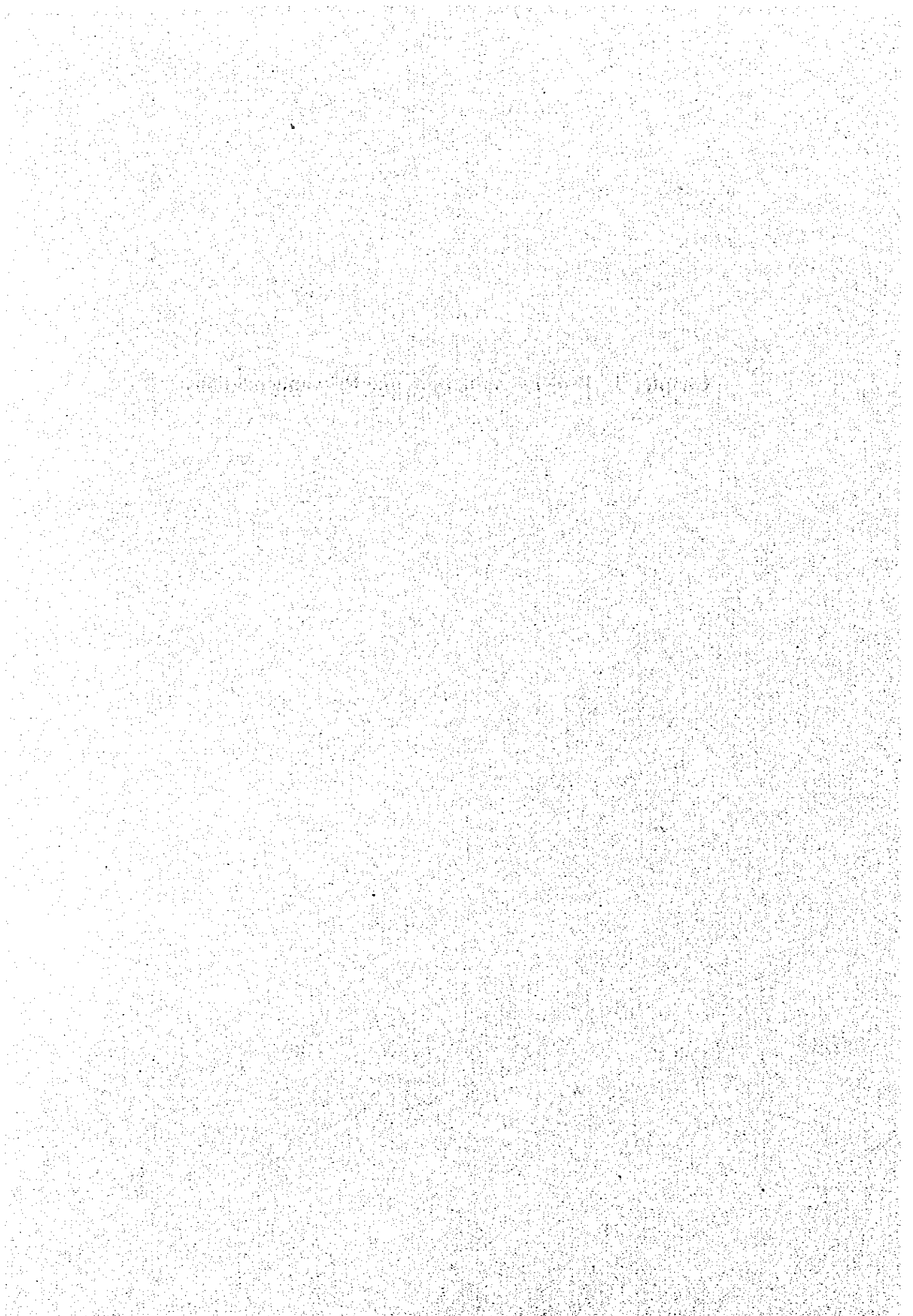


Chapter 4 Project Evaluations and Recommendations



Chapter 4 Project Evaluations and Recommendations

4-1 Project Effect

4-1-1 Project Effect

(1) Direct Effect

1) This project will increase the total capacity of 33/11 kV distribution transformers by 19%, 45 MVA from the original capacity of 237 MVA. This increase corresponds to the demand of about 370,000 customers. Most of waiting consumers can therefore be electrified subject to installation of receiving facilities at the consumer's end.

2) This project will increase the total capacity of 132/33 kV transformers by 135 MVA. The Ilala substation will have 1.5 times as large as the original capacity, so that the present unfavorable full-loaded operation will be eliminated. The Factory Zone III substation will have 90 MVA in addition to the original capacity, so that adjacent distribution substations connected to the FZ-III substation can receive additional electricity to meet increasing demand. The average down time of 30 minutes per month at the FZ-III substation will thus be greatly reduced.

3) The 132 kV Ubungo-Ilala transmission line will be upgraded to a two-circuit system. The average down time of 40 minutes per month will be almost eliminated thanks to this addition of one 132 kV line to the original single-circuit system.

4) The new distribution substations with the new 11 kV feeders will reasonably share the loads with the existing 11 kV distribution substations. This improvement in the distribution network will eliminate the present overloaded status and large voltage fluctuation, and reduce the number of outages (presently three times per day) to less than half.

(2) Indirect Effect

1) The distribution capacity will increase throughout the city of Dar es Salaam, so that all the substations will be improved with respect to the operating status (e.g. load factor). This will be of benefit to all the 2 million people of the city, and facilitate the spread of the prepayment-based rate collection system that has been recently introduced.

2) The present overloaded status will be eliminated, which will result in better supply reliability.

3) The economic loss attributable to supply restraint during 1991-1994 corresponds to as large as 5% of the GDP according to an estimation: outages have been giving adverse effect to the national economy. This project will reduce outages resulting from improving the distribution systems and contribute to the development of economy.

4-1-2 Verification of Suitability

The 1st phase of the project will expand the electric facilities according to the expected increase in demand for the benefit of the inhabitants. Therefore, the suitability of the 1st phase of the project can be verified by calculating how many people can be newly electrified.

The 2nd phase that will most significantly affect the distribution system for Dar es Salaam should be verified based on the demand status in the Factory Zone-III area.

Our verification study clarified that the number of consumers who will be newly electrified will total about 340,000.

Area Population

Total

The number of contractors throughout the country as of November 1995 is as follows.

Tariff No.1 (General consumers for consumption of less than 7,500 kWh per month)

Tariff No.2 (400V consumers for consumption of more than 7,500 kWh per month)

Tariff No.3 (11kV consumers)

Tariff No.4 (Public lighting)

Tariff no.5 (Zanzibar)

The number of contractors in the FZ-III area as of June 1996 is 26,704, 21.5% of the total number (124,175) in the Dar es Salaam area.

4-2 Recommendation

4-2-1 Technical Collaboration and Other Assistance Projects

The project implementer TANESCO has an experience in maintenance, management and operation of a large number of electric facilities of same type. However, in order to enhance maintenance capabilities, technical transfer from Japan in association with this project will be of benefit to the Tanzania side.

Other electric projects with charged or gratuitous assistance by foreign entities such as the World Bank, European countries and the African Development Bank are summarized below.

- Kihansi hydropower plant: the World Bank, SIDA, NORAD, EIB and KFW: Complete in 1999
- Singida-Arusha 220kV transmission system: Denmark: Complete in 1997

- Songo Songo natural gas development: the World Bank, EIB, etc.: Complete in 2000
 - Dar es Salaam distribution expansion: the World Bank, NORAD, etc.: Complete in 1998
- Financing for structural adjustment that has been suspended since 1994 will be resumed in near future.

4-2-2 Pending Matters and Challenges

- 1) Most portions of the 33 kV transmission route will be town-roadside except some bypass or underground portions where there are obstructions such as a structure or tree. Vital it is to acquire necessary lots smoothly and timely. Budgeting the acquisition cost including compensations for landowners is yet to be settled.
- 2) TANESCO should establish a useful database so that analyses for past operations and future planning can be done correctly and effectively.
- 3) TANESCO should establish necessary standards and manuals on design, construction, management, operation and maintenance so that technical capabilities can be improved.
- 4) TANESCO should review the existing system-substations and distribution-substations in order to identify the problems contained in these facilities.
- 5) TANESCO should review the existing communication systems and transportation facilities, and remove weak points by adding or replacing relevant equipment so that operating efficiency can be improved.

Appendices

Appendices

1.	<i>Member List of the Survey Team</i>	1
2.	<i>Survey Schedule</i>	3
3.	<i>List of Party Concerned in the Recipient Country</i>	7
4.	<i>Minutes of Discussion</i>	11
	4-1 <i>Minutes of Discussion July 31, 1996</i>	11
	4-2 <i>Technical Notes August 16, 1996</i>	36
	4-3 <i>Minutes of Discussion November 6, 1996</i>	42
5.	<i>Cost Estimation Borne by the Government of Tanzania</i>	51
6.	<i>References</i>	53

1. Member List of the Survey Team

1 . Member List of the Survey Team

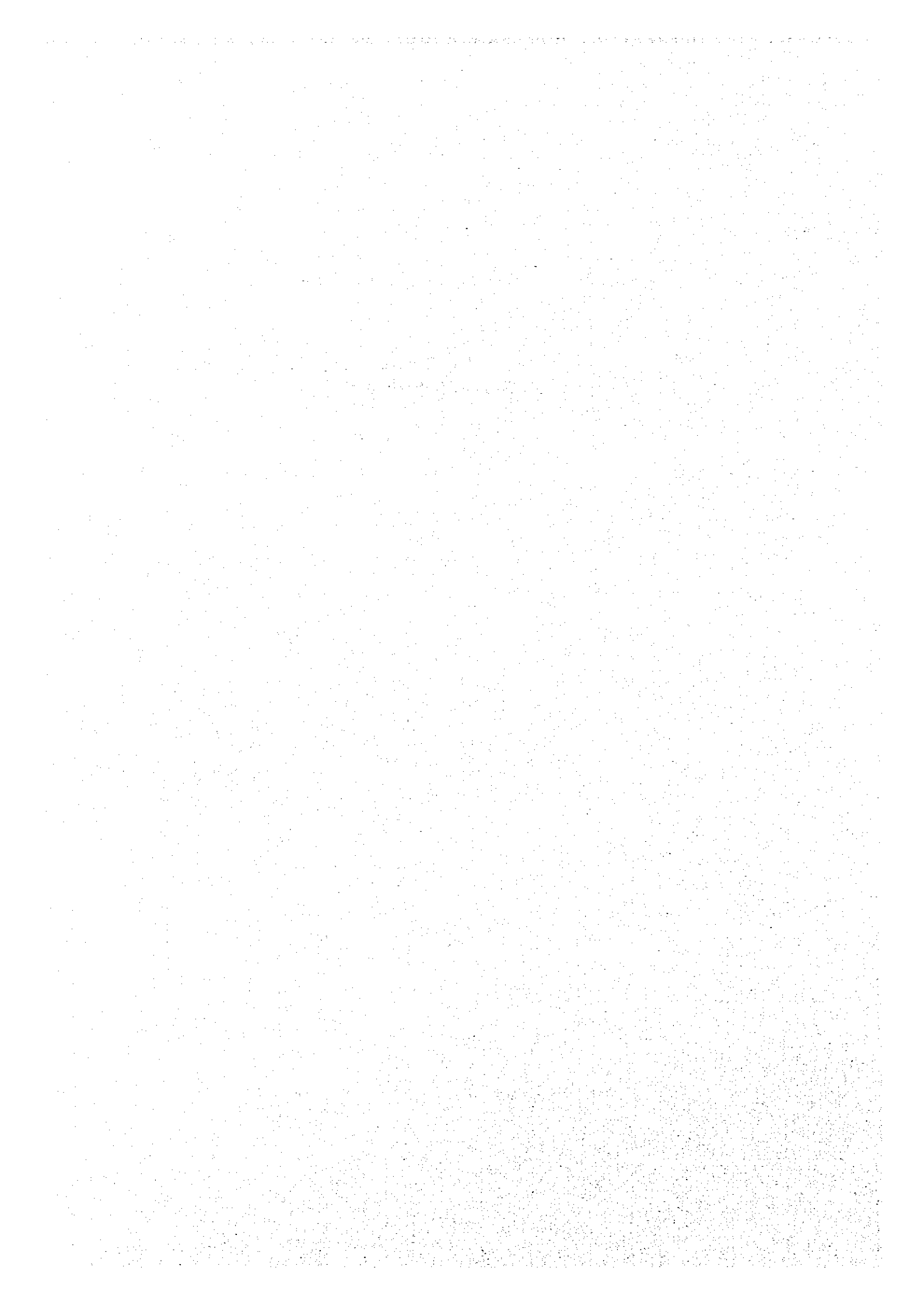
1-1 Site Survey

- 1. Leader, Mr. Hayao ADACHI**
Development Specialist, Institute for international Cooperation
Japan International Cooperation Agency
- 2. Coordinator, Mr. Shinichi MASUDA**
First Project Study Division, Grant Aid Project Study Department,
Japan International Cooperation Agency
- 3. Chief Consultant / Operation and Maintenance Planner, Mr. Hitoshi KITAZAWA**
EPDC International Ltd.
- 4. Transformer Planner, Mr. Minoru NODA**
EPDC International Ltd.
- 5. Electricity Transmission and Distribution Planner, Mr. Yoshiyuki KUDO**
EPDC International Ltd.

