THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA DETAILED DESIGN REPORT ON THE TELEVISION BROADCASTING NETWORK CONSTRUCTION PROJECT

VOLUME I

AUGUST 1979

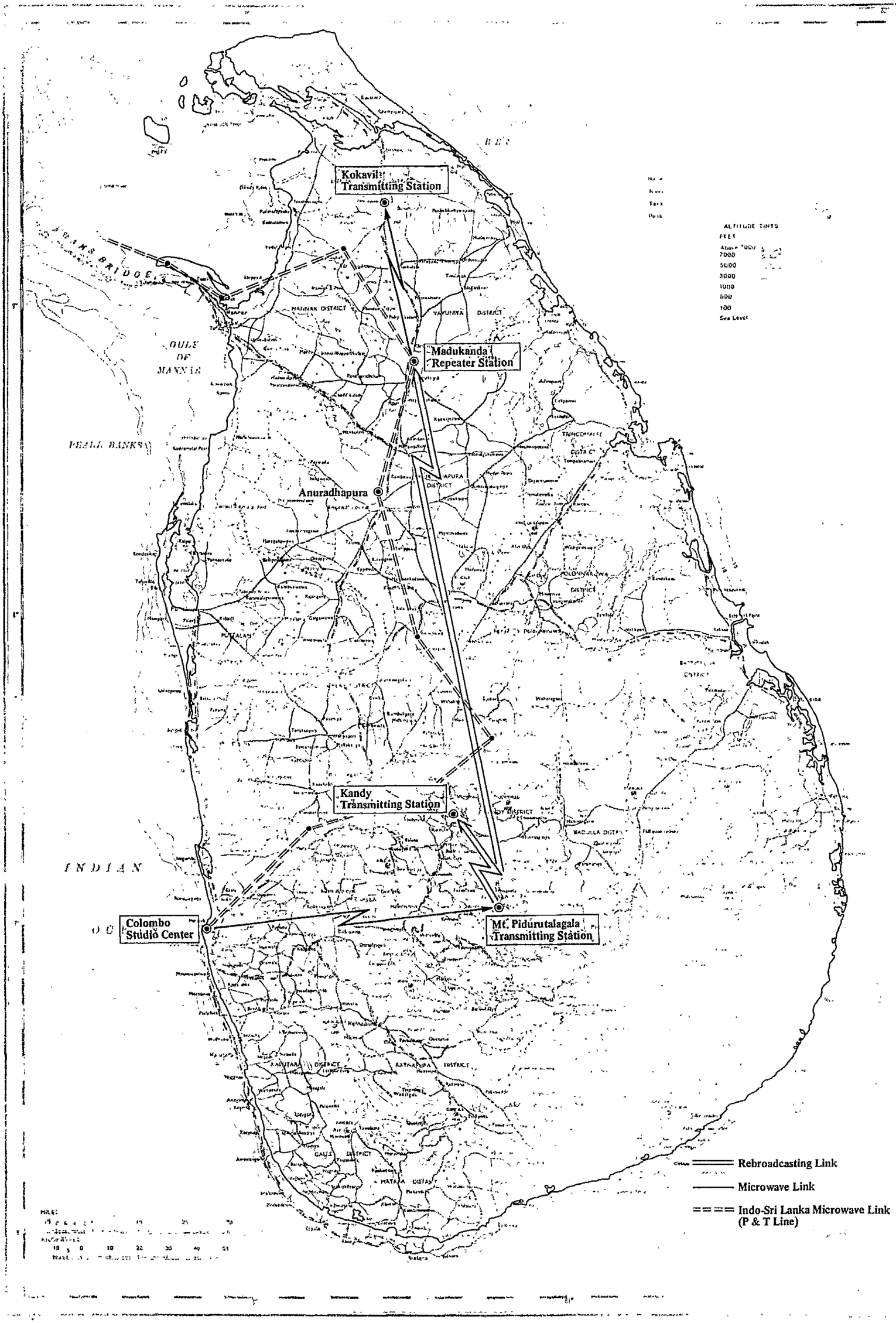
JAPAN INTERNATIONAL COOPERATION AGENCY

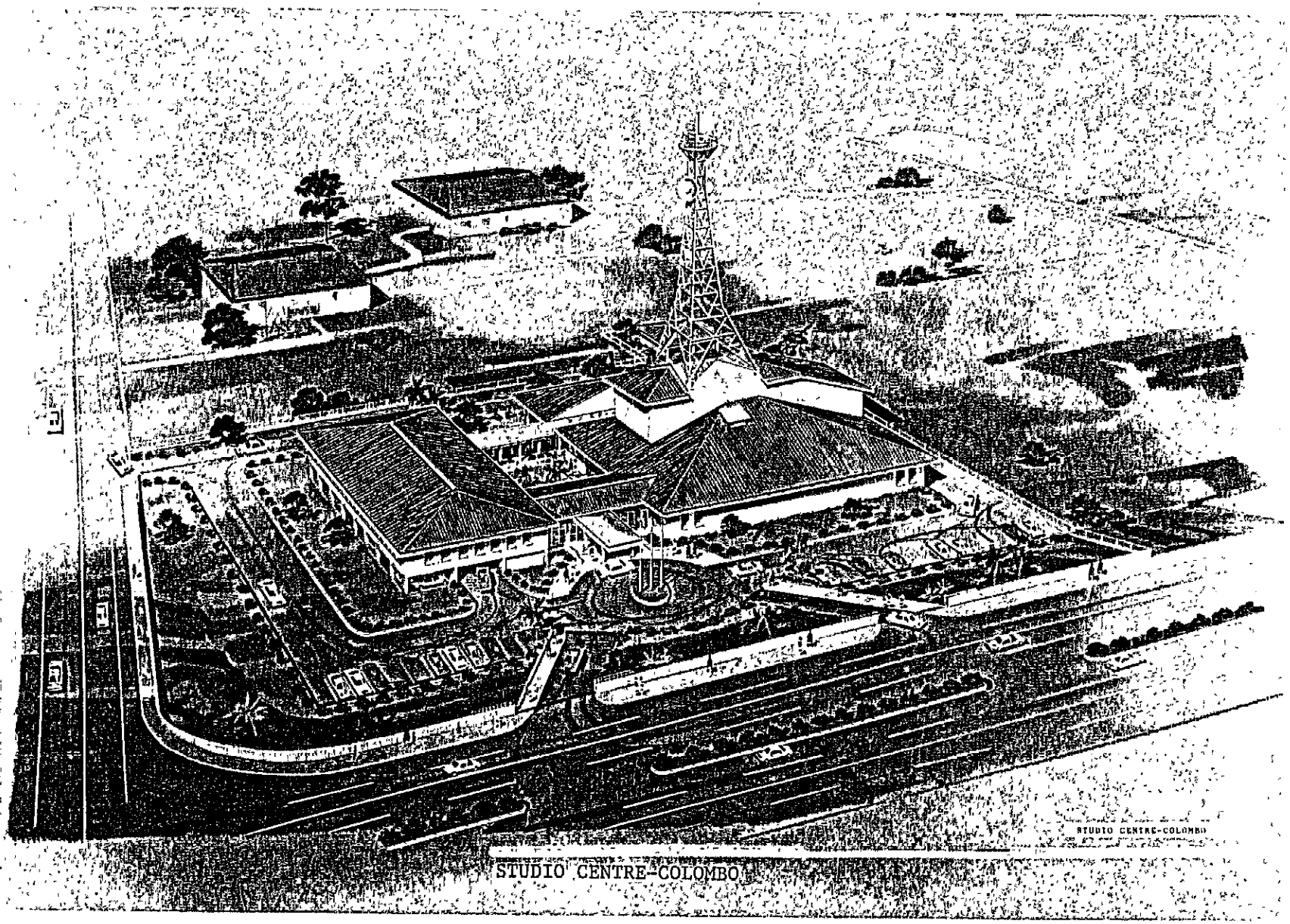
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA DETAILED DESIGN REPORT ON THE TELEVISION BROADCASTING NETWORK CONSTRUCTION PROJECT

VOLUME I

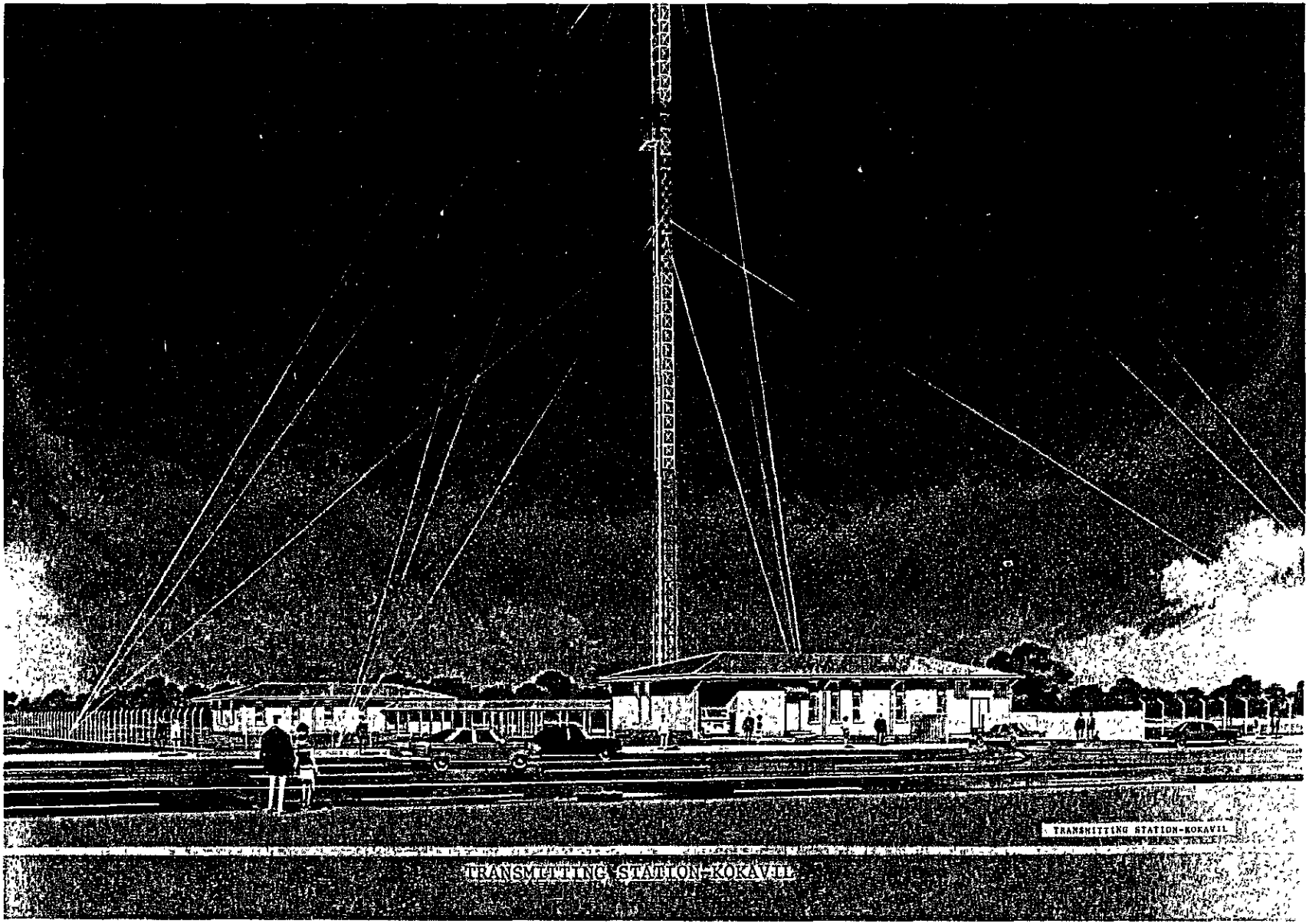
AUGUST 1979

JAPAN INTERNATIONAL COOPERATION AGENCY


Kokavil
Transmitting Station
Madukanda
Repeater Station
Anuradhapura
Kandy
Transmitting Station
Colombo
Studio Center
Mt. Pidurutalagala
Transmitting Station
ADAM'S BRIDGE
GULF OF MANNAR
PEARL BANKS
INDIAN
MANNAR DISTRICT
VAVUNIYA DISTRICT
TRINCOMALEE DISTRICT
POLONNARUWA DISTRICT
PUTTALAM
MATALE DISTRICT
KURUNEGALA DISTRICT
KEGALLA DISTRICT
GALLE DISTRICT
MATARA DISTRICT
BADULLA DISTRICT
MONARAGALA DISTRICT
ALTITUDE TINTS
FEET
Above 7000
7000
5000
3000
1000
500
100
Sea Level
Rebroadcasting Link
Microwave Link
Indo-Sri Lanka Microwave Link
(P & T Line)



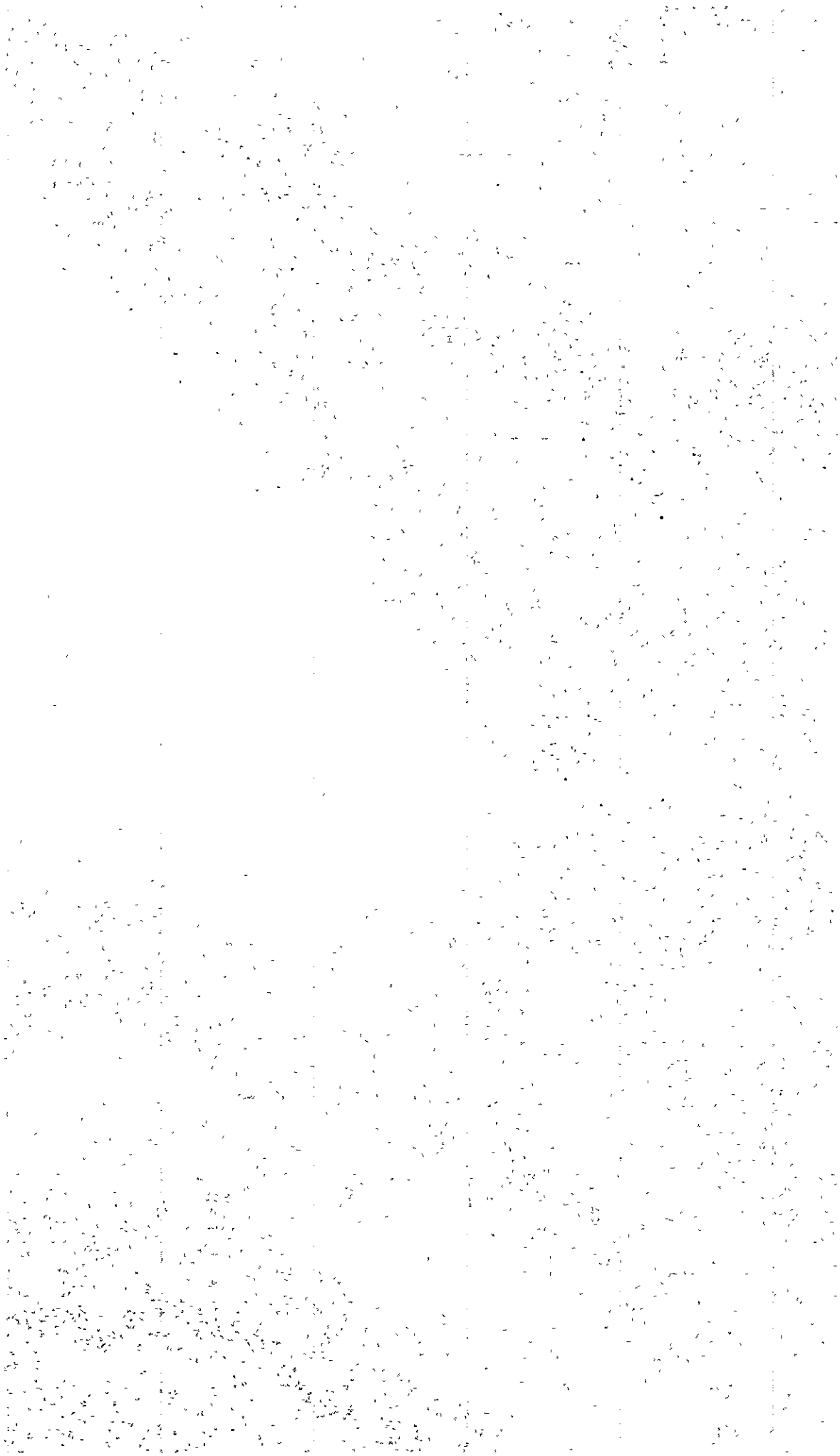
STUDIO CENTRE-COLOMBO



TRANSMITTING STATION-KOKAVIL

VOLUME I

GENERAL DESCRIPTION



Preface

In response to a request of the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan as a part of its technical cooperation to Sri Lanka decided to make a detailed design study on the nationwide television broadcasting network construction project which constitutes part of Sri Lanka's national development plan, and the Japan International Cooperation Agency (JICA) executed the study.

The JICA dispatched to Sri Lanka a survey team of 10 experts headed by Mr. Sadao Takemura, Special Assistant to the Director General of the Radio Regulatory Bureau, Ministry of Posts and Telecommunications, for conducting a detailed design study for a period from October 19th to November 23, 1978.

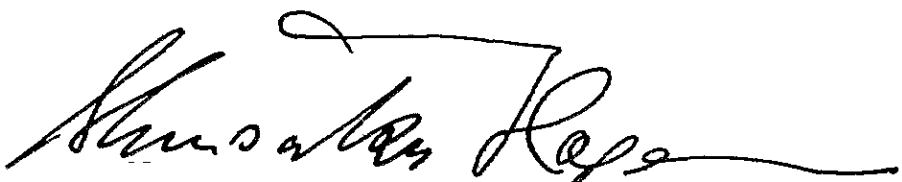
As a result of the field survey, the team submitted an interim report to the Government of Sri Lanka.

After further studies in Japan of the findings of the survey this final report has been prepared.

I sincerely hope that this report will contribute to the establishment of the television broadcasting network in the Democratic Socialist Republic of Sri Lanka, to its social and economic development and also to the promotion of friendship between Sri Lanka and Japan.

I would like to express my gratitude to those concerned of the Government of the Democratic Socialist Republic of Sri Lanka for their full cooperation extended to the team.

