

It is also necessary to have spaces for keeping drawings, manuals, measuring equipment, tools and subscriber cards and also to have working space.

- Operator console room

Operator positions are provided. There shall be enough space so that the superintendent may easily pass even when all the operator positions are occupied.

- Billing machine room

A small office electronic computer is provided. The work station, magnetic tape equipment and line printer shall be so installed that high working efficiency is obtained, space for cable duct shall also be provided.

- Radio & multiplex equipment room

Radio and multiplex equipment for inter-atoll communication, the associated supervisory equipment, concentrator for RCS, wiring board are installed. Spaces for keeping drawings, manuals, measuring equipment and tools required for operation and maintenance and for relocation of existing VHF/UHF radio equipment in NSS building are also necessary.

- Maritime console room

Spaces for control consoles for maritime communication and for teleprinter for telex communication are provided.

- Engineers' office

Office works on operation and maintenance of facilities are carried out in this room and spaces for keeping master copies of drawings and manuals are necessary.

- Workshop

Simple adjustment or repair of faulty unit or package shall be carried out in this room. Provision of space for keeping measuring equipment and tools required for adjustment and repair is necessary.

- Training & meeting

This room is used for the basic training and also for meeting. Spaces for keeping training materials are also necessary.

- Store room

Space for keeping spare parts for operation and maintenance, teleprinter paper, line printer paper, wires for distribution board is necessary.

TAB-6 in the next page gives the building requirement for equipment installation.

Estimation of required room floor spaces has been made according to equipment layout plans given in FIG-14.

Earth resistance of grounding for communication equipment shall be

1 ohm or less for communication equipment

10 ohm or less for MDF

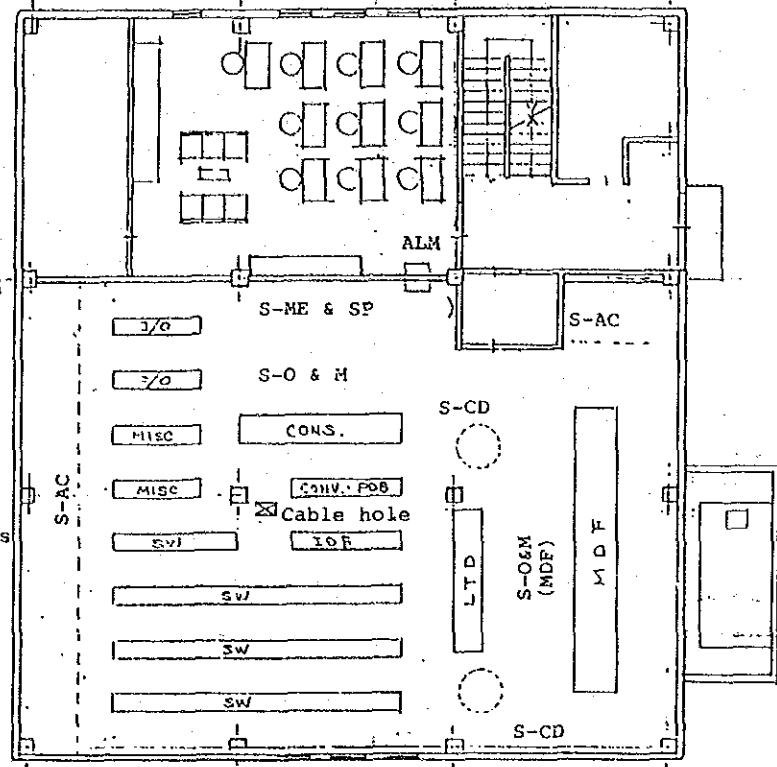
Room Name	Temperature (°C)	Humidity (%)	Height of beam bottom (m)	Floor loading (t/m <sup>2</sup> )
Power Room	-	-	4.2	3.0
Cable chamber	-	-	4.2	-
Automatic Switching Equipment Room	15 - 30	30 - 65	4.2*1	1.25*2
Operator Console Room	15 - 30	30 - 65	2.8	0.35
Billing Machine Room	15 - 30*3	30 - 65	2.8	0.35
Radio & Multiplex Equipment Room	15 - 30*3	30 - 65*3	3.2	1.25
Maritime Console Room	- *4	- *4	2.8	0.7
Engineers' Office	-	-	-	-
Workshop	-	-	-	-
Training & Meeting Room	-	-	-	-
Store Room	- *5	- *5	-	-

- \*1. Required by MDF                      \*2. Required by DC voltage regulator  
\*3. Required by concentrator           \*4. Operation in enclosed room is assumed.  
\*5. Temperature & humidity must be suitably controlled for storing papers for TTY and LP.

TAB-6 BUILDING REQUIREMENT FOR EQUIPMENT INSTALLATION

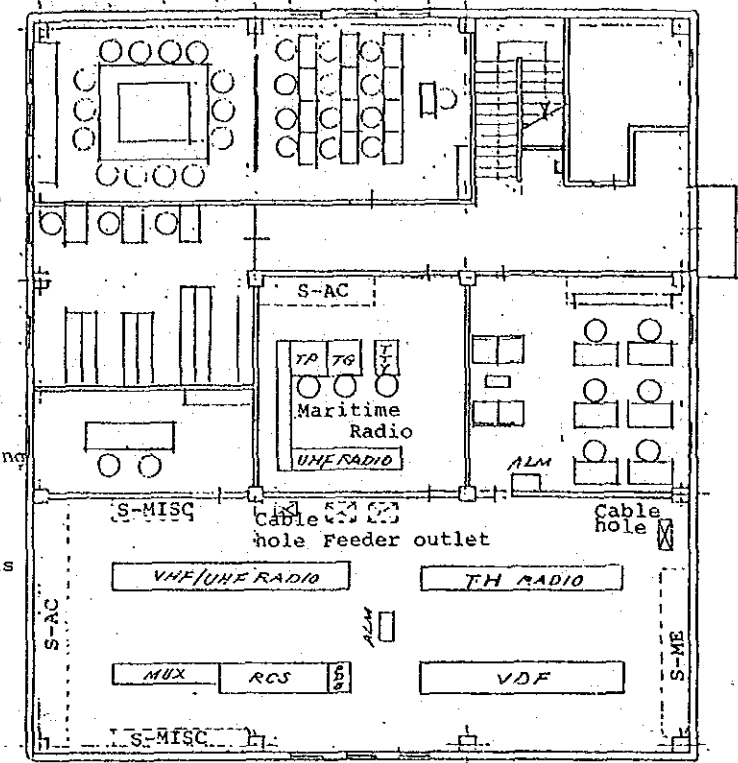


- MDF: Main Distribution Frame
- LTD: Line Test Desk
- SW: Switching Equipment
- I/O: Input/Output Equipment
- MISC: Miscellaneous Equipment
- CONS: Control & Test Console
- CONV: DC-DC Converter
- PDB: Power Distribution Board
- IDF: Intermediate Distribution Board
- ALM: Alarm Indicator
- S-CD: Space for Subscriber Cards
- S-AC: Space for Air-Condition. Equipment
- S-ME & SP: Space for Measuring Equipment & Spares
- S-O & M: Space for O & M staffs



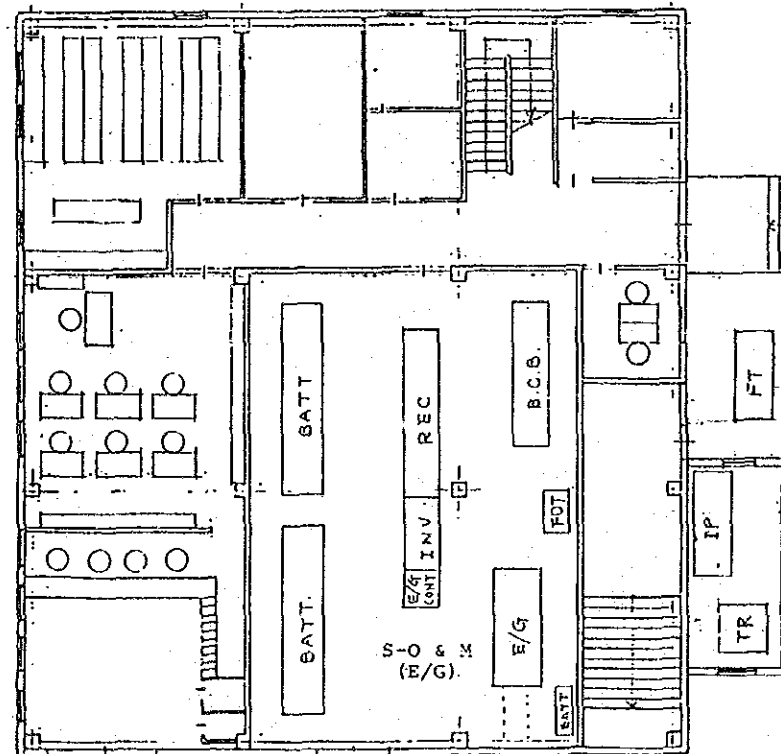
FIRST FL.

- TH RADIO: Trans-Horizon Equipment
- VHF/UHF RADIO: VHF/UHF Radio Equipment
- MUX: Multiplex Equipment
- RCS: Radio Concentrator System
- VDF: Voice Distribution Frame
- PDB: Power Distribution Board
- TP: Telephone Console
- TG: Telegraph Console
- TTY: Teleprinter
- UHF RADIO: UHF Radio Equipment
- ALM: Alarm Indicator
- S-AC: Space for Air Conditioning Equipment
- S-ME: Space for Measuring Equipment
- S-MISC: Space for Miscellaneous Items



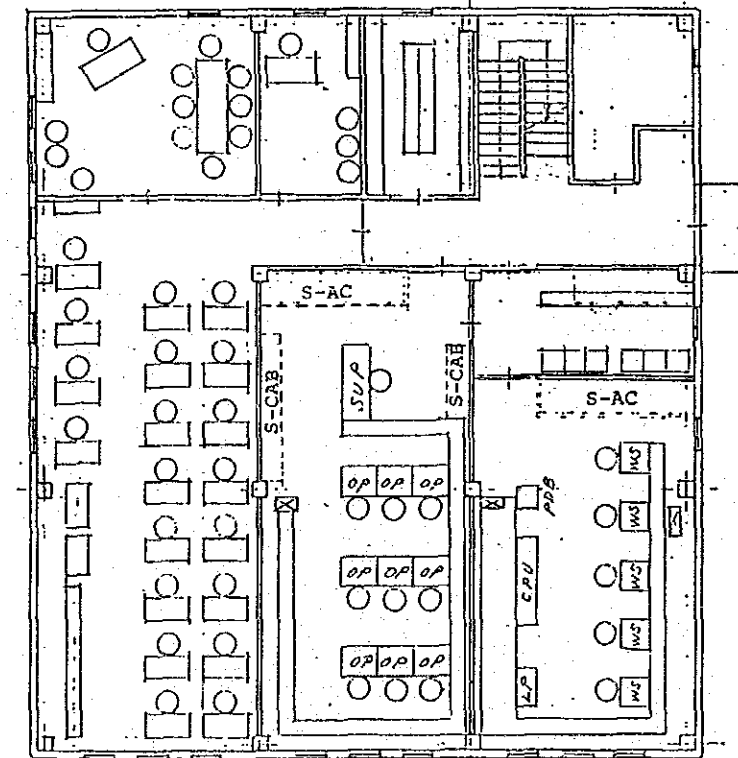
THIRD FL.

- BATT: Batteries
- REC: Rectifier
- INV: DC-AC Converter
- E/G: Engine Generator
- E/G CONT: E/G Control Cubicle
- FDT: Fuel Day Tank
- FT: Fuel Tank
- BCB: Branch Circuit Breaker
- TR: Transformer
- PI: Power Incoming Panel



GROUND FL.

- SUP: Supervisor Position
- OP: Operator Position
- CPU: Central Processing Unit
- LP: Line Printer
- WS: Work Station
- PDB: Power Distribution Board
- S-CAB: Space for Cabinets



SECOND FL

FIG-14 LAYOUT OF EQUIPMENT



#### 5-2-4 Training equipment and materials

A training room is provided in the Malé Telecommunication Centre not for full scale training but for introductory training to new employees and basic training for existing POSTEL staffs.

Consequently, the training equipment and material to be provided are limited only to the audio and visual training equipment and to the test equipment and material used for simple experiments.

#### 5-3 Basic Design II - Architectural Design

##### 5-3-1 Site Plan

The proposed site for the Malé Telecommunication Centre is as described in 4-1-1. The Centre building is rectangular in shape 18, mts in width and 20 mts in length (measured at the center line of the peripheral columns) with the electricity room protuding.

Telecommunication cables will be led into the Centre from Husnuheena Magu. Access doors to the emergency generator and Public Service Office are also planned to face this road. The site is long on the north-south axis, and there is a huge mango tree (amongst the largest on Malé) and several coconut trees standing on the south side. As large trees are scarce in Malé, it was decided not to cut the mango tree, and as a result the Centre is planned on the northern side of the site. Also as the adjoining site to the north is also government property, if any necessity for expansion of the facility may arise in the future, it would be possible, by combining the two sites, to facilitate this expansion.

Because Husnubeena Magu Road is only 5.5 mts. in width the Centre is to be built 3 mts. away from the edge of the road.

Staff entrance is located, facing Bakarumaa Goalhi Road, on the north side along with the service yard. The Sub Station, housing the transformer, fuel tank for the emergency generator and loading balconies of each floor are also located in and around this space.

The tower for the antennas of the Ari Atoll Communication System is to be erected on the top of the roof. The outside units of the air-conditioning packages are also to be placed on the roof.

#### 5-3-2 Building Plan

##### 1) Floor Plan

Rooms to house equipments that are heavy or need access to the outside are mainly placed on the ground floor while those requiring access to the tower are placed on the third floor which is the uppermost floor.

The staircase and toilets which form the vertical axis of the building are located on the north-west corner, as these are permanent elements, and by doing so facilitating easy replanning should such a need occur in the future.

The overall plan is determined by the interface between the various functions, interconnection of equipments and staff circulation. The floor space required for the telecommunication equipment has been determined by laying out the proposed equipments.

The administrative and maintenance sections were, as far as remaining space allows, housed in the Centre.

TAB-7 shows the correlation with the forecasted staff composition and the actual accommodating capacity of the Centre.

Room allocation per each floor and floor area are given in the following list.



