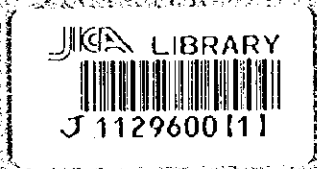


NO. 1

MINISTRY OF COMMUNICATIONS AND TRANSPORT
THE UNITED REPUBLIC OF TANZANIA

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR TELEPHONE NETWORK
REHABILITATION IN DAR ES SALAAM
IN
THE UNITED REPUBLIC OF TANZANIA**

MARCH, 1996



**JAPAN INTERNATIONAL COOPERATION AGENCY
NIPPON TELECOMMUNICATIONS CONSULTING CO.,LTD.**

BASIC DESIGN STUDY REPORT ON THE PROJECT FOR TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM

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PREFACE

In response to a request from the Government of the United Republic of Tanzania, the Government of Japan decided to conduct a basic design study on the project for Telephone Network Rehabilitation in Dar es Salaam and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Tanzania a study team from 21st October to 19th November, 1995.

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

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

I wish to express my sincere appreciation to the officials concerned of the Government of the United Republic of Tanzania for their close cooperation extended to the teams.

March, 1996



Kimio Fujita
President

Japan International Cooperation Agency

March, 1996

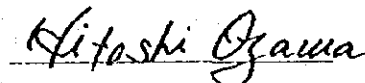
Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Telephone Network Rehabilitation in Dar es Salaam in the United Republic of Tanzania.

This study was conducted by Nippon Telecommunications Consulting Co. Ltd., under a contract to JICA, during the period from October 17, 1995 to March 29, 1996. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Tanzania and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,



Hitoshi OZAWA

project manager,

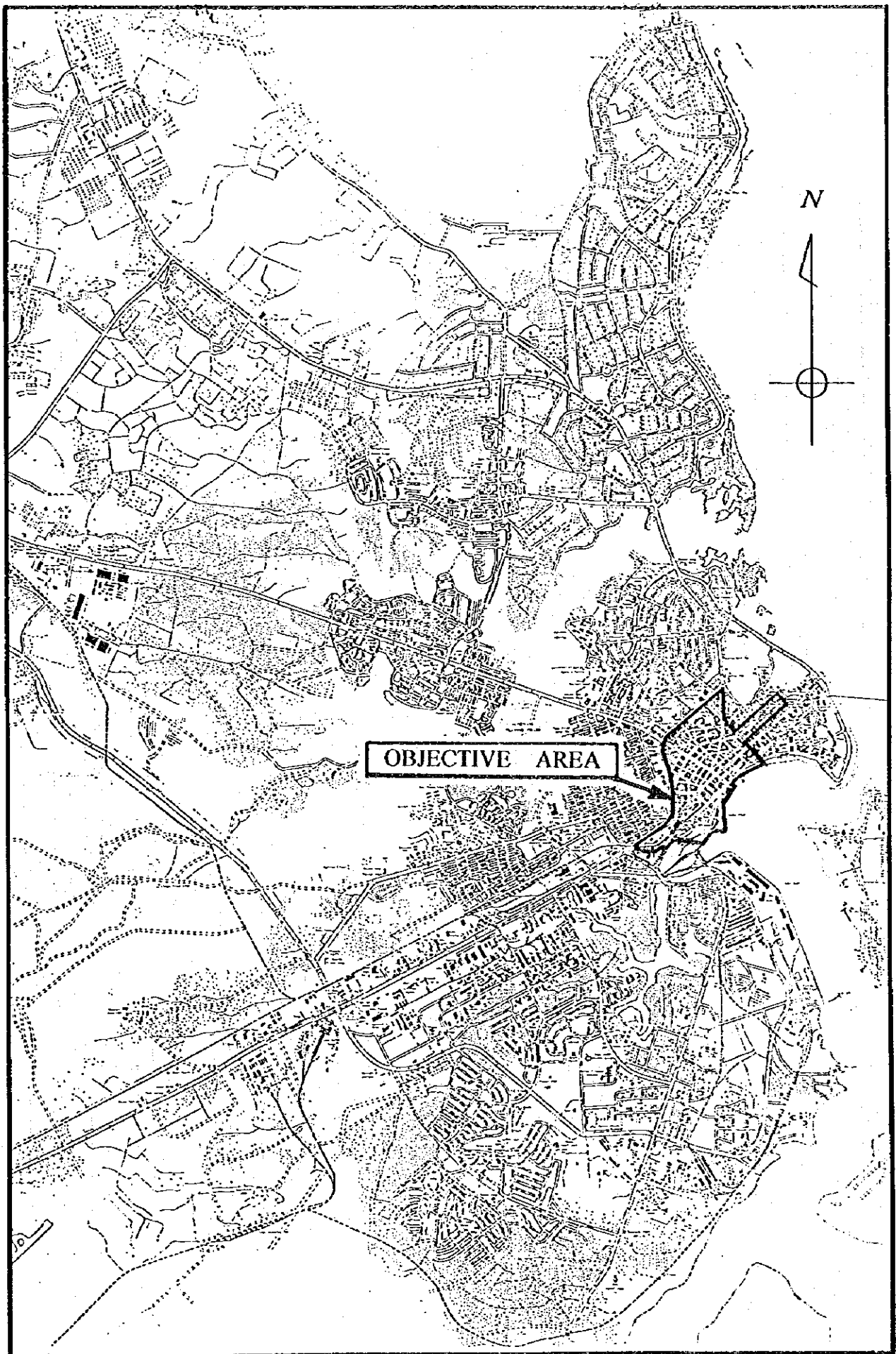
Basic design study team on

the Project for Telephone Network

Rehabilitation in Dar es Salaam

Nippon Telecommunications

Consulting Co., Ltd.



DAR ES SALAAM AREA MAP

List of Abbreviations

AfDB	African Development Bank
BS	British Standards
CR	Calling Rate
DANIDA	Danish Development Agency
DP	Distribution Point
E/N	Exchange Notes
ERP	Economic Recovery Program
ESAP	Economic and Social Action Program
EU	European Union
I / C	Incoming
IDA	International Development Bank
INTELSAT	International Telecommunication Satellite Organization
ITU	International Telecommunication Union
LE	Local Exchange
LU	Line Unit
MDF	Main Distribution Frame
O / G	Outgoing
OSP	Outside Plant
PC	Primary Center
RPFb	the Rolling Plan and Forward Budget
SC	Secondary Center
SIDA	Swedish International Development Agency
TC	Tertiary Center
TCC	Tanzania Communications Commission
Tsh	Tanzania Shilling
TRP	Telecommunications Restructuring Program
TTCL	Tanzania Telecommunications Company Ltd.

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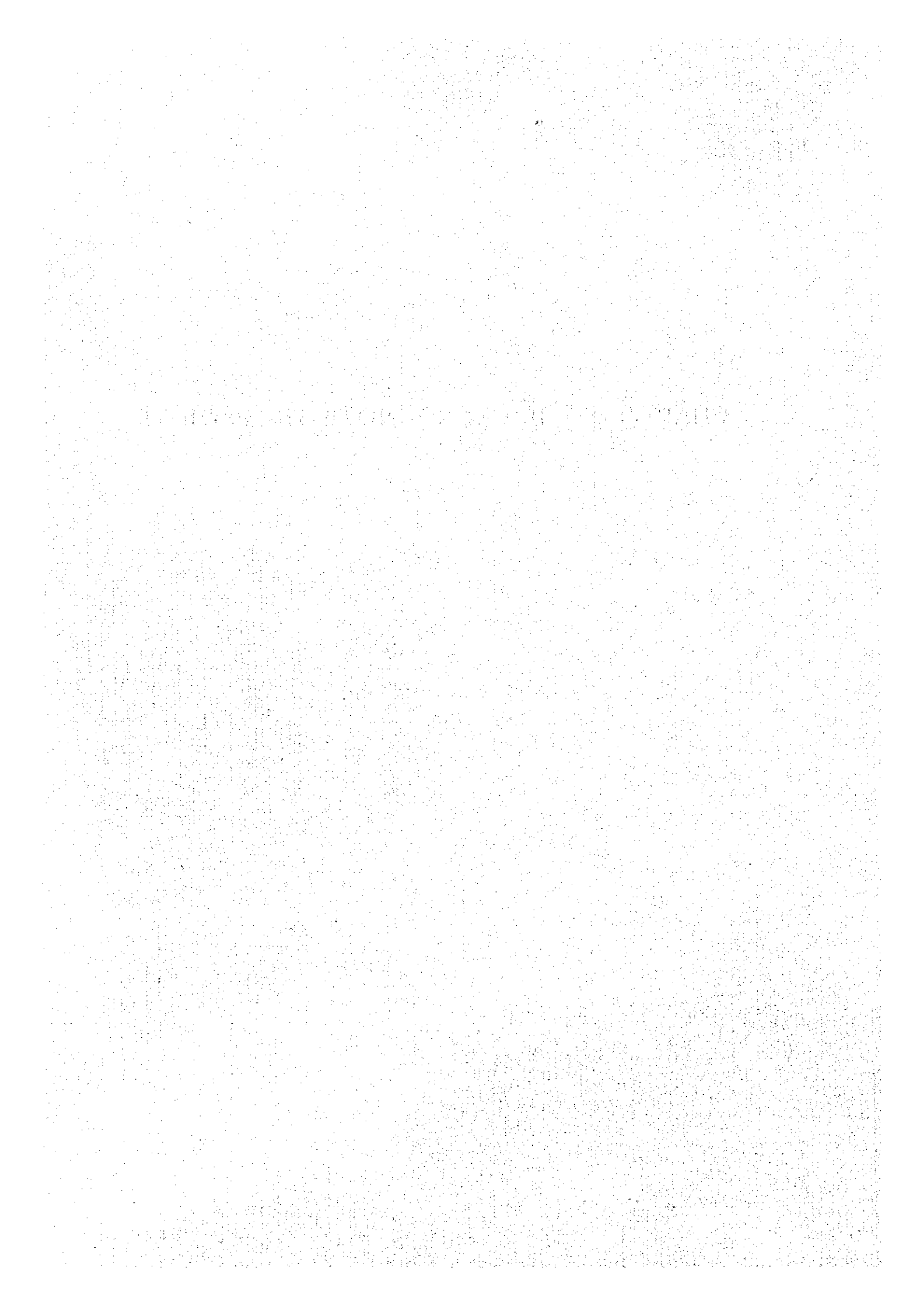
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CHAPTER 1 BACKGROUND OF THE PROJECT



Chapter 1 Background of the Project

The Tanzania telecommunications network has for quite a number of years kept deteriorating, reaching the current situation where there is severe congestion at most of the telephone exchanges, junction circuits and trunk routes. There is also a very high percentage of aged transmission and switching equipment and external facilities which require total replacement.

During 1990/91 the then Tanzania Posts and Telecommunications Corporation (TPTC) undertook a review to determine the status of the telecommunications services in Tanzania, following the guidance of the Ministry of Works, Communications and Transport, and with the assistance of the World Bank.

The report resultant from the review showed that the main problem was in the old and dilapidated national telecommunications network. The report noted that the network serving the country is heavily congested both at the local exchange and trunk levels, and needs extensive rehabilitation, expansion and modernization. The review thus undertaken led to the formulation of a 5-Year (1993-97) Telecommunications Restructuring Program (TRP).

In order to break the identified bottlenecks to allow better performance of the sector, and to modernize operating structure aiming at more business-like and customer-oriented enterprise with an efficient management and committed staff, TPTC was split to establish Tanzania Telecommunications Company Ltd. (TTCL) in January 1994. The immediate task of the TTCL after its formation in 1994, was its successful takeoff and implementation of the TRP.

The TRP is a five years comprehensive investment venture aiming at improving telephone density and upgrading telecommunications services in Tanzania, of which the expansion program owes chiefly to the Bank loans. The main donors for the program include the World Bank (IDA), the African Development Bank

(AfDB), the European Union, Sweden, Denmark, Japan and Kuwait.

Japan provided loans to the Tanzania Telecommunications Sector twice, in 1978 and 1979. Then, in 1989-1990, Japan extended grant aid for the Telecommunications Network Rehabilitation Project in Dar es Salaam Area (consisting of the first stage in the amount of ¥610 million and the second stage in the amount of ¥494 million). Further in 1993, Japan's grant aid amounting to ¥979 million was extended for the Telephone Network Rehabilitation Project for Port and Industrial Areas in Dar es Salaam. With these grant aid projects, the call completion ratio in these areas in Dar es Salaam has been remarkably improved.

However, the commercial area in Dar es Salaam has been left high and dry in terms of the quality improvement. The area still suffers from troubles with more than 40,000 failures a year. They are mainly due to extremely deteriorated, poor insulation cables which are still in use now. In the rainy seasons (twice a year), water penetration into cables causes line failures and faulty cables are often left unrepaired for as long as 2~3 months.

Moreover, switching facilities currently in operation in the relevant area are old type step-by-step systems aged 38 years and 24 years, and a cross-bar switch aged 20 years. All these old generation's mechanical type switches suffer from frequent troubles, e.g., 10 times a day. It is difficult for TTCL to maintain their functions properly due to non-availability of the relevant spare parts.

Above all, both internal and external facilities in the central exchange area require total replacement qualitatively.

It is a common understanding that a reliable and efficient communication medium supports economic development and industrial expansion and is vital to promotion of the development of other sectors. In this context, Dar es

Salaam's central commercial area is given the top priority in the rehabilitation scheme, and the Government of Tanzania expressed to the Government of Japan their wish to have grant aid assistance for the improvement of the telecommunications in this area, in the wake of the great success of the preceding grant aid projects.

In regard to the telephone demand in Dar es Salaam's central commercial area, it should be noted that 6,600 subscriptions are registered on the waiting list. In addition, there is a lot of potential demand. It causes extremely high usage of one telephone line. Therefore, the increase of telephone network capacity is also required, in addition to the network rehabilitation. In the TRP, however, rehabilitation and expansion are planned separately. That is, "expansion" of the telephone network in Dar es Salaam is to be covered by the ongoing African Development Bank loaned project, and this Project is to undertake "rehabilitation" only of the network.

CHAPTER 2 CONTENTS OF THE PROJECT

Chapter 2 Contents of the Project

2-1 Objectives of the Project

The economic situation in the Republic of Tanzania has been in a premature condition since the 1980s, as adversely affected by the worldwide recession due to oil crises followed by the sequel of the Uganda war, and some others. Tremendous efforts have been made by the Government through a series of reforms such as Economic Recovery Program (ERP 1986-89) followed by Economic and Social Action Program (ESAP 1989-92), to attain positive growth in the socio-economic activities.

It is no longer a debatable fact that telecommunications services are the greatest means and most driving force in the social integration and economic development. An efficient and well developed telecommunications services are one of the main contributing facts to economic growth and industrial expansion.

Nevertheless, the Tanzania telecommunications network has for quite a number of years kept deteriorating, reaching the current situation where there is severe congestion at most of the telephone exchanges, junction circuits and trunk routes. Most of the existing transmission and switching equipment, and external plant facilities are considerably aged, requiring total replacement.

To solve these problems, the Government of Tanzania formulated the 5-Year (1993-97) Telecommunications Restructuring Program (TRP).

In order to break the identified bottlenecks to allow better performance of the sector, TTCL (Tanzania Telecommunications Company Ltd.) was established, together with Tanzania Communications Commission (TCC) on 1st January 1994.

The immediate task of the TTCL after its formation in 1994, was its successful

takeoff and the implementation of TRP. It is intended that at the end of TRP, the country's telephone density be raised to 0.6 telephone per 100 inhabitants which is currently as low as 0.3. The demand fulfillment ratio (the ratio of the connected subscribers to the expressed demand) in 1997 is expected to increase from the present 37% to above 50 %.

Despite of the utmost endeavor by TTCL over a long period, tangible countermeasures for improvement could not be taken on account of financial constraints.

The current telecommunications facilities in the Central exchange area of Dar es Salaam aged nearly 4 decades are now superannuated, resulting in a lot of complaints from the customers. Maintenance service in the rainy seasons (twice a year) turns worse with a number of prolonged line failures due to poor insulation resistance attributable to paper insulated lead sheathed local cables outdated. Switching facilities currently in use have long been not supplied with the spare parts to replace, because of nearly 40 years old step-by-step machines. As a result, the telecommunications services in that area is in extremely critical condition.