August, 1979



SHINSAKU HOGEN
President
Japan International Cooperation Agency

FORMATION OF REPORT

VOL. I GENERAL DESCRIPTION

Section 1 Introduction

Section 2 Outline of Detailed Design of Broadcasting Equipment

Section 3 Outline of Detailed Design of Buildings and Towers

Section 4 Construction Schedule

Section 5 Costs Estimation

VOL. II BROADCASTING EQUIPMENT

Section 6 Technical Specifications of Broadcasting Equipment

VOL. III BUILDINGS AND TOWERS (1/2)

Section 7 Technical Specifications of Buildings and Towers

VOL. IV BUILDINGS AND TOWERS (2/2)

Section 8 Bill of Quantities for Buildings and Towers

VOL. V DRAWINGS

V-1 Design Drawings of Broadcasting Equipment

V-2 Studio Center - Colombo, Architectural and Structural Drawings

V-3 Studio Center - Colombo, Electrical and Heating, Ventilating and Air-Conditoning Drawings

V-4 Drawings of Transmitting and Repeater Stations

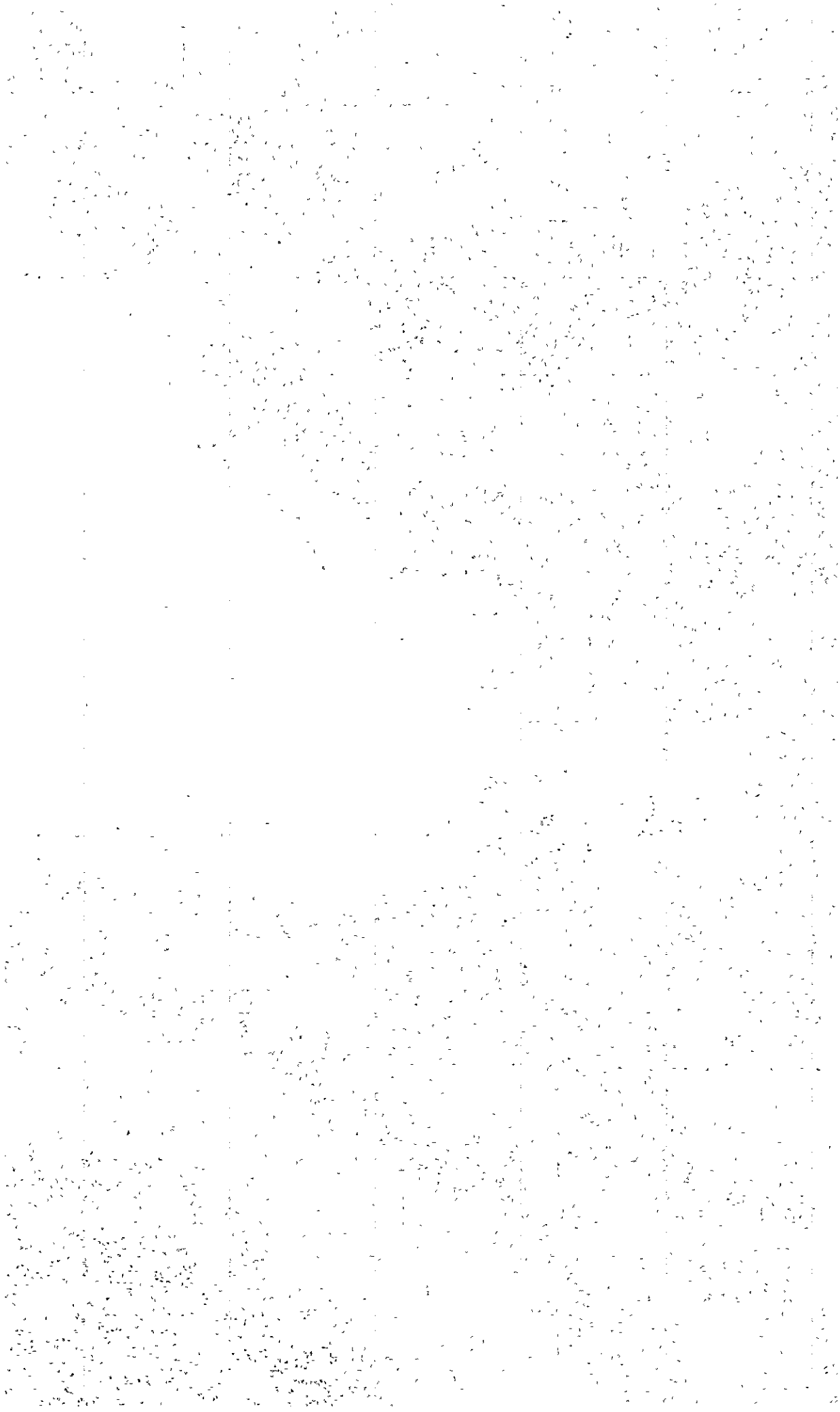
V-5 Drawings of Towers

TABLE OF CONTENTS

VOL. I GENERAL DESCRIPTION

SECTION 1

INTRODUCTION



SECTION 1

INTRODUCTION

This report presents a detailed design for the Television Broadcasting Network Construction Project of the Democratic Socialist Republic of Sri Lanka.

1-1 SCOPE OF THE DETAILED DESIGN

1-1-1 NAMES OF STATIONS

The following stations are to be constructed in this project.

(1) Colombo Studio Center
(2) Mt. Pidurutalagala Transmitting Station
(3) Kokavil Transmitting Station
(4) Kandy Transmitting Station
(5) Madukanda Repeater Station

1-1-2 SCOPE

This report contains the following items of information.

(1) Technical specifications
(2) Quantities of necessary facilities, equipment and materials
(3) Drawings
(4) Construction schedule
(5) Construction costs

1-2 OUTLINE OF THE DETAILED DESIGN SURVEY

1-2-1 PERIOD OF SURVEY

The survey for the detailed design was conducted for a period of 36 days from October 19th to November 23rd, 1978.

1-2-2 SURVEY TEAM MEMBERS

The survey was conducted by a survey team of the following members.

		Affiliated to
Head:	Sadao Takemura (Summarization)	Ministry of Posts & Telecommunications
Members:		
	Hiroshi Tsukada (for site planning)	Ministry of Posts & Telecommunications
	Kaoru Oka (for system design)	Japan Broadcasting Corporation (NHK)
	Hogara Chiba (for architecture)	NHK
	Takuo Umechi (for site planning)	NHK
	Sannosuke Ogawa (for structure)	NHK
	Shiro Hayakawa (for studio equipment)	NHK
	Fumio Nishimura (for broadcasting equipment)	All Japan Television Services Co., Ltd.
	Yuji Inoue (for building facilities)	All Japan Television Services Co., Ltd.
	Eiji Sakihara (General coordination)	Japan International Cooperation Agency

1-2-3 SURVEY ITEMS

(1) Continuous receiving and recording of field strength variation by long-distance radio wave propagation test.

(2) Survey on types, specifications, and location of broadcasting facilities and equipment of the Studio Center (including STL and TSL).

(3) Survey for determining specifications of transmitting and repeater station facilities and equipment (including antennas and power facilities).

(4) Survey on design of Studio Center (including building, airconditioning, lighting, sanitary, and power facilities, and steel tower on building roof) and for determining specifications of studio equipment.

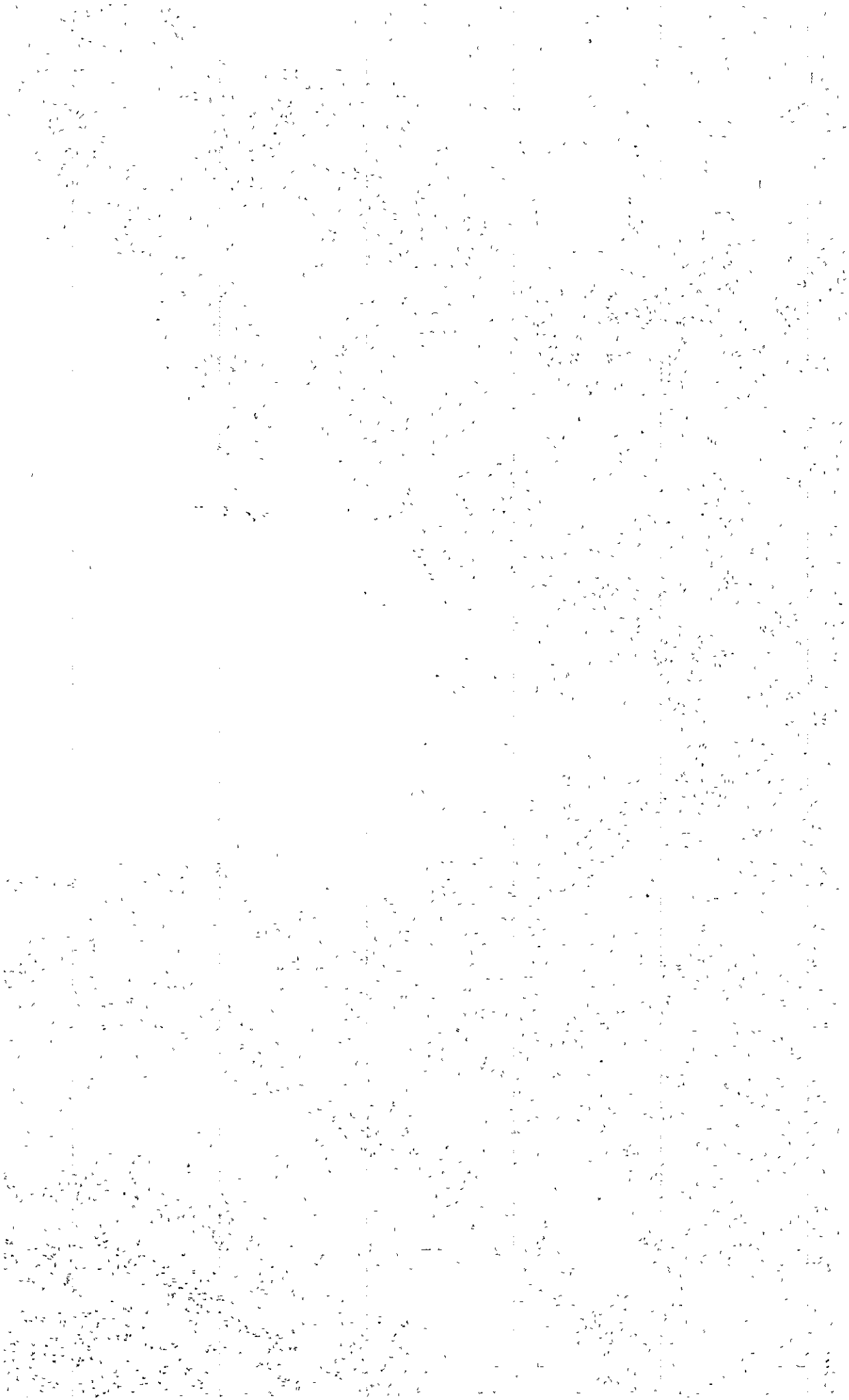
(5) Survey for constructing buildings of transmitting stations (including steel towers for transmitting antennas) and repeater station.

(6) Marcket research for building construction

The survey for constructing buildings included land surveying, soil and ground survey, collation between survey drawings prepared by S.L.B.C. and expected sites, and study on architectural laws and regulations, water supply and drainage conditions, power requirements, materials supply conditions, etc.

SECTION 2

OUTLINE OF DETAILED DESIGN OF BROADCASTING EQUIPMENT



SECTION 2

OUTLINE OF DETAILED DESIGN OF BROADCASTING EQUIPMENT

2-1 COLOMBO STUDIO CENTER

Colombo Studio Center shall incorporate one $200m^2$ studio, one $100m^2$ studio, and one $30m^2$ dubbing studio for producing programmes. The $200m^2$ studio shall be furnished with 3 TV cameras, batten type lighting equipment, wireless microphone, etc., to allow medium-scale drama and musical programmes to be produced there. The $100m^2$ studio shall be furnished with 2 TV cameras, fixed telescopic hangers, announce microphone control circuit, etc., to allow the production of news programmes.

The master control room shall be furnished with, in addition to master control equipment, CCU (for studio use), VTR (2 sets of 4-head VTR and 4 sets of cassette VTR), and 2 telecine chains so as to achieve rational operation.

An outside-broadcasting (OB) van to measure about 8 meters in length shall be provided. This OB van shall be furnished with 2 TV cameras, one VTR for recording use, one FPU, and one engine generator.

A small-scale ENG vehicle shall be provided for gathering news materials. This ENG vehicle shall be furnished with 2 ENG colour cameras (one for stand-by use).

City power of 400V/230V, 50Hz, 3 phases, 4 wires, 860KVA shall be supplied to the studio center. In consideration of supply voltage variation an induction voltage regulator of 100KVA shall be provided and power to respective equipment shall be fed through a distribution board. One engine generator (250KVA) shall be provided to assure power supply in case the city power fails.

2-2 MT. PIDURUTALAGALA TRANSMITTING STATION

No.5 channel (175.25MHz vision frequency and 180.75MHz sound frequency) shall be employed for the transmitting channel. Two transmitters shall be employed in parallel running and two outputs each 10kW (V/A ratio = 10/1) shall be combined to feed a resultant power of 20kW to the transmitting antenna. For the transmitting antenna, a 4-dipole antenna of 4 stages and 4 faces shall be constructed on a 50-meter selfsupporting steel tower. For sending broadcasting programmes from Colombo Studio Center to this transmitting station, a 7GHz band STL (Studio Transmitter Link) shall be provided. Control signals shall be sent multiplexed with programme signals and a 150MHz band TSL (Transmitter Studio Link) shall be provided for sending monitoring signals from the transmitting station, which shall be unattended, to the studio center. Orderwire telephone signals shall be multiplexed on the STL and TSL. The STL equipment shall employ space diversity reception.

City power of 400V/230V, 50Hz, 3 phases, 4 wires, 150KVA shall be supplied to the transmitting station. In consideration of supply voltage variation, an induction voltage regulator of 125KVA shall be provided and power to respective equipment shall be fed through a distribution board.
One engine generator (125KVA) shall be provided to assure power supply in case the city power fails.

2-3 KOKAVIL TRANSMITTING STATION

No.8 channel (196.25MHz vision frequency and 201.75MHz sound frequency) shall be employed for the transmitting channel. This transmitting station shall be furnished with the same types of transmitting equipment as those of Mt. Pidurutalagala Transmitting Station except that this transmitting station shall be furnished with no remote control and monitoring equipment because of being an attended station. The transmitting antenna shall be mounted on a 100-meter guy-wire type steel tower. For receiving the microwave used for transmitting the programme signal from Madukanda Repeater Station, space diversity reception shall be introduced by using 2 panels of 2mφ parabolic antenna (with radome). These parabolic antennas shall be mounted on a transmitting antenna steel tower.

City power of 400V/230V, 50Hz, 3 phases, 4 wires, 200KVA shall be supplied to the transmitting station. In consideration of supply voltage variation, an induction voltage regulator of 150KVA shall be provided and power to respective equipment shall be fed through a distribution board.
One engine generator (150KVA) shall be provided to assure power supply in case the city power fails.

2-4 KANDY TRANSMITTING STATION

No.10 channel (210.25MHz vision frequency and 215.75MHz sound frequency) shall be used for the transmitting channel.
This transmitting station shall be designed as the translator station for Mt. Pidurutalagala Transmitting Station. The programme signal from Mt. Pidurutalagala Transmitting Station shall be received by a 12-element Yagi antenna stack (with a corner reflector). Two translators shall be provided to form a stand-by operation system and an output power of 50W shall be fed to the transmitting antenna. For the transmitting antenna, a 2-dipole antenna of one stage and 4 faces shall be mounted on a 30-meter selfsupporting steel tower. This transmitting station shall be designed to start operation by receiving the programme signal from Mt. Pidurutalagala Transmitting Station and stop operation when the programme signal is no more received. For monitoring this transmitting station, equipment shall be installed at Kandy Medium-Wave Transmitting Station to allow for monitoring through a telephone line.

City power of 230V, 50Hz, single phase, 5KVA shall be supplied to the transmitting station. In consideration of supply voltage variation, an automatic voltage regulater of 3KVA shall be provided and power to respective equipment shall be fed through a distribution board.
One engine generator (3KVA) shall be provided to assure power supply in case the city power fails.

2-5 MADUKANDA REPEATER STATION

The programme signal dropped from Indo-Sri Lanka Microwave System shall be received at Madukanda Repeater Station and relayed to Kokavil Transmitting Station. Madukanda Repeater Station is designed to receive also the programme signal from Mt. Pidurutalagala Transmitting Station by an off-air receiving system. After the commencement of TV programme transmission by Indo-Sri Lanka Microwave System, the off-air receiving system shall be operated as a spare link.

The off-air receiving equipment shall be designed to start operation by receiving the programme signal from Mt. Pidurutalagala Transmitting Station and stop operation when the programme signal is no more received. For receiving the programme signal, space diversity reception using 2 sets of 12-element Yagi antennas (each 2 stacks) shall be introduced. For sending the programme signal to Kokavil Transmitting Station, a 7GHz microwave link shall be provided. The parabolic antenna to be used for the transmitting antenna shall be located at a height of 40 meters from the ground.

City power of 230V, 50Hz, single phase, 5KVA shall be supplied to the transmitting station. In consideration of supply voltage variation, an automatic voltage regulator of 3KVA shall be provided and power to respective equipment shall be fed through a distribution board.
One engine generator (3KVA) shall be provided to assure power supply in case the city power fails.

SECTION 3

OUTLINE OF DETAILED DESIGN OF BUILDINGS AND TOWERS

SECTION 3

OUTLINE OF DETAILED DESIGN OF BUILDINGS AND TOWERS

3-1 COLOMBO STUDIO CENTER

3-1-1 Site

Location: Torrington Square, Colombo 7.

The site provided for the Studio Center is located in front of the existing S.L.B.C. and is estimated to have a total area of about 31,000m^2. Of this site area, about 14,000m^2 is to be used for the Studio Center.

This portion of the site faces roads on the east and south sides and is used mostly for a hockey ground at present.

The road running between this site and S.L.B.C. is expected to be expanded to have a double width in future.

