

## APPENDICES

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## Appendix I Minutes of Discussion



MINUTES OF DISCUSSIONS  
ON  
THE DEVELOPMENT PROJECT  
FOR  
MEDIUM WAVE RADIO BROADCASTING NETWORK  
IN  
THE UNITED REPUBLIC OF TANZANIA

In response to the request of the Government of the United Republic of Tanzania for Grant Assistance for the Development Project of Medium Wave Radio Broadcasting Network ( hereinafter referred to as "the Project"), the Government of Japan decided to conduct a Basic Design Study on the Project and entrusted the study to the Japan International Co-operation Agency (JICA). JICA sent the Basic Design Study Team headed by Mr. Satoru ITOH, Special Advisor for International Cooperation, Ministry of Posts and Telecommunications from the 16th January to 12th February, 1989.

The team had a series of discussions with authorities concerned of the Government of the United Republic of Tanzania and conducted a field survey.

As the result of the study both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Dar es Salaam, 9th, February 1989

伊藤 哲

Mr. Satoru ITOH  
Team Leader,  
Basic Design Study Team  
JICA

~~MBAGA~~

Mr. F. D. MBAGA  
Deputy Principal Secretary,  
Office Of the Prime Minister  
and First Vice President

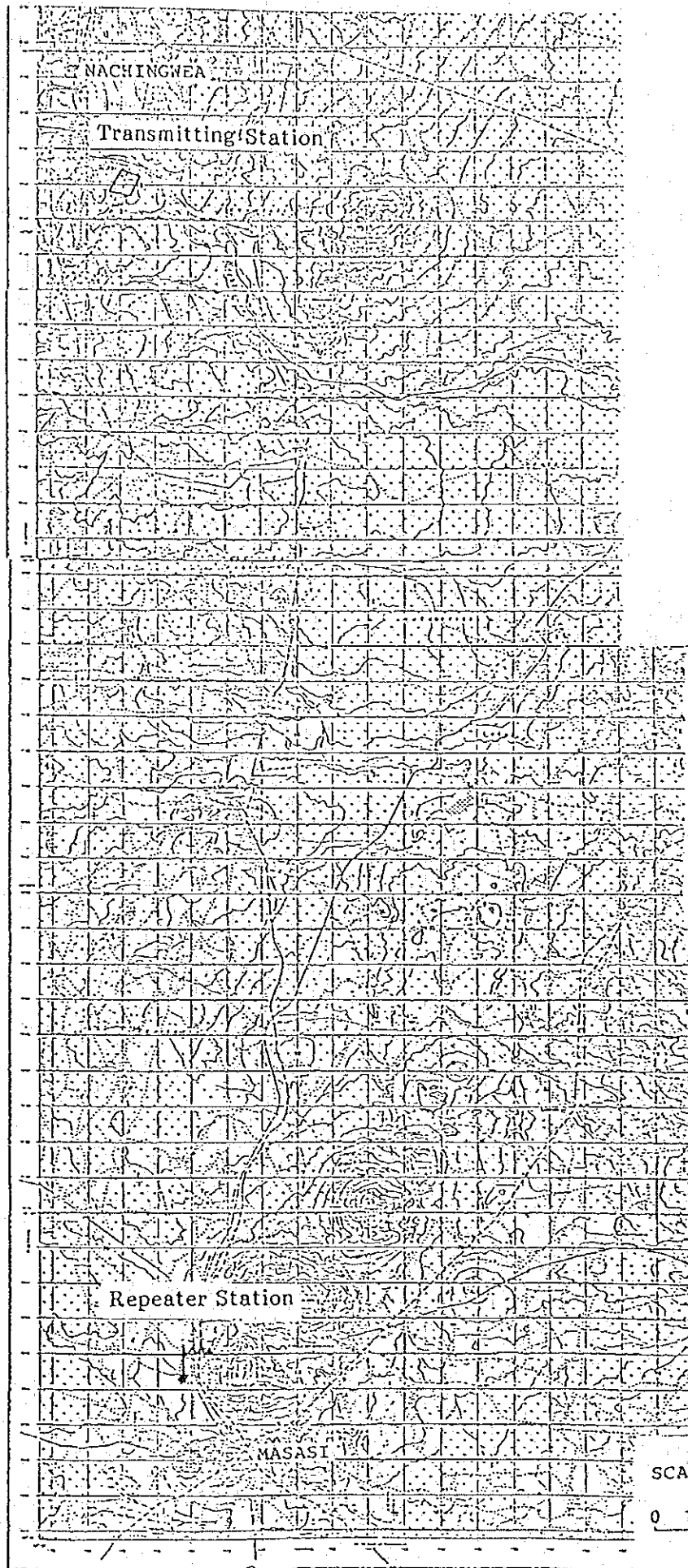
ATTACHMENT

1. The objective of the Project is to develop medium wave radio broadcasting network in the United Republic of Tanzania.
2. The proposed sites of the Project are prepared by the Government of Tanzania as attached in Annex-1.
3. The implementing Agency for the Project is Radio Tanzania Dar es Salaam under the Office of The Prime Minister and First Vice President.
4. The request made by the Government of Tanzania are shown in Annex-2.
5. The team will convey the intention of the Government of Tanzania to the Government of Japan that the latter will take the necessary measures to cooperate in implementing the Project within the scope of the Japanese economic cooperation in grant aid.
6. The Government of Tanzania understood Japan's Grant Aid System explained by the Team which includes a principle of use of a Japanese consultant firm and a Japanese Company for implementation of the Project.
7. The Government of Tanzania will take necessary measures as listed in Annex-3 on condition that the grant assistance by the Government of Japan is extended to the Project.

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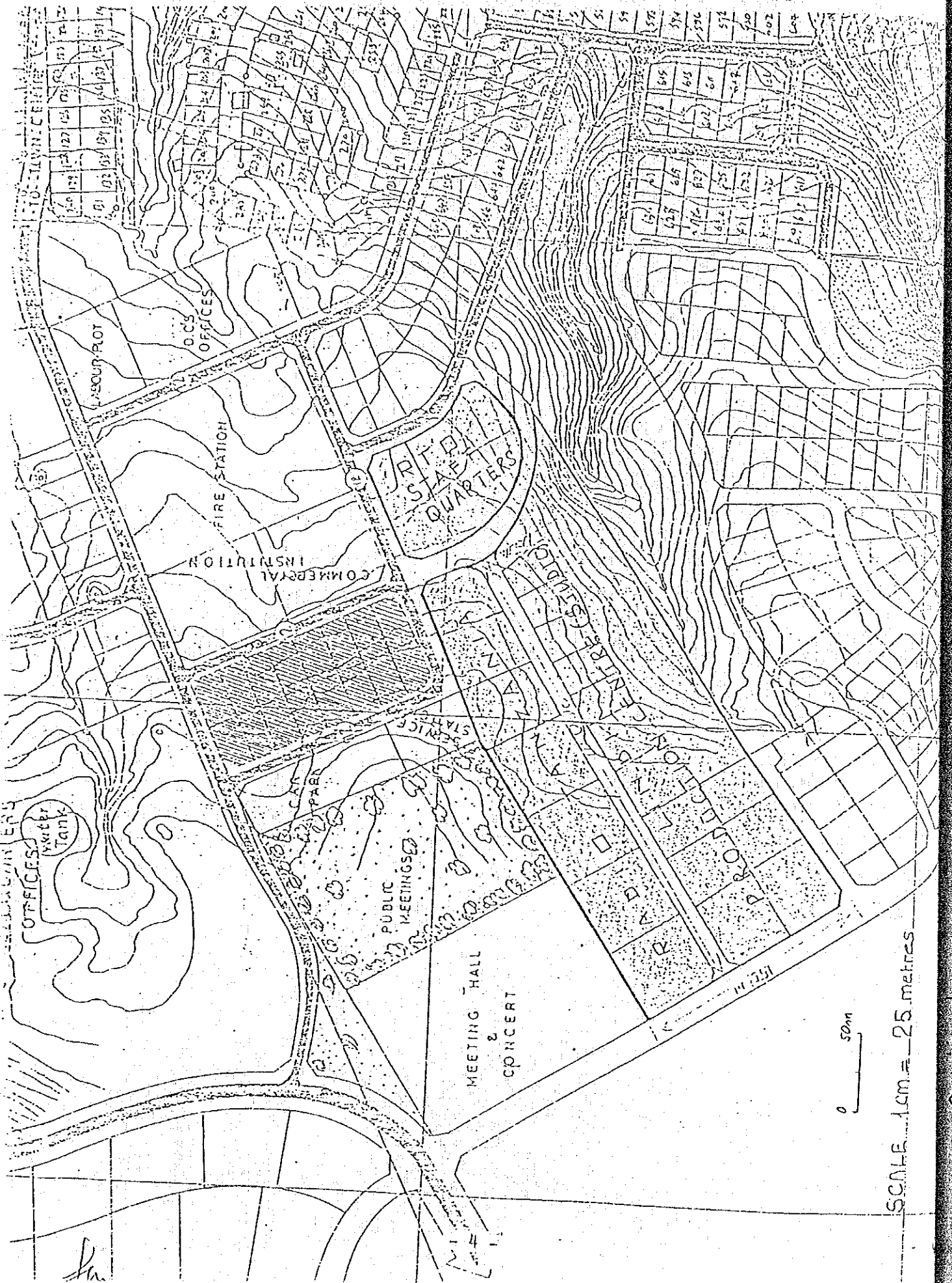
Annex 1-1-(1) Proposed Sites for Nachingwea Transmitting Station and Masasi Repeater Station



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fu

Annex 1-1-(2) Proposed Site for Lindi Studio



SCALE 1cm = 25 metres

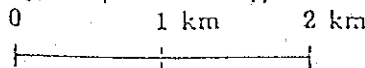


Annex 1-2 Proposed Sites for Songea Studio and Transmitting Station

25° 35'

Grid North

SCALE 1:50,000

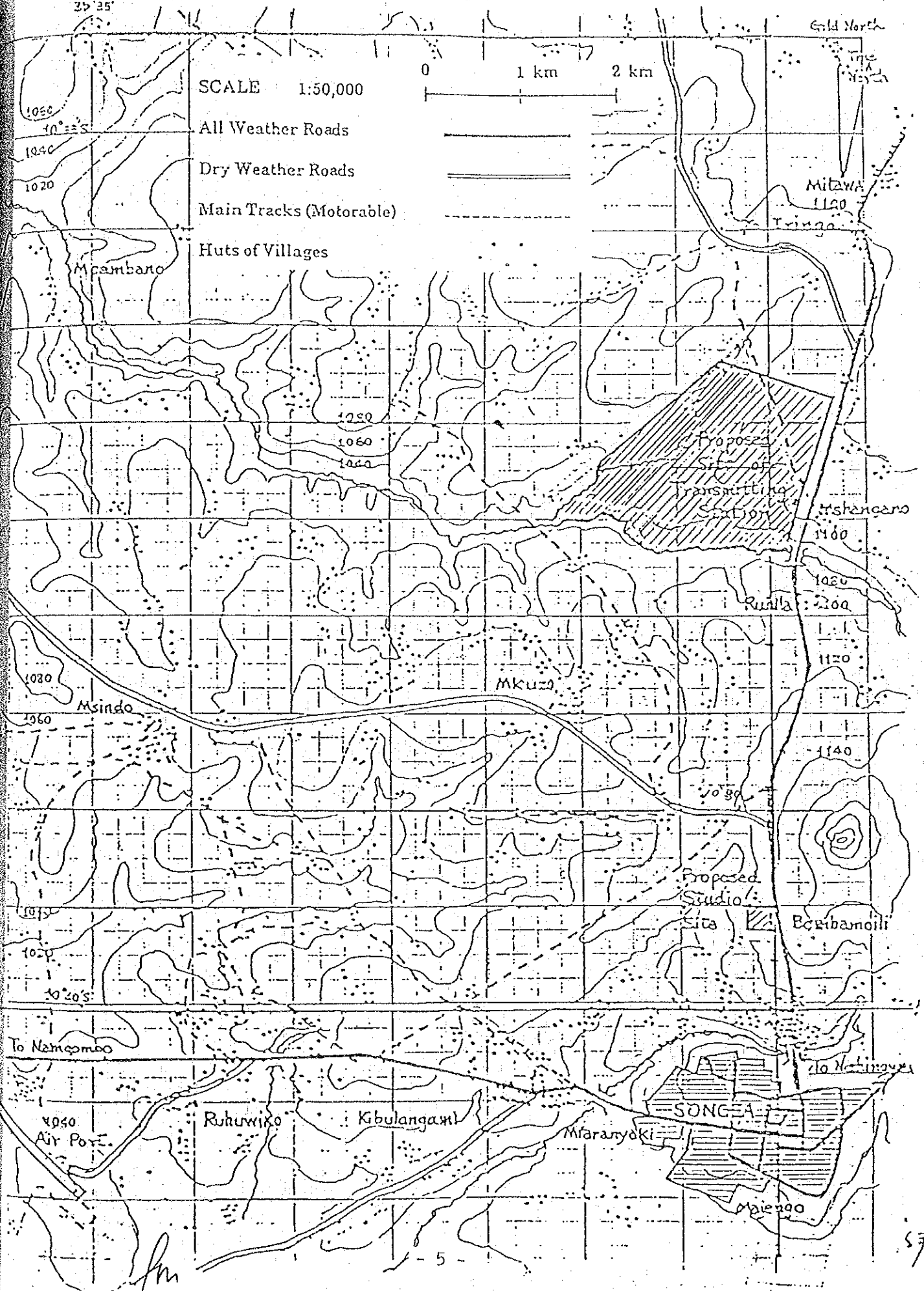


All Weather Roads

Dry Weather Roads

Main Tracks (Motorable)

Huts of Villages



Annex-2

1. Facilities for Nachingwea Project

- (1) 100kW/10kW MW Radio Transmitter
- (2) Antenna and Feeder
- (3) Receiving Equipment
- (4) Power Supply Equipment
- (5) Measuring Equipment
- (6) Transmitting House
- (7) Programme Transmission Link (from Masasi TPTC Office)
- (8) Repeater Station
  - 1) Repeater Equipment
  - 2) Station House
- (9) Studio Equipment
- (10) Power Supply Equipment for Studio
- (11) Tool & Vehicles for Maintenance
- (12) Spare Parts
- (13) Installation Materials

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2. Facilities for Songea Project

- (1) 100kW/10kW MW Radio Transmitter
- (2) Antenna and Feeder
- (3) Receiving Equipment
- (4) Power Supply Equipment
- (5) Measuring Equipment
- (6) Transmitting House
- (7) Studio to Transmitter Link
- (8) Studio Equipment
- (9) Power Supply Equipment for Studio
- (10) Tool & Vehicles for Maintenance
- (11) Spare Parts
- (12) Installation Materials

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*27/1*

Following arrangements will be taken by the Government of Tanzania.