This Project aims to upgrade the quality of telecommunications services in the commercial area of Dar es Salaam, the capital of Tanzania, through the full replacement of facilities comprising 3 conventional switches and superannuated subscriber cables, within the framework of the Government of Tanzania's overall socio-economic infrastructure promotion policy and in line with the TRP of which target is to improve efficiency and quality of services in the telecommunications sector.

2-2 Basic Concept of the Project

The Telecommunications Restructuring Program (TRP) formulated by the Tanzania Telecommunications Company Ltd. (TTCL) aims to improve the quality of telecommunications services in the nation, particularly in terms of telephone density and call completion ratio. In the TRP, emphasis is placed on the improvement of services in Dar es Salaam, the capital city.

The Government of Japan extended grant aids to the Government of Tanzania two times: one for the Telecommunications Network Rehabilitation Project in Dar es Salaam and the other for the Telephone Network Rehabilitation Project for Port and Industrial Areas in Dar es Salaam. As a result, the call completion ratio in the objective areas of these projects has been remarkably improved.

However, telecommunication services in Central exchange area in Dar es Salaam are still extremely poor, with the facilities which have been in use for more than 30 years. Outdated analogue switches are functioning beyond their service life due to the wear and tear of the components which are no longer manufactured now, while outside plant facilities are composed of overage and deteriorated cables, which often cause communication failures for as long as several months in the rainy seasons.

In consequence, telephone services in the business center in the Central exchange area are also extremely poor, although this area embraces a number of important subscribers, such as governmental offices, foreign embassies, banks, airlines, hotels, trading and other companies, markets, etc. That is, although this area is a center of the political and economic activities in the nation, the number of fault claims amounts to as many as 200 per 100 subscribers per year (30 times the number in Japan).

In view of the above situation, this Project aims to renew superannuated

switching equipment and rehabilitate overage cable facilities, so that problems resulting from such poor facilities can be solved, contributing to the successful materialization of the TRP.

The current capacity of the switching equipment in the Central exchange is approx. 20,000 LU, while the existing subscribers in the objective area number approx. 20,000, including 10,000 covered by the preceding Japan's grant aid projects. This will justify the capacity of the switching equipment to be renewed by this Project.

Hence it is considered appropriate to implement the following by this grant aid Project:

Switching equipment : Renewal of 20,000 LU
 Cables : Rehabilitation of 10,000 pairs

Facilities	Items	Unit	Quantity
Switch	Telephone switch	Switching capacity	20,000 LU
OSP	Main distribution frames	Termination capacity	10,000 pairs
	Primary cables	Line capacity	10,000 pairs
		Length	8 km (approx.)
	Cross connection cabinet	pcs.	19
	Secondary cables	Distribution length	31km (approx.)
Civil work	Manhole/Handhole	pcs.	59
	Conduit	Installation length	5km (approx.)

Due attention is being paid to the coordination with the ongoing AfDB project, with a view to avoiding repeated road excavation for underground duct installation as much as possible.

2-3 Basic Design

2-3-1 Design Concept

The basic design policy is established for the Project as follows, in consideration of the natural, social and local conditions, as well as the policy on the construction method and time period.

(1) Natural Conditions

In Dar es Salaam which faces the Indian Ocean, temperatures are high (26°C on the average) with little variations throughout a year. There are two rainy seasons in a year with plentiful rainfall (290 mm in April and 91 mm in December). Therefore, telephone lines often suffer from breakdowns due to penetration of rainwater into cables causing low insulation resistance of cable conductors or drop wires, but damage is seldom caused by typhoons, earthquakes, etc. For this reason, countermeasures for rainwater is required in designing the outside plant.

(2) Social Conditions

The objective area of this Project is densely built-up with houses, offices, hotels, stores, companies, governmental offices, etc., including the following:

- National Bank of Commerce Offices, The Bank of Tanzania;
- Local Insurance Offices;
- National Agricultural Food Corporation;
- Trading houses/shops ranging from retail, supermarkets to wholesale;
- Ministry of Finance, Foreign Embassies;
- TTCL Headquarters, Telecom. House, Post Office; and
- Ministry of Higher Education

Most of the buildings in this area are of brick laid or reinforced concrete structure, and some are skyscrapers. Hence no particular consideration is required with respect to the installation and fixing of lead-in cables and drop wiring into customer premises. Also there exist neither historic buildings nor specific structures which require special consideration.

Therefore, conditions to be taken into consideration in designing the outside plant facilities are the formation of streets and roads in each area, the configuration of cities and towns concerned, and the existence of underground facilities, such as power and water works, etc.

(3) Right of Way Permissions

All the outside plant facilities under this Project will require permission of road (and bridge) occupancy (both under and above the road), which necessitates the application for, and acquisition of, approval from the road authority concerned of either the Ministry of Works or the Dar es Salaam City Council (necessary formalities are to be followed by TTCL). Road pavement restoration works are to be sublet to a local contractor designated by the Ministry of Works or the Dar es Salaam City Council, and the costs of such works are to be paid directly to that contractor.

(4) Materials and Local Labor Utilization

Out of the materials necessary for this Project, cement, sand, gravel, crushed rock, iron bars and so forth are to be procured in Tanzania. Cement and iron bars procurable in Tanzania can meet the British Standards, and other items procurable locally are almost the same in quality with those on the general market.

Cable installation, pole erection, manhole construction, and installation of underground conduits are to be sublet to local construction companies, as

reliable companies are now available in Dar es Salaam.

(5) Capability of Maintenance

TTCL is responsible for performing the Project, and maintaining facilities after the completion of the Project.

Dar es Salaam Region of TTCL has a sufficient member of technical staff; 52 in the field of switching and 240 in OSP. They already have practical experience in operation and maintenance of new digital switching equipment and jelly-filled cables. Therefore, TTCL is capable of maintaining the facilities to be supplied by this Project.

(6) Grade of Facilities to be Implemented

The objective area is situated in the core of Dar es Salaam City, and the telecommunications network here assumes an important role in not only domestic but also international call connections. Hence major facilities and materials to be used under the Project shall be basically kept equivalent to the quality specified in ITU recommendations, same as the previous phases. Such major facilities comprise a digital switch, power supply, subscriber line facilities and its associated civil facilities.

As for the construction practice, certain consideration will be required for the rainy season which happens twice a year.

(7) Implementation Period

The construction practice usually depends upon the types of cable and other associated materials to be used, though the standard construction practice formulated by TTCL will be applied in principle. The equipment and materials to be adopted for this Project are limited to those which can satisfy the TTCL specifications and, therefore, no problem will be caused in this

respect.

The Project will be carried out in two sub-phases namely the detail design and the procurement/implementation. Each sub-phase is further divided into sub-schedules of relevant components, i.e., outside plant, civil, switch, drawings, materials manufacturing, transportation, installation, and acceptance test. These components are closely related with each and, therefore, the implementation schedules should be suitably arranged, so that the Project can be completed within the targeted implementation period.

Project implementation schedule (Table 3-1) shown in the item 3-1-6 is made observing this concept.

2-3-2 Basic Design

This Project aims to rehabilitate and renovate 3 units of conventional analogue type switching equipment in the Dar es Salaam Central exchange and superannuated outside plant facilities in the commercial area.

Basic design of this Project is described below.

2-3-2-1 Outside Plant Facilities

Outside plant facilities are composed of cable facilities and civil facilities. Basic design criteria for them are as described below.

Drawing 1 illustrates the configuration of subscriber cable facilities.

2-3-2-1-1 Cable Facilities

(1) Transmission Standard

The conductor resistance and attenuation loss of a local telephone network are designed based on the technical standards of TTCL as follows:

- DC loop resistance : maximum 1,500 ohms
- attenuation loss (at 1,500 Hz) : maximum 8.0 dB

The objective area covers the radius of 700 meters or so. The actual line length from MDF to a subscriber is less than 2,000 meters. Aforementioned transmission criterion is satisfactorily cleared even though the small diameter conductor is employed in this closed area. For this, the network can be realized by making use of 0.4 mm conductors for both primary and secondary cables so that the cable cost is saved.

(2) Cable Specifications

Primary and secondary cables to be installed in conduits and directly buried must be protected from water penetration so as to maintain required insulation for cable conductors. For them, therefore, PE (polyethylene) insulated, unit-pair twisted, jelly-filled, PE-LAP (laminated aluminum tape and polyethylene) sheathed cables are used.

(3) Cable Pairs to be Used

For both primary and secondary cables, 0.4 mm diameter cables are adopted, based on the TTCL standard, as shown in Table 2-1 below.

Table 2-1 Cable Pairs and Diameter

Cable	Diameter	Cable Pairs							
Duct Cable	0.4 mm	2,000	1,600	1,200	1,000	800	600	400	
		300	200	100	50	30	20	10	
Direct Buried	0.4 mm	200	100	50	30	20	10		

(4) Cable Distribution

1) Direct Distribution/Cross-Connection Cabinet

To achieve easy maintenance and efficient distribution of cables, a cross-connection cabinet is employed, in which primary and secondary cables are jointly connected. However, in case where no efficiency can be achieved due to short distance from the MDF, a direct distribution system will be employed.

2) Primary Cable Distribution

For primary cables, an underground conduit system will be adopted to protect cables from damages due to construction works by competent authorities for such underground structures as power lines, water pipes, etc.

The conduit is laid down under the drive way and, therefore, apt to be affected by a car tremor. On account of protection and easy maintenance, the depth of the underground conduit shall be 1 meter from the road surface of the drive way.

In the mean time, some vacant conduits will be produced under the AfDB loaned expansion project which is on the way of implementation in the objective area. By utilizing these vacant conduits for this rehabilitation Project as much as possible, re-digging of the road can be minimized to the least.

3) Secondary Cable Distribution

Secondary cable will be laid down under the pavement in principle.

Cable distribution method to be applied for the rehabilitation of secondary cable shall be coincide with the existing buried cable system. That is rehabilitated cable shall be accommodated in duct for the section where the existing cable is accommodated in duct, while rehabilitated cable shall be buried directly for the section where the existing cable is directly buried.

There exists no aerial cable in the objective area.

The same principle is applied to the vacant conduits, as mentioned in item 2) above. Hence as much vacant conduits as possible can be utilized for the rehabilitation Project.

(5) Depth of Directly Buried Cable

To keep cables away from unfavorable damages to be caused by other works for drainage, water-pipe, electric power feeder etc., the depth of subscriber cables under the pavement shall be more than 70 cm from the surface of the road.

In case of the directly buried type, the cable must be of steel-tape armored for self-protection.

(6) Cable Termination

A primary lead-in cable is connected with a PVC sheathed termination cable, and then terminated at MDF. A compound is injected into the splicing portion of the primary cable and the termination cable to make a moisture dam to prevent water penetration into the cables.

(7) Cable Specifications

Primary and secondary cables to be installed in conduits must be protected from water penetration so as to maintain required insulation of cable conductors. For them, therefore, PE (polyethylene) insulated, unit-pair twisted, jelly-filled, PE-LAP sheathed cables are used.

For secondary cables to be directly buried, PE insulated, unit-pair twisted, jelly-filled cables are used. In addition, they should be PE-LAP steel-tape armored cables, because they are not accommodated in the underground

conduit.

(8) Cable Splicing

For cable splicing, a closure type heat-shrinkable splicing will be employed in order to ensure speedy and uniform work performance.

2-3-2-1-2 Cross-Connection Cabinet

A cross-connection cabinet to be used under the Project is in accordance with the TTCL standard which employs fiberglass reinforced plastic (FRP) to prevent it from salty erosion.

(1) Location of Cabinet

A cross-connection cabinet is installed at such a location in a distribution block where a bunch of secondary cables are initiated from here, so that efficient distribution can be performed. Location of a cross-connection cabinet must be chosen carefully taking maintainability into account, and the cabinet must be fixed to the place on a pavement so as not to give disturbance to pedestrians.

Consideration should also be given so that their location will not need to be changed in the future.

(2) Cabinet Capacity

The capacity of cross-connection cabinet is either 1,200 pairs or 2,400 pairs, depending upon the total number of pairs of primary and secondary cables to be accommodated therein.

(3) Modification of Existing Cabinet

Provided that the existing 1,200 pairs type cross-connection cabinet has enough capability to accommodate extra cables, such a cabinet may be modified and adjusted to the 2,400 pairs type so that the cabinet is efficiently utilized.

2-3-2-1-3 Wooden Poles

Wooden poles which can meet the TTCL standard is used for installing cables and distribution point (DP) boxes on it.

The location of wooden poles is chosen in consideration of such factors as easy distribution of subscriber wires, no foreseeable harm to traffic conditions, least probability of removal in the future, and better maintainability.

2-3-2-1-4 Distribution Point (DP) Box

(1) Application of DP Box

Four types of DP boxes are available : pole-mounted, wall-mounted, indoor type and bay type. Where a DP box is installed on a wooden pole or an outer wall, the outdoor type is used, while the indoor type is used where it is installed in a building or residential house.

(2) Type of DP Box

The following types of DP box are used.

- Pole type 10 pairs
- Wall type 10 pairs 20 pairs
- Indoor type 20 pairs 30 pairs 50 pairs

— Bay type 100 pairs 200 pairs 300 pairs 400 pairs

(3) Location of DP Box

A wall-mounted DP box should be mounted on an outer wall of a solid building, so as to permit easy installation of drop wires and flexible extension to neighboring houses. The location of DP box shall be with the least possibility of suffering from damages by the third parties and of relocation in the future.

(4) Protection by Cable Cover

For riser cables to those DP boxes of pole-mounted, wall-mounted and indoor type, a cable cover shall be used for protection.

(5) Protection by Steel Pipe

In case a conduit system is adopted for the section between manhole/handhole and a cable rising point, a steel pipe is used for the vertical portion of a riser cable up to a DP box for protection.

2-3-2-1-5 Civil Facilities

Construction of civil facilities necessitates a huge amount of investments. Hence, close attention should be paid in selection of underground conduit routes, calculation of necessary number of conduits, decision of types and dimensions of manholes, so that the facilities designed can be optimum from the standpoint of cost saving and security as well as easy operation and maintenance.

(1) Selection of Conduit Routes

Conduit route is selected based on an overall study of technical matters

involved in construction and maintenance of civil facilities, by referring to the relevant data/information on the city planning, etc.

(2) Number of Conduits to be Installed

The number of conduits to be installed under this Project will be the number of new conduits necessary for this Project plus one which will be used at the time of replacing any defective cable.

The necessary quantity of the conduits is calculated in due consideration of the entire programs of TTCL, as well as the technical matters involved in construction, to realize efficient rehabilitation.

(3) Conduit Pipe

PVC pipe is generally used for underground conduit, while a steel pipe is adopted to those places of joint use of a bridge and for major road-crossing where traffic is heavy.

(4) Depth of Underground Conduit

Underground cable is apt to be inflicted by other construction works for water, drainage, power, etc. systems. To keep cables away from these damages, the depth of underground conduit shall be more than 100 cm from the ground surface.

(5) Warning Tape

A warning tape is installed between the ground surface and direct buried cables to draw attention to the presence of communication cable, so that probable damages to the cable from other construction sources such as

power lines and water pipes can be prevented.

(6) Types of Manholes and Handholes

Manholes and handholes are installed at cable jointing or branching points and any other points necessary for cable installation and maintenance.

A manhole size is determined, taking the following into account:

- necessary quantity of conduits accommodated;
- necessary space to work therein;
- presence of cable joints; and
- necessary radius of curvature of a cable.

Types and dimensions of manhole and handhole are tabulated in Table 2-2 below.

Table 2-2 Manhole Dimensions

Types	Length (m)	Width (m)	Depth (m)	No. of Conduits
handhole HH-1	1.2	0.6	1.1	3
manhole S-1	1.8	1.0	1.8	4
S-2	2.3	1.3	1.8	9
S-3	3.0	1.4	1.8	16
L-1	1.9	1.0	1.8	4
L-2	2.5	1.3	1.8	9
L-3	3.4	1.4	1.8	16
T-1	2.3	1.1	1.8	4
T-2	2.5	1.3	1.8	9
T-3	3.4	1.4	1.8	16

(7) Manhole Span

Manhole spans for local cables are determined, depending upon cable branching, location of cross-connection cabinets, and other geographical conditions. In any case, however, they should not exceed 200 meters.