1-2 D·B/D Explanation Team

- 1. Leader, Mr. Hayao ADACHI**
Development Specialist,
Institute for international Cooperation
Japan International Cooperation Agency
- 2. Coordinator, Mr. Kenichi MATSUMOTO**
Third Contract Division, Procurement Department,
Japan International Cooperation Agency
- 3. Chief Consultant / Operation and Maintenance Planner, Mr. Hitoshi KITAZAWA**
EPDC International Ltd.
- 4. Transformer Planner, Mr. Minoru NODA**
EPDC International Ltd.

2. Survey Schedule



2-1 Itinerary for Site Survey

1/3

No. of Day	Date	Week	Activity	Stay
1	7/23	Tue.	Tokyo (Narita) Lv. 11:35 NH-201 London Ar. 15:55	London
2	7/24	Wed.	London Lv. 16:30 SR-807 Zurich Ar. 19:05 Zurich Lv. 20:40 SR-292 Dar Es Salaam Ar. 7:20 (Mr.Noda) Market Reseach of equipment and materials in London	Air
3	7/25	Thu.	Dar Es Salaam Ar. 7:20 Courtesy call to EMB and JICA office (Mr.Noda) Market Reseach of equipment and materials in London London Lv. 22:25 BA-069	DSM Air
4	7/26	Fri.	Coutesy call to Ministry of Energy and Minerals (Mr.Noda) Dar Es Salaam Ar. 11:45 Discuss with TANESCO(Inception report, Schedule, Counterparts,etc)	DSM
5	7/27	Sat.	Field survey (132kV transmission line, Ubungo substation, Ubungo-FZ III transmission line route, FZ III substation, Mbagala substation, Kariakoo substation, Ilala substation, Msasani substation	DSM
6	7/28	Sun.	Inner Meeting, Arrange collected data and information	DSM
7	7/29	Mon.	Inner Meeting, Minutes of Discussion 作成	DSM
8	7/30	Tue.	Discuss with TANESCO on the Minutes of Discussion	DSM
9	7/31	Wed.	Signing on the Minutes of Discussion report to EMB and JICA	DSM
10	8/01	Thu.	Discuss with TANESCO (Data collection)	DSM
11	8/02	Fri.	Discuss with TANESCO (Data collection) Field survey (Tegeta S/S, Tandale S/S)	DSM
12	8/03	Sat.	Field survey (132kV transmission line, Mikocheni substation)	DSM
13	8/04	Sun.	Inner Meeting, Arrange collected data and information	DSM

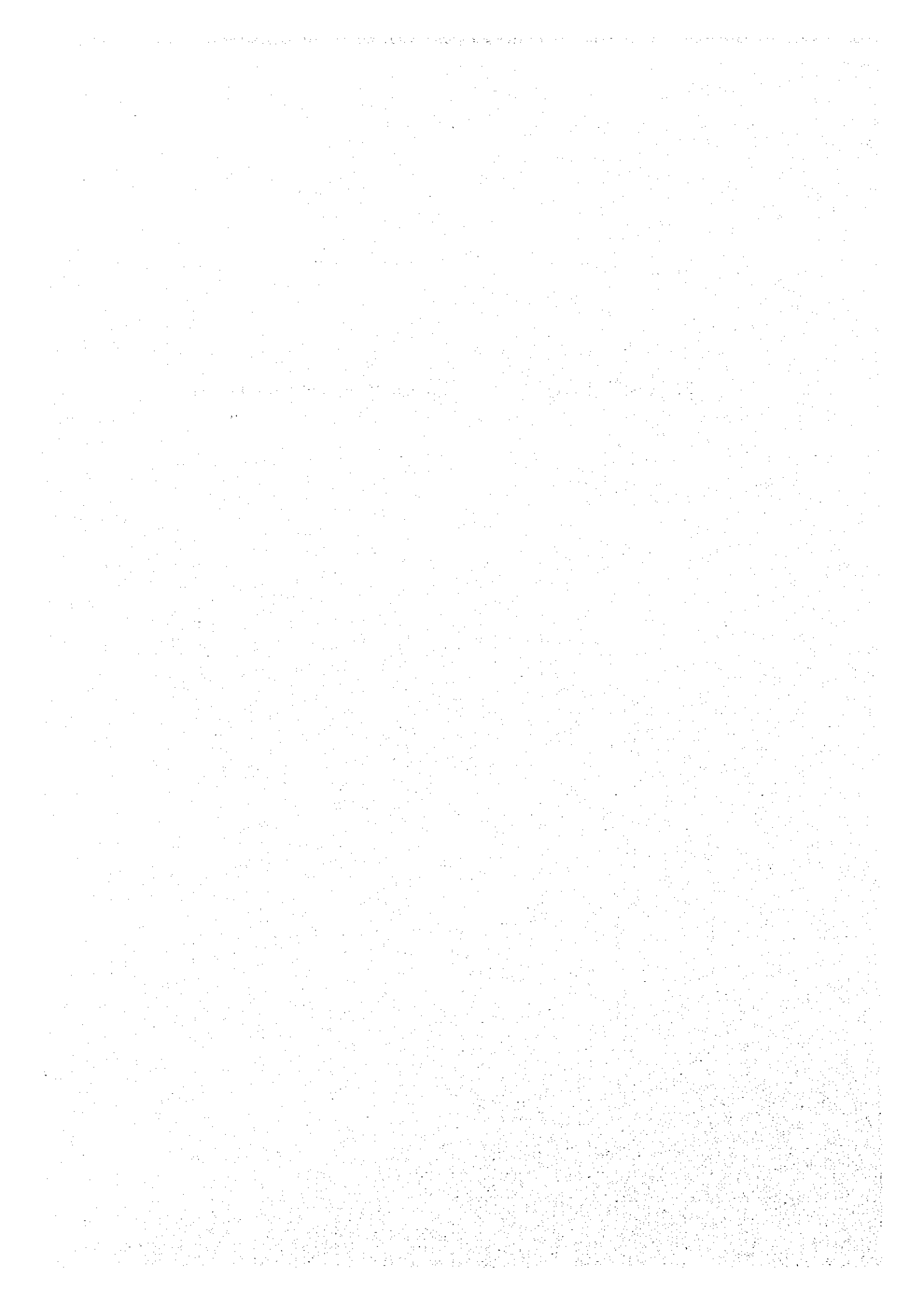
No. of Day	Date	Week	Activity	Stay
14	8/05	Mon.	Discuss with TANESCO (Data collection) Field survey (132kV Tandale substation, Ubungo substation on the outgoing facilities for Ilala and FZ III, Route survey for 132kV Ubungo-FZ III lines)	DSM
15	8/06	Tue.	Discuss with TANESCO (Data collection) (Mr.Noda) Data collection in Ubungo (Mr.Kudo) Data collection in Ubungo	DSM
16	8/07	Wed.	Courtesy call to Managing Director Mr.S.L.Mhavile Field survey(Kariokoo substation site, Transmission line route Ilala substation) Field survey for Ilala substation (11kV, 33kV)	DSM
17	8/08	Thu.	Route survey for 33kV transmission line of Kariakoo - Ilala substations Route survey for 33kV transmission line of 33kV Krasini - Mbagala substations	DSM
18	8/09	Fri.	Field survey for Kurasini substation Route survey for 33kV transmission line of 33kV Krasini - Mbagala substations Discuss on 132 kV transmission route survey Data collection of soil and associated information	DSM
19	8/10	Sat.	Route survey for 33kV transmission line of 33kV Krasini - Mbagala substations Inner Meeting, Arrange collected data and information	DSM
20	8/11	Sun.	Inner Meeting, Arrange collected data and information	DSM
21	8/12	Mon.	Discuss with TANESCO Route survey for 132kV transmission line of 33kV Ubungo - Ilala substations Route survey for 132kV transmission line of 33kV Ubungo - FZ-III substations	DSM
22	8/13	Tue.	Discuss with TANESCO Soil investigation of Ubungo - Ilala 132kV transmission line Route survey for 33kV transmission line of 33kV Krasini - Mbagala substations	DSM

No. of Day	Date	Week	Activity	Stay
23	8/14	Wed.	Discuss with TANESCO	DSM
24	8/15	Thu.	Discuss with TANESCO Specifications and data collection	DSM
25	8/16	Fri.	Discuss with TANESCO (Data collection), Route survey for 33kV transmission line, Signing of Technical Notes) Report to EMB and JICA	DSM
26	8/17	Sat.	Discuss with TANESCO Data collection and route survey for 11kV distribution line	DSM
27	8/18	Sun.	Arrange collected data	DSM
28	8/19	Mon.	Discuss with TANESCO (Data collection) Dar Es Salaam Lv. 19:45 BA-068	Air
29	8/20	Tue.	London Ar. 5:15 London Lv. 18:00 NH-202	Air
30	8/21	Wed.	Tokyo (Narita) Ar. 13:40	

2-2 Itinerary for D·B/D Explanation

No.of Day	Date	Week	Activity				Stay
1	10/28	Mon.	Tokyo (Narita)	Lv.	11:30	NH-201	London
			London	Ar.	15:00		
2	10/29	Tue.	London	Lv.	22:25	BA-069	Air
3	10/30	Wed.	Dar es Salaam	Ar.	12:15		DSM
			Immer Meeting				
4	10/31	Thu.	Courtesy call to EMB, JICA & TANESCO				DSM
5	11/1	Fri.	Discussion with TANESCO				DSM
6	11/2	Sat.	Immer Meeting				DSM
7	11/3	Sun.	Immer Meeting				DSM
8	11/4	Mon.	Discussion with TANESCO, MEM on the Minutes of Meeting				DSM
9	11/5	Tue.	Final Discussion with TANESCO on the Minutes of Meeting				DSM
10	11/6	Wed.	TANESCO, MEM, MOF, Report to EMB and JICA				Air
			Dar es Salaam	Lv.	20:05	BA-068	
11	11/7	Thu.	London	Ar.	5:00		Air
			London	Lv.	16:50	NH-202	
12	11/8	Fri.	Tokyo (Narita)	Ar.	13:15		

3. List of Party Concerned in the Recipient Country



3-1 Site Survey

	Name	Belongings
(1)	Tanzania Embassy of Japan	
	Mr. Sintaroo Sasaki	Ambassador
	Mr. Shigeyuki Suzuki	Minister
	Mr. Yasushi Shigemasa	First Secretary
	Mr. Kazuhiko Kitagawa	Second Secretary
(2)	London JICA Office	
	Mr. Hisayoshi Ogiwara	JICA UK Office
(3)	Tanzania JICA Office	
	Mr. Takemasa Kawazoe	Resident Representative
	Mr. Takashi Mizuno	Deputy Director
	Mr. Masahiko Uryu	Deputy Resident Representative
	Mr. Hiroyuki Moronaga	Assistant Resident Representative
	Ms. Manami Tada	Assistant Resident Representative
	Mr. Jackson M. Biswaro	Assistant Director (Economic Affairs)
	Mrs. Deborah Sungusia	Assistant Director
	Mr. Lwema Taguaba	Assistant Director (General Duties)
(4)	MEM(Ministry of Energy and Minerals)	
	Mr. Bahir J. Mrindoko	Acting Principal Secretary
	Prof. J. Mbwiliza	Deputy Minister
	Mr. Raphael O. S. Mollel	Principal Secretary
	Mrs. Esthet Masunzu	Assistant Commissioner Electricity
(5)	MOF (Ministry of Finance)	
	Mr. Paul A. Mwafongo	Commissioner for External Finance and Debt Management
(6)	TANESCO (Tanzania Electricity Supply Company Limited)	
	Mr. S. L. Mhaville	Managing Director
	Mr. Kyaro K. Iranga	Deputy Managing Director (Operations)
	Mr. S. J. Kimaryo	Deputy Managing Director (Technical Services)

Mr. B.E.A.T.Luhanga	Deputy Managing Director (Corporate Planning and Research)
Mr.S.M.Sikare	Director of Operations
Mrs.M.S.Baregu	Manager Distribution & Commercial Services
Mr.Abdalh Fereshi	Manager Sub-stations & Equipment Operations
Mrs.Sophia Mgonja	Distribution Engineer
Mr.Anastas P. Mbawala	Manager Projects
Mr.Gideon N. M. Nyamboha	Ag. Chief Design Engineer
Mr.S. A. (Al) Warrington	Site Construction Manager (Ubungo)
Mr.Prem K. Sharma	Electrical Construction Manager (Ubungo)
Mr. M. Kalokola	Zonal Director (Coast)
Mr.Leonard B. Kassana	Engineering Geologist (Ubungo)
Mr.Innocent Kalolo	Transmission Supervisor (Ubungo)
Mr.Ellas Tumbui	Transmission Supervisor (Ubungo)
Mr.Maya	Transmission Supervisor (Ubungo)
Mr.John	Linesman (Ubungo)
Mr.Chande	Surveyer (Ubungo)
Mr.Mfaume Kassanga	Distribution Engineer
Mr.Christopher Sumary	Manager Corporate Planning
Mr.Gilbert S. Mrosso	Surveyer
Mr.Mwalongo M. A.	Surveyer
Mr.Izahaki Mocha	Protection Engineer
Mr.David Lyimo	Senior Technician
Mr.Apoleon S. Mwakifulefule	Technician
Mr.Amon K. Gamba	Senior Electrical Engineer