1. To secure land necessary for the Proposed Sites
2. To carry out site preparation such as clearing, filling, leveling and demolishing the existing facilities, if necessary, before commencement of construction works
3. To complete all necessary civil and electrical works at Lindi and Songea Studio Sites prior to the commencement of installation of studio equipment
4. To provide facilities for distribution of electricity (transform from 33kV to 11kV, but in case of Nachingwea Transmitting Station transform from 33kV to 415V), water supply, drainage, telephone line, programme transmission lines and other incidental facilities to the proposed sites
5. To ensure prompt unloading, tax exemption, customs clearance at ports of disembarkation in Tanzania and prompt internal transportation therein of the products purchased under the grant
6. 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
7. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into Tanzania and stay therein for the performance of their work
8. To maintain and use properly and effectively the facilities constructed and equipment purchased under the grant
9. To undertake incidental civil works such as gardening, fencing, constructing gates, guard house and parking lot and exterior lighting, if needed



10. To take necessary measures for security in the Sites
11. To bear all the expenses, other than those to be borne by the Grant, necessary for construction of facilities as well as for the transportation and installation of the equipment
12. To maintain in good condition the road between Masasi town and Nachingwea Transmitting Site during the construction period

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## Appendix II Member List of the Basic Design Study Team





## MEMBERS OF STUDY TEAM

Members of Study Team are follows:

- Team Leader : Mr. Satoru Itoh  
\* Special Advisor for International Cooperation  
International Cooperation Division  
Ministry of Posts & Telecommunications
- Coordinator : Miss. Kanako Asami (in charge of Broadcasting Plan)  
\* Assistant Director  
International Cooperation Division  
Ministry of Posts & Telecommunications
- Survey Leader : Mr. Yoshiyuki Matsuda (in Charge of Network)  
\* Project Manager  
International Division  
All Japan Radio & Television Engineering Services Co.,  
LTD. (AJTS)
- Survey Staff : Mr. Masami Douchi (in charge of Buildings)  
\* Chief Engineer  
Ditto
- Survey Staff : Mr. Mitsuru Aihara (in charge of Buildings)  
\* Chief Engineer  
Ditto
- Survey Staff : Mr. Akira Nagase (in charge of Antennas)  
\* Engineer  
Ditto
- Survey Staff : Mr. Hiroshi Sonoda (in charge of Cost Estimate)  
\* Engineer  
Ditto



## Appendix III Itinerary of the Study



Itinerary of the Study

Date	Summary of Basic Design (B/D) Study
Jan. 16 (Mon) 17 (Tue)	<ul style="list-style-type: none"> <li>• Lv. Narita at 13:40 by BA-006 ---Via London---</li> <li>(Mr. Y. Matsuda, Mr. M. Douchi, Mr. M. Aihara, Mr. A. Nagase)</li> </ul>
18 (Wed)	<ul style="list-style-type: none"> <li>• Ar. Dar es Salaam at 08:15 by BA-069</li> <li>• Courtesy-call &amp; Meeting to Embassy of Japan and JICA office</li> </ul>
19 (Thu)	<ul style="list-style-type: none"> <li>• Courtesy-Call to the P.M. and F.V.P.'s Office and Ministry of Finance, Economic Affairs and Planning</li> <li>• Explanation of Inception Report and Questionnaire</li> <li>• Study concerning Conditions of RTD</li> </ul>
20 (Fri)	<ul style="list-style-type: none"> <li>• Study concerning Conditions of RTD</li> <li>• Study concerning usage and Effects of Radio Broadcasting in the Ministries of Education, Health and Welfare, Agriculture and Livestock Development</li> <li>• Data Collection concerning Architecture</li> <li>• Arrangement and Contract of Bring Test</li> </ul>
21 (Sat)	<ul style="list-style-type: none"> <li>• Study concerning Conditions of RTD</li> <li>• Study concerning Manpower Development Plan in the Ministry of Labour and Manpower Development</li> <li>• Data Collection concerning Architecture</li> </ul>
22 (Sun)	<ul style="list-style-type: none"> <li>• Data Filing and Preparation of Site Survey</li> </ul>
23 (Mon)	<ul style="list-style-type: none"> <li>• Study concerning Diffusion of Radio Sets in National Electric Co., Ltd.</li> <li>• Study and Data Collection concerning Conditions of TRD and the P.M. and F.V.'s Office</li> </ul>
24 (Tue)	<ul style="list-style-type: none"> <li>• Shift to Songea through Makanbako by cars (2 counterparts of TRD and 4 members of B/D Study Team)</li> </ul>
25 (Wed)	<ul style="list-style-type: none"> <li>• Ar. at Songea at 12:00</li> <li>• Courtesy-call to Regional Director and Meeting with Officers concerned</li> <li>• Survey in Studio and Tx sites (Tx=Transmitting Station)</li> </ul>
26 (Thu)	<ul style="list-style-type: none"> <li>• Survey in Studio and Tx sites (Measurement of Field Intensity and Earth Conductivity etc.)</li> </ul>

Date	Summary of Basic Design (B/D) Study
27 (Fri)	<ul style="list-style-type: none"> <li>• Data Collection concerning Local Portion works</li> <li>• Witness of Boring Test</li> <li>• (Mr. H. Sonoda arrived at Dar es Salaam)</li> </ul>
28 (Sat)	<ul style="list-style-type: none"> <li>• Shift to Masasi from Songea by cars</li> <li>• Shift to Nachingwea from dar es Salaam by air</li> <li>• Data Collection concerning Cost Estimation</li> </ul>
29 (Sun)	<ul style="list-style-type: none"> <li>• Survey in Nachingwea Tx site (Measurement of Field Intensity and Earth Conductivity etc.)</li> </ul>
30 (Mon)	<ul style="list-style-type: none"> <li>• Survey in Nachingwea Tx site</li> <li>• Data Collection from Nachingwea Authorities Concerned</li> <li>• Survey in Masasi TPTC and Repeater Station Site</li> <li>• Courtesy-call to Lindi Regional Director and Meeting with Officers concerned</li> <li>• Survey in Lindi Studio Site</li> <li>• Data Collection concerning Cost Estimation</li> </ul>
31 (Tue)	<ul style="list-style-type: none"> <li>• Data Collection from Lindi Authorities Concerned</li> <li>• Data Collection from Mtwara Authorities Concerned</li> <li>• Data Collection concerning Cost Estimation in Lindi/Mtwara</li> </ul>
Feb. 1 (Wed)	<ul style="list-style-type: none"> <li>• Survey of Mtwara Harbour Facilities</li> <li>• Data Collection from Lindi &amp; Mtwara Authorities Concerned</li> <li>• Data Collection concerning Cost Estimation in Lindi/Mtwara</li> </ul>
2 (Thu)	<ul style="list-style-type: none"> <li>• Shift to Dar es Salaam from Mtwara by air</li> </ul>
3 (Fri)	<ul style="list-style-type: none"> <li>• Team Leader Mr. S. Itoh and Coordinator Miss. K. Asami arrived at Dar es Salaam</li> <li>• Courtesy-call to Embassy of Japan and JICA Office</li> <li>• Data Collection from Ministries and Authorities Concerned (TANESCO HQ., TPTC HQ. etc.)</li> <li>• Meeting with RTD's members</li> <li>• Data Collection concerning Cost Estimation</li> <li>• Discussion among members of B/D Study Team</li> </ul>

Date	Summary of Basic Design (B/D) Study
4 (Sat)	<ul style="list-style-type: none"> <li>• Courtesy-call to the P.M. and F.V.P.'s Office</li> <li>• Meeting with RTD's members</li> <li>• Data Collection from Ministries and Authorities Concerned (TANESCO HQ., TPTC HQ. etc.)</li> </ul>
5 (Sun)	<ul style="list-style-type: none"> <li>• Discussion among members of B/D Study Team</li> <li>• Data Filing</li> <li>• Team member, Mr. H. Sonoda left Dar es Salaam</li> </ul>
6 (Mon)	<ul style="list-style-type: none"> <li>• Data Collection form Ministries and Authorities Concerned (TANESCO HQ., TPTC HQ. etc.)</li> </ul>
7 (Tue)	<ul style="list-style-type: none"> <li>• Courtesy-call to the Mister of State, Hon. Anna Makinda (Mr. S. Itoh, Miss. K. Asami and Mr. Y. Matsuda)</li> <li>• Meeting with RTD's members</li> <li>• Data Collection from Ministries and Authorities Concerned (TANESCO HQ., TPTC HQ. etc.)</li> </ul>
8 (Wed)	<ul style="list-style-type: none"> <li>• Inspection of a Vocational Training Center</li> <li>• Consultation concerning Minutes in the P.M. and F.V.P.'s Office</li> <li>• Final meeting with RTD members</li> </ul>
9 (Thu)	<ul style="list-style-type: none"> <li>• Inspection of group radio listening in a primary school in Dar es Salaam</li> <li>• Signing in Minutes at the P.M. and F.V.P.'s Office</li> <li>• Reporting to Embassy of Japan and JICA Office</li> </ul>
10 (Fri)	<ul style="list-style-type: none"> <li>• 6 members of B/D Study Team left Dar es Salaam (SR-293)</li> </ul>
11 (Sat)	<p>---Via Zurich---</p>
12 (Sun)	<ul style="list-style-type: none"> <li>• 6 members of B/D Study Team arrived at Narita (SR-162)</li> </ul>





## Appendix IV List of Interviewees



Embassy of Japan

Mr. Shoichi NAKAMURA	Ambassador Extraordinary and Plenipotentiary
Mr. Saburo TANAKA	Minister
Mr. Masahiko KANEKO	First Secretary
Mr. Kazumasa SHIBUTA	Expert

JICA Tanzania Office

Mr. Nobuo TOIDA	Resident Representative
Mr. Shunsuke IIZUKA	Deputy Director
Mr. Hiromi MOTOMURA	

Office of the Prime Minister and First Vice President

Hon. Anna S. Makinda	Minister of State.
Mr. Fadibili Mbagi	Deputy Principal Secretary
Mr. A. M. Ngororo	Director of Information Services
Mrs. H. I. Kundyia	Acting Director of Information Services

Ministry of Finance, Economic Affairs and Planning

Mr. Francis C. Byabato	Assistant Commissioner
Mr. P. J. Mbena	External Finance Officer
Dr. Kigoda Mokiwa	Senior Economist (DEV PLAN)
Mr. N. K. Mlalilaki	Government Statistician (Bureau of Statistics)
Mr. M. Owino	

Radio Tanzania Dares Salaam

Mr. David G. Wakati	Director of Broadcasting
Mr. J. Seleka	Acting Chief Engineer
Mr. E. T. K. Mangulla	Assistant Chief Engineer
Mr. Salim S. Nkamba	Senior Programme Organizer
Mr. K. Mpenda	Chief Editor

Mr. John H. Simtaji	Senior Manpower Management Officer
Mr. P. I. Mhumbira	Special Advisor
Mr. Peter Mamu	Engineer (Project)
Mr. X. Mwangole	Engineer (Project)
Mr. T. A. Usi	Engineer (Training)
Mr. Lhristupher E. M. Magola	News Editor
Mr. R. Mgaya	Accountant
Mr. Y. A. Mwakyeya	Foreign Purchasing Unit

Ministry of Education

Mr. J. B. Akwisombe	Programme Producer (Adult Education)
Mr. Peter Kibwana	Head School Broadcasts (School Education)
Mr. Willian A. Mbindi	Primary Education

Ministry of Health and Social Welfare

Mr. Richard J. Muro	Health Education Specialist
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Ministry of Agriculture and Livestock Development

Mr. Janet Mwenda  
Mr. Nyangi

Ministry of Labour and Manpower Development

Mr. Lawrence M. Mashanita	Director of Establishment
Mr. J. Ruzumyamhato	Director of Manpower Planning
Mr. J. Nyakirangani	Director of Training and Manpower Allocation

In Songea

Mr. C. N. Keenja	Regional Development Director
Mr. H. Z. Riwa	Regional Planning Officer
Mr. R. S. Ndunguru	Regional Land Development Officer
Mr. Mwasyeba Emmanuel	Planning Officer
Mr. Alfred F. Fuko	Acting Town Director (City Council)
Mr. P. C. Masumbuko	Town Engineer (City Council)

Mr. Beda B. Labule	Town Engineer (City Council)
Mr. Chacha S. Mwita	Regional Engineer
Mr. Christia Hilary Chale	Technical Building I
Mr. Kifaru	Regional Police Command
Mr. Yohana W. Nchimbi	District Sales Manager (RTC)
Mr. H. S. Kombo	Regional Manager (TANESCO)
Mr. J. T. Kababi	Regional Water Engineer (Water Supply Department)
Mr. B. T. Whero	Hydrogeology Technician (Water Supply Department)
Mr. G. D. Mwigira	Regional Director (TPTC)
Mr. Mtopa	Chief Executive Engineer (TPTC)

In Nachingwea

Mr. H. J. Komba	District Director
Mr. G. A. Linga	District Administration Officer
Mr. A. H. Miraji	District Engineer
Mr. E. L. Mahuwdi	District Engineer
Mr. Kepenji M. R.	Area Manager (TANESCO)
Mr. Mtumwe Niyusuph	Technician (TANESCO)

In Lindi

Mr. C. Rutaihwa	Regional Development Director
Mr. Mbatian Jaffu	Land Assistant
Mr. Kissila O. J. P.	Town Planner
Mr. Daud Mfwangavo	Regional Planning Officer
Mr. Jika Athumani	Acting Building Inspector
Mr. Ubwa M. K.	Regional Engineer
Mr. Manase S.	Acting Regional Manager (TANESCO)
Mr. Mwege O. S.	Head Telecommunication Engineering (TPTC)
Mr. Mokiwa P. A.	Regional Water Engineer (Water Supply Department)
Mr. R. M. Muhabuki	Hydrologist (Water Supply Department)
Mr. Monjega Y. F. A.	Water Department

In Masasi

Mr. Geoffrey J. Hamisi	District Administrative Officer
Mr. Bakari M. Dialala	Land Officer
Mr. Mgogo	Manager (TANESCO)
Mr. G. P. Nguku	E. G. Station Supervisor (TANESCO)
Mr. E. S. E. Ndali	Post Master (TPTC)

In Mtwara

Mr. M. D. Mkumbwa	Regional Development Director
Mr. C. J. Makula	Regional Manager (TANESCO)
Mr. Salvation L. M. Lugoe	General Manager (RTC)
Mr. J. Mungure	Port Manager in Mtwara Harbour Authority
Mr. H. Muwanya	Accounts Supervisor Revenue in Mtwara Harbour Authority

## Appendix V List of Collected Materials





## APPENDIX-V

1. 1988 POPULATION CENSUS PRELIMINARY REPORT  
Bureau of Statistics
2. MPANGO WA MAENDELEO 1987/88, 1988/89  
(ANNUAL DEVELOPMENT PLAN FOR 1987/88, 1988/89)  
Ministry of Finance, Economic Affairs and Planning
3. SPEECH BY THE MINISTER FOR FINANCE ECONOMIC AFFAIRS AND PLANNING  
'OUTLINING INCOMES AND EXPENDITURES OF THE GOVERNMENT DURING THE  
YEAR 1987/1988, 1988/89'  
Ministry of Finance, Economic Affairs and Planning
4. HALI YA UCHUMI WA TAIFA KATIKA MWAKA 1987  
(THE NATIONAL ECONOMIC SITUATION DURING 1987)  
issued by the Ministry of Finance, Economic Affairs and Planning
5. ECONOMIC AND OPERATIONS REPORT FOR THE YEAR END OF 30TH JUNE, 1987  
Bank of Tanzania
6. MPANGO WA PILI WA MUUNG AND WA MAENDELEO YAMIKA MITANO 1988/89-  
1992/93  
(THE SECOND FIVE YEAR DEVELOPMENT PLAN OF TANZANIA 1988/89-1992/93)  
Office of the Prime Minister and Vice President
7. BAJETI YA MATUMIZI YA KAWAIDANA MPANGO WA MAENDELEO 1988/89  
(RECURRENT EXPENDITURE BUDGET AND DEVELOPMENT PLAN 1988/89)  
Office of the Prime Minister and Vice President
8. DOCUMENT OF SEMINAR ON MASS MEDIA IN ARUSHA 1988  
Office of the Prime Minister and Vice President
9. DEVELOPMENT OF EDUCATION: 1986-1988 NATIONAL REPORT  
Ministry of Education
10. INVENTORY OF TRAINING INSTITUTIONS 1985  
Ministry of Labour and Manpower Development
11. UCHUNGUZI WA WAKITAJI YA WAFANYAKAZI WA PARAJA JUU LA KATI 1989  
(RESEARCH REPORT OF MANPOWER DEVELOPMENT 1989)  
Ministry of Labour and Manpower Development
12. MPANGO WA PILI WA MUUNGANO WA MIAKA MITANO MIKOA WA LINDI 1988/89-  
1992/93  
(THE SECOND FIVE YEAR DEVELOPMENT PLAN-LINDI REGION 1988/89-1992/93)  
Lindi Region Headquarters

13. MPANGO WA PILI WA MUUNGANO WA MIAKA MITANO MIKOA WA LINDI 1988/89-1992/93  
(THE SECOND FIVE YEAR DEVELOPMENT PLAN-LINDI REGION 1988/89-1992/93)  
Mtwara Region Headquarters
14. MPANGO WA PILI WA MUUNGANO WA MIAKA MITANO MIKOA WA RUVUMA 1988/89-1992/93  
(THE SECOND FIVE YEAR DEVELOPMENT PLAN-RUVUMA REGION 1988/89-1992/93)  
Ruvuma Region Headquarters
15. GEOTECHNICAL INVESTIGATION WORKS FOR THE PROPOSED DEVELOPMENT PROJECT FOR MEDIUM WAVE RADIO BROADCASTING NETWORK AT NACHINGWEA AND SONGEA  
Ministry of Communications and Works

## Appendix VI Country Data



## Census Results in Brief

Male Population, Mainland, 1988	11,012,647
Female Population, Mainland, 1988	11,521,111
Total Population, Mainland, 1988	22,533,758
Male Population, Zanzibar and Pemba, 1988	314,864
Female Population, Zanzibar and Pemba, 1988	325,714
Total Population, Zanzibar and Pemba, 1988	640,578
Male Population, The Republic of Tanzania, 1988	11,327,511
Female Population, The Republic of Tanzania, 1988	11,846,825
Total Population, The Republic of Tanzania, 1988	23,174,336
Annual Average Intercensal Growth Rate, Mainland, 1978 - 1988	2.8
Annual Average Intercensal Growth Rate, Zanzibar and Pemba, 1978 - 1988	3.0
Annual Average Intercensal Growth Rate, Tanzania, 1978 - 1988	2.8

# 1. Summary of Findings

## A Population of almost 23.2 million

The Mainland population observed in the 1988 census was 22,533,758, while the total population of Zanzibar was 640,578. Thus, the total population of the United Republic of Tanzania, according to the 1988 census, is 23,174,336.

In the previous (1978) census, the total Mainland population in 1978 was 17,036,499. The total population of Zanzibar was 476,111. The total for the United Republic of Tanzania was 17,512,610.

## Mainland's Growth Rate goes down, Zanzibar's goes up

The 1988 Census indicates a Mainland growth rate for the period 1978/88 of 2.8 percent, which is lower than the previous intercensal period, while Zanzibar's growth rate has increased slightly to 3.0 percent during the 1978/88 period. The 1978 census gave an average annual growth rate for the period of 1967/78 of 3.2 percent for the Mainland and 2.7 percent for Zanzibar.

The latest figures for the world as estimated by the United Nations in the 1986 Demographic Yearbook published in 1988, reveals an average annual population growth rate of 1.7 percent. The average annual population growth rate for Africa and Eastern Africa is higher, 2.9 and 3.1 percent respectively. And, finally, looking at the 1980 estimates for a few individual neighbouring countries, we find that Kenya had an average annual growth rate of 4.0 percent, while the estimates for Zambia and Zaire were 2.8 and 2.6 percent respectively.