(8) Cable Vault

Cable vault adopts water-proofing structure. Materials used for cable vault implementation may be local products.

(9) Iron Cover of Manhole/Handhole

An iron cover for a new manhole to be installed under this Project is the round-shaped, while that for a handhole is the square-shaped.

The materials of the frame and cover for new manholes and handholes, however, are not limited to spheroid cast iron.

2-3-2-1-6 Basic Design Diagram

Design diagrams are composed of a key map of this Project, primary cable drawings, underground conduit drawings, and cabling diagrams for the objective area in Dar es Salaam Central exchange area. They are given in the attachment Fig. 1 through Fig. 4-2/2.

2-3-2-2 Internal Plant Facilities

Internal plant facilities are composed of switch and power plant. Switching facilities currently used in Dar es Salaam Central exchange are two units of step-by-step switch, 5,000 LU made in India in 1972 and 4,000 LU made in U.K. in

1958, and one unit of cross-bar switch, 10,000 LU made in Japan in 1976. These machines are outdated, exceeding their life time of 20 years (ITU recommendation). Hence none of spare parts are supported by their manufacturers.

Because of superannuated facilities, troubles occur frequently: as much as 2,350 times a year in step-by-step, and 1,230 times in cross-bar in 1994. This is translated as trouble ratio of 10 times a day.

Historically, the automatic switch developed firstly was the step-by-step, which was followed by the cross-bar, and then the electronic system. Now is the era of digital type electronic switch.

TTCL implies to use the digital switch in TRP. In compliance with this policy, the digital switch will be employed for Dar es Salaam Central exchange under this Project, giving due consideration to compatibility with the existing Tanzania telephone network.

The capacity of the new switch (20,000 LU) is considered adequate, since another implementation program is in progress under AfDB loaned expansion scheme at Dar es Salaam Central exchange. In order to avoid confusion with the AfDB's expansion project, a tentative naming is given, for discrimination, to the switch to be provided by this rehabilitation Project as "Dar es Salaam Central II switch".

The design conditions for switching should conform to the TTCL standards, or the ITU standards for the matters not specified in the TTCL standards, giving due consideration to compatibility with the existing facilities which configure the Tanzania telecommunications network.

2-3-2-2-1 Exchange Hierarchy and Numbering

(1) Exchange Hierarchy

Tanzania's telephone network is made up of an international exchange in Dar es Salaam and four tiers or ranks in the domestic network.

Tertiary Center (TC) : Top-level transit trunk exchange
(5 TCs including Dar es Salaam)

Secondary Center (SC) : Middle-level transit trunk
exchange
(some function with LE too)

Primary Center (PC) : Low-level transit trunk exchange
(some function with LE too)

Local Exchange (LE) : Terminal exchange
(accommodates subscribers)

Dar es Salaam Central exchange is characterized as the secondary center within the multi-exchange area of Dar es Salaam. That is, the switch shall be capable of functioning as SC, PC, and LE combined.

(2) Numbering

A call destination is identified with numeric numbers dialled. The numbering plan is set up to organically process calls.

The telephone numbering plan in Tanzania is composed of an international access code, a trunk code and a subscriber number. Special 3-digit numbering is also available for particular services such as police call, fire call and number inquiry.

A new numbering plan shall be set up in Dar es Salaam central zone in consideration of subscriber expansion scheme having 10,000 LU under the AfDB loaned project which is going to be completed in 1997. Accordingly, a new numbering given to each existing subscriber is such that the existing 5-digit subscriber numbering will be changed into 6 digits, by inserting extra one digit after the existing 1-digit office code ("2" for step-by-step and "3" for cross-bar).

2-3-2-2-2 Traffic Handling Capacity

The call processing capability or the traffic handling capacity of a switching system is represented as the product of the line capacity and the average calling rate per subscriber. TTCL's traffic measurement at the existing switching equipment of Dar es Salaam revealed that the average originating calling rate per subscriber is 0.07 Erlang. The new switch to be implemented under this Project shall be capable of handling 20,000 subscribers with average originating calling rate of 0.07 Erlang.

There is another factor determining the switching capacity, namely call handling capacity. In this Project, the call handling capacity is to be designed so as to allow a maximum line capacity of the exchange.

2-3-2-2-3 Junction Circuits

Dar es Salaam Central exchange is ranked as a secondary center in the network hierarchy, where transit trunk circuits are provided currently with 32 destinations.

In addition, the AfDB loaned project is to install a new digital trunk switch and one local exchange to be involved in the Dar es Salaam network.

To cope with the above new situation, junction circuits in connection with Dar es Salaam Central II will be newly organized, in due consideration of network simplicity, route selectivity, and safety operation, so that a cost-effective junction network hierarchy will be realized (ref. Fig. 7). The proposed junction circuits from/to Dar es Salaam Central II is defined as follows with 13 destinations:

- Dar es Salaam Central I
- Dar es Salaam trunk exchange
- Pug Road exchange
- Oyster Bay exchange
- International exchange
- Ubungu exchange
- Kariakoo exchange
- Msasani exchange
- Kawe exchange
- Kurasini exchange
- Kijitonyama I exchange
- Kijitonyama II exchange
- Dar es Salaam Central (cross-bar)*

* The junction route from/to Dar es Salaam Central (cross-bar) shall be provided tentatively only during the implementation period. It shall be

withdrawn after the completion of switch-over.

2-3-2-2-4 Loss Probability

Loss probability is expressed in terms of the probability of losing a call which has been originated in the network. The lost call is due mainly to non-availability of idle junction circuits, and partly to no internal speech path within the switch.

Loss probability of 1 % means that the user fails to make communication once in 100 times trial. The less the probability, the better the service grade but the higher in cost.

Loss probability applicable to this network is determined for each case as mentioned below, in due consideration of the service grade acceptable to customers and the implementation cost to realize such service grade, so that compatibility with the existing network is ensured.

These figures comply with international standards (ITU-GAS6 1981).

(1) Trunk Connections and International Connections

The trunk circuits for handling trunk (long distance) calls including international calls among Dar es Salaam Central II exchange, international gateway switch and trunk exchange shall have a loss probability of 1 %.

(2) Local Connections

The local junction circuits among Dar es Salaam Central II exchange and other local exchanges shall have a loss probability of 1%, while the calls within Dar es Salaam Central II exchange area shall have a loss probability of 2 %.

(3) Other Connections

Special number service lines shall have a loss probability of 1 %.

2-3-2-2-5 Signaling

A telecommunication network is systematically composed of those component sub-systems of switching, transmission and terminals. The vast overall system can perform functions as a result of organic interconnection between its sub-systems. This necessitates the transfer of various signals between the component sub-systems. The signaling system is the means employed to make these transfers.

(1) Subscriber Line Signaling

A subscriber line signaling system comprises loop signals as supervisory signals, and dial pulse signals for dial pulse phones or dual tone multi-frequency (DTMF) signals for push-button phones, as selection signals.

In Dar es Salaam, due to the functional limitation of the existing switching facilities, dial pulse signals are generally used as the selection signals. In the areas where digital switching equipment have been installed, both dial pulse signals and DTMF signals are employed. Both types of signals will be employed in the Dar es Salaam Central II exchange after the installation of new digital switch.

(2) Interexchange Signaling

An interexchange signaling system employs loop signals and E&M signals as supervisory signals, and both pulse signals and multi-frequency compelled (MFC) signals as selection signals. Nowadays No.7 signaling is

chiefly employed.

Under the Project, the above-mentioned signaling systems shall be applied.

2-3-2-2-6 Charging System

A charging system is a mechanism to figure out the telephone fee for each subscriber. Telephone charges vary according to the type and length of calls, by which the switching equipment automatically calculates bills.

In Tanzania, calls are categorized broadly as local calls and long distance (trunk) calls, with the tariff system worked out for each category.

The Project shall employ an automatic detailed charging system as widely used as the standard charging system.

2-3-2-2-7 Junction Facilities

The object of the Project is to rehabilitate the facilities and no expansion is covered. The junction facilities necessary for connecting the existing adjacent exchanges to the digital switching equipment to be installed under the Project are to be provided with the self-reliance effort of TTCL.

2-3-2-2-8 Power Plant

The power plant facilities comprises power receiving equipment, rectifiers, batteries, and engine-driven generators. Except rectifiers and batteries, the existing power plant facilities are to be used continuously.

(1) Rectifiers

The rectifier units are to be large enough in capacity to satisfy the maximum

capacity requirements of the switching facilities.

The number of units is to have a redundancy factor of n+1 configuration so that DC power can be supplied stably to the communication equipment.

(2) Batteries

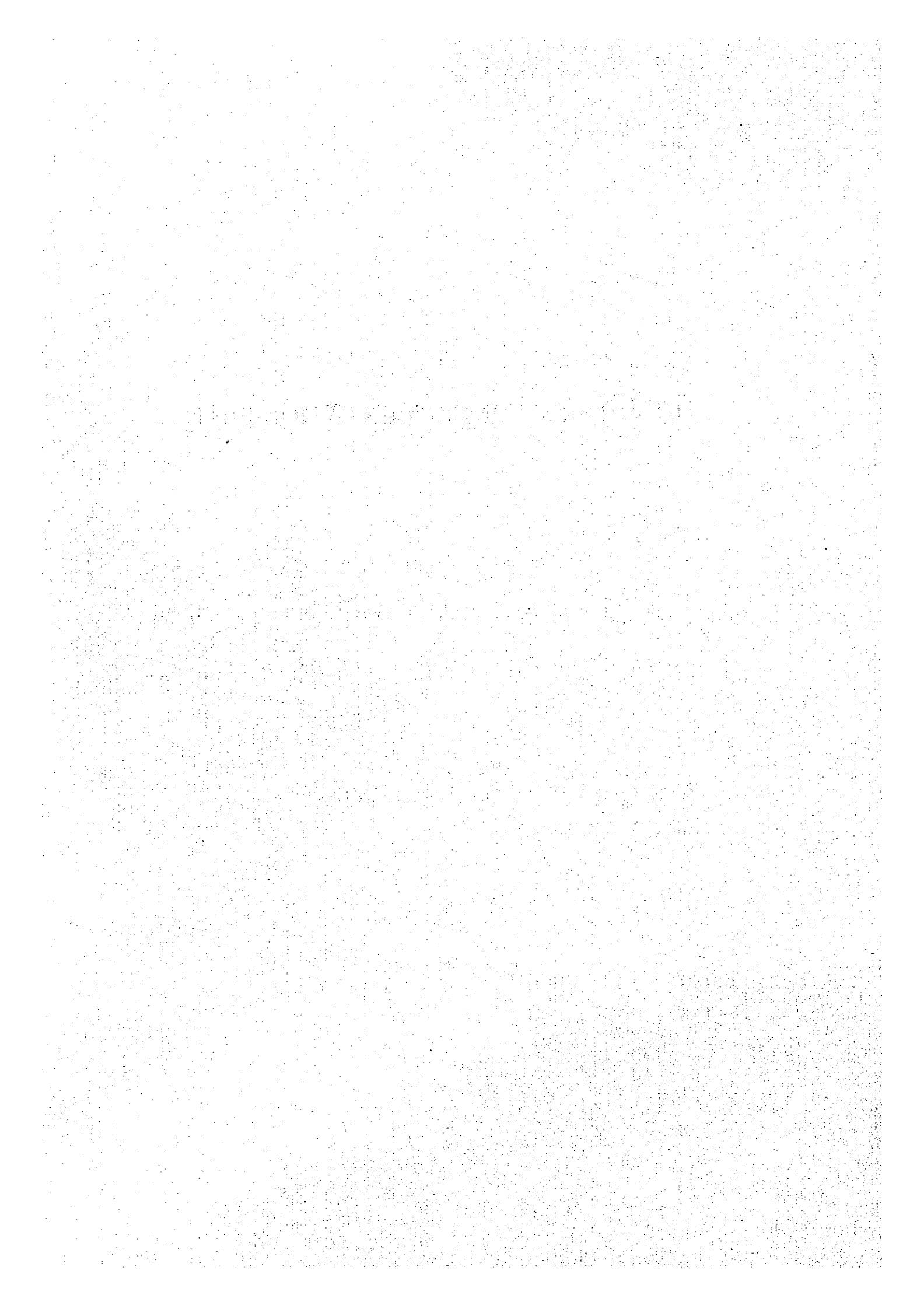
The battery facilities are to be of adequate size to feed DC power to the switching facility having 20,000 LU capacity.

In view of commercial power outages and outages for maintenance and inspection of the engine-driven generators which requires 6 hours, the batteries are to have sufficient capacity to supply electrical power for 8 hours under the conditions of busy hour loading.

2-3-2-2-9 Building Facilities

The facilities incidental to the switching equipment under this Project shall be installed making better use of the vacant space in the Telecom. House Building where the existing switching facilities are located (ref. Fig. 6). New MDF shall be installed, taking easy maintainability into account, at the adjoined place to the existing MDF installed by the preceding Telecommunications Network Rehabilitation Project in Dar es Salaam Area (ref. Fig. 5).

CHAPTER 3 IMPLEMENTATION PLAN



Chapter 3 Implementation Plan

3-1 Implementation Concept

3-1-1 Implementation Scheme

The government authority in telecommunications is the Ministry of Communications and Transport, and the operational body is TTCL.

The execution of this Project is undertaken by TTCL under the authority of the Ministry of Communications and Transport. In order to carry out smoothly the Project, TTCL is requested to nominate a project manager who is responsible to administrate the Project with respect to the coordination among correlated fields, in close cooperation with the consultant.

The Project is implemented under turnkey basis, though subcontractors may be employed locally since available local construction companies are capable of doing cable laying, cable splice, pole installation, manhole construction, underground duct construction, etc.

3-1-2 Implementation Conditions

The matters to be taken into consideration will be as follows:

(1) Right of Way Permission

It is prerequisite to complete relevant formalities, such as obtaining approval of road utilization/ occupancy and permission of road excavation from either the Ministry of Works or Dar es Salaam City Council. Hence a special care must be taken, prior to starting the works, on submitting application document by TTCL, so that necessary application documents can be submitted by TTCL to competent authorities with sufficient lead time in advance to starting the relevant works, and no delay will be caused in the

implementation time schedule in connection therewith.

(2) Road Expansion Scheme

According to the Dar es Salaam City Road Expansion Master Plan prepared by JICA in 1994, the road width expansion work is to be implemented in the commercial zone, i.e., the target area of this Project (Sokoine Drive, etc.). In case this work is under way at the time of detail design, or in advance to the start of the construction work, of this Project, suitable measures must be taken to meet the situation.

(3) Rain Consideration

A considerable amount of rainfall in Dar es Salaam in the rainy season, twice a year, is likely to exercise unfavorable effects on the construction work of outside plant and civil works. For this Project, therefore, the construction work schedule should be drawn up deliberately so that the Project can be implemented efficiently and safely within the contracted period.

3-1-3 Demarcation in the Scope of Work

Works to be undertaken by the Japanese side and the Tanzania side are described as follows:

Refer to Appendix attached for cost estimation to be borne by the recipient country, Tanzania.

(1) Work to be Undertaken by Japanese Side

- 1) Installation of 20,000 LU digital switching equipment, including power

plant facilities such as rectifier and battery.

- 2) Rehabilitation of primary and secondary cables from MDF to each DP, including pertaining outside and civil facilities.
- 3) Provision of drop wires, jumper wires to be used for transferring the existing subscribers to new facilities after completion of the new system.
- 4) Provision of measuring equipment, tools and materials necessary for maintenance of local telephone facilities after completion of this Project.
- 5) Compensation of the costs for recovery of concrete and asphalt roads excavated for the Project.

(2) Work to be Undertaken by Tanzania Side

- 1) To support switching-over of all subscriber lines to newly installed digital switching equipment, after completion of installation tests.

To withdraw the existing 3 switching facilities and incidental power plant.

- 2) To secure the place for new MDF installation, side-by-side with the existing 8,000 LU MDF.

Any structure which may constitute an obstacle to the above installation should be removed.

- 3) To provide air-conditioner in the switching room.
- 4) Re-installation of drop wires between DP and subscriber's premises, and jumper wiring in MDF and cross-connection cabinets necessitated

for the above, in connection with the transfer of the existing to new facilities, after installation of new cables.