Floor	Room	Floor Area (m <sup>2</sup> )
Ground Floor	Lobby	28.2
	Public Service Office	58.2
	Power Room	125.6
	Cable Chamber	31.2
	Transformer Room	16.8
	Guardman's Room	9.0
	Store-1	42.1
	Fan Room	18.0
	Toilets	7.6
	Shower Room	7.0
	Corridor	31.9
	Staircase	12.2
	Pump Room	10.8
Kettle Room	6.0	
1st Floor	Automatic Switching Equipment Room	250.0
	Anteroom	5.6
	Airconditioning Machine Room	22.9
	Engineers' Office-1	68.8
	Corridor	15.8
	Staircase	12.2
	Toilets	13.8
Kettle Room	2.7	
2nd Floor	Administration Office	105.0
	Director's Office	32.1
	Deputy Director's Office	15.6
	Store-2	16.6
	Operator Console Room	81.0
	Billing Machine Room	66.6
	Lounge	18.9
	Corridor	23.3
	Staircase	12.2

Floor	Room	Floor Area (m <sup>2</sup> )
	Toilets	13.8
	Kettle Room	2.7
3rd Floor	Radio & Multiplex Equipment Room	137.2
	Workshop	18.9
	Maritime Console Room	37.2
	Engineers' Office-2	39.1
	Library	31.5
	Training and Meeting Room	65.0
	Corridor	27.5
	Staircase	12.2
	Toilets	13.8
	Kettle Room	2.7
	Total	1,569.3 m <sup>2</sup>

NOTE: Floor area is calculated from the centre line of walls.

2) Section

The required floor height (floor to soffit of beam) differs with the equipment to be housed. The required floor height of each floor are; Ground Floor - 4.1 m, 1st Floor - 4.2 m, 2nd Floor - 3 m, 3rd Floor - 3 m, respectively. The Ground Floor is raised 0.5 m. from the design ground level.

The height of the building will be 17.7 m. from the design ground level. The top of tower will be approximately 46 m above ground level.

3) Structural Plan

Masonry using locally available coral stone (petrified coral) joined with lime mortar is the most common method of building construction in the Maldives. There are some reinforced concrete or steel structures but these are few.

TAB-7 FORECASTED STAFF COMPOSITION AND ACCOMMODATION CAPACITY  
OF THE TELECOMMUNICATION CENTRE

	Number of staff at present	Number of staff to be recruited	Total	Simultaneous staff turn-out	Allowable accommodation in the Centre
Common	38	2 7 (billing)	40 7	40 [ 2 (technical staff) 5 (operators)	22 } (Office) 7 } (Public Service Office) 5 (Billing Machine Room)
Radio Transmission Network Group	33	9 1	42 1	36 1 (Mahibadhoo)	10 (Engineer's Office) -
Telephone Network Group	7	21 (operators) 8 (technical staff)	28 33	10 12	10 (Manual Switching Room) 10 (Engineers Office)
Cable Group	25	3	28	28	4 (Engineer's Office)
Postal Services Division	46	0	46	46	4 (Public Service Office)

As the islands have developed from coral reefs all the available water as well as the sand have a high salt content which is the most adverse element for concrete manufacture. The only available source of aggregates is crushed coral stone which is brittle and cannot be expected to have adequate compression strength. Under the above mentioned conditions it is deemed technically inappropriate to plan the structure of the building using on-site mixed concrete, as the Centre will house heavy telecommunication equipment, have considerable floor height and will support a 30 mt. steel tower on top therefore will require high level of structural strength. In the light of the above it is proposed that the main superstructure of the building be of steel and pre-fabricated elements to attain adequate structural strength and required building characteristics.

However for the foundation structure the use of on-site mixed concrete is inevitable. Therefore for this concrete it is planned to use imported aggregates and sand and to de-salinate the water to be used for mixing the concrete.

The tower to be erected on the roof shall be composed of steel shapes and angles and will be a rectangular trussed structure. Trussed structure is lightweight and common for steel towers.

Structural analysis and calculation shall be according to those stipulated by the Japan Architectural Institute.

Due to the limited off loading capability of Malé Port the pre-fabricated elements and steel members should be planned to weigh less than 3-tons per member.

The standard to be employed for technical specifications such as structural strength etc. shall be those according to JIS. (Japan Industrial Standards) or its equal.

4) Material and Method of Construction

The internal partition walls shall be gypsum plaster boards on light gauge steel furring.

The floors will be covered with PVC sheets and the false ceiling will be mineral acoustic tiles. However in the telecommunication equipment rooms the columns, beams and ceiling will be left exposed.

In the Power Room (housing the emergency generator) sound absorbing materials shall be applied directly to the soffit of the ceiling slabs for the purpose of sound absorption and attenuation. The floor shall be anti-acid floor tiles.

External windows shall be of aluminum, doors to rooms housing telecommunication equipment shall be of steel while those for regular rooms shall be of wood.

Water proofing of the roof shall be sheet type.

### 5-3-3 Building Equipments

#### 1) Electrical

##### 1. Transformer

A transformer with a capacity of 300 KVA shall be placed in the Transformer Room which shall receive primary power of 3 phase 3 wire 11 kV 50 Hz.

Secondary supply from the transformer will be 3 phase 4 wire 400/230 V 50 Hz. The main switch gear and panel will be placed in the Power Room. The panel will be a cubicle type in consideration of easiness of installation and maintenance.

##### 2. Power Lines and Driving Facilities

The main lines required will be for general and emergency lighting, air conditioning, ventilating and pumps. Wiring will be placed inside PVC conduits. To prevent electrical noises placing panels in the automatic switching room will be avoided and for power and control cables will be of shielded type or placed inside steel conduit pipes.

3. Illumination

In view of economy, lighting will be mainly by fluorescent lamps. The level of illumination shall be as listed below and for other areas shall be according to the levels specified by Japan Industrial Standards (JIS).

- Telecommunication equipment rooms, offices 400 Lux.
- Power Room, ACMR, Pump Room 200 Lux.
- Corridors, Staircase, Store, Lavatory 100 Lux.

The following lighting fixtures will be employed,

- telecommunication equipment rooms, building equipment rooms exposed installation type
- offices, corridors embedded installation type

4. Socket Outlets

Outlets for general use and equipments will be provided where required. The appliance to be installed will conform to B.S. standards.

5. Fire Detectors

Smoke detectors will be provided in Power Room and Billing Machine Room. Alarm indicator is to be installed in Engineer's Office-1 Room.

6. Telephone

Telephone line conduits, terminate and outlets will be provided.

7. Electrical Facility for the Tower

Lighting rods, ladder lights, and maintenance lights and outlets shall be provided for the tower.

8. Earthing

Electrical equipments for the building and telecommunication equipment will be earthed as follows;

- High voltage (11 kV)	below 10 ohms
- Low voltage (400/230 V)	" 100 ohms
- MDF	" 10 ohms
- Telecommunication Eqpt.	" 1 ohm

2) Plumbing

1. Water

a) Utility Water

As the existing well at the site cannot be used due to the building taking up most of the site area a new well will be bored and the water from the well will be used for utility purposes after being filtered.

The elevated tank for the water supply will be of FRP (fiber reinforced plastic).

b) Drinking Water

Rainwater falling on the roof of the building will be collected in an FRP tank placed on the roof of the Substation after being filtered and the collected water will be gravity fed to the Kettle Room on the Ground Floor. The overflow from the tank will be led to the newly bored well. The capacity of the FRP storage tank will be 18 cu. mts. in accordance with the guideline of the Water & Sanitation Authority.

It is estimated that as an annual average 4 litres/sq. mts. of water can be collected daily.

2. Drainage System

The drainage for the ground floor and the rest of the floors will be separated. Soiled and grey waters will be combined at each floor.

3. Fire Extinguishing System

Dry chemical powder extinguishing units will be placed in the office rooms. ABC portable extinguishers will also be provided. Telecommunication equipment rooms, are provided with Halon 1301 portable extinguishers, while Power Room, with both ABC and Halon extinguishers.

4. Piping Material

Considering resistivity to corrosion and easiness of installation all the pipes will be PVC.

3) Air-conditioning and Ventilation System

1. Air-conditioning

A dispersed packaged type air-conditioning system is proposed from the viewpoint of economy of space, running cost and installation as well as adaptability. The package will be air-cooled type owing to the high salt and mineral content of the available water. Salinity of the air will be eliminated by filters.

The conditions for air-conditioning are as follows;

(1) Rooms to be air-conditioned

Automatic Switching Equipment Room  
Operator Console Room  
Billing Machine Room  
Radio & Multiplex Equipment Room  
Maritime Console Room  
Store-2

(2) Established temperature/humidity

Outside	32°C	79%
Inside	25 ± 5°C	50 ± 10%



(3) Operation period of air-conditioning

The Automatic Switching Equipment Room, Operator Console Room, Radio & Multiplex Room and Maritime Console Room will be air-conditioned around the clock.

The outside air supply unit will turn off in the event of the generator turning on due to commercial power failure.

(4) Equipment layout

Outside air supply unit will be placed in the air-conditioning machine room and the outside air will be sent via air ducts. Because heat generation in the Automatic Switching Equipment Room, Billing Machine Room, and Radio & Multiplex Room is high the air conditioning units will be dispersed to facilitate maintenance and replacement. A stand-by air-conditioning unit will be provided in the Automatic Switching Equipment Room. As heat generation is small in Store-2 (storage for computer print out paper) and Maritime Console Room, window type air-conditioner is proposed for the former and split-type wall hanging air conditioner for the latter.

2. Ventilation

(1) Rooms to be Mechanically Ventilated

Power Room

Sub-station

Pump Room

Cable Chamber

Shower Room

Ceiling fans are planned for office rooms without air-conditioning or ventilation.

(2) Equipment Layout

Exhaust and intake fan will be provided in the Power Room.

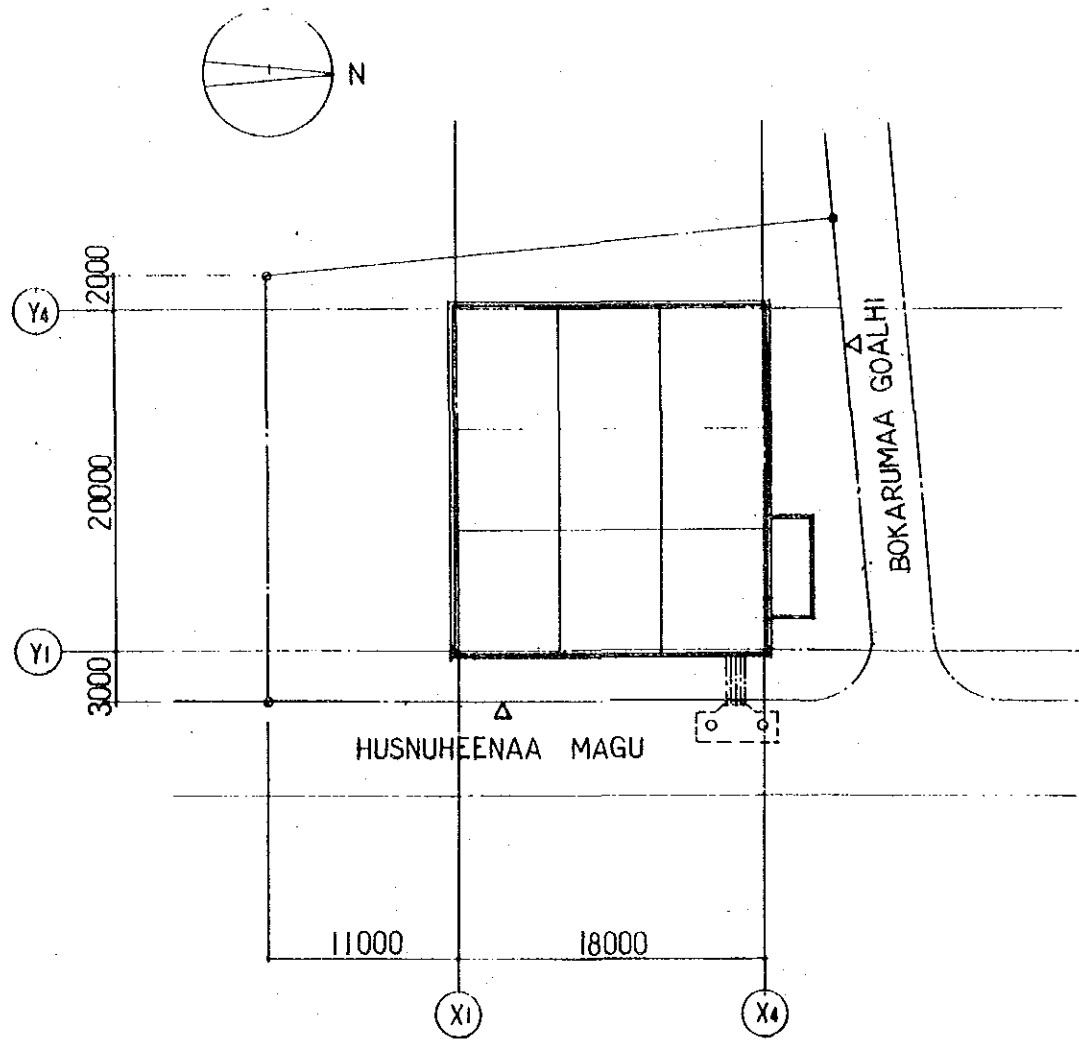
A window type exhaust fan will be provided in the Pump Room, Cable Chamber and Shower Room.

An exhaust and intake fan will be provided for the emergency generator.