## An Average of 26 Persons per sq.km.

Based on a land area of 881,289 sq. km, the Mainland population density of 19.3 persons/sq.km. in 1978 has increased to 25.5 persons/sq.km. in 1988. With a land area of 2,460 sq. km, the population density of Zanzibar has increased from 201 persons/sq.km. in 1978 to 260 persons/sq.km. in 1988.

The average population density for the world, according to the United Nations' 1986 Demographic Yearbook, is 36 persons/sq.km, while the density for Africa and Eastern Africa are 19 and 27 respectively. Looking at 1980 estimates for a few individual neighbouring countries, we find that Kenya had a population density of 36 while Zambia and Zaire had a density of 9 and 13 persons per sq.km, respectively.

## Lower Urban Growth Rate in 1978 - 1988 compared to 1967 - 1978

In the 1978 census it was observed, that the urban population of Tanzania Mainland experienced a very rapid growth, though its urban population was still relatively small. The proportion of urban population in Mainland increased from 6.39 percent in 1967 to 13.78 in 1978 at an average annual growth rate of 8.87 percent. In Zanzibar, the proportion of urban population increased from 28.63 percent in 1967 to 32.55 percent in 1978 at an average annual growth rate of 3.85 percent.

Current figures from the 1988 census indicate a lower growth rate of the urban population when compared to the urban growth experienced from the 1978 census. Details will be given in future publications.

According to the 1980 United Nations' estimates, proportions of urban population for some of the African countries were considerably higher. The urban population in Kenya was estimated to 15.5 percent, while estimates for Zaire and Zambia were 34.2 and 43.0 percent respectively.

## Households

The 1988 census figures confirm the predominancy of large households, especially in rural areas. The results give an average size of households of 5.3 for Mainland and an average size of 4.7 for Zanzibar.

The observed average size of households in 1978 was 5.0 persons for Mainland rural areas, compared to 4.5 persons for Mainland urban areas. The average household size in 1978 for Zanzibar urban and rural was 4.2 persons.

## Sex Ratio

The 1988 census results give a sex ratio of 96 for Mainland and 97 for Zanzibar, meaning that for every 100 females there were 96 and 97 males, respectively. Hence, there is an even sex distribution of the total population.

The derived sex ratio for Mainland in 1978 was 96, while the comparable figure for Zanzibar was 99.

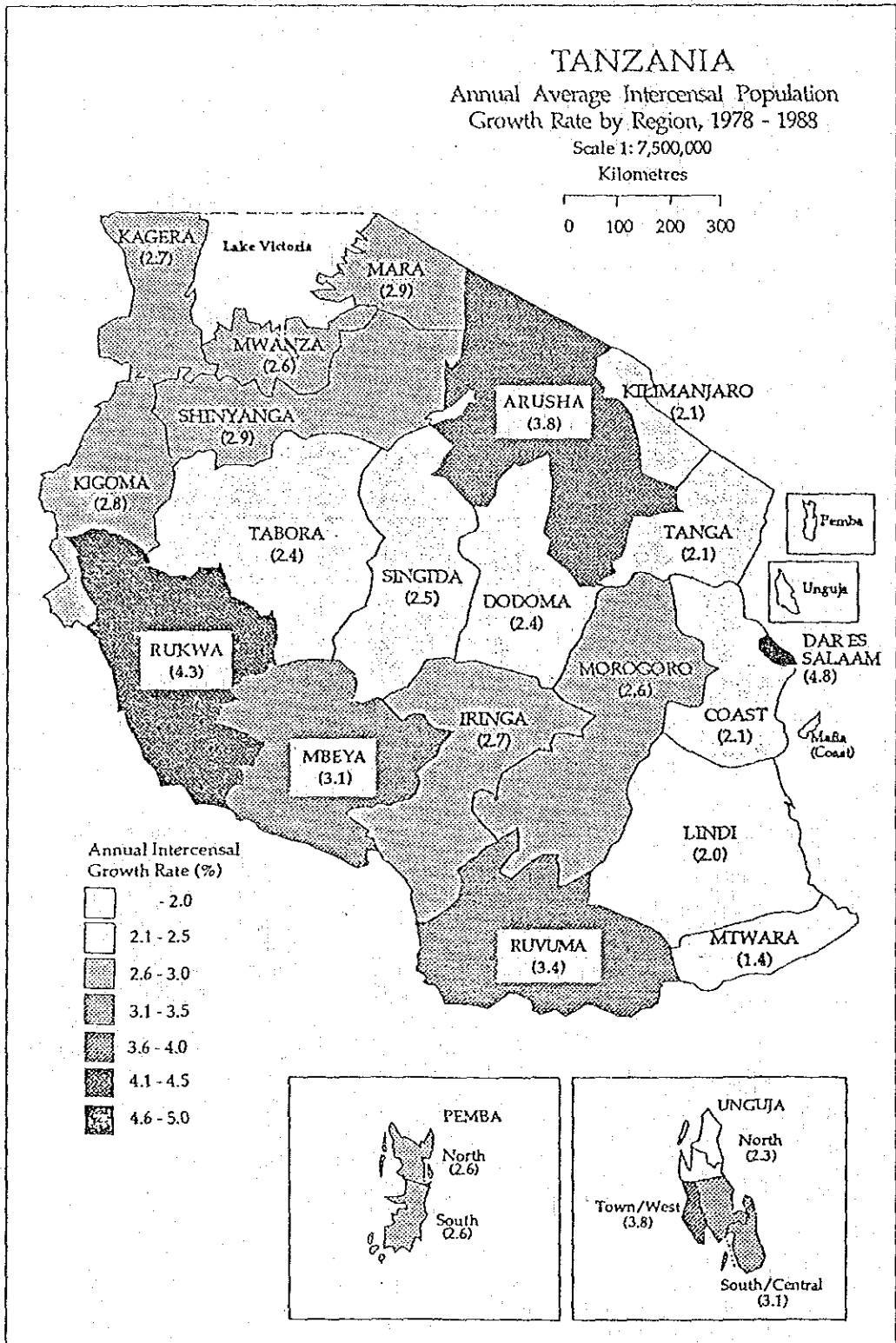




Table 1: CENSUS POPULATION AND INTERCENSAL GROWTH RATES BY REGION.  
 Regions arranged by census classification

Region	Population (Number)					Annual Average Intercensal Growth Rate	
	Census 1967	Census 1978	Projections 1978-88	Census 1988	Deviation <sup>1</sup>	1967-78	1978-88
Dodoma	709,380	972,005	1,274,000	1,237,819	-36,181	2.9	2.4
Arusha	610,474	926,223	1,321,000	1,351,675	+30,675	3.8	3.8
Kilimanjaro	652,722	902,437	1,193,000	1,108,699	-84,301	2.9	2.1
Tanga	771,060	1,037,767	1,340,000	1,283,636	-56,364	2.7	2.1
Morogoro	682,700	939,264	1,237,000	1,222,737	-14,263	2.9	2.6
Coast	428,041	516,586	611,000	638,015	+27,015	1.7	2.1
Dar es Salaam	356,286	843,090	1,723,000	1,360,850	-362,150	7.8	4.8
Lindi	419,853	527,624	645,000	646,550	+1,550	2.1	2.0
Mtwara	621,293	771,818	934,000	889,494	-44,506	2.0	1.4
Ruvuma	395,447	561,575	758,000	783,327	+25,327	3.2	3.4
Iringa	689,905	925,044	1,193,000	1,208,914	+15,914	2.7	2.7
Mbeya	753,765	1,079,864	1,469,000	1,476,199	+7,199	3.3	3.1
Singida	457,938	613,949	791,000	791,814	+814	2.7	2.5
Tabora	502,068	817,907	1,236,000	1,036,293	-199,707	4.4	2.4
Rukwa	276,091	451,897	684,000	694,974	+10,974	4.5	4.3
Kigoma	473,443	648,941	851,000	854,817	+3,817	2.9	2.8
Shinyanga	899,468	1,323,535	1,839,000	1,772,549	-66,451	3.5	2.9
Kagera	658,712	1,009,767	1,451,000	1,326,183	-124,817	3.9	2.7
Mwanza	1,055,883	1,443,379	1,889,000	1,878,271	-10,729	2.8	2.6
Mara	544,125	723,827	932,000	970,942	+38,942	2.6	2.9
<b>Mainland</b>	<b>11,958,654</b>	<b>17,036,499</b>	<b>23,371,000</b>	<b>22,533,758</b>	<b>-837,242</b>	<b>3.2</b>	<b>2.8</b>
Kaskazini-Unguja	56,360	77,017	..	97,028	..	2.3	2.3
Kusini-Unguja	39,087	51,749	..	70,184	..	3.1	3.1
Mjini-Magharibi	95,047	142,041	..	208,327	..	3.7	3.8
Kaskazini-Pemba	72,015	106,290	..	137,399	..	3.6	2.6
Kusini-Pemba	92,306	99,014	..	127,640	..	0.6	2.6
<b>Zanzibar</b>	<b>354,815</b>	<b>476,111</b>	<b>625,000</b>	<b>640,578</b>	<b>+15,578</b>	<b>2.7</b>	<b>3.0</b>
<b>Tanzania</b>	<b>12,313,469</b>	<b>17,512,610</b>	<b>23,996,000</b>	<b>23,174,336</b>	<b>-821,664</b>	<b>3.2</b>	<b>2.8</b>

<sup>1</sup> Actual population according to the 1988 census, compared to the population projections

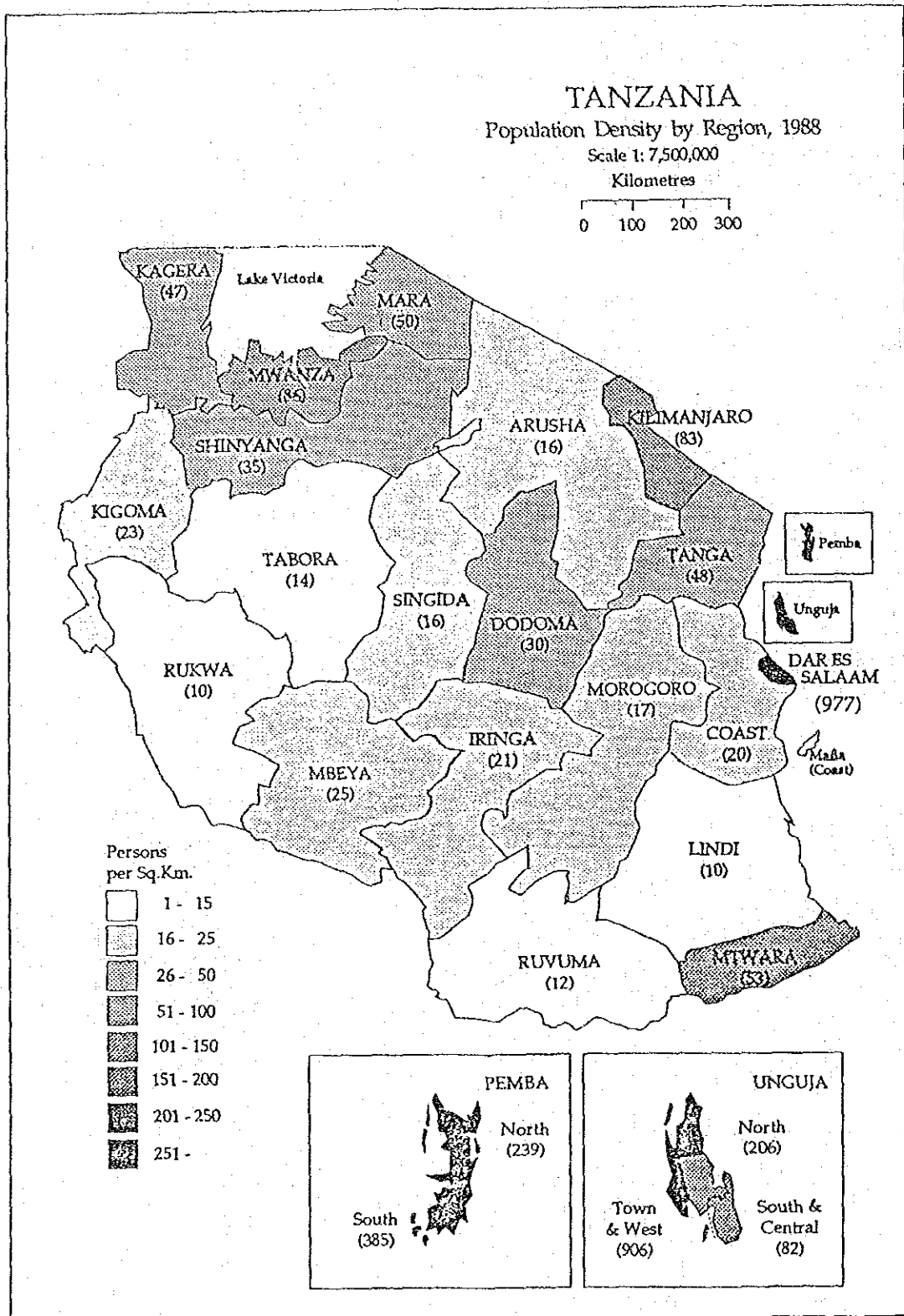


Table 2: Population Density and Household Size by Region 1967, 1978 and 1988

Region	Land area (Sq. Kms)	Density <sup>1</sup>			H'hold Number 1988	H'hold Average Size (Persons)		
		1967	1978	1988		1967	1978	1988
Dodoma	41,311	17	24	30	244,684	4.4	4.7	5.0
Arusha	82,306	7	11	16	249,436	4.8	5.3	5.4
Kilimanjaro	13,309	49	68	83	205,302	5.0	5.3	5.4
Tanga	26,808	29	39	48	249,147	3.8	4.7	5.1
Morogoro	70,799	10	13	17	227,705	4.2	4.7	5.3
Coast	32,407	13	16	20	128,218	..	4.3	4.9
Dar es Salaam	1,393	256	605	977	314,304	..	4.1	4.3
Lindi	66,046	6	8	10	138,070	3.7	4.4	4.6
Mtwara	16,707	37	46	53	198,726	3.8	4.3	4.4
Ruvuma	63,498	6	9	12	146,874	4.0	5.2	5.3
Iringa	56,864	12	16	21	248,479	4.5	4.5	4.8
Mbeya	60,350	12	18	25	297,636	4.8	5.0	4.9
Singida	49,341	9	12	16	148,937	4.1	4.6	5.3
Tabora	76,151	7	11	14	180,129	4.5	5.0	5.7
Rukwa	68,635	4	7	10	130,759	4.7	5.1	5.3
Kigoma	37,037	13	18	23	146,961	4.5	5.5	5.8
Shinyanga	50,781	18	26	35	279,690	5.7	5.8	6.3
Kagera	28,388	23	36	47	269,626	3.9	4.5	4.9
Mwanza	19,592	54	74	96	292,962	5.7	6.0	6.4
Mara	19,566	28	37	50	143,246	6.0	6.2	6.7
Mainland	881,289	14	19	26	4,240,891	4.5	4.9	5.3
Kaskazini-Unguja	470	124	169	206	23,347	3.2	3.9	4.1
Kusini-Unguja	854	47	62	82	15,284	3.1	4.1	4.5
Mjini-Magharibi	230	428	640	906	42,142	3.7	4.2	4.9
Kaskazini-Pemba	574	157	232	239	29,324	3.5	4.4	4.6
Kusini-Pemba	332	226	242	385	26,300	3.5	4.5	4.8
Zanzibar	2,460	149	201	260	136,397	3.5	4.2	4.7
Tanzania	883,749	14	20	26	4,377,288	4.4	4.9	5.2

<sup>1</sup> Inhabitants/Sq.Km., according to the relevant area the particular year.

VI-2 Basic Economic Indicators

	1976	1981	1982	1983	1984	1985	1986	1987	1988
1. Population (million)	16.3	18.6	19.2	19.8	20.5	21.2	21.9	22.6	22.5*1
2. Gross Domestic Product (GDP)									
At. Current Prices (mill. TSh)	21,652	43,906	52,546	62,608	78,143	108,083	143,034	198,101	287,200
At. 1976 Prices ( % )	2,652	23,301	23,439	22,882	23,656	24,278	25,158	26,142	27,318
3. Income per Capital									
At. Current Prices (TShs)	1,328	2,361	2,737	3,612	3,812	5,027	6,531	8,765	
At. 1976 Prices ( % )	1,328	1,253	1,221	1,155	1,154	1,129	1,149	1,157	
4. Prices Index (77=100)	85.1	196.9	253.9	322.6	439.2	585.4	775.2	1,004.4	1,410.4
		1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89
5. Balance of Trade (mill. TSh)									
(i) Export ( % )		-509	-533	-528	-615	-707	-790	-796.95	-791.95
(Cash crops) ( % )		570	369	347	335	317	355	388.65	438.05
(ii) Import ( % )		(268.12)	(283.58)	(281.13)	(235.98)	(242.38)	(224.57)	(225.65)	
(Imported Foods) ( % )		1,079	902	875	950	1,024	1,145	1,185	1,230
		(575.5)	(383.8)	(177.5)	(381.2)	(303.0)	-	-	-
Foreign-exchange holdings (mill. TSh)		-4,202.0	-5,347.4	-7,517.3	-8,861.9	-14,464.1	-17,458.3	-24,700.0	

Source: Mpango Wa Maendeleo Wa Mwaka 1988/89, 1987/88 (Annual Development Plan for 1987/88, 1988/89) 1988 Population Census Preliminary Report

\*1 Result of 1988 Census Values in 1981-1987 are estimated according to growth rate.