The ground surface is about 1.8 meters lower than the road on the east. At present, there are a clubhouse and other related facilities in this portion of the site. These existing facilities in this portion of the site are expected to be removed by Sri Lanka side prior to the commmencement of the work of this project, and it is necessary to start the expansion of the road on the east side at an early time in compliance with the construction work of the project.

Note: The shape and the circumstances of the site are based on the survey drawing "Proposed Allocation for S.L.B.C." obtained from S.L.B.C.

3-1-2 Allocation

In determining the allocation of the Studio Center building in the site, consideration has been given to the following points.

(1) To assure convenience for access of visitors, employees, and vehicles from the road on the east side and ease of carrying in and out equipment and materials, scenery and props, etc, from and to the road on the south side.

(2) To let the entrance of the Studio Center building confront that of the existing radio station building for shorting the traffic lines of those concerned between the Studio Center and existing radio station building.

(3) To provide passages around the building in the site and provide as much parking space including the space under the office rooms as possible. The entrance of the building shall be reached through a ramp from the road on the east side.

(4) To leave a space on the north side of the Studio Center building for providing sufficient space and advisable shape upon future expansion of studios and related rooms, office rooms, etc.

Refer to Fig. 3-1 for the allocation of the Studio Center building.

3-1-3 Floor Plan

The following fundamental requirements have been set out for the design of the Studio Center building.

(1) The building shall have such a scale in the first phase of starting television broadcasting that shall provide mainly basic facilities necessary for programme production and transmission.

(2) Two TV studios and one dubbing studio shall be provided in consideration of the broadcasting hours and the contents of programmes to be broadcast in the first phase.

(3) By utilizing the situation of the Studio Center being located near the existing radio station building, facilities that

can be made common to the existing radio station and TV Studio Center shall be adopted as much as possible while avoiding duplication.

(4) Such floor planning shall be made that can cope with the future expansion of studios and related rooms, office rooms, etc.

In construction, the building shall consist roughly of a studio block and an office room block, which shall be connected to each other at the entrance. Two TV studios shall be provided: one with a floor area of about 200m^2 and the other with a floor area of about 100m^2. One dubbing studio shall also be provided. Of the two TV studios, the former shall be designed for the production of medium-scale programmes such as drama, music, household, and audience participation programmes and the latter for the production of extra-long news and report shows.

In order to reduce the influence of noise from outside (such as of traffic on the roads) to the studios, the studio shall be surrounded with the office room block on the south side and with the master control room, maintenance room, etc., on the east side.

A subcontrol room, one or two stores, and a sound lock room shall attach to each studio. The master control room, performers' rooms, and scenery/props room, shall be arranged organically around these rooms.

The studio block shall also incorporate a radio relay equipment room, power room, and building equipment room. A steel tower shall be constructed on the roof of the studio block.

The office room block shall comprise office rooms for personnel such as engineers for programme production and transmission and producers for programme production, a library, and a

conference room. The space under the office room block shall be used as a parking space. The total floor area of the building shall be about 3,150m^2 (excluding air duct space). The rooms to be accommodated in the Studio Center building are given in the following table. The garage for the TV OB van shall be provided separately.

Rooms to Be Accommodated in The Studio Center

	Room		Floor Area (m^2)	Remarks
Studio Block	TV Studio 1		216	For producing drama, music, household, and audience participation programmes. To be furnished with grid pipes, fixed cyclorama, lower pit for cyclorama, and water supply and drainage pit. Ceiling height: 9m
	Subcontrol room	1	57	For sound, video, and light switching and adjustment. To be provided with floor wiring ducts.
	Lighting control rack room		9	
	Store	1	36	For storage of cameras and lighting fixtures
		2	27	For storage of musical instruments.
	Sound lock room	1	12.5	To be provided at entrance of studio for sound insulation.
	Sound lock area	1	9	To be provided at entrance of studio for sound insulation.

(Continued)

	Room	Floor Area (m^2)	Remarks
Studio Block	TV Studio 2	144	For producing extra-long news and report shows. To be furnished with grid pipes and fixed cycloramas. Ceiling height: 6.5m
	Subcontrol room 2	57	For sound, video, and light switching and adjustment. To be provided with floor wiring ducts.
	Store 3	24	For storage of cameras and lighting fixtures.
	Sound lock room 2	12.5	
	Sound lock area 2	9	
	Dubbing studio	30	For dubbing films and tapes. Interior is to be of floating structure.
	Subcontrol room 3	36	To be provided with floor wiring ducts.
	Master control room	171	For switching programmes sent from respective studios and relay spots to be sent to the transmitting station as scheduled. To accommodate telecine, VTR, etc. Floor wiring ducts are to be provided.

(Continued)

	Room		Floor Area (m^2)	Remarks
Studio Block	Maintenance room		57	For repair and adjustment of broadcasting equipment and maintenance and storage of relay equipment.
	Film and tape store		48	Including film preview space.
	Equipment store	4	24	For storage of equipment, component parts and spares.
	Radio relay equipment room		24	To be provided in the first floor.
	Rehearsal room		81.15	
	Make-up room	1	28	To be provided with dressing tables, washbasins, lockers, dressing and shower rooms.
		2	28	To be provided with dressing tables, washbasins, lockers, dressing and shower rooms.
	Performers' waiting room		21	For performers' meeting and resting.
	Dress room		9.75	
	Scenery/props room		207.25	For storage, manufacture, and repair of scenery and props. To be furnished with scene-docks, racks, a work bench, and a sink.

(Continued)

	Room		Floor Area (m^2)	Remarks
Studio Block	Props store	5	15	
	Rest room for Property men	3	8.75	
	Power room		108	To accommodate power receiving and distribution equipment and engine generator, etc. Floor wiring ducts are to be laid.
	Building equipment room		162	For accommodating water chilling units, pumps, and airconditioning equipment. To be provided with equipment foundation.
	Rest room for maintenance personnel	2	9	
	Store	7	9	
	Exhaust fan room		36	For sending out exhaust air of studio. To be provided on the second floor.
	Air handling unit room		36	To be provided on the first floor.
	Workshop	1	108	
		2	57	
	Rest room for workers	1	7.5	

(Continued)

	Room	Floor Area (m^2)	Remarks
Studio Block	Store 6	7.5	
	Receptionist office	18.5	
	Telephone exchanger room	8.75	
	Battery room for the above	8.75	
	Kettle room	7	To be provided with sink table
	Toilet	36	To be divided into two rooms: one for men and one for women
	Corridor 1 and others	160.1	Observation windows are to be provided between corridor and master control room and subcontrol rooms for visitors. (Air duct space is not included in the floor area.)
Office Room Block	Office room 1	279	For personnel to be engaged in programme production.
	2	186	For engineers to be engaged in programme production and transmission.
	Conferernce room	108	Separable into two rooms by means of sliding door.
	Library	83.375	For storage and perusal of photographs, books, music scores, scripts, newpaper clippings and other references.

(Continued)

Room		Floor Area (m^2)	Remarks
Office Room Block	Toilet	46.5	To be divided into two rooms: one for men and one for women.
	Corridor 2 and others	99.625	
	Entrance lobby	198	To be furnished with a reception desk.

Note 1: Figures in "Room" columns are those given in the relevant floor plan (Figs. 3-2 and 3-3).

Note 2: Floor areas are obtained on the basis of lengths between column centers.

3-1-4 Structure

(1) Scale of structure

Floor planning has been made for the studio block, office room block, and entrance lobby portion.

The studio block shall be one-storied except studio portions which shall be two-storied or three-storied. The office room block shall be two-storied and the entrance lobby portion shall be one storied. The studio block shall be made from reinfoced concrete with rigid frames.

In order to assure insulation against vibration sound to the studios, expansion joints shall be provided between Studio 2 and scenery/props room and between the rehearsal and scenery/props rooms.

On the roof of Studio 1 a selfsupporting steel tower of 35 meters shall be erected. Reinforced concrete bearing walls

shall be employed for the walls surrounding Studios 1 and 2 from the standpoints of structural strength and acoustics. Other walls of the building shall mostly be made of brick.

Strip footing shall be employed for the section of Studios 1 and 2, mat foundation for the underground water tank section, and individual footings for most of other parts of the building. All these footing and foundations shall be made of reinforced concrete.

Floor and roof slabs shall be made of reinforced concrete. On roof slabs wooden roof trusses are provided, on which corrugated asbestos sheets and roofing tiles shall be laid.

The garage, which shall be built separetely from the Studio Center building, shall be one-storied and built with rigid frames. The frames, foundations, floor slabs, and roof slabs of the garage shall be made of reinforced concrete and the walls shall be made of brick.

(2) Structural design

Structural analysis and structural design have been made on the basis of the Japanese Building Standard Law and Regulations and the structural design standards set out by the Architectural Institute of Japan with reference to the British Standards.

Structural design for wind load has been made by adopting the maximum instantaneous wind velocity of 54.0m/sec or 121 miles/hour. The live load for design has been determined in consideration of the Japanese Building Standard Law, the load standards formulated by the Architectural Institute of Japan and the British Standards. The live loads of the special-purpose rooms (such as studios and master control and subcontrol rooms) has been determined in consideration of standard values adopted by NHK through calculation of the weights of equipment and

facilities accommodated in these rooms. The allowable soil bearing capacity has been designed by adopting the value of 10 tons/m^2. Structural strength against seismic force has not been considered.

(3) Materials to be employed for structural materials and construction methods

Structural materials shall be selected in consideration of the importance of the building and facilities, and those methods of construction established in Sri Lanka shall be adopted.

For reinforcing bars, products in compliance with the Japanese Industrial Standards (JIS) shall be imported for use at the site.

Cement, sand, crushed stone, and brick to be used shall be those produced in Sri Lanka.

3-1-5 Finish

For finishing materials, those available in Sri Lanka and convenient for maintenance shall be employed so far as there is no hindrance for the purposes and functions of the building. For the methods of finish, those estabilished in the country shall be employed as much as possible.

In more concrete, the building shall be roofed with corrugated asbestos sheets and roofing tiles on wooden roof trusses to be layed on reinforced concrete roof slabs.

External walls shall be finished with cement mortar. Internal walls and ceilings of general rooms such as office rooms shall be finished with paint on cement mortar surface. Boarding on suspended ceiling shall also be employed partially. The floor shall be faced with PVC tiles or so. Fittings, both internal and external, shall be mostly made of wood except large doors.

Sound absorbing materials and sound insulation materials shall be employed at necessary places for the acoustic treatment of the studios and control rooms and for protection against noise from building equipment and facilities as required. For soundproof fittings, metal fittings shall be employed. Equipment rooms such as the master control and subcontrol rooms shall be provided with floor ducts for wiring between equipment.

3-1-6 Acoustics

(1) Overall planning

The site of the Studio Center is located in comparatively quiet environment and only small automobiles' noise may be considered for the noise source. Since the studios are designed to be surrounded by the office block and control rooms and not to face the road directly, the influence of external noise is considered very small.

For the indoor noise and vibration sources of the Studio Center, building equipment may be considered.
Although the building equipment room is planned not to adjoin any studio directly, it shall be located comparatively near the studios but through the scenery/props room for reducing noise and vibration.

The floor dimensions of the TV studios and dubbing studio have been determined from the design requirements of necessary floor areas and the heights of these studios have been determined from operational requirements such as the picture effects of scenes to be televised. From the standpoint of dimensional ratio, the studios involve no problem at all except that Studio 2 is nearly square in form. However, a desirable studio acoustic performance shall be obtainable by proper selection or arrangement of interior finishing materials.

(2) Design against noise and vibration

1) Permissible noise level

Design objectives against airconditioning noise are as follows.

TV Studios	NC-20
Dubbing studio	NC-15
Subcontrol room	NC-25
Master control room	NC-30
Rehearsal room	NC-25

The dubbing studio shall have a minimal noise level in consideration of use for speech.

Unstationary noise other than airconditioning noise, shall be limited to unobtrusive levels in consideration of masking effect on the assumption that there shall be the amount of noise mentioned above.

2) TV Studios 1 and 2

a) Studio walls shall be made of reinforced concrete (150mm in thickness) and extensive external walls shall be double walls containing brick walls inside.

b) In order to prevent sound which may be transmitted through solid bodies from the equipment room and scenery/props room, expansion joints shall be employed between Studio 2 and the scenery/props room and a simplified floating floor construction using high-density glass wool layer shall be employed for the studio floors.

c) A sound lock area shall be provided between each studio and the scenery/props room for the purpose of sound lock and its walls and ceiling shall be of sound absorbing type. A type C soundproof door

(TL value: approx. 35dB at 500Hz) shall be employed on the studio side.

d) A sound lock room which shall be also effective for the subcontrol room, shall be provided between each studio and the corridor and the sound lock room shall be constructed to absorb sound sufficiently. A type C soundproof door shall be provided on the studio side and a type D soundproof door (TL value: approx. 25dB at 500Hz) on the corridor side.

e) A soundproof type observation window shall be provided between each studio and subcontrol room.

f) The necessary amount of sound absorbent devices shall be provided in the airconditiner room, in the duct space, and above the ceilings of the studios separately as will be necessary so that the airconditioning noise (NC) shall fall below NC-20.

3) Dubbing studio

a) In construction, the dubbing studio shall employ floating construction so that the sound of foot steps on the corridor and other sounds transmitted through solid bodies should not enter into the studio. Boxes made of sound insulating gypsum boards shall be suspended floated through rubber springs in the building structure made of brick.

b) A soundproof observation window and a type A soundproof door (TL value: approx. 50dB at 500Hz) shall be provided between the dubbing studio and subcontrol room.

c) A soundproof observation window shall be provided between the dubbing studio and master control room.

d) As many sound absorbent devices shall be provided in the building equipment room, in the duct space, and

above the studio ceiling separetely as will be required for the airconditioning noise to fall below NC-15.

e) Soundproof construction and vibration proof construction shall also be considered for respective building sections in consideration of unstationary significant noise.

4) Subcontrol rooms

a) In order to prevent external noise from entering into each subcontrol room, a sound absorbing sound lock room shall be provided in front of the entrance and a type C soundproof door shall be employed for the entrance door.

b) As many sound absorbent devices as will be required shall be provided so that the airconditioning noise shall fall below NC-25.

5) Master control room

a) A type D soundproof door shall be employed for the entrance door.

b) As many sound absorbing equipment as will be required shall be provided so that the airconditioning noise shall fall below NC-30.

6) Scenery/props room

By employing expansion joint between Studio 2 and rehearsal room, sound insulation shallbe effected against vibration sound. For sound insulation between Studio 2 and scenery/ props room, a double wall made of brick shall be employed.

7) Rehearsal room

Although no large sound or vibration will be produced in the rehearsal room while Studio 1 is used, the

rehearsal room shall employ a simplified floating construction in which ground floor slab shall be insulated from the walls and foundation.

8) Building equipment room

Equipment having reciprocating or rotatory mechanisms, such as refrigerator, pumps, and airconditioners, shall be installed vibration proofed. Vibration proofing shall also be considered for pipes and airconditioning ducts. For the entrance door, sound insulation shall be considered to some extent.

9) Power room

Transformer and generator shall be installed vibration proofed (upon installation of broadcasting equipment and facilities). For the admission/exhaust air chamber of the engine generator, measures shall be taken so that the noise caused by the generator on the outdoor site border line shall become less than 50 phons.

(3) Room acoustic design

1) Design objectives

Studios 1 and 2 and the dubbing studio shall be designed so that their average sound absorption coefficient at 500Hz shall become 0.45 ∿ 0.50.

2) TV Studios 1 and 2

a) The interior dimensions of Studio 1 shall roughly be 17.2m x 11.4m x 9.0m (height) and those of Studio 2 11.4m x 11.4m x 6.5m (height).

b) These studios shall be constructed into regular forms on the premise that acoustically these studios should be designed to be comparatively sound absorbing and to meet the requirements for television broadcasting.

c) By the adoption of regular shape for the studio, flutter echo may be caused between the cyclorama and observation window glass, so that the window glass shall be inclined not to be parallel to the cyclorama.

d) Plywood cyclorama shall be employed for absorbing low tones and the walls and ceiling shall be finished by using materials which absorb medium and high tones.

e) For the average sound absorption coefficient of 0.45∿0.50, the reverberation time of Studio 1 shall be approx. 0.55 seconds and that of Studio 2 approx. 0.40 seconds.

3) Dubbing studio

a) The interrior dimensions of the dubbing studio shall be roughly 5.0m x 4.0m x 2.8m (height).

b) The dubbing studio shall be of irregular form in consideration of use for speech.

c) Some portions of the wall shall be finished with low frequency absorbing materials and others with medium and high frequency absorbing materials.
The ceiling shall be finished with materials intended for absorbing all frequencies of sound.

d) The average sound absorption coefficient of the dubbing studio shall be approx. 0.35 and the reverberation time approx. 0.22 seconds.

4) Subcontrol rooms

Being monitor rooms, the subcontrol rooms shall be designed to absorb sound to some extent in consideration of their acoustic characteristics.

5) Master control room

The master control room shall be designed to absorb sound to some extent in consideration of its interior acoustic characteristics.

6) Scenery/props room

While a TV studio is in-service, no such operations that may produce sound shall be performed in the scenery/ props room. In consideration of the effect of sound lock, the scenery/props room shall be designed to absorb sound to some extent.

7) Rehearsal room

In consideration of acoustic characteristics, the rehearsal room shall be designed to absorb sound to some extent.

8) Building equipment room and power room

These rooms, which have sound sources, shall be designed. to absorb sound as much as possible.

3-1-7 Building Equipment

(1) Airconditioning and Ventilating Facilities

1) Features of studios

The features of studios are given below. These features are very important for designing airconditioning facilities.

a) Some studios may be used in some hours while others may not be used in those hours.

b) In studios and broadcasting equipment room, much heat is generated by lighting and broadcasting equipment and the amount of heat in these rooms may vary with time.

c) It is necessary to prevent noise and vibration caused

outside or by airconditioning equipment from entering into studios.

d) Many rooms are closed up inside the building and long-time suspension of airconditioning if encountered in these rooms may result in a serious hindrance to the continuation of broadcasting service.