5-3-4 Basic Design Drawings

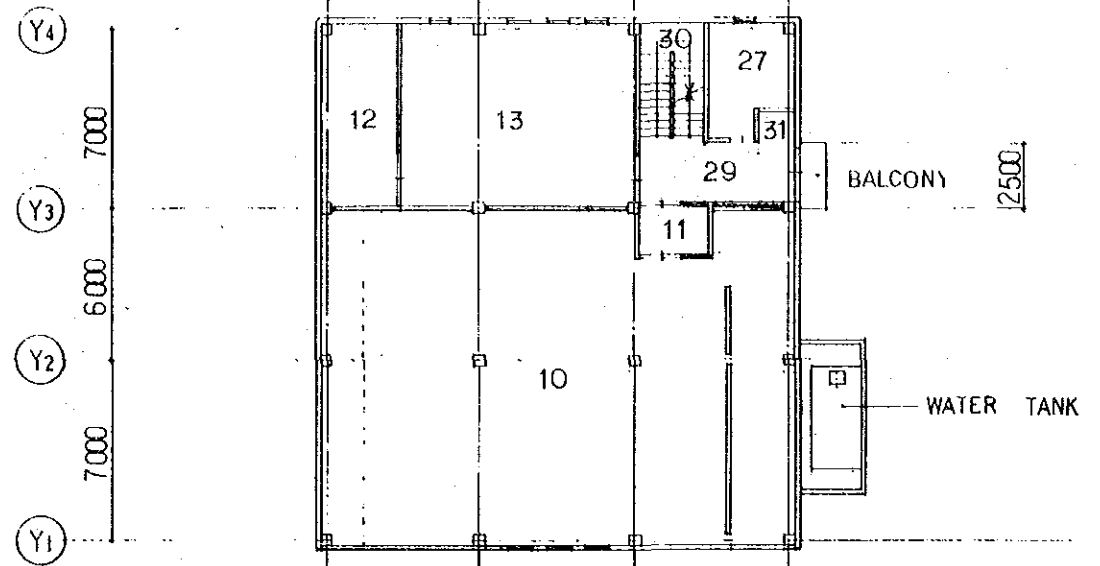
Site Plan, Floor Plan, Section, Elevation, Electrical Power Schematic Diagram, Plumbing Schematic Layout and Air-conditioning Equipment Layout are attached. (FIG-15 thru FIG-20)



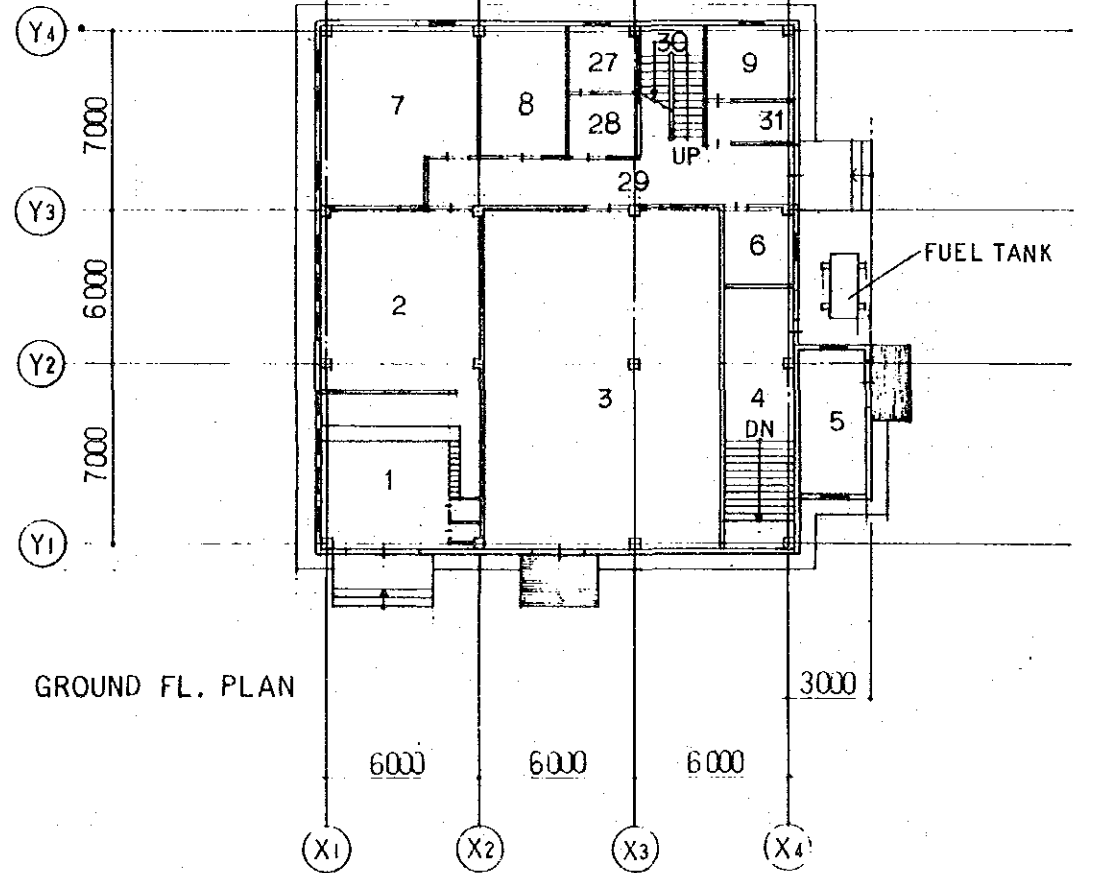


SITE PLAN 1:450

- 1 LOBBY
- 2 PUBLIC SERVICE OFFICE
- 3 POWER ROOM
- 4 CABLE CHAMBER
- 5 SUB STATION
- 6 GUARDMAN'S ROOM
- 7 STORE - 1
- 8 FAN ROOM
- 9 PUMP ROOM
- 10 AUTOMATIC SWITCHING EQUIPMENT ROOM
- 11 ANTEROOM
- 12 AIR CONDITIONING MACHINE ROOM
- 13 ENGINEERS' OFFICE - 1
- 14 ADMINISTRATION OFFICE
- 15 DIRECTOR'S OFFICE
- 16 DEPUTY DIRECTOR'S OFFICE
- 17 STORE - 2
- 18 OPERATOR CONSOLE ROOM
- 19 BILLING MACHINE ROOM
- 20 LOUNGE
- 21 RADIO & MULTIPLEX EQUIPMENT ROOM
- 22 WORKSHOP
- 23 MARITIME CONSOLE ROOM
- 24 ENGINEERS' OFFICE - 2
- 25 LIBRARY
- 26 TRAINING & MEETING ROOM
- 27 TOILETS
- 28 SHOWER ROOM
- 29 CORRIDOR
- 30 STAIRCASE
- 31 KETTLE ROOM



FIRST FL. PLAN



GROUND FL. PLAN

NAME OF PROJECT : TELECOMMUNICATION DEVELOPMENT PROJECT IN THE REPUBLIC OF MALDIVES  
MALE' TELECOMMUNICATION CENTRE

AMENDMENT :

NAME OF DRAWING : SITE PLAN & FLOOR PLAN (I)

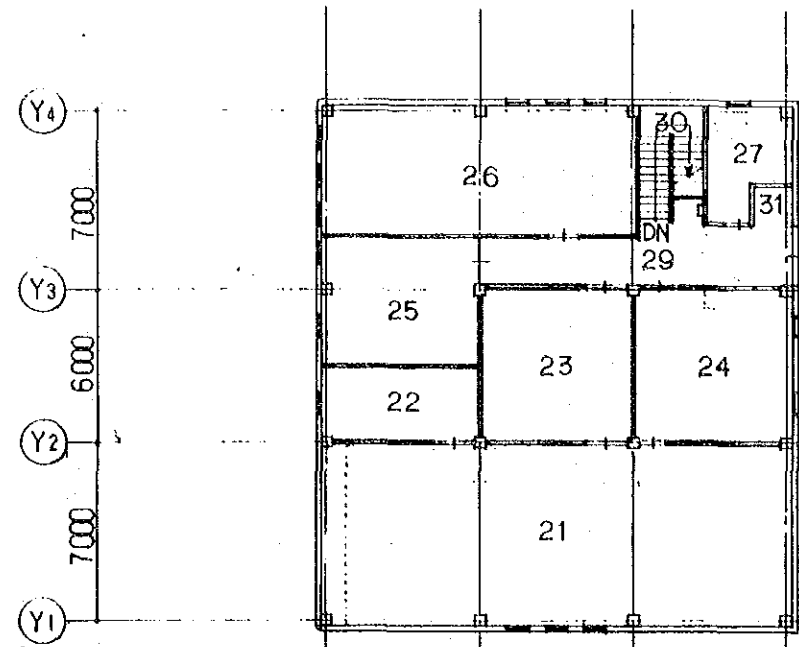
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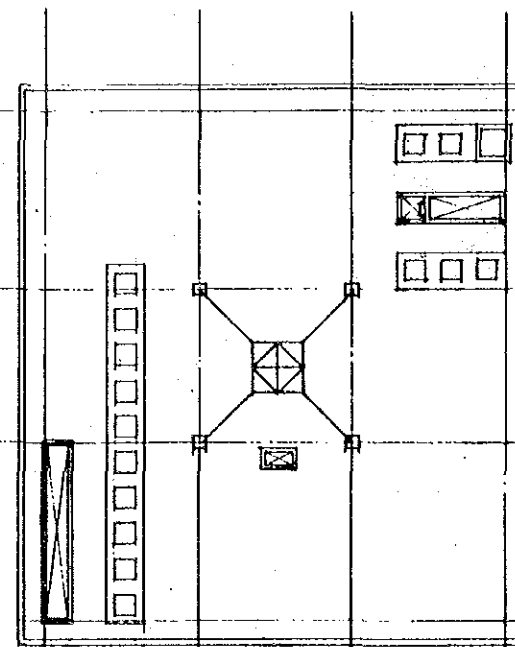
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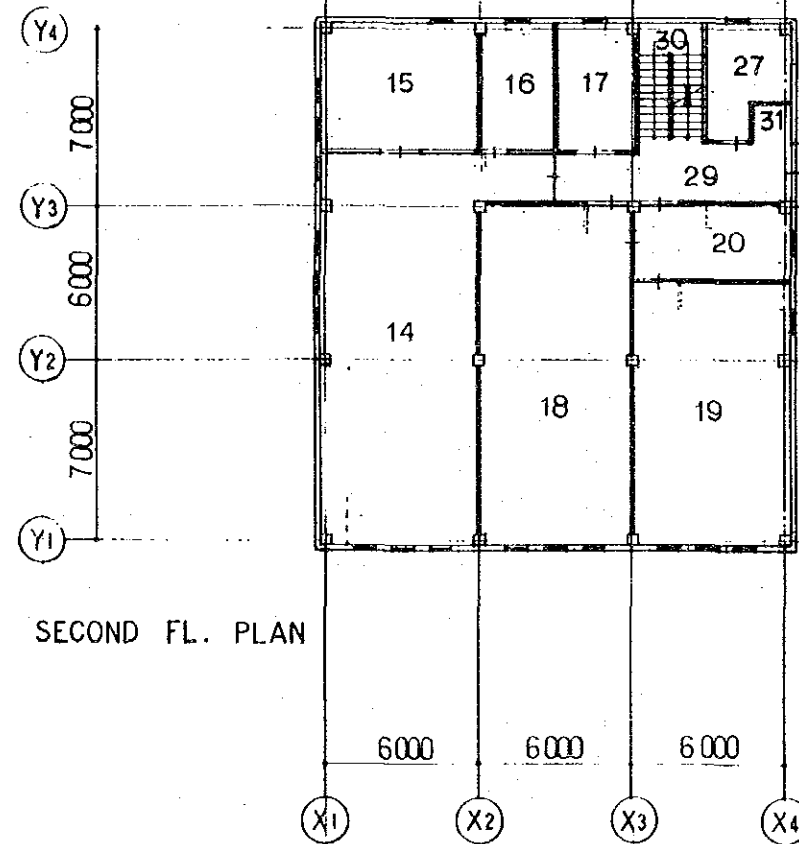
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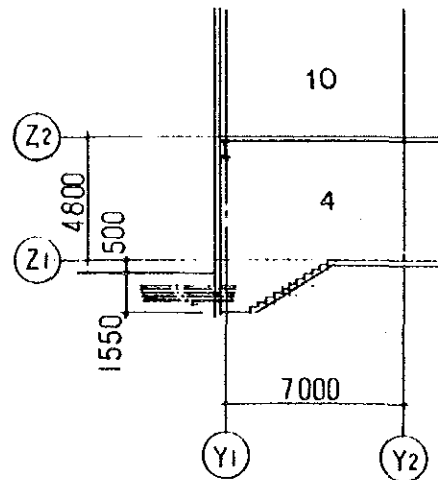
THIRD FL. PLAN



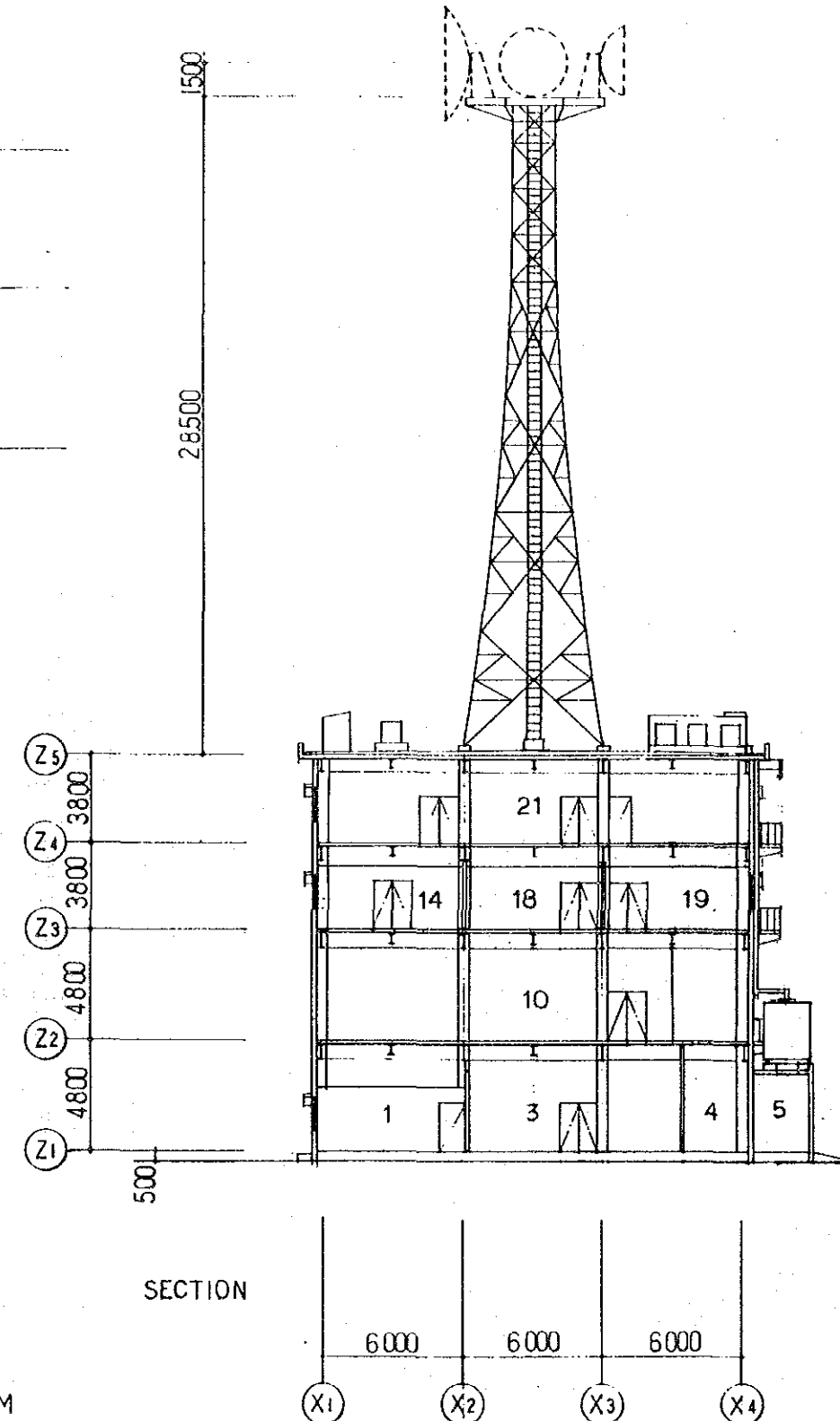
ROOF PLAN



SECOND FL. PLAN



SECTION FOR CABLE CHAMBER ROOM



SECTION

NAME OF PROJECT : TELECOMMUNICATION DEVELOPMENT PROJECT IN THE REPUBLIC OF MALDIVES  
 MALE TELECOMMUNICATION CENTRE

AMENDMENT :