VI-3 Gross Domestic Product at Factor Cost by Industrial Origin

(million TShs)

	1976	1981	1982	1983	1984	1985	1986	1987
Agriculture, Hunting, Fishing and Forestry	9,046 (41.8%)	9,511 (40.8%)	9,639 (41.1%)	9,914 (43.3%)	10,312 (43.6%)	10,931 (45.0%)	11,557 (45.9%)	12,066 (46.2%)
Mining and Quarrying	214 (1.0%)	193 (0.8%)	193 (0.8%)	174 (0.8%)	186 (0.8%)	174 (0.7%)	167 (0.7%)	165 (0.6%)
Manufacturing	2,811 (13.0%)	2,382 (10.2%)	2,304 (9.8%)	2,103 (9.2%)	2,159 (9.1%)	2,075 (8.6%)	1,991 (7.9%)	2,075 (7.9%)
Electricity and Water Supply	220 (1.0%)	417 (1.8%)	420 (1.8%)	413 (1.8%)	439 (1.9%)	461 (1.9%)	544 (2.2%)	585 (2.2%)
Construction	884 (4.1%)	890 (3.8%)	930 (4.0%)	549 (2.4%)	660 (2.8%)	601 (2.5%)	752 (3.0%)	774 (3.0%)
Wholesale & Retail Trade Restaurants and Hotels	2,839 (13.1%)	2,725 (11.7%)	2,668 (11.4%)	2,612 (11.4%)	2,640 (11.2%)	2,662 (11.0%)	2,953 (11.7%)	3,086 (11.8%)
Transportation and Communication	1,685 (7.8%)	1,652 (7.1%)	1,694 (7.2%)	1,473 (6.4%)	1,482 (6.3%)	1,509 (6.2%)	1,514 (6.0%)	1,582 (6.1%)
Financial, Insurance, Bank Services	2,460 (11.4%)	3,078 (13.2%)	3,369 (14.4%)	3,533 (15.4%)	3,739 (15.8%)	3,843 (15.8%)	4,169 (16.6%)	4,224 (16.2%)
Public Administration and their Services	2,342 (10.8%)	3,551 (15.2%)	3,556 (15.2%)	3,543 (15.5%)	3,549 (15.0%)	3,616 (14.9%)	3,283 (13.1%)	3,309 (12.7%)
G D P	21,653 (100)	23,301 (100)	23,439 (100)	22,882 (100)	23,656 (100)	24,278 (100)	25,158 (100)	26,142 (100)

Source: Hali ya Uchumi Wa Taifa, Katika Mwaka 1987.  
(The National Economic Situation during 1987)

VI-4 Produce and Export of Cash Crops

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
<b>1. Coffee</b>							
Amt. of Produce (kt)	56	53	49.2	48.3	54	41.2	50
Amt. of Export (%)	56.4	55.2	54.8	49.1	48.86	48.62	48.0
Price of Export (\$ million)	131.68	135.49	153.21	128.27	161.82	142.41	112.8
Unit Price (\$)	2.33	2.45	2.79	2.61	3.31	2.93	2.35
<b>2. Cotton</b>							
Amt. of Produce (kt)	44.59	42.9	140.4	154.8	107.8	213.1	226.1
Amt. of Export (%)	40.7	39.0	38.7	29.7	24.15	46.73	45.0
Price of Export (\$ million)	63.69	56.29	58.62	47.49	30.0	39.53	65.25
Unit Price (\$)	1.56	1.44	1.52	1.6	1.24	0.85	1.45
<b>3. Sisal</b>							
Amt. of Produce (kt)	61	46	38.3	32.3	28.5	36.9	36
Amt. of Export (%)	54.4	32.4	23.7	26.1	15.47	15.39	14.0
Price of Export (\$ million)	28.46	15.58	11.28	9.16	5.5	4.89	5.6
Unit Price (\$)	0.52	0.48	0.47	0.35	0.34	0.31	0.4
<b>4. Tea</b>							
Amt. of Produce (kt)	15.53	16.3	17.1	16.7	15.5	14.1	17
Amt. of Export (%)	11.3	12.2	15.7	11.3	10.8	11.3	14.0
Price of Export (\$ million)	17.46	19.27	23.85	18.72	15.86	12.38	18.9
Unit Price (\$)	1.55	1.57	1.52	1.66	1.47	1.09	1.35
<b>5. Tobacco</b>							
Amt. of Produce (kt)	16.2	13.6	11.1	13.4	12.5	16.4	16.7
Amt. of Export (%)	11.3	5.9	5.6	7.3	8.6	7.7	9.0
Price of Export (\$ million)	19.88	13.31	10.48	10.85	15.40	12.92	13.95
Unit Price (\$)	1.76	2.23	1.87	1.66	1.8	1.68	1.56
<b>6. Cashewnuts</b>							
Amt. of Produce (kt)	44	33	48.3	32.5	18.8	16.5	20
Amt. of Export (%)	5.4	9.0	-	21.5	18.55	11.56	9.0
Price of Export (\$ million)	6.95	43.74	23.69	21.49	13.8	12.44	9.15
Unit Price (\$)	1.28	4.86	-	1.0	0.74	1.07	1.02
<b>Total Amount of Export of Cash Crops (\$ million)</b>	268.12	283.58	281.13	235.98	242.38	224.57	225.65
<b>Total Amount of Export of manufactured Products (\$ million)</b>	183.00	142.07	151.43	107.98	108.10	89.15	163.00
<b>Grand Total Amount of Export (\$ million)</b>	451.12	425.65	432.56	343.97	350.48	313.72	388.65

Source: Hollya Uchumi Wa Taifa Katika Mwaka 1987 (The National Economic Situation During 1987)  
Mapango Wa Maendeleo Wa Mwaka 1988/80, 1987/88 (Annual Development Plan for 1987/88, 1988/89)

VI-5 Trade in Government Finance

(million TShs in)

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89 estimate
(a) Total Recurrent Revenue	10,960.0	13,145.0	15,464.6	19,143.0	22,321.0	34,948.7	57,429.5	62,670.0
(b) Total Recurrent Expenditure	13,214.1	14,871.5	18,119.9	21,336.5	27,402.3	40,390.2	61,765.0	70,272.0
Expenditure Surplus	-2,254.1	-1,726.5	-2,770.6	-3,193.5	-5,081.3	-5,891.5	-4,335.5	-7,602.0
(c) Development Expenditure	5,185.0	5,145.5	5,736.0	5,391.1	5,817.0	15,090.9	15,091.1	28,400.0
(i) Internal Sources	3,390.0	3,293.5	2,770.6	3,901.4	4,595.0	9,635.8	8,467.1	12,200.0
(ii) External Sources	1,795.0	1,852.0	2,965.4	1,489.7	1,442.0	54,551.0	6,624.0	45,360.0
(d) Bank Borrowing	3,278.0	4,206.0	4,699.0	3,340.4	4,925.0	1,656.3	913.6	600.0
(e) Non-Bank Borrowing	783.0	814.0	788.0	1,125.0	1,308.0	2,556.7	2,500.0	2,500.0
(f) External Loans & Grants	1,795.0	1,852.0	2,965.0	1,489.7	1,442.0	54,551.0	6,624.0	45,360.0
(g) Other Income	1,588.1	-	-	1,629.5	4,243.7	11,314.3	9,389.0	36,702.0
(h) Ministries & Parastatals	4,537.0	4,583.2	5,047.0	4,467.1	4,964.0	13,900.2	13,900.0	24,894.5
(i) Region	648.0	562.3	687.0	924.0	833.0	1,190.9	1,190.9	2,204.2

Source: Mapango Wa Maeudeleo Wa Mwaka 1987/88, 1988/89  
(Annual Development Plan for 1987/88, 1988/89)

VI-6 Salary Scale (1988/89)

	Salary Scale of Servant
OS. 1	1,645/= ~ 1,695/=
OS. 2	1,715/= ~ 1,805/=
OS. 3	1,820/= ~ 1,940/=
OS. 4	1,965/= ~ 2,165/=
OS. 5	2,195/= ~ 2,435/=
NTA.	1,965/= ~ 2,405/=
MU.	1,775/= ~ 2,160/=
MS. 1	2,185/= ~ 2,780/=
MS. 2	2,860/= ~ 3,525/=
MS. 3	3,715/= ~ 4,555/=
MS. 4	4,690/= ~ 5,850/=
MS. 5	6,020/= ~ 6,745/=
MS. 6	6,775/= ~ 7,085/=
MS. 7	7,160/=
MS. 8	7,260/=
MS. 9	7,360/=
MS. 10	7,410/=
MS. 11	7,450/=
MS. 12	7,624/=
MS. 13	7,670/=
MS. 14	7,810/=
MS. 15	7,940/=
MS. 16	7,980/=
MS. 17	8,250/=
MS. 18	8,780/=
MS. 19	8,980/=

Source: Data of the President and First Vice President's Office



VI-7 Radio sets produced in Dar es Salaam factory of Matsushita

	I No. of radio sets plus radio sets with cassette tape recorder, produced for year	II No. of radio sets for Zanzibar, produced for year	III No. of radio sets for export pro- duced for year	IV = I - (II + III)	V No. of radio sets failed in 10 years life cycle in IV	VI Accumulated number of radio sets in case of 10 years life cycle in IV	VII No. of radio sets failed in 15 years life cycle in IV	VIII Accumulated number of radio sets in case of 15 years life cycle in VI	IX No. of radio sets failed in 20 years life cycle in IV	X Accumulated number of radio sets in case of 20 years life cycle in IV
1966										
67										
68										
69										
70										
71										
72	4,827	161		4,466		4,466		4,466		4,466
73	73,614	2,565	6,104	64,945		69,411		69,411		69,411
74	107,432	3,743	7,845	95,843		165,254		165,254		165,254
75	132,260	4,617	15,770	111,873		277,127		277,127		277,127
76	165,294	5,762	20,764	138,738		415,865		415,865		415,865
77	173,537	6,053	3,120	164,364		580,229		580,229		580,229
78	234,802	8,191	533	226,078		806,307		806,307		806,307
79	156,887	5,472	3,386	148,029		954,336		954,336		954,336
80	150,110	5,233	7,340	137,537		1,091,873		1,091,873		1,091,873
81	115,103	4,015	0	111,088		1,202,961		1,202,961		1,202,961
82	87,831	3,068	0	84,763	4,466	1,283,258		1,287,724		1,287,724
83	35,020	1,224	757	33,039	64,945	1,251,352		1,320,763		1,320,763
84	30,783	1,071	1,843	27,869	95,843	1,183,378		1,348,632		1,348,632
85	37,225	1,294	2,032	33,899	1,118,873	1,105,404		1,382,531		1,382,531
86	13,804	472	2,489	10,843	138,738	977,509		1,393,374		1,393,374
87	16,000	272	0	15,728	164,364	828,873	4,466	1,404,636		1,409,102
88	18,000	522	0	17,478	226,078	620,273	69,411	1,352,703		1,426,580

VI-8 Radio sets produced in Arusha factory of Philips

	I No. of radio sets plus radio sets with cassette tape recorder, produced for year	II No. of radio sets for Zanzibar and export	III III = I - II	IV No. of radio sets failed in 10 years life cycle in III	V Accumulated number of radio sets in case of 10 years life cycle in IV	VI No. of radio sets failed in 15 years life cycle in III	VII Accumulated number of radio sets in case of 15 years life cycle in IV	VIII No. of radio sets failed in 20 years life cycle in III	IX Accumulated number of radio sets in case of 20 years life cycle in IV
1966	14,000	1,140	12,860		12,860		12,860		12,860
67	20,000	1,640	18,360		31,220		31,220		31,220
68	49,400	4,050	45,350		76,570		76,570		76,570
69	90,800	7,440	83,360		159,930		159,930		159,930
70	118,400	9,700	108,700		286,630		286,630		286,630
71	129,900	10,650	119,250		387,880		387,880		387,880
72	136,200	13,380	149,820		537,700		537,700		537,700
73	151,700	12,440	139,260		676,960		676,960		676,960
74	171,200	14,040	157,160		834,120		834,120		834,120
75	110,300	9,040	101,260		935,380		935,380		935,380
76	111,500	9,140	102,360	12,860	1,024,880		1,037,740		1,037,740
77	150,500	12,340	138,160	18,360	1,144,680		1,175,900		1,175,900
78	206,900	16,960	189,940	45,350	1,289,270		1,365,840		1,365,840
79	128,700	10,550	118,150	83,360	1,324,060		1,483,990		1,483,990
80	96,500	7,910	88,590	108,700	1,303,950		1,572,580		1,572,580
81	65,500	2,230	63,270	119,250	1,247,970	12,860	1,622,990		1,635,850
82	21,800	740	21,060	149,820	1,119,210	18,360	1,625,690		1,656,910
83	13,800	1,130	12,670	139,260	992,620	45,350	1,593,010		1,669,580
84	31,000	2,540	28,460	157,160	863,920	83,360	1,538,110		1,698,040
85	49,400	4,050	45,350	101,260	808,010	108,700	1,474,760		1,743,390
86	62,000	5,080	56,920	102,360	762,570	119,250	1,412,430	12,860	1,787,450
87	13,650	460	13,220	138,160	637,630	149,820	1,275,830	18,360	1,782,310
88	15,000	510	14,490	189,940	462,180	139,260	1,151,060	45,350	1,751,450

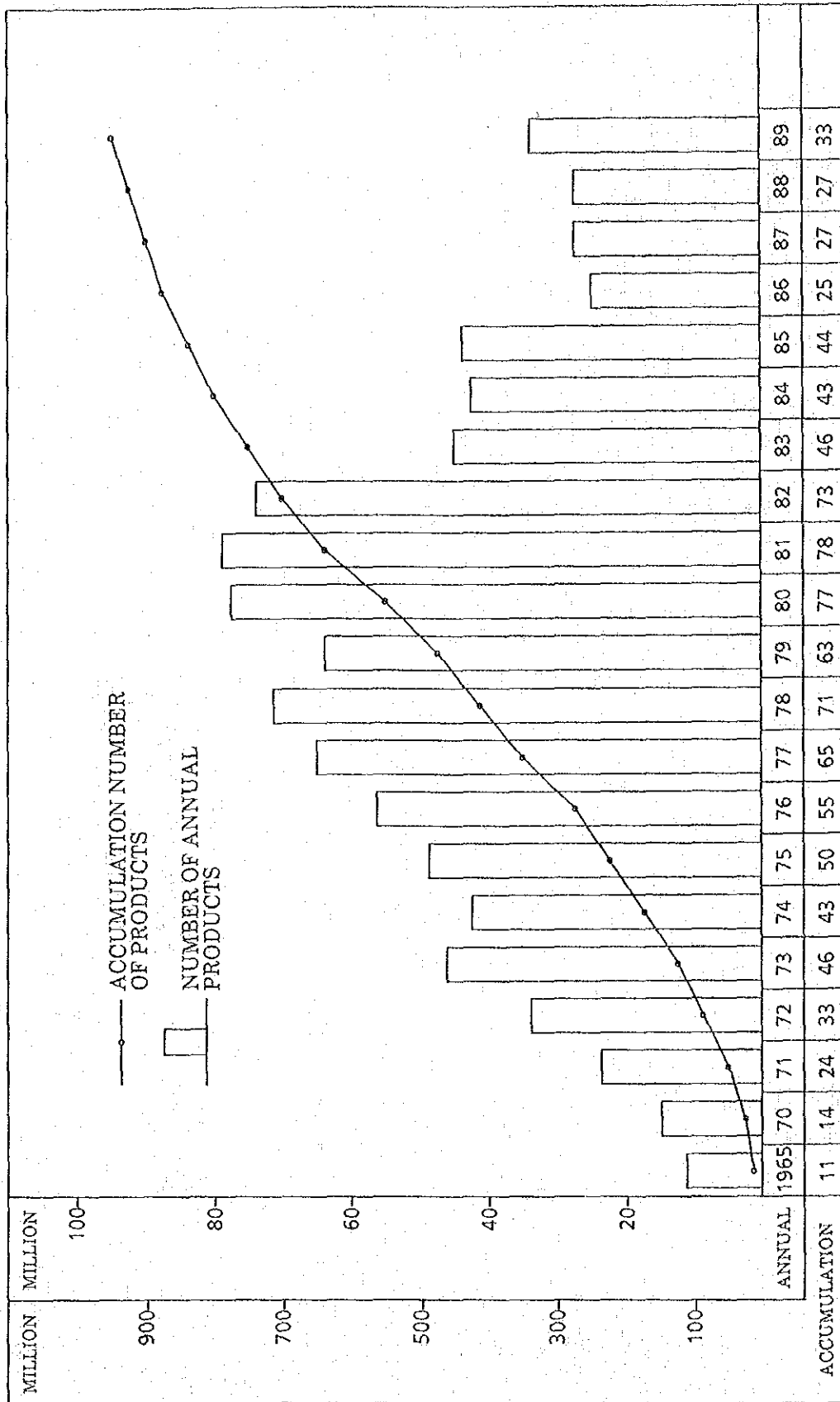
VI-9 Number of Radio sets imported

	I No. of radio sets plus radio sets with cassette tape recorder, et. imported for year	II No. of radio sets failed in 10 years life cycle	III Accumulated number of radio sets in case of 10 years life cycle	IV No. of radio sets failed in 15 years life cycle	V Accumulated number of radio sets in case of 15 years life cycle	VI No. of radio sets failed in 20 years life cycle	VII Accumulated number of radio sets in case of 20 years life cycle
1966	1,140		1,140		1,140		1,140
67	1,640		2,780		2,780		2,780
68	4,050		6,830		6,830		6,830
69	7,440		14,270		14,270		14,270
70	9,700		23,970		23,970		23,970
71	10,650		34,620		34,620		34,620
72	13,541		48,161		48,161		48,161
73	21,109		69,270		69,270		69,270
74	25,629		94,899		94,899		94,899
75	29,427		124,326		124,326		124,326
76	35,666	1,140	158,852		159,992		159,992
77	21,513	1,640	178,725		181,505		181,505
78	25,684	4,050	200,359		207,189		207,189
79	19,408	7,440	212,327		226,597		226,597
80	20,483	9,700	223,110		247,080		247,080
81	14,730	10,650	227,190	1,140	260,670		261,810
82	8,900	13,541	222,549	1,640	267,930		270,710
83	3,110	21,109	204,550	4,050	266,990		273,820
84	5,454	25,629	184,375	7,440	265,004		279,274
85	7,376	29,427	162,324	9,700	262,680		286,650
86	8,050	35,666	134,708	10,650	260,080	1,140	293,560
87	8,300	21,513	121,495	13,541	254,839	1,640	300,220
88	8,500	25,684	104,311	21,109	242,230	4,050	304,670