(7) CROWN AGENTS

Mr.David Roissetter	Deputy Director-Japanese Aid
Eur Ing Ian Nightingale	Head of Technical Procurement
Miss.Rachel Warren	Business Development Manager

3-2 D·B/D Explanation

Name	Belongings
(1) Tanzania Embassy of Japan	
Mr. Sintaroo Sasaki	Ambassador
Mr. Shigeyuki Suzuki	Minister
Mr. Yasushi Shigemasa	First Secretary
Mr. Kazuhiko Kitagawa	Second Secretary
(2) Tanzania JICA Office	
Mr. Takemasa Kawazoe	Resident Representative
Mr. Takashi Mizuno	Deputy Director
Mr. Hiroyuki Moronaga	Assistant Resident Representative
Ms. Manami Tada	Assistant Resident Representative
(3) MEM (Ministry of Energy and Minerals)	
Mrs. Esthel Masunzu	Assistant Commissioner Electricity
Mr. Theophilho Bwakea	Executive Engineer
(4) MOF (Ministry of finance)	
(5) TANESCO (Tanzania Electricity Supply Company Limited)	
Mr. B.E.A.T.Luhanga	Managing Director
Mr.S.M.Sikare	Director of Operations
Mrs.M.S.Baregu	Manater Distribution Engineer
& Commercial Services	
Mr.Abdallh Fereshi	Manager Sub-stations & Equipment
Operations	
Mrs.Sophia Mgonja	Distribution Engineer
Mr.Martin M. Kalokola	Zonal Director-Coast
Mr.Cosmas L.M.Masawe	Ag.Director of Operations
Mr.Hiroyuki Sato	Japanese Governmental Specialist (power
	Distribution)
Mr.Gladstone E.Kombe	Electricity IV Project Coordinator
Mr.M.E.Kingu	Chief Rural Electric Engineer

(6) Others

(Inter-Consultant Ltd.)

Dr.Strat P.Mosha

Director

Mr.Thaddei S.Mlingi

Director-Civil Eng.and Project Management

Mr.David M.Mosha

Managing Director

(University of Dar Es Salaam)

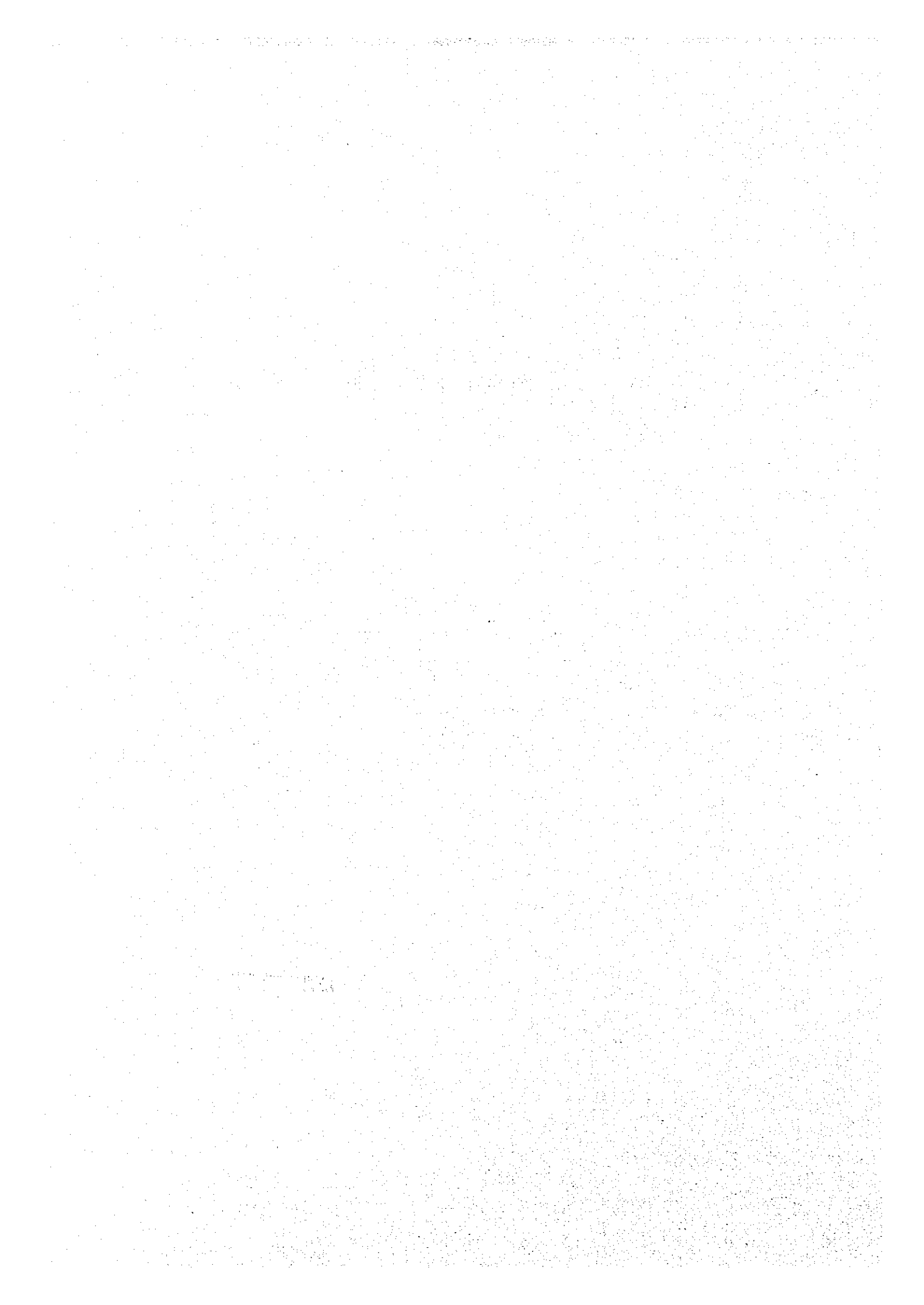
Dr.B.B. Nyichomba

Senior Lecturer & Consultant

(University College of Lands and Arshitectual Studies)

Mr.E.H.Silayo

4. Minutes of Discussion



4-1 MINUTES OF DISCUSSIONS

ON THE BASIC DESIGN STUDY ON DAR ES SALAAM POWER SUPPLY EXPANSION PROJECT IN THE UNITED REPUBLIC OF TANZANIA

In response to the request from the Government of the United Republic of Tanzania, the Government of Japan decided to conduct a Basic Design Study on Dar es Salaam Power Supply Expansion Project (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA has sent to Tanzania a Study Team which is headed by Mr. Hayao ADACHI, Development Specialist, JICA, and is scheduled to stay in the country from 25 of July to 19 of August, 1996.

The Team had a series of discussions with the concerned officials of Tanzania and conducted a field survey at the study area.

As a result of discussions and field survey, both sides have confirmed the main items described in the attached sheets.


Dar es Salaam, July 31, 1996



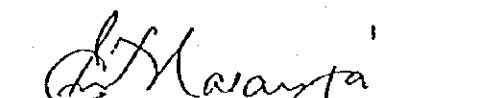
Mr. Hayao ADACHI
Leader
Basic Design Study Team
JICA



Mr. Bashir J. MRINDOKO
Acting Principal Secretary
Ministry of Energy and Minerals



Mr. Kyaro K. IRANGA
Deputy Managing Director (Operation)
Tanzania Electric Supply Company
Limited



Mr. Emmanuel M. MASANJA
Commissioner for External Finance
and Debt Management
Ministry of Finance

ATTACHMENT

1.Objectives

The objective of the Project is to increase the stability of electric supply system in Dar es Salaam.

2.Project sites

The map of the project sites is attached in Annex I.

3.Executing agency

The Ministry of Energy and Minerals is responsible for the coordination to implement the Project.

The Tanzania Electric Supply Company Limited is responsible for the execution of the Project.

4.Items requested by the Government of Tanzania

After discussions with the Team, the following components were finally requested by the Government of Tanzania. The items of the Project is described in Annex II. However, the items to be included in the Project will be determined after further studies.

1) Hala S/S extension project

Capacity increase of transformer at Hala, extension of Ubungo substation and construction of a 132KV single circuit transmission line between Ubungo and Hala with relevant 11KV distribution lines (Steel towers will be designed for double circuit stringing.)

2) Kariakoo S/S construction project

Construction of Kariakoo substation (33KV/11KV) and a 33KV single circuit transmission line between Hala and Kariakoo with relevant 11KV distribution lines

3) Mbagala S/S construction project

Construction of Mbagala substation (33KV/11KV) and a 33KV single circuit transmission line between Kurasiini and Mbagala with relevant 11KV distribution lines

4) Factory Zone III S/S extension project

Extension of Factory Zone III substation with 132KV/33KV transformers and construction of a 132KV single circuit transmission line between Ubungo and Factory Zone III (Steel towers will be designed for double circuit stringing.)

5) Common items

Procurement of equipment and materials necessary for the construction and operation and maintenance related to the Project

5. Japan's Grant Aid System

- 1) The Government of Tanzania understands the system of Japan's Grant Aid as explained by the Team.
- 2) The Government of Tanzania will take necessary measures, as described in Annex III for the smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

6. Schedule of the Study

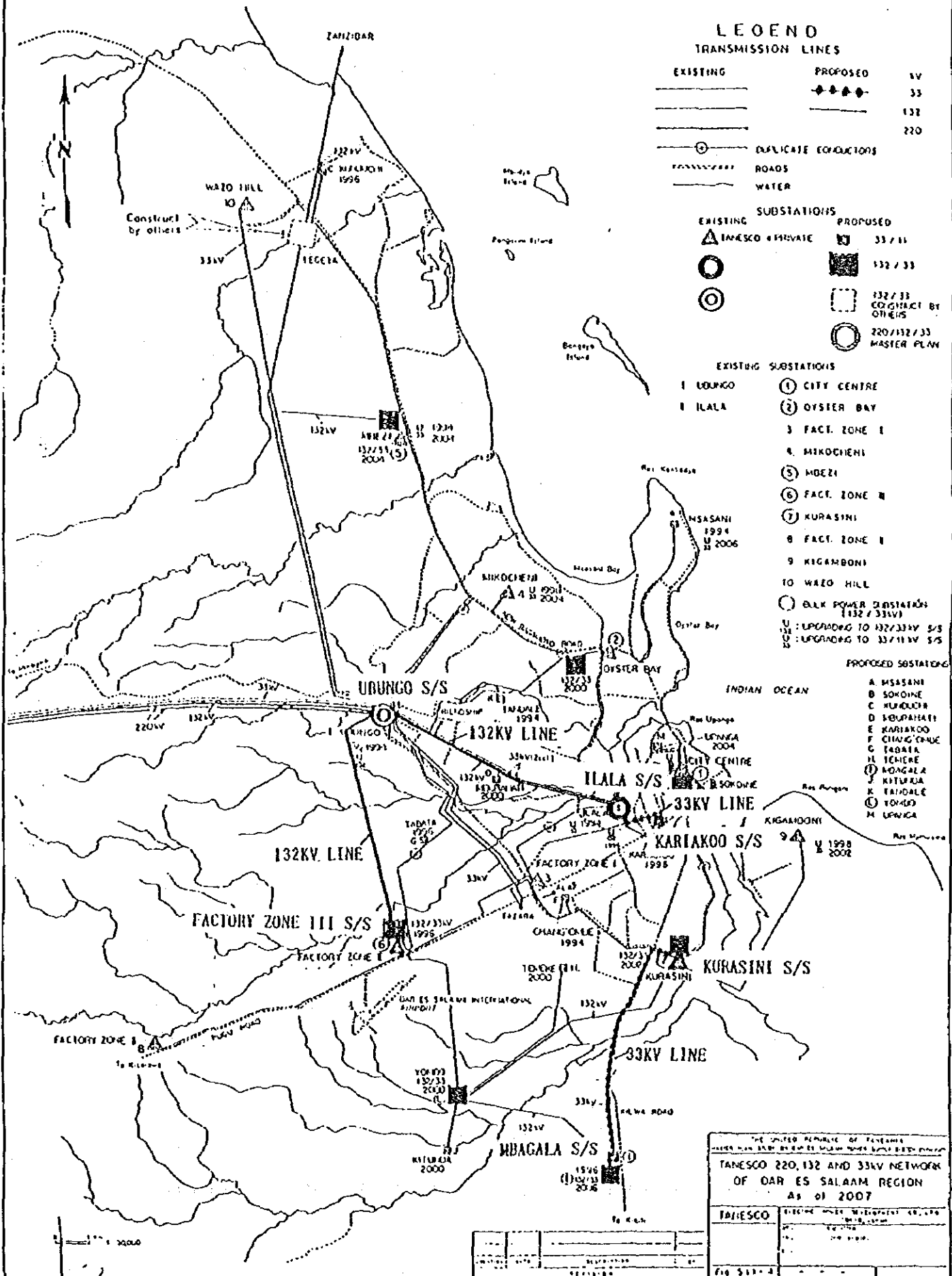
- 1) The Team will proceed to further study in Tanzania until August 19, 1996.
- 2) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around November, 1996.
- 3) In case that the content of the draft report is accepted in principle by the Government of Tanzania, JICA will complete the final report and send it to the Government of Tanzania around January, 1997.