- 5) Removal of primary and secondary cables, cross-connection cabinets which have become disused upon completion of this Project.

3-1-4 Consultant Supervision

Objective area of this Project is located in a limited zone within Dar es Salaam City. A variety of technologies are integrated in the Project, such as switching network engineering, outside plant engineering, etc.

Hence, it is proposed to adopt a combined supervisory system consisting of stationed supervision and spot supervision. An engineer capable of coordinating all the relevant technologies will be stationed to cover all the period of the Project, while spot supervisors specializing in respective fields will be dispatched on demand particularly for inauguration and acceptance tests and other occasions.

3-1-5 Procurement Plan

(1) Major Materials

Almost all the construction materials and tools, as well as telecommunications equipment such as switching equipment, rectifiers, batteries, cables, wires, etc., are not manufactured in Tanzania. Therefore the materials for this Project owe to the foreign made. A procurement plan may be established so as to keep efficient maintainability and system compatibility with the existing facilities so that a reliable telecommunications network will be secured.

Equipment and materials are delivered to Tanzania mainly by marine transportation, and unloaded at Dar es Salaam.

As for the inland transportation, no hazardous environment is foreseen since a depot for the Project can be located in the vicinity of the harbor of Dar es Salaam.

(2) Materials to be Procured Locally

Among wide variety of materials necessitated for the implementation of this Project, cement, sand, gravel, crushed rock and iron bars are to be procured in Tanzania.

Cement and iron bars procurable in Tanzania can meet the British Standards (BS), and other items procurable locally are almost the same in quality with those on the general market. Recently manhole iron covers have become available on the market, of which the adaptability may be checked after detailed design.

As for the wooden poles, it is possible to procure from the third country, e.g., Zambia, in the wake of success in the previous projects.

3-1-6 Implementation Schedule

The Project implementation period, i.e., after the signing of the Exchange of Notes (E/N) till the completion of implementation work at site, will take 22 months as shown in Table 3-1. Assuming that E/N signing be in June 1996, the Project will be completed in March 1998.

3-1-7 Obligations of Recipient Country

In addition to the scope of the works mentioned in Item 3-1-3 above, the following should also be undertaken by the Tanzania side:

(1) Arrangement for exemption from the following taxes:

- Customs clearance and import taxes on equipment and materials to be imported from foreign countries
- Taxes on durable consumer goods to be procured locally

(2) Local Support

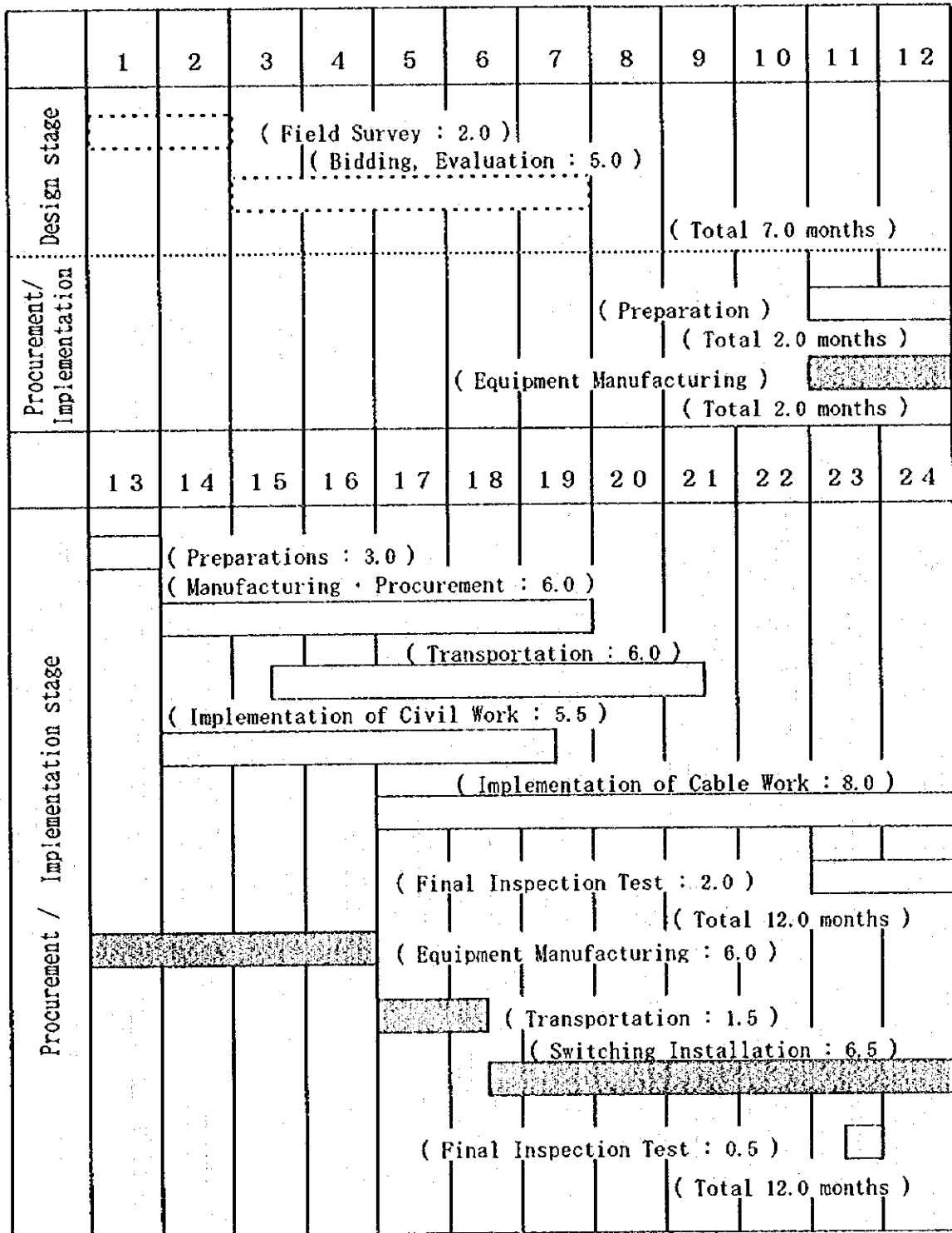
- Telecommunications means (toll and local communications)
- Work offices and utilities (fuel and light expenses)

(3) Permits and approvals to be required in connection with the road occupation and excavation

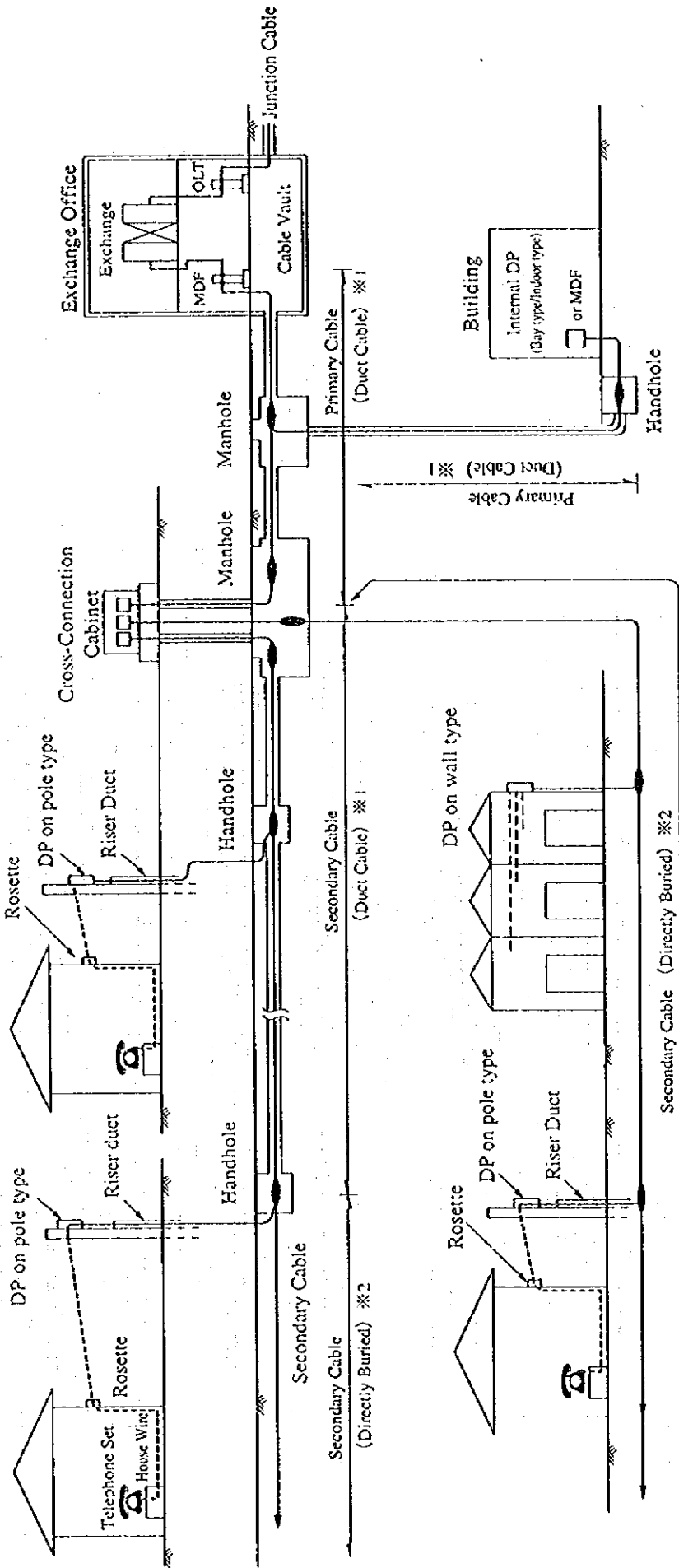
(4) Issuance of Authorisation to Pay

Detail designs, tender specifications, equipment and materials procurement, and supervision of construction work for the facilities which fall under the scope of work by the Tanzania side are to be undertaken by TTCL and the Project Implementation Organisation.

Table 3-1 IMPLEMENTATION TIME SCHEDULE



..... Implementation Design
 _____ OSP. Civil Works
 _____ Internal Plant Works



- ※1 In case that existing cable is using Duct, rehabilitation cable shall be in Duct.
- ※2 In case that existing cable is not using a duct, rehabilitation cable shall be directly buried.
- ※3 Wiring shown in dotted line is under TTCL responsibility.
Drop wire (from DP to Rosette) will be provided by Japanese side, but the wiring work will be done by TTCL.

Drawing 1 Configuration of Subscriber Cable Facilities

3-2 Operation and Maintenance Plan

3-2-1 Maintenance Staff

The Project deals with renewal of 10,000 pairs old cables in the central zone of Dar es Salaam. There exist another 10,000 pairs new cables which have been rehabilitated under the preceding phase of the project. As a whole, all facilities of the outside plant will totally be renewed after completion of this Project.

Claims from local subscribers which amount to as high as approximately 42,000 cases a year, as shown in Table 3-2, will be remarkably decreased as a result of this renovation. That is, the claim ratio of 200/100 subscribers a year is expected to be improved to 60/year which is the target of TTCL in 1998 (see Table 3-3) after the completion of the Project.

Table 3-2

SUMMARY OF SUBSCRIBERS FAULTS

(As of 1994)

Month	Switch	MDF	Telephone	Openwire Covered wire DPs	Underground Cable Cross cabinet	Fault not found		Total
						Test came clear	unknown	
1	121	30	1,204	585	504	344	1,112	3,900
2	119	32	1,318	702	589	594	1,962	5,316
3	96	10	595	540	534	294	1,136	3,205
4	182	38	608	980	724	688	1,895	5,115
5	301	—	613	531	884	372	411	3,112
6	104	22	516	993	372	598	1,114	3,719
7	289	12	529	551	843	390	610	3,224
8	120	7	259	715	603	295	621	2,620
9	101	45	411	1,018	340	245	700	2,860
10	92	22	370	804	667	138	879	2,972
11	98	44	632	791	861	195	773	3,394
12	74	3	270	754	617	88	829	2,635
	1,697	265	7,325	8,964	7,538	4,241	12,042	42,072

Table 3-3 PERFORMANCE TARGETS FOR TTCL

		Target Indicator	1992	1993	1994	1995	1996	1997	1998
No. of Facilities	Connected DEL's at year end								
		Dar es Salaam	33626	35664	41000	46000	60000	75000	93750
		Other	45611	49341	51800	53800	59800	74750	93438
		Total	79267	85005	92800	99800	119800	149750	187188
Trouble Claims	Average Number of Faults/DEL/Year								
		National	2.3	2.1	1.4	1.4	1.0	0.6	0.6
		Dar es Salaam	2.2	1.9	2.5	2.0	1.2	0.6	0.6
		Faults cleared (%)							
		within 24 Hrs	33%	34%	34%	40%	50%	70%	80%
		within 48 Hrs	49%	54%	53%	70%	75%	80%	85%
		within 30 Days	88%	89%	90%	93%	95%	95%	97%

Assumption is made that 50% of the maintenance manpower is devoted to preventive maintenance and 50%, to repair work (corrective maintenance), and the failure rate is improved by 70% as a result of the rehabilitation, then the manpower saving 35% will be attained. Further, this figure may be reflected to reduction of employees presumably as shown in Table 3-4.

This surplus workers could be availed in preventive aspect of the maintenance work, and future expansion of the facilities.

Table 3-4 Comparison of Required Number of Operation & Maintenance Staff

	(unit: person)		
	before rehabilitation	after rehabilitation	difference
Outside plant facilities			
Maintenance Staff	112	72	40
Operation Staff	28	26	2
Switching facilities			
Maintenance Staff	33	22	11
Operation Staff	6	5	1

3-2-2 Spare Parts

For operation and maintenance of the outside plant and civil facilities, the undermentioned spare equipment and materials will be provided by this Project:

- Cables (primary and secondary cables)
- Cross-connection cabinets
- DP boxes
- Cables splicing materials

3-2-3 Revenue / Expenses

(1) Study Conditions

The revenue and expenditure of this Project is studied, based on the income from the local telephone network composed of the 20,000 LU switch and 20,000 pairs OSP consisting of 10,000 pairs to be installed under this Project plus the 10,000 pairs OSP already installed by the previous project, and the costs of depreciation and O/M thereof.

Calculation is based on the actual earnings only from 17,613 lines currently working in 1995. Extra earning which will be derived by the increment of subscribers to reach 20,000 is not added in this study.

(2) Revenue

In regard to the components of facilities by which telecommunication property is formed, assumption is made that the contribution of switching facility is 30%, transmission facility 25%, subscriber facility 5%, and outside plant 40%. The revenue obtained by a telephone network is shared proportionally by these ratios. Since the transmission (25%) and subscriber facilities (5%) are not covered by the Project, the amount of 30%

must be subtracted from the total income.

The total income of the Central Region, as shown in Table 3-5, is the amount actually obtained by 17,613 lines, out of which 70% is the amount contributed by the Project.

Table 3-5 TTCL Telephone Revenue and O/M cost estimated for Each Region

Name of Region	No. of Working Lines (1995)	Revenue in 1995 (M. TSH)	Annual Revenue Per line (T. TSH)	Operation & Maintenance (M. TSH)
Dar-es-Salaam				
DSM Central	17,613	10,000	568	4,689
DSM North	12,311	7,230	587	3,277
DSM South	8,419	4,490	533	2,241
Arusha	6,156	2,190	356	1,639
Kagera	2,559	380	148	681
Dodoma	4,370	1,230	281	1,163
Iringa	1,763	340	193	469
Kigoma	2,199	350	159	585
Lindi	1,108	130	117	295
Mbeya	4,202	800	190	1,119
Kilimanjaro	5,976	1,300	218	1,591
Morogoro	3,397	480	141	904
Mara	1,613	210	130	429
Mtwara	1,427	320	224	380
Mwanza	5,664	760	134	1,508
Shinyanga	2,086	370	177	555
Ruvuma	1,596	280	175	425
Tabora	2,648	280	106	705
Tanga	5,803	910	157	1,545
Zanzibar	4,322	910	211	1,151
Singida	804	90	112	214
Pemba	1,026	90	88	273
Total	97,062	※1 33,140	341	※2 25,840

※1 Telephone Revenue : The amount is referred to TTCL's Revenue in 1995.