VI-10 Diffused Number of Radio set (estimation)

	I Diffused number of radio sets in case of 20 years cycle	II Diffused number of radio sets in case of 15 years cycle	III Diffused number of radio sets in case of 10 years cycle
1966	14,000	14,000	14,000
67	34,000	34,000	34,000
68	83,400	83,400	83,400
69	174,200	174,200	174,200
70	292,600	292,600	292,600
71	422,500	422,500	422,500
72	590,327	590,327	590,327
73	815,641	815,641	815,641
74	1,094,271	1,094,271	1,094,271
75	1,336,833	1,336,833	1,336,833
76	1,613,597	1,613,597	1,599,597
77	1,937,634	1,937,634	1,903,634
78	2,379,336	2,379,336	2,295,936
79	2,664,923	2,664,923	2,490,723
80	2,911,533	2,911,533	2,618,933
81	3,100,621	3,086,621	2,678,121
82	3,215,344	3,181,344	2,625,017
83	3,264,163	3,180,763	2,448,522
84	3,325,946	3,151,746	2,231,673
85	3,412,571	3,119,971	2,075,738
86	3,474,384	3,065,384	1,874,787
87	3,491,632	2,935,305	1,587,998
88	3,482,700	2,745,993	1,168,764

VI-11 Development of Dry-cell Battery Production



Source: MATSUSHITA DAR ES SALAAM

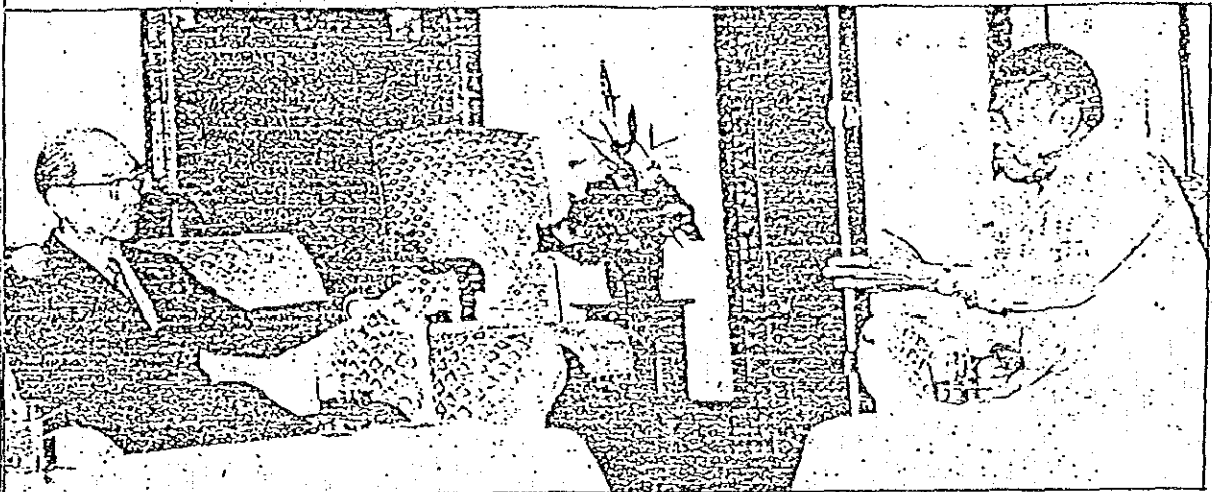
# DAILY NEWS

THURSDAY, NOVEMBER 10, 1988

PRICE: EIGHT SHILLINGS, KENYA 4/-

TANZANIA

## Mwinyi receives Matsushita chief, urges



PRESIDENT Mwinyi with the Managing Director of Matsushita Electric Company of Japan, Mr. T. Yamashita, at the State House in Dar es Salaam yesterday. (Picture by Henry Isike)

# Produce cheap radios for rural people

PRESIDENT Mwinyi yesterday appealed to the Matsushita Electric Company (East Africa) to look into the possibility of manufacturing simple and cheap radio sets for the rural community in Tanzania.

Ndugu Mwinyi said "Tanzania is a vast country and the means of communication is difficult. But radio communication is the only quick link between the masses in the rural areas and the Party and Government leadership in the urban

centres".

President Mwinyi was speaking at the Matsushita Electric Industrial Company Limited of Japan, Mr. T. Yamashita, at the State House in Dar es Salaam.

Ndugu Mwinyi said, "They need radio sets but they can't afford to buy them at current prices". They need simple and cheap radio sets which they can afford to buy, he added.

President Mwinyi also told the Matsushita Electric Company to consider the possibility of estab-

lishing workshops for repairs and servicing centres of radio sets in the regions.

The President assured the company that the Government will give the necessary support it needed in manufacturing more products to help meet the demand of the people in Tanzania.

He said: "I am glad for what you are doing in Tanzania. The significance of your activities in the country are of great importance to our economy. The activities of your company are highly appreciated because it is a

transfer of technology to the people of Tanzania".

President Mwinyi also urged the Matsushita Electric Company to consider the possibility of establishing other fields of investment in Dar es Salaam or up-country.

On behalf of his company, the Matsushita Managing Director assured Ndugu Mwinyi that his company will fulfill all the request of the President as soon as possible.

In celebrating twenty years of the establishment of Matsushita Electric in Tanzania, the company has contributed 700,000/- towards the Presidential Fund for Self Reliance.

### VI-13 Traffic conditions on the road from Dar es Salaam to each projected site

Overland transportation routes from Dar es Salaam are indicated on VI-13-1.

#### (1) The site at Songea

A paved highway about 1,000km long can be used for overland transportation from Dar es Salaam (VI-13-①). Travel time is 2 days. To transfer personnel by airplane, there is a route between Dar es Salaam and Songea. (It takes 1 hour by chartered flight or Air Tanzania domestic service).

#### (2) The sites at Nachingea, Lindi, and Masasi

As shown on Map VI-3 the overland route from Dar es Salaam will be via Songea. But since the section between Songea and Masasi (②) is unpaved, it would be difficult to transport goods on large trucks in rainy seasons, when the roads become rough.

However, it is possible to ship equipment and materials from Dar es Salaam to Mtwara port, and then use overland routes from Mtwara port to each site.

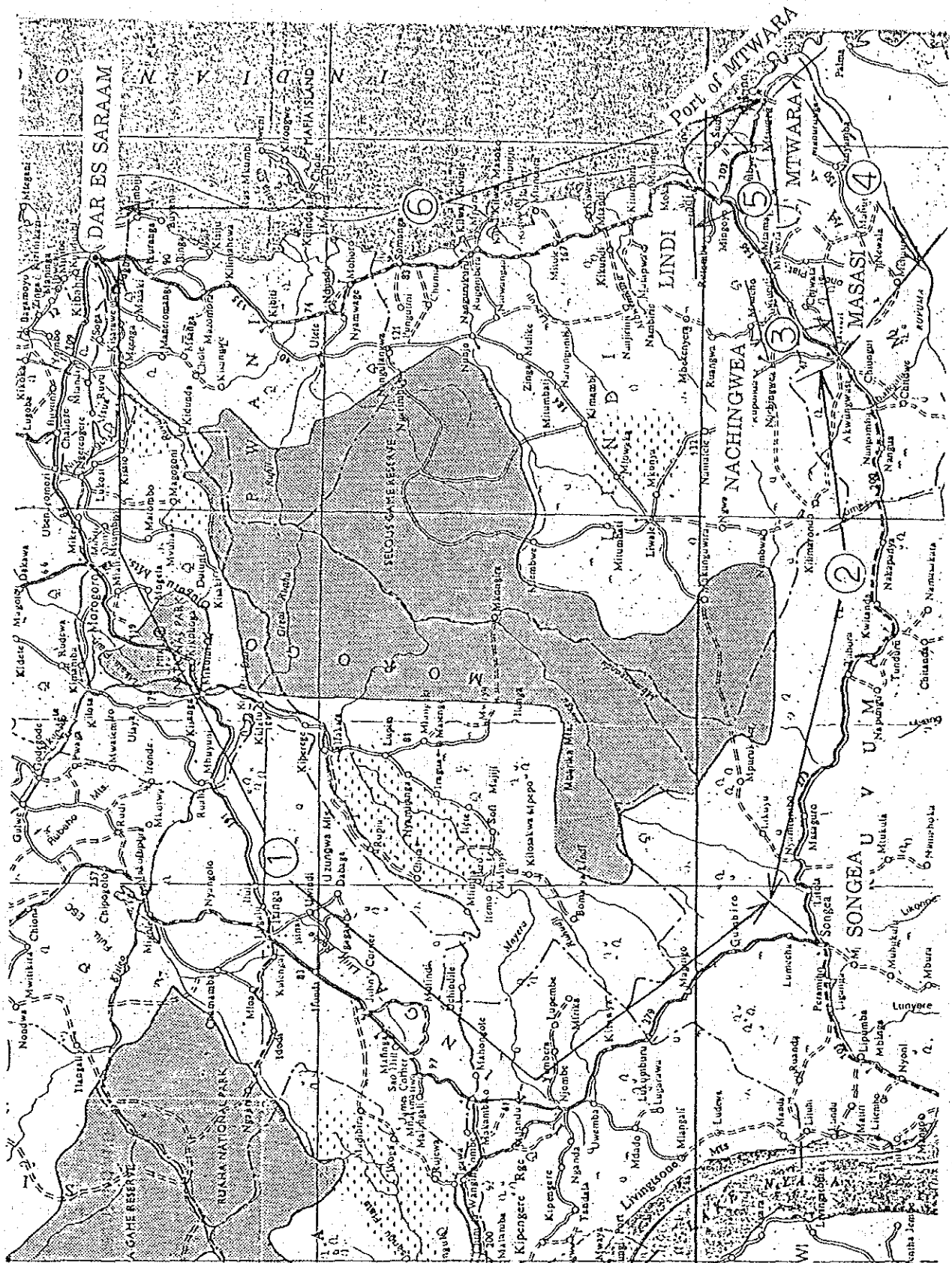
Mtwara port is the second largest international seaport of Tanzania (with a depth of 10m), called at by many foreign vessels.

However, Japanese ships call only at the port of Dar es Salaam, so transportation to Mtwara port will have to be by TACOSHILI (Tanzania Coastal Shipping Line LTD.), a domestic liner. This domestic route is serviced once a week and takes 18 hours (⑥). This liner calls at Lindi port, too, but only when the tide is high.

As for the road conditions from Mtwara port to each site, there is a perfect paved road to Masasi(④), and it is possible to use large trucks from Masasi to Nachingea (③). However, there are 3 to 4 sections that need repair in rainy seasons. There is also a tentatively-paved road from Mtwara port to the site at Lindi (⑤).

To transport personnel to each site, flying is faster and more reliable.

To Nachingea, we can use the route from Dar es Salaam to Nachingwea airport, and to Lindi, from Dar es Salaam to Mtwara airport. (It takes 1 hour by chartered flight or by Air Tanzania).



VI-13-1 Transportation route from Dar es Salaam to each site.

①: Dar es Salaam	-	Songea	(1,000km paved road)
②: Songea	-	Masaki	( 473km paved road)
③: Masasi	-	Nachingwea	( 47km unpaved road)
④: Masasi	-	Mtwara	( 190km paved road)
⑤: Lindi	-	Mtwara	( 103km paved road)
⑥: Dar es Salaam	-	Mtwara harbor	(Sea route)



## Appendix VII Summary of Reports on Soils and Foundation Investigations



THE UNITED REPUBLIC OF TANZANIA  
MINISTRY OF COMMUNICATIONS AND WORKS

THE DIRECTOR  
RADIO TANZANIA  
P.O. BOX 9150  
DAR ES SALAAM

THE GEOTECHNICAL INVESTIGATION WORKS  
FOR THE DEVELOPMENT PROJECT FOR MEDIUM  
WAVE RADIO BROADCASTING NET WORK FOR  
SONGEA AND NACHINGWEA SITES

CENTRAL MATERIALS LABORATORY  
P.O. BOX 9452  
DAR ES SALAAM

## 1.0 EVALUATION OF THE BEARING CAPACITY OF THE SOILS.

### 1.1 Bearing Capacity from Shear Strength Parameters:

#### 1.1.1 Songea Site:

The various test results of coefficient of cohesion, penetration resistance and angle of shearing resistance indicate that local shear failure may be expected.

The bearing capacity of the soils is calculated from Terzaghi's theory. 2,3,4,5

$$q_{net} = cN_c + \gamma D(N_q - 1) + 0.5B\gamma N_\gamma$$

$$\text{and } q_{safe} = \frac{q_{net}}{F} + \gamma D$$

From the summary in Tables 3 and 4 it may be seen that a safe bearing capacity (SBC) of not more than 200KN/m<sup>2</sup> may be adopted for the antenna site (BH 1) and a maximum SBC of 300KN/m<sup>2</sup> may be adopted for the building site (BH. 2).

indicate that local shear failure may be expected.

#### 1.1.2 Nachingwea site

Triaxial test results reveal low values of effective cohesion and the angle of shearing resistance, hence suggesting a local shear failure pattern. A summary of safe bearing capacity given in table 5 and 6 indicate a value of 220KN/m<sup>2</sup> to be acceptable at this site if we are to base on Terzaghi's C' - Ø' theory only.

### 1.2 Bearing Capacity from SPT Data.

The soils at Songea site and those at Nachingwea are both C - Ø soils. Correlation of SPT and bearing capacity has been established fairly correctly for cohesionless soils, however for cohesive soils no reliable correlation has been published to date<sup>5</sup>. No attempt will be made here of suggesting safe bearing capacity from SPT values.

### 3.0 CONCLUSIONS AND RECOMMENDATIONS:

Based on the field and laboratory investigations the following conclusions are drawn:-

1. The soils met with both at Songea and Nachingwea sites are generally soft. Whereas they can sustain higher loads from the shearing strength consideration, these loads are restricted by excessive settlements especially at antenna stations, where the foundation width is expected to be about 2.5m.
2. Settlements for particular loading condition (both total and differential) should be checked during the design process and bearing pressure selected accordingly.
3. The safe bearing capacities have been evaluated to be  $75\text{KN/m}^2$  and  $120\text{KN/m}^2$  for the Antenna Sites at Songea and Nachingwea respectively while the bearing capacities for the proposed building sites at Songea and Nachingwea are  $300\text{KN/m}^2$  and  $240\text{KN/m}^2$  respectively.

