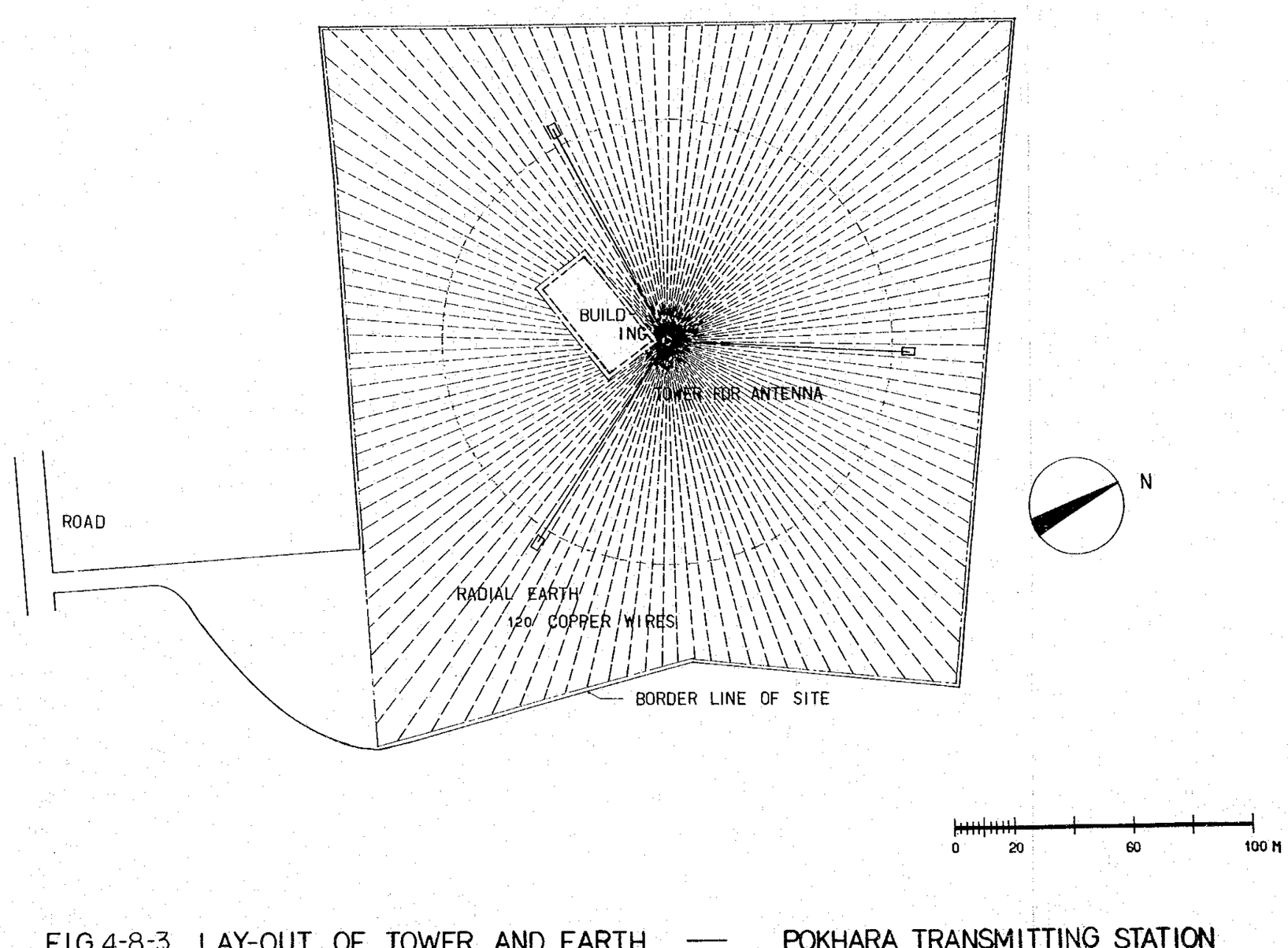
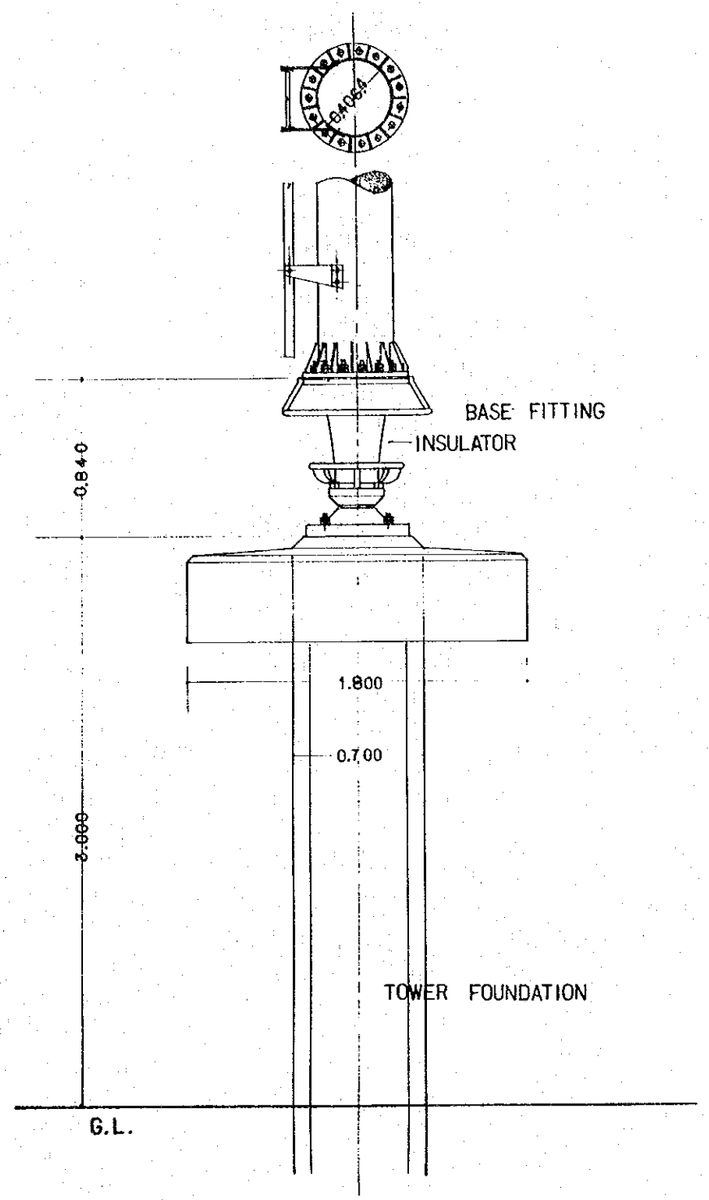