2) Temperature and humidty conditions for airconditioning design

	Dry-bulb temperature	Relative humidity
Outdoor	33°C	70%
Indoor	26°C	55%

3) Heat source system

In consideration of the feature of item 1) above, cooling with a heat storage tank which stores chilled water from water chilling units shall be employed. This cooling system with a heat storage tank provides the following advantages.

a) Water chilling unit operation can be continued at full load, assuring high efficiency and reduced power costs.

b) High adaptability of cooling operation is available against load which may vary heavily in both time and capacity.

c) Cooling operation at light load also is facilitated.

d) Cooling operation can be continued for a considerable period of time in the event of emergency such as failure in the cooling or heating sourse equipment.

e) The capacity of the water chilling unit can be reduced.

For cooling source equipment, two sets of water-to-water type motor driven reciprocating water chilling units shall be employed.

4) Airconditioning and ventilation system

a) The following rooms in respective systems shall be airconditioned.

No.1 System	TV Studio 1 and its subcontrol room
No.2 System	TV Studio 2 and its subcontrol room
No.3 System	Master control room, dubbing studio, and related subcontrol room
No.4 System	Maintenance room and radio relay equipment room
No.5 System	Rehearsal room, make up room and performer's waiting room

b) The film and tape store shall be dehumidified.

c) The following rooms shall be ventilated by ceiling fans: office rooms, library, conference room, entrance lobby, workshop 1, etc.

d) The following rooms shall be ventilated by ventilation fans: power room, building equipment room, scenery/props room, workshop 2, stores, kettle room, toilets, battery room, etc.

(2) Plumbing facilities

1) Water supply facilities

City water from the main city water pipe shall be stored in a water tank, then pumped up to an elevated water tank on the roof, and distributed to respective points by gravity.

2) Hot-water supply facilities

Hot water shall be produced by a storage type hot water gas boiler and supplied to the respective make-up and shower rooms. Gas cock and electric power receptacles shall be provided in the kettle room for drinking water.

3) Fire extinguishing facilities

A fire pump shall be provided to use the heat storage tank as the water source and indoor fire hydrants shall be provided at proper locations. The fire pump shall start operation by depressing the pushbutton in a fire hydrant box.

4) Sanitary fixtures

Sanitary fixtures meeting requirements shall be provided in toile make-up rooms, kettle room, and other locations wherever necessary.
Flush valve method shall be employed for flushing of closet bowls and urinals.

5) Drainage facilities

Sewage, waste water, and rain water from the building shall be led down by natural flow to terminal trap basins and then to a public sewer. Connection work with the sewer shall be conducted by Sri Lanka.

(3) Electric facilities

1) Main power line facilities

Wiring from terminals on the secondary side of the power board in the power room to respective distribution boards for distributing power to lighting and broadcasting equipment and power control boards shall be made by using ladders for high power use, ducts, and pipes. Power lead-in works shall be performed by Sri Lanka. The receiving power voltage will be 400/230V, 3 phases, 4 wires. (Power facilities in the power room, such as power receiving and distribution board, shall be provided in the installation of broadcasting equipment.)

2) Power facilities

Wiring and piping shall be made from terminals on the secondary side of the power control board in the building equipment room to respective loads. Motors shall be started manually, and monitored in the building equipment room. Start/stop of water chilling units shall be controlled automatically.

3) Lighting fixtures and receptacle facilities

Piping and wiring from the branch circuits on the secondary side of the power distribution boards for lighting fixtures to lighting and wiring fixtures and the supply and installation of lighting and wiring fixtures shall be accomplished (excluding studio lighting fixtures for TV broadcasting). Battery-operated lamps and maintenance lamps shall be provided at necessary locations. Most lighting fixtures employ fluorescent lamps and the standard illuminations of the major rooms are roughly as follows.

Office rooms:	300 lx
Studio and subcontrol and master control rooms:	400 lx
Corridors and stores:	200 lx

4) Piping for low power use (for telephone, television sets, interphone and clocks)

Piping shall be made to respective terminal boards by using ladders for low power use and pipes. Piping shall also be made from terminal boards to respective receptacles. (Equipment and accessories shall be provided by the installation of broadcasting equipment and facilities. The wiring of clock facilities only shall be included in this work and other wiring works shall be included in the installation of broadcasting equipment.)
Telephone line lead-in works shall be accomplished by Sri Lanka.

5) Earthing work

Earthing shall be provided for high power use, low power use, broadcasting equipment use, and lightning use, respectively. Driven-in earthing rods connected with each other shall be employed for earthing.

6) Piping, and mounting of panels and boards for broadcasting equipment use

Necessary pipes and ducts for broadcasting equipment shall be provided in Studio 1 and related subcontrol room, Studio 2 and related subcontrol room, dubbing studio and related subcontrol room, and master control room.

Boxes, panels, and boards for broadcasting use shall be provided in the respective studios.

7) Fire alarm facilities

Indoor fire hydrant boxes each furnished with a pushbutton, a bell, and a lamp shall be provided. Sensors shall also be provided at many places so as to surely detect fire if encountered. An alarm receiving panel shall be provided in the receptionist's office.

3-1-8 Steel Tower

(1) Construction and scale

A selfsupporting square steel tower of 35 meters shall be erected on the roof of Studio 1 (at a height of 50 meters from the ground). This tower, having a circular platform at the top, shall mount a parabolic antenna for FPU and allow the antenna for the base station to be mounted atop the tower. At intermediate stages of the tower a 4mϕ parabolic antenna and a 1.8mϕ parabolic antenna shall be

mounted for microwave links. This steel tower shall be furnished with aviation obstruction lights, vertical feeder racks, and a ladder for maintenance use.

(2) Structural design

Structural analysis and design has been carried out in conformity with the Japanese Building Standard Laws and Related Regulations and various standards set out by the Architectural Institute of Japan.

Structural design for wind pressure has been made on the basis of the maximum instantaneous wind speed of 54.0 m/sec or 121 miles/hour.

For the weight of loads on the tower, such as antennas, and the wind receiving area of the tower, structural strength against seismic force shall not be considered.

(3) Structural materials to be employed

Steel materials for towers shall be in compliance with the Japanese Industrial Standards (JIS). The members and parts manufactured shall be imported for use at the site.

All steel tower members shall be galvanized and then finished with unti-rast paint. See Fig. 3-4 "OUTLINE OF TOWER."

3-2 TRANSMITTING AND REPEATER STATIONS

3-2-1 Mt. Pidurutalagala Transmitting Station

(1) Site

Location: Longitude 7°00'02" N, latitude 80°46'18" E

A moderately inclined grassland located on the south of the triangulation point atop Mt. Pidurutalagala (2524m above the sea level) is to be selected for the site of the transmitting station. The land shall be leveled in two stages, one for the steel tower and the other for the station building, through cut and fill. The tower shall be constructed on the upper stage and the station buliding on the lower stage. The building and tower shall be so located that the feeder from the transmitter shall go out from the wall on the north side of the building to be directed to the center of the steel tower. The site area shall be about 1450m^2. Ground leveling shall be accomplished by Sri Lanka prior to the commencement of building construction work.

Maintenance and inspection after inaugurating the operation of the building and facilities shall be performed by access through the existing path for mountain-climbers, and construction materials shall be transported by means of a ropeway to be provided temporarily for the construction work. See Fig. 3-5 "SITE PLAN."

(2) Floor Plan

The transmitting station shall be designed for use as an unattended station. In addition to the equipment rooms such as transmitter room, power room, and blower room, an office room and a night-duty room shall be provided for personnel to visit the site for routine maintenance and inspection or in the event of emergency. In consideration of severe weather conditions atop the mountain, a

supply/exhaust air chamber shall be provided for the emergency engine generator. The transmitting station building shall have a total floor area of about 290m^2 and accommodate the following rooms.

Rooms to Be Accommodated in The Transmitting Station

Room	Floor Area (m^2)	Remarks
Transmitter room	120	Some space shall be left for future expansion of equipment. Floor wiring ducts will be provided.
Power room	72	Some space shall be provided for future expansion as in the case of the transmitter room. Power receiving and distribution boards, emergency engine generator, etc., shall be accommodated. Floor wiring ducts, engine generator foundation, and supply/exhaust air chamber will be provided.
Blower room	24	Including supply air chamber.
Maintenance room	14	For maintenance, repair, adjustment of broadcasting equipment and others.
Office room	14	
Night-duty room	10	
Store	7	
Kettle room and toilet	7	To be provided with sink, table, and shelves.
Entrance and corridor	20	

Note: Floor areas are obtained on the basis of lengths between column centers.

See Fig. 3-6 "FLOOR PLAN."

(3) Construction

1) Construction and scale

In construction, the station building shall be one storied with rigid frames. The frames (columns and beams), foundation, floor slab, and roof slab shall be made of reinforced concrete and the walls of brick.
The building shall measure 12m x 24m in scale.

2) Structural design

Same as in the case of the Studio Center building except that the allowable bearing power of soil of 15 tons/m^2 has been adopted as the result of soil survey.

3) Structural materials to be employed

Same as in the case of the Studio Center building.

(4) Finish

The basic principles for the selection of materials and methods of finish are the same as those of the Studio Center building.

The roof slab shall be made of reinforced concrete, on which wooden roof trusses and corrugated asbestos sheets shall be layed. External walls shall be finished with cement mortar. For the interior, the ceiling shall be finished with cement mortar. and painted or finished with asbestos sheets on suspended ceiling and walls shall be finished with cement mortar or cement mortar and paint.

The floor shall be finished with cement mortar or PVC floor tiles.

For insulation of noise of the equipment room, cemented excelsior boards or glass wool mats shall be employed partially. Wiring ducts shall be layed on the floor.

The fittings shall be made of wood except some large doors and shutters to be made of metal. Double windows shall be employed for the outside windows in consideration of weather conditions on the mountain. Hoods and others for the supply/exhaust air, which shall be provided on the external walls of the building, shall be of special type in consideration of the weather conditions on the mountain.

(5) Building equipment

1) Ventilating facilities

Compulsory exhaust fans shall be provided for preventing temperature rise in the transmitter and power rooms. The office and night-duty rooms shall be furnished with plug sockets (receptacles) for electric heaters for heating.

2) Plumbing facilities

Drinking water shall be supplied by carrying it up by hand from the foot of the mountain. Rainwater will be employed for the cooling water of the emergency engine generator and for toilet and others, when necessary. Rainwater on the roof will be led to a reservoir through gutters and supplied by gravity. A septic tank and seepage pit shall be provided for sewage from the toilet and waste water for miscellaneous use.

3) Electric facilities

a) Lighting fixture plug socket facilities

Wiring from terminals on the secondary side of power distribution board in the power room to distribution boards for lighting fixture, piping and wiring to lighting and wiring fixtures, installation of lighting and wiring fixtures and boards, and wiring, etc., (power facilities in the power room, such as power distribution boards, shall be included in the installation of broadcasting equipment).

Power lead-in work shall be accomplished by Sri Lanka. The voltage of the receiving power shalll be 400/230V, 3 phases, 4 wires.

b) Facilities for broadcasting equipment

Pipes, ladders, and ducts shall be provided for connection between broadcasting equipment.

c) Earthing facilities

Earthing shall be provided for high-power use, broadcasting equipment use, and lightning arrester use. Net and copper plate earthing shall be employed. When required earthing resistance is not obtainable, the wiring shall be extended to a proper point on earth until the required earthing resistance can be obtained.

(6) Steel tower

1) Construction and scale

A selfsupporting square steel tower of 50 meters shall be erected on the ground which is 2519 meters above the sea level. The intervals of tower leg bases shall be 12m by 12m. The top of the tower forms an upright tower construction with a crosssection of 1.5 meters square and a length of 15 meters, on which a transmitting antenna or a 4-dipole antenna of 4 stacks and 4 panels shall be mounted.

At two intermediate positions on the tower 4mφ parabolic antennas for STL use shall be mounted. Aviation obstruction lights, vertical feeder racks, and ladders for maintenance use shall also be provided on the tower. The foundation of the tower shall be made of reinforced concrete.
Horizontal feeder racks shall be provided between the steel tower and station building.

2) Structural design

Same as in the case of the steel tower for the Studio Center except that the allowable bearing power of soil of 15 tons/m^2 has been employed as the result of soil survey.

3) Structural materials to be employed

The steel materials of the tower and horizontal feeder racks shallbe the same as those of the Studio Center steel tower. The reinforced concrete foundation shall also be the same as that of the Studio Center building.
See Fig. 3-7 "OUTLINE OF POWER."

3-2-2 Kokavil Transmitting Station

(1) Site

Location: Longitude 9°16'12" N, latitude 80°24'18" E

A site of 120m x 120m (14,400m^2) in the wood located along a path, which can be reached by going on a branch path about 100 meters to the west from near the "150" milestone alsong the highway (Route A9).

A triangulation point (64m above the sea level) is set in

the site. The path is expected to be doubled in width in future.

The steel tower shall be erected at the center of the site and the station building shall be so located as shall not come directly under any guy wire of the steel tower and shall not cover the triangulation point.
It is necessary to fell and route up trees of the wood and level the ground where the building shall be constructed, which shall all be carried out by Sri Lanka prior to the commencement of the construction of the building.
See Fig. 3-8 "SITE PLAN."

(2) Floor plan

This station shall be designed to be an attended station. The basic floor plan including the equipment room and others shall be the same as that of Mt. Pidurutalagala Station Building, although a garage shall be provided in the station building and a house for operating personnel to live in shall be built separately. The station building and house slall be connected by a connecting corridor.

This transmitting station shall have a total floor area of about 470m^2 and accommodate those rooms listed below. The facilities of this station shall be used for the on-the-job training of TV transmitting station operating personnel in the beginning of television broadcasting.

Rooms to Be Provided in Kokavil Transmitting Station

Room	Floor Area (m^2)	Remarks
Transmitter room	120	Some space shall be provided for future expansion of equipment. Foor wiring ducts shall be provided.

(Continied)

Room		Floor Area (m^2)	Remarks
Station Building	Power room	72	To accommodate power receiving and distribution equipment and engine generator. Some space shall be provided for future expansion of equipment. Floor wiring ducts, the foundation of the engine generator, and supply/exhaust air chamber shall be provided.
	Blower room	24	Including supply air chamber.
	Maintenance room	14	For maintenance, repair, and adjustment of broadcasting equipment.
	Office room	36	
	Store	19.4	To consist of 2 rooms.
	Garage	24	
	Kettle room	4.2	To be furnished with sinks, tables, and shelves.
	Toilet	2.4	
	Entrance and corridor	46	
House for Operating Personnel	Dining room	45	Including corridor.
	Kitchen	12	To be furnished with sink, kitchen table, range table, and shelves.
	Attached store	6	

(Continued)

Room		Floor Area (m^2)	Remarks
House for Operating Personnel	Bedroom	18	
	Bedroom	15.75	
	Toilet and shower room	11.25	

Note: Floor areas are obtained on the basis of lengths between column centers.

See Fig. 3-9 for the floor plans of the station building and house for operating personnel.

(3) Construction

1) Construction and scale

In scale, the station building shall be nearly equal to the station building of Mt. Pidurutalagala Transmitting Station and shall be 12m x 30m in floor area.
The construction of the house for operating personnel shall be the same as that of the station building but its floor area shall measure 6m x 18m.

2) Structural design

The structural design of the station building is the same as that of the Studio Center building, except that the soil bearing power of 15 tons/m^2 has been adopted as the result of soil survey.

3) Structural materials to be employed

Same as in the case of Studio Center building.

(4) Finish

The concept of finish of this transmitting station is the same as that of Mt. Pidurutalagala Transmitting Station, except that the external windows shall not be doubled and simplified supply /exhaust air hood shall be employed since the special weather conditions on mountains need not be considered for this transmitting station.

(5) Building equipment

1) Ventilating facilities

Compulsory exhaust fans shall be provided for preventing temperature rise in the transmitter and power rooms. The office room, bedrooms, and dining room shall be provided with ceiling fans.

2) Plumbing facilities

Drinking water and cooling water for the emergency engine generator shall when necessary be transpored from a nearby water source and stored.

Rainwater shall be used as water for toilet and miscellaneous use. Rainwater on the roof shall be led through gutters to a reservoir and then supplied by gravity. In case rainwater is short supply, water shall be transported from a nearby water source for replenishment.

A septic tank and a seepage pit shall be provided for sewage and miscellaneous waste waters.

3) Electric facilities

Same as Mt. Pidurutalagala Transmitting Station.

(6) Steel tower

1) Construction and scale

The tower shall be a 100m square steel tower supported by 3-stage guy wires extended into 4 directions and shall be erected on the ground about 63.5 meters above the sea level. The guy wires shall be fixed to four reinforced concrete anchor blocks located at a distance of 70 meters from the center of the tower. The foot of the steel tower shall be supported by a spherical support layed on a reinforced concrete foundation.

The tower shall be an upright tower with a crosssection of 1.2m square which shall be able to mount the transmitting antenna or a 4-dipole antenna of 4 stacks and 4 panels at the top of the tower. Two parabolic antennas of 2mϕ for microwave link use shall be mounted at the top and above the second-stage guy wires.
Horizontal feeder racks shall be provided between the steel tower and station building.

2) Structural design

Same as in the case of the Studio Center steel tower, although the calculation of guy wires has been made by the method established by NHK. The allowable bearing power of soil is made 15 tons/m^2 as the result of soil survey.

3) Structural materials to be employed

The steel materials of the steel tower and horizontal feeder racks shall be the same as those of the Studio Center steel tower. The reinforced concrete for foundation and anchor blocks shall be the same as those of the Studio Center building.
See Fig. 3-10 "OUTLINE OF TOWER."

3-2-3 Kandy Transmitting Station

(1) Site

Location: Longitude 7°16'36" N, latitude 80°36'28" E

The proposed site of Kandy Transmitting station is located on the hill of Primrose (about 640m above the sea level) and about 35 meters east of the existing microwave repeater station. Access to the station building from the foot of the hill shall be made through steps provided for the existing repeater station but it is necessary to provide a path between the steps and transmitting building station on the hill. The provision of this path and tree felling and ground leveling in the site shall be executed by Sri Lanka. Ground leveling shall be made in two stages, one for the steel tower and the other for the station building.
The site area shall be about 750m^2.
See Fig. 3-11 "SITE PLAN."

(2) Floor plan

This station shall be designed to be an unattended station. The station building shall be 2-storied in consideration of the space of the site. The transmitter room shall be located on the first floor and power room, toilet, etc., shall be on the ground floor. The total floor area shall be about 35m^2.
See Fig. 3-12 "FLOOR PLAN."