### 4.0 REFERENCES:

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MINISTRY OF COMMUNICATIONS AND WORKS  
**MATERIALS LABORATORY**  
 SUMMARY OF TEST RESULTS

P.O. Box 9452  
 DAR ES SALAAM

PROJECT: RTD BOOSTER STATION-SONGEA

ORIGINATOR: RADIO TANZANIA

LABORATORY No.	BH NO. 1					BH NO. 2			
LOCATION	1	2	3	4	5	1	2	3	2
SAMPLE No	1	2	3	4	5	1	2	3	2
DEPTH IN (M)	0.5	3.0	4.3	5.2	6.0	1.0	2.0	3.2	4.0
COLOUR									
GRADATION									
% Passing (76mm) 3 in.									
(38mm) 1 1/2 in.			100						100
(19mm) 3/4 in.			94						97
(9.5mm) 3/8 in.			91						82
(4.75) 3/16 in.		100	85	100	100			100	74
B.S. Sieve No. 7	100	99	74	89	99	100	100	95	71
14	99	98	62	79	98	98	98	87	65
25	96	95	57	70	96	92	92	78	58
36	92	92	55	66	95	85	85	73	54
52	87	88	53	62	93	77	77	68	50
72	78	81	49	56	88	65	65	60	44
100	71	74	46	52	81	55	55	54	40
200	64	65	41	44	70	46	46	46	34
<b>ATTERBERG LIMITS</b>									
LL	49	51	54	48	59	36	43	43	33
PL	21	24	22	22	22	13	15	20	19
P.I.	28	27	32	26	37	23	28	28	14
<b>CLASSIFICATION</b>									
PROPOSED	CL	CL	SC	SC	CH	SC	SC	SC	SC
<b>COMPACTION</b>									
(Std/Mod.) M.D.D. kg/m <sup>3</sup>									
O.M.C.									
F.D.D. kg/m <sup>3</sup>	1382	1844	2020	1684			1869	2002	1928
F.M.C.	23.0	24.2	10.7	24.3			14.7	13.5	13.7
Field Compaction (%)									
<b>C.B.R.</b>									
At 95/100% M.D.D. Std/Mod. kg/m <sup>3</sup> Unsoaked									
1 day soaked									
4 days soaked									
Swell (%)									
<b>TRIAXIAL</b>									
Cohesion kn/m <sup>2</sup>									
Friction									
U.C.C.									
Max Strength									
Strain at failure (%)									

Date \_\_\_\_\_

MATERIALS ENGINEER

TABLE 1

MINISTRY OF COMMUNICATIONS AND WORKS  
**MATERIALS LABORATORY**  
SUMMARY OF TEST RESULTS

P.O. Box 9452  
DARES SALAAM

PROJECT: RTD BOOSTER STATION - NACHINGWEA

ORIGINATOR: RADIO TANZANIA

LABORATORY No.									
LOCATION		BH. 1						BH. 2	
SAMPLE No	1	2						11	2
DEPTH IN (M)	1.0	3.5	4.6					1.8	4.4
COLOUR									
<b>GRADATION</b>									
% passing (76mm) 3 in.									
(38mm) 1 1/2 in.									
(19mm) 3/4 in.									
(9.5mm) 3/8 in.									
(4.75) 3/16 in.	100	100						100	100
B.S. Sieve No. 7	89	92						100	97
14	70	77						97	93
25	57	62						91	81
36	51	55						88	76
52	46	49						85	73
72	41	45						81	69
100	37	41						77	66
200	31	36						71	61
<b>ATTERBERG LIMITS</b>									
L.L.	32	47						48	41
P.L.	11	18						18	17
P.I.	20	29						30	24
<b>CLASSIFICATION</b>									
PROPOSED/FAA	SC	SC						CL	CL
<b>COMPACTION</b>									
(Std/Mod.) M.D.D. kg/m <sup>3</sup>									
O.M.C.									
F.D.D. kg/m <sup>3</sup>	1965	1968	1543					1534	1634
F.M.C.	11.9	24.7	17.6					22.9	22.1
Field Compaction (%)									
<b>C.B.R.</b>									
At 95/100% M.D.D. Std/Mod. kg/m <sup>2</sup> Unsoaked									
1 day soaked									
4 days soaked									
Swell (%)									
<b>TRIAxIAL</b>									
Cohesion kn/m <sup>2</sup>									
Friction									
<b>U.C.C.</b>									
Max Strength									
Strain at failure (%)									

Date \_\_\_\_\_

TABLE 2

MATERIALS ENGINEER

Table - 3 Result from BH 1, site for Antenna Songea Depth of foundation  
D = 2.0m

S/NO.	Width (m)	Safe bearing capacity (F.S. = 2.5 KN/m <sup>2</sup> )
1.	1.0	213.8
2.	1.5	219.5
3.	2.5	230.0
4.	3.5	242.5

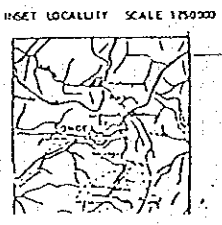
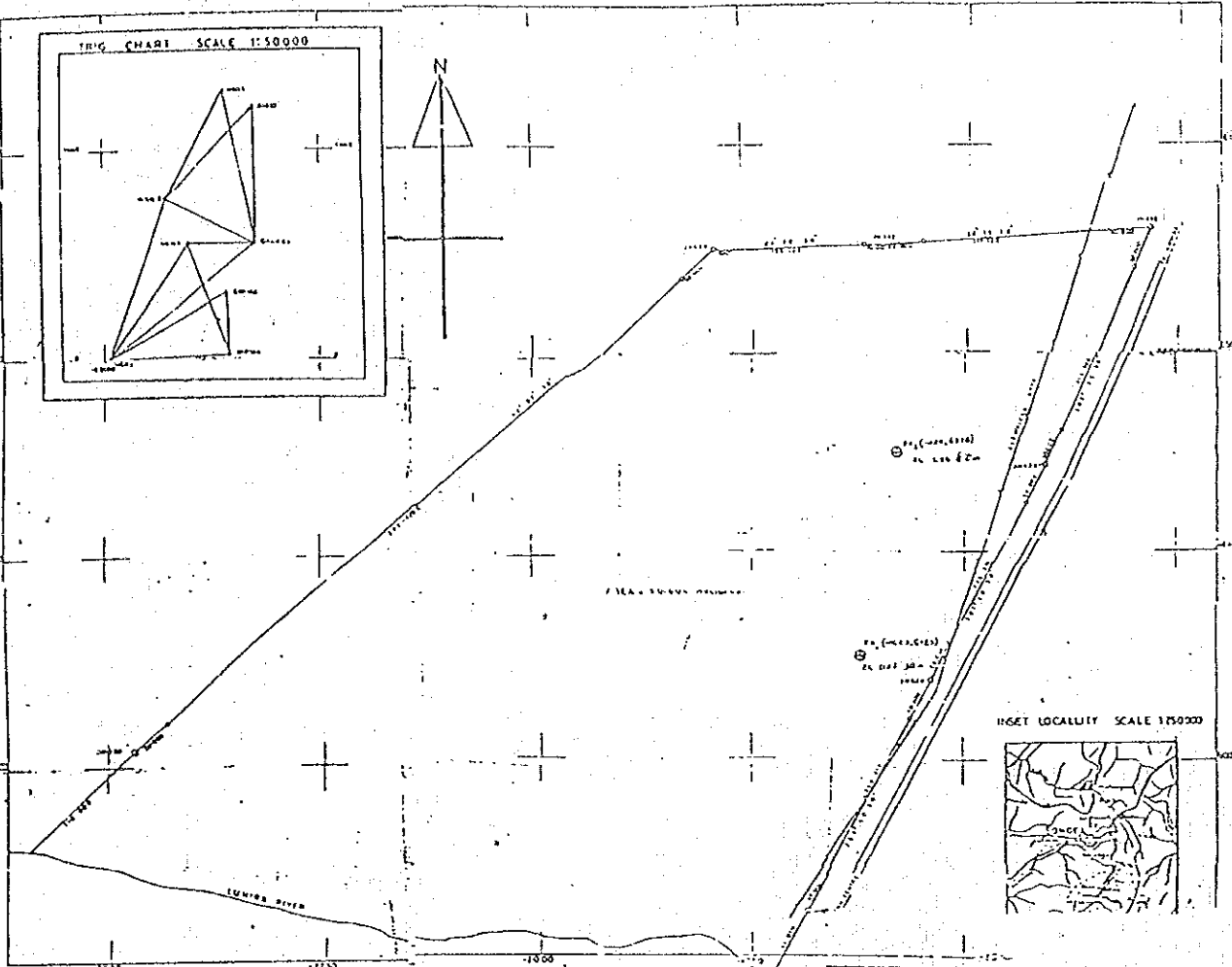
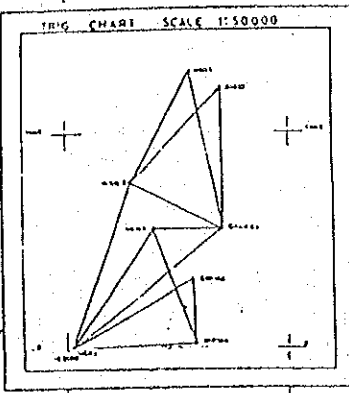
Table - 4 Results from BH 2, site for Transmission Building Songea

S/NO	Width (m)	Safe Bearing Capacity F.S. = 2.5 (KN/m <sup>2</sup> )
1.	0.8	307.5
2.	1.0	311.8
3.	1.5	322.7
4.	2.0	333.7
5.	2.5	344.6



SURVEY OF RADIO BOOSTER STATION  
SONGEA TOWNSHIP.

PLOT NO. ....



OFFICE	RECORDS
COMPS.	.....
H. P.	.....
STANDARD SHEET NO.	.....
ACTION C. C.	.....
PLAN NO.	<input type="text"/>

SCALE 1:250
AMENDMENTS BY
1. ....
2. ....
PHOTOSTAT COPIES SENT TO
1. ....
2. ....

File in following reduced scale for Songea etc

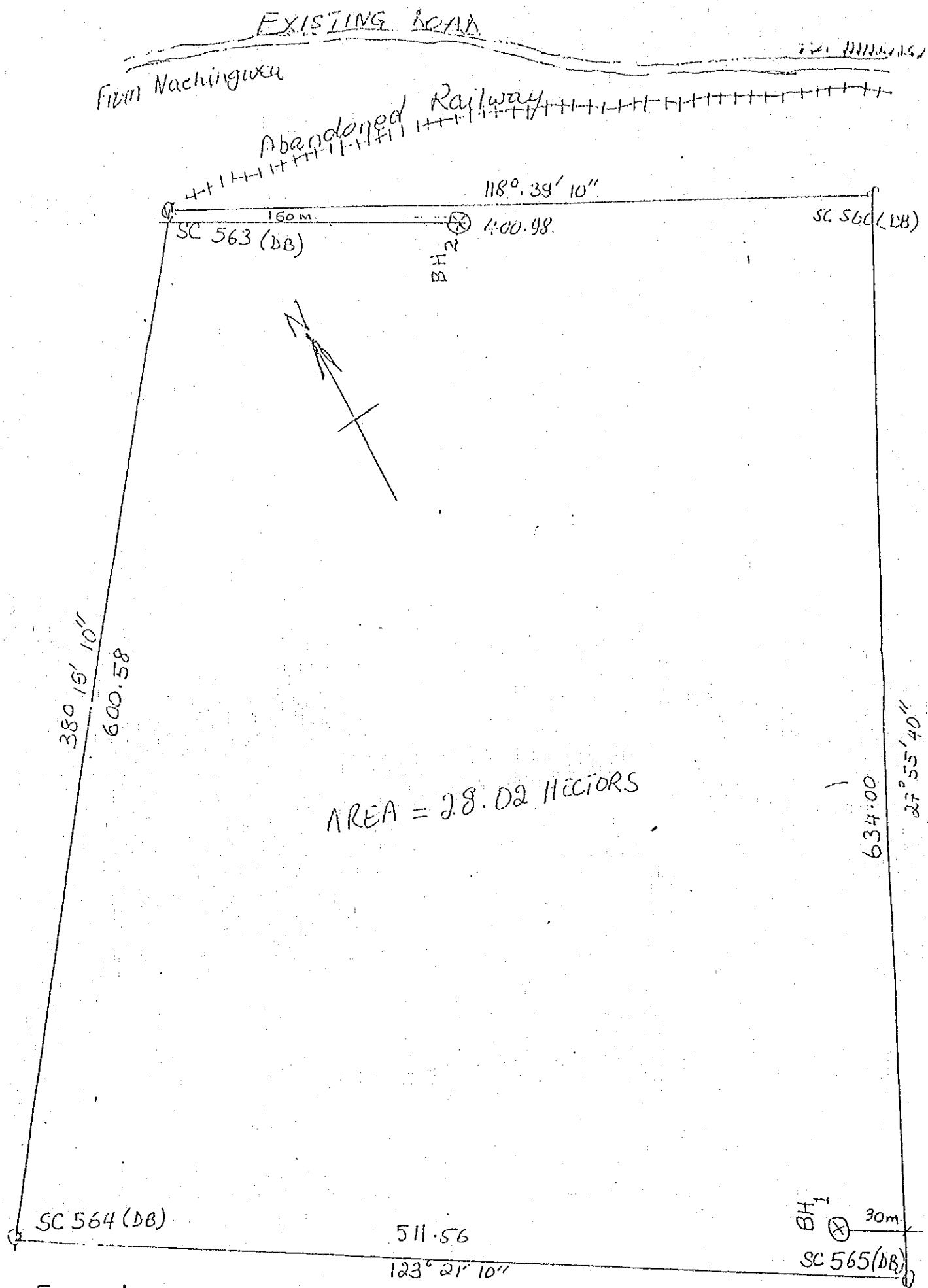


FIG. 1 b Nachingwea site

# MINISTRY OF COMMUNICATION AND WORKS

MATERIALS LABORATORY P.O. Box 9452 DAR ES SALAAM

## BORE LOG

Project R.T.D. BOOSTER STATION - SONGEA Location ANTENNA AREA  
 Bore Hole No. 1 Ground Elevation \_\_\_\_\_ Boring by \_\_\_\_\_ Date 29/01/89

Depth in cm	Depth in (ft.)	Elevation	Thickness	Legend	Type of soil, colour & consistency	Sample No.	S.P.T. S.C.P.										
							Blows per		(N-Value)								
							6" 15cm	12" 30cm	10	20	30	40	50				
30	1				Top soil												
60	2				Reddish Brown silty clay soil												
90	3																
120	4																
150	5																
180	6						2										
210	7							5									
240	8																
270	9																
300	10																
340	11																
370	12																
400	13				Reddish Brown silty clay soil with scattered sand granules and small stone												
430	14																
460	15																
490	16						18										
520	17							65									
550	18																
580	19						5										
610	20				Reddish Brown silty clay soil				16								
640	21																
670	22																
700	23																
730	24																
760	25				Reddish brown silty clay with highly decomposed rock												
790	26						6										
820	27								21								
850	28																
880	29																
910	30																

Remarks:-

Fig. 2 - Bore log for BH No. 1 of Songea site

Drillers:-

MATERIALS ENGINEER.

# MINISTRY OF COMMUNICATION AND WORKS

MATERIALS LABORATORY P.O. Box 9452 DAR ES SALAAM

## BORE LOG

Project R.T.D. BOOSTER STATION - SONGEA Location BUILDING AREA  
 Bore Hole No. 2 Ground Elevation \_\_\_\_\_ Boring by \_\_\_\_\_ Date 27/01/89

Depth in cm	Depth in (ft.)	Elevation	Thickness	Legend	Type of soil, colour & consistency	Sample No.	S.P.T. S.C.P.											
							Blows per		(N-Value)									
							6" 15 cm	12" 30 cm	10	20	30	40	50	60				
30	1				Top soil													
60	2				Reddish silty clay soil													
90	3																	
120	4																	
150	5																	
180	6				Reddish silty clay sand soil (stiff)	8												
210	7																	
240	8																	
270	9																	
300	10																	
340	11																	
370	12				Reddish silty clay sand soil with big sand granules with scattered decomposed stone fragments	5												
400	13																	
430	14																	
460	15																	
490	16																	
520	17																	
550	18																	
580	19																	
610	20																	
640	21																	
670	22																	
700	23																	
730	24																	
760	25																	
790	26																	
820	27																	
850	28																	
880	29																	
910	30																	

Remarks:-

Fig. 3 - Typical Borelog for BH No. 2 of Songea Site

Driller:-

MATERIALS ENGINEER.

# MINISTRY OF COMMUNICATION AND WORKS

MATERIALS LABORATORY P.O. Box 9452 DAR ES SALAAM

## BORE LOG

Project RTD BOOSTER STATION-NACHINGWEA Location ANTENNA AREA  
 Bore Hole No. 1 Ground Elevation \_\_\_\_\_ Boring by \_\_\_\_\_ Date 05-02-89

Depth in cm	Depth in (ft.)	Elevation	Thickness	Legend	Type of soil, colour & consistency	Sample No.	S.P.T. S.C.P.																
							Blows per		(N-Value)														
							6" 15cm	12" 30cm	0	2	4	6	8	10									
30	1				Top soil																		
60	2																						
90	3				Reddish brown silty sand clay soil																		
120	4																						
150	5						32																
180	6							60/26cm															
210	7				Decomposed rock layer-very soft																		
240	8																						
270	9																						
300	10				Reddish brown silty sand clay with scattered small fragments of decomposed rock up to 3.7m																		
340	11						11	t															
370	12							60/23.0cm															
400	13																						
430	14																						
460	15				Brownish silt sandy clay soil																		
490	16						24																
520	17							50/7.0cm															
550	18																						
580	19																						
610	20																						
640	21																						
670	22																						
700	23																						
730	24																						
760	25																						
790	26																						
820	27																						
850	28																						
880	29																						
910	30																						

Remarks:-

Fig. 4 - Typical bore log for BH No.1  
Songea Nachingwea site

Driller:-

MATERIALS ENGINEER.