NAME OF DRAWING : FLOOR PLAN (2) & SECTION

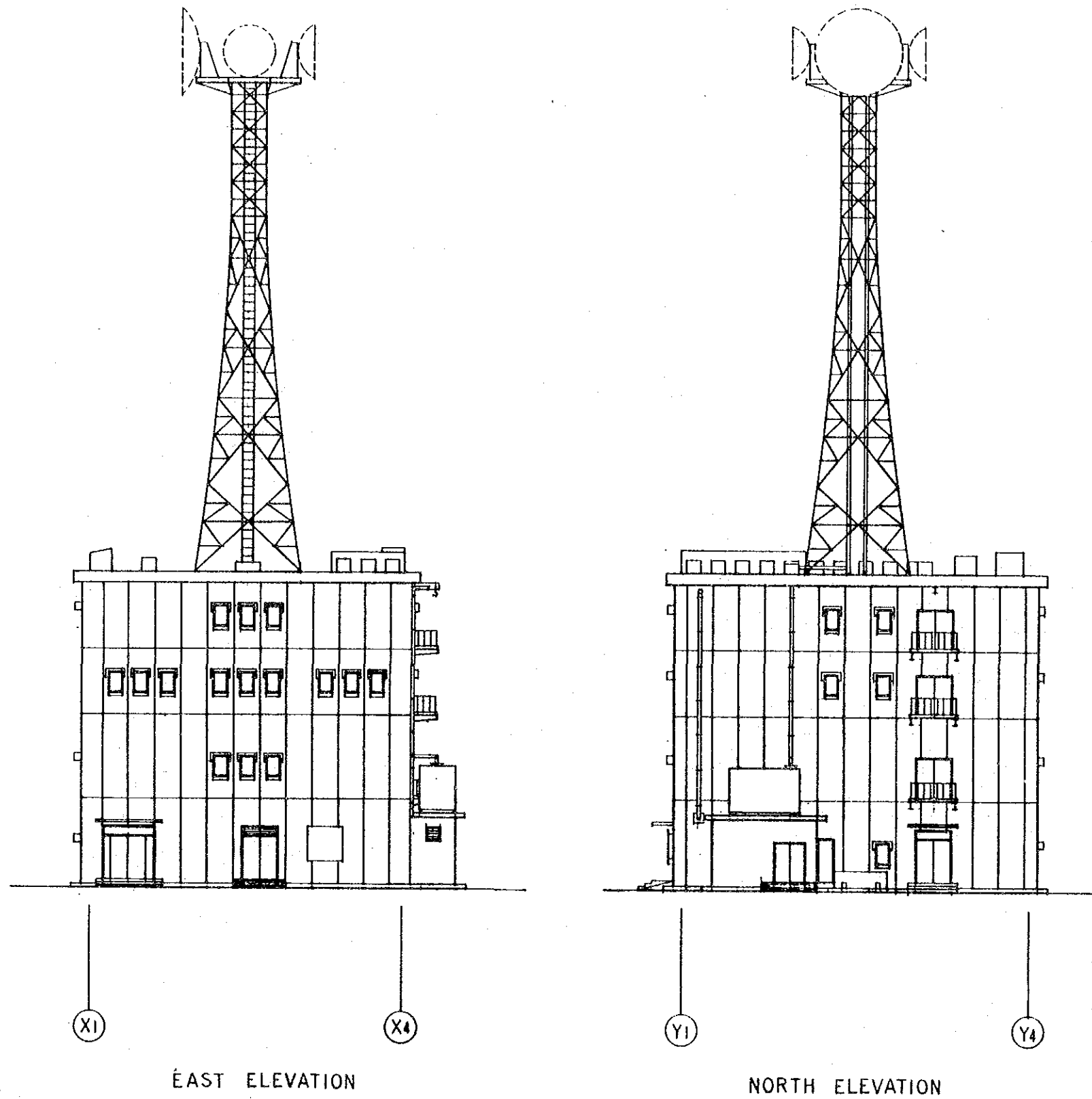
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DATE :

DRAWING NO :

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NAME OF PROJECT :  
 TELECOMMUNICATION DEVELOPMENT PROJECT IN THE REPUBLIC OF MALDIVES  
 MALE' TELECOMMUNICATION CENTRE

AMENDMENT :

NAME OF DRAWING :  
 ELEVATION

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SHEET NO :

A - 3



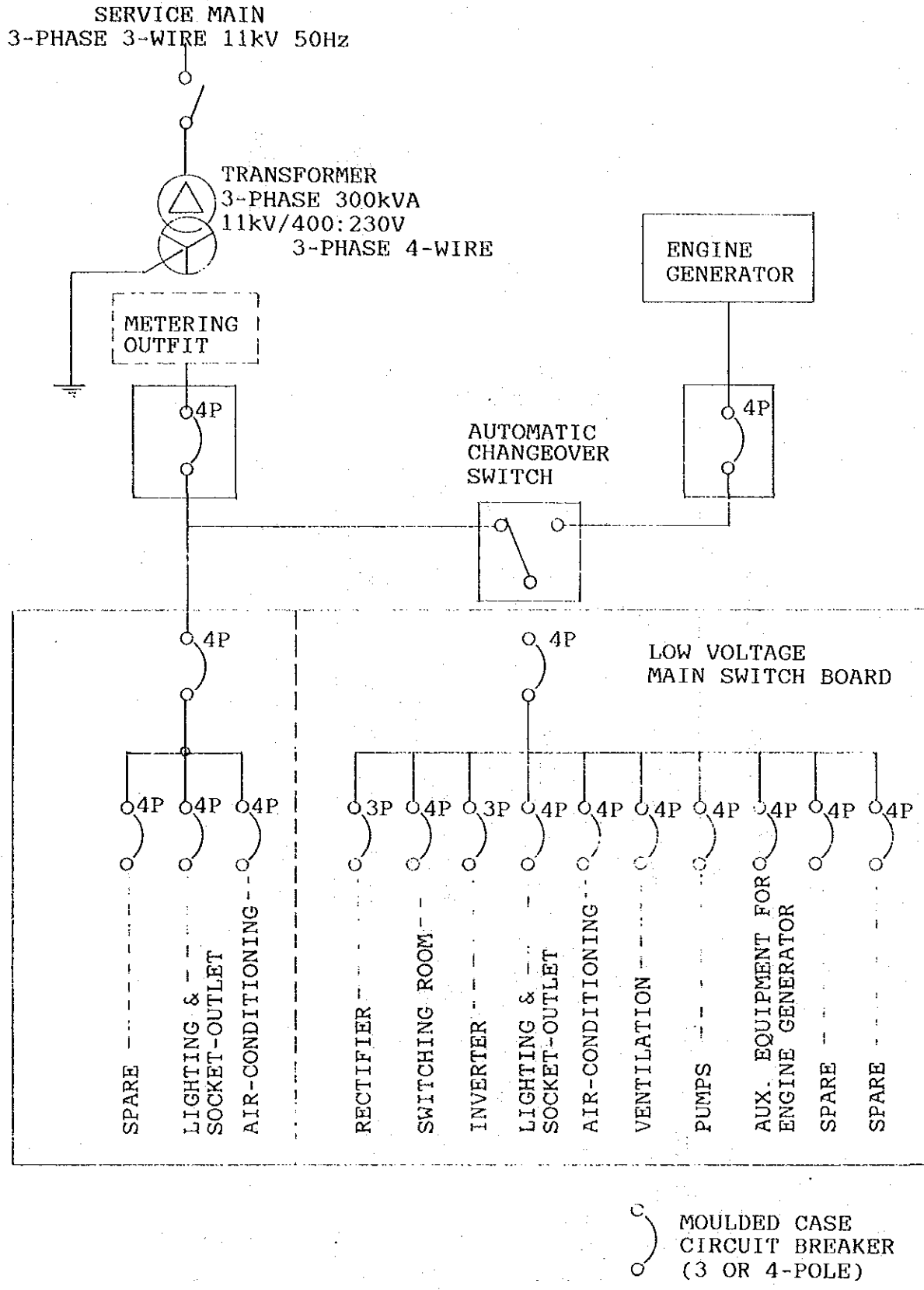


FIG-18 ELECTRICAL POWER SCHEMATIC DIAGRAM



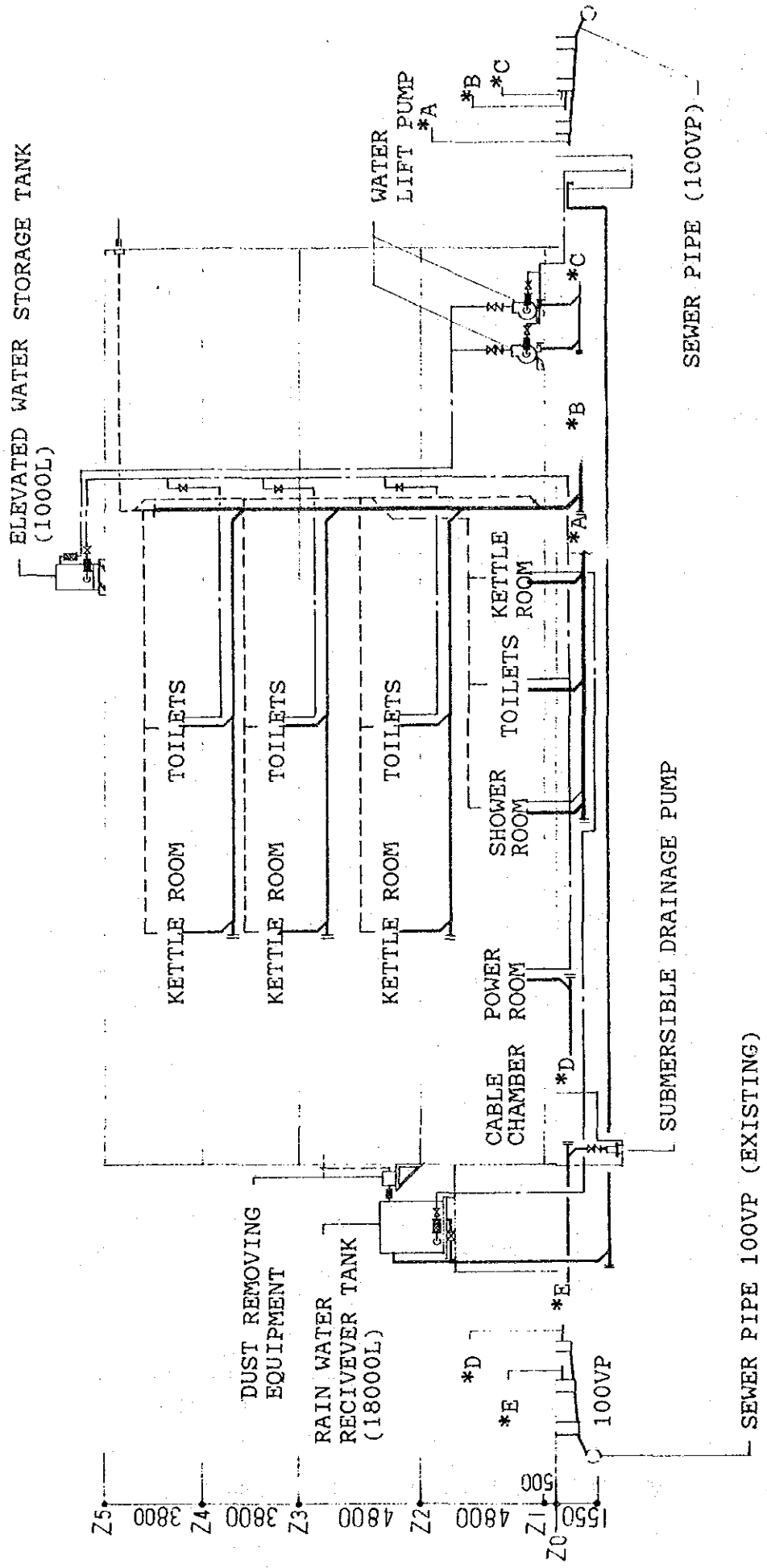
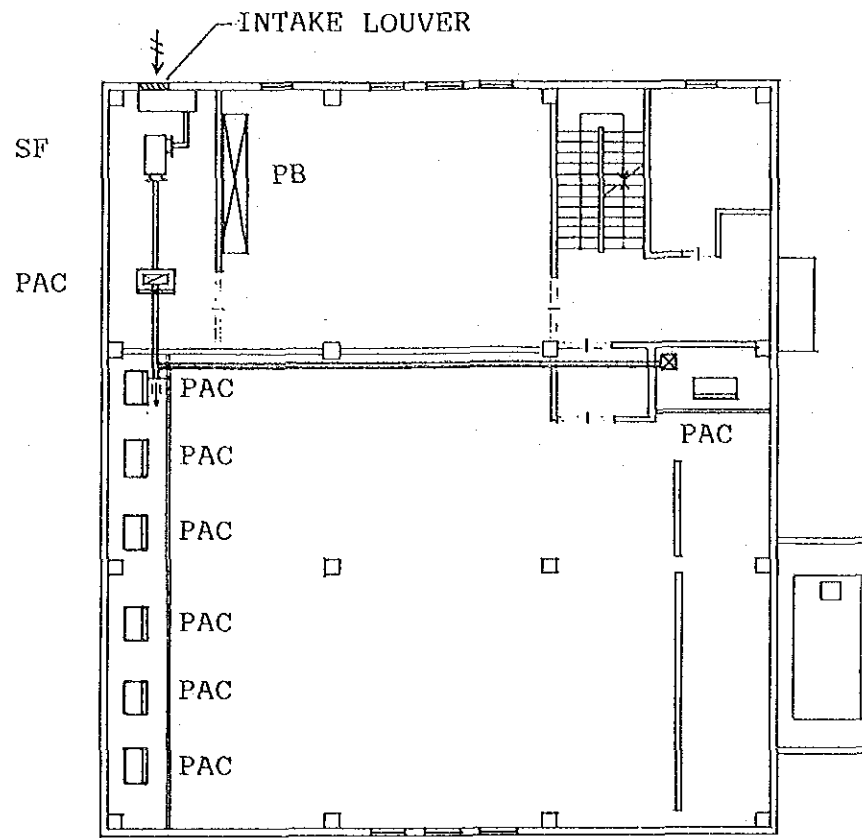
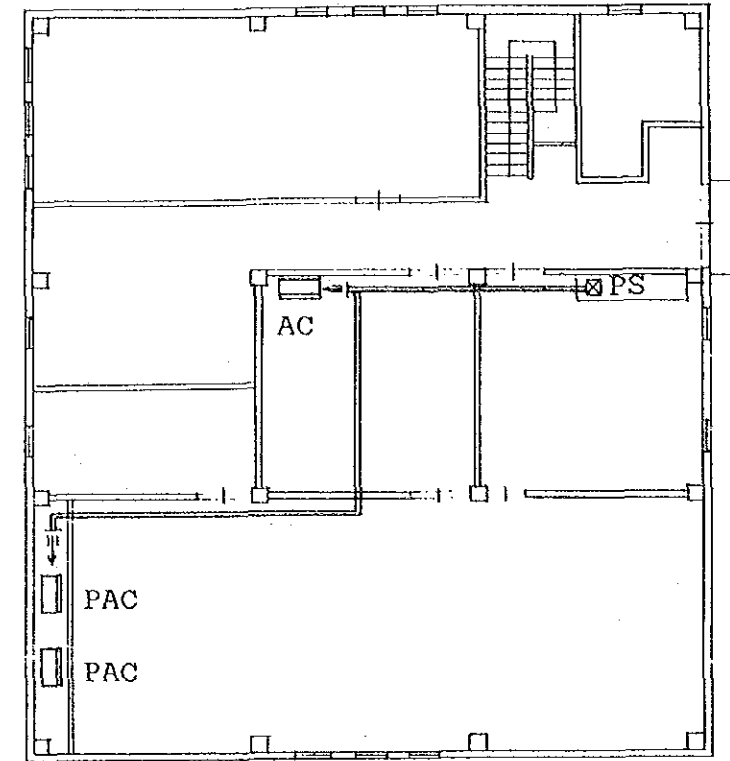