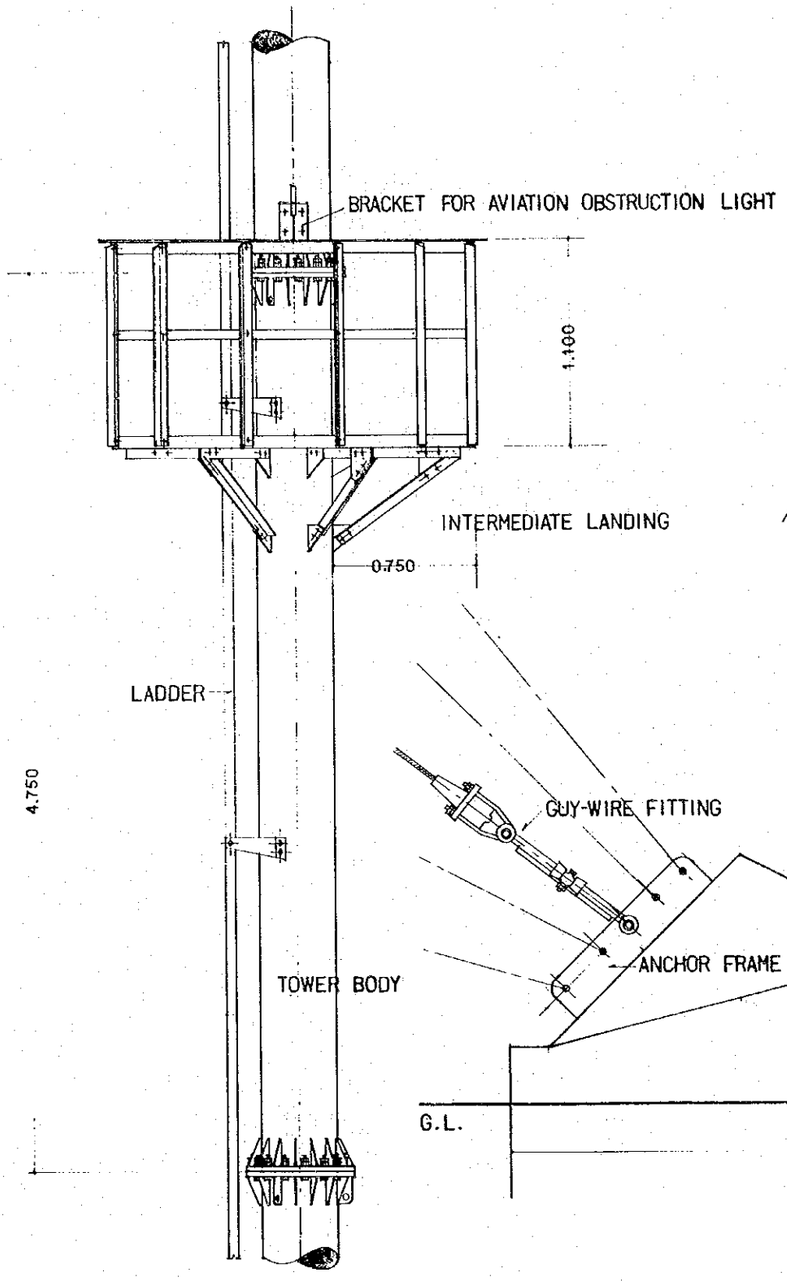
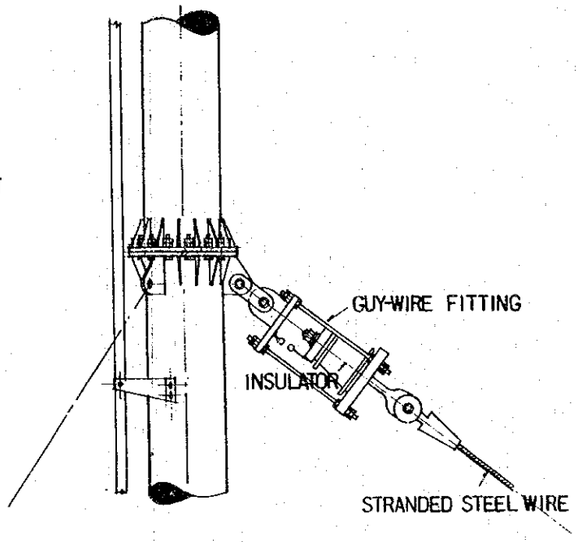