# MINISTRY OF COMMUNICATION AND WORKS

MATERIALS LABORATORY P.O. Box 9452 DAR ES SALAAM

## BORE LOG

Project RED BOOSTER STATION-NACHINGWEA Location TRANSMISSION BUILDING  
 Bore Hole No. 2 Ground Elevation \_\_\_\_\_ Boring by 1 Date 06/02/89

Depth in cm	Depth in (ft.)	Elevation	Thickness	Legend	Type of soil, colour & consistency	Sample No.	S.P.T. S.C.P.											
							Blows per		(N-Value)									
							6" 15 cm	12" 30 cm	10	20	30	40	50	60				
30	1				Top soil													
60	2																	
90	3				Reddish silty calyey soil													
120	4																	
150	5																	
180	6																	
210	7						2											
240	8							7	0									
270	9																	
300	10																	
340	11																	
370	12																	
400	13				Reddish silty clayey soil, traces of mica was observed.		3											
430	14							6	0									
460	15																	
490	16																	
520	17																	
550	18																	
580	19																	
610	20						2											
640	21																	
670	22							5	0									
700	23																	
730	24																	
760	25																	
790	26						3											
820	27							5	0									
850	28																	
880	29																	
910	30						3											
940	31																	
970	32							6	0									
1000	33						3	7	0									

Remarks:- Fig. 5 Typical bore log for BH No.2 of Nachingwea site

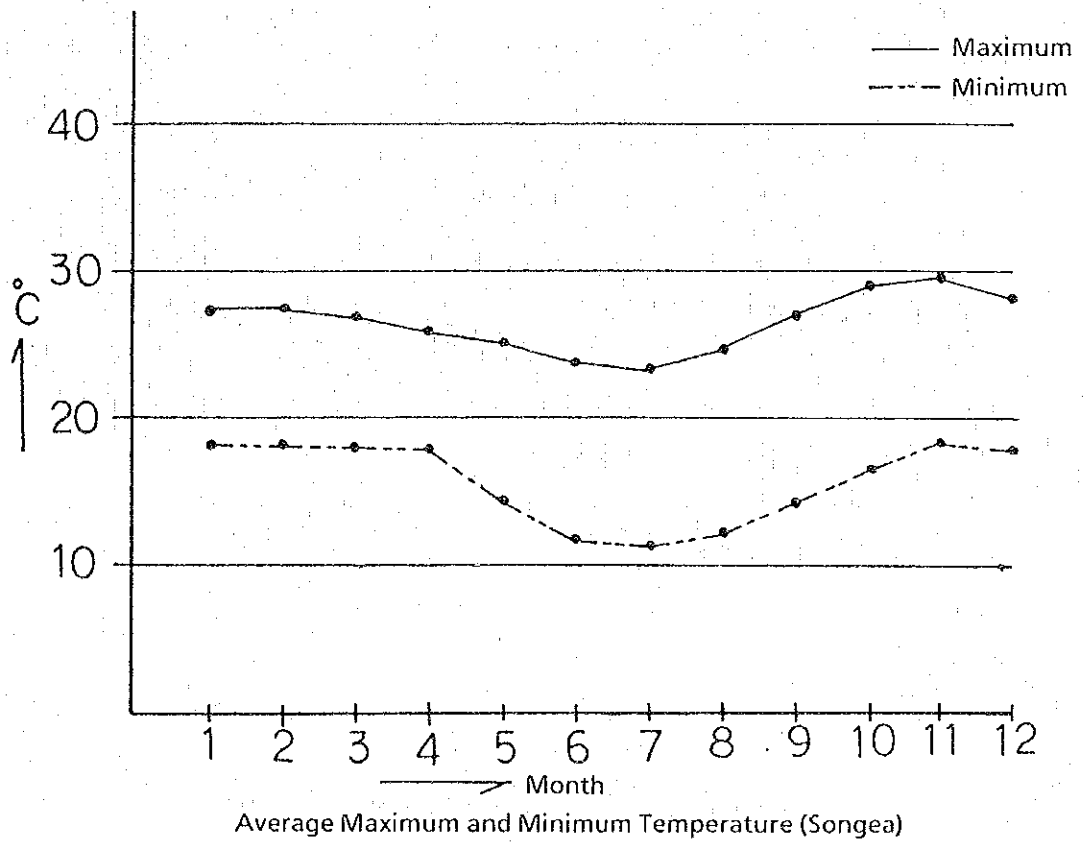
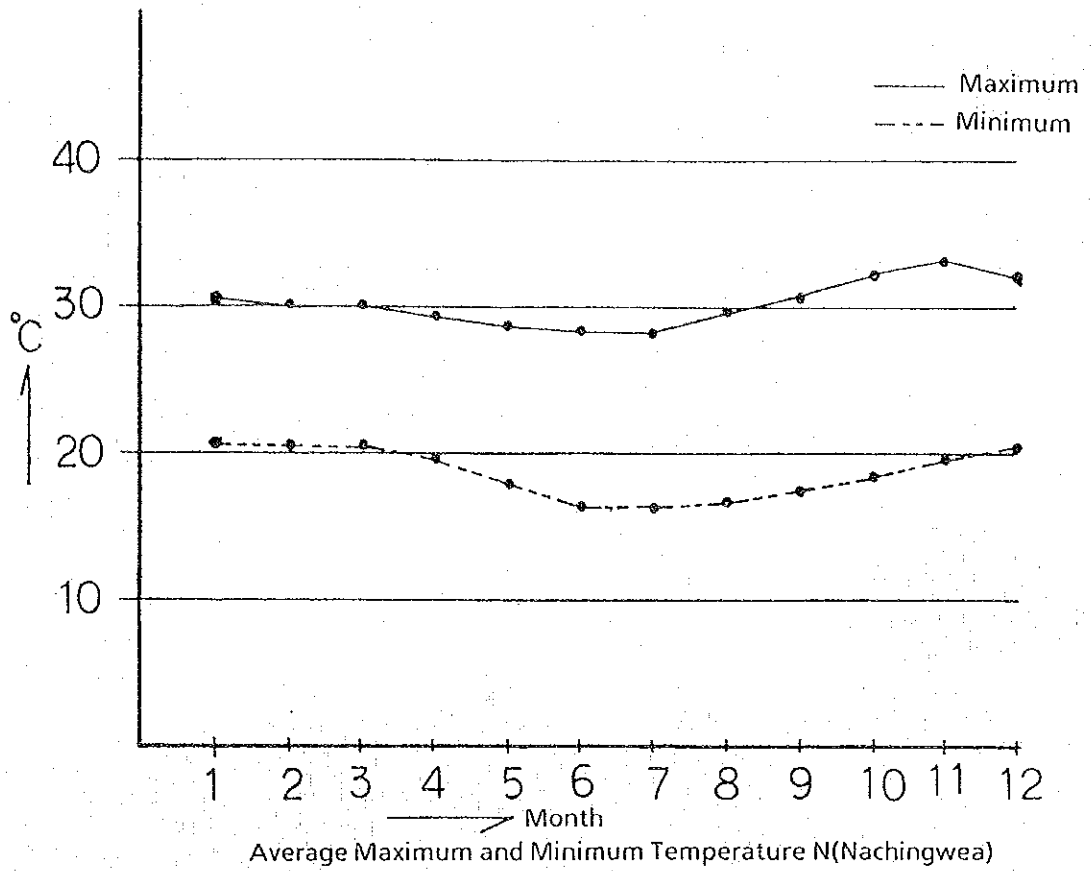
## Appendix VIII Reference





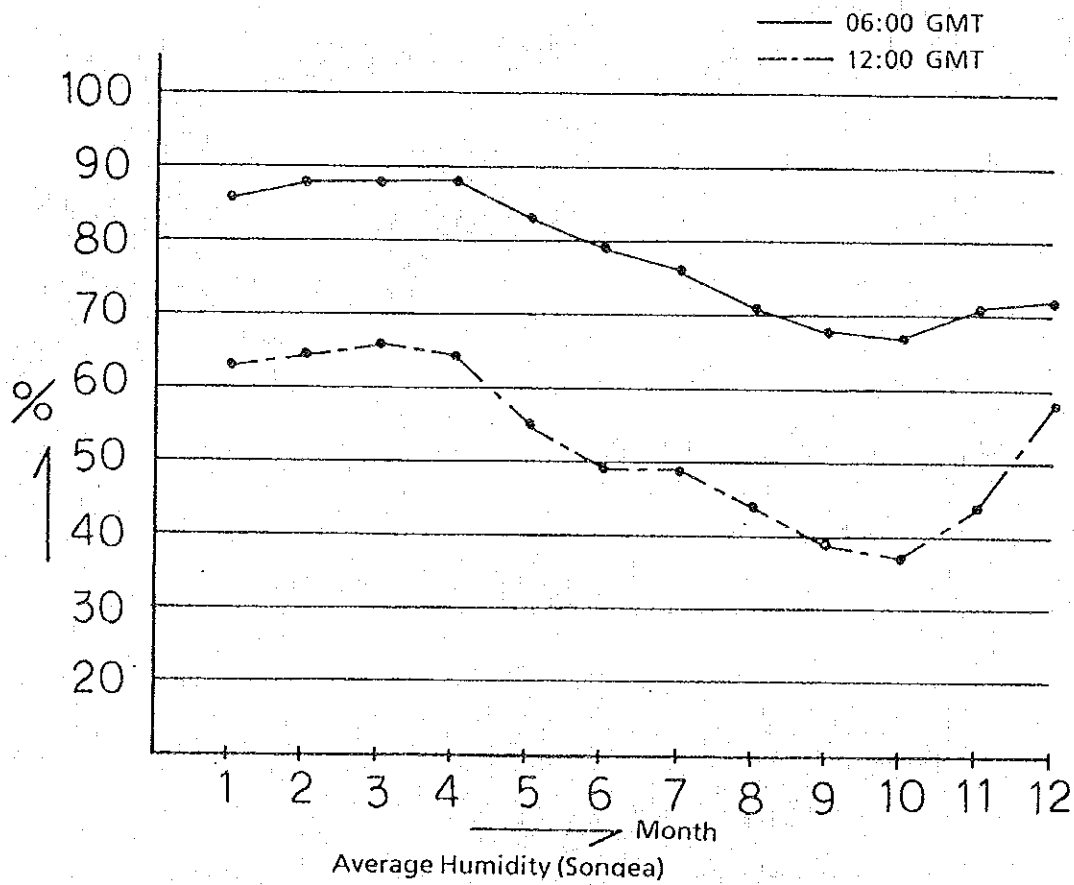
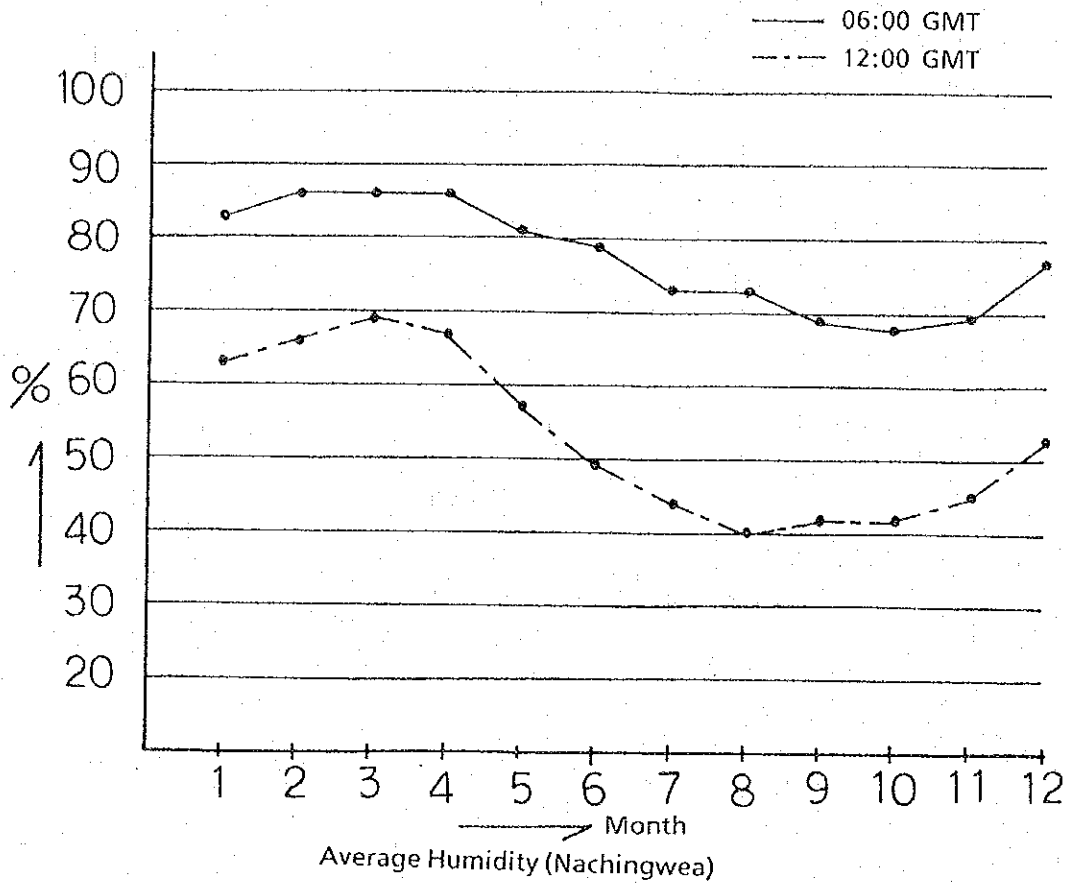
Average Maximum and Minimum Temperature per Month

TANZANIA Meteorological Agency



Average Humidity per Month

TANZANIA Meteorological Agency



STATION NAME: NACHINGWEA PART TIME MET. STATION

LATITUDE: 10°21'S LONGITUDE: 38°45'E ALTITUDE: 1520 FEET

MONTH	TEMPERATURE ( 1951-70 )										RELATIVE HUMIDITY				RAINFALL ( 1949-50 )			
	ATMOSPHERIC PRESSURE ( hPa )					EXTREMES					DRY BULB				DEW POINT			
	0600 GMT	1200 GMT	MAX	MIN	RANGE	HIGHEST	LOWEST	0600 GMT	1200 GMT	1200 GMT	0600 GMT	1200 GMT	0300 GMT	0600 GMT	1200 GMT	MEAN	HIGHEST	LOWEST
January	30.5	10.0	37.4	13.6	24.5	28.9	21.4	21.3	83	63	156	470	48	94.3				
February	30.0	9.6	35.0	14.5	25.4	28.6	21.7	21.6	86	66	158	328	68	108.7				
March	30.0	9.6	35.3	10.3	25.0	28.4	21.9	22.0	86	69	196	323	53	121.4				
April	29.3	9.6	32.6	13.7	23.5	27.8	21.2	21.1	86	67	157	310	40	102.9				
May	28.6	10.7	33.0	11.6	22.3	27.7	19.0	18.5	81	57	29	157	0	42.3				
June	28.2	11.8	34.0	9.0	20.8	27.2	17.0	15.5	79	49	4	32	0	12.6				
July	28.1	11.9	31.5	7.7	20.4	26.8	15.4	13.5	73	44	4	31	0	20.2				
August	29.5	12.9	36.0	10.8	21.3	28.1	16.4	13.4	73	40	1	15	0	13.0				
September	30.8	13.3	36.0	11.5	22.9	29.4	17.2	15.1	69	42	4	28	0	23.0				
October	32.1	13.7	36.2	12.9	24.6	30.8	18.2	16.1	68	42	6	37	0	19.8				
November	33.0	13.5	36.5	13.5	25.5	31.0	19.4	17.7	69	45	6.6	211	2	163.0				
December	32.1	11.7	38.5	12.1	25.5	30.3	21.2	19.6	77	53	12.5	318	1	123.7				
Year	30.2	11.5	38.5	7.7	23.3	28.8	19.2	17.9	77	53	95.0	1241	57.5	123.2				

MONTH	MEAN NUMBER OF DAYS OF RAIN	DAILY SUNSHINE	DAILY RADIATION	MONTHLY EVAPORATION			CLOUD AMOUNT			DAILY WIND RUN	WIND SPEED	CALMS	VISIBILITY				
				PAN TYPE			TOTAL						WIND (1951-62)	CALMS (06-1966-70)	1936-67		
				MEAN	HIGHEST	LOWEST	0600	1200	TOTAL						0600	1200	0600
January	12	22.11	25.21	17.17	6.4	6.7	6.4	6.7	6	5	1	1	0	2	1		
February	9	19.80	21.65	17.71	6.4	6.8	6.4	6.8	4	5	1	2	1	1	2		
March	14	23.57	26.00	18.30	6.0	6.7	6.0	6.7	3	4	1	2	0	1	2		
April	13	23.24	25.50	21.48	5.4	6.3	5.4	6.3	5	5	3	1	1	1	1		
May	5	23.61	26.34	21.56	3.5	4.9	3.5	4.9	6	7	0	1	0	0	1		
June	1	22.99	24.24	21.55	2.8	4.9	2.8	4.9	6	7	2	1	0	0	1		
July	1	21.23	25.04	18.55	3.0	5.5	3.0	5.5	7	7	0	0	1	1	0		
August	1	23.66	25.83	21.40	3.4	5.6	3.4	5.6	6	8	1	1	0	0	1		
September	1	23.82	26.34	22.48	4.1	5.9	4.1	5.9	6	7	3	0	0	0	1		
October	1	24.37	25.83	21.77	4.9	5.7	4.9	5.7	6	7	2	0	1	1	0		
November	1	24.41	26.46	22.57	5.3	6.0	5.3	6.0	6	6	2	1	0	1	1		
December	9	24.58	28.09	22.36	5.9	6.3	5.9	6.3	7	6	1	1	1	1	0		
Year	71	23.11	25.11	21.11	4.8	5.9	4.8	5.9	6	6	17	11	6	7	12	10	