FIG-19 PLUMBING DIAGRAM



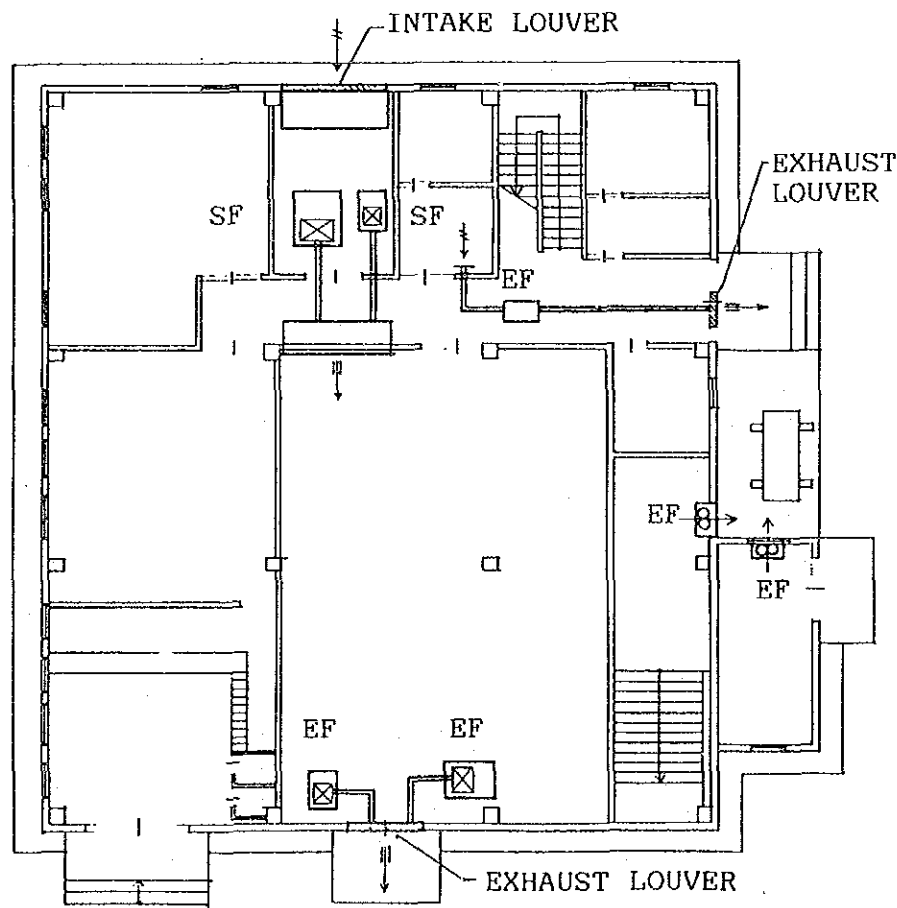


FIRST FL.

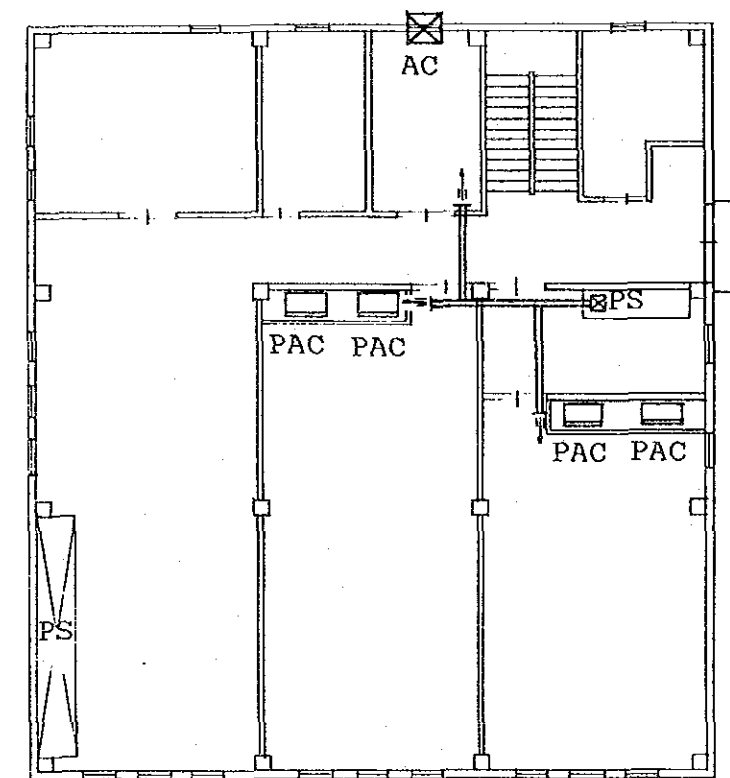


THIRD FL.

- PAC : PACKAGE AIR-CONDITIONER
- AC : WALL MOUNTED TYPE AIR-CONDITIONER
- SF : SUPPLY AIR FAN
- EF : EXHAUST AIR FAN
- PB : POWER BOARD
- PS : PIPE SPACE



GROUND FL.



SECOND FL.

FIG-20 AIR-CONDITIONING AND VENTILATION EQUIPMENT LAYOUT



5-4 Construction Budget

Expenses estimated for the works to be done by the Maldives side are given below for the sake of reference.

1)	Malé Telecommunication Centre Building	
	- Site clearance	6,800 Rf
	- Fencing	11,600 Rf
	- High voltage switch gear in the power station	133,300 Rf
2)	Ari Atoll Telecommunication System	
	- Site clearance	42,500 Rf
	- Project management	19,300 Rf
3)	Malé Telephone System	
	- Public announcement of new numbering system for telephone	15,000 Rf
	- Project management	20,200 Rf
	- Cut over	2,800 Rf
	<hr/>	
	Total	251,500 Rf



## CHAPTER 6 IMPLEMENTATION PLAN





## CHAPTER 6 IMPLEMENTATION PLAN

### 6-1 Implementation Plan

The implementing body and party to the contract for design and construction of the Project will be POSTEL.

The time for implementation of this Project will require, counting from the conclusion of the Exchange of Notes, including design development and tendering procedures, 25.5 months. However this duration is not compatible with the policy of one year budgets of Japan's Grant Aid. As such the individual construction schedule for the three components of the Project are given below;

Malé Telecommunication Centre	20.5 months
Ari Atoll Communication System	21 months
Malé Telephone System	22 months

Schedule bar chart of the components is shown on FIG-21 on the next page.

### 6-2 Demarkation of the Project

#### 1) Works to be borne by Japan's Grant Aid

##### i) Telecommunication Centre Building

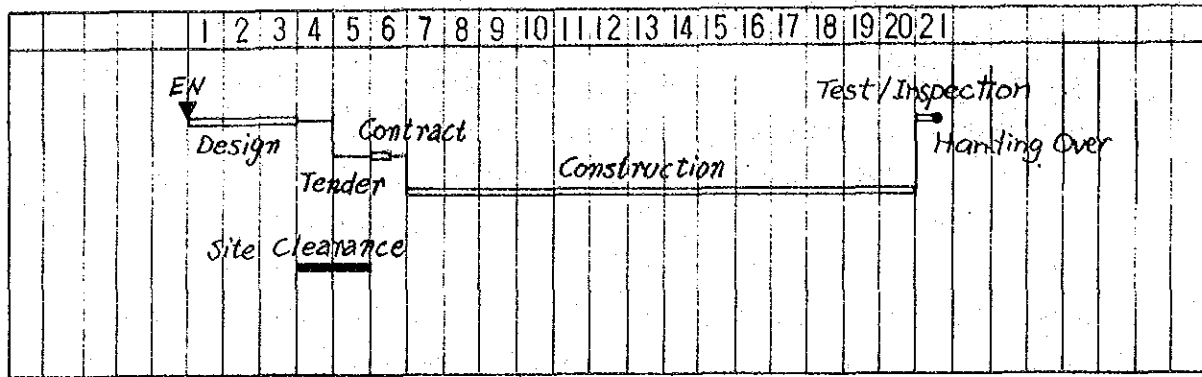
The following works will be borne by the Grant

##### a. Construction of the Building

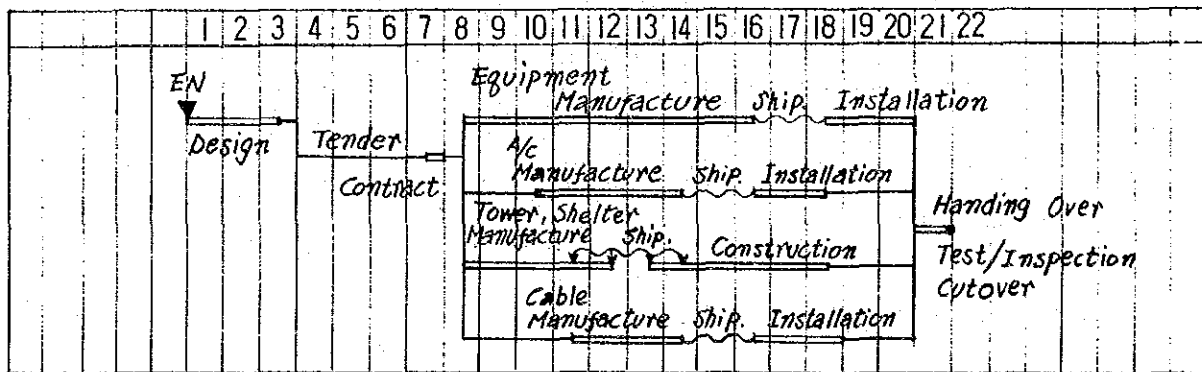
##### b. External Works

Fencing around the Site and pavement within the site

MALE TELECOMMUNICATION CENTRE BUILDING



ARI ATOLL COMMUNICATION SYSTEM



MALE TELEPHONE SYSTEM

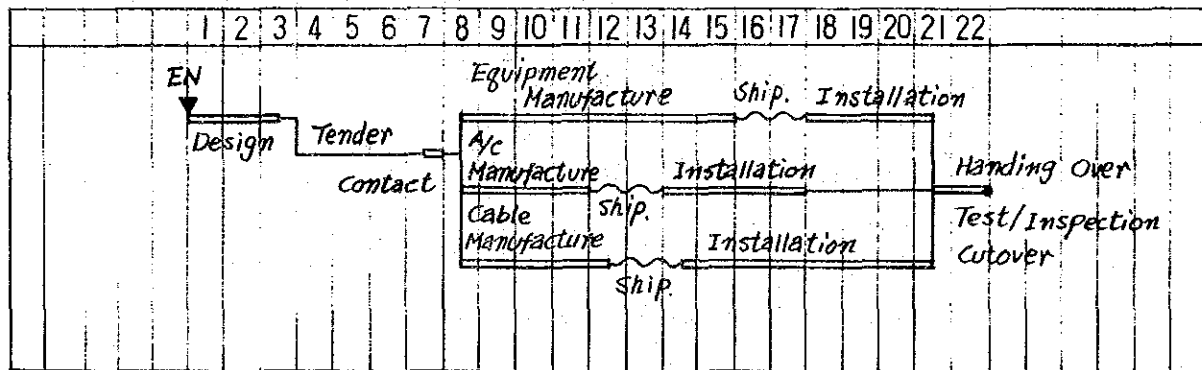


FIG-21 TENTATIVE TIME SCHEDULE

c. Building Equipment Work

1 Electricity

Including laying of power line from the generator station to the high tension switch gear inside the Centre.

2 Plumbing

Including well boring

3 Air-conditioning and ventilation

Air-conditioning shall be limited to the telecommunication equipment rooms.

ii) Telecommunication Equipments

All works including installation and wiring of the equipments.