FIG.4-8-3. LAY-OUT OF TOWER AND EARTH — POKHARA TRANSMITTING STATION







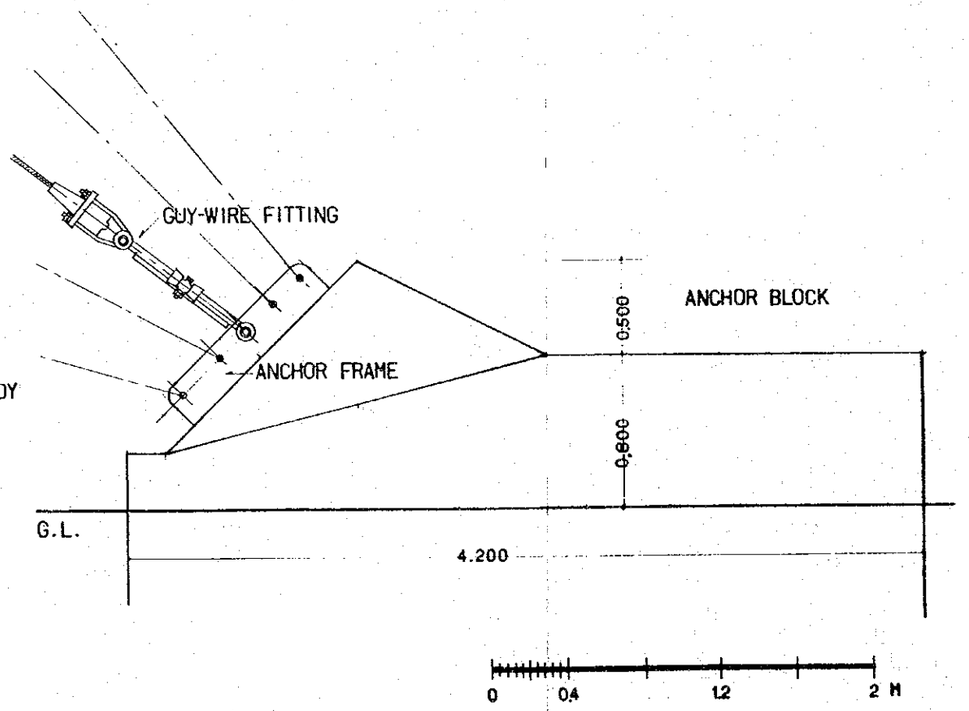