※2 Operation and maintenance cost corresponds to the total amount of O/M cost (12,404.5 M. TSH) plus general administration cost (13,435.4 M. TSH).

The amount for each region is estimated that the cost is proportional to the number of lines in the region respectively.

(3) Secondary Effects

Undermentioned secondary effects are expected to be derived from the rehabilitation Project:

- 1) Bill collection at this moment is as low as 85% (1994). A more aggressive collection strategy can be implemented when the quality of service reaches a satisfactory standard. Anticipated ratio of 93% (TTCL's target in 1998) may be realized after the completion of the renovation, resulting in 8% improvement.
- 2) A call completion ratio is not satisfactory. For example, it is 30% for long distance call, and 23% for international incoming call. Improvement of service quality will help increase to stimulate subscribers to increased telephone usage. It is assumed that this will lead to the increase in income by 7%.
- 3) Because of difficulty in repairing faulty cables in a short time, most of the faults (50%) are carried over to the following day, week, or month. The renovation of cables in the objective area will be able to eliminate such carried over faults to a considerable extent. 2% increase in income is assumed.

Hence, $1) + 2) + 3) = 17\%$

Therefore the Project contributes revenue-wise 8,700 million Shillings to be earned by 17,613 subscribers in Dar es Salaam Central II exchange area as follows:

$$\begin{aligned} & [\text{Actual income earned in the objective area in 1995}] \times 0.7 \times (1 + 0.17) \\ & = 8,700 \text{ (M.Tsh.)} \end{aligned}$$

(4) Expenditure

The costs of O/M and depreciation in regard to the facilities constructed under the Project are figured out as follows:

1) Operation & Maintenance Cost

Operation and maintenance costs of each district are estimated, based on the actual amount of 1995's O/M plus administration and the number of telephone subscribers in the respective districts. The operational expenditure in Central Region of Dar es Salaam is 4,689 million Tanzania Shillings.

2) Depreciation Cost

Depreciation cost is calculated in accordance with the following equation. The depreciation cost of the outside plant of 10,000 pairs implemented under the preceding phases of the rehabilitation project is included.

$$Dt = (C - s) \times \frac{i}{(1+i)^n - 1}$$

where

Dt : depreciation amount

C : Construction cost

s : residual 5%

i : interest 8%

n : effective life 20 years

Then the depreciation amount is figured out.

Dt : depreciation amount = 236

Table 3-6 Project Income and Expenses

(unit : M.Tsh.)

(1) Revenue from telephones in the objective area	8,700
(2) Operation & Maintenance cost	4,689
(3) Depreciation cost	236
(1)-(2)-(3) Balance	3,775

As can be seen from Table 3-6, the revenue to be earned by the currently working 17,613 lines (88.1% of the provided full capacity of 20,000 LU) is large enough to cater for the O/M and depreciation costs of the renovated facilities.

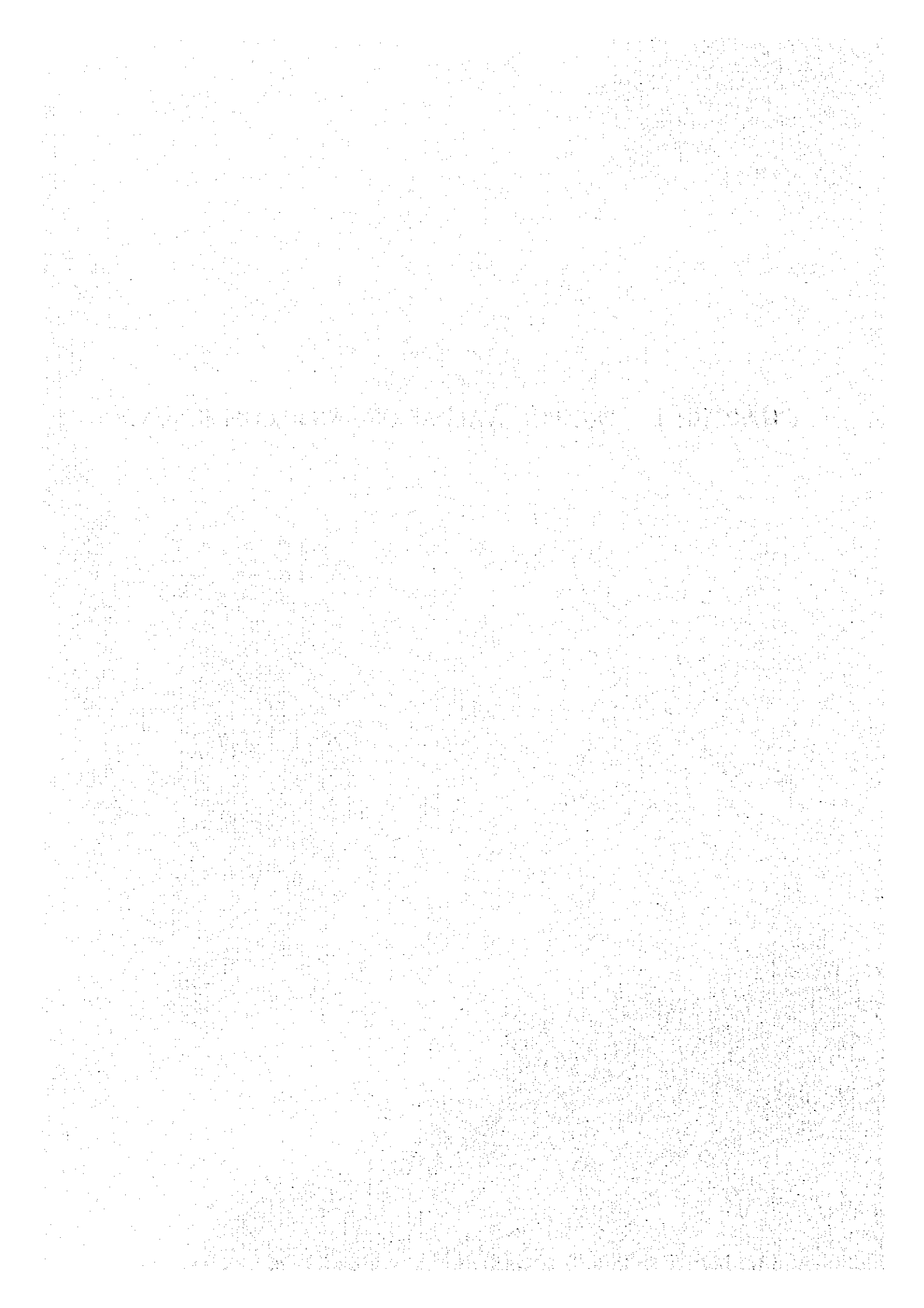
(5) Cross Subsidy

The Dar es Salaam telephone network which includes a network of the objective area is the nucleus of the telecommunications systems in the country, where 80% of the whole traffic originates/terminates, earning 66% of the national telephone revenue.

On the contrary, revenues in the districts other than the 3 regions (Dar es Salaam, Arusha and Dodoma) are insufficient to cover the running cost of their own.

Hence, it is regarded as appropriate that TTCL adopts the cross subsidy mechanism in which the revenue accrued from the profitable areas be invested for the development and/or improvement of networks of the unprofitable areas. In this context, this Project targeted to upgrade the quality of the service in the most profitable area in Tanzania, is expected to contribute to the development of telecommunications in the unprofitable areas, and further to strengthen socio-economic infrastructure of the country.

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION



Chapter 4 Project Evaluation and Recommendation

4-1 Project Effect

This Project aims to replace the switching facilities of the Central Exchange and rehabilitate the cable and civil facilities in the commercial area in Dar es Salaam, in line with the Telecommunications Restructuring Program (TRP). With the materialization of this Project, all the subscribers in the Central Exchange area will be accommodated in the most advanced digital switching equipment and stable telecommunication services can be provided in the area.

Beneficiaries of this Project are ordinary people of various kinds and no problem is foreseen in the operation and maintenance of the facilities completed by this project. Hence, it can be said that this Project is appropriate as a grant aid project.

Expected benefits of this Project are:

- (1) The current telephone services in Dar es Salaam are poor, with the annual fault claim ratio being more than 200 per 100 subscribers due to superannuated switching equipment and overage cables facilities. This ratio will be improved to 60 per 100 subscribers, achieving the target in 1997 specified in TRP.
- (2) Digital switching equipment to be introduced by this Project is equipped with a recorder for chargeable call data. This will permit TTCL to issue correct bills to subscribers promptly, and will serve for improving the charge collection ratio.
- (3) Improvement in telecommunications facilities will lead to improvement in call completion ratio. Calls can be made whenever necessary and, in consequence, the number of calls will be increased, leading to the increase in income from telephone services.
- (4) The income from telephone services in Dar es Salaam including the objective area accounts for 66% of the total income of TTCL. The increased income in this area will permit TTCL to invest in the development of telecommunications in unprofitable areas.

- (5) The outside plant facilities provided by this Project have the advantage of being easy to expand. That is, the future network expansion, when occasion demands, can be done easily. In addition, the facilities are easy to maintain, so that line failures due to water penetration during the two rainy seasons in a year can be eliminated, and the necessary number of maintenance staff can be minimized.
- (6) Telephone services available whenever necessary will enable businessmen to take necessary actions just in time, permitting them to make efficient stock control, timely inquiries, etc. Hence they will no longer lose business opportunities on account of lack of communication means. This will further mean the increase of profits in foreign trade.
- (7) Economic activities, such as production, transport and delivery of daily necessities, are supported by telecommunications. Hence, improvement of public telecommunications by this Project will substantially contribute to promotion of the economic activities in the objective area where banks, business offices, hotels, shops, etc. are concentrated.

4-2 Recommendation

Upgrading of the telecommunications facilities in the commercial district of the Central Exchange area in Dar es Salaam will produce great benefits as mentioned above. In addition, this Project will contribute to improvement of social environment of the people residing in the objective area. Hence, in order to maximize the benefits of this Project, due attention must be paid to the following:

- (1) This Project adopts jelly-filled PE cables which are the same in type with those used for the previous JICA projects.

Therefore, TTCL has practical experience in O/M of these cables. Although

daily maintenance can be easily performed by TTCL technicians in the Dar es Salaam region, their technical level of long-term network improvement planning, systematic maintenance and management of facilities, etc. is not adequate. Hence, it will be recommendable to conduct, under the grant aid scheme, a training in Japan for some selected engineers, e.g., key persons, group leaders in the field of outside plant engineering, etc.

For this purpose, utilization of the JICA program after the completion of this Project is conceivable, as it covers training of recipient countries' engineers in Japan with respect to operation, maintenance and management of networks, as well as dispatch of experts to recipient countries for a short term with respect to outside plant engineering.

- (2) In order to ensure smooth project implementation, the Government of Tanzania/TTCL is requested to take necessary measures for the budget to cover the Tanzania side's financial burden share for the Project soon after signing of the Exchange of Notes, so that the implementation can be commenced without delay.
- (3) Digital switching equipment to be introduced by this Project is equipped with the function to record the data of chargeable calls. This will permit TTCL to issue correct bills to subscribers promptly, and will serve for improving the charge collection ratio. However, in order to actually effectuate the improvement in the collection ratio, the collection method must be improved to make it simple and effective.

APPENDICES

Appendix	1	Member List of the Survey Team
Appendix	2	Survey Schedule
Appendix	3	<i>List of the Parties Concerned in the Recipient Country</i>
Appendix	4	Minutes of Discussions
Appendix	5	Cost Estimation Borne by the Recipient Country
Appendix	6	References

Appendix 1

Member List of the Survey Team

MEMBER LIST OF THE SURVEY TEAM

I. Basic Design Team

1. Leader : Mr. Kazuhiko TERAO
Grant Aid Div., Economic Cooperation Bureau, Ministry of Foreign Affairs
2. Technical Adviser : Mr. Yoshimasa SHIMIZU
International Organizations Div., International Affairs Dept.,
Minister's Secretariat, Ministry of Posts and Telecommunications
3. Project Coordinator : Mr. Akio KAGAWA
Consultant Contract Div., Procurement Dept., JICA
4. Chief Consultant, Telecommunication Network Planner : Mr. Hitoshi OZAWA
Nippon Telecommunications Consulting Co., Ltd.
5. Outside Plant Planner, Materials Procurement Planner : Mr. Mitsuo MAKINO
Nippon Telecommunications Consulting Co., Ltd.
6. Switching System Planner : Mr. Toyokuni YAMAGUCHI
Nippon Telecommunications Consulting Co., Ltd.
7. Civil Facilities Planner, Cost Estimate : Mr. Hiroaki KURITA
Nippon Telecommunications Consulting Co., Ltd.

II. Draft Basic Design Study Report Explanation Team

1. **Leader : Shigemaro AOKI**
Senior Telecommunication Advisor, Institute for International Cooperation,
ICA
2. **Technical Advisor : Eiichi OGAWA**
Section Chief, International Organizations Div., International Affairs Dept.,
Minister's Secretariat, Ministry of Posts and Telecommunications
3. **Project Coordinator : Takaei WADA**
Consultant Contract Div., Procurement Dept., JICA
4. **Chief Consultant : Hitoshi OZAWA**
Nippon Telecommunications Consulting Co., Ltd.
5. **Cost Estimation, Civil and Architecture Planner : Hiroaki KURITA**
Nippon Telecommunications Consulting Co., Ltd.

Appendix 2
Survey Schedule

SURVEY SCHEDULE

I. Field Survey

Date	Works
In 1995	
Oct. 21 (Sat.)	Lv. Tokyo (JL401) Av. London
22 (Sun.)	Lv. London (BA069)
23 (Mon.)	Av. Dar es Salaam Courtesy call to Japanese Embassy Discussion with JICA Office
24 (Tue.)	Courtesy call to Ministry of Finance Courtesy call to TTCL and submission of Inception Report
25 (Wed.)	Courtesy call to Ministry of Works, Communications, and Transport Discussion with TTCL
26 (Thu.)	Preparation of draft Minutes of Discussions
27 (Fri.)	Signing of Minutes of Discussions Reporting to Japanese Embassy and JICA Office Lv. Dar es Salaam (KL568) (Official members only)
28 (Sat.)	Site survey by Consultant members
29 (Sun.)	Site survey
30 (Mon.)	Site survey and data collection
31 (Tue.)	Site survey and data collection
Nov. 1 (Wed.)	Site survey and data collection
2 (Thu.)	Site survey and data collection
3 (Fri.)	Site survey and data collection
4 (Sat.)	Data filing and Team members meeting
5 (Sun.)	Data filing

Date	Works
6 (Mon.)	Site survey and data collection
7 (Tue.)	Site survey and data collection
8 (Wed.)	Site survey and data collection
9 (Thu.)	Site survey and data collection
10 (Fri.)	Site survey and data collection
11 (Sat.)	Team members meeting and data filing
12 (Sun.)	Data filing
13 (Mon.)	Site survey and data collection
14 (Tue.)	Site survey and data collection
15 (Wed.)	Data filing
16 (Thu.)	Interim reporting to TTCL Data filing (Summary) Interim reporting to Japanese Embassy and JICA Office
17 (Fri.)	Team members meeting Consultant members leaving Dar es Salaam (KL568)
18 (Sat.)	Av. Amsterdam Lv. Amsterdam (JL412)
19 (Sun.)	Av. Tokyo

II. Explanation of Draft Basic Design Study Report

Date	Works
In 1996	
Feb.18 (Sun)	Lv. Tokyo (SR169) Av. Zurich
19 (Mon.)	Lv. Zurich (SR292)
20 (Tue.)	Av. Dar es Salaam Discussion with JICA Office Courtesy call to Japanese Embassy Courtesy call to, and discussion with, MOC* Courtesy call to, and discussion with, TTCL**
21 (Wed.)	Site survey (External Plant Facilities) and Team members meeting
22 (Thu.)	Site survey (External Plan Facilities) and drafting of Minutes of Discussions
23 (Fri.)	Discussion with TTCL Meeting with JICA Office
24 (Sat.)	Site survey (Internal Plant Facilities) in TTCL Central Exchange and Oyster Bay Exchange
25 (Sun)	Drafting of Minutes of Discussions and Team members meeting
26 (Mon.)	Discussion with TTCL Meeting with Segitel, the Contractor of AfDB Project Signing Minutes of Discussions Reporting to Japanese Embassy and JICA Office
27 (Tue.)	Lv. Dar es Salaam (SR293) Ar. Zurich

28 (Wed.)