STATION NAME: SONGEA AIRPORT MET. STATION

LATITUDE: 10°41'S LONGITUDE: 36°35'E ALTITUDE: 3500FEET

MONTH	ATMOSPHERIC PRESSURE (1957-80)				TEMPERATURE (1957-80)										RELATIVE HUMIDITY				RAINFALL (1956-80)							
	0600 GMT		1200 GMT		MEANS		EXTREMES		DRY BULB		DEW POINT		0300 GMT		0600 GMT		1200 GMT		MEAN		HIGHEST		LOWEST		MAX. FALL	
	hPa	hPa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	mm	mm	mm	mm	mm	mm	mm	mm
January	896.6	895.7	27.3	18.1	9.2	32.5	13.2	20.9	25.6	18.1	17.8	94	86	63	286	432	127	266	432	127	40.3	40.3	84.5	84.5	84.5	84.5
February	896.3	893.8	27.3	18.2	9.1	32.0	15.5	20.9	25.6	18.1	18.1	96	88	64	235	421	82	235	421	82	82	82	82	82	82	82
March	897.2	895.1	26.6	17.9	8.9	34.5	7.0	20.7	24.9	18.5	18.1	96	88	66	255	437	99	255	437	99	69.4	69.4	69.4	69.4	69.4	69.4
April	898.2	895.9	25.7	17.2	8.7	30.5	11.3	20.2	24.7	17.9	17.2	96	88	64	123	233	15	123	233	15	64.0	64.0	64.0	64.0	64.0	64.0
May	900.1	897.0	25.0	14.7	10.9	30.1	8.4	18.5	23.9	15.4	13.8	91	79	49	12	47	0	12	47	0	25.6	25.6	25.6	25.6	25.6	25.6
June	901.6	899.3	25.7	11.6	12.1	28.8	5.2	16.5	22.7	12.9	10.9	88	76	49	4	6	0	4	6	0	4.3	4.3	4.3	4.3	4.3	4.3
July	902.2	899.5	23.1	11.1	12.0	28.8	4.2	16.1	21.9	11.6	10.0	88	76	49	4	6	0	4	6	0	25.2	25.2	25.2	25.2	25.2	25.2
August	901.4	898.6	22.6	12.1	12.5	29.0	6.6	17.5	23.5	12.1	10.0	83	71	44	0	6	0	0	6	0	5.1	5.1	5.1	5.1	5.1	5.1
September	900.5	897.7	24.1	14.2	12.7	31.1	8.1	19.4	24.0	13.2	10.3	84	68	39	1	5	0	1	5	0	4.0	4.0	4.0	4.0	4.0	4.0
October	899.5	896.7	28.0	16.5	12.4	34.4	9.3	21.2	27.0	14.4	11.1	83	67	37	7	33	0	7	33	0	25.9	25.9	25.9	25.9	25.9	25.9
November	898.0	895.1	20.8	18.2	11.1	33.7	14.0	22.2	28.2	16.2	14.4	86	71	44	63	170	1	63	170	1	55.3	55.3	55.3	55.3	55.3	55.3
December	898.0	895.1	22.0	17.9	10.1	33.3	15.5	21.5	26.3	18.1	16.7	92	82	58	212	428	1	212	428	1	24.0	24.0	24.0	24.0	24.0	24.0
Year	899.0	896.1	22.1	15.6	10.8	34.5	4.2	19.6	25.1	15.7	14.1	90	79	53	1171	1429	668	1171	1429	668	90.3	90.3	90.3	90.3	90.3	90.3

MONTH	MEAN NUMBER OF DAYS OF		SUNSHINE (1957-80)		DAILY RADIATION (1971-80)				MONTHLY EVAPORATION (1966-76)				CLOUD AMOUNT (1957-80)				DAILY WIND RUN (1971)		WIND SPEED (1957-80)		CALMS (1966-80)		VISIBILITY (1961-80)					
	RAIN	THUNDER	MEAN	MIN.	MEAN	MEAN	MEAN	HIGHEST	LOWEST	MEAN	HIGHEST	LOWEST	TOTAL	0600	1200	0600	1200	0600	1200	0600	1200	0600	1200	0600	1200	0600	1200	
	mm	days	hours	hours	hours	hours	hours	mm	mm	mm	mm	oktas	oktas	oktas	oktas	km	km	knots	knots	days	days	days	days	days	days	days	days	
January	19	17	5.2	3.5	15.33	16.23	13.85	217	291	170	6.6	6.5	4.8	5.5	114.7	5	8	10	2	1	0	1	0	1	1	1	1	
February	17	15	6.3	4.8	16.06	18.37	14.63	194	268	150	6.5	6.6	4.4	5.4	113.5	4	6	9	2	1	1	1	1	1	1	1	1	
March	23	15	5.5	4.9	15.29	16.56	13.71	241	304	166	6.5	6.6	5.2	5.8	104.9	5	8	10	3	1	1	2	1	1	2	1	1	
April	12	6	5.4	5.4	14.28	15.51	12.75	191	289	132	6.2	6.5	5.6	6.0	124.9	6	8	7	2	1	0	2	1	1	2	1	1	
May	2	0	6.6	6.0	14.35	15.34	12.33	190	280	122	4.5	6.0	3.8	5.1	112.0	6	8	9	2	1	0	1	1	1	1	1	1	
June	0	0	7.2	6.0	13.93	15.71	11.18	199	317	114	4.1	5.6	3.0	5.2	134.2	6	8	9	1	0	0	0	1	1	1	1	1	
July	1	0	6.7	5.1	14.71	16.88	11.38	196	257	123	4.3	5.8	3.6	5.3	146.7	7	9	7	1	0	0	0	1	1	1	1	1	
August	0	0	7.5	5.3	16.35	17.61	13.35	223	264	170	3.3	5.7	3.2	5.3	151.9	8	9	2	1	0	0	0	1	1	1	1	1	
September	0	0	5.4	4.7	16.83	17.87	14.94	291	305	201	3.2	5.1	3.5	5.0	187.3	11	11	1	0	0	0	0	1	1	1	1	1	
October	1	1	5.2	4.7	16.28	17.54	14.63	281	295	245	4.4	5.1	3.1	4.8	221.4	12	12	0	0	0	0	0	1	1	1	1	1	
November	1	5	4.2	3.4	15.72	17.06	13.60	281	295	138	5.3	5.7	4.5	5.4	195.5	10	11	1	0	0	0	0	1	1	1	1	1	
December	14	15	4.7	3.0	15.72	17.06	13.60	272	291	189	6.5	6.2	5.2	5.5	176.3	7	9	5	2	0	0	0	1	1	1	1	1	
Year	144	115	5.0	4.0	15.72	17.06	13.60	272	291	189	6.5	6.2	5.2	5.5	176.3	7	9	5	2	0	0	0	1	1	1	1	1	1

STATION NAME: MITWARA MET. STATION

LATITUDE: 10°31'S LONGITUDE: 40°11'E ALTITUDE: 370 FEET

MONTH	ATMOSPHERIC PRESSURE (1957-80)		TEMPERATURE (1957-80)						EXTREMES (1957-80)				DRY BULB (1957-80)				DEW POINT (1957-80)				RELATIVE HUMIDITY (1957-80)				RAINFALL (1957-80)			
	hPa		°C		°C		°C		°C		°C		°C		°C		°C		%		%		mm		mm		mm	
	0000 GMT	1200 GMT	MAX.	MIN.	RANGE	HIGHEST	LOWEST	0400 GMT	1000 GMT	1600 GMT	2200 GMT	0400 GMT	1000 GMT	1600 GMT	2200 GMT	0400 GMT	1000 GMT	1600 GMT	2200 GMT	0600 GMT	1200 GMT	1800 GMT	2400 GMT	MEAN	3-MEAS.	LOWEST	MAX. 24 HOUR FALL	
January	999.2	996.5	30.2	23.2	7.0	34.4	19.7	26.6	28.8	23.6	23.2	23.6	23.7	23.7	23.7	23.7	23.7	23.7	23.7	80	85	85	213	55%	51	199.6		
February	998.8	996.1	30.4	23.0	7.4	35.0	20.0	26.6	29.0	23.7	23.4	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	85	85	85	177	45%	17	168.7		
March	999.4	996.5	30.7	22.6	8.1	34.1	19.9	26.5	28.7	23.8	23.7	23.8	23.7	23.7	23.7	23.7	23.7	23.7	23.7	86	86	86	209	75%	71	232.7		
April	1000.5	997.7	30.5	22.3	8.2	33.9	18.5	25.8	28.5	23.2	23.6	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	86	86	86	142	41%	15	132.4		
May	1002.7	1000.1	30.0	20.7	9.3	32.8	13.4	24.5	28.6	21.2	20.7	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	82	82	82	48	12%	2	109.2		
June	1004.5	1002.4	29.3	19.1	10.2	32.2	12.7	23.1	28.0	19.0	18.4	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	79	79	79	14	6%	0	45.7		
July	1005.6	1003.3	29.0	18.6	10.4	31.5	12.2	22.4	27.8	18.8	17.2	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	80	80	80	5	4%	0	25.7		
August	1002.3	1002.7	29.6	18.4	11.2	32.7	15.0	23.2	28.2	19.3	17.5	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	80	80	80	5	4%	0	22.9		
September	1001.8	1001.8	29.8	18.7	11.1	32.8	15.0	24.7	28.8	20.3	18.6	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	77	77	77	5	4%	2	91.2		
October	1003.4	1000.4	30.3	20.1	10.2	34.1	15.6	26.5	28.8	21.1	20.2	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	73	73	73	5	4%	0	96.1		
November	1001.5	998.5	31.1	21.9	9.2	35.1	17.4	27.6	29.5	22.2	21.7	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	74	74	74	5	4%	0	74.4		
December	999.6	996.7	30.7	23.1	7.6	34.8	19.9	27.4	29.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	80	80	80	5	4%	4	184.1		
Year	1002.2	999.4	30.1	21.0	9.2	35.1	12.2	25.4	28.7	21.7	21.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	81	81	81	5	4%	68	199.6		

MONTH	MEAN NUMBER OF DAYS OF RAIN	THUNDER	DAILY SUNSHINE (1971-80)			DAILY RADIATION (1971-80)			MONTHLY EVAPORATION (1957-80)			CLOUD AMOUNT (1957-80)				DAILY WIND RUN (1971-80)		WIND SPEED (1957-80)		VISIBILITY (1961-80)			
			MAX.	MEAN	MIN.	MAX.	MEAN	MIN.	MEAN	HIGHEST	LOWEST	TOTAL	LOW	WIND RUN	WIND SPEED	FOG	MIST-HAZE						
			hours	hours	hours	MJ/m <sup>2</sup>	MJ/m <sup>2</sup>	MJ/m <sup>2</sup>	mm	mm	mm	oktas	oktas	oktas	oktas	km	knots	days	days				
January	13	10	6.4	10.5	4.1	15.69	17.03	13.60	6.2	5.8	4.7	4.6	171.7	7	11	7	3	0	0	2	1		
February	12	11	7.4	7.4	4.3	16.98	19.12	14.32	5.8	5.7	4.3	4.4	159.6	7	10	6	1	0	1	1	1		
March	15	14	5.9	6.2	5.3	15.59	16.73	14.51	5.2	6.1	3.5	4.9	110.4	7	8	7	4	0	1	1	2		
April	15	7	6.6	8.3	4.8	15.04	17.63	13.08	4.7	6.1	3.4	5.0	106.9	10	9	2	3	0	1	1	1		
May	6	0	7.8	10.0	4.8	16.21	17.37	14.77	3.7	5.1	2.6	4.5	205.1	13	11	1	1	0	0	1	1		
June	4	0	9.2	10.0	8.7	16.14	17.54	15.07	3.2	4.8	2.0	3.9	222.6	14	11	1	1	0	0	1	1		
July	2	0	8.7	9.5	8.0	15.92	16.85	13.84	3.5	4.9	2.3	4.2	243.8	11	12	0	1	0	0	1	1		
August	3	0	9.1	9.9	8.2	16.59	17.55	15.23	3.5	4.9	2.3	4.4	181.7	10	13	1	0	0	0	1	1		
September	4	0	9.1	10.1	8.5	17.56	18.41	15.99	4.6	4.7	4.2	4.2	143.8	8	13	3	0	0	0	0	1		
October	4	0	9.4	10.1	8.3	17.74	18.74	16.76	5.7	4.6	5.5	4.3	135.8	8	13	4	1	1	0	0	1		
November	5	2	9.6	11.1	8.3	18.58	19.66	17.31	5.7	4.5	5.5	4.1	133.2	7	12	4	1	1	0	0	1		
December	11	8	8.2	9.9	6.6	17.08	19.21	15.36	5.9	5.3	5.3	4.4	165.3	7	12	5	1	1	0	1	1		
Year	90	52	8.1	8.9	7.5	16.44	16.99	15.49	4.6	5.2	3.2	4.4	166.9	9	11	4	1	1	4	10	13		

STATION NAME: LINDI MET. STATION

LATITUDE: 10°00'S LONGITUDE: 39°42'E ALTITUDE: 113FEET

MONTH	ATMOSPHERIC PRESSURE (1938-55)		TEMPERATURE (1935-55)										RELATIVE HUMIDITY			RAINFALL			1936-50	
	hPa		MEANS		RANGE		EXTREMES		DRY BULB		DEW POINT		%			mm			mm	
	0600 GMT	1200 GMT	MAX.	MIN.	°C	°C	HIGHEST	LOWEST	0600 GMT	1200 GMT	0600 GMT	1200 GMT	0300 GMT	0600 GMT	1200 GMT	MEAN	HIGHEST	LOWEST	MAX. 24 HOUR FALL	
January	1007.6	1004.4	30.9	23.7	7.2	34.2	20.7	26.5	29.4	23.7	24.2	93	85	74	152	32.7	18	97.1		
February	1007.4	1004.3	31.3	23.4	7.9	34.9	20.3	26.2	29.7	23.8	24.3	94	86	73	114	31.7	7	113.5		
March	1007.6	1004.5	31.3	23.2	8.1	36.2	20.3	25.8	29.7	23.7	24.3	95	89	73	127	31.8	4.1	100.1		
April	1009.2	1006.4	30.9	22.8	8.1	34.8	18.4	25.3	28.9	23.0	23.7	95	87	74	174	31.8	18	218.3		
May	1011.3	1008.4	30.6	21.3	9.3	33.3	17.3	24.1	29.3	21.0	21.6	94	83	64	43	17.2	0	47.0		
June	1014.0	1011.0	30.2	19.3	10.9	33.3	13.9	22.4	29.0	19.0	19.3	92	81	56	11	7.7	0	30.5		
July	1014.6	1011.7	29.9	18.8	11.1	32.6	12.3	21.9	28.3	18.4	19.1	92	80	57	10	5.1	0	26.7		
August	1014.2	1011.2	29.8	19.2	10.6	34.0	12.3	22.6	28.1	18.9	19.9	93	81	61	8	3.9	0	23.6		
September	1013.7	1010.5	29.5	20.1	9.4	34.1	15.2	23.9	28.1	20.3	21.0	94	81	66	13	7.7	0	28.2		
October	1012.2	1009.2	29.9	21.6	8.3	34.3	17.9	25.8	28.6	21.6	22.0	93	77	68	14	18.2	0	134.2		
November	1009.9	1006.8	30.9	23.2	7.7	34.0	20.0	27.2	29.5	23.0	23.2	92	80	69	54	25.6	0	74.2		
December	1008.4	1005.3	31.3	23.7	7.6	34.6	21.1	27.3	29.7	23.8	24.0	93	81	71	140	28.2	0	189.5		
Year	1010.8	1007.8	30.5	21.7	8.8	36.2	12.3	24.9	29.0	21.7	22.2	93	82	67	935	14.7	17	218.8		

MONTH	MEAN NUMBER OF DAYS OF	DAILY SUNSHINE			DAILY RADIATION			MONTHLY EVAPORATION			CLOUD AMOUNT (1935-55)			WIND SPEED (1938-55)			CALMS (1951-55)			VISIBILITY (1949-55)		
		RAIN	THUNDER	MEAN	INSTRUMENT	MEAN	MAX.	MIN.	PAN TYPE	HIGHEST	LOWEST	TOTAL	0600	1200	0600	1200	0600	1200	0600	1200	0600	1200
		mm	days	hours	WJ-2	WJ-2	WJ-2	WJ-2	mm	mm	oktas	oktas	oktas	oktas	knots	knots	days	days	days	days	days	days
January	11	13									6.0	5.7	4.2	3.7	4	8	2	1	1	0	1	1
February	6	13									5.7	5.6	3.5	3.9	4	8	3	1	0	0	0	1
March	13	15									5.3	5.6	3.2	4.0	4	7	1	1	1	1	0	1
April	13	10									4.4	5.8	3.0	4.4	6	6	1	2	1	0	1	1
May	6	2									3.3	4.8	2.1	4.0	7	7	1	2	0	0	1	1
June	2	0									2.9	4.5	1.6	3.9	7	8	1	1	0	0	1	0
July	2	0									3.0	4.6	2.0	4.2	6	9	1	1	0	0	1	0
August	1	0									3.3	4.6	2.5	3.8	6	10	1	1	0	0	0	0
September	2	1									4.1	3.5	3.6	3.1	5	11	1	1	0	0	0	0
October	2	0									4.8	3.0	4.7	2.2	4	11	2	1	0	0	0	0
November	3	3									5.2	3.2	5.2	2.4	4	12	2	0	0	0	1	1
December	9	11									5.4	4.6	4.0	2.6	4	11	2	1	0	1	1	1
Year	70	68									4.5	4.6	3.3	3.5	5	9	18	13	3	2	7	7



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