FIG.4-8-4. DETAIL OF TOWER

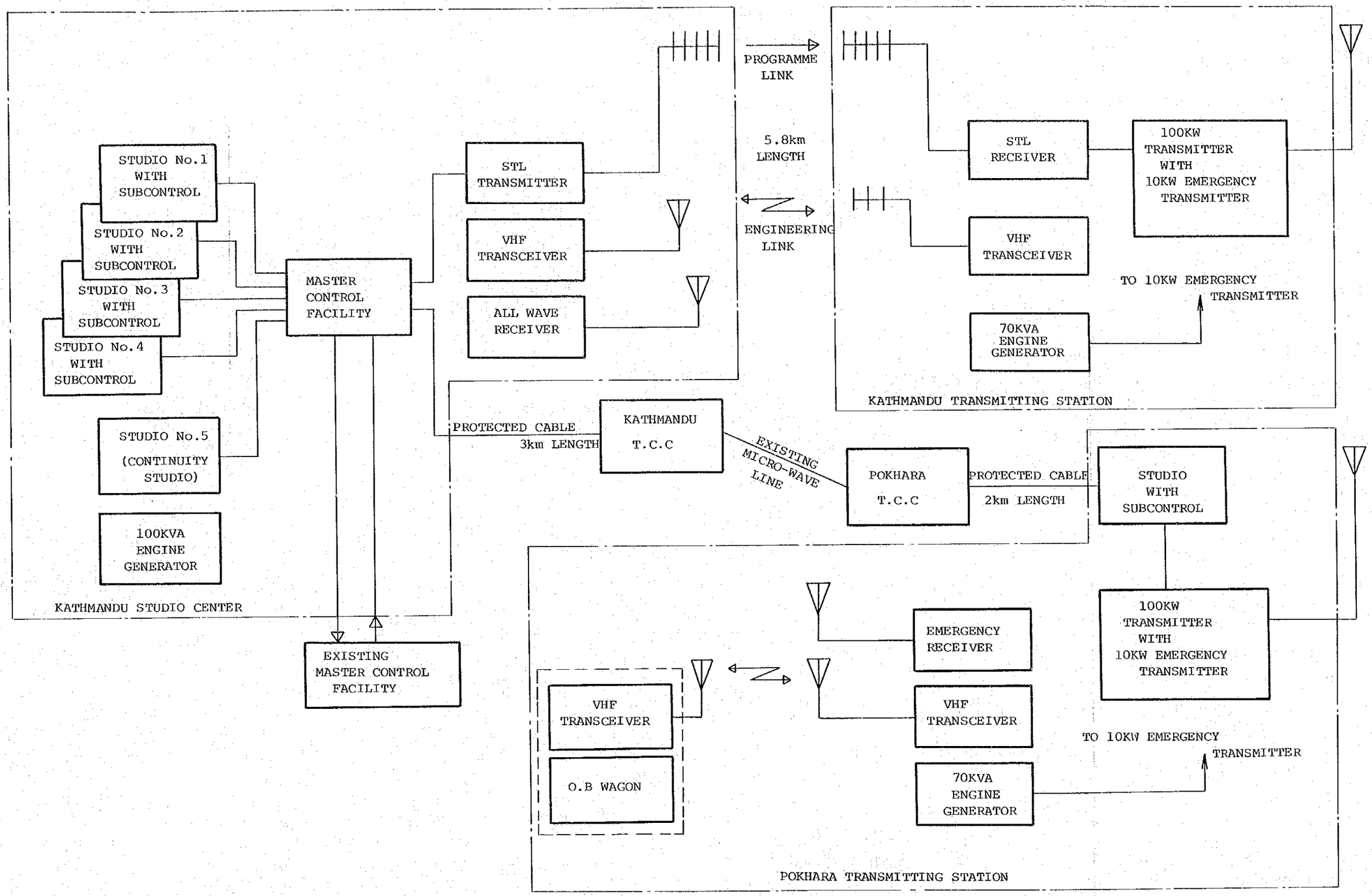


Fig. 4-9. SCHEMATIC