Lv. Zurich (JL412)

29 (Thu.)

Ar. Tokyo

- * MOC : Ministry of Communications and Transport
- ** TTCL : Tanzania Telecommunications Company Ltd.

Appendix 3

List of the Parties Concerned in the Recipient Country

LIST OF THE PARTIES CONCERNED IN THE RECIPIENT COUNTRY

I. Field Survey

(1) Tanzania Officials

1. Ministry of Finance
Mr. Mueni Assistant Commissioner External Finance

2. Ministry of Works, Communications and Transport
Dr. George Mlingwa Principal Secretary

3. Tanzania Telecommunications Company Ltd.
Mr. A. B. Maptunda Managing Director
Dr. F. Killimbe Acting Deputy Managing Director /
Development

Mr. Ernest C. Moshia Director International Operation
Mr. A. Amri Director Network / Construction
Mr. N. Buchanagandi Principal Staff College
Mr. John. Mupapalika Acting Director / Design & Engineering
Mr. E. J. Mutafungwa Zonal Director of Dar-es-Salaam
North Zone

Mr. A. D. Kakolwa Principal Executive Engineer
Mr. A. Stephano Principal Executive Engineer
Mr. K.A.M.A. Mohamed Principal Sectional Engineer - External
Mr. S. S. Rashid Principal Telecoms. Controller
Mr. Myonga Manager Finance
Mr. S. M. Manyama Chief Accountant
Mr. Takashi Kosugi JICA Expert

4. TRP office
Mr. Ph. Andriessen Principal Secretary
Mr. Alex Moon Assistant Secretary

5. Intech : Consultant of AfDB Project
Mr. Arvid Hovdenak Resident Manager
Mr. Sverre B. Starand Senior Civil Engineer
Mr. Steiner Kristensen Senior Switching Engineer

6. World Bank
Mr. Tony Thompson Resident Representative

(2) Japanese Officials

1. Japanese Embassy

Mr. Mitsuru Eguchi Ambassador
Mr. Shigeyuki Suzuki Minister / Counsellor
Mr. Kazuhiko Kitagawa Second Secretary

2. JICA Office

Mr. Hiromasa Kawazoe Resident Representative
Mr. Takashi Mizuno Deputy Resident Representative
Mr. Hiroyuki Moronaga Assistant Resident Representative

3. JETRO Office

Mr. Junichi Takamiya Resident Representative

II. Explanation of Draft Basic Design Study Report

(1) Tanzania Officials

1. Ministry of Communications and Transport

Mr. Salim MSOMA The Principal Secretary

2. Ministry of Finance

Mr. M. KIBEANA Commissioner for External Finance

3. Tanzania Telecommunications Company Ltd. (TTCL)

Mr. A. B. MAPUNDA Managing Director (Tel : 41054)

**Mr. J. E. MHANDO Deputy Managing Director / Development
(Tel : 41054)**

Mr. Asenath MPATWA Director / Business & Strategic Planning

Mr. John MUPAPALIKA Acting Director / Design & Engineering

Mr. A. D. KAKOLWA Principal Executive Engineer

Mr. K. A. M. A. MOHAMED Principal Sectional Engineer - External

Mr. D. J. BELLEGE Office of the Zonal Director (Tel : 31693)

4. Segitel, the Contractor of AfDB Project

Mr. M. D. Ryan Director - Project Operations

(2) Japanese Officials

1. Japanese Officials - Japanese Embassy

Mr. Shigeyuki Suzuki Minister / Counsellor

Mr. Yasushi Shigemasa First Secretary

2. JICA Office

Mr. Hiromasa Kawazoe Resident Representative

Mr. Hiroyuki Moronaga Assistant Resident Representative

3. JICA Expert

Mr. Takashi Kosugi

Appendix 4

Minutes of Discussions

**MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE PROJECT FOR
TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM (PHASE II-B)
IN
THE UNITED REPUBLIC OF TANZANIA**

In response to the request from the Government of the United Republic of Tanzania (hereinafter referred to as "the Government of Tanzania"), the Government of Japan decided to conduct a Basic Design Study on the Project for Telephone Network Rehabilitation in Dar es Salaam (Phase II-B) (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Tanzania the Basic Design Study Team, which is headed by Mr. Kazuhiko TERAQ, Official, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, from 23rd of October to 17th of November, 1995.

The team had a series of discussions with the relevant officials of the Government of Tanzania and conducted a field survey at the study area.

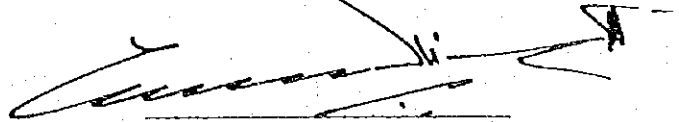
In the course of discussions and field survey, both sides have confirmed the main items as described in the attached sheets.

The team will proceed with further work and prepare the Basic Design Report in order to realize the Project.

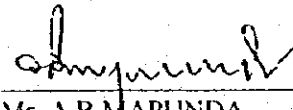
Dar es Salaam, October 27, 1995



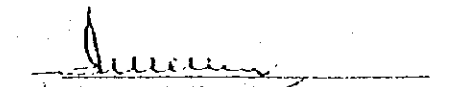
Mr. Kazuhiko TERAQ
Leader
Basic Design Study Team
Japan International
Cooperation Agency (JICA)



Dr. George MLINGWA
Principal Secretary
Ministry of Works,
Communications and Transport



Mr. A.B. MAPUNDA
Managing Director
Tanzania Telecommunications
Company Ltd. (TTCL)



Mr. M. KIBWANA
Commissioner for External Finance
Ministry of Finance

ATTACHMENT

1. Objectives

The objective of the Project is to provide necessary facilities and equipment for the rehabilitation of telecommunications network in Dar es Salaam.

2. Project Sites

The project covers a part of central exchange area in Dar es Salaam. (Map of the project sites is attached to ANNEX-I)

3. Executing Agency

- (1) Tanzania Telecommunications Company Ltd. (TTCL) is the executing agency of the Project.
- (2) Ministry of Works, Communications and Transport is the responsible ministry of the Project.

4. Items requested by the Government of Tanzania

- (1) After discussions with the Basic Design Study Team, the following items were finally requested by the Government of Tanzania.

(a) Arrangement of Switching Equipment	20,000 Lines
(b) Arrangement of Main Distribution Frame (MDF)	1 Lot
(c) Primary Cables Installation	10,000 Pairs
(d) Cross Connection Cabinet Installation	1 Lot
(e) Secondary Cables Installation	1 Lot
(f) Associated Civil Works for ducts, manholes, handholes, etc.	1 Lot

- (2) The final component of the Project will be determined based on the further surveys and studies done by the Basic Design Study Team.

5. Japan's Grant Aid System

- (1) The Government of Tanzania has understood the system of Japan's Grant Aid explained by the team as described in ANNEX - II.
- (2) The Government of Tanzania will take all necessary measures, described in ANNEX - III, for smooth implementation of the Project, on condition that Grant Aid assistance by the Government of Japan is extended to the Project.

6. The Schedule of the Study

- (1) The consultants will proceed with further studies in Dar es Salaam until 17th of November, 1995.

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(2) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around the beginning of February, 1996.

(3) In case that the contents of the report is accepted in principle by the Government of Tanzania, JICA will complete the final report and send it to the Government of Tanzania by around April, 1996.

7. Other relevant issues

(1) It was confirmed that all the capital of TTCL is wholly owned by the Government of Tanzania and will not be privatized in the near future.

(2) The Project covers the implementation of installation as follows:

- Installation of Switching Equipment
- Installation/ construction work with materials from MDF to distribution points on the local cable network
- Supply of materials for maintenance use

(3) It was confirmed that TTCL will provide the space about MDF and Switching Equipment.

(4) It was confirmed that TTCL is responsible for providing jumpering work.

(5) TTCL agreed that Japanese side will use ducts constructed by African Development Bank project and the demarcation for the two projects will be well defined.

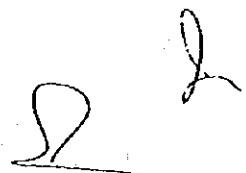
(6) TTCL is to carry out transfer work of drop wire for existing subscribers.

(7) All removal work such as removal of aerial and underground cables with associated accessories are to be carried out by TTCL after transferring to new facilities.

(8) TTCL will allocate the necessary budget and personnel for execution of the Project.

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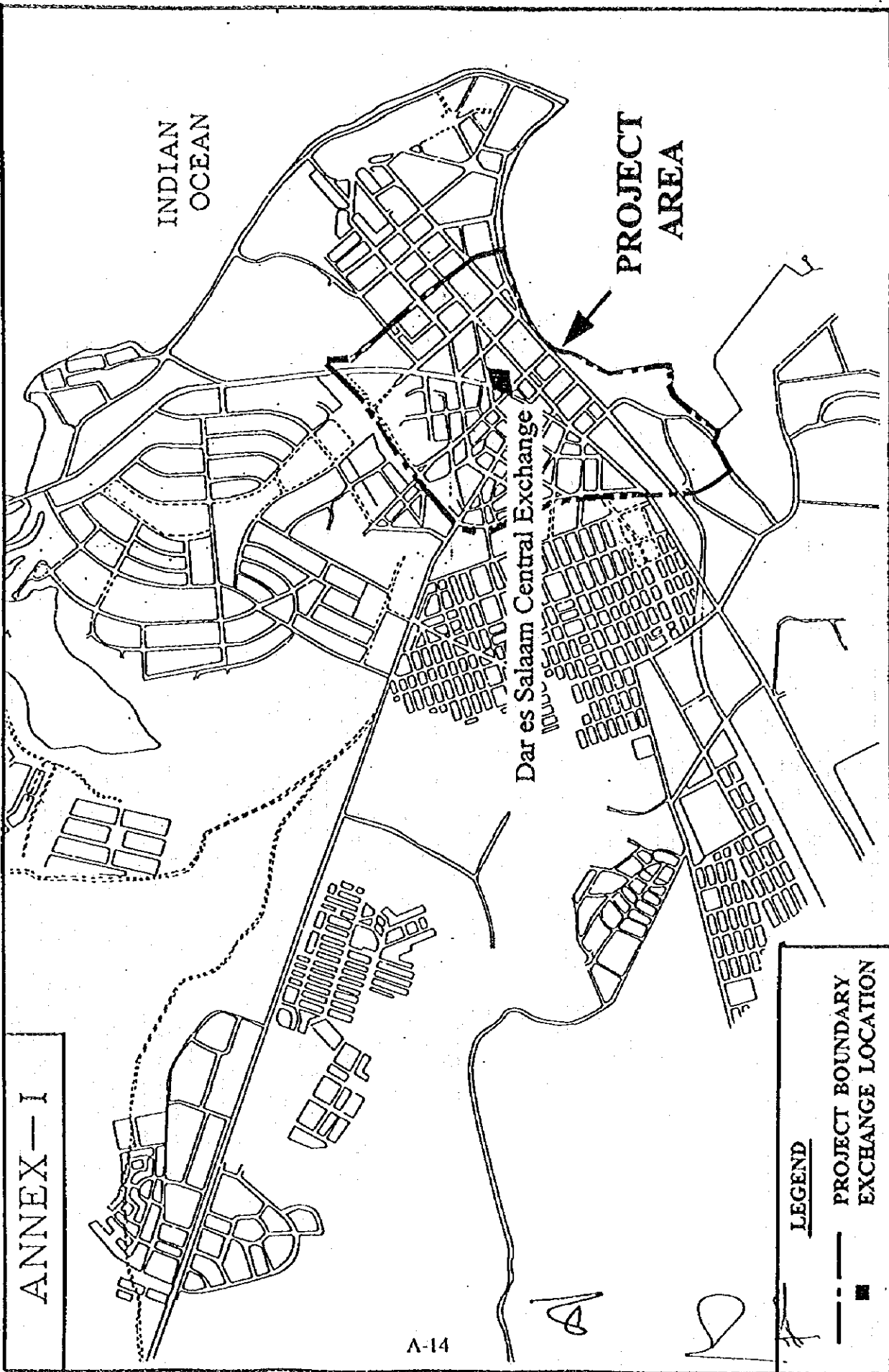


ANNEX-I

INDIAN OCEAN

PROJECT AREA

Dar es Salaam Central Exchange



LEGEND

PROJECT BOUNDARY
EXCHANGE LOCATION

Handwritten mark

Japan's Grant Aid Scheme

1. *Grant Aid Procedures*

- 1) Japan's Grant Aid Program is executed through the following procedures.
- | | |
|---------------------------------|--|
| Application | (Request made by a recipient country) |
| Study | (Basic Design Study conducted by JICA) |
| Appraisal & Approval | (Appraisal by the Government of Japan and Approval by Cabinet) |
| Determination of Implementation | (The Notes exchanged between the Governments of Japan and the recipient country) |

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

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2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- a) Confirmation of the background, objectives, and benefits of the requested project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- d) Preparation of a basic design of the Project
- e) Estimation of costs of the Project

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry (ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

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The consulting firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency and also to avoid any undue delay in implementation should the selection process be repeated.

3. Japan's Grant Aid Scheme

1) What is Grant Aid ?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed.

However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

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When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However the prime contractors, namely, consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

- (1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
- (2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- (3) To secure buildings prior to the procurement in case the installation of the equipment.
- (4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
- (5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.
- (6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

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7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

9) Banking Arrangements (B/A)

- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

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Annex III

Necessary measures to be taken by the Government of Tanzania on condition that Japan's Grant Aid is extended :

1. To secure land of the Project
2. To clear, level and reclaim the sites prior to the commencement of the Project
3. To bear commissions to the Japanese foreign exchange bank to execute the banking services based upon the banking arrangement
4. To ensure prompt unloading and customs clearance at port of disembarkation in Tanzania and facilitate internal transportation therein of the products purchased under the Grant Aid
5. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Tanzania with respect to the supply of the products and services under the verified contracts
6. To accord Japanese nationals, whose services may be required in connection with the supply of products and the services under the verified contracts, such facilities as may be necessary for their entry into Tanzania and stay therein for the performance of their work
7. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant Aid
8. To bear all the expenses other than those to be borne by the Grant Aid, necessary for the transportation and the installation of the equipment.

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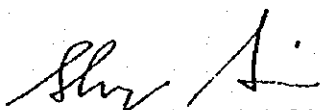
MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE PROJECT FOR
TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM (PHASE II-B)
IN
THE UNITED REPUBLIC OF TANZANIA
(EXPLANATION ON DRAFT BASIC DESIGN)

In October 1995, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for Telephone Network Rehabilitation in Dar es Salaam (Phase II-B) (hereinafter referred to as "the Project"), to the United Republic of Tanzania, and through discussions, field survey and technical examination of the results in Japan, has prepared the Draft Basic Design on the study.

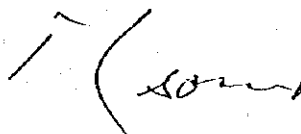
In order to explain and to consult the Government of Tanzania on the components of the Draft Basic Design, JICA sent to Tanzania a study team, which is headed by Mr. Shigemaro AOKI, Senior Telecommunication Advisor, Institute for International Cooperation, JICA, and is scheduled to stay in the country from 20th of February to 27th of February, 1996.

In the course of discussions, both parties have confirmed the main items described on the attached sheets.

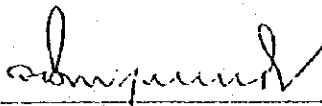
Dar es Salaam, February 26, 1996



Mr. Shigemaro AOKI
Leader
The Explanation Team
for Draft Basic Design
Japan International
Cooperation Agency (JICA)



Mr. Salim MSOMA
The Principal Secretary
Ministry of Communications
and Transport



Mr. A. B. MAPUNDA
Managing Director
Tanzania Telecommunications
Company Ltd. (TTCL)



Mr. M. KIBWANA
Commissioner for External Finance
Ministry of Finance

ATTACHMENT

1. Components of Draft Basic Design

The Government of Tanzania has agreed and accepted in principle the components of the Draft Basic Design proposed by the Team.