7. Major Points of Discussions

- 1) The Government of Tanzania will allocate the necessary budget and personnel for execution of the Project.
- 2) Both parties agreed that the installation works of the 11KV distribution lines and their relevant accessories should be conducted by the Tanzanian side utilizing the equipment and materials to be procured under the Grant Aid.
- 3) The Japanese side will confirm the progress of securing the sites at the time of the presentation of the draft Basic Design report. Both parties should agree the necessary land areas for the Project on the existing one-to-50,000 scale map with relevant information before the Team's departure.

- 4) Both parties agreed that the Tanzanian side should conduct the preliminary environmental and compensation survey and report the result to the Team before their departure.
- 5) The Tanzanian side agreed that the topographic survey of the Project area would be conducted by the Tanzanian side based on the specification to be given by the Team before the Team's departure.
- 6) The Tanzanian side agreed to conduct the soil investigation for the Project based on the specification to be given by the Team before the Team's departure. Both parties understood that the survey results of items which are required for the Basic Design should be reported to the Japanese side by mid September, 1996.
- 7) The Tanzanian side requested some counterpart engineers to be trained in Japan. The Team recommended that the official request should be submitted to the Government of Japan.

ANNEX I Map of the Project Sites



LEGEND

TRANSMISSION LINES

EXISTING	PROPOSED	kV
—————	◆◆◆◆◆	33
—————	—————	132
—————	—————	220

⊙	DPLICATE CONNECTIONS
—————	ROADS
~~~~~	WATER

### SUBSTATIONS

EXISTING	PROPOSED	kV
▲	■	33 / 11
○	■	132 / 33
○	□	132 / 33 CONTRACT BY OTHERS
○	○	220/132/33 MASTER PLAN

### EXISTING SUBSTATIONS

- 1 URUNGO
- 1 ILALA
- 1 CITY CENTRE
- 2 OYSTER BAY
- 3 FACT. ZONE I
- 4 MIKOCHEJI
- 5 MBEZI
- 6 FACT. ZONE II
- 7 KURASINI
- 8 FACT. ZONE I
- 9 KIGAMBONI
- 10 WAZO HILL
- BULK POWER SUBSTATION (132/33kV)
- U : UPGRADING TO 132/33kV S/S
- U : UPGRADING TO 33/11kV S/S

### PROPOSED SUBSTATIONS

- A MSAANI
- B SOHINE
- C KUPINDUJI
- D SEUPAHATI
- E KARIAKOO
- F CHANG'OMBE
- G TABARA
- H TCHERE
- I KONGELA
- J KIFURIA
- K FAIDALE
- L TONYO
- M UENGA

THE UNITED REPUBLIC OF TANZANIA  
 POWER AND WATER SUPPLY CORPORATION  
**TANESCO 220, 132 AND 33kV NETWORK  
 OF DAR ES SALAAM REGION  
 As of 2007**

TANESCO	ELECTRIC POWER SUPPLY CORPORATION
1000, 1000	1000, 1000
1000, 1000	1000, 1000

*Handwritten signature*



Construction of 132 kV transmission line between Ubungo - Factory Zone III  
8.6 km

(c) Common items

- Procurement of Vehicles and tools

	Unit	Quantity
Truck (Loading capacity : 5 tons, with 3-ton crane)	set	2
Pickup double cabin (Loading capacity : 1 ton)	set	3
Tools	lot	1

- Others

Installation of a new telecommunications system



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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 the sites for the Project
2. To clear, level and reclaim the sites prior to the commencement of the construction
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the sites
4. To exempt taxes and to take the necessary measures for customs clearance of the materials and equipment brought for the Project at the port of disembarkation
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 duration of their work
7. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant
8. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment



## ANNEX IV

### ON JAPAN'S GRANT AID PROGRAM

#### 1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures.

- Application (request made by a recipient country)
- Study (Preliminary Study / Basic Design Study conducted by JICA)
- Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- Determination of Implementation (Exchange of Notes between the both Governments)
- Implementation (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grant Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested project are not clear, a Preliminary Study is conducted prior to a Basic Design Study.

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

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

#### 2. Contents of the Study

##### 1) Contents of the Study

The purpose of the Study (Preliminary Study/Basic Design Study) conducted on a

project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

- a) to confirm background, objectives, benefits of the project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation,
- b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
- c) to confirm items agreed on by the both parties concerning a basic concept of the project
- d) to prepare a basic design of the project,
- e) to estimate cost involved in the project.

Final project components are subject to approval by the Government of Japan and therefore may differ from an original request.

Implementing the project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized on Exchange of Notes.

## 2) Selecting (a) Consulting Firm(s)

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

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency and also to avoid possible undue delay in implementation caused if a new selection process is repeated.

## (3) Status of a Preliminary Study in the Grant Aid Program

A Preliminary Study is conducted during the second step of a project formulation & preparation as mentioned above.

A result of the study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study.

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process (appraisal and approval).

It is important to notice that at the stage of Preliminary Study, no commitment is made by the Japanese side concerning the realization of the Project in the scheme of Grant Aid Program.

### 3. Japan's Grant Aid Scheme

#### 1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

#### 2) Exchange of Notes (E/N)

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

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

4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

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

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". ( The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons. )

#### 5) Necessity of the "Verification"

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

**6) Undertakings required to the Government of the recipient country**

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

- i) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,
- ii) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- iii) to secure buildings prior to the installation work in case the Project is providing equipment,
- iv) 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,
- v) 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,
- vi) 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 facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

**8) Re-export**

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

9) Banking Arrangement (B/A)

(a) The Government of the recipient country or its designated authority shall 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 Government of the recipient country or its designated authority under the contracts verified.

(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.

## ATTACHMENT

### 1.Objectives

The objective of the Project is to increase the stability of electric supply system in Dar es Salaam.

### 2.Project sites

The map of the project sites is attached in Annex I.

### 3.Executing agency

The Ministry of Energy and Minerals is responsible for the coordination to implement the Project.

The Tanzania Electric Supply Company Limited is responsible for the execution of the Project.

### 4.Items requested by the Government of Tanzania

After discussions with the Team, the following components were finally requested by the Government of Tanzania. The items of the Project is described in Annex II. However, the items to be included in the Project will be determined after further studies.

#### 1) Hala S/S extension project

Capacity increase of transformer at Hala, extension of Ubungo substation and construction of a 132KV single circuit transmission line between Ubungo and Hala with relevant 11KV distribution lines (Steel towers will be designed for double circuit stringing.)

#### 2) Kariakoo S/S construction project

Construction of Kariakoo substation (33KV/11KV) and a 33KV single circuit transmission line between Hala and Kariakoo with relevant 11KV distribution lines

#### 3) Mbagala S/S construction project

Construction of Mbagala substation (33KV/11KV) and a 33KV single circuit transmission line between Kurasini and Mbagala with relevant 11KV distribution lines

#### 4) Factory Zone III S/S extension project

Extension of Factory Zone III substation with 132KV/33KV transformers and construction of a 132KV single circuit transmission line between Ubungo and Factory Zone III (Steel towers will be designed for double circuit stringing.)

5) Common items

Procurement of equipment and materials necessary for the construction and operation and maintenance related to the Project

**5. Japan's Grant Aid System**

- 1) The Government of Tanzania understands the system of Japan's Grant Aid as explained by the Team.
- 2) The Government of Tanzania will take necessary measures, as described in Annex III for the smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

**6. Schedule of the Study**

- 1) The Team will proceed to further study in Tanzania until August 19, 1996.
- 2) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around November, 1996.