DIAGRAM OF TOTAL SYSTEM

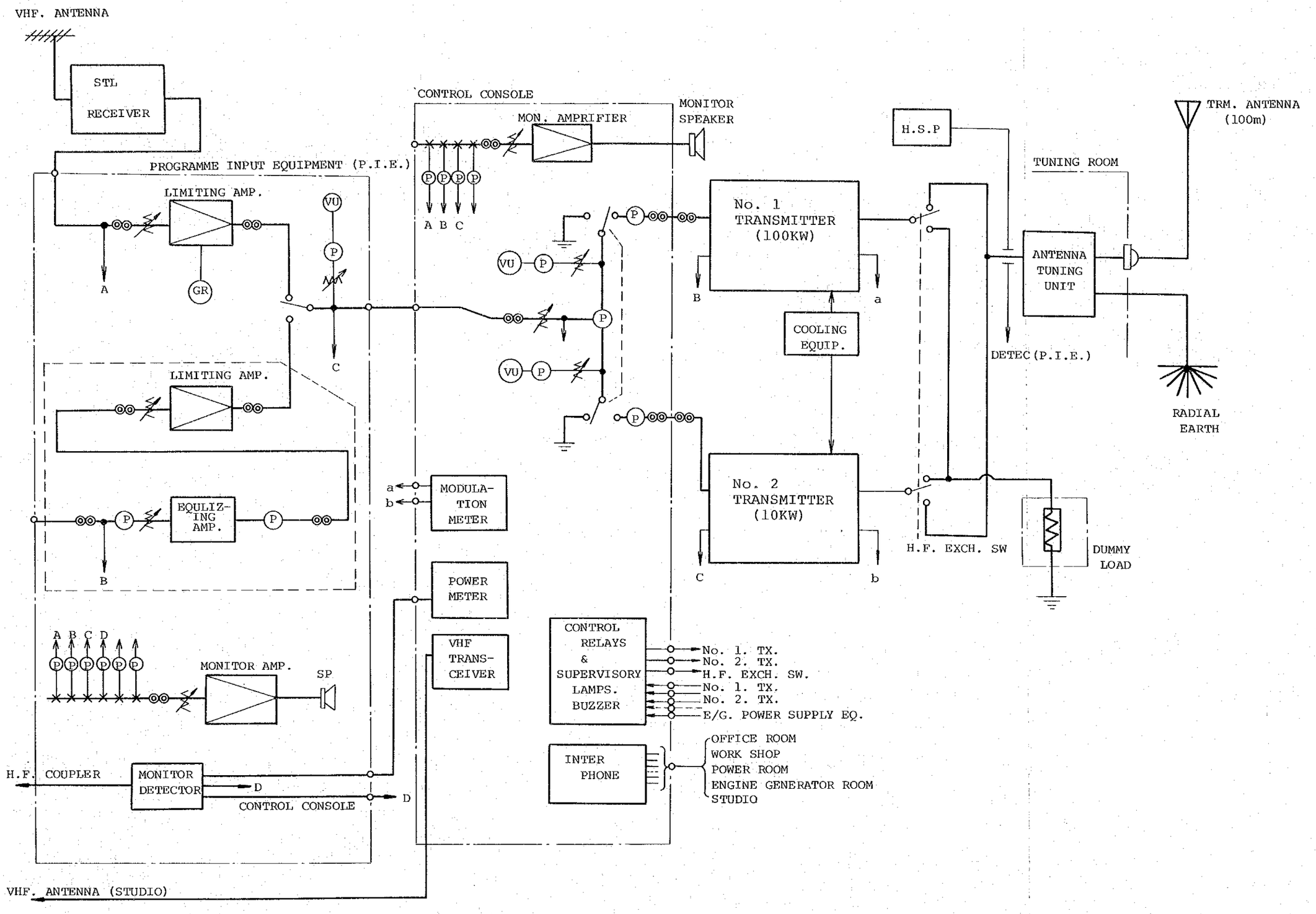


Fig. 4-10-1. SCHEMATIC DIAGRAM OF KATHMANDU