2. Japan's Grant Aid System

- (1) The Government of Tanzania has understood the system of Japanese Grant Aid explained by the team as attached ANNEX I.
- (2) The Government of Tanzania will take the necessary measures, described in ANNEX II, for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

3. Future Schedule

The team will make the Final Basic Design Study Report in accordance with the confirmed items and send it to the Government of Tanzania by the end of March 1996.

4. Issue of TTCL Privatization

It was reconfirmed that the Government of Tanzania wholly owns all the capital of TTCL and has no intention to invite the private sector participation in the operation and management of basic telephone service provided by TTCL.

ANNEX I

Japan's Grant Aid Scheme

1. Grant Aid Procedures

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereafter referred to as "the Study"), conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- a) Confirmation of the background, objectives, and benefits of the requested Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
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- d) Preparation of a basic design of the Project
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The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA select (a) firm (s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consulting firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency and also to avoid any undue delay in implementation should the selection process be repeated.

3. Japan's Grant Aid Scheme

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2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

- 4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However the prime contractors, namely, consulting constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

- 5) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

- 6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

- (1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
- (2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- (3) To secure buildings prior to the procurement in case the installation of the equipment.
- (4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
- (5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with

respect to the supply of the products and services under the Verified Contracts.

(6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(8) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

(9) Banking Arrangements (B/A)

- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

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ANNEX II

Necessary measures to be taken by the Government of Tanzania on condition that the Japan's Grant Aid is extended:

1. To provide data and information necessary for the implementation of the Project;
2. To secure the sites (necessary lands) for the Project;
3. To clear, level and reclaim the sites prior to the commencement of the construction;
4. To undertake incidental outdoor works such as gardening, fencing, gates and lighting in and around site where required;
5. To provide storages and yards in the sites where required;
6. To bear commissions to the Japanese foreign exchange bank to execute the banking service based upon the Banking Arrangement (B/A);
7. To exempt from the taxes and to take necessary measures for customs clearance of equipment and materials for the Project at the port of disembarkation;
8. To exempt Japanese nationals involved in the project from customs duties, internal taxes and other fiscal levies which may be imposed in Tanzania with respect to the supply of the products and services under the verified contracts;
9. To accord Japanese Nationals, whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into Tanzania and stay therein for the performance of their work;
10. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant, and
11. To bear all the expenses other than those to be borne by the grant, necessary for the transportation and installation of the equipment.

Appendix 5

Cost Estimation Borne by the Recipient Country

Cost Estimation Borne by the Recipient Country

No.	Item	Cost (Thousand Tsh)
1.	Removal of Duct Cable	1,729.6
2.	Removal of Wooden Pole	991.1
3.	Running of Jumper Wire (MDF)	10,850.0
4.	Replacement of Drop wire	61,975.2
5.	Removal of Old Switch (XB)	2,888.9
6.	Removal of Old Switch (SXS)	1,949.9
7.	Supply of Air Conditioning Facilities for Switching room	104,944.0
8.	Removal of Power Facilities	149.6
	Sum.	185,478.3

Appendix 6

References

List of Document/Data/Information Collected

1. Those obtained from Tanzania Telecommunications Company Ltd. (TTCL)
 - (1) Telecommunications Restructuring Program - TRP (Takeoff & Progress)
 - (2) Telecommunications Tariff Effective 1 January 1995
 - (3) Annual Traffic Analysis Summary Report 1994
 - (4) Tanzania Telecommunications Company Report of the Auditors
 - (5) Monthly Vacancy Summary of TTCL October 1995
 - (6) Organisational Structure of Tanzania Telecommunications Company Ltd.
 - (7) Training Courses Offered by TTCL Staff College
 - (8) Dar es Salaam C5 Trunking Diagram
 - (9) Dar es Salaam GX5K Trunking Diagram
 - (10) Dar es Salaam C400 Trunking Diagram
 - (11) Dar es Salaam Switching Network Diagram 94-3-9
 - (12) Updated Tanzania Telephone Access Codes
 - (13) Central Area Trouble Record each month 1994
 - (14) Format of Faults Record every morning - Typical one day for South/North/Central
 - (15) 1994 Performance Target Realisation
 - (16) Faults Record for 1994 in the Categories of Reported/Cleared/Carried-over
 - (17) Performance Indicators of MOU Targets for 1994
 - (18) Telecommunications Facilities in DSM Metropolitan Area by Exchange
 - (19) International Telephone Lines
 - (20) International Telex Lines
 - (21) Telecommunications Facilities Information
 - (22) Exchange Families and Capacities (58 Exchanges)
 - (23) Trunk Exchanges
 - Types, No. of Trunks, Year Commenced, Total Trunks, Country of Origin
 - (24) Telex Exchanges
 - Types, No. of Trunks, Year Commenced, Total Trunks, Country of Origin
 - (25) Donors' Coordination Meeting 19th May 1995
 - (26) Proposed Switching Area
 - (27) MDF Layout Plan
 - (28) Trunking Diagram
 - (29) TTCL revised MOU Target
 - (30) Diagram of Outside Plant
 - TTS Map in Commercial Area
 - Duct Diagram, Main Cable Diagram, Distribution Diagram
 - (31) Cable Vault Plan
 - (32) MDF Layout
 - (33) Primary Network and Duct Plan
 - (34) Secondary Cable Diagram

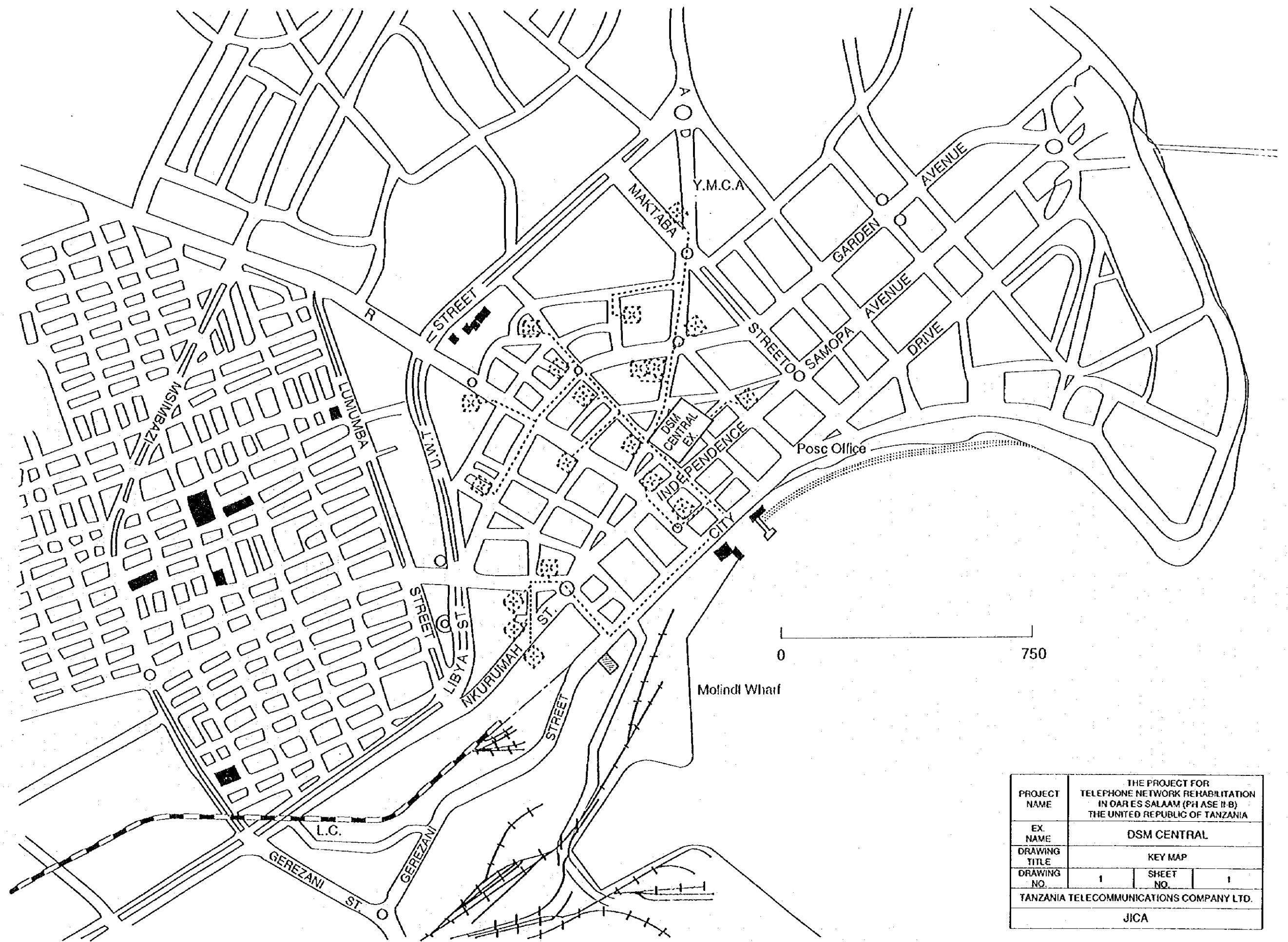
2. Those obtained from organisations other than TTCL

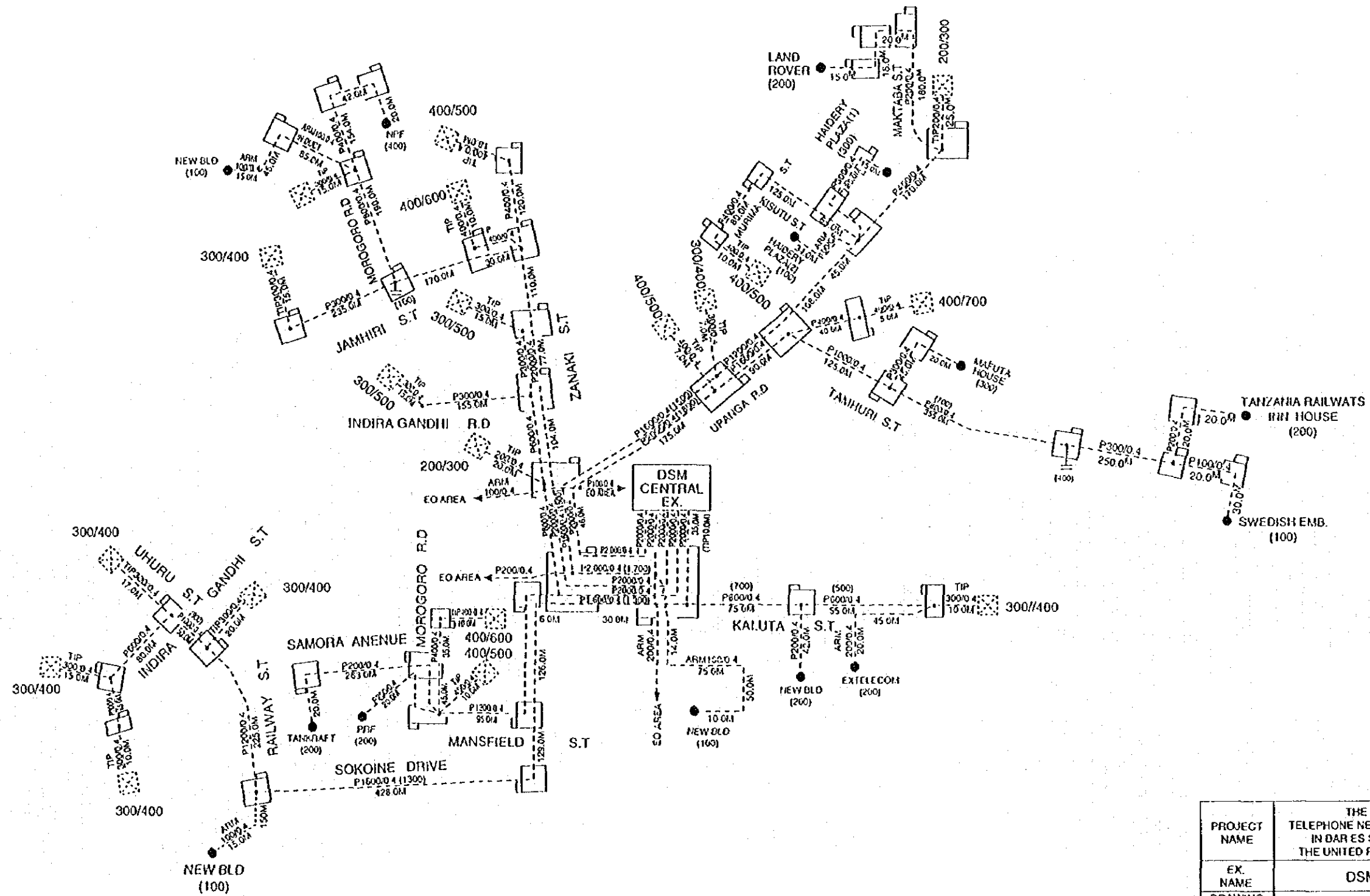
- (1) Development Co-operation Report TANZANIA 1994 Report September 1995 (UNDP)
- (2) Statistical abstract 1993 Bureau of Statistics February 1995 (Statistic Bureau)
- (3) Economic Bulletin for the Quarter Ended 30th June 1995 Vol.XXIV No.2 (Bank of Tanzania)
- (4) Economic and Operations Report for the Year Ended 30th June 1995 (Bank of Tanzania)
- (5) The Rolling Plan and Forward Budget for Tanzania for the Period 1994/95-1996/97
Joint Publication by The President Office Planning Commission and Ministry of Finance
- (6) Foreign Currency Exchange Rate by Daily Basis during the Past 6 Months Nov. 9th '95
(Bank of Tanzania)
- (7) TCC structure (MOWCT)
- (8) Monthly Economic Review (Bank of Tanzania)
- (9) Speech by MOF Introducing National Assembly the Estimate Revenue and Expenditure for
Financial Year 1995/96 (Ministry of Finance)
- (10) Third Telecom. Project (JICA)
- (11) TTS Map (SEGITEL)
- (12) Cost Estimation References/Data
 - Material Cost References (National Engineering Co., Ltd.)
(Ravji Construction Co., Ltd.)
(TEGRY INDUSTRIES)
(AUTO MECH Ltd.)
(PIPECO - ALAF)
 - Wages/Rental Fee for Machinery/etc. (Ravji Construction Co., Ltd.)
 - Regulation of Wages (Ministry of Labour)
 - Insurance System and Premium (National Insurance Corp. Ltd.)
 - Restoration Cost (Konoike Construction Co., Ltd.)
- (13) Road Planning (Regional Office of MOWCT)
(Municipality of DSM)