- 3) In case that the content of the draft report is accepted in principle by the Government of Tanzania, JICA will complete the final report and send it to the Government of Tanzania around January, 1997.

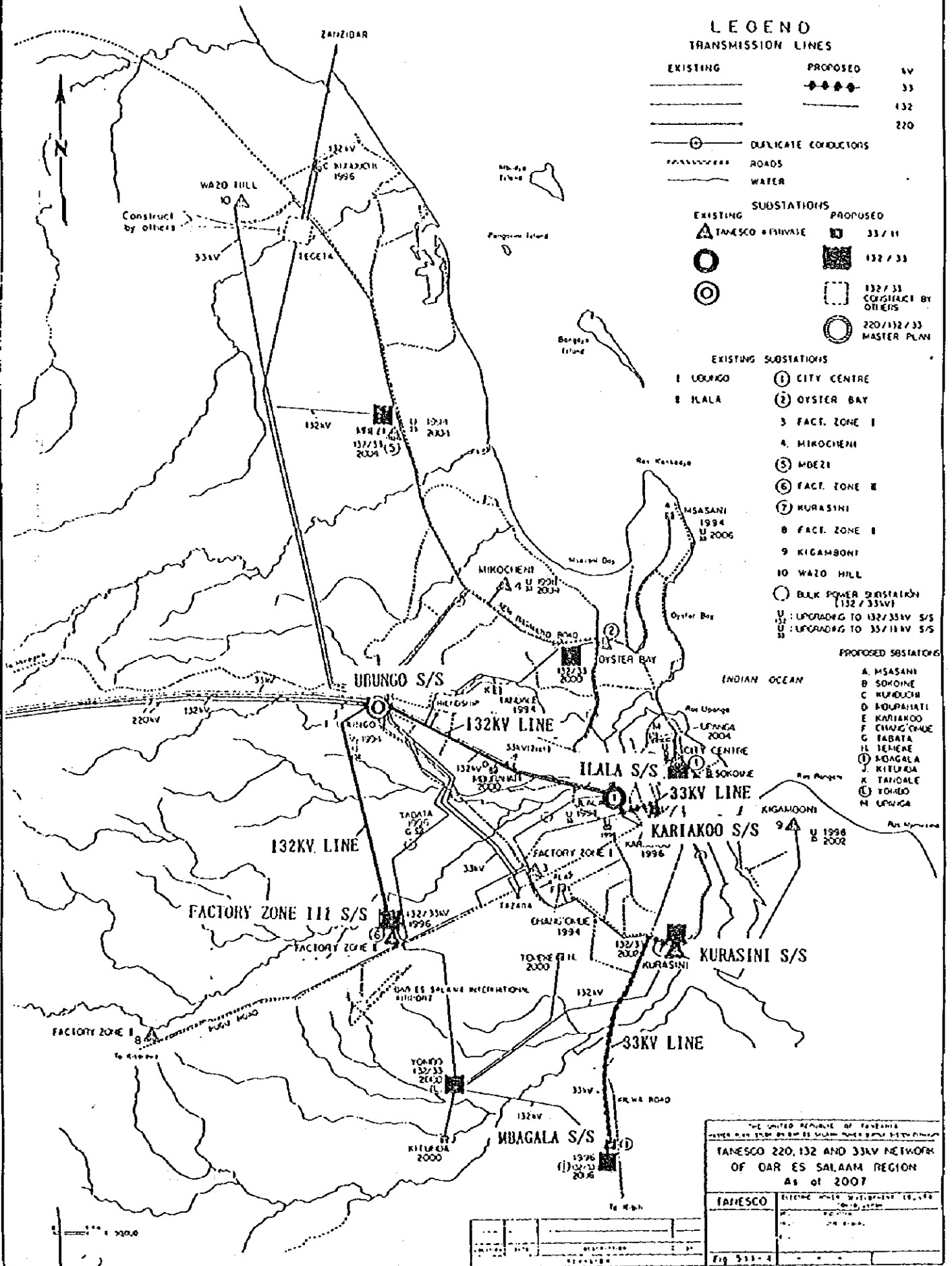
**7. Major Points of Discussions**

- 1) The Government of Tanzania will allocate the necessary budget and personnel for execution of the Project.
- 2) Both parties agreed that the installation works of the 11KV distribution lines and their relevant accessories should be conducted by the Tanzanian side utilizing the equipment and materials to be procured under the Grant Aid.
- 3) The Japanese side will confirm the progress of securing the sites at the time of the presentation of the draft Basic Design report. Both parties should agree the necessary land areas for the Project on the existing one-to-50,000 scale map with relevant information before the Team's departure.

- 4) Both parties agreed that the Tanzanian side should conduct the preliminary environmental and compensation survey and report the result to the Team before their departure.
- 5) The Tanzanian side agreed that the topographic survey of the Project area would be conducted by the Tanzanian side based on the specification to be given by the Team before the Team's departure.
- 6) The Tanzanian side agreed to conduct the soil investigation for the Project based on the specification to be given by the Team before the Team's departure. Both parties understood that the survey results of items which are required for the Basic Design should be reported to the Japanese side by mid September, 1996.
- 7) The Tanzanian side requested some counterpart engineers to be trained in Japan. The Team recommended that the official request should be submitted to the Government of Japan.



# ANNEX I Map of the Project Sites



## LEGEND

### TRANSMISSION LINES

EXISTING	PROPOSED	kV
		33
		132
		220
		Duplicate Conductors
		ROADS
		WATER

### SUBSTATIONS

EXISTING	PROPOSED	Location / Upgrade
		33 / 11
		132 / 33
		132 / 33 CONSTRUCT BY OTHERS
		220/132/33 MASTER PLAN

### EXISTING SUBSTATIONS

- |          |                                    |
|----------|------------------------------------|
| 1 URUNGU | ① CITY CENTRE                      |
| 2 ILALA  | ② OYSTER BAY                       |
|          | 3 FACT. ZONE I                     |
|          | 4 MIROCHINI                        |
|          | ⑤ MBEZI                            |
|          | ⑥ FACT. ZONE II                    |
|          | ⑦ KURASINI                         |
|          | 8 FACT. ZONE III                   |
|          | 9 KIGAMONI                         |
|          | 10 WAZO HILL                       |
|          | BULK POWER SUBSTATION (132 / 33kV) |
| U        | UPGRADING TO 132/33kV S/S          |
| U        | UPGRADING TO 33/11kV S/S           |

### PROPOSED SUBSTATIONS

- |   |              |
|---|--------------|
| A | MSASANI      |
| B | SOKOINE      |
| C | MURUDUHI     |
| D | KOUPAIYATI   |
| E | KARIAKOO     |
| F | CHAZZI CHAZI |
| G | TABATA       |
| H | TEHERE       |
| ① | MBAGALA      |
| J | KITUKWA      |
| K | TARDALE      |
| L | YOHIO        |
| M | UPWA         |

*Handwritten signature or initials*



- Construction of 132 kV transmission line between Ubungo - Factory Zone III  
8.6 km

**(c) Common items**

- Procurement of Vehicles and tools

	Unit	Quantity
Truck (Loading capacity : 5 tons, with 3-ton crane)	set	2
Pickup double cabin (Loading capacity : 1 ton)	set	3
Tools	lot	1

- Others

Installation of a new telecommunications system

## ANNEX III

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

1. To secure the sites for the Project
2. To clear, level and reclaim the sites prior to the commencement of the construction
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the sites
4. To exempt taxes and to take the necessary measures for customs clearance of the materials and equipment brought for the Project at the port of disembarkation
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 duration of their work
7. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant
8. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment

## ANNEX IV

### ON JAPAN'S GRANT AID PROGRAM

#### I. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures.

- Application (request made by a recipient country)
- Study (Preliminary Study / Basic Design Study conducted by JICA)
- Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- Determination of Implementation (Exchange of Notes between the both Governments)
- Implementation (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grant Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested project are not clear, a Preliminary Study is conducted prior to a Basic Design Study.

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

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

#### 2. Contents of the Study

##### 1) Contents of the Study

The purpose of the Study (Preliminary Study/Basic Design Study) conducted on a

project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

- a) to confirm background, objectives, benefits of the project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation,
- b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
- c) to confirm items agreed on by the both parties concerning a basic concept of the project
- d) to prepare a basic design of the project,
- e) to estimate cost involved in the project.

Final project components are subject to approval by the Government of Japan and therefore may differ from an original request.

Implementing the project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized on Exchange of Notes.

## 2) Selecting (a) Consulting Firm(s)

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

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency and also to avoid possible undue delay in implementation caused if a new selection process is repeated.

## (3) Status of a Preliminary Study in the Grant Aid Program

A Preliminary Study is conducted during the second step of a project formulation & preparation as mentioned above.

A result of the study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study.

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process (appraisal and approval).

It is important to notice that at the stage of Preliminary Study, no commitment is made by the Japanese side concerning the realization of the Project in the scheme of Grant Aid Program.

### 3. Japan's Grant Aid Scheme

#### 1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

#### 2) Exchange of Notes (E/N)

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

4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

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

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". ( The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons. )

#### 5) Necessity of the "Verification"

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

6) Undertakings required to the Government of the recipient country

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

- i) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,
- ii) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- iii) to secure buildings prior to the installation work in case the Project is providing equipment,
- iv) 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,
- v) 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,
- vi) 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 facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

8) Re-export

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



9) Banking Arrangement (B/A)

- (a) The Government of the recipient country or its designated authority shall 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 Government of the recipient country or its designated authority under the contracts verified.
- (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.

## 4-2 TECHNICAL NOTES

### BASIC DESIGN STUDY

ON

DAR ES SALAAM POWER SUPPLY SYSTEM EXPANSION

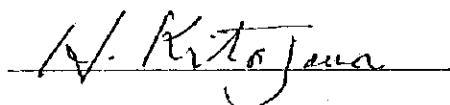
IN

THE UNITED REPUBLIC OF TANZANIA

The Consultant of the Basic Design Study Team had a series of discussions with TANESCO (Executing Agency) and conducted field surveys in the Project sites.

As a result of the discussions and field surveys, both parties have confirmed the main technical items described on the attached sheets.

16th August, 1996



Mr. Hitoshi Kitazawa  
Chief Consultant  
Basic Design Study Team



Mr. S.L. Mhaville  
Managing Director  
Tanzania Electric Supply Co. Ltd.

ATTACHMENT

1. The items to be included in the Project are determined as follows:

(a) Ilala S/S extension project

- Additional installation at Ilala S/S      132/33kV 45MVA transformer x 1  
                                                                                         33/11kV 15MVA transformer x 1
- Construction of 132kV transmission line between Ubungo-Ilala      7.5 km
- Procurement of the materials for the construction of 11kv distribution line      1.5 km

(b) Kariakoo S/S construction project

- Installation at new Kariakoo S/S      33/11kV 15MVA transformer x 1
- Construction of 33kV transmission line between Ilala-Kariakoo      1.3 km
- Procurement of the materials for the construction of 11kV distribution line      1.6 km

(c) Mbagala S/S construction project

- Installation at new Mbagala S/S      33/11kV 15MVA transformer x 1
- Construction of 33kV transmission line between Kurasini-Mbagala      9.2 km
- Procurement of the materials for the construction of 11kV distribution line      1.6 km

(d) Factory Zone III S/S extension project

- Additional installation at F.Z.III S/S      132/33kV 45MVA transformer x 2