TRANSMITTING STATION

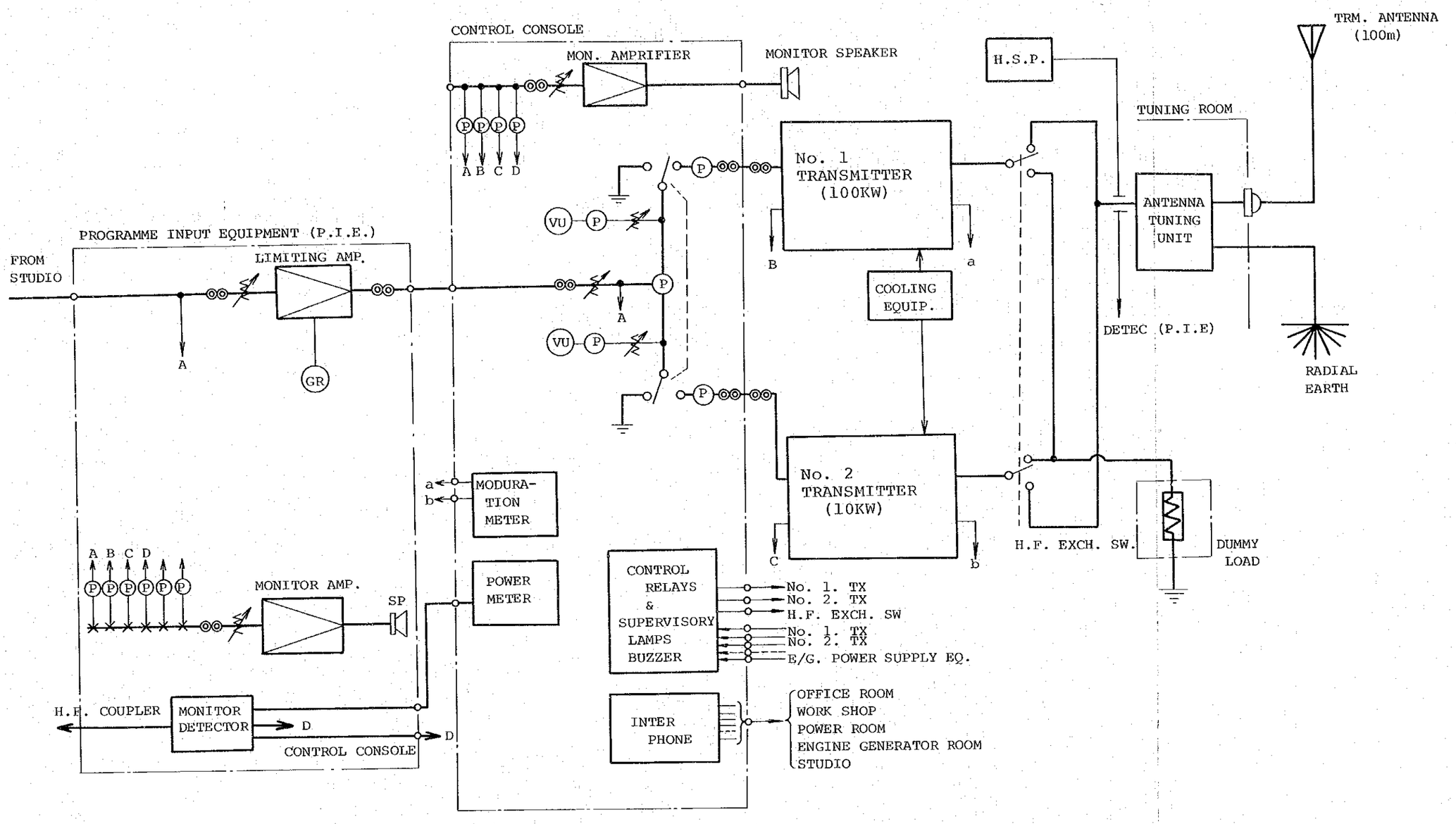
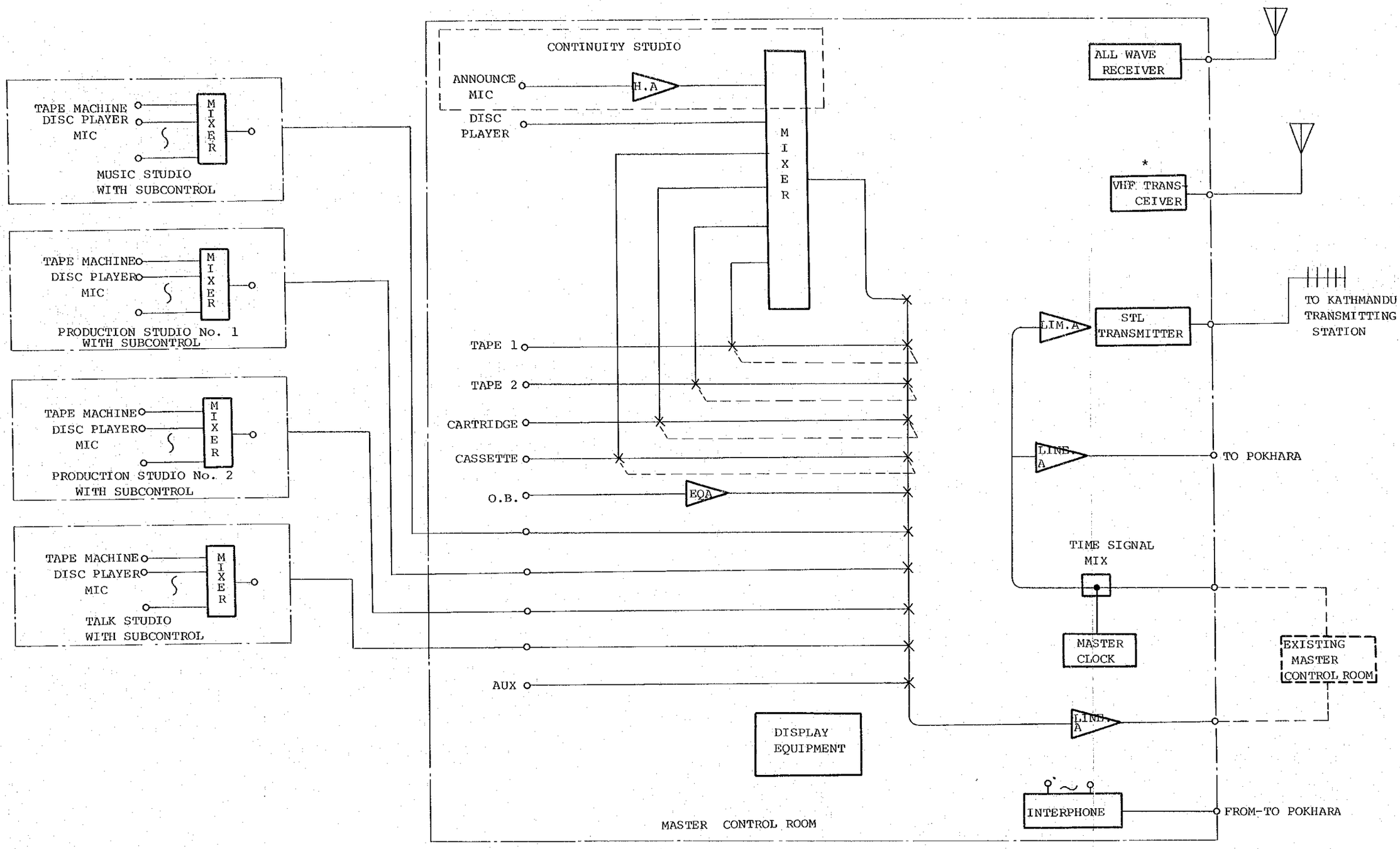