2) Works and Items to be borne by the Maldivian Government

i. Telecommunication Center Building

a. Site

Acquisition, grading and leveling of the land.

b. External Work

Removal of the existing wall facing to roads erection of new walls between the adjoining land and gardening.

c. Installation of high tension switch gear, at the generator of the Malé Electricity Board, for branching the power line for the Centre.

d. All furnitures and other incidental office equipments as desks chairs, cabinets etc. are to be provided.

ii. Telecommunication Equipments

- a. Acquisition and grading of land for erecting and installing the antenna tower and equipment for the inter-atoll telecommunication system. Providing for space within the Island Office for the same.
- b. User lines and telephone sets for the Malé telephone system.
- c. Work required at the existing telephone exchange when switching over subscribers.

3) Common Expense

- a. Bank Fees  
Fees required for making the Banking Arrangement and issuing the Authorization to Pay shall be borne by the Maldivian side.
- b. Import of Materials and Equipment  
All transport cost including internal transportation of materials and equipments to be provided by the Grant shall be borne by the Grant. Custom clearance at the receiving port and tax exemption of the materials and equipments shall be facilitated by the Maldivian side.
- c. Visas and Exemption of Fiscal Levies  
The Maldivian side shall provide for necessary visas and work permits to all Japanese nationals working for the implementation of the Grant and exempt them from any custom duties, internal taxes and other fiscal levies that may be imposed upon them in the Republic of Maldives.
- d. Operation and Maintenance  
The Maldivian side shall operate and maintain the facility and equipment provided by the Grant, properly and effectively.
- e. Accommodation of Data etc.  
POSTEL shall provide all necessary data concerning the existing telecommunication systems for the purpose of detailed design and facilitate the use of the Cable & Wireless antenna tower for carrying out propagation tests.

The Maldivé side shall expedite the smooth implementation of the construction work by giving cooperation in securing the temporary occupancy of roads, hiring of boats, assistance in off loading of materials and transportation of large goods.

f. Others

Any cost arising in implementing the construction of facilities as well as transport and installation of materials and equipment for the Project which is outside the scope of the Grant shall be borne by the Maldivé side.

6-3 Maintenance supervision plan

i) Operation and maintenance (O & M) staffs

Providing telecommunication services of a good quality through a continuous and stable operation of telecommunication facilities requires assignments of well trained staffs. Necessary number of O&M staff for various facilities introduced in this plan is as follows:

- Inter-atoll telecommunication facilities

Telephone terminal

Operation of the terminal is commissioned to the island office but the itinerary maintenance is carried out by POSTEL.

- Mahibadhoo facilities

A power technician stations at the island while radio equipment is maintained on non-attendant basis through remote supervision from Malé telecommunication centre.

Malé telecommunication centre

24-hour maintenance is carried out by 9 technicians on 3-2-1-1 shift duty basis.



Required number of persons to be newly employed is as follows.

- Inter-atoll telecommunication facilities

Radio facilities	10 persons (technicians)
- Male telephone facilities	
Telephone switching equipment	8 persons (technician)
" " "	21 persons (operator)
Billing machine	-
Telephone cable facilities	3 persons (technician)
Building equipment	2 persons ( " )
Airconditioning equip. etc.	

iii) Training of Operation and Maintenance Staffs

Number of O&M staffs to be assigned for new telecommunication facilities to be installed in this project totals 91 persons as mentioned above. Excluding operators, all the remaining 58 persons are of technical staffs.

Although number of technical staffs to be newly employed amounts to 21 persons excluding those requiring only a considerably simple training for O&M works, i.e., those for telephone, cable facilities, power supply equipment, line test desk, etc, the balance is 10 persons.

In the Maldives, there is a vocational school for training of technicians and it is considered to be closest to telecommunication sector, as it has an electronics course.

The electronics course consists of two classes, one is an introductory class and the other one for two years. The former was started in 1984, while the latter is scheduled to start in 1985. According to POSTEL they will be able to secure at least 10 persons for new technical staffs from the graduates of the electronics course. However, training in the electronics course is not always sufficient for O&M of telecommunication facilities.

In other words, training for telecommunication technique is indispensable for the graduates from the electronics course, hence POSTEL is requested to make a maximum effort to training of new employees, and POSTEL acknowledge this necessity fully.

Since a training room together with a set of basic training equipment and materials is provided in the telecommunication centre building in this project, POSTEL should use these facilities effectively to give a basic training, supplemental training for improvement of technical knowledge of existing employees and thereby to establish a sound O&M organization.

Compositions, circuitry, etc. of the telecommunication facilities, accordingly the O&M procedures of the equipment to be introduced differ appreciably manufacturer by manufacturer. That is, the O&M procedures for facilities to be introduced in this project differ from those for the existing facilities, therefore, it will be necessary to ask the manufacturer to give an appropriate guidance to O&M, including instruction of operating procedures for about a half to one month period guidance to employees who have completed the basic training or existing employees.

Good and continuous communication services by the facilities introduced in this project are insured only through carrying out the basic training by POSTEL and the O&M guidances furnished by manufacturers.



iv) Operation and Maintenance costs for facilities to be provided  
Annual operation costs for the facilities are estimated as follows:

- Inter-atoll communication facilities

Salaries with overhead	Rf 110,000
Charges for electricity	Rf 162,000
Cost of fuel for D.E.G.	Rf 130,000
Cost of operation and maintenance parts	Rf 22,000
Total	<u>Rf 424,000</u>

- Malé telephone facilities

Salaries with overhead	Rf 892,000
Charges for electricity	Rf 921,000
Cost of fuel for Standby D.E.G.	Rf 2,000
Cost of spares for O&M	<u>Rf 104,000</u>
Total	Rf 1,919,000

v) Study of income

Results of assessment of income on the basis of estimated traffic and of present tariff system are summarized below.

- Inter-atoll communication facilities	Rf 90,000 p. annum
- Malé telephone facilities	<u>Rf 5,000,000 p. annum</u>
Total	Rf 5,090,000

Summing up the O&M costs and incomes by the inter-atoll communication and by Malé telephone facilities expected net earning will be Rf. 2,747,000 (96 million yen.)

6-4 Procurement

All the materials required for installation work of telecommunication facilities shall be imported.

All construction materials including aggregates required for the building and for civil works related to the installation work of telephone cables and equipment shelters as well as tower construction shall be imported. Unskilled labourers can be hired locally.

However as skilled labour and technicians are in short supply they must be dispatched from Japan.

## CHAPTER 7 PROJECT EVALUATION



## CHAPTER 7 PROJECT EVALUATION

In an 'island nation' like the Maldives telecommunication can be considered as one of the 'Basic Human Needs'. On the other hand the rapid exchange of information and data necessary for a modern national development cannot be achieved without telecommunications. However, in the Maldives, although there exists a great demand for telephone communications in the inhabited islands (other than the 'resort islands') and its necessity is acknowledged, because of the great amount of investment required for establishing such a communication system to the islands, the demand has not been answered.

It should be meaningful, under the above circumstances, for the Telecommunication Development Project to be implemented by Japan's Grant Aid. Especially the communication system to the islands, separated by great stretches of ocean, should contribute unmeasurably in upgrading the welfare of the people and assisting in the development of the region. As an example, greater amount of communications would facilitate a more economic and efficient shipment of fish, agricultural and daily goods. It would also supplement other infrastructures such as transport, medical care and education. (medical advice can be obtained from doctors in Malé, frequent instructions to teachers residing in the islands would help even the quality of education). On the other hand upgrading the Malé telephone system will strengthen the function of Malé, as the capital of the nation, and give boost to the tourist industry which is a major source of foreign currency. Furthermore, because almost all of the political and economical activities of the Maldives is concentrated in Malé, the improvement of its telephone services should, by further vitalizing these activities, benefit not only to the residents of Malé but to the whole nation.



## **CHAPTER 8 CONCLUSION AND RECOMMENDATION**





## CHAPTER 8 CONCLUSION AND RECOMMENDATION

The implementation of the Telecommunication Development Project should play an important role in the development of the remote areas of the nation and as part of the basic infrastructure contribute in the overall advancement of the nations socia-economic structure.

This Project is essential in establishing the foundation for the development of telecommunications in the Maldives. The Ari Atoll Communication System while contributing greatly to the welfare of the inhabitants shall also provide a base for future telecommunication means between other atolls. On the other hand the Malé Telephone System is not only a basic need for the capital but will become the nucleus for telecommunications of the whole nation.

However, the future of telecommunications development in the Maldives is not completely free of problems. The organization, operation, maintenance and charging system of POSTEL, the implementing body, still leaves room for improvement. The training of technical staff, able to operate the new equipments introduced by the Project, is also imperative. In view of the above, POSTEL and the Maldives Government are requested to increase the budget and staff number of the telecommunications sector and, by utilizing the Training Room provided in the Centre, to upgrade the overall operation and maintenance capability of telecommunication facilities. POSTEL is also requested to collect data from the Ari Atoll Communication System and utilize this data for planning the expansion of the system to other islands.



## APPENDICES



APPENDIX-1

MEMBERS LIST AND SCHEDULE OF THE BASIC DESIGN STUDY MISSION TEAM

1. MEMBERS OF THE FIELD SURVEY

<u>NAME</u>	<u>TEAM STATUS AND AFFILIATION</u>
<u>Mr. Seikou FUKUDA</u>	<u>Team Leader</u> Economic Cooperation Bureau Ministry of Foreign Affairs
<u>Mr. Shimpei KOBAYASHI</u>	<u>Telecommunications Planning</u> International Affairs Bureau Nippon Telegraph & Telephone Public Corporation (NTT)
<u>Mr. Yoshifusa SHIKAMA</u>	<u>Project Coordinator</u> Grant Aid Department, Japan International Cooperation Agency
<u>Mr. Kazunari SHIRAI</u>	<u>Facility Planning</u> Architect Nippon Sogo Architects & Engineers (NSK)
<u>Mr. Hideaki OTA</u>	<u>Architectural Design</u> Architect Nippon Sogo Architects & Engineers (NSK)
<u>Mr. Tatsuo AKIKUSA</u>	<u>Structural Engineering</u> Engineer Nippon Sogo Architects & Engineers (NSK)
<u>Mr. Katsuhiro AOKI</u>	<u>Building Equipments Design</u> Engineer Nippon Sogo Architects & Engineers (NSK)

(to be continued on next page)

<u>NAME</u>	<u>TEAM STATUS AND AFFILIATION</u>
<u>Mr. Haruo ISHIZUKA</u>	<u>Radio Transmission System Planning</u> Engineer Nippon Telecommunications Consulting Co., Ltd. (NTC)
<u>Mr. Nobuo NAKAJIMA</u>	<u>Switching System Planning</u> Engineer Nippon Telecommunications Consulting Co., Ltd. (NTC)
<u>Mr. Kenichi YOKOO</u>	<u>Outside Plant System Planning</u> Engineer Nippon Telecommunications Consulting Co., Ltd. (NTC)

2. SCHEDULE OF THE BASIC DESIGN STUDY TEAM

DATE	DAY	ACTIVITY
Oct. 20	Sat.	- Mr. KOBAYASHI, Mr. SHIRAI, Mr. OTA, Mr. AKIKUSA, Mr. AOKI, Mr. ISHIZUKA, Mr. Nakajima Lv. Tokyo Ar. Colombo Mr. SHIKAMA joins the team in Colombo)
21	Sun.	- Lv. Colombo Ar. Malé  - Courtesey call to Department of Post & Telecommunications (POSTEL)
22	Mon.	- Courtesey call to Ministry/Authorities Concerned  - <u>1st Discussion</u>  o Explanation of the inception report  o Discussion of schedule of the survey  - <u>2nd Discussion</u>  o Confirmation of schedule and Counterparts  o Hearing of the Maldivian side's plan and request  - Courtesey call to Ministry/Authorities concerned  - Survey of the proposed site for the Malé Telecommunication Centre
(23	Tue.)	- Survey of Radio Receiving Station on Villingili Island
24	Wed.	- Collection of data at Ministry/Authorities concerned  - Survey of existing Exchange Station and radio facilities  - Discussion within the Team and with POSTEL  - Mr. FUKUDA (Team Leader), Mr. YOKOO Lv. Tokyo Ar. Malé

DATE	DAY	ACTIVITY
25	Thu.	- Discussion within the Team - <u>3rd Discussion</u> o Priority of implementation of the plan - Survey of existing Exchange Station and proposed site for the Centre
26	Fri.	- Study of collected data
27	Sat.	- Lv. Malé Ar. Gan Island - Survey of facilities on Gan Island - Discussion with POSTEL
28	Sun.	- Survey of Fedhoo, Naradhoo, Hitadhoo Islands of Addu Atoll - Lv. Gan Island Ar, Malé
29	Mon.	- Discussion within the Team - Collection of data at Ministry/Authorities concerned - Discussion with POSTEL
30	Tue.	- Mr. FUKUDA, Mr. SHIKAMA, Mr. AKIKUSA, Mr. ISHIZUKA survey Mahibadhoo, Omadhoo, Hannyammedhoo Islands of Ari Atoll - Discussion with POSTEL by remaining Team members
31	Wed.	- <u>Signing of Minutes of Discussion</u> (Mr. FUKUDA, Mr. KOBAYASHI and Mr. SHIKAMA)
Nov. 1	Thu.	- Lv. Malé Mr. Colombo
2	Fri.	- Courtesey call and report to Embassy of Japan and JICA Office in Colombo
3	Sat.	- Lv. Colombo
4	Sun.	Ar. Tokyo (Mr. SHIRAI, Mr. OTA, Mr. AKIKUSA, Mr. AOKI)



DATE	DAY	ACTIVITY
Nov. 1	Thu.	- Lv. Malé Ar. Singapore
2-3	Fri.-Sat.	- Survey of construction situation
4	Sun.	- Lv. Singapore Ar. Tokyo
(Mr. ISHIZUKA, Mr. NAKAJIMA, Mr. YOKOO)		
Nov. 1	Thu.	- Survey of telecommunication situation in malé
2	Fri.	- Study of collected data
3	Sat.	- Survey of existing telecommunication facilities in Malé
		- Preperation for survey of Ari Atoll
4	Sun.	- Mr. ISHIZUMA, Mr. NAKAJIMA leave Malé for survey of Ari Atoll (Mafushi, Lhohi, Dagnethi, Maamigili)
		- Mr. YOKOO, survey of line facilities
5	Mon.	- Mr. ISHIZUKA, Mr. NAKAJIMA, survey of Ari Atoll (Fenfushi, Mandhoo, Himandhoo, Feridhoo, Uklhas)
		- Mr. YOKOO Lv. Malé
6	Tue.	- Mr. ISHIZUKA, Mr. NAKAJIMA, survey of Ari Atoll (Thodhoo, Rasdhoo, Kuramathi)
		- Mr. YOKOO Ar. Tokyo
7-11	Wed.-Sun.	- Collection of additional data and study of collected data
12	Mon.	- Mr. ISHIZUKA, Mr. NAKAJIMA Lv. Malé
13	Tue.	- Mr. ISHIZUKA, Mr. NAKAJIMA Ar. Tokyo

MINUTES OF DISCUSSION  
ON  
THE TELECOMMUNICATION DEVELOPMENT  
PROJECT IN  
THE REPUBLIC OF MALDIVES

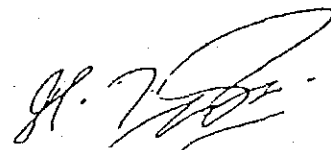
In response to the request made by the Government of the Republic of Maldives for the Telecommunication Development Project (hereinafter referred to as "The Project"), the Government of Japan has sent, through the Japan International Cooperation Agency (hereinafter referred to as "JICA"), a team headed by Mr. Seiko Fukuda, Grant Aid Division, Economic Cooperation Department, Ministry of Foreign Affairs, to conduct a basic design study from October 21st to November 13th, 1984. The team has carried out a field survey, held a series of discussions and exchanged views with the authorities concerned of the Project.