- Construction of 132kV transmission line between Ubungo-Factory Zone III      9.3 km

(e) Common items

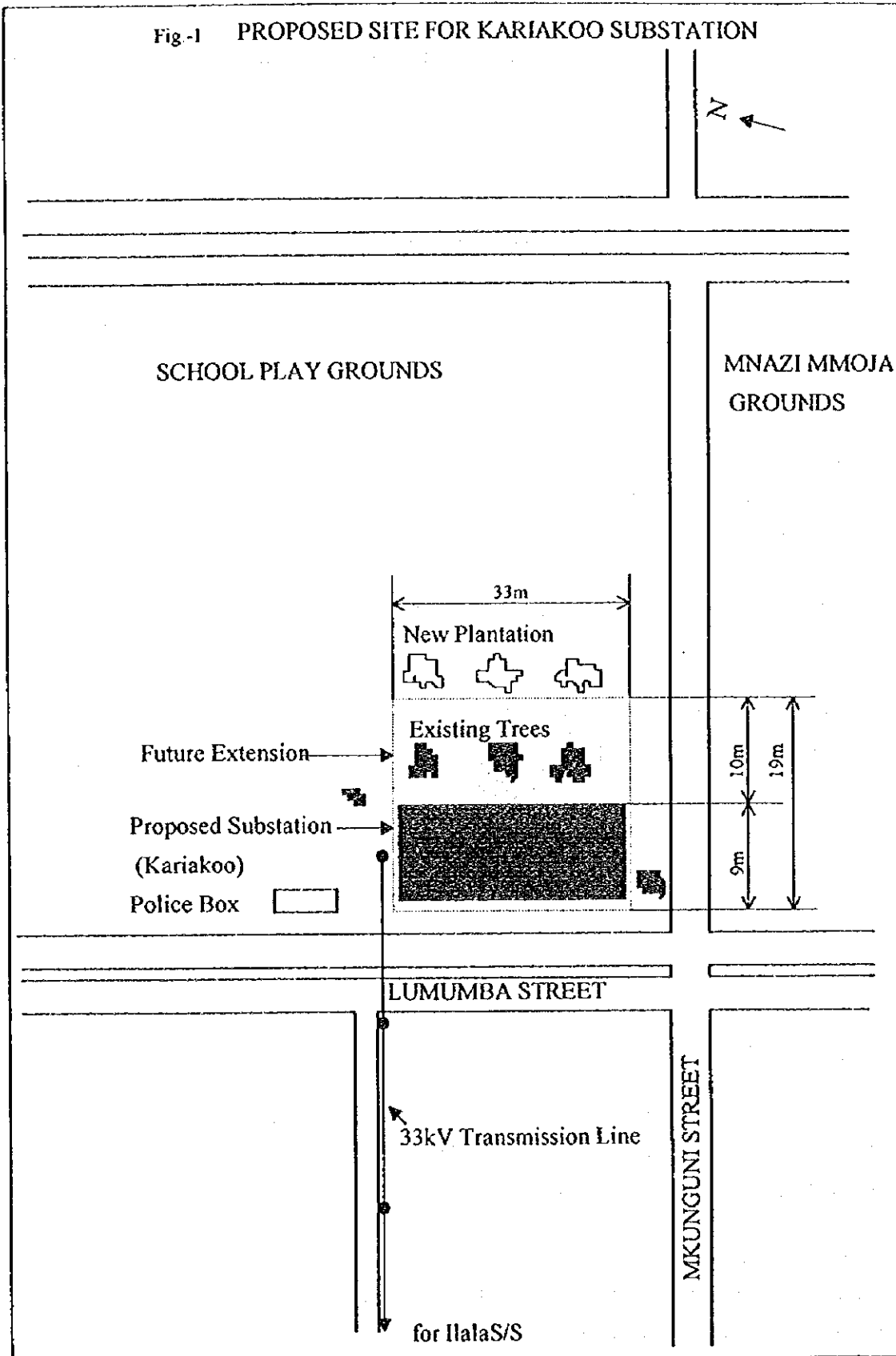
- Procurement of Vehicles and tools

	Unit	Quantity
Truck(Loading capacity: 5 tons, with 3-ton crane)	set	2
Pickup double cabin(Loading capacity: 1 ton)	set	3
Tools	lot	1

- Others  
Installation of new telecommunications system

2. Arrangement of Karlakoo S/S is shown in Fig-1 attached and TANESCO will provide a wall around the station and plant trees for future extension.
3. 132kV transmission lines between Ubungo-Ilala and Ubungo-Factory Zone III were surveyed and determined their lengths on the maps.
4. Both parties agreed that the topographic survey and soil investigation will be conducted based on the specification attached and report to the Team by mid September, 1996.
5. The right of way of 132kV Ubungo-Ilala line will utilize existing 33kV interconnecting line which is not used now after demolishing the line. Demolishing work should be done by TANESCO before new construction work.
6. The first tower from Ubungo S/S for 132kV Ubungo-Ilala line will be installed in the vicinity of 33kV switchyard and two overhead 33kV lines within the area will be replaced by underground cables. Demolishing work of the overhead lines should be done by TANESCO.

Fig-1 PROPOSED SITE FOR KARIAKOO SUBSTATION



## Specification of Topographic Survey and Soil Investigation for 132 kV Transmission Line

96/08/16

### A. Topographic Survey

Following survey result data is required for basic design study.

1. Center line survey
  - a. Span length (up to 350 meters, planned standard span length is 300 meters).
  - b. Horizontal deviation angle
2. Profile survey
  - a. Profile of the transmission line route
  - b. Level of the tower site
  - c. Location of road
  - d. Other lines such as other transmission lines, distribution lines, telephone lines, etc.
3. Scale of profile drawing
  - a. Horizontal : 1 : 2,000
  - b. Vertical : 1 : 400
4. Route to be surveyed
  - a. Ubungo - Ilala  
(Basically new line will be constructed on the same route of existing 33kV inter connector line)
  - b. Ubungo - Factory Zone III

### B. Soil Investigation

For the design of tower foundation :

1. Bearing capacity of soil at tower site (kg/sqcm, ton/sqm)  
In the dead end tower site, tension type tower site and swampy areas.
  - Ubungo - Ilala line (Tower nos. 1, 5, 11, 24)
  - Ubungo - FZ III line
2. Standard penetration test  
Standard penetration test is required in the following site.
  - Ubungo - Ilala line (near tower nos. 2 & 8)
  - Ubungo - FZ III line (at the point where SPT is necessary)

Necessary data are as follows :

- a. N - value
- b. Relative density ( $\rho_{cu.m}$ )
- c. Internal friction angle ( $\Phi$ )
- d. Cohesion ( $\rho_{sqm}$ ) ( $C'$ )

3. Others

- a. LSD sounding
- b. Augering + laboratory test
- c. Insitu vane testing at selected areas like swampy area.

#### 4.3 MINUTES OF DISCUSSIONS

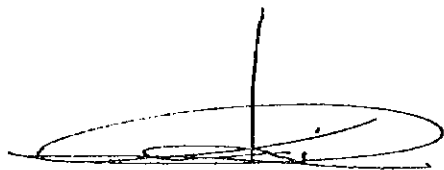
### ON THE BASIC DESIGN STUDY ON DAR ES SALAAM POWER SUPPLY EXPANSION PROJECT IN THE UNITED REPUBLIC OF TANZANIA

In July 1996, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on Dar es Salaam Power Supply Expansion Project (hereinafter referred to as "the Project") to Tanzania, and through discussions, field survey, and technical examination of the results in Japan, JICA has prepared a Draft Basic Design Report of the Study.

In order to explain and to consult Tanzania on the components of the Draft Basic Design Report, JICA sent to Tanzania a Draft Basic Design Report Explanation Team, headed by Mr. Hayao ADACHI, Development Specialist, JICA, from October 30 to November 6, 1996.

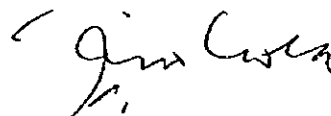
As a result of discussions, both parties confirmed the main items described on the attached sheet.

Dar es Salaam, November 6, 1996




Mr. Hayao ADACHI  
Leader  
Basic Design Study Team

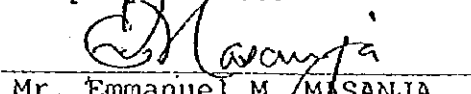
Japan International  
Cooperation Agency



Dr. Jonas KIPOKOLA  
Principal Secretary  
Ministry of Energy and  
Minerals



Mr. B.E.A.T. LUHANGA  
Managing Director  
Tanzania Electric Supply  
Company Limited



Mr. Emmanuel M. MASANJA  
Commissioner for External  
Finance and Debt  
Management  
Ministry of Finance



## ATTACHMENT

### 1. Components of Draft Report

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

### 2. Japan's Grant Aid system

- (1) The Government of Tanzania has understood the system of Japan's Grant Aid Scheme described in Annex II explained by the Team.
- (2) The Government of Tanzania will take necessary measures, described in Annex I, for the smooth implementation of the Project on condition that Japan's Grant Aid is extended to the Project.

### 3. Further Schedule

The Team will make the Final Report in accordance with the confirmed items, and send it to the Government of Tanzania around December, 1996.

### 4. Major Points of Discussions

- 1) The Government of Tanzania will allocate the necessary budget and personnel for execution of the Project.
- 2) Both parties agreed that the installation works of the 11KV distribution lines and their relevant accessories should be conducted by the Tanzanian side utilizing the equipment and materials to be procured under the Grant Aid.
- 3) The Tanzanian side requested that the topographic survey for the future detailed design would be conducted under the Grant Aid. The Team replied that the request would be discussed with officials concerned in Tokyo.
- 4) The Tanzanian side requested that the soil investigation for the future detailed design would be conducted under the Grant Aid. The Team replied that the request would be discussed with officials concerned in Tokyo.
- 5) The Tanzanian side requested some counterpart engineers to be trained in Japan. The Team recommended that the official request should be submitted to the Government of Japan.

6) Both parties agreed that it is necessary to resettle the households to secure the right of way for the construction of 132KV transmission line between Ubungo and Factory Zone III. TANESCO shall guarantee the right of way by compensating the relevant households. Japanese side will reconsider the appropriateness of the execution of the component between Ubungo and the Factory Zone III, after the completion of the following procedures by TANESCO:

- i) to take necessary measures through City Council to prevent from people's further settlement in the Project area
- ii) to receive a copy of the City Commissioner's letter noticing the completion on individual payments to the affected people, attaching a copy of the receipt of the total lump sum payment to be made to the City Commissioner by TANESCO



## ANNEX I

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

1. To secure the sites for the Project
2. To clear, level and reclaim the sites prior to the commencement of the construction
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the sites
4. To exempt taxes and to take the necessary measures for customs clearance of the materials and equipment brought for the Project at the port of disembarkation
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 for the duration of their work
7. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant
8. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment

## ANNEX II

### ON JAPAN'S GRANT AID PROGRAM

#### **I. Japan's Grant Aid Procedures after the Study**

(1) The Japan's Grant Aid Program is executed by the following procedures.

- **Study** (Preliminary Study / Basic Design Study conducted by JICA)
- **Appraisal & Approval** (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- **Determination of Implementation** (Exchange of Notes between both Governments)
- **Implementation** (Implementation of the Project)

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

The Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by the two Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

#### **2. Japan's Grant Aid Scheme**

##### **1) What is Grant Aid?**

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance

with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

2) Exchange of Notes (E/N)

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

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

4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

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

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons. )

5) Necessity of the "Verification"

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

6) Undertakings required to the Government of the recipient country

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

- ① to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,
- ② to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- ③ to secure buildings prior to the installation work in case the Project is providing 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 facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

#### 8) Re-export

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

#### 9) Banking Arrangement (B/A)

- (a) The Government of the recipient country or its designated authority shall 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 Government of the recipient country or its designated authority under the contracts verified.

(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.







## **5. Cost Estimation Borne by the Recipient Country**



## 5. Cost Estimation Borne by the Recipient Country

The estimates costs to be borne by the Tanzania Electric Supply Company Limited are as follows:

( 1 )	Obtainment of the project sites Land procurement negotiations and ground leveling of the sites	500 M. Tsh