(3) Construction

1) Construction and scale

In construction, the station building shall be 2-storied with rigid frames. Frames (columns and beams), foundations, floor slab, and roof slab shall be made of reinforced concrete and walls shall be made of brick. The floor area shall measure 4.2m x 4.2m.

2) Structural design

Same as the Studio Center building, except that the allowable bearing power of soil of 10 tons/m^2 has been adopted as the result of soil survey.

3) Structural materials to be employed

Same as the Studio Center building.

(4) Finish

Similar to the finish of Kokavil Transmitting Station

(5) Building equipment

1) Ventilating facilities

Compulsory exhaust fans shall be provided for preventing temperature rise in the transmitter and power rooms.

2) Plumbing facilities

Drinking water and cooling water for the emergency engine generator will be transported from a nearby water source when necessary.
Rainwater shall be used as water for toilet and miscellaneous use. Rainwater on the roof shall be led through gutters to a reservoir and then supplied by gravity.

A septic tank and a seepage pit shall be provided for sewage and miscellaneous waste waters.

3) Electric facilities

Same as Kokavil Transmitting Station, except that the voltage of the receiving power shall be 230V, single phase, 2 wires.

(6) Steel tower

1) Construction and scale

The steel tower shall be a 30m selfsupporting square steel tower to be erected on the ground about 638 meters above the sea level and shall have leg base intervals of 7m by 7m. The top of the tower forms an upright tower with a crosssection of 1.5m square and a length of 6m, on which the transmitting antenna or a 2-dipole antenna of one stack and 4 panels can be mounted.

At intermediate stages a Yagi antenna for receiving and other antennas shall be mounted. Aviation obstruction lights, vertical feeder racks, and a ladder for maintenance use shall be provided. The foundation shall be made of reinforced concrete. Horizontal feeder racks shall be provided between the steel tower and station building.

2) Structural design

Same as in the case of the Studio Center steel tower, except that the allowable bearing power of soil of 10 tons/m^2 is adopted as the result of soil survey.

3) Structural materials to be employed

Same as in the case of Mt. Pidurutalagala Transmitting Station steel tower.
See Fig. 3-13 "OUTLINE OF TOWER."

3-2-4 Madukanda Repeater Station

(1) Site

Location: Longitude 8°45'36" N, Latitude 80°32'40" E

The proposed site is located on a hill (about 190m above the sea level) which can be reached by following a path

branched from the highway (Route A9) in Vavuniya Town. The proposed site is next to the site of the existing microwave repeater station. The site area is about 370m^2. The steel tower of the above-mentioned microwave repeater station shallbe used also for this repeater station. Horizontal feeder racks shall be provided between the station building and steel tower.

Rocks are exposed everywhere in the proposed site and ground leveling shallbe limited to the area on which the station building shallbe constructed.
See Fig. 3-14 "SITE PLAN."

(2) Floor plan

Same as Kandy Transmitting Station.
See Fig. 3-12 " FLOOR PLAN."

(3) Construction

1) Construction and scale

Same as Kandy Transmitting Station building.

2) Structural design

Same as Studio Center building, except that the allowable bearing power of soil of 50 tons/m^2 has been adopted as the result of soil survey.

3) Structural materials to be employed

Same as in the case of the Studio Center building.

(4) Finish

Same as Kandy Transmitting Station.

(5) Building equipment

The ventilating, plumbing, and electric facilities of

this repeater station shall be the same as those of Kandy Transmitting Station.

(6) Steel tower

1) The existing P & T's steel tower shall be used.

2) Horizontal feeder racks shall be provided between the P & T's steel tower and repeater station building.