As the result of the study and discussions, both parties have agreed to recommend to their respective Governments to examine the results of the survey attached herewith towards the realization of the Project.

October 31st, 1984  
Male'

福田晴耕

SEIKO FUKUDA  
Team Leader  
Basic Design Study Team  
JICA



IBRAHIM HUSSAIN ZAKI  
Senior Under Secretary  
Ministry of Foreign Affairs

ATTACHMENT

1. The objective of the project is to improve the Maldives telecommunication system and its network.
2. The Japanese Study Team will convey to the Government of Japan the desire of the Maldivian side that the Government of Japan takes necessary measures to cooperate in implementing "the Project" and provides the building and other items listed in Annex I within the scope of Japanese Economic Cooperation Programme in Grant form.
3. The Government of Maldives has understood Japan's grant aid system explained by the team which includes the principle of using of Japanese consultant firm and Japanese General Contractor for implementation of "the Project".
4. The Government of Maldives will take necessary measures listed in Annex II on condition that the Grant assistance by the Government of Japan is extended to "the Project".

ANNEX I

Items requested for "the Project" by the Government of Maldives.

1) facility

- (a) Male' Telecommunication Center to accomodate the function of Training, inter-atoll telecommunication network, Male' telephone network, maritime telecommunication and administration.

\* location of the center is shown on Annex III,

2) Equipment in the Center

- (a) Radio terminal equipment and concentrator for inter-atoll network and Male' exchange.

3) Ari Atoll Telecommunication

- (a) Facility and equipment for Ari Atoll telecommunication which shall form a part of the inter-atoll communication network.

ANNEX II

31

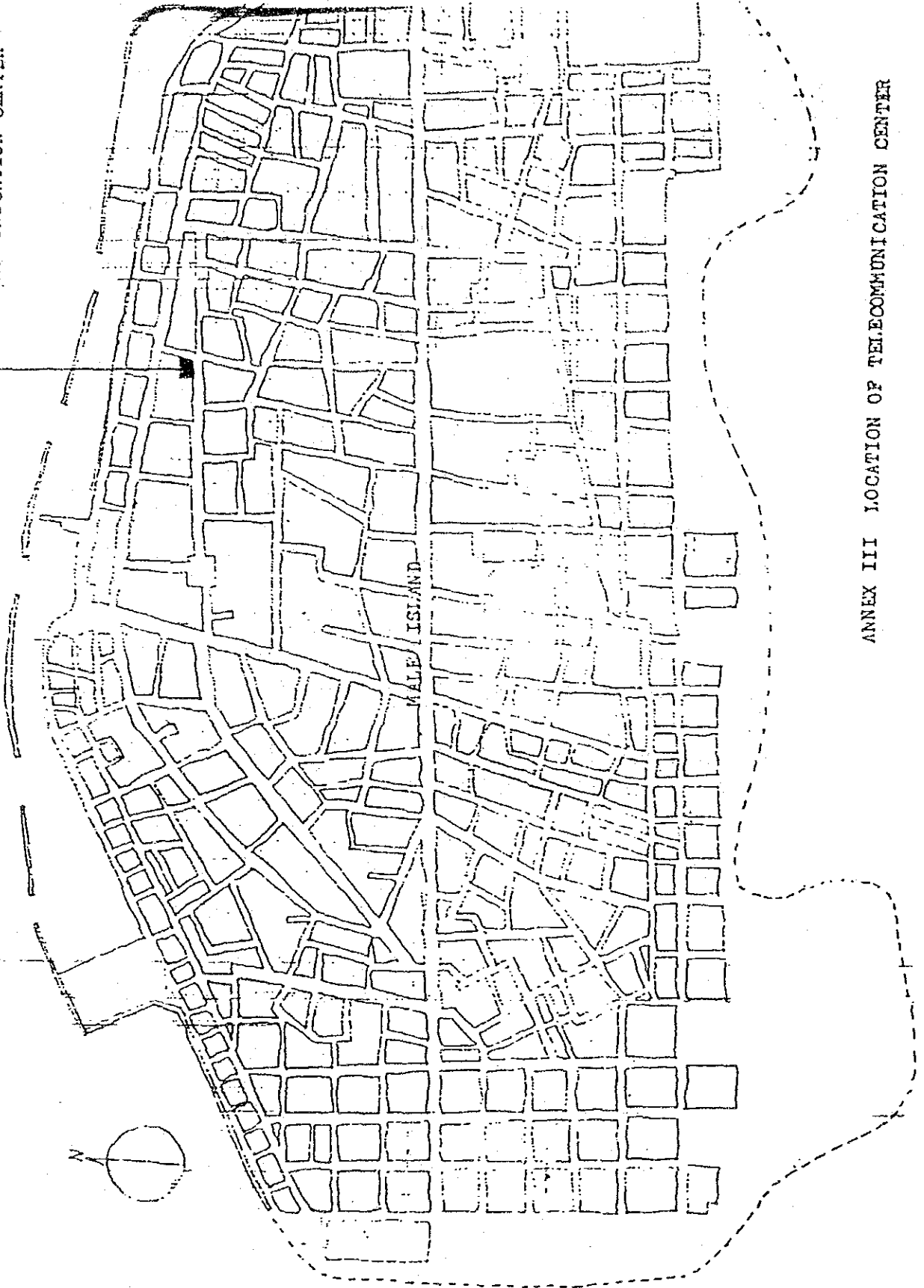
Following arrangements are required to be taken by the Government of Maldives.

1. To secure a lot of land necessary for the construction of building and to clear, fill and level the site as needed before the start of the construction.
2. To provide necessary data and information for basic design.
3. To provide facilities for distribution of electricity, sewage and incidental facilities to the proposed project site.
4. To ensure prompt unloading, tax exemption, customs clearance at ports of disembarkation in Maldives, and prompt internal transportation therein of the products purchased under the grant.
5. To maintain and use properly and effectively that facilities constructed and equipment purchased under the grant.
6. To undertake incidental civil work such as gardening, fencing, gate and exterior lighting, if needed.

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9/11  
Ri

PROPOSED SITE  
FOR  
TELECOMMUNICATION CENTER



ANNEX III LOCATION OF TELECOMMUNICATION CENTER

APPENDIX-3

MEMBERS LIST AND SCHEDULE OF THE DRAFT REPORT EXPLANATION TEAM

1. MEMBERS OF THE TEAM

<u>NAME.</u>	<u>TEAM STATUS AND AFFILIATION</u>
<u>Mr. Shimpei KOBAYASHI</u>	<u>Team Leader</u>  International Affairs Bureau Nippon Telegraph & Telephone Public Corporation (NTT)
<u>Mr. Shigeru TAKAGI</u>	<u>Project Coordinator</u>  Grant Aid Department Japan International Cooperation Agency (JICA)
<u>Mr. Kazunari SHIRAI</u>	<u>Facility Planning</u>  Architect Nippon Sogo Architects & Engineers (NSK)
<u>Mr. Haruo ISHIZUKA</u>	<u>Telecommunication Equipment Planning</u>  Engineer Nippon Telecommunications Consulting Co., Ltd. (NTC)

2. SCHEDULE OF THE DRAFT REPORT EXPLANATION TEAM

DATE	DAY	ACTIVITY
(Mr. KOBAYASHI, Mr. TAKAGI)		
Feb. 9	Sat.	- Lv. Tokyo
10	Sun.	-Ar. Colombo
11	Mon.	- Courtesey call to Embassy of Japan and JICA Office in Colombo - Mr. SHIRAI, Mr. ISHIZUKA Lv. Tokyo Ar. Malé
12	Tue.	- Courtesey call to Ministry of Foreign Affairs - Discussion with POSTEL o Survey of new proposed site
13	Wed.	- Explanation of Draft Final Report at the MOFA. - Discussion with POSTEL - Discussion with Ministry/Authorities concerned - Collection of data concerning new proposed site
14	Thu.	- Discussion with POSTEL o Confirmation regarding the adoption of the new proposed site as the site for the Centre
15	Fri.	- Survey of site for Mahibadhoo Base Station
16	Sat.	- Discussion concerning the Minutes of Discussion
17	Sun.	- Signing of the Minutes of Discussion by Mr. Ibrahim Hussain ZAKI, Senior Undersecretary of MOFA, and Mr. Shimpei KOBAYASHI, Team Leader
18	Mon.	- Lv. Malé
19	Tue.	- Ar. Tokyo



MINUTES OF DISCUSSIONS

The Draft Report of the Basic Design Study on the Telecommunication Development Project in Republic of Maldives.

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At the request of the Government of the Republic of Maldives for grant aid for the Telecommunication Development Project, the Government of Japan dispatched a Mission to carry out the Basic Design Study (hereinafter referred to as "the Study") on the Telecommunication Development Project ( hereinafter referred to as "the Project") through Japan International Cooperation Agency (JICA) from October 21st to November 13th, 1984.

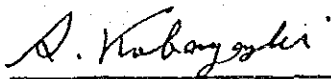
The Mission carried out a field survey and had a series of discussions with the authorities concerned of the Government of the Republic of Maldives.

As a result of these survey and discussion, JICA prepared and submitted a Draft Final Report on the Study and dispatched a Mission to explain and discuss on this Report starting from February 11th to February 19th 1985.

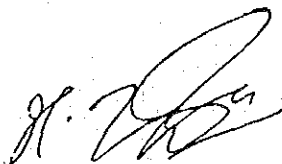
Both parties had a series of discussions on the Report and have agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined toward the realization of the Project.

February 17th, 1985.

Male'



Mr. Simpei KOBAYASI  
Team Leader  
Japanese Survey Team  
JICA



Mr. Ibrahim Hussain Zaki  
Senior Under Secretary  
Ministry of Foreign Affairs  
MALE'

*JD*

MAJOR POINT OF UNDERSTANDING

BASIC DESIGN

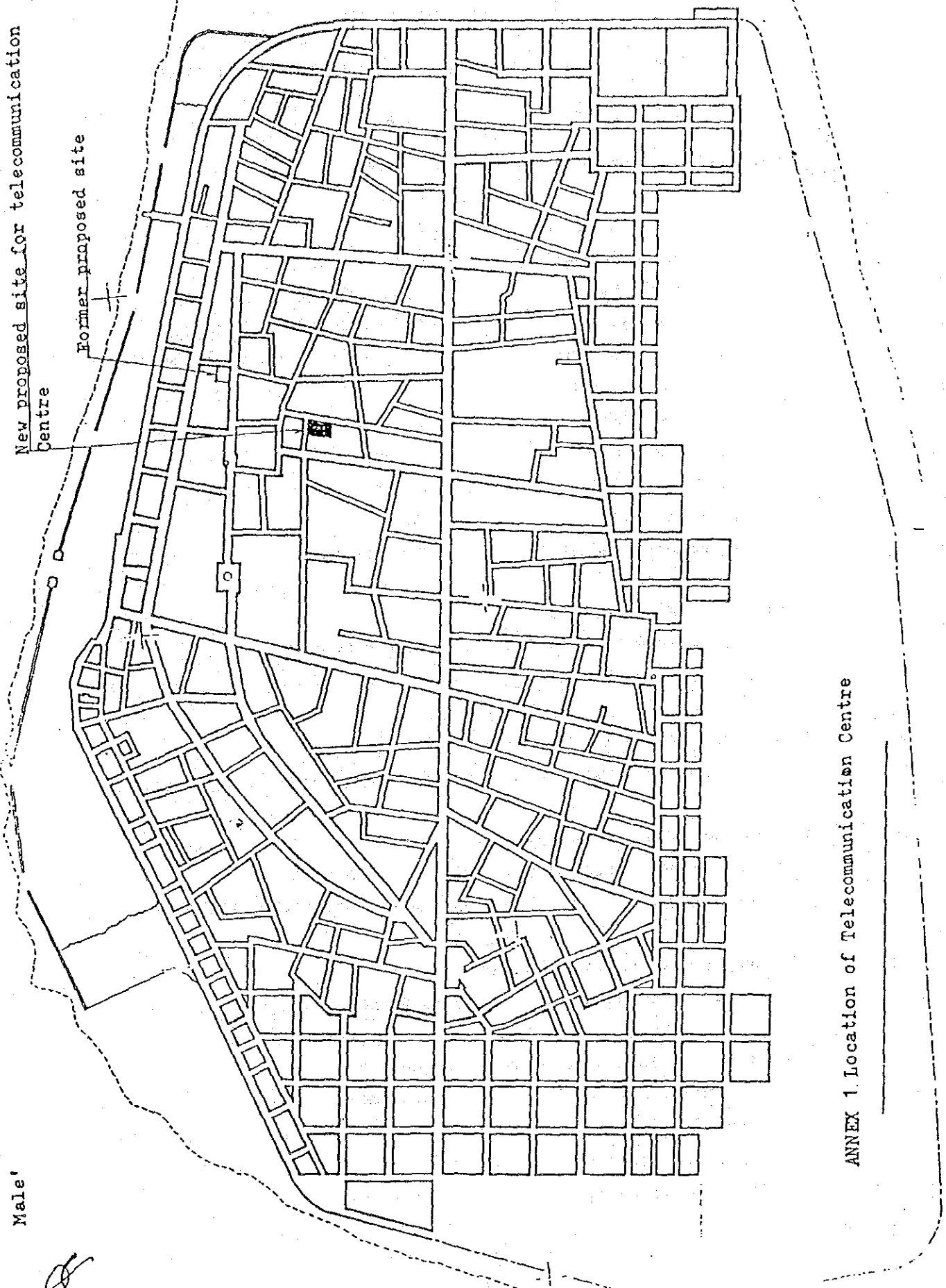
1. The Government of Maldives has proposed to change the former designated site for Male' Telecommunication Centre building to a new one (Refer to attached map; Annex I ).