( 2 )	Providing storage spaces for the facilities of equipment and materials	288 M. Tsh
( 3 )	Construction work on 11 kV distribution line	
<hr/>		
	Total	788 M. Tsh



## 6. References

6-1	Study Report on Factory Zone-III (upgrading to 132kV) .....	53
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**6-1 Study Report on Factory Zone - III  
(Upgrading to 132 kV)**

**September 1996**

**EPDC INTERNATIONAL LTD.**

## **Table of Contents**

<b>1-1</b>	<b>Project Background .....</b>	<b>55</b>
<b>1-2</b>	<b>Power Supply to Dar es Salaam .....</b>	<b>55</b>
<b>1-3</b>	<b>Conclusion .....</b>	<b>63</b>
<b>1-4</b>	<b>Attachments .....</b>	<b>65</b>



## 1-1 Project Background

In Tanzania, developing the basic economy-related infrastructure such as power systems has been considered the most important from the beginning of the survey for the master plan.

In Dar es Salaam, power demand in 1991 was 114 MW, being forecasted that it will reach 169.5 MW in 1996 and 307.6 MW in 2000 according to steady recovery of the economy. Actually, a peak demand reached 185 MW in October 1995. Such increase in demand has been required new power plants to be developed and existing transmission systems to be improved by eliminating overload from the Ubungo-Ilala 132 kV transmission line, and improving the supply reliability through rehabilitating the aged facilities. The concept to urgently realize this development—the main goal of this project—is to expand the existing transmission systems in order to sustain the social functions and economic activities in Dar es Salaam.

A past study on the effect of the expansion project indicated that more than 76,000 families would be newly electrified, and the total population of about 1.4 million in the capital would also benefit from the project. The present status characterized by quickly increasing load is further intensifying the need for urgent implementation of the project. Expansion of existing substations and construction of new substations that can meet the increasing power demand will surely contribute to the development of the economy and society.

## 1-2 Power Supply to Dar es Salaam

Since a 220 kV transmission line connecting the Ubungo substation to the Kidatu and Mtera hydropower stations has been completed in addition to the one existing circuit, the power supply to Dar es Salaam has now not been suffering from voltage fluctuation even in case of maximum power demand.

This project aims at eliminating the present overloaded status and improving the supply reliability through stepping up the voltage of the transmission line from 33 kV

to 132 kV so that it can accommodate additional distribution systems; changing the existing single circuit between Ubungo s/s and Ilala s/s to a double circuit, and constructing a Southern system substation (Factory Zone-III) following the construction of the Tegeta substation for the Northern system, dividing the total load into three portions.

With respect to the subject "Urgency of expansion of the Ubungo s/s - Factory Zone-III 132 kV transmission system" at the basic design survey, we would like to explain the recommendation as follows.

To realize a transmission network available for the future demand status in Dar es Salaam, we recommended that at the first stage the voltage of the Factory Zone-III be upgraded, and the areas covered by each substation be modified as shown below so that the most important portions of the network can be improved first. This recommendation is based on the previous master plan and feasibility study, and on our internal studies on how to improve the present unfavorable conditions (overload, significant voltage drop, power loss, etc.). For detailed information, see Master Plan Study in pages 5-8 and 5-36.

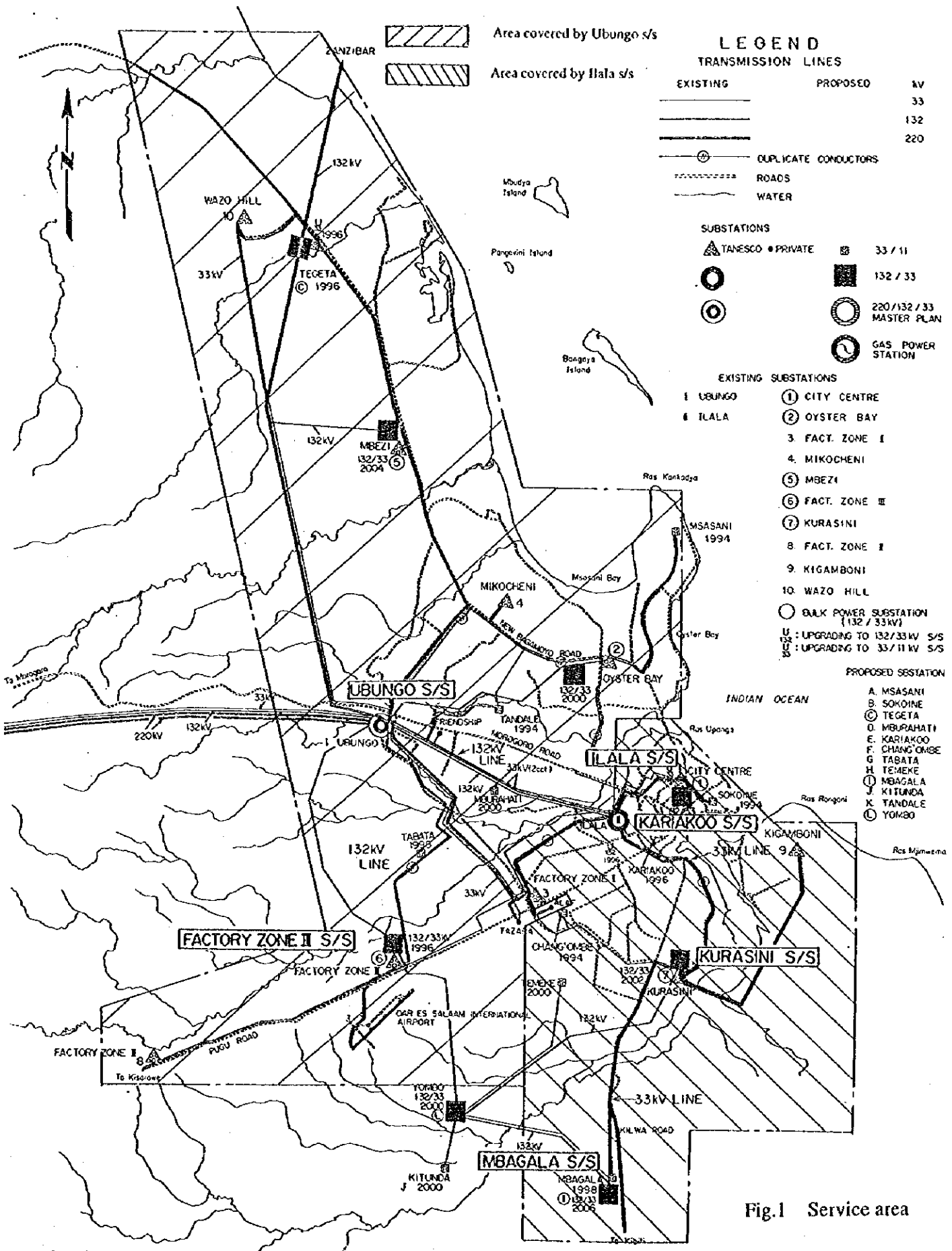
1) Present areas covered by each substation

In normal status, the Ubungo s/s and Ilala s/s supply power to the areas shown in Table I and Fig. 1.

Table 1 Distribution Substations 33/11 kV Transformers: Installed Capacity and Service Areas

Substation and consumer	Transformer capacity x no. of units	Total capacity
<b>(Substations connected to Ubungo s/s)</b>		
1. Ubungo premises	15 MVA x 3	45 MVA
2. Msasani	15 MVA x 1	15 MVA
3. Oyster bay	5 MVA x 2 + 15 MVA	25 MVA
4. Factory Zone - II	5 MVA x 1	5 MVA
5. Mbezi	7.5 MVA x 1	7.5 MVA
6. Factor Zone - III	15 MVA x 1	15 MVA
7. Mikocheni	15 MVA x 1	15 MVA
Subtotal		117.5 MVA
<b>(Substations connected to Ilala s/s)</b>		
1. Ilala premises	15 MVA x 2	30 MVA
2. Sokoine	15 MVA x 1	15 MVA
3. City Center	15 MVA x 3	45 MVA
4. Factory Zone - I	5 MVA x 2 + 15 MVA	25 MVA
5. New Airport	5 MVA x 1	5 MVA
6. Kurasini	15 MVA x 1	15 MVA
7. Kigamboni	5 MVA x 1	5 MVA
Subtotal		140 MVA
<b>(Major consumers connected to Ubungo s/s)</b>		
1. Alaf	10 MVA x 3	30 MVA
2. Wazo hill	5 MVA x 3	6.3 MVA
3. Friendship Textile	3.15 MVA x 2	6.3 MVA
4. TAZARA	3.15 MVA x 2	6.3 MVA
Subtotal		57.6 MVA
<b>Total</b>		<b>305.1 MVA</b>





**LEGEND**

**TRANSMISSION LINES**

EXISTING	PROPOSED	kV
		33
		132
		220

- DUPLICATE CONDUCTORS
- ROADS
- WATER

**SUBSTATIONS**

- TANESCO
- PRIVATE
- 33 / 11
- 132 / 33
- 220 / 132 / 33 MASTER PLAN
- GAS POWER STATION

**EXISTING SUBSTATIONS**

- I UBUNGO
- II ILALA
- ① CITY CENTRE
- ② OYSTER BAY
- 3. FACT. ZONE I
- 4. MIKOCHENI
- ⑤ MBEZI
- ⑥ FACT. ZONE III
- ⑦ KURASINI
- 8. FACT. ZONE I
- 9. KIGAMBONI
- 10. WAZO HILL
- BULK POWER SUBSTATION (132 / 33 kV)
- U : UPGRADING TO 132/33 kV S/S
- 132 : UPGRADING TO 33/11 kV S/S

**PROPOSED SUBSTATION**

- A. MSASANI
- B. SOKOINE
- © TEGETA
- D. MBURAHATI
- E. KARIAKOO
- F. CHANG'OMBE
- G. TABATA
- H. TEMEKE
- ① MBAGALA
- J. KITUNDA
- K. TANDALE
- ① YOMBO

Scale 1:50,000

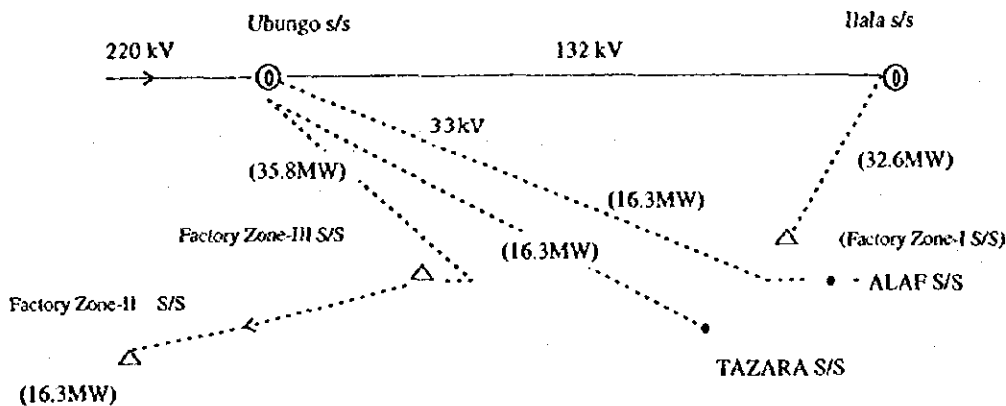
Fig.1 Service area



## 2) Demand forecast for Factory Zone-III

Normal power transmission to the distribution substations located in the Factory Zone-III is shown in Fig.-2. The Factory Zone-I s/s has been connected to the Ilala s/s via a 33 kV (32.6 MW) transmission line of 5 km long. The Factory Zone-III s/s has been connected to the Ubungo s/s via a 33 kV (35.8 MW) transmission line of 7 km long. The Factory Zone-II s/s has been connected to the Factory Zone-III s/s via a 33 kV (16.3 MW) transmission line of 5.9 km long. The Ubungo s/s has covered also Alaf s/s (an aluminum factory) and Tazara s/s (a railway) via a 33 kV transmission line of 9.2 km and 7.9 km long respectively.

Fig.-2



Figures in ( ) show the transmission capacity.

In 1997, three substations Tabata, Chang'ombe and Temeke (constructed by foreign aids) will be added to this network.

Our demand forecast for the 11 kV distribution lines from each substation for the period 1993-2001 was made based on the revised forecast prepared in 1994 and actual maximum load values recorded in the 1993-1996 period (see 1-4 Attachment 3).

## 3) Study results

Our demand forecast in a time series approximately agrees with the previously determined forecast values, except that the Factory Zone-I, Factory Zone-III and

Tazara substations will have quicker increase in demand due to drastic development of the covered area and change in the operating status of electric facilities. Moreover, the Factory Zone-I s/s should be reinforced with additional transformers in 1999, and the Factory Zone-III s/s should also be reinforced with additional transformers.

4) Power supply after upgrading the Factory Zone-III S/S

Stepping up from 33 kV to 132 kV can eliminate the transmission loss, overload and voltage drop, and enables the improvement in supply reliability. The new network after the addition of new substations (to be constructed by foreign aids) as shown in Table 2 will facilitate removing heavy burdens from the Ilala system. An additional advantage of the new network is that in case of a fault of the Ilala system the Factory Zone-III s/s can take the place of the Ilala s/s, so that the overall reliability of the network can be improved.

The area along the Nyerere street (ex-Pugu road) contains the large Tabata and Temeke residential areas and an industrial zone that accounts for a nationwide share of as large as 40%.

The 132 kV upgrading plan can meet the quick increase in demand, and will contribute to the improvement in supply reliability, while giving incentives to investment, increasing employment opportunities and preventing the degradation of public order (possibly caused by population increase).

5) Load types and no. of consumers

	Number of consumers	Power consumption share (%)
Tariff No. 1 (for general consumers for 7,500 kWh or less per month)	259,100	52.10
Tariff No. 2 (for 400V consumers for 7,500 kWh or more per month)	755	23.22
Tariff No. 3 (for 11 kV consumers)	141	21.15
Tariff No. 4 (for public lighting)	252	0.33
Tariff No. 5 (Zanzibar)	1	3.2



The number of consumers in this area as of June 1996 is 26,704 that accounts for 21.5% of the total consumers (124,175) in Dar es Salaam.

6) Number of newly electrified persons

The number of direct beneficiaries (i.e. newly electrified persons) in the area is about 340,000, while indirect beneficiaries of the project are all of 2 million people living in Dar es Salaam.

Area	Population
(1) Factory Zone-I	36,000
(2) Factory Zone-II	41,000
(3) Factory Zone-III	123,000
(4) TABATA	28,000
(5) CHANG'OMBE	68,000
(6) TEMEKE	44,000
<hr/>	
TOTAL	340,000"

1-3 Conclusion

We recommend that the Southern system Factory Zone-III s/s with boosting to 132 kV be constructed not later than 1999. This recommendation was obtained based on the demand forecast results for distribution substations Factory Zone-I, II and III s/s, ALAF s/s and Tazara s/s located in the Factory Zone-III area, and on our evaluation for the transmission capacity of the existing 33 kV transmission lines and load status of the existing transformers.