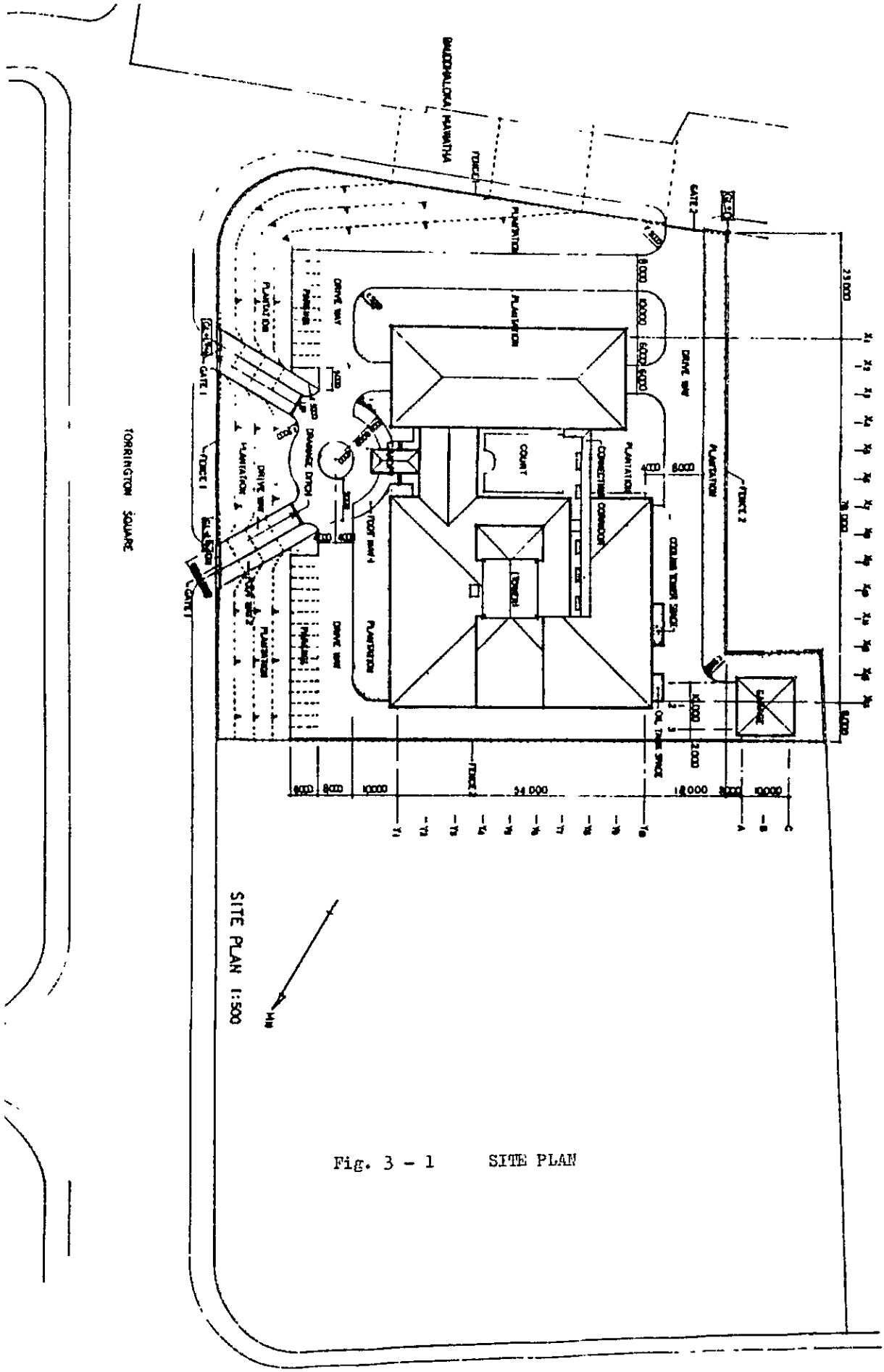


Fig. 3 - 1 SITE PLAN

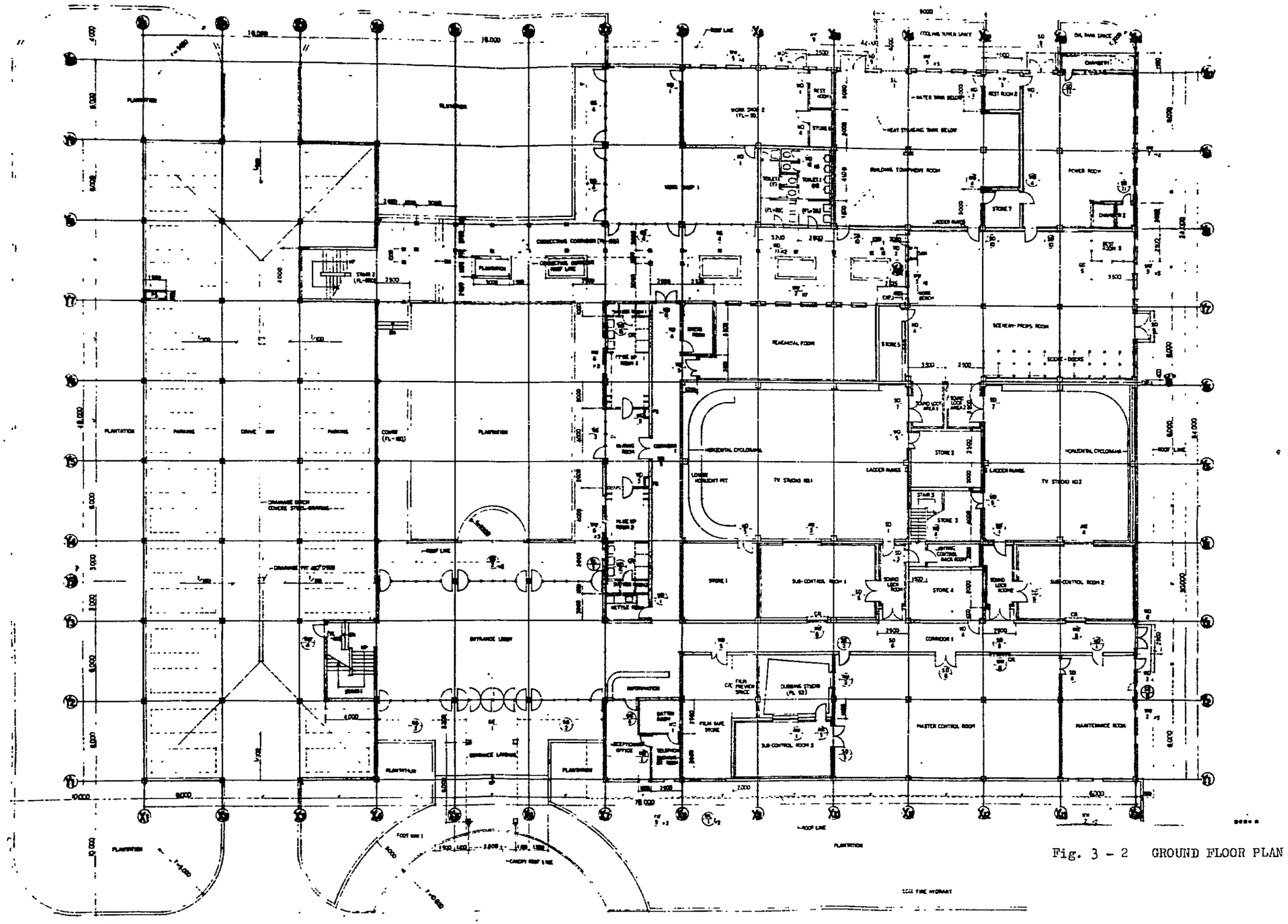


Fig. 3 - 2 GROUND FLOOR PLAN

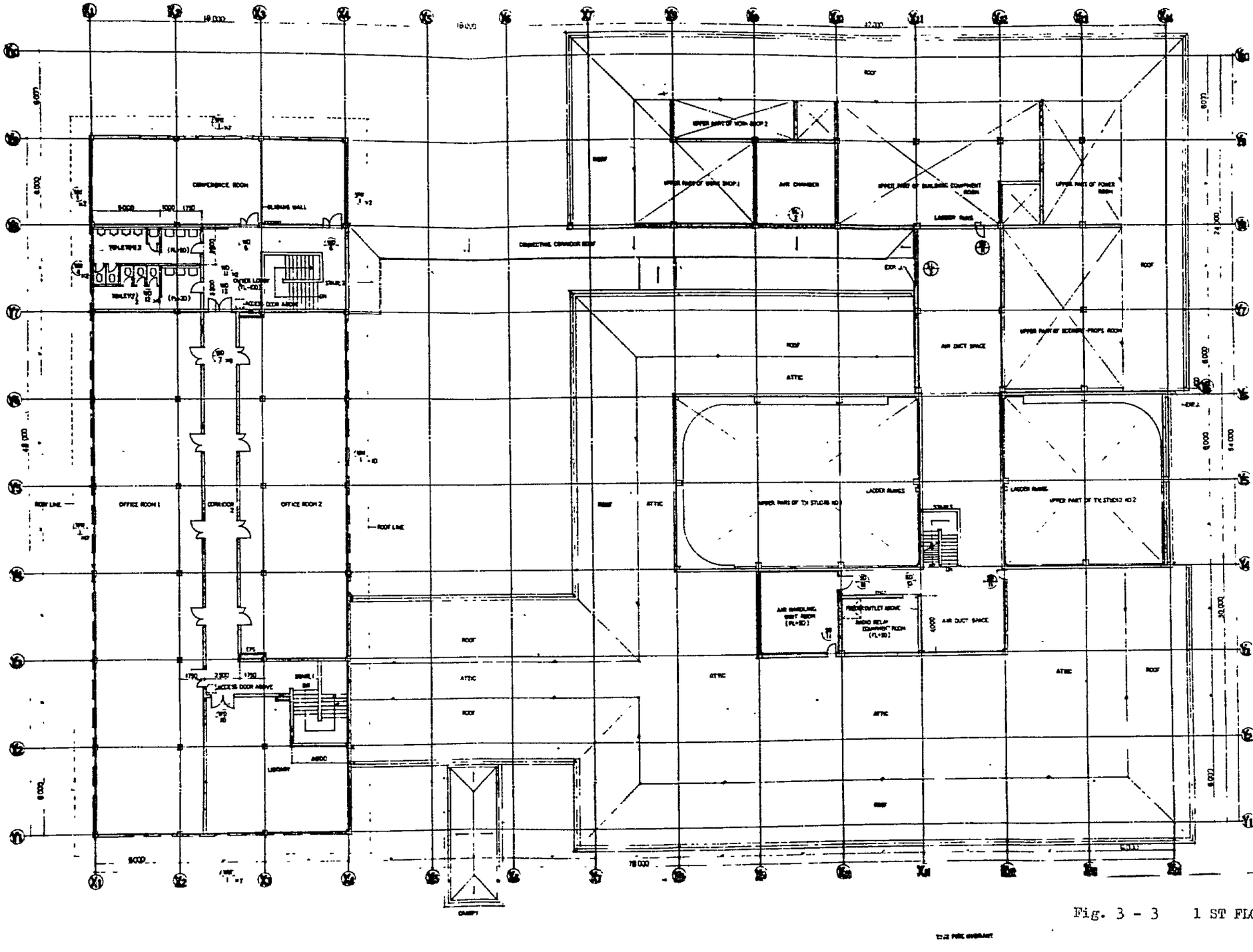


Fig. 3 - 3 1 ST FLOOR PLAN

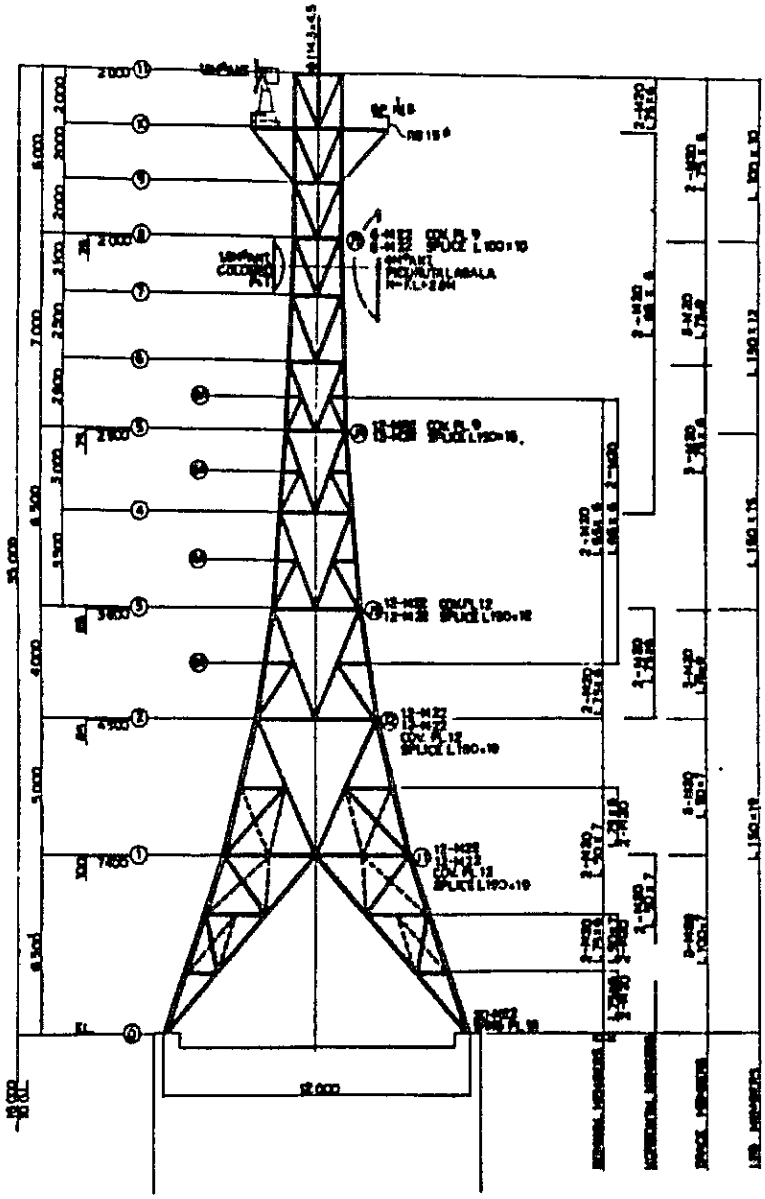


Fig. 3 - 4 OUTLINE OF TOWER

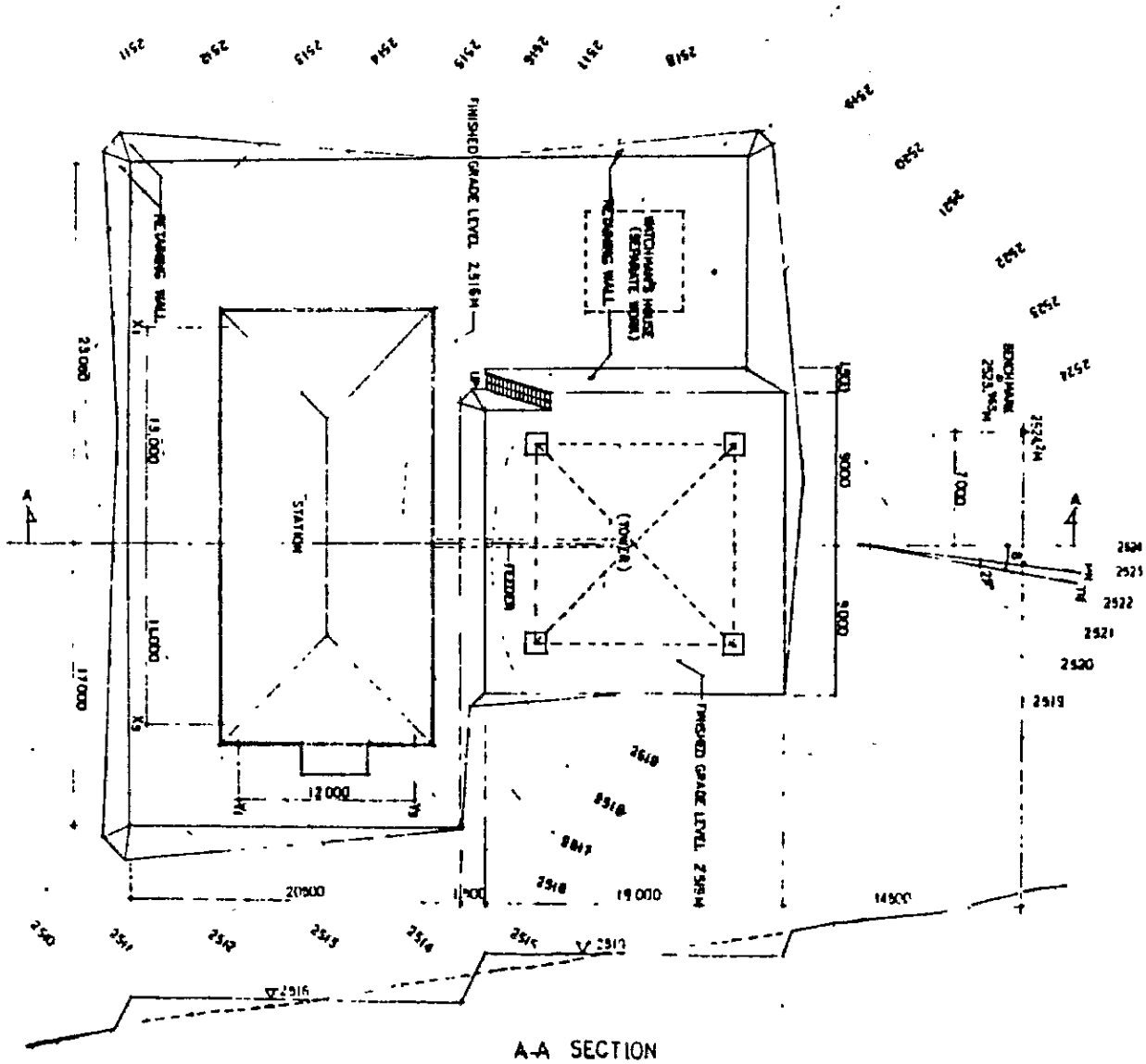


Fig. 3 - 5 SITE PLAN

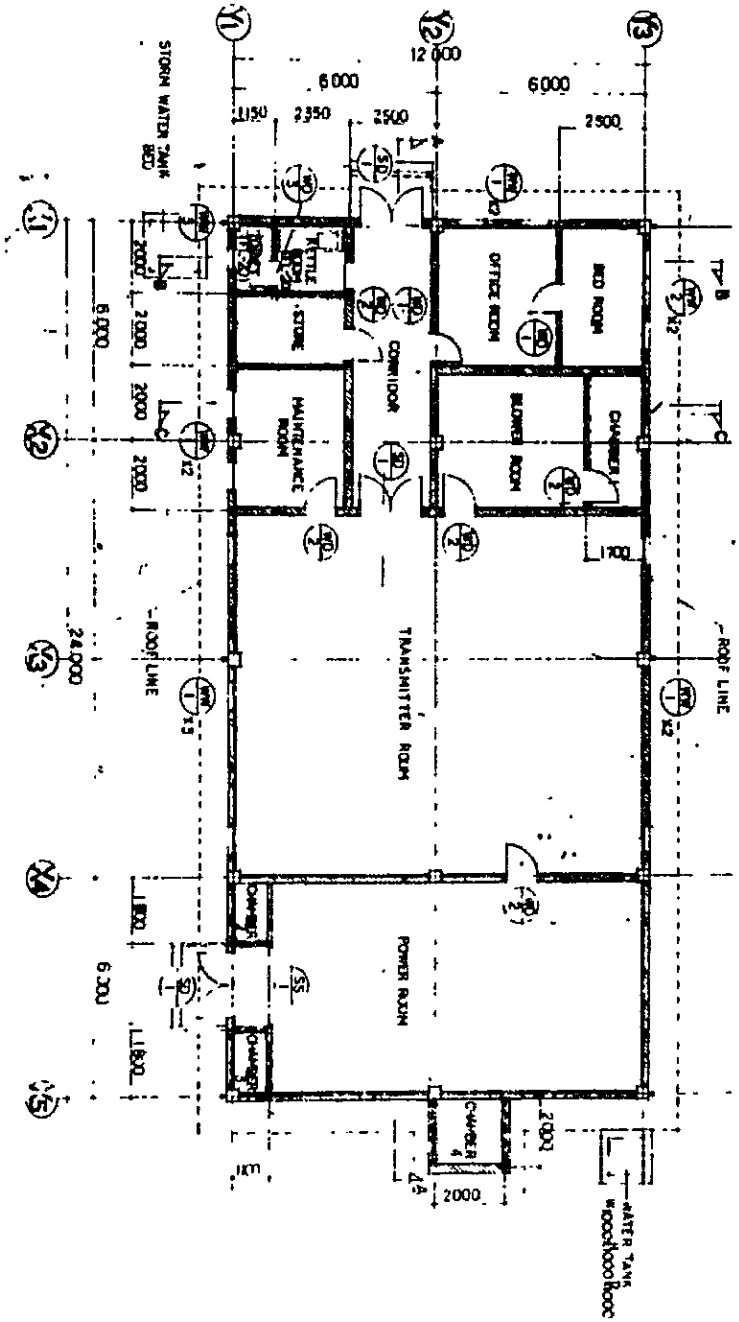


Fig. 3 - 6 FLOOR PLAN

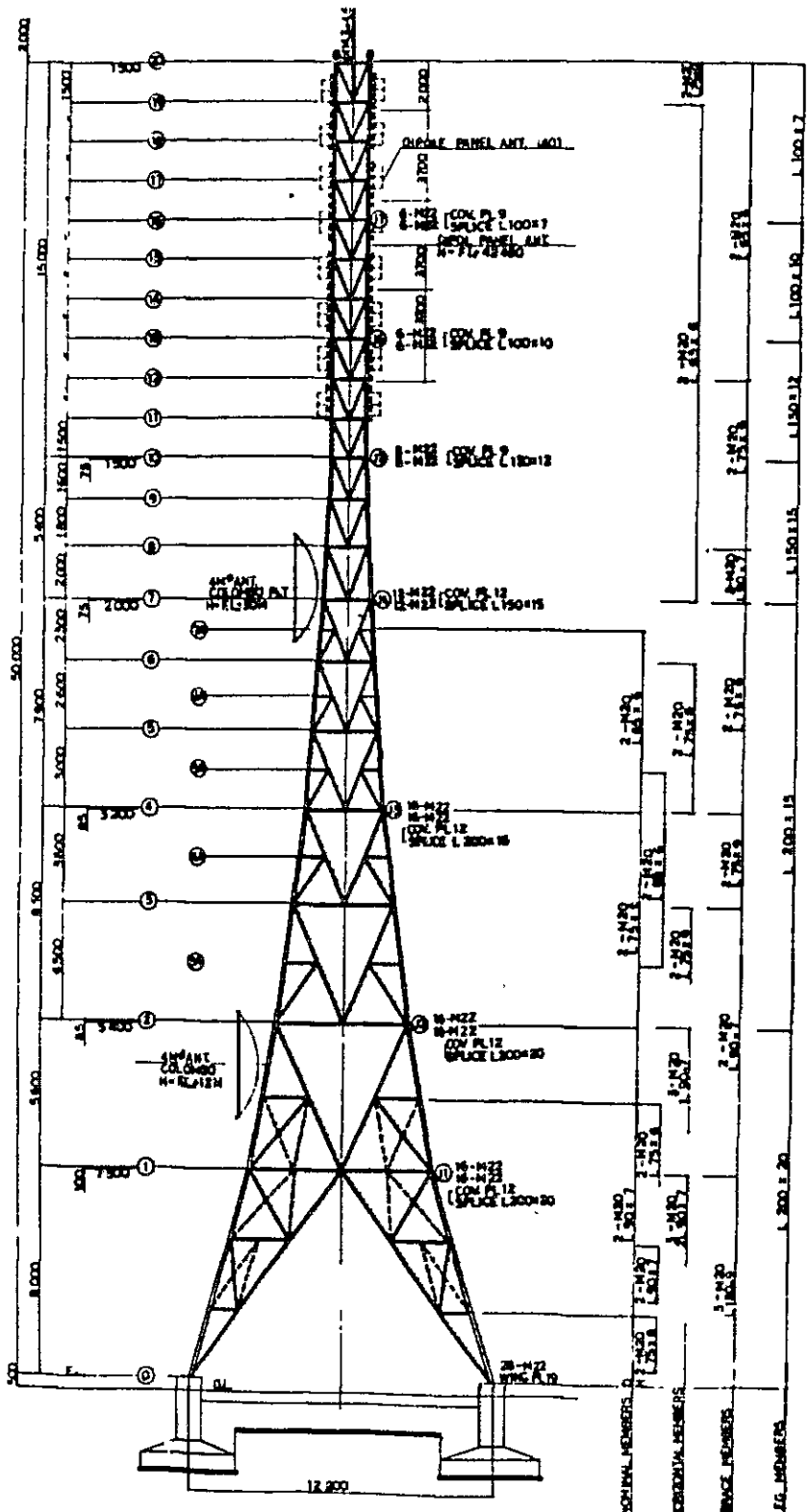


Fig. 3 - 7 OUTLINE OF TOWER

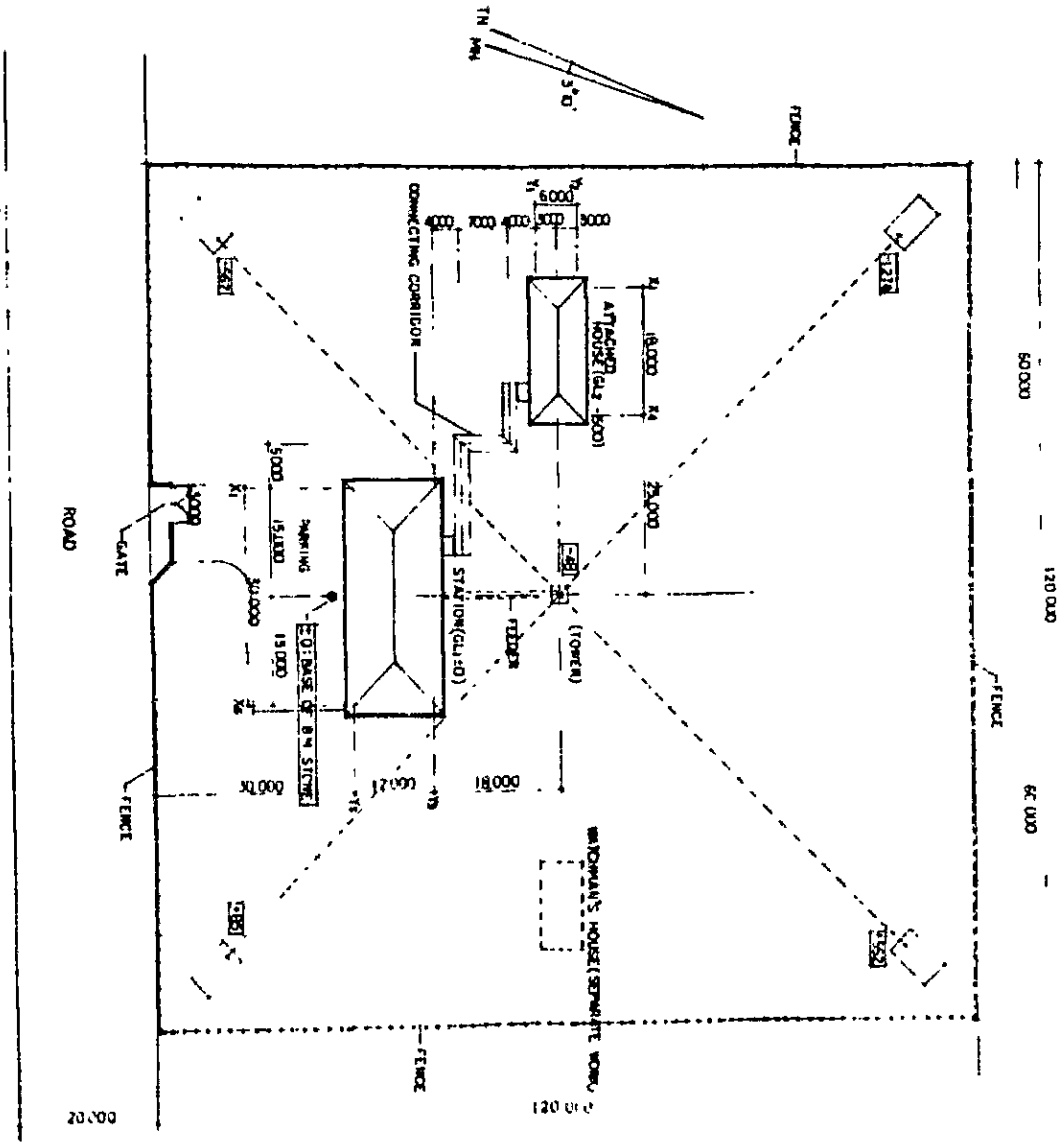


Fig. 3 - 8 SITE PLAN

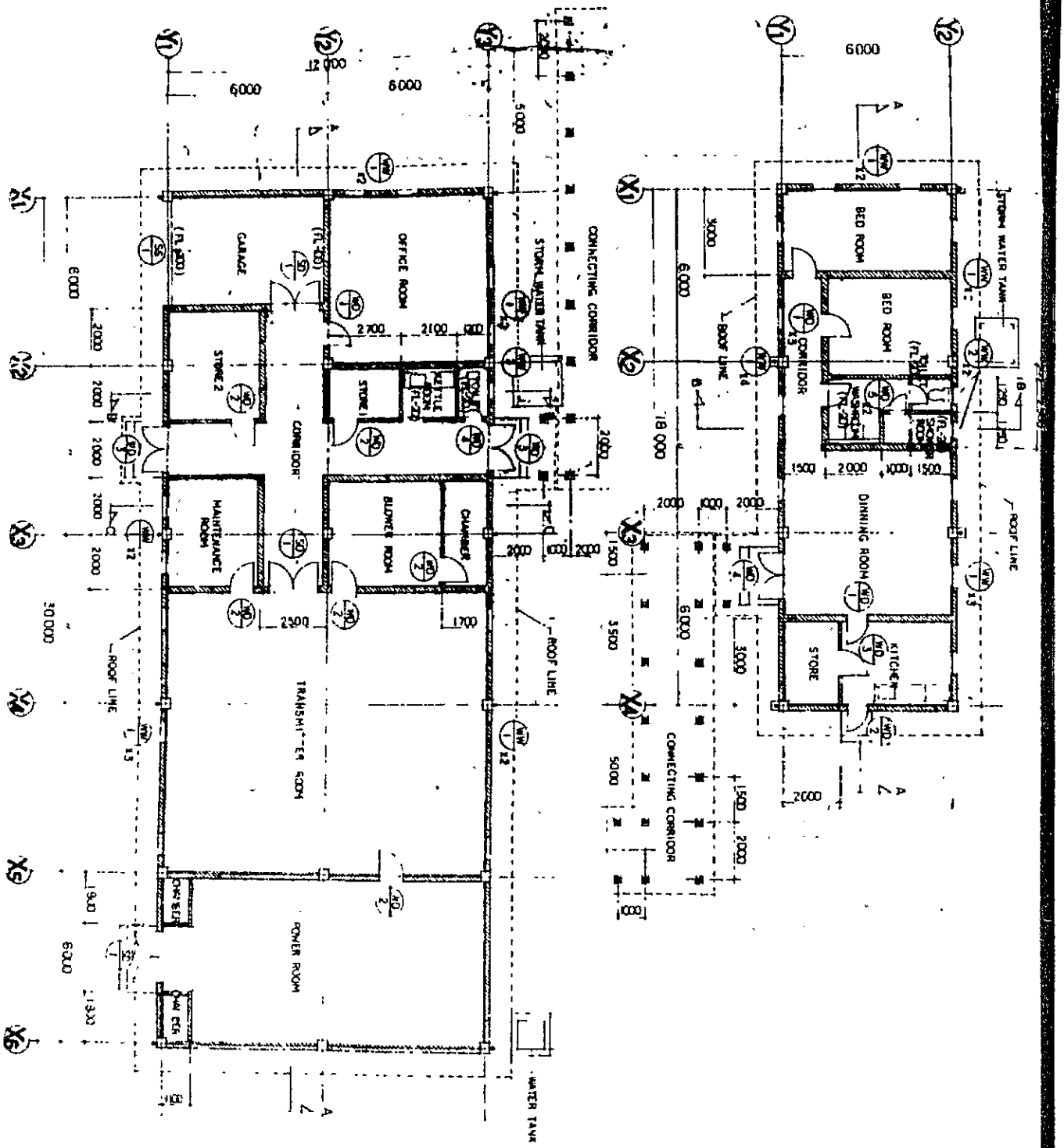


Fig. 3 - 9 FLOOR PLAN

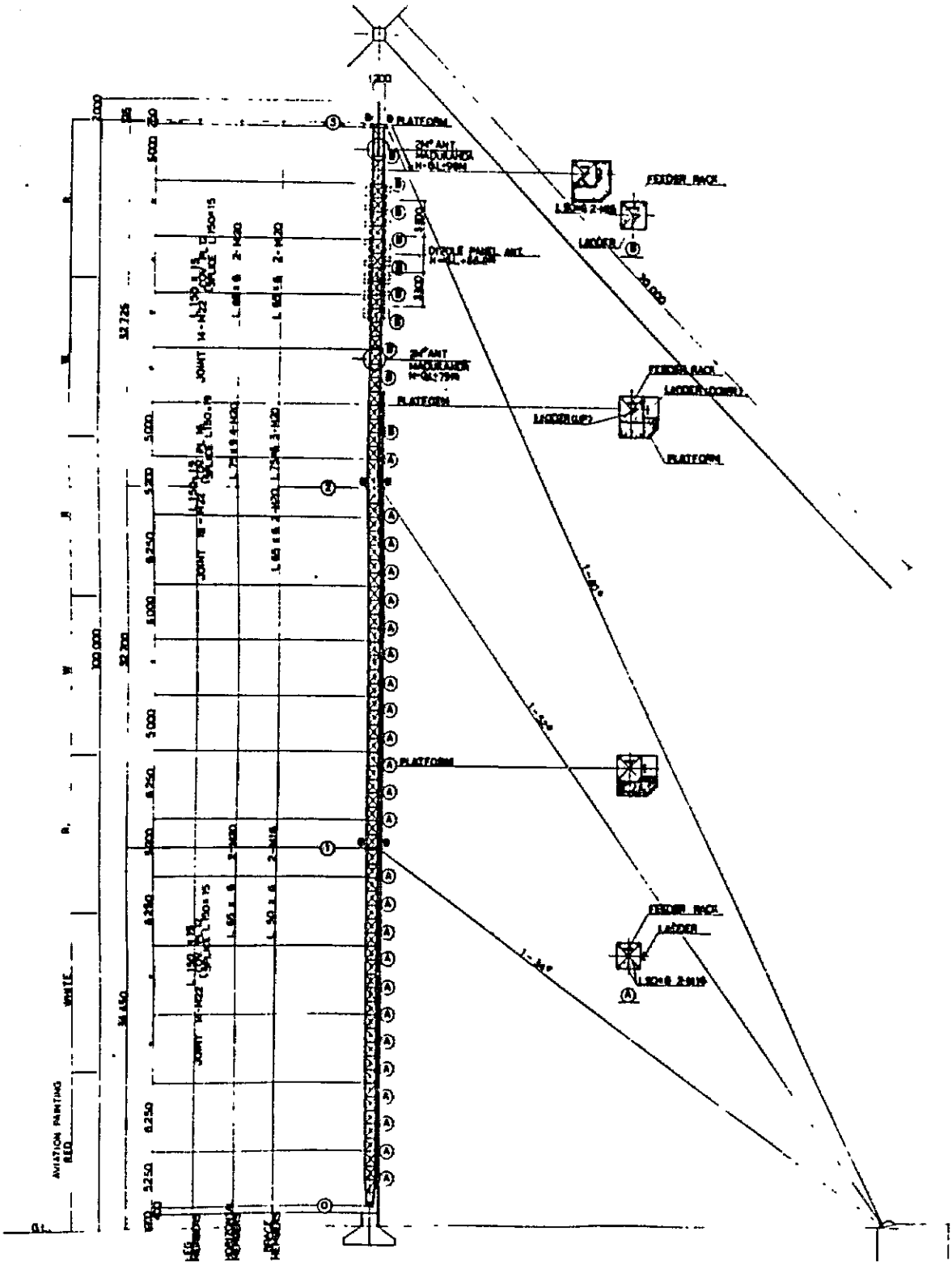


Fig. 3 - 10 OUTLINE OF TOWER

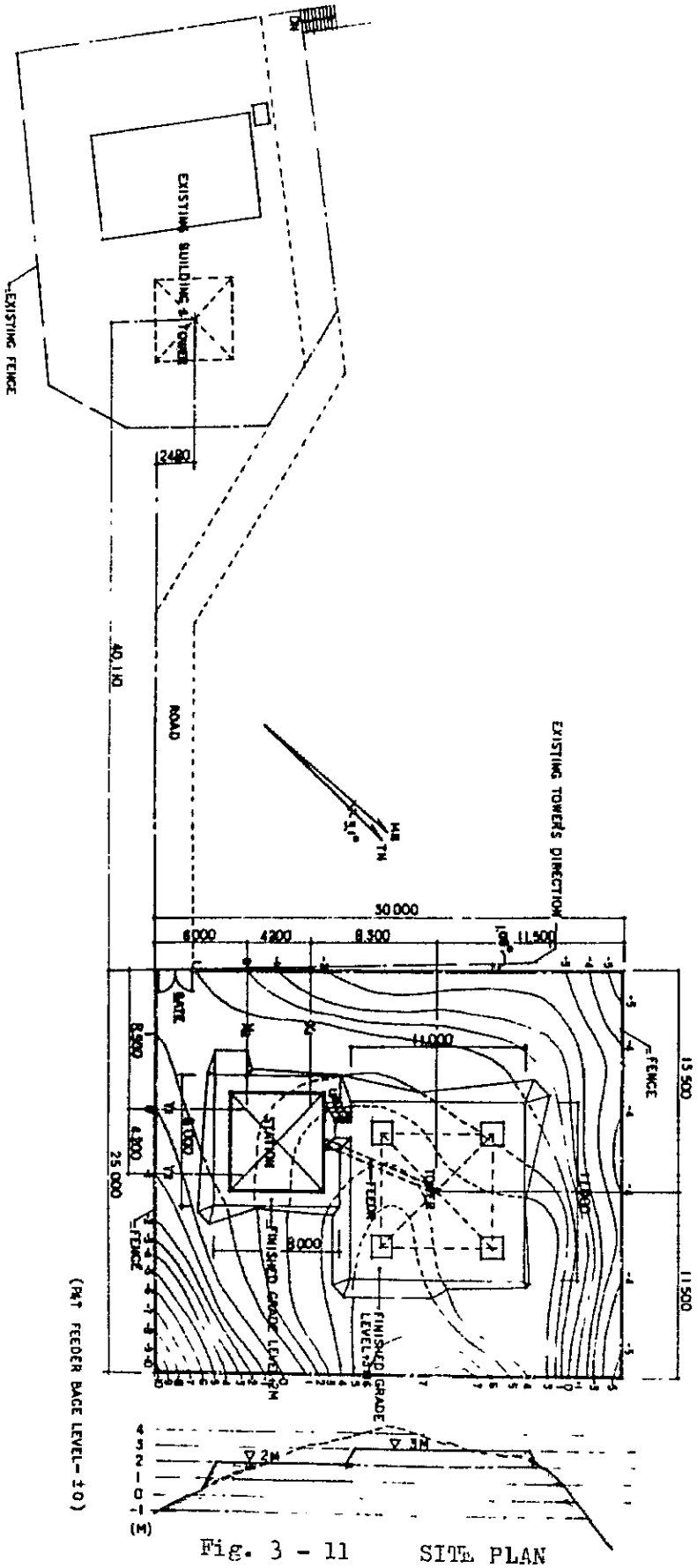


Fig. 3 - 11 SITE PLAN

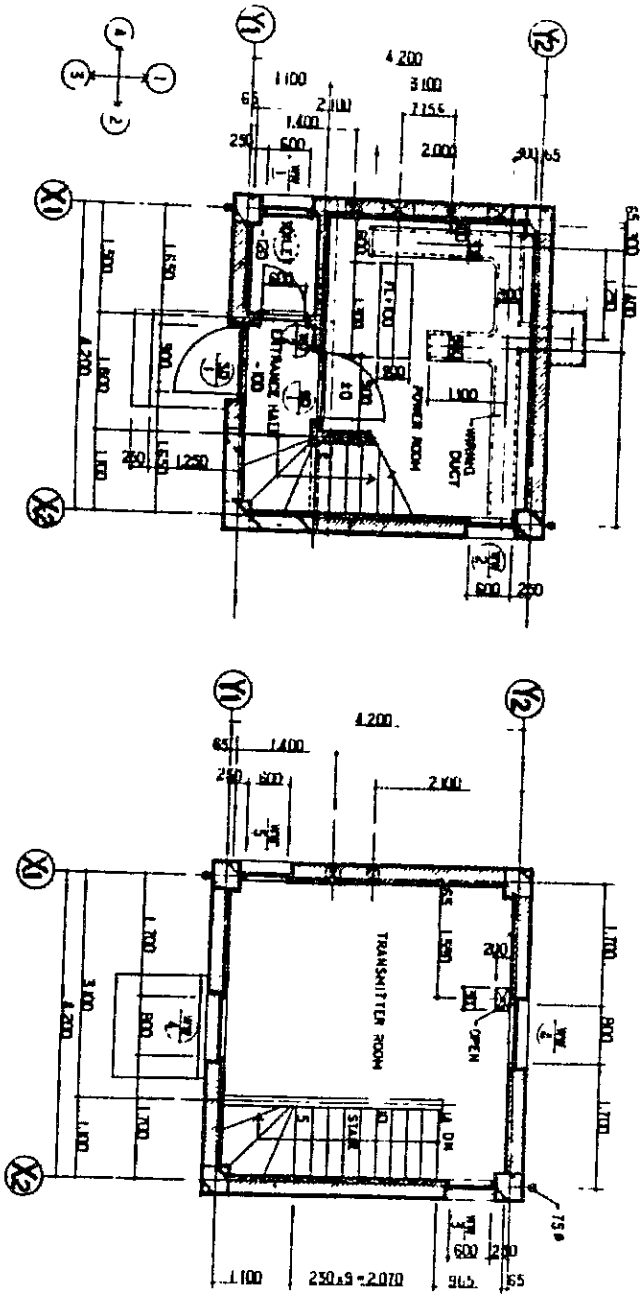


Fig. 3 - 12 FLOOR PLAN

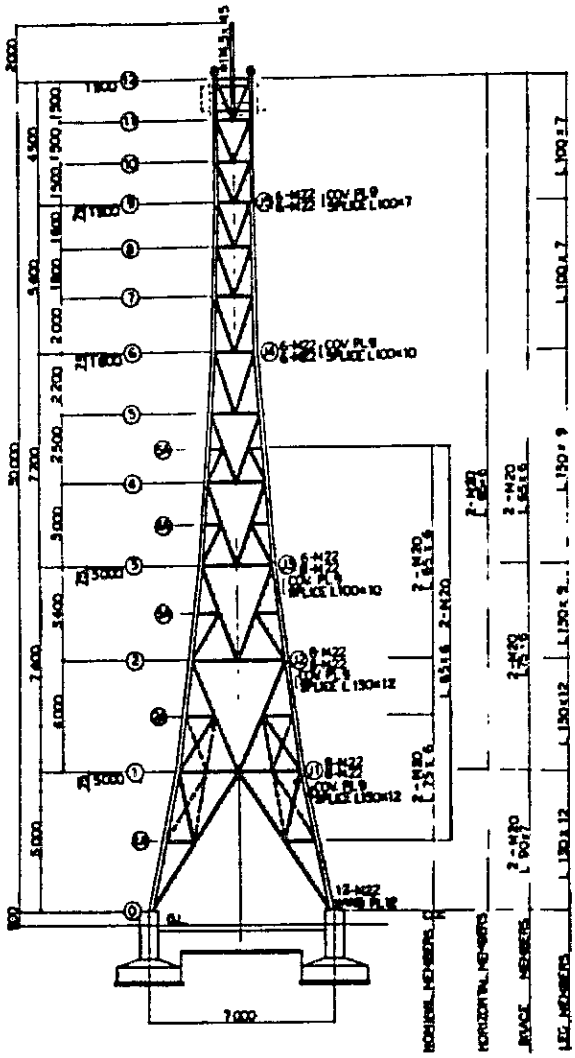


Fig. 3 - 13 OUTLINE OF TOWER

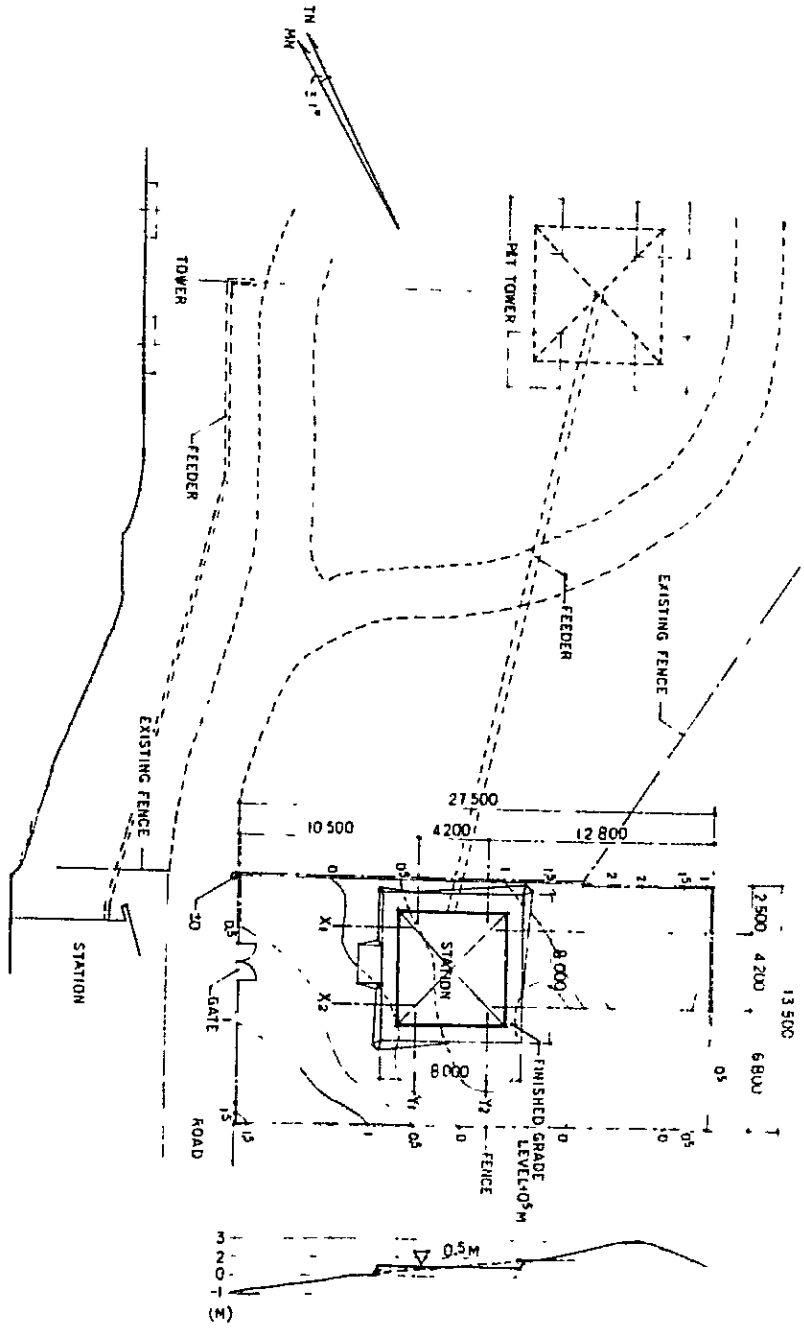


Fig. 3 - 14 SITE PLAN

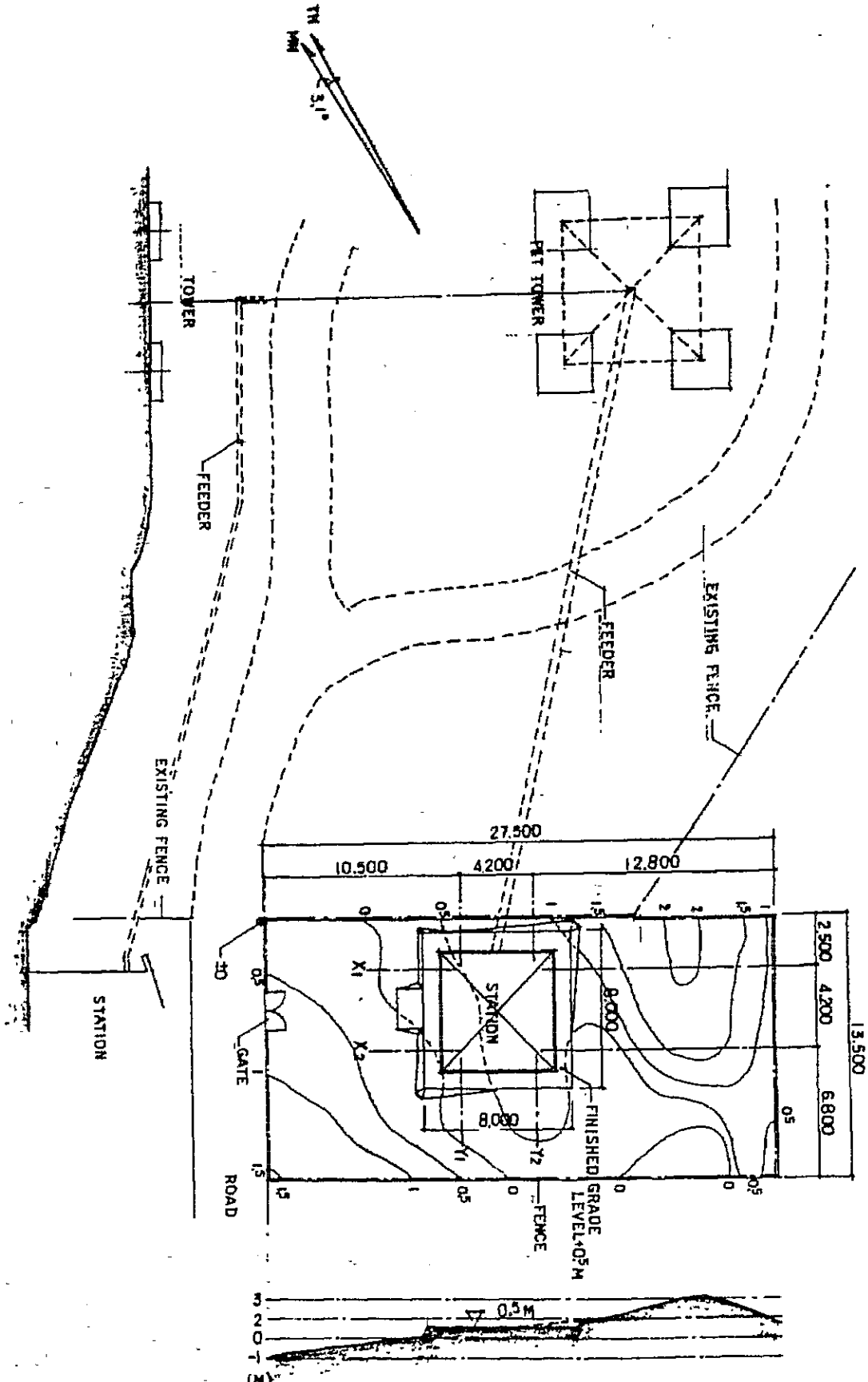
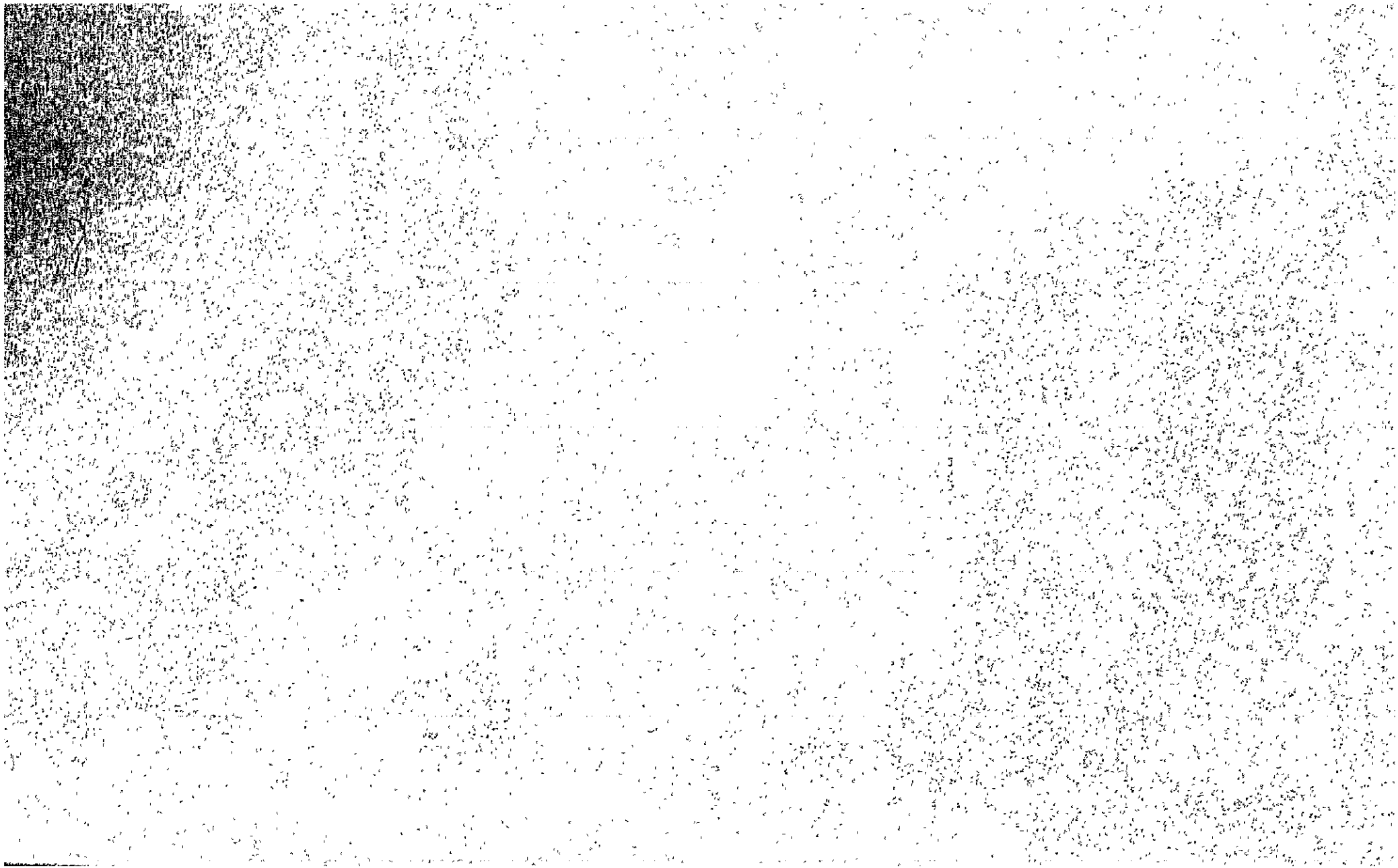


FIG.3-15 SITE PLAN

SECTION 4

CONSTRUCTION SCHEDULE



SECTION 4

CONSTRUCTION SCHEDULE

In planning the construction schedule of the broadcasting network, the following items were considered.

(1) The entire construction work should be finished within 21 months.

(2) For the purpose of saving manpower, the construction work for each station should be arranged so that there will be no duplication.

The construction schedule is prepared on the following premises.

1) The construction schedule is tabulated for the total number of months from the start.

2) Interruption of construction which may be caused by rainy seasons is not considered.

3) Preparation and clearing of the lands for the Studio Centre, Transmitting and Repeater Stations should be completed before the commencement of the construction works.

4) Facilities for distribution of electricity, water supply, drainage and other incidental facilities to these sites should be completed before the commencement of the construction works.

5) The terms of works assigned in the construction schedule are as follows:

a) TV Equipment manufacture (excluding preparation period): 10 months

b) Manufacture of steel tower materials and aerial: 6 months

c) Transportation and custom clearance: 3 months

d) Building construction

Colombo Studio Centre:	20 months
Mt. Pidurutalagala transmitting Station:	8.5 months
Kokavil Transmitting Station:	9 months
Kandy Transmitting Station:	6.5 months
Madukanda Repeater Station:	6.5 months

6) Equipment installation at the studio should be completed within 3 months after the interim building inspection.

7) Equipment installation at the respective transmitting and repeater stations should be completed by the following period after the final building inspection is over. Construction work of steel tower should be completed before equipment installation.

Name of Transmitting Station and Repeater Station	Equipment Installation	Tower/Mast and Aerial Construction