After observing and studying the new site, Japanese side has agreed with the Maldivian proposal.

2. The Government of Maldives principally has agreed to the basic design proposed in Draft Final Report.
  3. The Final Report (10 copies in English) on the Project will be submitted to Maldivian side by the end of the April 1985.
- JD*

Male'  
New proposed site for telecommunication  
Centre

Former proposed site



ANNEX 1. Location of Telecommunication Centre

APPENDIX-5

LIST OF CONCERNED PERSONS MET BY THE MISSION TEAM

Department of Posts and Telecommunications

Mr. Riluvan Shareef	Director
Mr. Hussain Shareef	Dep. Director
Mr. Mohamed Manik	Asst. Director
Mr. Moosa Didi	Senior Engineer (Radio)
Mr. C. Khanthasamy	Technical Officer (Exchange)
Mr. Hussain Manik	Overseer (Outside Plant)
Mr. Ahmed Solih	Engineer
Mr. Jaufar Jamaal	Project Officer
Mr. Mohamed Shiraj	Administrative Officer
Mr. Moosa Hassen	Foreman
Mr. Mohamed Vajeeh	Postmaster

Ministry of Foreign Affairs

Mr. Ibrahim Hussain Zaki	Senior Undersecretary
Mr. Mohamed Shareef	Director of External Resources

Department of Tourism

Mr. Ahamed Zahir	Director General
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Ministry of Fisheries

Hon. Abdul Sattar Moosa Didi	Minister
Mr. Shakir	Asst. Director of Fisheries

Ministry of Transport and Shipping

Hon. Ahamed Mujuthaba	Minister
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Department of Information and Broadcasting

Mr. Mohamed Waheed	Director
--------------------	----------

Department of Finance

Mr. Ismail Fathy	Director
------------------	----------

Department of Physical Planning and Design

Mr. Mohamed Shafeeg Asst. Director

Maldives Electricity Board

Mr. Abdul Shakoor Director

Ministry of Home Affairs and Social Services/Male Municipality

Hon. Umar Zahir Minister/Acting Director

Ministry of Planning and Development

Mr. Mohamed Shihab Undersecretary

Mr. Hassan Sobir Undersecretary

Mr. Mohamed Saeed Undersecretary

Ministry of Education

Mr. Asima Shakoor Undersecretary

Department of Meteorology

Mr. Abdullahi Majeed Director

Water and Sanitation Authority

Mr. Abdul Majeed Mahir Dep. Director

Mr. Mohamed Ibrahim Asst. Manager

State Trading Organization

Mr. Ibrahim Shakeeb Dep. Director

Mr. Ismail Ibrahim Manager (Trade Information Unit)

Moldives Transport and Contracting Co.

Mr. Adams Saleem Director

Department of Public Works and Labour

Mr. Abdullah Kamaludeen Director

Ministry of Atolls Administration

Hon. Abdulla Hameed Minister

Mr. Hussain Hameed Minister

Vocational Training Centre in Male

Mr. Mohamed Hameed                      Chief Coordinator

Voice of Maldives

Mr. Ahmed Manik                      Chief Engineer

TV Maldives

Mr. Hussain Rasheed                  Technician

Mr. Mohamed Asif                      Technician

Maldives Monetary Authority

Mr. Ibrahim Saleem                    Manager (Research & International  
Organisation Division)

Maldives National Ship Management Ltd.

Mr. Abdulla Saeed                    Senior Executive

Maldives Airport Authority

Mr. Mohamed Amjad                    Asst. Director

APPENDIX-6

REFERENCE MATERIAL COLLECTED BY THE MISSION TEAM

1. Report Prepared for the Government of the Republic of Maldives on Telecommunication Development  
(UNDP/ITU, Sept. 1981)
2. The Economy of Maldives, Problems & Prospects  
(Ministry of Planning and Development, 1983)
3. Statistical Year Book of Maldives 1983  
(Ministry of Planning and Development)
4. Statistical Year Book of Maldives 1984  
(Ministry of Planning and Development)
5. Physical Development Plan for Malé Capital Region Proposals Paper  
(Office for Physical Planning and Design, Oct. 1983)
6. Urban Planning in Malé  
(Office for Physical Planning and Design, May 1984)
7. Telephone Directory 1983/1984 & Telex Directory
8. The Maldives : An Updating Economic Memorandum  
(South Asia Programs Department, World Bank, Jan. 1984)
9. Vocational Training Center Course Guides on  
Airconditioning/Refrigeration, Electricity and Electronics
10. Pilot Atoll Development Project, Alifu Atoll-Maldives  
(ESCAP, UNIDO, UNEP, ILO, FAO Joint Report, Nov. 1980)
11. Final Report Prepared for Asian Development Bank on Telecommunication Development in the Maldives  
(Mr. L. D. Bewley, Consultant for ADB, Oct. 1984)

12. Terminal Report on Tariffs for the Maritime Mobile Services in the Republic of Maldives  
(Asia Pacific Telecommunity, Aug. 1984)
13. Budget for Department of Posts and Telecommunications
14. Some Meteorological Data 1966-1983  
(National Meteorological Centre, Department of Meteorology)
15. Maldives, A Nation of Islands  
(Media Transasia Ltd., 1983)
16. Through Maldives  
(Novelty Press, 1984)



## APPENDIX-7 REFERENCE DATA

GDP per Capita, Telephone Density  
and Total Telephones (1/3)

Country	GDP/Capita (US\$)	Telephone Density	Total Telephones
Bangladesh	131	0.1	122,190
Ethiopia	121	0.3	100,783
Mali	162	0.1	8,485
Burundi	210	0.1	5,601
India	206	0.5	2,981,609
Sri Lanka	275	0.7	109,900
Pakistan	298	0.5	393,010
Sudan	393	0.4	68,503
Ghana	1,802	0.6	70,653
Kenya	400	1.3	216,674
Indonesia	568	0.4	600,643
Honduras	626	0.9	33,667
Zambia	591	0.5	32,659
El Salvador	755	1.8	86,316
Thailand	767	1.1	529,106
Philippines	784	1.2	624,101
Papua New Guinea	832	1.6	50,050
Morocco	707	1.1	241,100
Nigeria	808	0.7	708,390
Congo	1,100	0.6	8,899
Guatemala	1,155	1.4	97,670
Peru	1,368	0.7	129,742
Ecuador	1,562	3.2	290,200
Jamaica	1,345	6.2	124,258
Dominican Republic	1,188	3.0	175,054
Colombia	1,249	6.3	1,747,689

GDP per Capita, Telephone Density  
and Total Telephones (2/3)

Country	GDP/Capita (US\$)	Telephone Density	Total Telephones
Costa Rica	1,143	10.9	255,898
Syria	1,639	4.9	471,127
Korea, Rep. of	1,690	13.8	5,158,357
Malaysia	1,744	6.3	825,289
Panama	1,837	10.7	212,992
Algeria	2,134	3.3	606,869
Brazil	1,748	7.2	8,536,000
Mexico	3,356	7.4	5,411,108
Portugal	2,172	14.8	1,455,804
Argentina	5,437	10.7	3,041,475
Chile	2,908	5.2	595,108
South Africa	2,541	13.1	3,208,730
Yugoslavia	2,816	10.2	2,303,501
Uruguay	3,376	10.1	294,350
Venezuela	4,403	9.4	1,377,630
Greece	3,442	30.2	2,956,663
Hong Kong	5,235	35.0	1,822,846
Israel	4,360	32.1	1,302,000
Singapore	5,379	31.6	771,400
Ireland	4,879	20.8	720,000
Spain	4,871	32.8	12,350,058
Italy	6,232	36.3	20,444,047
New Zealand	7,579	58.8	1,875,538
United Kingdom	8,868	50.7	28,375,982
Japan	9,605	51.0	60,349,857

GDP per Capita, Telephone Density  
and Total Telephones (3/3)

Country	GDP/Capita (US\$)	Telephone Density	Total Telephones
Austria	8,716	42.1	3,177,944
Finland	10,196	52.2	2,511,306
Canada	11,674	64.7	15,741,723
Nether lands	9,894	54.4	7,769,115
Belgium	9,792	38.7	3,818,626
France	10,529	49.8	26,940,296
United States	12,591	78.7	181,893,000
Denmark	11,424	68.0	3,483,323
Germany, Fed. Rep	11,484	48.8	30,122,023
Norway	13,937	48.5	1,992,090
Sweden	13,545	82.8	6,889,000
Switzerland	14,728	74.9	4,780,760
Hungary	2,108	12.1	1,296,682

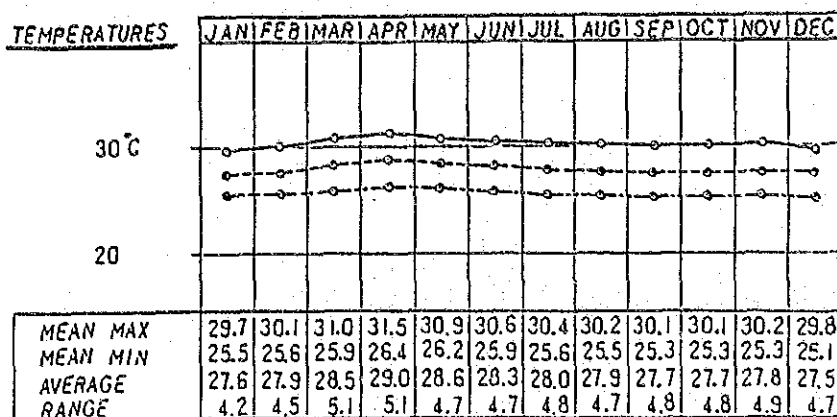
Source: World's Telephones, A statistical Compilation as of January 1982  
(ATT)  
World Development Report 1983. (World Bank)

TELEPHONE SITUATION IN COUNTRIES  
SIMILAR TO MALDIVES

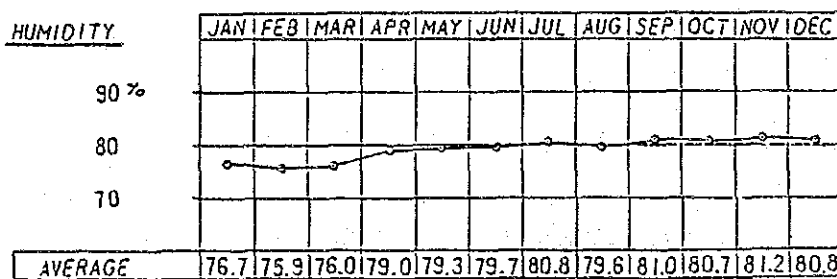
	<u>Total Telephone</u>	<u>Telephone Density</u>	<u>Concentration to Metropolitan Area (%)</u>	<u>Percentage of Residential Telephone (%)</u>
Bahama	75,071	35.8	71.6	54.1
Berumuda	48,958	88.7	67.2	45.1
Jamaica	125,258	6.2	73.1	64.3
American Samoa	5,992	17.6	60.6	40.9
Cook Islands	1,670	9.8	71.8	46.9
French Polynesia	24,818	17.7	90.6	N.A
Northern Mariana	2,325	13.5	65.6	54.5
Papua New Guinea	50,050	1.6	43.2	N.A
Solomon Islands	2,708	1.1	90.1	(83.5)
Western Samoa	5,857	3.7	98.0	46.4
Average	34,171	19.6	19.6	50.3*

\* Excluding Solomon Islands.

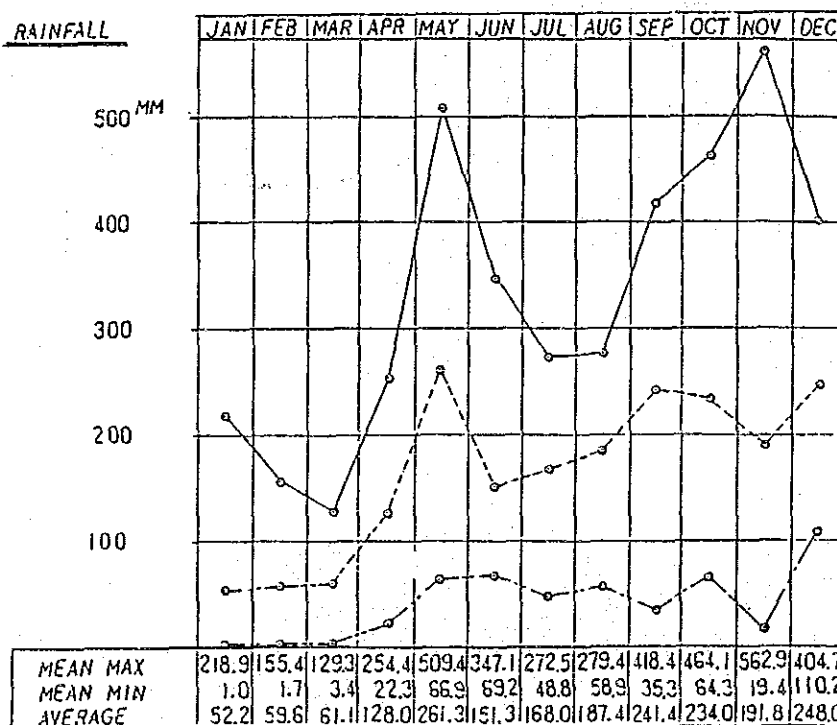
METEOROLOGICAL DATA IN MALE'



(1969~1983 AVERAGE TEMPERATURES FOR 15 YEARS)  
 HIGHEST RECORDED TEMPERATURE 34.1 °C (1973.4.28)  
 LOWEST RECORDED TEMPERATURE 17.2 °C (1978.11.3)



(1974~1983 AVERAGE HUMIDITY FOR 10 YEARS)



(1969~1983 AVERAGE RAINFALL FOR 15 YEARS)  
 HEAVIEST RAINFALL FOR 24HRS : 175.9 MM (1977.12.23)

SOURCE : NATIONAL METEOROLOGICAL CENTRE





JICA