Table 2 Areas Covered by Each S/S After Upgrading

Unit: MVA

132/33 kV Substation	Distribution Substation	MVA x No. of units	MVA
1. Ilala  (This project) 45 x 3 = 135	a. Ilala	15 x 3	45
	b. City Center	15 x 3	45
	c. Sokoine	15 x 1	15
	d. Kariakoo	15 x 1	15
	e. Kurasini	15 x 1	15
	f. Kigamboni	5 x 3	15
	g. Mbagala	15 x 1	15
		<b>Total</b>	
2. Ubungo S/S	a. Ubungo	15 x 3	15
	b. Nordic		
	c. Friendship		
	d. Mburahati		
3. Factory Zone - III  (This project) 45 MVA x 2 = 90 MVA	a. Factory Zone-III	15 x 2	30
	b. Factory Zone-II	5 x 2	10
	c. Factory Zone-I	5 x 2 + 15	25
	d. Alaf	10 x 3	30
	e. TAZARA	3.15 x 2	6.3
	f. Tabata	5 x 1	5
	g. Chang'ombe	15 x 1	15
	h. Temeke	15 x 1	15
		<b>Total</b>	
4. Oyster Bay (Year 2000)	a. Oyster Bay		
	b. Mikocheni		
	c. Msasani		
	d. Tandale		
5. Tegeta (Existing, 1995)	a. Tegeta		
	b. Wazo Hil		
	c. Mbezi		
	d. Kunduchi		
6. Kurasini (Year 2002)	a. Chang'ombe	15 x 1	15
	b. Temeke	15 x 1	15
7. Yombo (Year 2006)	a. Yombo		
	b. Kitunda		

**1-4 Attachments**

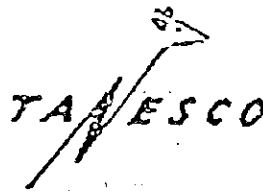
	<b>Page</b>
1) Answer to your request (English) .....	66
2) Demand forecast for the Dar es Salaam area .....	70
3) Demand forecast (Factory Zone-III area) .....	71
4) Power flow diagram for the Dar es Salaam area .....	72

1) Answer to your request (English)

FDR0078 05

## TANZANIA ELECTRIC SUPPLY COMPANY LIMITED

TELEPHONE  
27281-17285  
TELEGRAMS  
TANESCO  
TELEX 41218



HEAD OFFICE  
P.O. BOX 9024  
DAR ES SALAAM  
TANZANIA

YOUR REF.

OUR REF.  
DMDO/JICA

30th April, 1996

DATE

The Counsellor,  
Embassy of Japan,  
P.O. Box 2577,  
DAR ES SALAAM.

For the kind attention of Mr. Suzuki

Your Excellency,

Re: DAR ES SALAAM POWER SUPPLY  
SYSTEM EXPANSION PROJECT

Please refer to our letter DMDO/JICA of 25.3.96 on the above mentioned subject. The following are further information and clarifications on the request for the Grant Aid for the project.

A. URGENCY OF PROJECT IMPLEMENTATION

A.1 LOADS DEMAND AT ILALA SUBSTATION

The project is required to be implemented soon to alleviate the load on the 2 x 45 MVA transformers at Ilala. These two transformers are now almost fully loaded. The average load so far is about 75MVA while the maximum load that has been attained so far is 94MVA. Therefore, new additional load has to be supplied by increasing the 132/33kV transformation capacity.

A.2 NEW LOADS AT CITY CENTRE, KARIAKOO AND CHANG'OMBE AND NYERERE ROAD (PUGU ROAD) INDUSTRIAL AREAS

There are many buildings coming up at the City Centre and Kariakoo areas. In the City Centre proper there are eight large buildings under construction which will be completed in the near future, whose average demand will be above 500kVA.

## FDR0078 05

There are also four large buildings which are beginning to be constructed. There is also one big hotel (New Africa Hotel) which will soon be opened. There are extensions to some of the existing buildings and some buildings which are already completed, but not yet fully utilized.

In Karikoo area there are over 70 buildings over four storeys at different stages of construction. There will also require considerable power. It is estimated that the load demand of new buildings in Karikoo and City Centre area is over 20MVA. In the Industrial areas of Nyerere Road (Pugu Road) and Chang'ombe there are few medium industries being built/constructed. However, the biggest increase in load will be obtained from the existing industries which are increasing the capacity utilization of their machinery, in particular those being operated by new investors. Factory Zone No.1 Substation maximum demand is now 13MVA (installed capacity 15MVA) whereas Factory Zone No.III and Factory Zone II substations combined load is 18 MVA (installed capacity 20MVA).

### A.3 RELIABILITY OF SUPPLY ⁻⁸⁹⁻

The City Centre area is supplied by the single 132kV line from Ubungo Substation to Ilala substation. As mentioned earlier there are considerable power interruptions due to outage of this single line. The average interruption time is above 40 minutes per month. Some of the interruptions have taken as much as one hour. There are already complaints from some of the factories, such as Tanzania Breweries, which has increased their performance on the interruptions of supply. Generally after four years of load shedding TANESCO customers have become very sensitive to power interruptions. There are also increased automation and use of computers in the office buildings, and hence complaints on power interruption and voltage fluctuations are increasing.

In the Industrial areas supplied partly from Ilala substations and from Factory Zone No.3 substation there are also considerable interruptions of supply. The average interruption time for Factory Zone No.3 is 30 minutes per month. The reliability of supply is very important to improve production in the factories and for attracting new investments.

### A.4 LONG TERM PLAN

In the long term the establishment of 132/33kV transformation at Factory Zone No.3 substation will cater for the planned Industrial areas of Kitunda (behind the Airport along Tanzania Railway) and Mbagala Industrial area along Kilwa Road).

## FDR 0078 05

For the overall plan 2x50MVA, 132/33kV transformers at Ubungo substation and 2x45 MVA transformers at Tegeta substation (near the Cement Factory) will cater for the loads in the northern part of Dar es Salaam. While the 2x45 MVA transformers at Ilala substation and the proposed 2x45MVA transformers at Factory Zone No.3 substation will cater for loads in the southern part of Dar es Salaam.

## B. CLARIFICATION ON ITEMS OF EXPANSION PLAN

## B.1 UBUNGO SUBSTATION

The proposed 132kV line from Ubungo substation to Ilala substation and 132kV line from Ubungo substation to Factory Zone No.3 substation, will require equipment at Ubungo substation to connect these lines to the existing 132kV bus bars. These facilities will include 132kV isolators, 132kV circuit breakers and the associated control and communication equipment. These equipment will have to be installed at Ubungo Substation.

## B.2 TRANSFORMER CAPACITY AT ILALA AND FACTORY ZONE NO.III.

The proposed increase of capacity of 33/11kV transformer at Ilala substation is 1x15MVA and not 1x5MVA, for Factory Zone No.III, the proposed transformer capacity is 2 x 45 MVA 132/33kV and not 1 x 45 MVA 132/33kV.

## C. GENERATION CAPACITY

The present grid system demand is 330MVA, the present available generation capacity in the grid system is as follows:-

Kidatu	204 MW	
Mtera	80 MW	
New Pangani	66 MW	
Hale	15 MW	
Nyumba ya Muangu	5 MW	370 MW
Gas Turbines	2x 33 MW	
	2 x 16 MW	98 MW

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Diesel Stations

Ubungo	10 MW	
Mbeya	4 MW	
Dodoma	7 MW	
Tabora	6 MW	
Mwanza	6 MW	33 MW

Total available capacity 501 MW

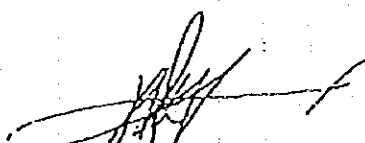
The plans for the increase of capacity is as follows:-

Gas to electricity project converting the existing gas turbines from fuel on to natural gas and installing an additional 1 x 35 MW Gas turbines	37.5MW	1998
Lower Kihansi 3 x 60MW	180MW	1999
Independent Power project	100MW	1998
Zambia Tanzania Interconnector	100 - 200MW	2000

All these projects are being pursued vigorously. The Kihansi project is under construction and is financed by World Bank loan. Electricity to gas project financing is in the final stages of approval and most probably will start at end of this year. The Independent Power project is about to take off as they are now finalizing land ownership procedures. The feasibility study for Zambia Tanzania interconnector is completed. The study is being documented for seeking financing from the donor community.

Therefore with all those generation projects we will need a considerable improvement in the distribution system in the major cities starting with Dar es Salaam. The other major towns namely Tanga, Arusha, Morogoro, Mwanza, Mbeya and Moshi will also have their distribution system improved to cater for the increased demand.

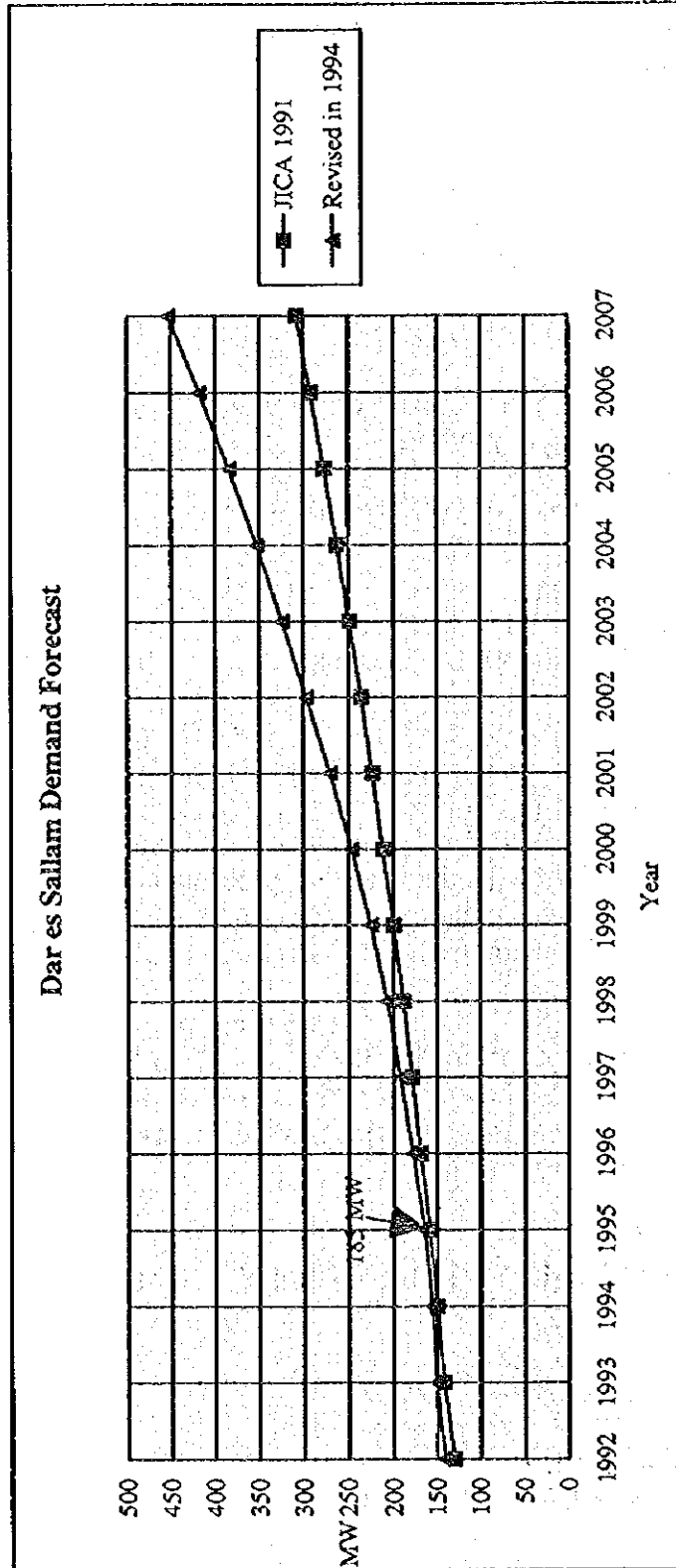
Yours faithfully,  
for: TANZANIA ELECTRIC SUPPLY COMPANY LIMITED

  
K.K. Iranga  
for: MANAGING DIRECTOR

(3)

2) Demand forecast for the Dar es Salaam area

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
JICA 1991	130.20	142.10	150.20	158.90	169.50	179.30	189.30	199.90	211.80	223.70	236.00	248.80	262.40	276.80	291.80	307.60
Revised in 1994	141.30	150.80	156.00	164.60	178.60	192.80	207.10	225.30	246.60	270.10	297.00	323.90	352.50	383.90	417.20	452.80





3) Demand forecast (Factory Zone-III area)

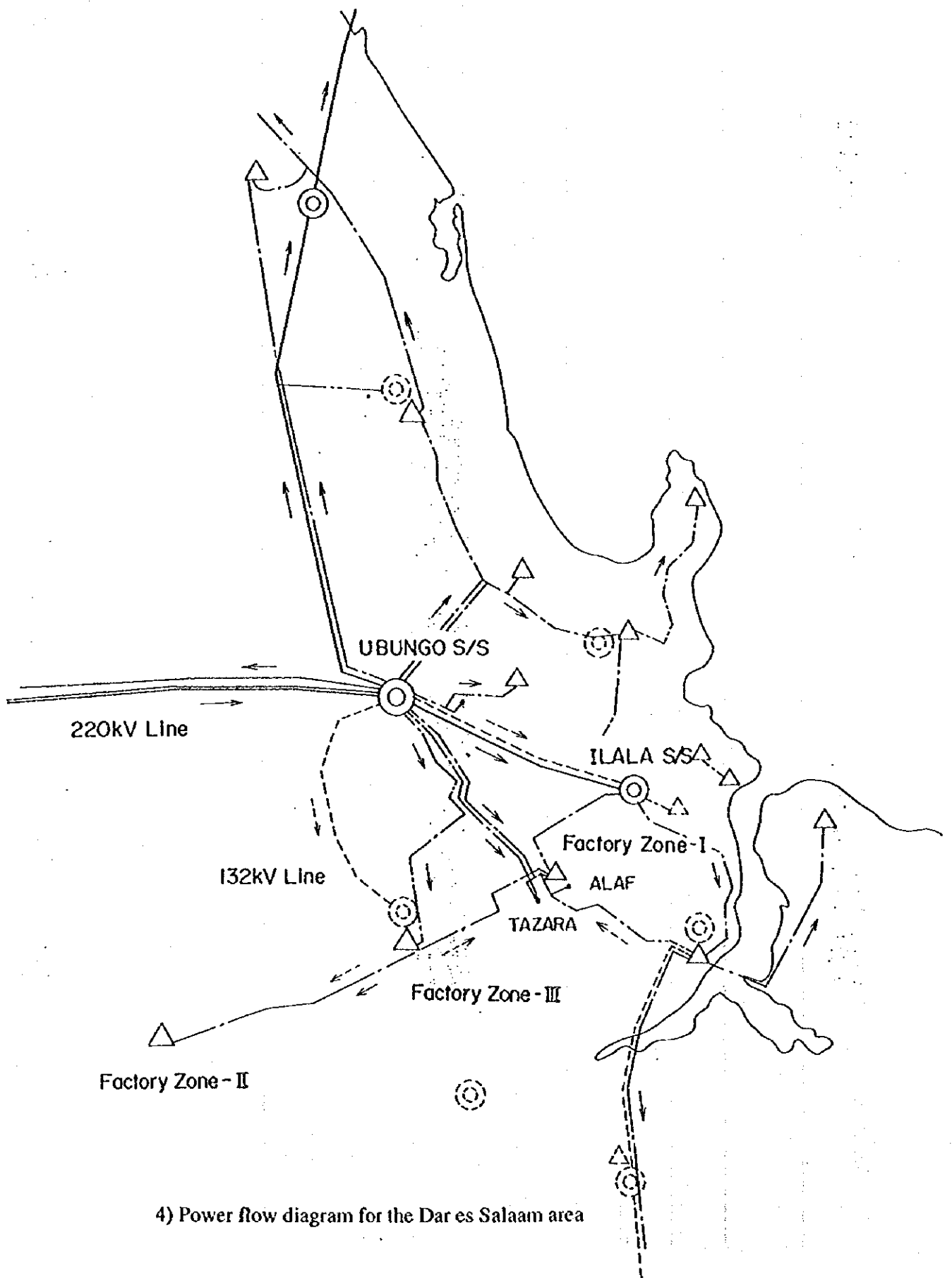
Unit: kW

Distribution Substation	Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	Transmission capacity (MW)	Weekly marginal load (MW)
1. Factory Zone-I		19,230	20,000	20,800	22,048	23,812	25,955	△ ○ 29,329	34,315	41,521	32.60	26.60
2. Factory Zone-II		2,219	2,308	2,400	2,544	2,748	2,995	3,384	3,959	4,790	16.30	6.65
3. Factory Zone-III		11,538	12,000	12,480	13,229	14,287	15,573	○ (19,858) ○ 17,597	(23,233) 20,588	24,911	35.80	19.95
4. ALAF		9,200	9,568	9,951	10,548	11,392	12,417	14,031	16,416	19,863	16.30	26.60
5. TAZARA		4,000	4,160	4,326	4,586	4,953	5,399	6,101	7,138	8,637	16.30	4.19
6. TABATA		0	0	0	1,700	1,836	2,001	2,261	2,645	3,200		4.75
7. CHANGOMBE		0	0	3,900	4,134	4,465	4,867	5,500	6,435	7,786		14.25
8. TEMEKE		0	0	0	0	0	0	0	2,600	3,146		14.25
TOTAL		46,187	48,036	53,857	58,789	63,493	69,207	78,203	94,096	113,854		

○: The year when the number of transformers should be increased

△: The year when the demand will reach the transmission capacity limit.

Figures in ( ) show the values after adding the load of the new s/s Tabata.



4) Power flow diagram for the Dar es Salaam area







JICA