Mt. Pidurutalagala Transmitting Station	2 months	2 months
Kokavil Transmitting Station	2 months	3 months
Kandy Transmitting Station	1 month	2 months
Madukanda Repeater Station	1 month	2 months

8) Construction of steel tower should be started at least 1 month after completion of the foundation work thereof.

The construction Schedule is given in annex.

SECTION 5

COSTS ESTIMATION

SECTION 5

COSTS ESTIMATION

5-1 TOTAL PROJECT CONSTRUCTION COST AND COST ESTIMATE CONDITIONS

The breakdown of estimated project construction costs obtained as a result of the detailed design is annexed.

The grand total of estimated construction costs is 3,500 million yen (269 million rupees). The cost estimate for this project has been made out on the following conditions.

(1) Cost estimate is made as of March 1979.

(2) The estimated costs of equipment and construction materials are all on the basis of CIF Colombo.

(3) Costs for additional construction works, transportation and storage are not included.

(4) Currency exchange rates employed are as follows.

US $1.00 = ¥200
US $1.00 = Rs15
1Rs = ¥13

5-2 CLASSIFICATION OF COSTS BY WORK

Costs estimated for the respective works and equipment are as follows. Figures below the unit (million) are rounded.

(1) Equipment

1,599 million yen (123 million rupees)

(2) Installation

258 million yen (20 million rupees)

(3) Station buildings and towers/tower construction

1,517 million yen (117 million rupees)

(4) Broadcasting equipment and architectural consultant fee

126 million yen (10 million rupees)

5-3 CLASSIFICATION OF COSTS BY STATION

Costs estimated for the respective stations are as follows. Consultantation fee for broadcasting equipment and that for buildings and towers are overall costs and are not included in this classification.

(1) Colombo Studio Center

2,187 million yen (168 million rupees)

(2) Mt. Pidurutalagala Transmitting Station

484 million yen (37 million rupees)

(3) Kokavil Transmitting Station

511 million yen (39 million rupees)

(4) Kandy Transmitting Station

102 million yen (8 million rupees)

(5) Madukanda Repeater Station

91 million yen (7 million rupees)

ANNEX

Construction Cost

Thousand Yen
(Thousand Rs.)

Item	Expense for Equipment	Expense for Installation	Expense for Buildings and Steel Tower/Mast	Total
Colombo Studio	1,116,776 (85,906)	102,417 (7,878)	967,592 (74,430)	2,186,785 (168,214)
Pidurutalagala Transmitting Station	215,150 (16,550)	68,700 (5,284)	200,287 (15,407)	484,137 (37,241)
Kokavil Transmitting Station	176,250 (13,558)	61,000 (4,692)	273,582 (21,045)	510,832 (39,295)
Kandy Transmitting Station	36,320 (2,794)	14,000 (1,077)	51,643 (3,973)	101,963 (7,843)
Madukanda Repeater Station	55,045 (4,234)	11,500 (885)	23,996 (1,846)	90,541 (6,965)
Total	1,599,541 (123,042)	257,617 (19,816)	1,517,100 (116,700)	3,374,258 (259,558)
Consultant Fee	125,742(9,672)			
Grand Total	3,500,000(269,231)			