Fig. 4-10-2. SCHEMATIC DIAGRAM OF POKHARA TRANSMITTING STATION



* COMMUNICATION LINK FOR KATHMANDU TRANSMITTING STATION

Fig. 4-11-1. SCHEMATIC DIAGRAM OF KATHMANDU STUDIO CENTER

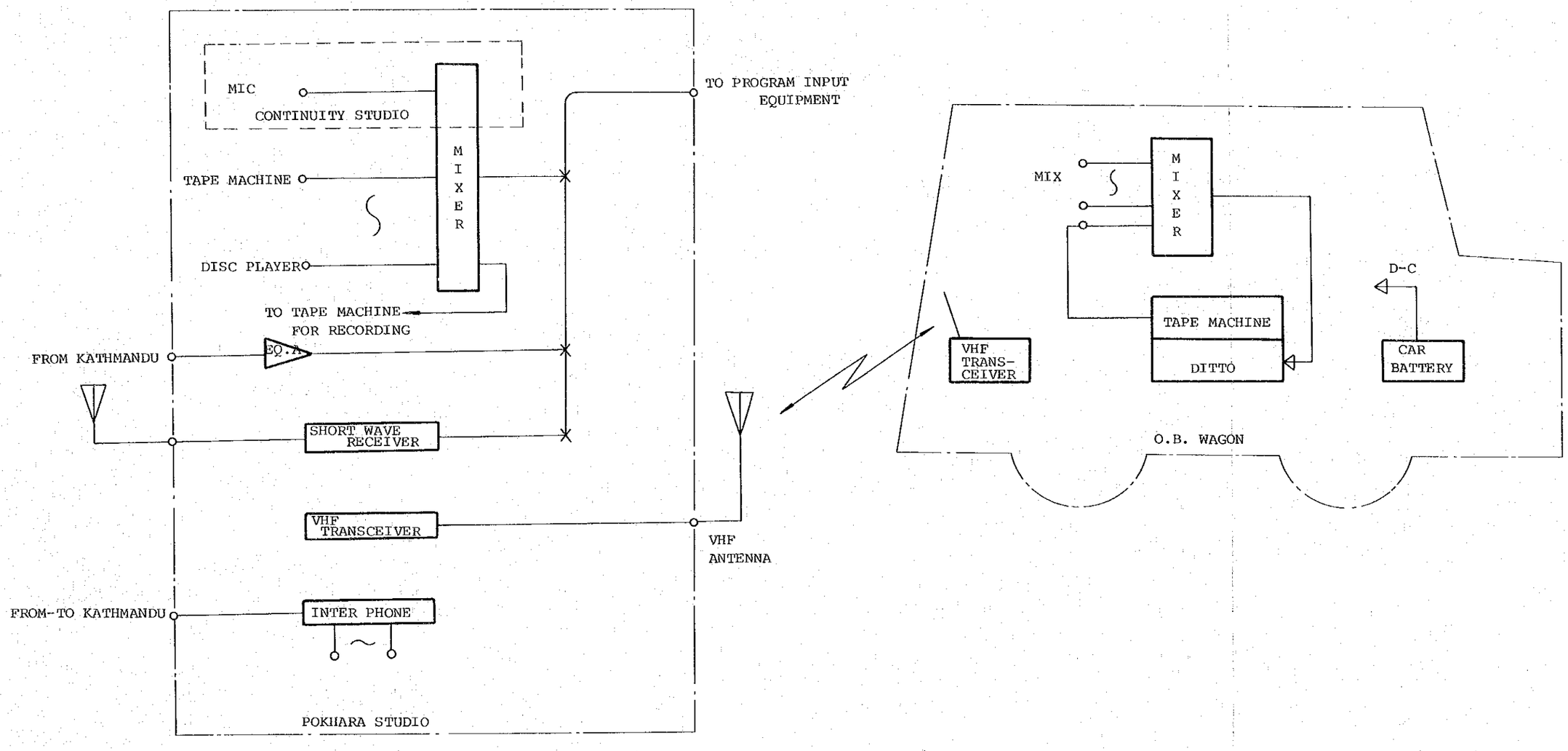


Fig. 4-11-2. SCHEMATIC DIAGRAM OF POKHARA PRODUCTION FACILITIES

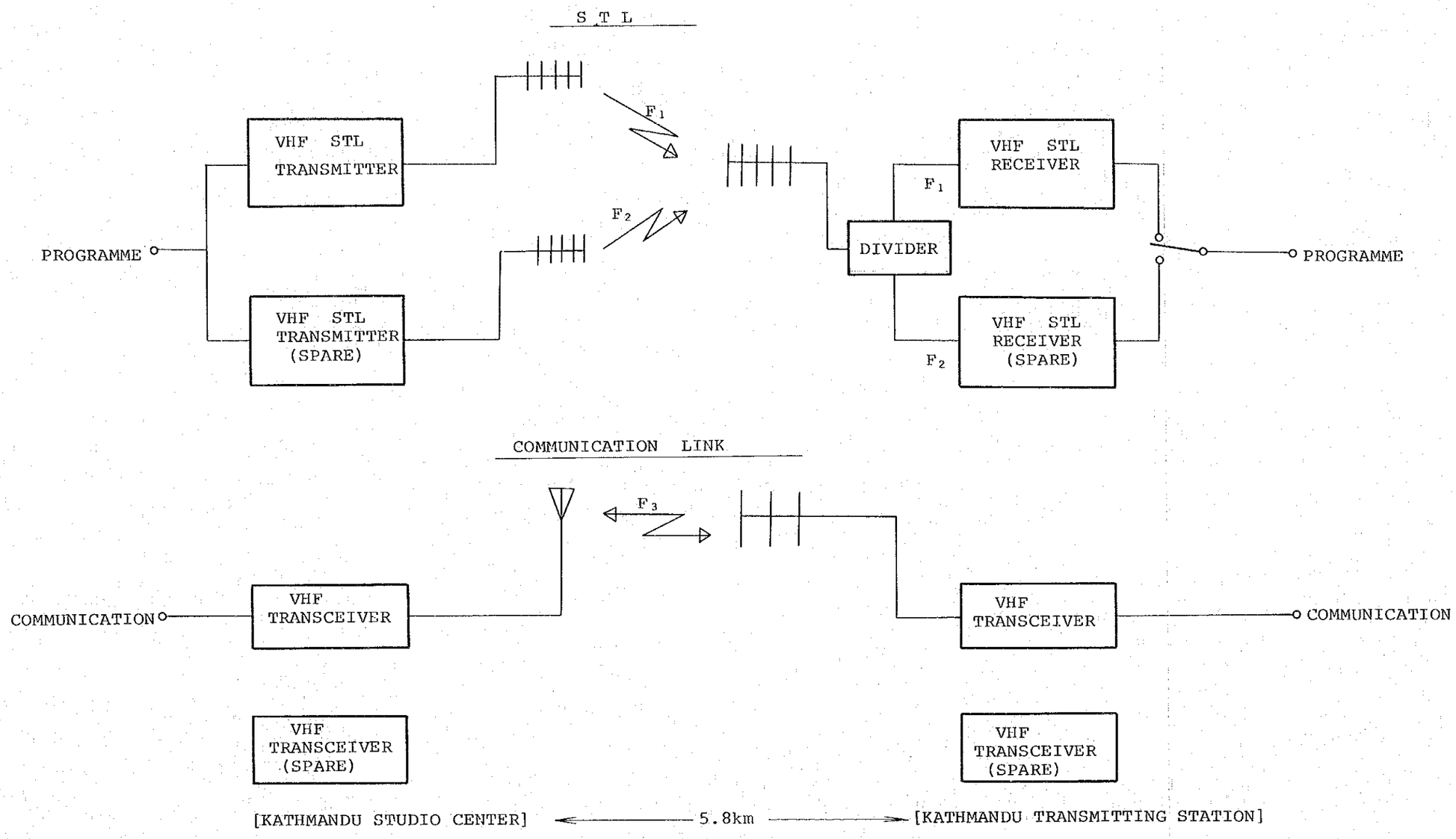


Fig. 4-11-3. SCHEMATIC DIAGRAM OF STL & COMMUNICATION LINK
(FROM KATHMANDU STUDIO CENTER TO KATHMANDU TRANSMITTING STATION)

SECTION 5 IMPLEMENTATION PLAN

SECTION 5 IMPLEMENTATION PLAN

The items which were taken into consideration in planning the construction schedule are as follows.

(1) The entire construction work should be completed with in 15 months. (cf. Table S7-2)

(2) As the minimum term is estimated for each activity, the construction schedule is to be managed strictly.

(3) In relation to the limited term, the construction work is to be carried out in parallel at the following three locations.

1) Kathmandu transmitting station
2) Pokhara transmitting station
3) Kathmandu studio centre

(4) For the overall adjustment of the two transmitting stations and studio centre equipment, the last thirty days (one month) of the construction schedule are allocated for the final test.

The construction schedule was prepared under the following premises.

(1) The construction schedule is the total number of months from the date of entry of work.

(2) For the management of the construction work, a separate detailed PART/Time construction schedule showing the progress of construction work is to be prepared.

(3) The expected term for each construction work in the construction schedule is as following.

1)	Manufacture of broadcasting equipment	8.5 months
2)	Manufacture of antenna mast	6 months
3)	Installation of transmitter equipment (including final test and acceptance test)	3 months

4)	Transportation of building material (including 1.5 month for preparation of shipping)	5 months
5)	Transportation of broadcast equipment	3.5 months
6)	Installation of transmitting antenna mast	3 months
7)	Construction of Kathmandu and Pokhara station building	7 months
8)	Construction of Kathmandu studio centre building	13 months

(4) During the construction work of transmitter building and transmitting antenna construction term overlaps 2.5 months, the consultant are to give necessary instructions so that the two construction works can be carried on smoothly to prevent occurrence of accidents as well.

(5) In constructing the transmitting antenna the steel mast installation work is to be started two months after completion of the foundation work.