Basic Design Drawings

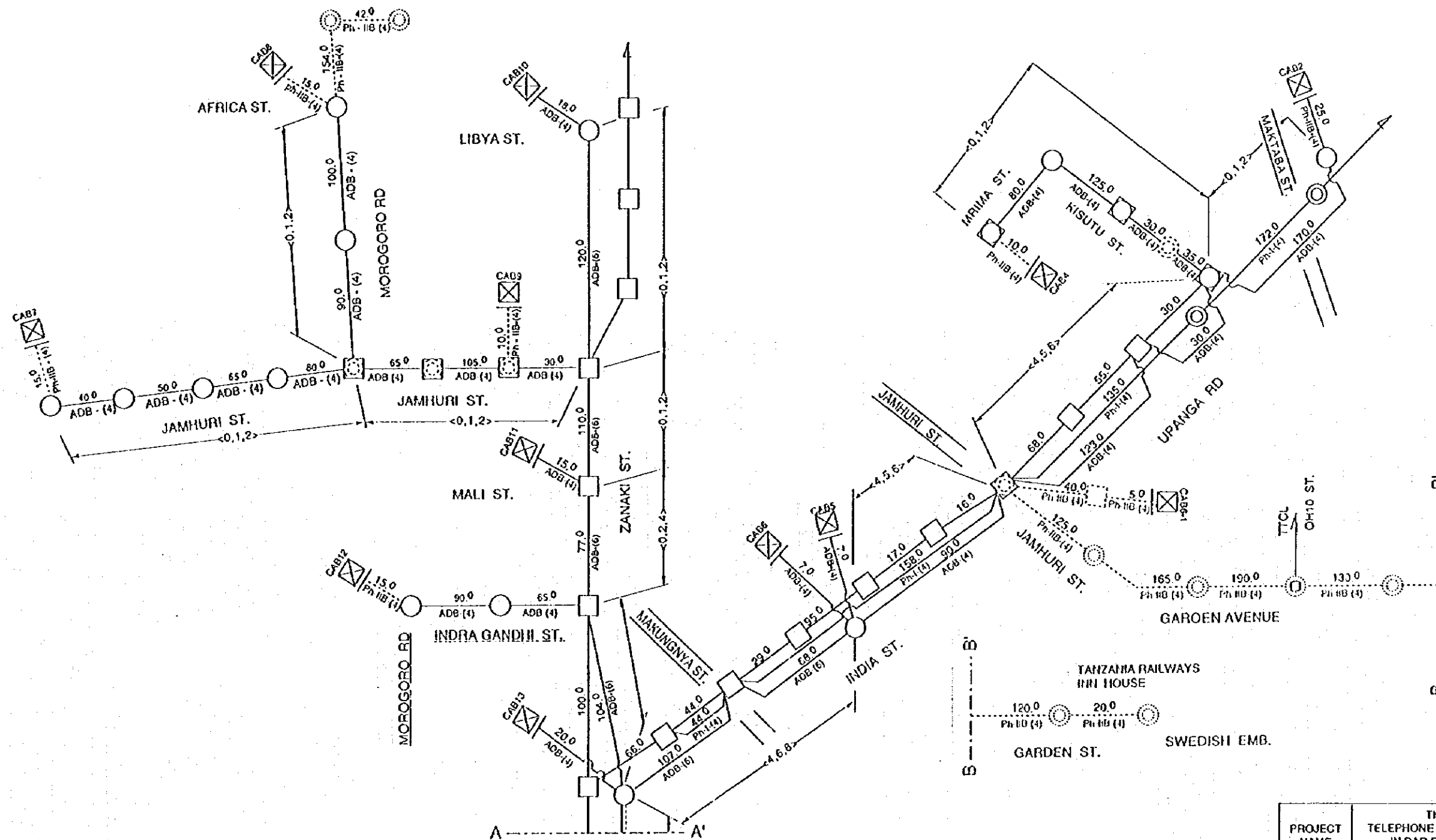
BASIC DESIGN DRAWINGS

- Figure 1. Key Map
- Figure 2. Cable Termination Plan
- Figure 3. Primary Cable Plan
- Figure 4. (1/2) Duct Route Plan (1/2)
- Figure 4. (2/2) Duct Route Plan (2/2)
- Figure 5. MDF Layout Plan
- Figure 6. Switching Room Plan
- Figure 7. Trunking Diagram



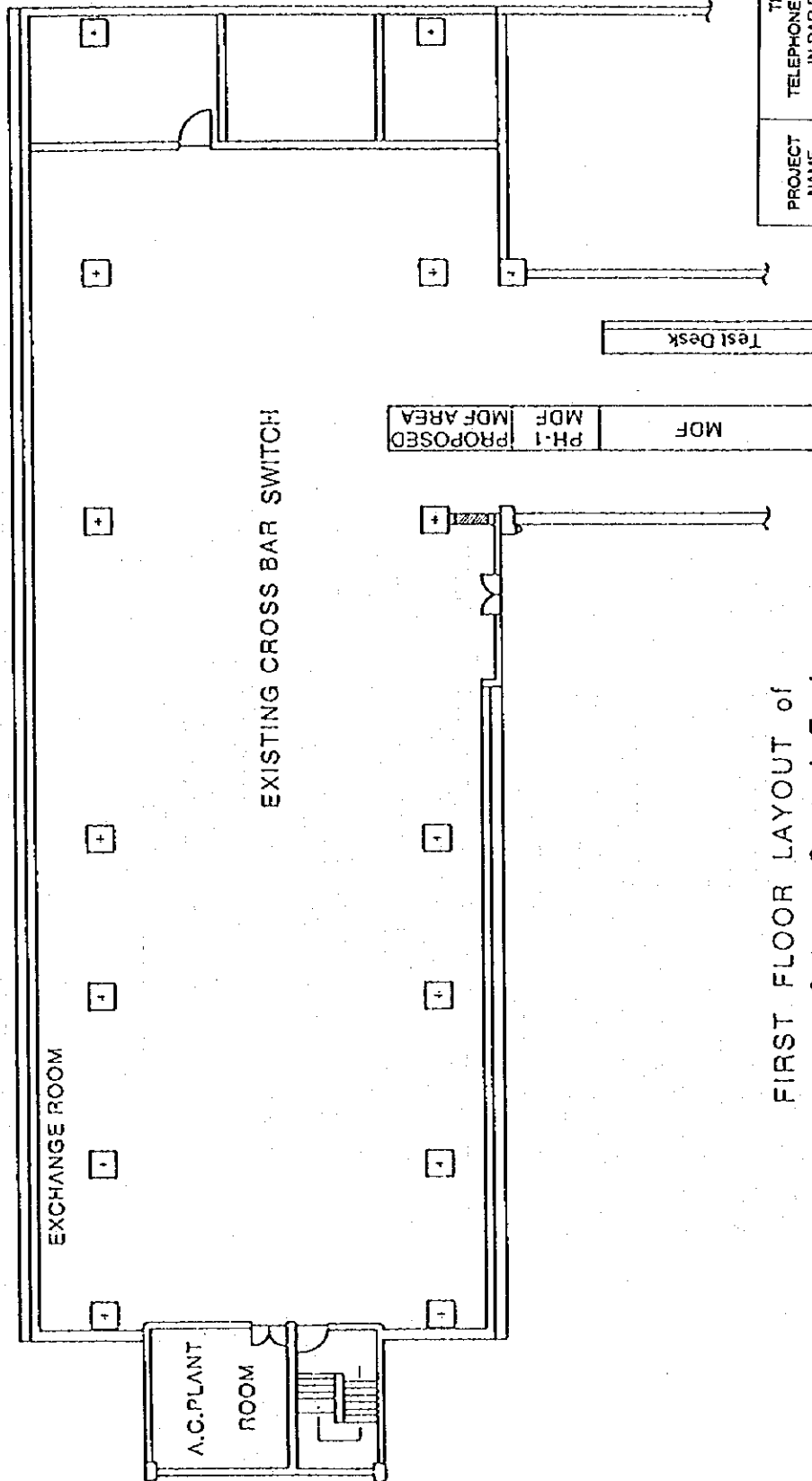


PROJECT NAME	THE PROJECT FOR TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM (PHASE II-B) THE UNITED REPUBLIC OF TANZANIA		
EX. NAME	DSM CENTRAL		
DRAWING TITLE	PRIMARY CABLE PLAN		
DRAWING NO.	3	SHEET NO.	1
TANZANIA TELECOMMUNICATIONS COMPANY LTD.			
JICA			



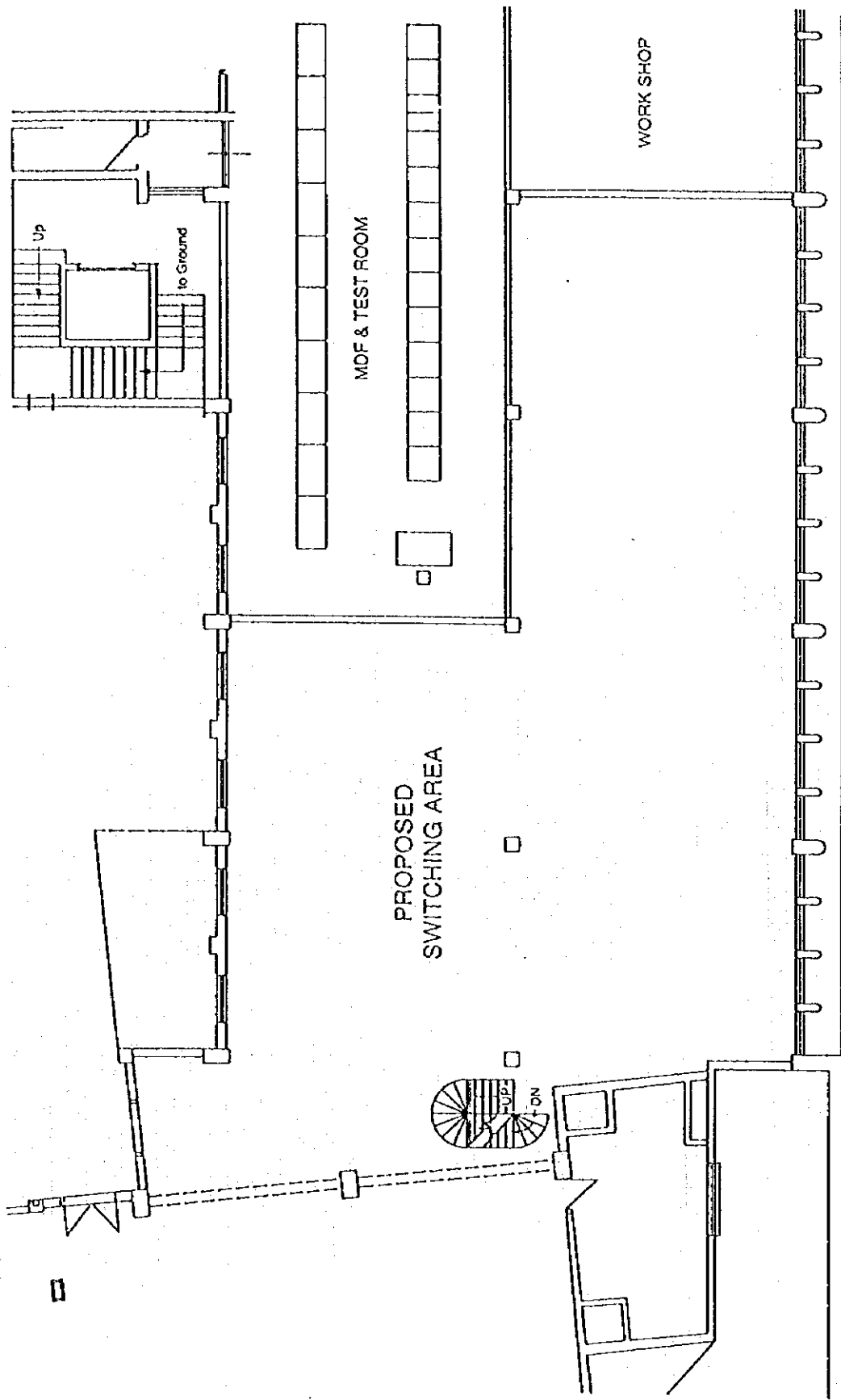
PROJECT NAME	THE PROJECT FOR TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM (PH ASE II B) THE UNITED REPUBLIC OF TANZANIA		
EX. NAME	DSM CENTRAL		
DRAWING TITLE	DUCT ROUTE PLAN		
DRAWING NO.	4	SHEET NO.	2/2
TANZANIA TELECOMMUNICATIONS COMPANY LTD.			
JICA			

DRAWING for LOCATION OF PROPOSED MDF

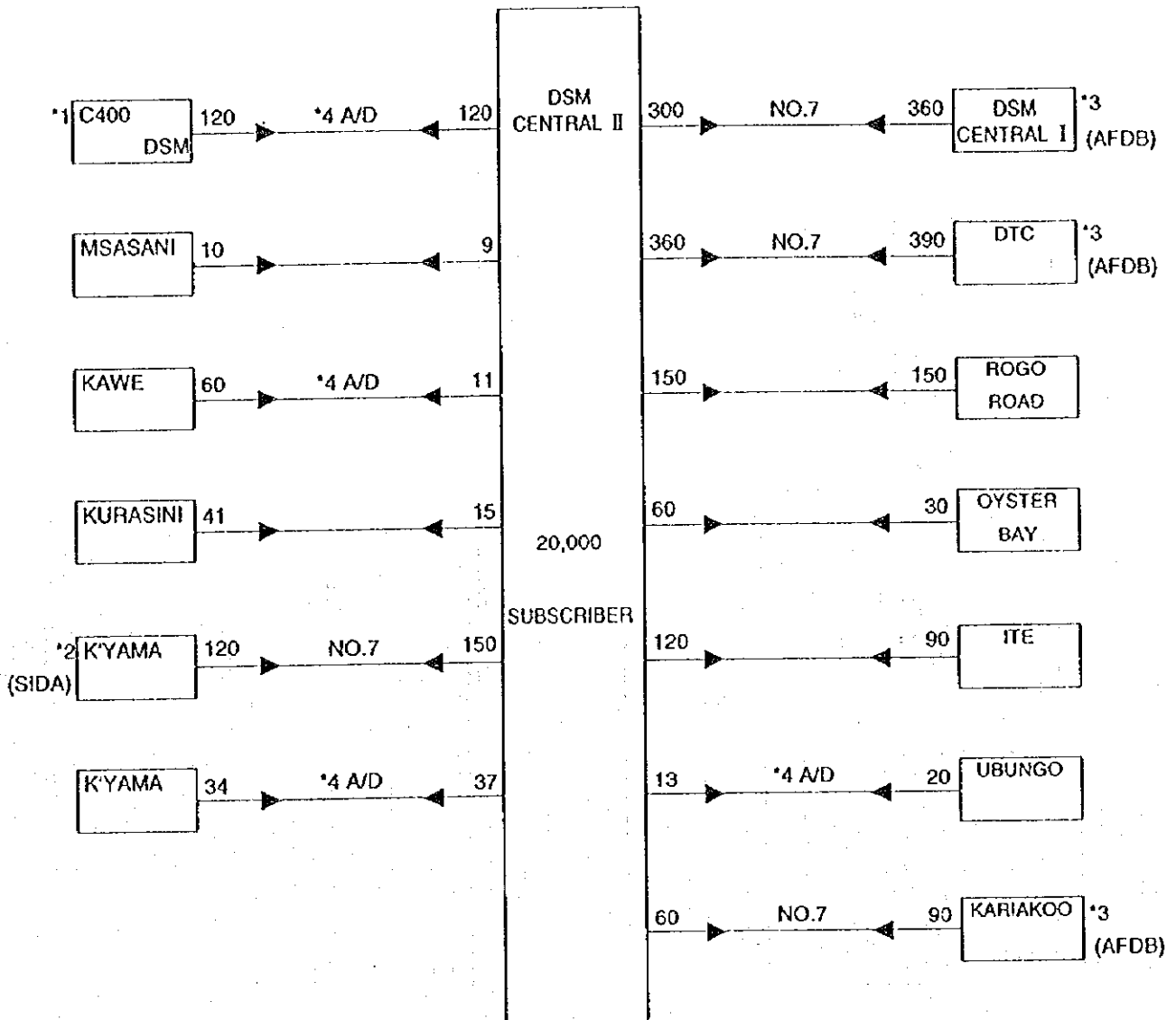


FIRST FLOOR LAYOUT of
Dares Salaam Central Exchange

PROJECT NAME	THE PROJECT FOR TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM (PH ASE II-B) THE UNITED REPUBLIC OF TANZANIA		
EX. NAME	DSM CENTRAL		
DRAWING TITLE	MDF LAYOUT PLAN		
DRAWING NO.	5	SHEET NO.	1
TANZANIA TELECOMMUNICATIONS COMPANY LTD.			
JICA			



PROJECT NAME	THE PROJECT FOR TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM (PH ASE II-B) THE UNITED REPUBLIC OF TANZANIA		
EX. NAME	DSM CENTRAL		
DRAWING TITLE	SWITCHING ROOM PLAN		
DRAWING NO.	6	SHEET NO.	1
TANZANIA TELECOMMUNICATIONS COMPANY LTD.			
JICA			



Number of A/D converter for Trunk Exchange to New DSM switch

OGT (outgoing circuits) : 1405

ICT (incoming circuits) : 1515

Remarks :

- *1 : to be withdrawn after transferring subscribers to New Digital Switch
- *2 : to be installed under SIDA PROJECT
- *3 : to be installed under AIDB PROJECT
- *4 : to be provided by TTCL

PROJECT NAME	THE PROJECT FOR TELEPHONE NETWORK REHABILITATION IN DAR ES SALAAM (PH ASE II-B) THE UNITED REPUBLIC OF TANZANIA		
EX. NAME	DSM CENTRAL		
DRAWING TITLE	TRUNKING DIAGRAM		
DRAWING NO.	7	SHEET NO.	1
TANZANIA TELECOMMUNICATIONS COMPANY LTD.			
JICA			

JICA