Cost Estimation Broadcasting Facility

Thousand Yen
(Thousand Rs.)

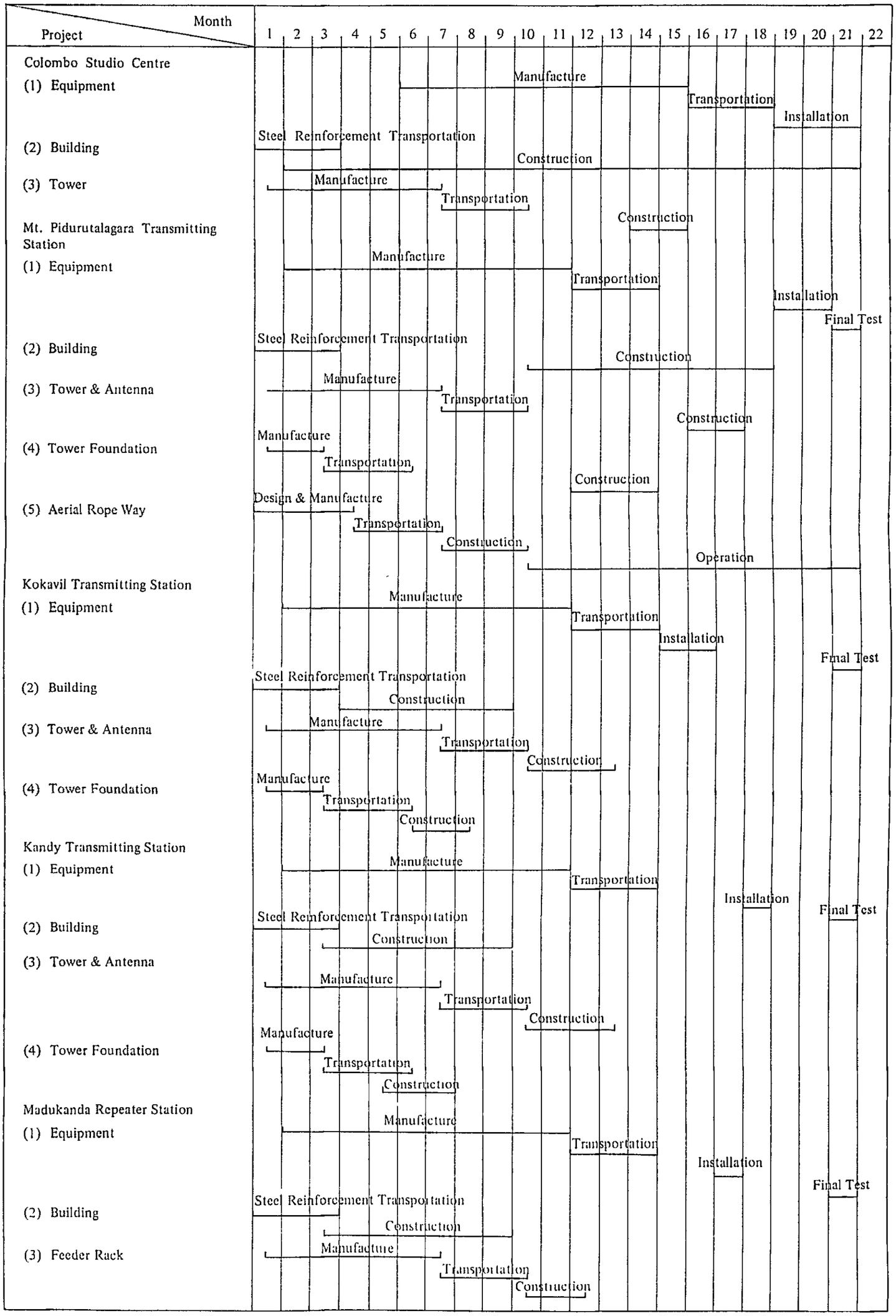
Item	COLOMBO	MT. PIDURU	KOKAVIL	KANDY	MADUKANDA	Total
Equipment	1,116,776 (85,906)	215,150 (16,550)	176,250 (13,558)	36,320 (2,794)	55,045 (4,234)	1,599,541 (123,042)
Installation	102,417 (7,878)	68,700 (5,284)	61,000 (4,692)	14,000 (1,077)	11,500 (885)	257,617 (19,816)
Total	1,219,193 (93,784)	283,850 (21,834)	237,250 (18,250)	50.320 (3,871)	66.545 (5,119)	1,857,158 (142,858)

Cost Estimation Building and Tower

¥
(Rupee)

Item	COLOMBO	MT.PIDURU	KOKAVIL	KANDY	MADUKANDA	Total
Building Construction Work	276,035,797 (21,233,523)	25,259,026 (1,943,002)	37,641,783 (2,895,522)	3,666,044 (282,003)	3,388,325 (260,640)	345,990,975 (26,614,690)
Exterior Construcion Work	72,192,756 (5,552,389)	5,568,342 (428,334)	20,498,239 (1,576,788)	7,173,319 (551,794)	3,557,897 (273,684)	108,990,553 (8,383,889)
Electrical Work	103,556,000 (7,965,846)	6,656,600 (512,046)	7,326,500 (563,577)	2,544,100 (195,700)	2,500,600 (192,354)	122,583,800 (9,429,523)
Plumbing and Sanitaru Work	55,211,300 (4,247,023)	943,200 (72,554)	2,195,500 (168,885)	905,400 (69,646)	903,300 (69,485)	60,158,700 (4,627,593)
Airconditioning Work	192,004,400 (14,769,569)	4,277,900 (329,069)	5,179,200 (398,400)	812,500 (62,500)	812,500 (62,500)	203,086,500 (15,622,038)
Tower Construction Work	30,827,353 (2,371,335)	77,168,329 (5,936,125)	155,728,988 (11,979,153)	28,362,764 (2,181,751)	7,834,766 (602,674)	299,922,200 (23,070,938)
Aerial Rope Way		57,166,671 (4,397,436)				57,166,671 (4,397,436)
Temporaly Wort etc.	237,764,620 (18,289,587)	23,247,201 (1,788,246)	45,012,237 (3,462,480)	8,178,374 (629,106)	4,998,169 (384,475)	319,200,601 (24,553,893)
Total	967,592,226 (74,430,171)	200,287,269 (15,406,713)	273,582,447 (21,044,804)	51,642,501 (3,972,500)	23,995,557 (1,845,812)	1,517,100,000 (116,700,000)

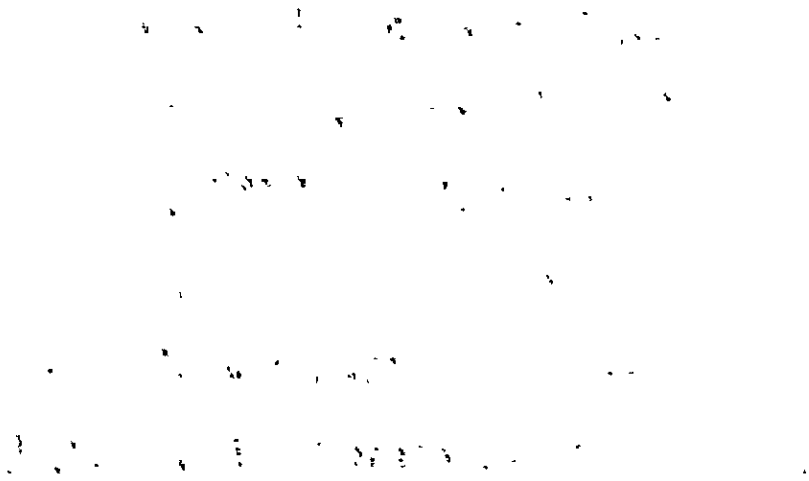
CONSTRUCTION SCHEDULE



CONSTRUCTION SCHEDULE

Project \ Month	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	+1
Colombo Studio Centre (1) Equipment (2) Building (3) Tower (4) Main Power Gas Supply & Water Supply																									
Mt. Pidurutalagala Transmitting Station (1) Equipment (2) Building (3) Main Power (4) Tower & Antenna (5) Tower Foundation (6) Aerial Rope Way (7) Main Power for Rope Way																									
Kokavil Transmitting Station (1) Equipment (2) Building (3) Tower & Antenna (4) Tower Foundation (5) Main Power																									
Kandy Transmitting Station (1) Equipment (2) Building (3) Tower & Antenna (4) Tower Foundation (5) Main Power																									
Malukanda Repeater Station (1) Equipment (2) Building (3) Feeder Rack (4) Main Power																									

Legend
Circle (○): Event (Time when managerial judgement is required.)
Solid line (–): Activity (Work which requires time or resource)
Solid line (RTD): Real time dummy (Dependency which requires time but no work)



JICA